YAMAHA 2009

SERVICE MANUAL

YFM5FGY
YFM5FGPY
YFM7FGY
YFM7FGPY

LIT-11616-22-19 34D-28197-10

EAS20050

YFM5FGY/YFM5FGPY/YFM7FGY/YFM7FGPY
SERVICE MANUAL
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LIT-11616-22-19

EAS20071

IMPORTANT

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.

This model has been designed and manufactured to perform within certain specifications in regard to performance and emissions. Proper service with the correct tools is necessary to ensure that the vehicle will operate as designed. If there is any question about a service procedure, it is imperative that you contact a Yamaha dealer for any service information changes that apply to this model. This policy is intended to provide the customer with the most satisfaction from his vehicle and to conform to federal environmental quality objectives.

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.

TIP

- This Service Manual contains information regarding periodic maintenance to the emission control system. Please read this material carefully.
- Designs and specifications are subject to change without notice.

EAS20081

IMPORTANT MANUAL INFORMATION

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

⚠	**This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.**

⚠ WARNING	**A WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.**

NOTICE	**A NOTICE indicates special precautions that must be taken to avoid damage to the vehicle or other property.**

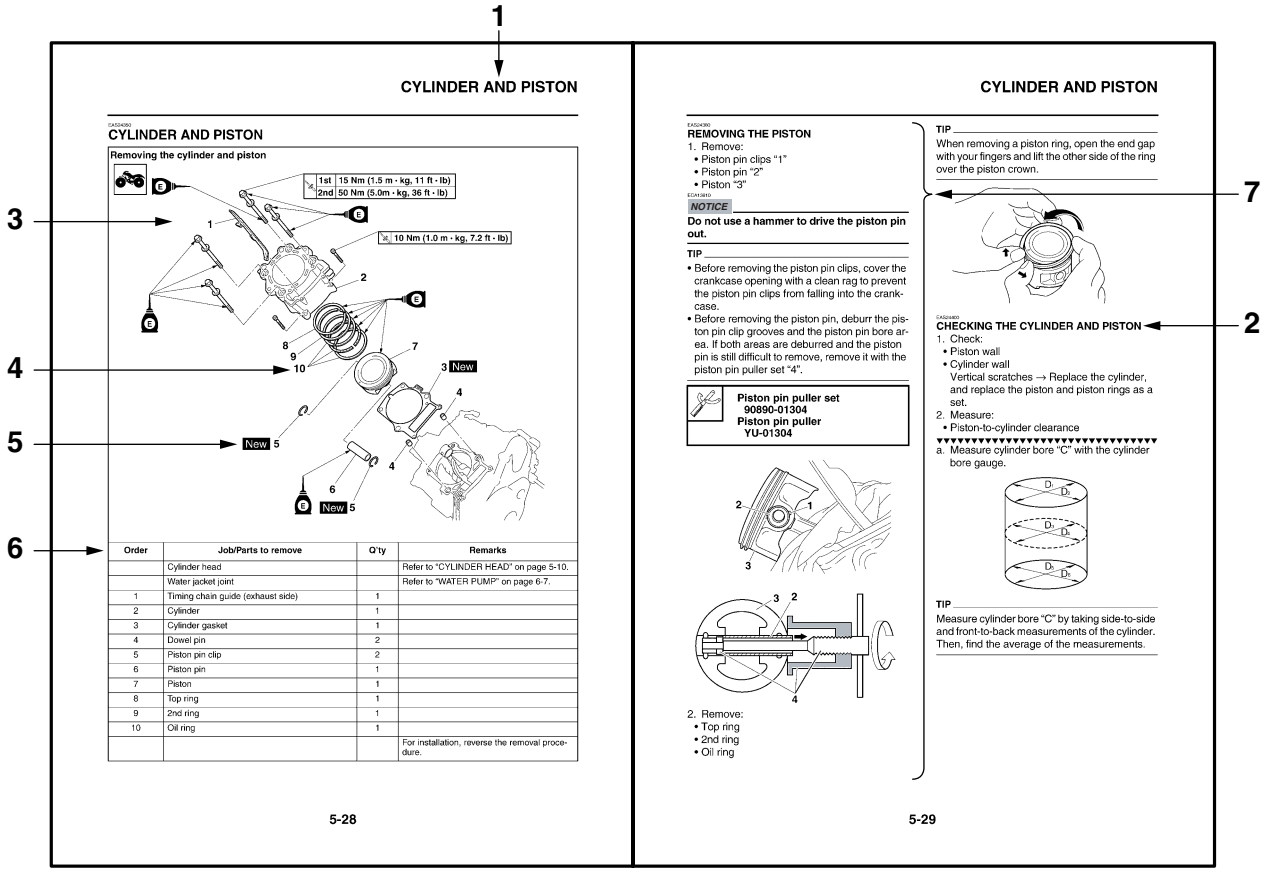
TIP	A TIP provides key information to make procedures easier or clearer.

EAS20090

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.

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



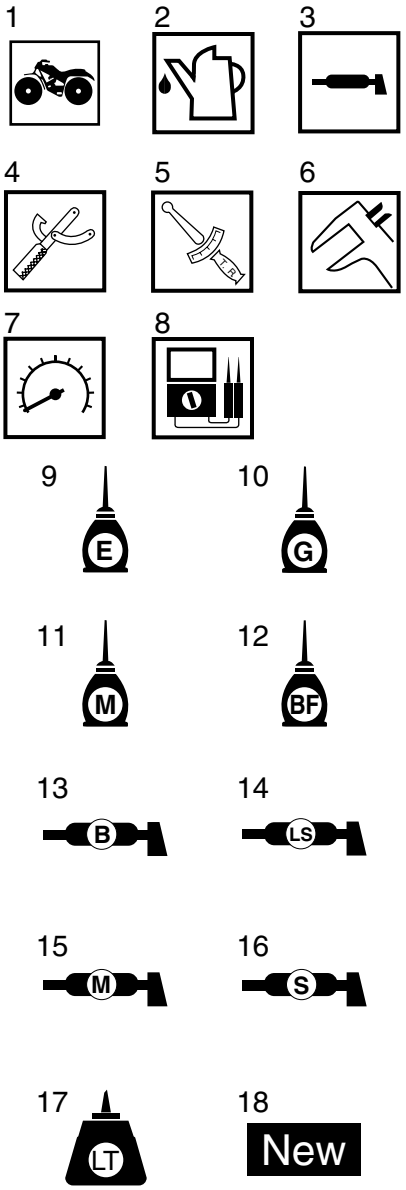
EAS20100

SYMBOLS

The following symbols are used in this manual for easier understanding.

TIP

The following symbols are not relevant to every vehicle.



1. Serviceable with engine mounted
2. Filling fluid
3. Lubricant
4. Special tool
5. Tightening torque
6. Wear limit, clearance
7. Engine speed
8. Electrical data
9. Engine oil
10. Gear oil
11. Molybdenum disulfide oil
12. Brake fluid
13. Wheel bearing grease
14. Lithium-soap-based grease
15. Molybdenum disulfide grease
16. Silicone grease
17. Apply locking agent (LOCTITE®).
18. Replace the part with a new one.

EAS20110

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GENERAL INFORMATION

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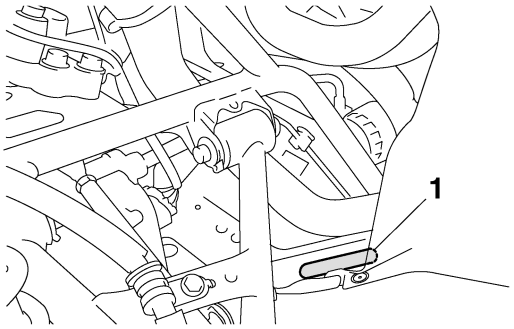
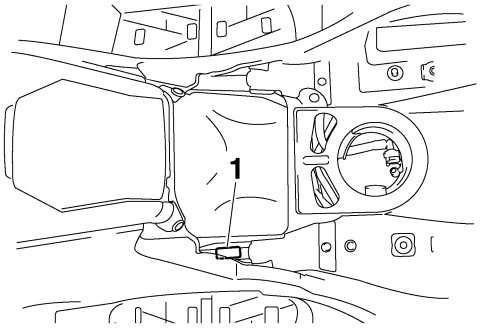
EAS20130
IDENTIFICATION

EAS20140
VEHICLE IDENTIFICATION NUMBER
The vehicle identification number “1” is stamped into the front left side of the frame.



EAS20150
MODEL LABEL
The model label “1” is affixed to the location shown in the illustration. This information will be needed to order spare parts.



EAS20170
FEATURES

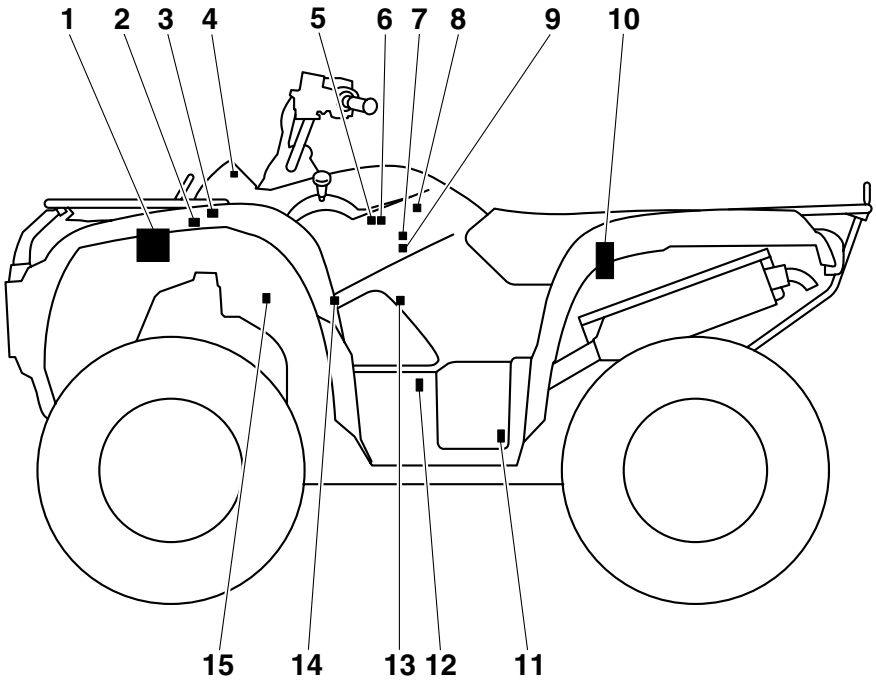
EAS28P1031
OUTLINE OF THE FI SYSTEM

The main function of a fuel supply system is to provide fuel to the combustion chamber at the optimum air-fuel ratio in accordance with the engine operating conditions and the atmospheric temperature. In the conventional carburetor system, the air-fuel ratio of the mixture that is supplied to the combustion chamber is created by the volume of the intake air and the fuel that is metered by the jet used in the respective carburetor.

Despite the same volume of intake air, the fuel volume requirement varies with the engine operating conditions, such as acceleration, deceleration, or operating under a heavy load. Carburetors that meter the fuel through the use of jets have been provided with various auxiliary devices, so that an optimum air-fuel ratio can be achieved to accommodate the constant changes in the operating conditions of the engine.

As the requirements for the engine to deliver more performance and cleaner exhaust gases increase, it becomes necessary to control the air-fuel ratio in a more precise and finely tuned manner. To accommodate this need, this model has adopted an electronically controlled fuel injection (FI) system, in place of the conventional carburetor system. This system can achieve an optimum air-fuel ratio required by the engine at all times by using a microprocessor that regulates the fuel injection volume according to the engine operating conditions detected by various sensors.

The adoption of the FI system has resulted in a highly precise fuel supply, improved engine response, better fuel economy, and reduced exhaust emissions.



1. ECU (engine control unit)
2. Lean angle sensor
3. Fuel injection system relay
4. Engine trouble warning light
5. ISC (idle speed control) unit
6. Intake air pressure sensor
7. TPS (throttle position sensor)
8. Intake air temperature sensor
9. Fuel injector
10. Fuel pump
11. Speed sensor
12. Crankshaft position sensor
13. Coolant temperature sensor
14. Spark plug
15. Ignition coil

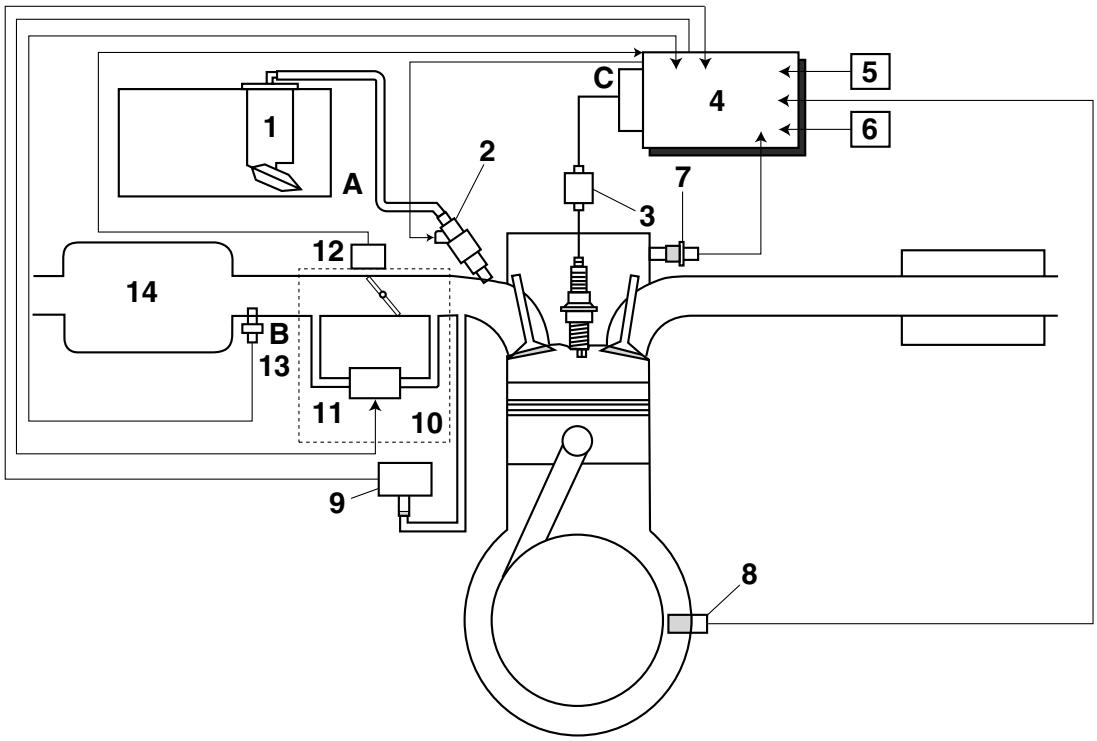
EAS28P1032

FI SYSTEM

The fuel pump delivers fuel to the fuel injector via the fuel filter. The pressure regulator maintains the fuel pressure that is applied to the fuel injector at only 324 kPa (3.24 kgf/cm², 46.1 psi). Accordingly, when the energizing signal from the ECU energizes the fuel injector, the fuel passage opens, causing the fuel to be injected into the intake manifold only during the time the passage remains open. Therefore, the longer the length of time the fuel injector is energized (injection duration), the greater the volume of fuel that is supplied. Conversely, the shorter the length of time the fuel injector is energized (injection duration), the lesser the volume of fuel that is supplied.

The injection duration and the injection timing are controlled by the ECU. Signals that are input from the throttle position sensor, crankshaft position sensor, intake air pressure sensor, intake air temperature sensor, coolant temperature sensor, lean angle sensor and speed sensor enable the ECU to determine the injection duration. The injection timing is determined through the signals from the crankshaft position sensor. As a result, the volume of fuel that is required by the engine can be supplied at all times in accordance with the driving conditions.

Illustration is for reference only.

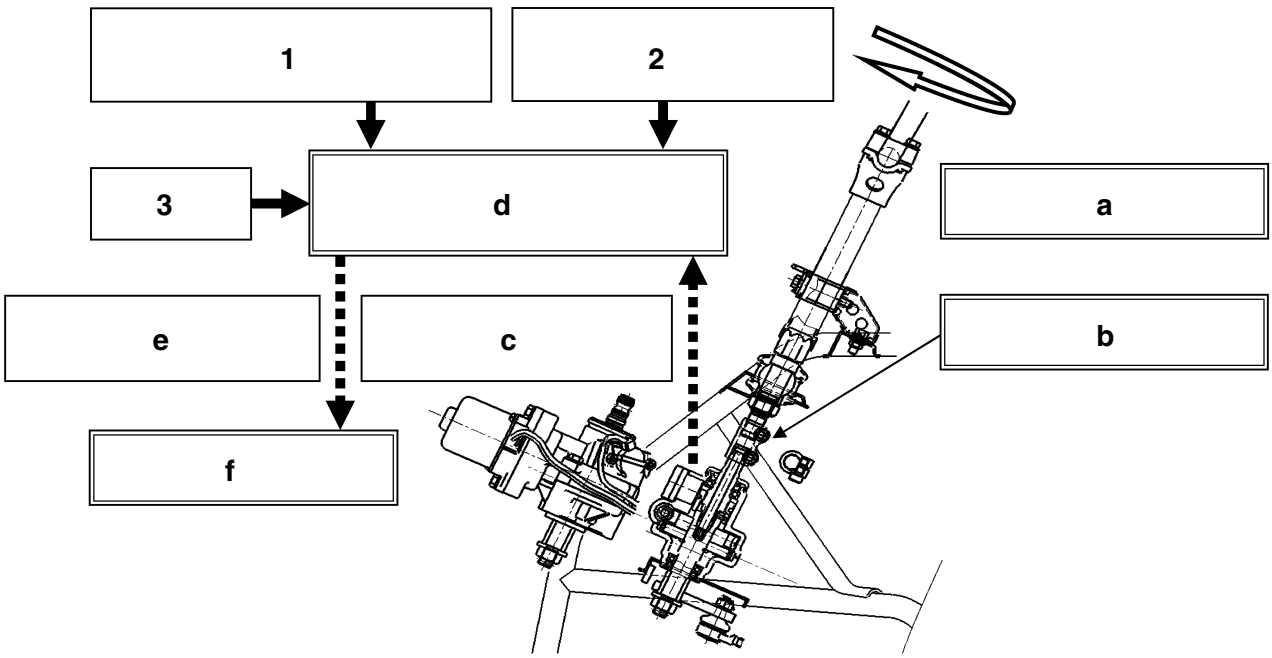


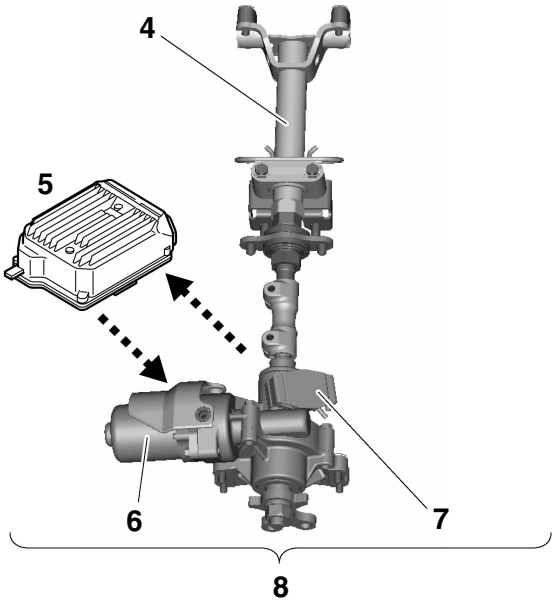
1. Fuel pump
2. Fuel injector
3. Ignition coil
4. ECU (engine control unit)
5. Speed sensor
6. Lean angle sensor
7. Coolant temperature sensor
8. Crankshaft position sensor
9. Intake air pressure sensor
10. Throttle body
11. ISC (idle speed control) unit
12. Throttle position sensor
13. Intake air temperature sensor
14. Air filter case

A. Fuel system
B. Air system
C. Control system

EAS28P1033

OUTLINE OF THE EPS (ELECTRIC POWER STEERING) SYSTEM (YFM5FGP/YFM7FGP only)





1. Speed information from speed sensor
2. Engine starting RPM information from ECU
3. Battery
4. Steering stem
5. EPS control unit
6. EPS motor
7. Torque sensor
8. EPS unit

a. Operates steering
b. Twists torsion bar
c. Sends the torque sensor signal
d. EPS control unit calculates assist power
e. Electricity output switched by EPS control unit
f. Activates EPS motor

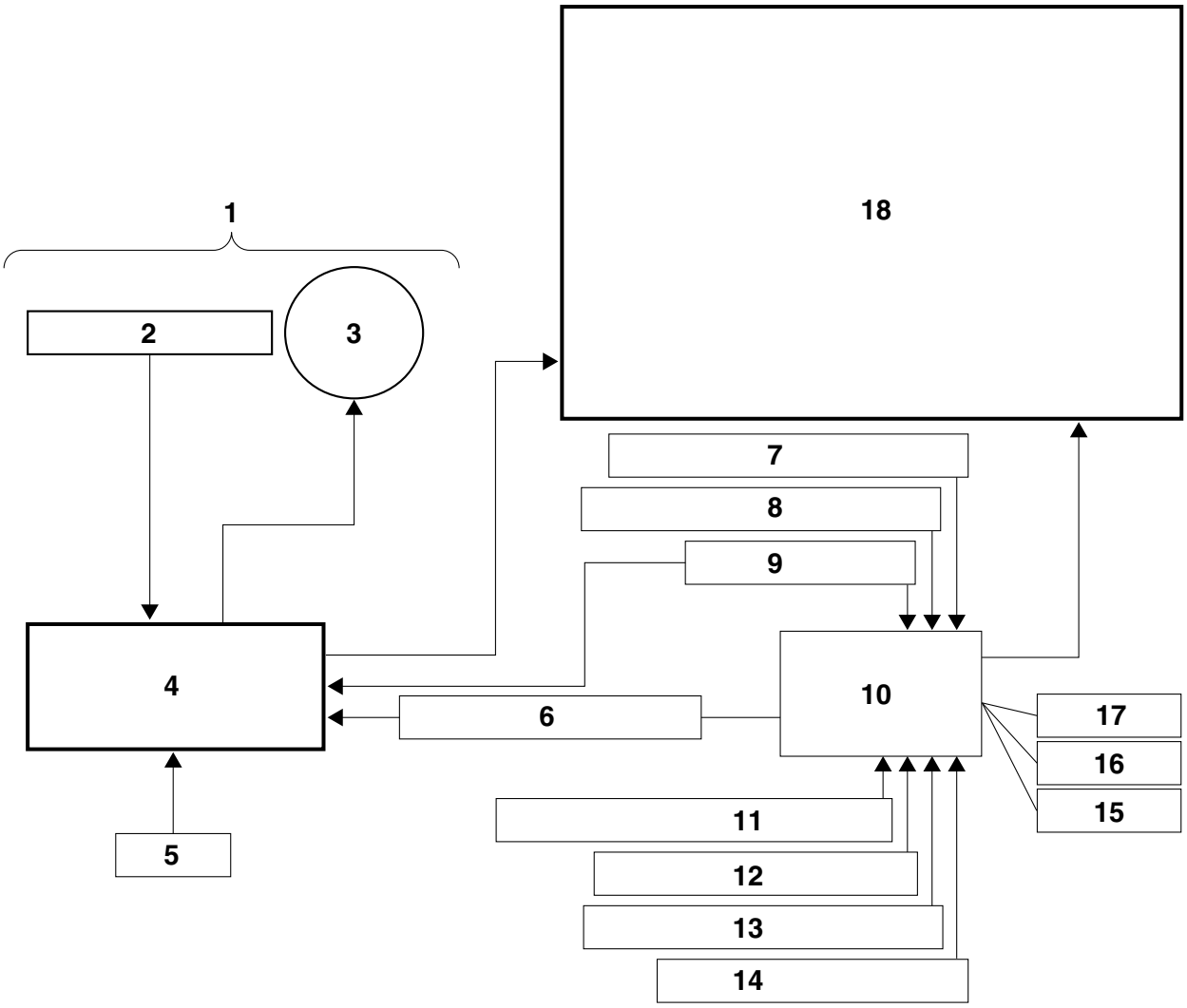
ECA28P1027

NOTICE

To prevent accidental damage to the EPS unit, it must not be disassembled.

EAS28P1034

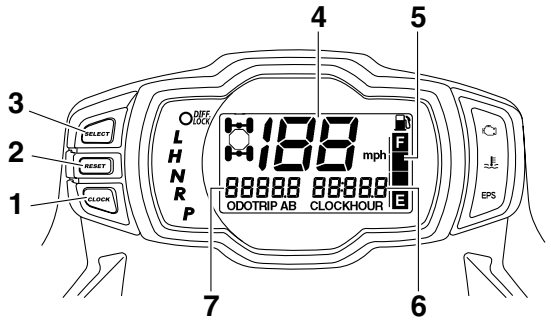
EPS (ELECTRIC POWER STEERING) SYSTEM BLOCK DIAGRAM (YFM5FGP/YFM7FGP only)



1. EPS unit
2. Torque sensor
3. EPS motor
4. EPS control unit
5. Battery
6. Engine rpm signal
7. Coolant temperature sensor signal
8. Crankshaft position sensor signal
9. Speed sensor signal
10. ECU (engine control unit)
11. Intake air temperature sensor signal
12. Throttle position sensor signal
13. Intake air pressure sensor signal
14. Lean angle sensor signal
15. Ignition coil
16. Fuel pump
17. Fuel injector
18. Meter assembly
    - Multifunction display: Speedometer/Odometer/Tripmeter A/Trip meter B/Clock/Fuel meter/Gear position
    - Indicator and warning lights: EPS warning/Engine trouble warning/Coolant temperature warning/Reverse indicator/Neutral indicator/Park indicator/High-range indicator/Low-range indicator/Differential lock
    - FI and EPS self-diagnostic fault codes

EAS28P1035
INSTRUMENT FUNCTIONS

Multifunction display



1. "CLOCK" button
2. "RESET" button
3. "SELECT" button
4. Speedometer
5. Fuel meter
6. Clock/Hour meter
7. Odometer/Tripmeter A/Tripmeter B

The multifunction display is equipped with the following:
- a speedometer (which shows the 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 clock
- an hour meter (which shows the total time the engine has been running)
- a fuel meter
- a self-diagnosis device

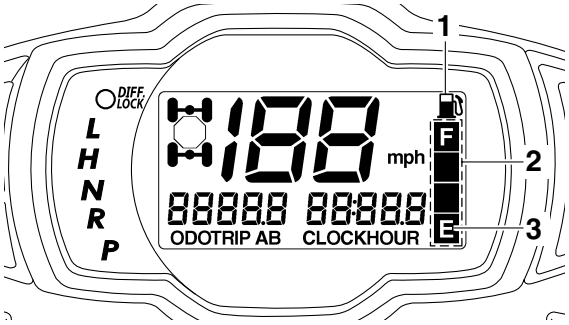
Odometer and tripmeter modes
Pushing the "SELECT" button switches the display between the odometer mode "ODO" and the tripmeter modes "A" and "B" in the following order:
ODO → TRIP A → TRIP B → ODO
To reset a tripmeter, select it by pushing the "SELECT" button, and then push the "RESET" button for at least three seconds. The tripmeters can be used to estimate the distance that can be traveled with a full tank of fuel. This information will enable you to plan future fuel stops.

TIP

Pushing and holding in the "SELECT" button, and turning the key to "ON" while the button is pushed, switches the display between "mph" and "km/h".

Clock mode
Pushing the "CLOCK" button switches the display between the clock mode "CLOCK" and the hour meter mode "HOUR" in the following order:
CLOCK → HOUR → CLOCK
To set the clock:
1. Set the display to the clock mode.
2. Push the "SELECT" button and "RESET" button together for at least three seconds.
3. When the hour digits start flashing, push the "RESET" button to set the hours.
4. Push the "SELECT" button, and the minute digits will start flashing.
5. Push the "RESET" button to set the minutes.
6. Push the "SELECT" button and then release it to start the clock.

Fuel meter



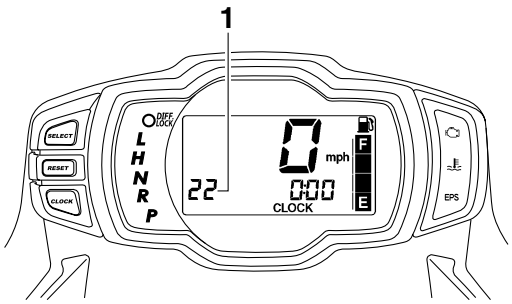
1. Fuel level warning indicator
2. Fuel meter
3. "E" segment

The fuel meter indicates the amount of fuel in the fuel tank. The display segments of the fuel meter disappear from "F" (full) towards "E" (empty) as the fuel level decreases. When the "E" segment disappears and the fuel level warning indicator flashes, refuel as soon as possible.

TIP

This fuel meter is equipped with a self-diagnosis system. If the electrical circuit is defective, all the display segments and fuel level warning indicator will start flashing. If this occurs, check the electrical circuit.
Refer to "SIGNALING SYSTEM" on page 9-19.

Self-diagnosis device



1. Fault code display

This model is equipped with a self-diagnosis device for various electrical circuits.
If any of those circuits are defective, the multifunction display will indicate a two-digit fault code. If the multifunction display indicates such a fault code, note the code number, and check the vehicle.

ECA28P1028

NOTICE

If the multifunction display indicates a fault code, the vehicle should be checked as soon as possible in order to avoid engine damage.

EAS20180
IMPORTANT INFORMATION

EAS20190
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” on page 1-14.
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.

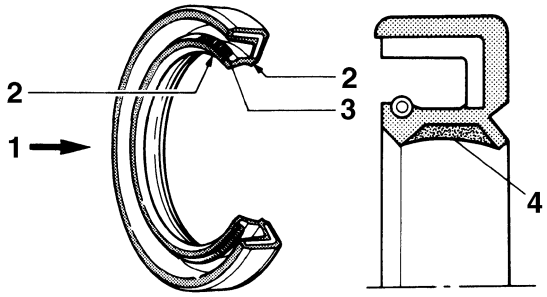
4. During disassembly, clean all of the parts and place them in trays in the order of disassembly. This will speed up assembly and allow for the correct installation of all parts.
5. Keep all parts away from any source of fire.

EAS20200
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.

EAS20210
GASKETS, OIL SEALS AND O-RINGS

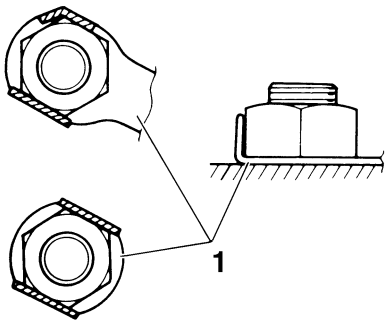
1. When overhauling the engine, replace all gaskets, seals and O-rings. All gasket surfaces, oil seal lips and O-rings must be cleaned.
2. During reassembly, properly oil all mating parts and bearings and lubricate the oil seal lips with grease.



1. Oil
2. Lip
3. Spring
4. Grease

EAS20220
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 tabs along a flat of the bolt or nut.

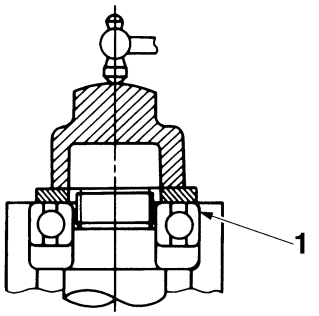


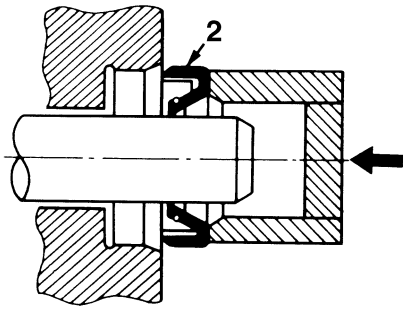
EAS20230
BEARINGS AND OIL SEALS

Install bearings “1” and oil seals “2” so that the manufacturer marks or numbers are visible. When installing oil seals “2”, lubricate the oil seal lips with a light coat of lithium-soap-based grease. Oil bearings liberally when installing, if appropriate.

ECA13300
NOTICE

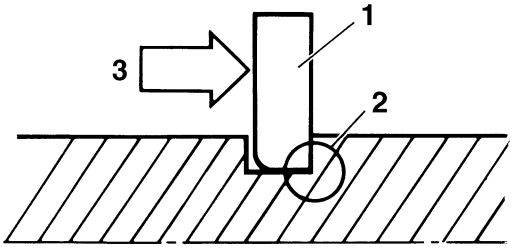
Do not spin the bearing with compressed air because this will damage the bearing surfaces.





EAS20240
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 the sharp-edged corner “2” is positioned opposite the thrust “3” that the circlip receives.

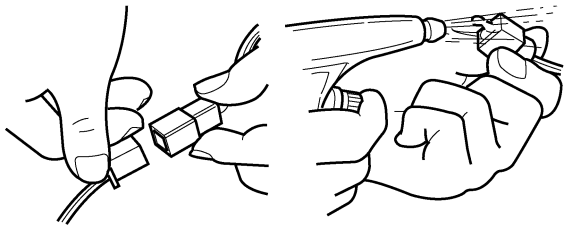


EAS20250
CHECKING THE CONNECTIONS

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.

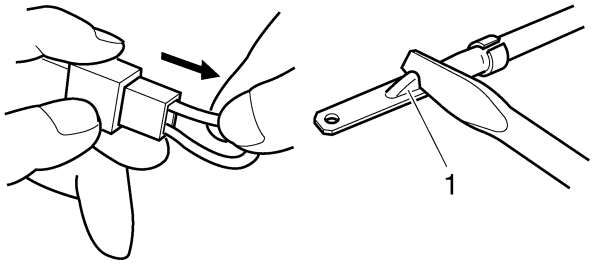


3. Check:
   - All connections

   Loose connection → Connect properly.

TIP

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



4. Connect:
   - Lead
   - Coupler
   - Connector

TIP

Make sure all connections are tight.

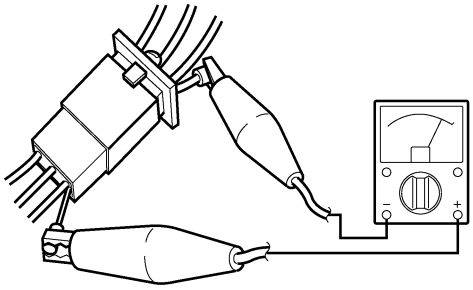
5. Check:
   - Continuity

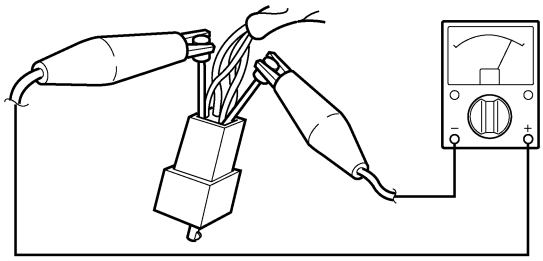
   (with the pocket tester)

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

TIP

- 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.



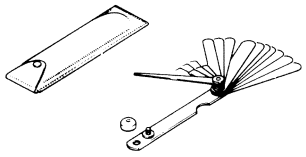
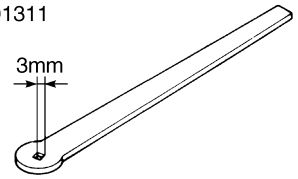
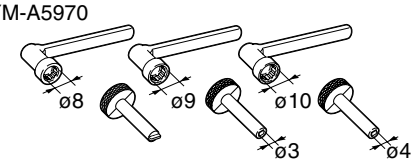
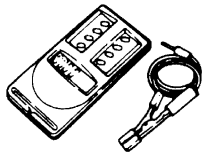
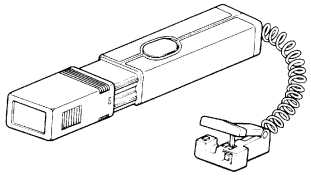


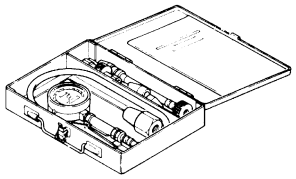
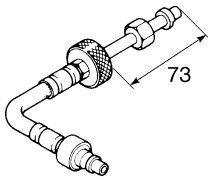
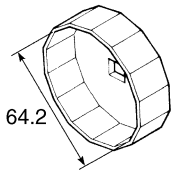
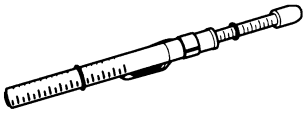
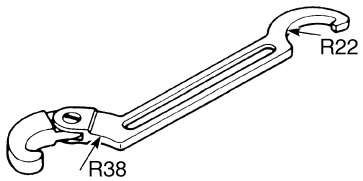
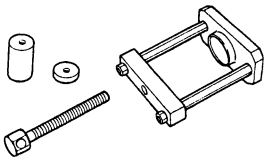
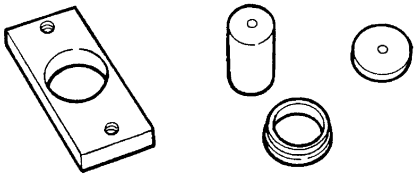
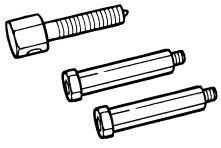
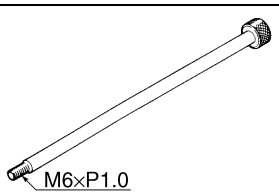
EAS20260
SPECIAL TOOLS

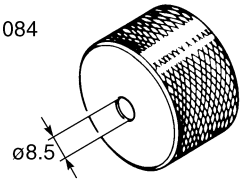
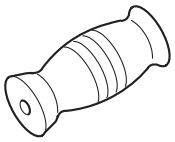
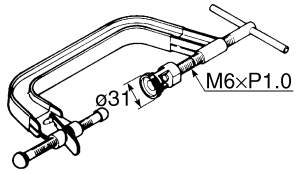
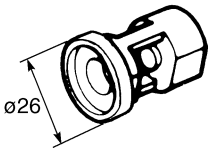
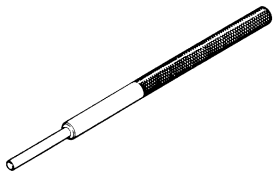
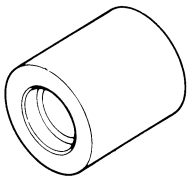
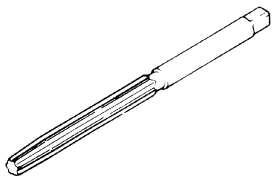
The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools as this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools, part numbers or both may differ depending on the country.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

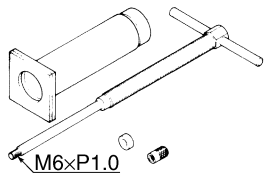
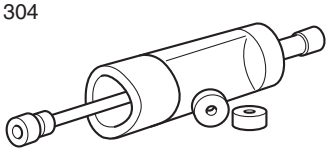
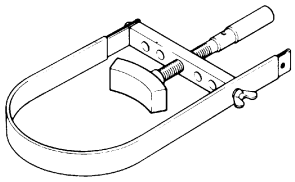
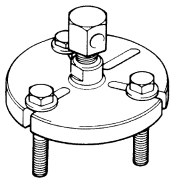
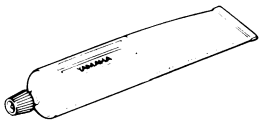
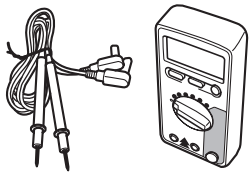
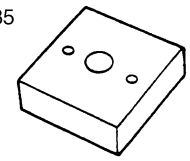
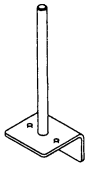
TIP

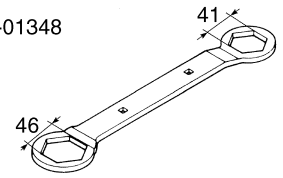
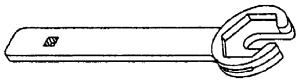
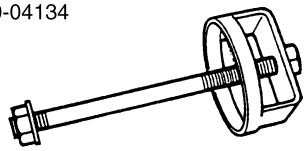
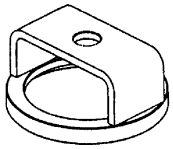
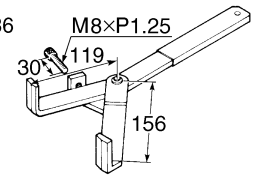
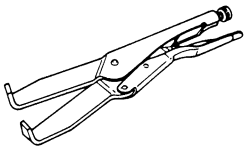
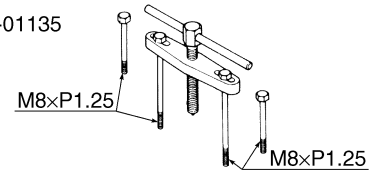
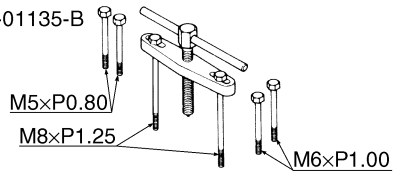
- For U.S.A. and Canada, use part numbers starting with “YM-”, “YU-”, or “ACC-”.
- For others, use part numbers starting with “90890-”.

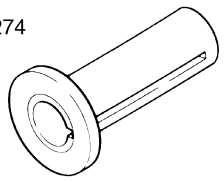
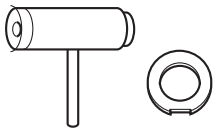
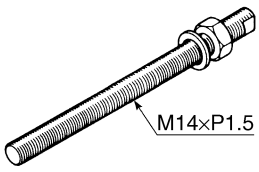
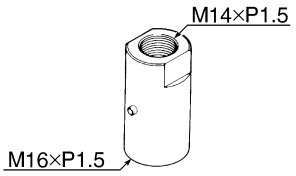
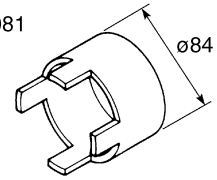
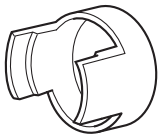
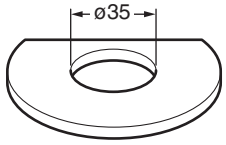
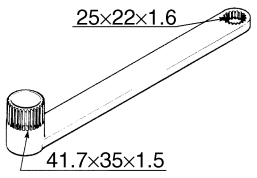
Tool name/Tool No.	Illustration	Reference pages
Pocket tester 90890-03112 Analog pocket tester YU-03112-C		1-13, 9-81, 9-82, 9-83, 9-87, 9-89, 9-90, 9-91, 9-92, 9-93, 9-94, 9-95, 9-96, 9-97, 9-98
Thickness gauge 90890-03079 Narrow gauge set YM-34483		3-5
Tappet adjusting tool 90890-01311 Six piece tappet set YM-A5970	90890-01311  YM-A5970 	3-5
Digital tachometer 90890-06760 YU-39951-B		3-8
Timing light 90890-03141 Inductive clamp timing light YU-03141		3-8

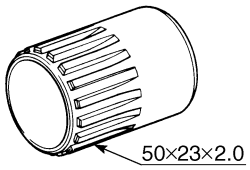
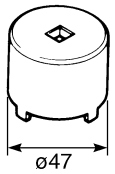
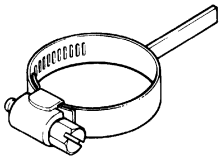
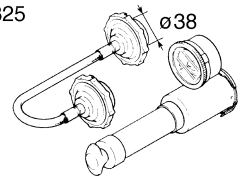
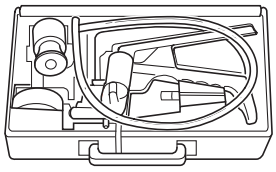
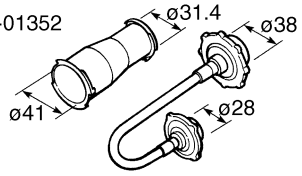
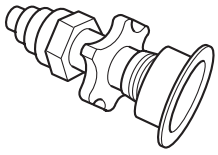
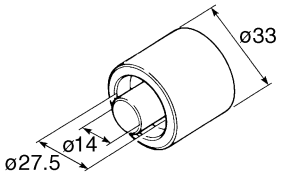
Tool name/Tool No.	Illustration	Reference pages
Compression gauge 90890-03081 Engine compression tester YU-33223		3-9
Extension 90890-04082		3-9
Oil filter wrench 90890-01426 YU-38411		3-11
Belt tension gauge 90890-03170 Rear drive belt tension gauge YM-03170		3-28
Ring nut wrench 90890-01268 Spanner wrench YU-01268		3-31, 3-32
Ball joint remover 90890-01474 YM-01474		4-57, 4-61
Ball joint remover attachment set 90890-01480 Ball joint adapter set YM-01480		4-57, 4-61
Ball joint remover short shaft set 90890-01514 YM-01514		4-57
Slide hammer bolt 90890-01083 Slide hammer bolt 6 mm YU-01083-1		5-18, 5-20

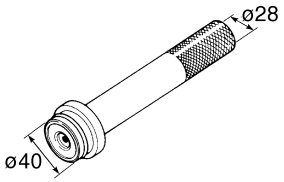
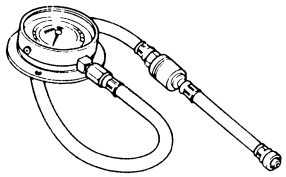
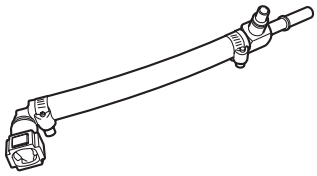
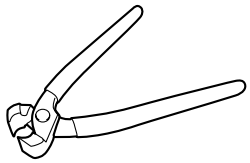
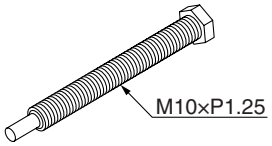
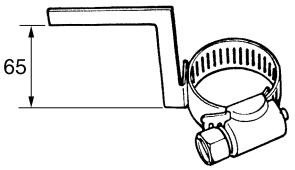
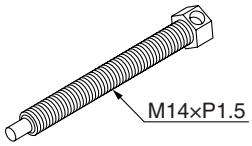
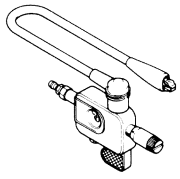
Tool name/Tool No.	Illustration	Reference pages
Weight 90890-01084 YU-01083-3	90890-01084  YU-01083-3 	5-18
Valve spring compressor 90890-04019 YM-04019	 	5-22, 5-27
Valve spring compressor attachment 90890-01243 Valve spring compressor adapter (26 mm) YM-01253-1	 	5-22, 5-27
Valve guide remover (ø6) 90890-04064 Valve guide remover (6.0 mm) YM-04064-A		5-23
Valve guide installer (ø6) 90890-04065 Valve guide installer (6.0 mm) YM-04065-A		5-23
Valve guide reamer (ø6) 90890-04066 Valve guide reamer (6.0 mm) YM-04066		5-23

Tool name/Tool No.	Illustration	Reference pages
Piston pin puller set 90890-01304 Piston pin puller YU-01304	90890-01304  YU-01304 	5-29
Sheave holder 90890-01701 Primary clutch holder YS-01880-A		5-36, 5-37, 5-38, 5-50, 5-54
Flywheel puller 90890-01362 Heavy duty puller YU-33270-B		5-36
Yamaha bond No. 1215 90890-85505 (Three Bond No.1215®)		5-38, 5-66
Digital circuit tester 90890-03174 Model 88 Multimeter with tachometer YU-A1927		5-42, 7-7
Sheave fixed block 90890-04135 Sheave fixed bracket YM-04135	90890-04135  YM-04135 	5-50, 5-53

Tool name/Tool No.	Illustration	Reference pages
Locknut wrench 90890-01348 YM-01348	90890-01348  YM-01348 	5-50, 5-53
Sheave spring compressor 90890-04134 YM-04134	90890-04134  YM-04134 	5-50, 5-53
Universal clutch holder 90890-04086 YM-91042	90890-04086  YM-91042 	5-58, 5-59
Crankcase separating tool 90890-01135 Crankcase separator YU-01135-B	90890-01135  YU-01135-B 	5-70

Tool name/Tool No.	Illustration	Reference pages
Crankshaft installer pot 90890-01274 Installing pot YU-90058	90890-01274  YU-90058/YU-90059 	5-72
Crankshaft installer bolt 90890-01275 Bolt YU-90060		5-72
Adapter (M16) 90890-04130 Adapter #13 YM-04059		5-72
Spacer (crankshaft installer) 90890-04081 Pot spacer YM-91044	90890-04081  YM-91044 	5-72
Spacer 90890-01309 Pot spacer YU-90059		5-72
Coupling gear/middle shaft tool 90890-01229 Gear holder YM-01229		5-82, 5-85

Tool name/Tool No.	Illustration	Reference pages
Bearing retainer wrench 90890-04128 Middle gear bearing retainer YM-04128		5-83, 5-84
Ring nut wrench 90890-01430 YM-38404		5-83, 5-84
Final gear backlash band 90890-01511 Middle drive gear lash tool YM-01230		5-86, 8-29
Radiator cap tester 90890-01325 Radiator pressure tester YU-24460-01	90890-01325  YU-24460-01 	6-3
Radiator cap tester adapter 90890-01352 Radiator pressure tester adapter YU-33984	90890-01352  YU-33984 	6-3
Mechanical seal installer 90890-04132 Water pump seal installer YM-33221-A		6-9

Tool name/Tool No.	Illustration	Reference pages
Middle driven shaft bearing driver 90890-04058 Bearing driver 40 mm YM-04058		6-9
Pressure gauge 90890-03153 YU-03153		7-7
Fuel pressure adapter 90890-03176 YM-03176		7-7
Boots band installation tool 90890-01526 YM-01526		8-9, 8-11, 8-22, 8-24
Ring gear fix bolt (M10) 90890-01527 YM-01527		8-13
Gear lash measurement tool 90890-01475 Middle drive gear lash tool YM-01475		8-13
Ring gear fix bolt (M14) 90890-01524 YM-01524		8-29
Ignition checker 90890-06754 Opama pet-4000 spark checker YM-34487		9-91

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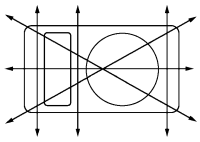
EAS29110
GENERAL SPECIFICATIONS

Model	
Model	28P1, 28P5 (YFM5FGY) 34D1, 34D5, 34D8 (YFM5FGPY) 5C0A, 5C0C (YFM7FGY) 43P1, 43P5, 43P8, 43PA (YFM7FGPY)
Dimensions	
Overall length	2065 mm (81.3 in)
Overall width	1180 mm (46.5 in)
Overall height	1240 mm (48.8 in)
Seat height	905 mm (35.6 in)
Wheelbase	1250 mm (49.2 in)
Ground clearance	275 mm (10.8 in)
Minimum turning radius	3200 mm (126 in)
Weight	
With oil and fuel	294.0 kg (648 lb)
Maximum loading limit	220.0 kg (485 lb) (Total weight of rider, cargo, accessories, and tongue)

EAS29120
ENGINE SPECIFICATIONS

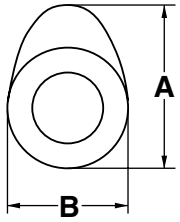
Engine	
Engine type	Liquid cooled 4-stroke, SOHC
Displacement	558.0 cm³ (YFM5FGY/YFM5FGPY) 686.0 cm³ (YFM7FGY/YFM7FGPY)
Cylinder arrangement	Forward-inclined single cylinder
Bore × stroke	92.0 × 84.0 mm (3.62 × 3.31 in) (YFM5FGY/YFM5FGPY) 102.0 × 84.0 mm (4.02 × 3.31 in) (YFM7FGY/YFM7FGPY)
Compression ratio	9.30 :1 (YFM5FGY/YFM5FGPY) 9.20 :1 (YFM7FGY/YFM7FGPY)
Standard compression pressure (at sea level)	480 kPa (4.8 kgf/cm², 68.3 psi) (YFM5FGY/YFM5FGPY) 450 kPa (4.5 kgf/cm², 64.0 psi) (YFM7FGY/YFM7FGPY)
Minimum–maximum	420–540 kPa (4.2–5.4 kgf/cm², 59.7–76.8 psi) (YFM5FGY/YFM5FGPY) 390–500 kPa (3.9–5.0 kgf/cm², 55.5–71.1 psi) (YFM7FGY/YFM7FGPY)
Starting system	Electric starter
Fuel	
Recommended fuel	Unleaded gasoline only
Fuel tank capacity	20.0 L (5.28 US gal, 4.40 Imp.gal)
Fuel reserve amount	4.5 L (1.19 US gal, 0.99 Imp.gal)
Engine oil	
Lubrication system	Wet sump
Type	YAMALUBE 4 5W-30 or 10W-40 or 20W-50, SAE 5W-30 or SAE 10W-40 or SAE 20W-50
Recommended engine oil grade	API service SG type or higher, JASO standard MA
Engine oil quantity	
Total amount	2.40 L (2.54 US qt, 2.11 Imp.qt)
Without oil filter cartridge replacement	2.00 L (2.11 US qt, 1.76 Imp.qt)
With oil filter cartridge replacement	2.10 L (2.22 US qt, 1.85 Imp.qt)
Oil pressure (hot)	50.0 kPa/1600 r/min (0.50 kgf/cm²/1600 r/min, 7.3 psi/1600 r/min)
Final gear oil	
Type	SAE 80 API GL-4 Hypoid gear oil
Total amount	0.25 L (0.26 US qt, 0.22 Imp.qt)
Periodic oil change	0.20 L (0.21 US qt, 0.18 Imp.qt)
Differential gear oil	
Type	SAE 80 API GL-4 Hypoid gear oil
Total amount	0.23 L (0.24 US qt, 0.20 Imp.qt)
Periodic oil change	0.22 L (0.23 US qt, 0.19 Imp.qt)

Oil filter	
Oil filter type	Cartridge (paper)
Oil pump	
Oil pump type	Trochoid
Inner-rotor-to-outer-rotor-tip clearance	Less than 0.12 mm (0.0047 in)
Limit	0.20 mm (0.0079 in)
Outer-rotor-to-oil-pump-housing clearance	0.090–0.170 mm (0.0035–0.0067 in)
Limit	0.24 mm (0.0094 in)
Oil-pump-housing-to-inner-and-outer-rotor clearance	0.03–0.10 mm (0.0012–0.0039 in)
Limit	0.17 mm (0.0067 in)
Pressure check location	Cylinder head
Cooling system	
Radiator capacity (including all routes)	1.99 L (2.10 US qt, 1.75 Imp.qt)
Coolant reservoir capacity (up to the maximum level mark)	0.24 L (0.25 US qt, 0.21 Imp.qt)
From low to full level	0.14 L (0.15 US qt, 0.12 Imp.qt)
Radiator cap opening pressure	93.3–122.7 kPa (0.95–1.25 kgf/cm², 13.5–17.8 psi)
Valve relief pressure	4.9 kPa (0.05 kgf/cm², 0.7 psi)
Thermostat	
Model/manufacturer	3B4/NIPPON THERMOSTAT
Valve opening temperature	50–54 °C (122–129 °F)
Valve full open temperature	70 °C (158 °F)
Valve lift (full open)	7.0 mm (0.28 in)
Radiator core	
Width	248.2 mm (9.77 in)
Height	340 mm (13.4 in)
Depth	22 mm (0.87 in)
Water pump	
Water pump type	Single suction centrifugal pump
Reduction ratio	32/31 (1.032)
Impeller shaft tilt limit	0.15 mm (0.006 in)
Spark plug	
Manufacturer/model	NGK/LMAR6A-9
Spark plug gap	0.8–0.9 mm (0.031–0.035 in)
Cylinder head	
Volume	51.40–54.40 cm³ (YFM5FGY/YFM5FGPY) 56.70–60.30 cm³ (YFM7FGY/YFM7FGPY)
Warpage limit	0.03 mm (0.0012 in)

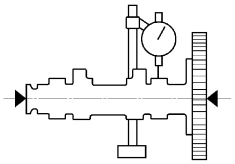


Camshaft	
Drive system	Chain drive (left)

Camshaft lobe dimensions	
Intake A	43.488–43.588 mm (1.7121–1.7161 in)
Limit	43.388 mm (1.7082 in)
Intake B	36.959–37.059 mm (1.4551–1.4590 in)
Limit	36.859 mm (1.4511 in)
Exhaust A	43.129–43.229 mm (1.6980–1.7019 in)
Limit	43.029 mm (1.6941 in)
Exhaust B	37.007–37.107 mm (1.4570–1.4609 in)
Limit	36.907 mm (1.4530 in)



Camshaft runout limit	0.015 mm (0.0006 in)



Timing chain

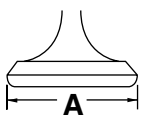
Model/number of links	98XRH2010/126
Tensioning system	Automatic

Rocker arm/rocker arm shaft

Rocker arm inside diameter	12.000–12.018 mm (0.4724–0.4731 in)
Rocker arm shaft outside diameter	11.981–11.991 mm (0.4717–0.4721 in)
Rocker-arm-to-rocker-arm-shaft clearance	0.009–0.037 mm (0.0004–0.0015 in)

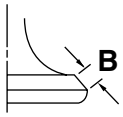
Valve, valve seat, valve guide

Valve clearance (cold)	
Intake	0.09–0.13 mm (0.0035–0.0051 in)
Exhaust	0.16–0.20 mm (0.0063–0.0079 in)
Valve dimensions	
Valve head diameter A (intake)	32.90–33.10 mm (1.2953–1.3031 in) (YFM5FGY/YFM5FGPY) 37.90–38.10 mm (1.4921–1.5000 in) (YFM7FGY/YFM7FGPY)
Valve head diameter A (exhaust)	27.90–28.10 mm (1.0984–1.1063 in) (YFM5FGY/YFM5FGPY) 31.90–32.10 mm (1.2559–1.2638 in) (YFM7FGY/YFM7FGPY)

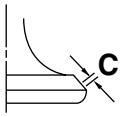


Valve face width B (intake)	2.26 mm (0.0890 in)

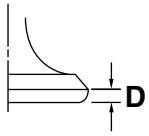
Valve face width B (exhaust)	2.26 mm (0.0890 in)



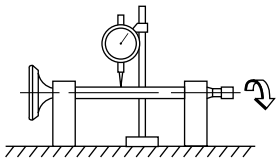
Valve seat width C (intake)	1.00–1.20 mm (0.0394–0.0472 in)
Limit	1.60 mm (0.0630 in)
Valve seat width C (exhaust)	1.00–1.20 mm (0.0394–0.0472 in)
Limit	1.60 mm (0.0630 in)



Valve margin thickness D (intake)	0.80–1.20 mm (0.0315–0.0472 in)
Limit	0.4 mm (0.02 in)
Valve margin thickness D (exhaust)	0.80–1.20 mm (0.0315–0.0472 in)
Limit	0.4 mm (0.02 in)



Valve stem diameter (intake)	5.975–5.990 mm (0.2352–0.2358 in)
Limit	5.945 mm (0.2341 in)
Valve stem diameter (exhaust)	5.960–5.975 mm (0.2346–0.2352 in)
Limit	5.930 mm (0.2335 in)
Valve guide inside diameter (intake)	6.000–6.012 mm (0.2362–0.2367 in)
Limit	6.050 mm (0.2382 in)
Valve guide inside diameter (exhaust)	6.000–6.012 mm (0.2362–0.2367 in)
Limit	6.050 mm (0.2382 in)
Valve-stem-to-valve-guide clearance (intake)	0.010–0.037 mm (0.0004–0.0015 in)
Limit	0.080 mm (0.0031 in)
Valve-stem-to-valve-guide clearance (exhaust)	0.025–0.052 mm (0.0010–0.0020 in)
Limit	0.100 mm (0.0039 in)
Valve stem runout	0.040 mm (0.0016 in)

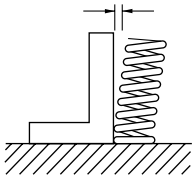


Cylinder head valve seat width (intake)	1.00–1.20 mm (0.0394–0.0472 in)
Cylinder head valve seat width (exhaust)	1.00–1.20 mm (0.0394–0.0472 in)

Valve spring

Free length (intake)	40.38 mm (1.59 in)
Limit	38.36 mm (1.51 in)
Free length (exhaust)	40.38 mm (1.59 in)
Limit	38.36 mm (1.51 in)
Installed length (intake)	35.00 mm (1.38 in)
Installed length (exhaust)	35.00 mm (1.38 in)

Spring rate K1 (intake)	34.18 N/mm (3.49 kgf, 195.16 lbf)
Spring rate K2 (intake)	44.14 N/mm (4.50 kgf, 252.04 lbf)
Spring rate K1 (exhaust)	34.18 N/mm (3.49 kgf, 195.16 lbf)
Spring rate K2 (exhaust)	44.14 N/mm (4.50 kgf, 252.04 lbf)
Installed compression spring force (intake)	171.00–197.00 N (17.44–20.09 kgf, 38.44–44.29 lbf)
Installed compression spring force (exhaust)	171.00–197.00 N (17.44–20.09 kgf, 38.44–44.29 lbf)
Spring tilt (intake)	2.5°/1.80 mm
Spring tilt (exhaust)	2.5°/1.80 mm



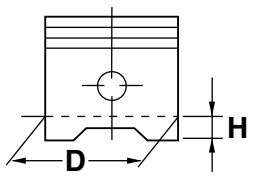
Winding direction (intake)	Clockwise
Winding direction (exhaust)	Clockwise

Cylinder

Bore	92.000–92.010 mm (3.6220–3.6224 in) (YFM5FGY/YFM5FGPY) 102.000–102.010 mm (4.0157–4.0161 in) (YFM7FGY/YFM7FGPY)
Wear limit	92.080 mm (3.6252 in) (YFM5FGY/YFM5FGPY) 102.080 mm (4.0189 in) (YFM7FGY/YFM7FGPY)
Taper limit	0.05 mm (0.002 in)
Out of round limit	0.05 mm (0.002 in)

Piston

Piston-to-cylinder clearance	0.030–0.055 mm (0.0012–0.0022 in)
Limit	0.10 mm (0.0039 in) (YFM5FGY/YFM5FGPY) 0.13 mm (0.0051 in) (YFM7FGY/YFM7FGPY)
Diameter D	91.955–91.970 mm (3.6203–3.6209 in) (YFM5FGY/YFM5FGPY) 101.955–101.970 mm (4.0140–4.0146 in) (YFM7FGY/YFM7FGPY)
Height H	10.0 mm (0.39 in)

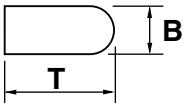


Offset	0.50 mm (0.0197 in)
Offset direction	Intake side
Piston pin bore inside diameter	23.004–23.015 mm (0.9057–0.9061 in)
Limit	23.045 mm (0.9073 in)
Piston pin outside diameter	22.991–23.000 mm (0.9052–0.9055 in)

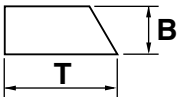
Limit	22.971 mm (0.9044 in)
Piston-pin-to-piston-pin-bore clearance	0.004–0.024 mm (0.0002–0.0009 in)
Limit	0.0740 mm (0.0029 in)

Piston ring

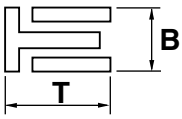
Top ring	
Ring type	Barrel
Dimensions (B × T)	1.20 × 3.50 mm (0.05 × 0.14 in) (YFM5FGY/YFM5FGPY) 1.20 × 3.80 mm (0.05 × 0.15 in) (YFM7FGY/YFM7FGPY)



End gap (installed)	0.20–0.35 mm (0.008–0.014 in)
Limit	0.60 mm (0.024 in)
Ring side clearance	0.030–0.070 mm (0.0012–0.0028 in)
Limit	0.12 mm (0.0047 in)
2nd ring	
Ring type	Taper
Dimensions (B × T)	1.20 × 4.00 mm (0.05 × 0.16 in)



End gap (installed)	0.75–0.90 mm (0.03–0.04 in)
Limit	1.25 mm (0.049 in)
Ring side clearance	0.020–0.060 mm (0.0008–0.0024 in) (YFM5FGY/YFM5FGPY) 0.030–0.070 mm (0.0012–0.0028 in) (YFM7FGY/YFM7FGPY)
Limit	0.12 mm (0.0047 in) (YFM5FGY/YFM5FGPY) 0.13 mm (0.0051 in) (YFM7FGY/YFM7FGPY)
Oil ring	
Dimensions (B × T)	2.00 × 2.80 mm (0.08 × 0.11 in) (YFM5FGY/YFM5FGPY) 2.50 × 2.80 mm (0.10 × 0.11 in) (YFM7FGY/YFM7FGPY)

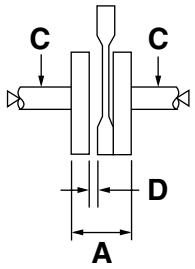


End gap (installed)	0.20–0.70 mm (0.01–0.03 in)
Ring side clearance	0.04–0.13 mm (0.0016–0.0051 in) (YFM5FGY/YFM5FGPY) 0.060–0.150 mm (0.0024–0.0059 in) (YFM7FGY/YFM7FGPY)

Crankshaft

Width A	74.95–75.00 mm (2.951–2.953 in)

Runout limit C	0.030 mm (0.0012 in)
Big end side clearance D	0.350–0.650 mm (0.0138–0.0256 in)



Balancer

Balancer drive method	Gear

Automatic centrifugal clutch

Clutch type	Wet, centrifugal automatic
Clutch shoe thickness	1.5 mm (0.06 in)
Limit	1.0 mm (0.04 in)
Clutch-in revolution	2000–2100 r/min (YFM5FGY/YFM5FGPY) 1950–2050 r/min (YFM7FGY/YFM7FGPY)
Clutch-stall revolution	3500–3600 r/min (YFM5FGY/YFM5FGPY) 3550–3650 r/min (YFM7FGY/YFM7FGPY)

V-belt

V-belt width	33.3 mm (1.31 in)
Limit	30.0 mm (1.18 in)

Transmission

Transmission type	V-belt automatic
Primary reduction system	V-belt
Secondary reduction system	Shaft drive
Secondary reduction ratio	41/21 × 24/18 × 33/9 (9.544)
Operation	Left hand operation
Single speed automatic	2.380–0.700 :1
Low range	31/16 (1.938)
High range	31/27 (1.148)
Reverse gear	23/14 × 28/23 (2.000)
Drive axle runout limit	0.06 mm (0.0024 in)

Shifting mechanism

Shift mechanism type	Shift drum and guide bar
Shift fork-R, -L thickness	5.76–5.89 mm (0.227–0.232 in)

Decompression device

Device type	Auto decomp

Air filter

Air filter element	Wet element
Air filter oil grade	Foam air filter oil

Fuel pump	
Pump type	Electrical
Model/manufacturer	3B4/DENSO
Throttle body	
Type/quantity	40EIS/1
Manufacturer	MIKUNI
ID mark	28P1 00 (YFM5FGY/YFM5FGPY) 43P1 00 (YFM7FGY/YFM7FGPY)
Throttle valve size	#50
Fuel injector	
Model/quantity	297510–1010/1
Manufacturer	DENSO
Idling condition	
Engine idling speed	1550–1650 r/min
Intake vacuum	33.0 kPa (248 mmHg, 9.7 inHg) (YFM5FGY/YFM5FGPY) 35.0 kPa (263 mmHg, 10.3 inHg) (YFM7FGY/YFM7FGPY)
Water temperature	85.0–95.0 °C (185.0–203.0 °F) (YFM5FGY/YFM5FGPY) 75.0–85.0 °C (167.0–185.0 °F) (YFM7FGY/YFM7FGPY)
Oil temperature	80.0–90.0 °C (176.0–194.0 °F) (YFM5FGY/YFM5FGPY) 55.0–65.0 °C (131.00–149.0 °F) (YFM7FGY/YFM7FGPY)
Throttle lever free play	3.0–5.0 mm (0.12–0.20 in)
Speed limiter length	Less than 12 mm (0.47 in)
Shaft drive	
Middle gear backlash	0.10–0.30 mm (0.004–0.012 in)
Final gear backlash	0.10–0.20 mm (0.004–0.008 in)
Differential gear backlash	0.05–0.25 mm (0.002–0.010 in)

EAS29130
CHASSIS SPECIFICATIONS

Chassis	
Frame type	Steel tube frame
Caster angle	5.0°
Camber angle	0.0°
Kingpin angle	11.0°
Kingpin offset	0.0 mm (0.00 in)
Trail	26.0 mm (1.02 in)
Tread rear (STD)	915.0 mm (36.02 in)
Tread front (STD)	940.0 mm (37.01 in)
Toe-in (with tire touching the ground)	0.0–10.0 mm (0.00–0.39 in)
Front wheel	
Wheel type	Panel wheel
Rim size	12 × 6.0 AT
Rim material	Steel (for models equipped with steel wheels) Aluminum (for models equipped with aluminum wheels)
Wheel travel	180 mm (7.1 in)
Radial wheel runout limit	2.0 mm (0.08 in)
Lateral wheel runout limit	2.0 mm (0.08 in)
Rear wheel	
Wheel type	Panel wheel
Rim size	12 × 7.5 AT
Rim material	Steel (for models equipped with steel wheels) Aluminum (for models equipped with aluminum wheels)
Wheel travel	230 mm (9.1 in)
Radial wheel runout limit	2.0 mm (0.08 in)
Lateral wheel runout limit	2.0 mm (0.08 in)
Front tire	
Type	Tubeless
Size	AT25 × 8–12
Manufacturer/model	DUNLOP/KT421
Wear limit (front)	3 mm (0.12 in)
Rear tire	
Type	Tubeless
Size	AT25 × 10–12
Manufacturer/model	DUNLOP/KT425
Wear limit (rear)	3 mm (0.12 in)
Tire air pressure (measured on cold tires)	
Recommended	
Front	35 kPa (0.35 kgf/cm², 5.0 psi)
Rear	30 kPa (0.30 kgf/cm², 4.4 psi)
Minimum	
Front	32 kPa (0.32 kgf/cm², 4.6 psi)
Rear	27 kPa (0.27 kgf/cm², 4.0 psi)

Front brake	
Type	Dual disc brake
Operation	Right hand operation
Front brake lever free play (lever end)	0 mm (0 in)
Front disc brake	
Disc outside diameter × thickness	220.0 × 3.5 mm (8.66 × 0.14 in)
Brake disc thickness limit	3.0 mm (0.12 in)
Brake disc deflection limit	0.1 mm (0.004 in)
Brake pad lining thickness (inner)	4.4 mm (0.17 in)
Limit	1.0 mm (0.04 in)
Brake pad lining thickness (outer)	4.4 mm (0.17 in)
Limit	1.0 mm (0.04 in)
Master cylinder inside diameter	12.70 mm (0.50 in)
Caliper cylinder inside diameter	33.96 mm (1.34 in)
Recommended fluid	DOT 4
Rear brake	
Type	Dual disc brake
Operation	Left hand and right foot operation
Rear brake lever free play (lever end)	0 mm (0 in)
Brake pedal free play	0.0–5.0 mm (0.00–0.20 in)
Rear disc brake	
Disc outside diameter × thickness	205.0 × 3.5 mm (8.07 × 0.14 in)
Brake disc thickness limit	3.0 mm (0.12 in)
Brake disc deflection limit	0.1 mm (0.004 in)
Brake pad lining thickness (inner)	5.8 mm (0.23 in)
Limit	1.0 mm (0.04 in)
Brake pad lining thickness (outer)	5.8 mm (0.23 in)
Limit	1.0 mm (0.04 in)
Master cylinder inside diameter	12.70 mm (0.50 in)
Caliper cylinder inside diameter	33.96 mm (1.34 in)
Recommended fluid	DOT 4
Steering	
Steering bearing type	Ball and race bearing
Steering tension	50 N (5.0 kgf) (YFM5FGPY/YFM7FGPY)
Front suspension	
Type	Double wishbone
Spring/shock absorber type	Coil spring/oil damper
Wheel travel	180 mm (7.1 in)
Shock absorber travel	90.2 mm (3.55 in) (YFM5FGY/YFM5FGPY) 90.7 mm (3.57 in) (YFM7FGY/YFM7FGPY)
Spring free length	292.0 mm (11.50 in)
Installed length	233.1 mm (9.18 in) (YFM5FGY/YFM5FGPY) 233.5 mm (9.19 in) (YFM7FGY/YFM7FGPY)
Spring rate K1	23.00 N/mm (2.35 kgf/mm, 131.33 lb/in)
Spring stroke K1	0.0–90.2 mm (0.00–3.55 in) (YFM5FGY/YFM5FGPY) 0.0–90.7 mm (0.00–3.57 in) (YFM7FGY/YFM7FGPY)
Optional spring available	No

Spring preload adjusting positions	
Minimum	1
Standard	3
Maximum	5

Rear suspension

Type	Double wishbone
Spring/shock absorber type	Coil spring/oil damper
Wheel travel	230 mm (9.1 in)
Rear shock absorber assembly travel	109.2 mm (4.30 in)
Spring free length	318.1 mm (12.52 in) (YFM5FGY/YFM5FGPY) 314.5 mm (12.38 in) (YFM7FGY/YFM7FGPY)
Installed length	270.6 mm (10.65 in) (YFM5FGY/YFM5FGPY) 267.5 mm (10.53 in) (YFM7FGY/YFM7FGPY)
Spring rate K1	31.00 N/mm (3.16 kgf/mm, 177.01 lb/in) (YFM5FGY/YFM5FGPY) 33.50 N/mm (3.42 kgf/mm, 191.29 lb/in) (YFM7FGY/YFM7FGPY)
Spring rate K2	36.00 N/mm (3.67 kgf/mm, 205.56 lb/in) (YFM7FGY/YFM7FGPY)
Spring stroke K1	0.0–109.2 mm (0.00–4.30 in) (YFM5FGY/YFM5FGPY) 0.0–43.0 mm (0.00–1.69 in) (YFM7FGY/YFM7FGPY)
Spring stroke K2	43.0–109.2 mm (1.69–4.30 in) (YFM7FGY/YFM7FGPY)
Optional spring available	No
Spring preload adjusting positions	
Minimum	1
Standard	3
Maximum	5

EAS29140
ELECTRICAL SPECIFICATIONS

Voltage	
System voltage	12 V
Ignition system	
Ignition system	TCI (digital)
Advancer type	Digital
Ignition timing (B.T.D.C.)	5.0°/1600 r/min
Engine control unit	
Model/manufacturer	F8T83872/MITSUBISHI (YFM5FGY/YFM5FGPY) F8T83874/MITSUBISHI (YFM7FGY/YFM7FGPY)
Fuel injection sensor	
Crankshaft position sensor resistance	459–561 Ω at 20 °C (68 °F)
Intake air pressure sensor output voltage	3.75–4.25 V
Intake air temperature sensor resistance	290–390 Ω at 80 °C (176 °F)
Coolant temperature sensor resistance	2.45 kΩ at 20 °C (68 °F) 290–354 Ω at 80 °C (176 °F)
Ignition coil	
Model/manufacturer	2JN/YAMAHA
Minimum ignition spark gap	6.0 mm (0.24 in)
Primary coil resistance	2.16–2.64 Ω at 20 °C (68 °F)
Secondary coil resistance	8.64–12.96 kΩ at 20 °C (68 °F)
Spark plug cap	
Material	Resin
Resistance	10.0 kΩ
AC magneto	
Model/manufacturer	F4T39373/MITSUBISHI
Standard output	14.0 V 34.0 A at 5,000 r/min
Stator coil resistance	0.108–0.132 Ω at 20 °C (68 °F)
Rectifier/regulator	
Regulator type	Semi conductor-short circuit
Model/manufacturer	FH012AA/SHINDENGEN
Regulated voltage (DC)	14.2–14.8 V
Rectifier capacity (DC)	50.0 A
Withstand voltage	40.0 V
Battery	
Model	YTX20L-BS
Voltage, capacity	12 V, 18.0 Ah
Manufacturer	GS YUASA
Ten hour rate amperage	1.8 A

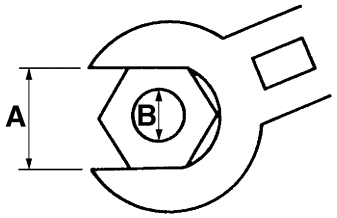
Headlight	
Bulb type	Halogen bulb
Bulb voltage, wattage × quantity	
Headlight	12 V, 35.0/35.0 W × 2
Tail/brake light	12 V, 5.0/21.0 W × 1
Meter lighting	EL
Indicator and warning lights	
Neutral indicator light	LED
Reverse indicator light	LED
Coolant temperature warning light	LED
Park indicator light	LED
On-Command four-wheel-drive/differential gear lock indicator	LCD
Engine trouble warning light	LED
High-range indicator light	LED
Low-range indicator light	LED
Differential gear lock indicator light	LED
EPS warning light	LED (YFM5FGPY/YFM7FGPY)
Electric starting system	
System type	Constant mesh
Starter motor	
Model/manufacturer	SM-17/MITSUBA
Power output	0.80 kW
Armature coil resistance	0.0050–0.0150 Ω at 20 °C (68 °F)
Brush overall length	12.0 mm (0.47 in)
Limit	6.50 mm (0.26 in)
Brush spring force	6.02–6.51 N (614–664 gf, 21.69–23.45 oz)
Mica undercut (depth)	0.70 mm (0.03 in)
Starter relay	
Model/manufacturer	2768113-A/JIDECO
Amperage	180.0 A
Coil resistance	4.18–4.62 Ω at 20 °C (68 °F)
Fuel sender unit	
Sender unit resistance (full)	19.00–21.00 Ω
Sender unit resistance (empty)	139.00–141.00 Ω
Auxiliary DC output	
Jack capacity	12 V, 10.0 A (120 W)
Fan motor relay	
Model/manufacturer	ACM33211/MATSUSHITA
Coil resistance	86.4–105.6 Ω
Fuel injection system relay	
Model/manufacturer	ACM33211/MATSUSHITA
Coil resistance	86.4–105.6 Ω

Headlight relay	
Model/manufacturer	G8HN-1C4T-DJ/OMRON
Coil resistance	94.5–115.5 Ω
Four-wheel-drive motor relay 3	
Model/manufacturer	ACM33211/MATSUSHITA
Coil resistance	86.4–105.6 Ω
Four-wheel-drive motor relay 1, 2	
Model/manufacturer	G8HN-1C4T-DJ/OMRON
Coil resistance	94.5–115.5 Ω
Circuit breaker	
Circuit breaker type	Fuse
Fuses	
Main fuse	40.0 A
Headlight fuse	15.0 A
Signaling system fuse	5.0 A
Ignition fuse	15.0 A
Radiator fan motor fuse	20.0 A
Auxiliary DC jack fuse	15.0 A
Fuel injection system fuse	15.0 A
Four-wheel-drive motor fuse	15.0 A
EPS fuse	40.0 A (YFM5FGPY/YFM7FGPY)
Spare fuse	40.0 A
Spare fuse	20.0 A
Spare fuse	15.0 A
Spare fuse	5.0 A

EAS20320
TIGHTENING TORQUES

EAS20330
GENERAL TIGHTENING TORQUE SPECIFICATIONS

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. Distance between flats
B. Outside 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

EAS20340
ENGINE TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Exhaust pipe nut	M8	4	14 Nm (1.4 m·kg, 10 ft·lb)	
Muffler bolt	M8	1	20 Nm (2.0 m·kg, 14 ft·lb)	
Muffler and muffler bracket bolt	M8	2	20 Nm (2.0 m·kg, 14 ft·lb)	
Spark arrester bolt	M6	3	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Purging bolt	M10	1	27 Nm (2.7 m·kg, 19 ft·lb)	
Exhaust pipe protector bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Crankshaft end accessing screw	M36	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Timing mark accessing screw	M14	1	6 Nm (0.6 m·kg, 4.3 ft·lb)	
AC magneto cover bolt	M6	11	10 Nm (1.0 m·kg, 7.2 ft·lb)	
AC magneto rotor nut	M16	1	60 Nm (6.0 m·kg, 43 ft·lb)	
AC magneto/crankshaft position sensor lead holder bolt	M5	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Starter clutch bolt	M8	3	30 Nm (3.0 m·kg, 22 ft·lb)	
Drive belt cover bolt	M6	12	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Drive belt case bolt	M6	8	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Bearing housing bolt (primary sheave assembly)	M6	4	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Bearing retainer bolt (bearing housing)	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Primary sheave assembly nut	M16	1	140 Nm (14.0 m·kg, 100 ft·lb)	
Secondary sheave assembly nut	M16	1	100 Nm (10.0 m·kg, 72 ft·lb)	
Secondary sheave spring retaining nut	M36	1	90 Nm (9.0 m·kg, 65 ft·lb)	
Clutch housing assembly bolt	M6	9	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Clutch carrier assembly nut	M22	1	190 Nm (19.0 m·kg, 140 ft·lb)	Left-hand thread Stake.
Cylinder bolt	M10	4	50 Nm (5.0 m·kg, 36 ft·lb)	See TIP.
Cylinder bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Cylinder head stud bolt (exhaust pipe)	M8	4	15 Nm (1.5 m·kg, 11 ft·lb)	
Cylinder head bolt	M9	4	35 Nm (3.5 m·kg, 25 ft·lb)	
Cylinder head bolt	M9	2	38 Nm (3.8 m·kg, 27 ft·lb)	
Cylinder head bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Tappet cover bolt	M6	8	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Camshaft sprocket cover bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Thermostat cover bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	

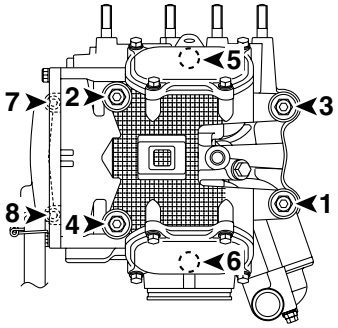
Item	Thread size	Q'ty	Tightening torque	Remarks
Oil check bolt	M8	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Cylinder head air bleed bolt	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Camshaft sprocket bolt	M7	2	20 Nm (2.0 m·kg, 14 ft·lb)	
Decompression assembly bolt	M7	2	20 Nm (2.0 m·kg, 14 ft·lb)	
Valve adjusting screw locknut	M6	4	14 Nm (1.4 m·kg, 10 ft·lb)	
Bearing retainer bolt (camshaft)	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	LT
Timing chain guide bolt (intake side)	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	LT
Timing chain tensioner cap bolt	M16	1	20 Nm (2.0 m·kg, 14 ft·lb)	
Timing chain tensioner bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Oil delivery pipe 1 union bolt	M8	2	18 Nm (1.8 m·kg, 13 ft·lb)	
Oil delivery pipe 2 union bolt	M14	2	35 Nm (3.5 m·kg, 25 ft·lb)	
Oil delivery pipe 2 union bolt	M10	1	20 Nm (2.0 m·kg, 14 ft·lb)	
Oil delivery pipe 2 bolt	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Crankcase bolt	M8	3	26 Nm (2.6 m·kg, 19 ft·lb)	
Crankcase bolt	M6	4	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Crankcase bolt	M6	9	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Dipstick guide bolt	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Engine oil drain bolt	M14	1	30 Nm (3.0 m·kg, 22 ft·lb)	
Oil filter cartridge	M20	1	17 Nm (1.7 m·kg, 12 ft·lb)	
Oil filter cartridge union bolt	M20	1	30 Nm (3.0 m·kg, 22 ft·lb)	LT
Timing chain guide bolt (lower)	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	LT
Bearing retainer bolt (crankcase)	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	LT
Oil pump bolt	M6	3	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Oil pump housing cover screw	M5	1	5 Nm (0.5 m·kg, 3.6 ft·lb)	
Oil pump driven gear nut	M10	1	22 Nm (2.2 m·kg, 16 ft·lb)	Use a lock washer.
Balancer driven gear nut	M18	1	80 Nm (8.0 m·kg, 58 ft·lb)	Use a lock washer.
Water pump housing bolt	M6	3	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Coolant drain bolt	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Water pump air bleed bolt	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Water pump outlet pipe bolt	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Water jacket joint bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Shift lever cover bolt	M6	4	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Shift lever 2 assembly bolt	M6	1	14 Nm (1.4 m·kg, 10 ft·lb)	
Shift drum stopper bolt	M14	1	18 Nm (1.8 m·kg, 13 ft·lb)	
Stopper lever stopper bolt	M14	1	18 Nm (1.8 m·kg, 13 ft·lb)	

Item	Thread size	Q'ty	Tightening torque	Remarks
Middle drive pinion gear nut	M22	1	190 Nm (19.0 m·kg, 140 ft·lb)	Stake.
Middle drive shaft bearing housing bolt	M8	4	32 Nm (3.2 m·kg, 23 ft·lb)	LT
Middle drive shaft bearing retainer bolt	M8	4	29 Nm (2.9 m·kg, 21 ft·lb)	Stake. LT
Front drive shaft yoke nut (middle gear side)	M16	1	115 Nm (11.5 m·kg, 85 ft·lb)	
Middle driven shaft bearing retainer	M55	1	80 Nm (8.0 m·kg, 58 ft·lb)	Left-hand thread LT
Middle driven pinion gear bearing housing bolt	M8	4	25 Nm (2.5 m·kg, 18 ft·lb)	
Middle driven pinion gear bearing retainer	M60	1	130 Nm (13.0 m·kg, 94 ft·lb)	Left-hand thread LT
Rear drive shaft yoke nut (middle gear side)	M16	1	150 Nm (15.0 m·kg, 110 ft·lb)	LT
Starter motor bolt	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Starter motor lead nut	M6	1	11 Nm (1.1 m·kg, 8.0 ft·lb)	
Spark plug	M10	1	13 Nm (1.3 m·kg, 9.4 ft·lb)	
Stator coil assembly bolt	M6	3	7 Nm (0.7 m·kg, 5.1 ft·lb)	LT
Crankshaft position sensor bolt	M5	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	LT
Coolant temperature sensor	M12	1	18 Nm (1.8 m·kg, 13 ft·lb)	
Gear position switch bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Reverse switch	M10	1	17 Nm (1.7 m·kg, 12 ft·lb)	
Speed sensor bolt	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	

TIP

Temporarily tighten the cylinder bolts to 15 Nm (1.5 m·kg, 11 ft·lb) and then tighten them to 50 Nm (5.0 m·kg, 36 ft·lb).

Cylinder head tightening sequence:



EAS20350
CHASSIS TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Engine mounting bolt (front lower side)	M10	2	42 Nm (4.2 m·kg, 30 ft·lb)	
Engine mounting bolt (front upper side)	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	LT
Engine mounting bolt (rear lower side)	M10	2	42 Nm (4.2 m·kg, 30 ft·lb)	
Engine mounting bolt (rear upper side)	M6	2	10 Nm (1.0 m·kg, 7.2 ft·lb)	LT
Rubber damper nut (front side)	M10	2	42 Nm (4.2 m·kg, 30 ft·lb)	
Rubber damper nut (rear side)	M10	2	42 Nm (4.2 m·kg, 30 ft·lb)	
Trailer hitch bolt	M10	2	55 Nm (5.5 m·kg, 40 ft·lb)	
Drive select lever unit bolt	M6	3	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Drive select lever guide bolt	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Shift arm bolt	M6	1	14 Nm (1.4 m·kg, 10 ft·lb)	LT
Shift control cable nut	M14	1	17 Nm (1.7 m·kg, 12 ft·lb)	
Drive select lever shift rod locknut (select lever unit side)	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	Left-hand thread
Drive select lever shift rod locknut (shift arm side)	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Brake pedal free play adjusting nut	M8	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Radiator bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Radiator bracket bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Coolant reservoir bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Fuel tank bolt	M6	4	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Fuel pump nut	M6	6	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Fuel tank side cover bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Fuel tank breather hose joint bolt	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Throttle body joint clamp screw	M5	2	3 Nm (0.3 m·kg, 2.2 ft·lb)	
Engine skid plate bolt	M6	8	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Footrest bracket bolt	M10	8	53 Nm (5.3 m·kg, 38 ft·lb)	
Footrest board bolt	M6	8	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Footrest bolt	M6	4	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Front carrier bolt	M8	4	26 Nm (2.6 m·kg, 19 ft·lb)	
Front carrier bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Front carrier bracket bolt	M8	2	34 Nm (3.4 m·kg, 24 ft·lb)	
Front guard bolt	M8	4	26 Nm (2.6 m·kg, 19 ft·lb)	
Front grill bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Front grill bracket bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	

Item	Thread size	Q'ty	Tightening torque	Remarks
Front fender bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Rear carrier bolt	M8	4	34 Nm (3.4 m·kg, 24 ft·lb)	
Rear carrier bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Rear carrier bracket bolt	M10	4	53 Nm (5.3 m·kg, 38 ft·lb)	
Rear fender bolt	M6	4	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Front wheel nut	M10	8	55 Nm (5.5 m·kg, 40 ft·lb)	
Front wheel axle nut	M20	2	260 Nm (26.0 m·kg, 190 ft·lb)	Stake.
Rear wheel nut	M10	8	55 Nm (5.5 m·kg, 40 ft·lb)	
Rear wheel axle nut	M20	2	260 Nm (26.0 m·kg, 190 ft·lb)	Stake.
Front brake caliper bolt	M8	4	30 Nm (3.0 m·kg, 22 ft·lb)	
Front brake disc bolt	M8	8	30 Nm (3.0 m·kg, 22 ft·lb)	LT
Rear brake caliper bolt	M8	4	30 Nm (3.0 m·kg, 22 ft·lb)	
Rear brake disc bolt	M8	8	30 Nm (3.0 m·kg, 22 ft·lb)	LT
Brake hose union bolt	M10	6	27 Nm (2.7 m·kg, 19 ft·lb)	
Brake pad holding bolt	M6	4	17 Nm (1.7 m·kg, 12 ft·lb)	
Brake caliper bleed screw	M8	4	5 Nm (0.5 m·kg, 3.6 ft·lb)	
Steering knuckle and front upper arm nut	M10	2	25 Nm (2.5 m·kg, 18 ft·lb)	
Steering knuckle and front lower arm nut	M12	2	30 Nm (3.0 m·kg, 22 ft·lb)	
Steering knuckle and tie-rod nut	M10	2	25 Nm (2.5 m·kg, 18 ft·lb)	
Front upper arm nut	M10	4	45 Nm (4.5 m·kg, 32 ft·lb)	LS
Front lower arm nut	M10	4	45 Nm (4.5 m·kg, 32 ft·lb)	LS
Front shock absorber nut	M10	4	45 Nm (4.5 m·kg, 32 ft·lb)	
Front brake disc guard bolt	M6	6	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Front brake hose holder bolt	M6	4	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Front arm protector nut	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Rear arm protector holder nut	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Rear knuckle nut	M10	4	45 Nm (4.5 m·kg, 32 ft·lb)	
Rear upper arm nut	M10	4	45 Nm (4.5 m·kg, 32 ft·lb)	LS
Rear lower arm nut	M10	4	45 Nm (4.5 m·kg, 32 ft·lb)	LS
Rear shock absorber nut	M10	4	45 Nm (4.5 m·kg, 32 ft·lb)	
Rear brake disc guard bolt	M6	6	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Rear brake hose guide bolt	M6	4	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Rear arm protector nut	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Rear arm protector holder nut	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Rear brake hose protector bolt	M6	4	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Stabilizer joint nut	M10	4	51 Nm (5.1 m·kg, 37 ft·lb)	

Item	Thread size	Q'ty	Tightening torque	Remarks
Stabilizer holder bolt	M8	4	30 Nm (3.0 m·kg, 22 ft·lb)	
Handlebar holder bolt	M8	4	20 Nm (2.0 m·kg, 14 ft·lb)	
Front brake master cylinder holder bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Rear brake master cylinder holder bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Front brake lever pivot bolt	M6	1	6 Nm (0.6 m·kg, 4.3 ft·lb)	S
Front brake lever pivot nut	M6	1	6 Nm (0.6 m·kg, 4.3 ft·lb)	
Rear brake lever pivot bolt	M6	1	6 Nm (0.6 m·kg, 4.3 ft·lb)	Left-hand thread S
Rear brake lever pivot nut	M6	1	6 Nm (0.6 m·kg, 4.3 ft·lb)	Left-hand thread
Front brake hose joint bolt	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Rear brake hose joint bolt	M6	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Brake pipe locknut	M10	3	19 Nm (1.9 m·kg, 13 ft·lb)	
Steering stem bushing bolt	M8	2	23 Nm (2.3 m·kg, 17 ft·lb)	
Steering stem bracket bolt	M10	2	51 Nm (5.1 m·kg, 37 ft·lb)	LT
Steering stem support bolt (for YFM5FG/YFM7FG)	M8	4	30 Nm (3.0 m·kg, 22 ft·lb)	LT
Pitman arm nut (for YFM5FG/YFM7FG)	M14	1	190 Nm (19.0 m·kg, 140 ft·lb)	
Steering stem bearing bolt (for YFM5FGP/YFM7FGP)	M10	2	51 Nm (5.1 m·kg, 37 ft·lb)	LT
Steering stem bearing nut (for YFM5FGP/YFM7FGP)	M22	1	125 Nm (12.5 m·kg, 90 ft·lb)	
Steering stem joint bolt (for YFM5FGP/YFM7FGP)	M8	2	35 Nm (3.5 m·kg, 25 ft·lb)	LT
EPS unit bolt (for YFM5FGP/YFM7FGP)	M8	4	30 Nm (3.0 m·kg, 22 ft·lb)	LT
Pitman arm nut (for YFM5FGP/YFM7FGP)	M16	1	210 Nm (21.0 m·kg, 150 ft·lb)	
EPS motor cover bolt (for YFM5FGP/YFM7FGP)	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Pitman arm and tie-rod nut	M10	2	25 Nm (2.5 m·kg, 18 ft·lb)	
Tie-rod end locknut (pitman arm side)	M10	2	15 Nm (1.5 m·kg, 11 ft·lb)	
Tie-rod end locknut (front wheel side)	M10	2	15 Nm (1.5 m·kg, 11 ft·lb)	Left-hand thread
Differential assembly nut	M10	1	55 Nm (5.5 m·kg, 40 ft·lb)	
Differential assembly bolt	M10	2	55 Nm (5.5 m·kg, 40 ft·lb)	LT
Differential gear oil filler bolt	M14	1	23 Nm (2.3 m·kg, 17 ft·lb)	

Item	Thread size	Q'ty	Tightening torque	Remarks
Differential gear oil drain bolt	M10	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Differential case cover bolt	M8	5	24 Nm (2.4 m·kg, 17 ft·lb)	
Differential motor bolt	M6	3	11 Nm (1.1 m·kg, 8.0 ft·lb)	
Front drive shaft yoke nut (differential case side)	M14	1	62 Nm (6.2 m·kg, 45 ft·lb)	
Final drive assembly nut	M10	2	66 Nm (6.6 m·kg, 48 ft·lb)	
Final gear oil filler bolt	M14	1	23 Nm (2.3 m·kg, 17 ft·lb)	
Final gear oil drain bolt	M14	1	23 Nm (2.3 m·kg, 17 ft·lb)	
Final gear oil level check bolt	M8	1	10 Nm (1.0 m·kg, 7.2 ft·lb)	
Final drive case cover bolt	M8	11	23 Nm (2.3 m·kg, 17 ft·lb)	
Final drive pinion gear bearing housing bolt	M8	4	23 Nm (2.3 m·kg, 17 ft·lb)	
Electrical components tray bolt	M6	3	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Battery holding bracket fitting screw	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Battery holding bracket nut	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
ECU (engine control unit) bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
ECU bracket bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Rectifier/regulator bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Ignition coil bolt	M6	2	7 Nm (0.7 m·kg, 5.1 ft·lb)	
Frame ground bolt	M6	1	7 Nm (0.7 m·kg, 5.1 ft·lb)	

EAS20360
LUBRICATION POINTS AND LUBRICANT TYPES

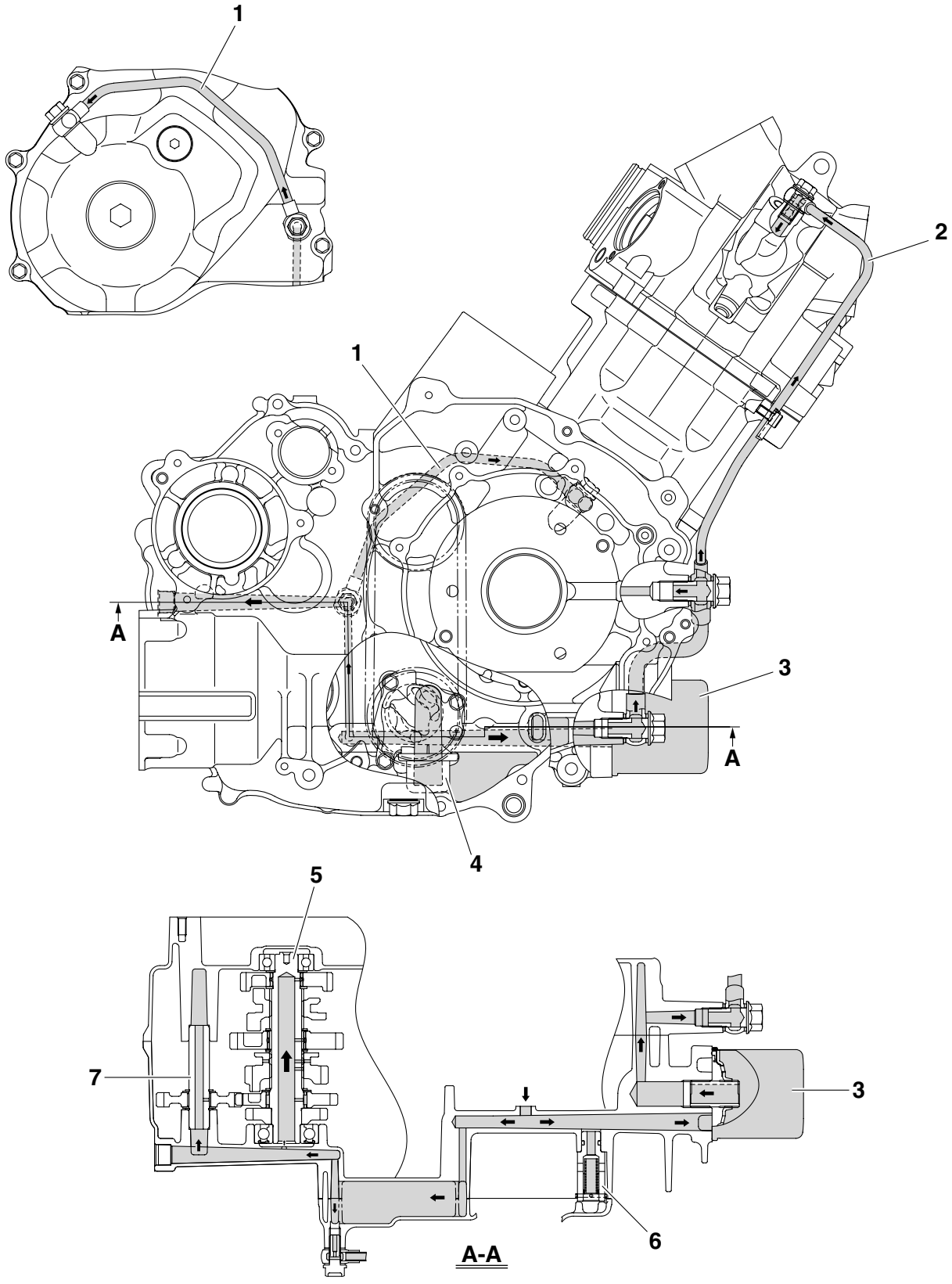
EAS20370
ENGINE

Lubrication point	Lubricant
Oil seal lips	LS
Bearings	E
O-rings	LS
Cylinder head bolts	M
Crankshaft pin	E
Connecting rod big end thrust surface	E
Crankshaft sprocket	M
Inner race (crankshaft)	E
Buffer boss (crankshaft)	E
Crankshaft seal	E
Piston pin	E
Piston rings and ring grooves	E
Valve stems (intake and exhaust)	M
Valve stem seal (intake and exhaust)	M
Rocker arm shafts	E
Camshaft lobes	M
Decompressor lever pin	E
Decompressor lever	E
Rocker arms (intake and exhaust)	M
Oil pump shaft	E
O-ring (oil filter cartridge)	LS
Water pump impeller shaft	M
Dipstick mating surface	E
Starter idler gear inner surface	E
Starter idler gear shaft	E
Starter wheel gear	E
Torque limiter	E
Clutch housing shaft end	LS
Clutch carrier assembly	E
One-way clutch bearing	E
Clutch dog and middle drive gear	M
Reverse idle gear shaft	E
Middle driven shaft splines	M

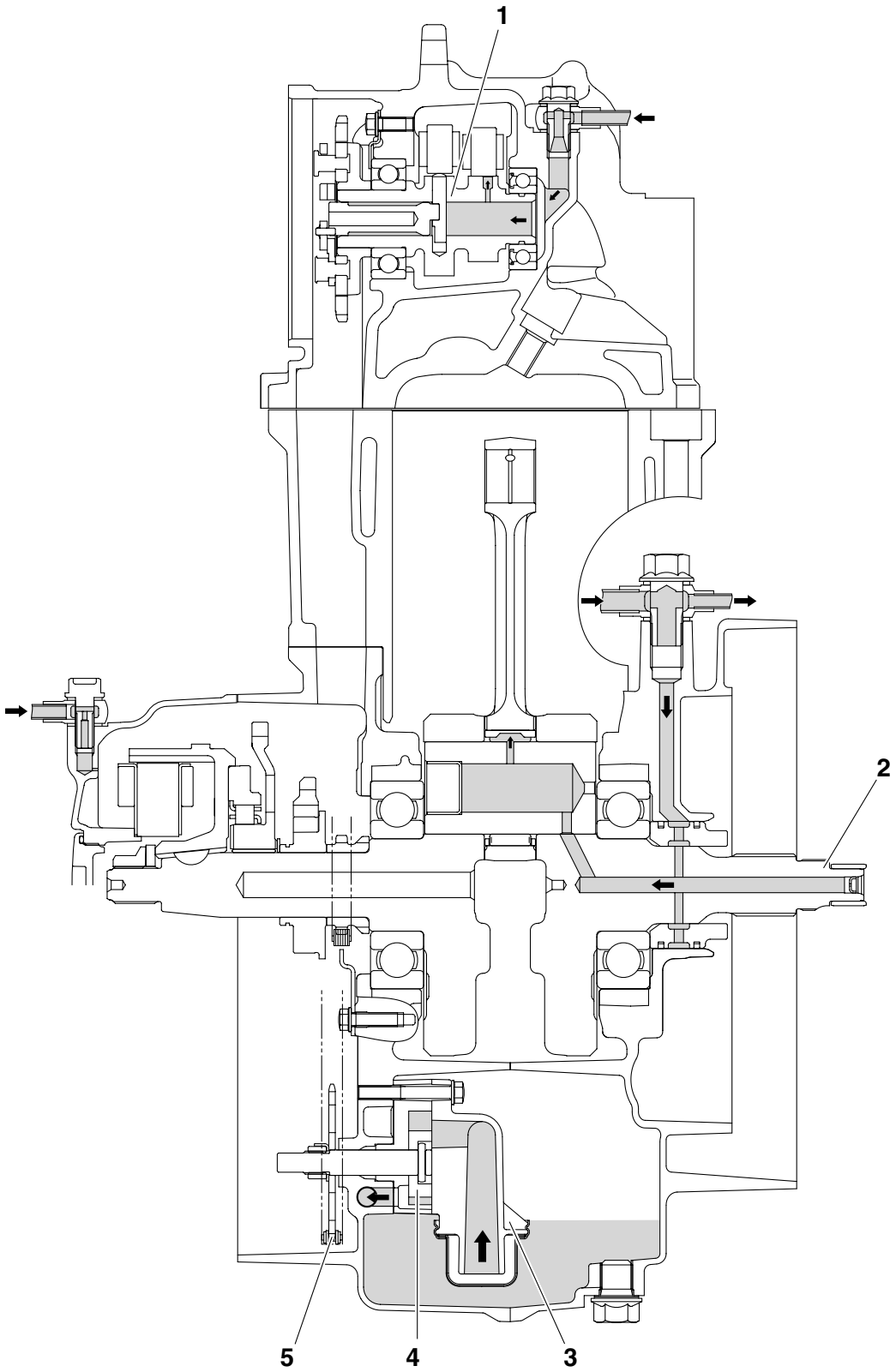
Lubrication point	Lubricant
Shift drum	E
Shift forks and shift fork guide bar	E
Ball (shift drum stopper)	E
Stopper lever and stopper lever shaft	E
Shift lever 2 inner surface	LS
Shift lever 1	E
Shift lever 1 gear teeth and shift lever 2 gear teeth	E
Stopper lever stopper	E
Bearing (final drive pinion gear)	G
Bearing (final drive case)	G
AC magneto lead grommet	Yamaha bond No.1215 (Three bond No.1215®)
Crankcase mating surface	Yamaha bond No.1215 (Three bond No.1215®)

EAS20390
LUBRICATION SYSTEM CHART AND DIAGRAMS

EAS20410
LUBRICATION DIAGRAMS



1. Oil delivery pipe 1
2. Oil delivery pipe 2
3. Oil filter cartridge
4. Oil strainer
5. Drive axle
6. Relief valve assembly
7. Reverse idle gear shaft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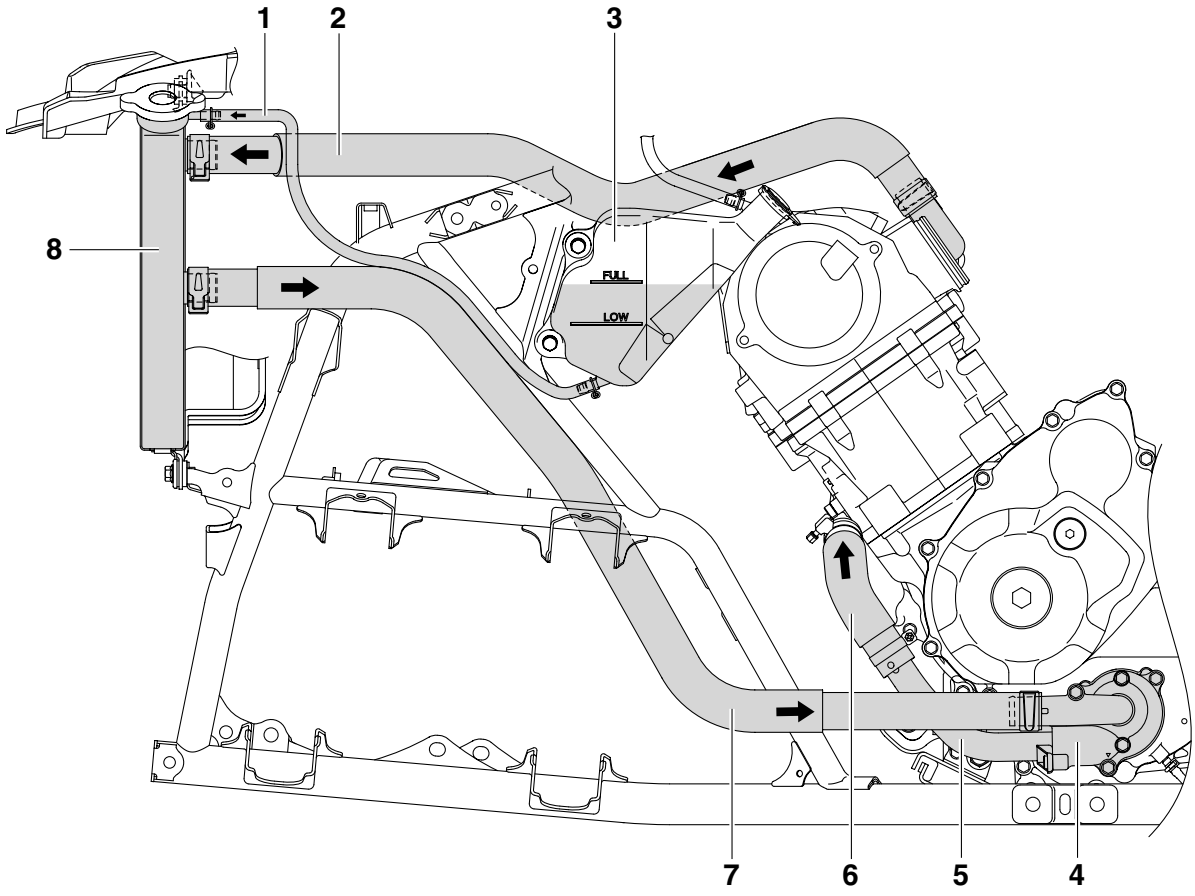
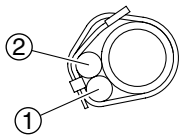
1. Camshaft
2. Crankshaft
3. Oil strainer
4. Oil pump rotor
5. Oil pump driven gear

EAS20420
COOLING SYSTEM DIAGRAMS



1. Coolant reservoir hose
2. Radiator inlet hose
3. Coolant reservoir
4. Water pump
5. Water pump outlet pipe
6. Water pump outlet hose
7. Radiator outlet hose
8. Radiator

EAS20430
CABLE ROUTING



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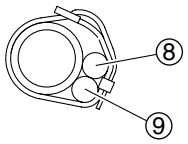

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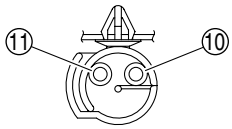

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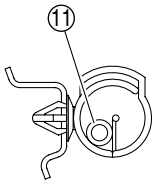

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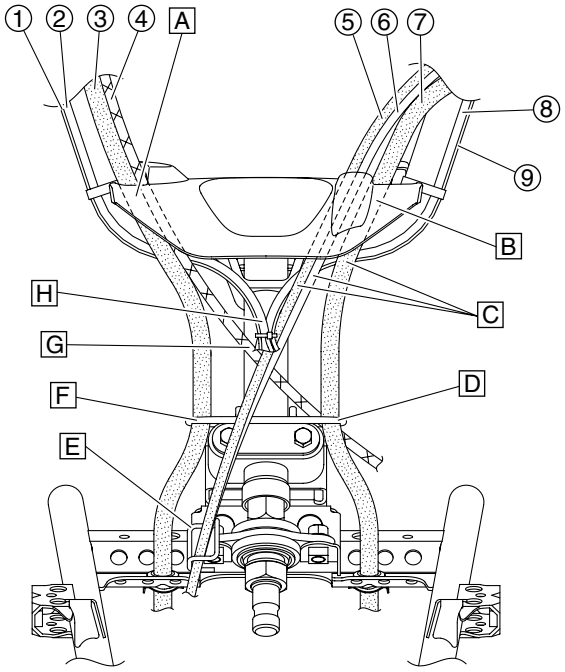
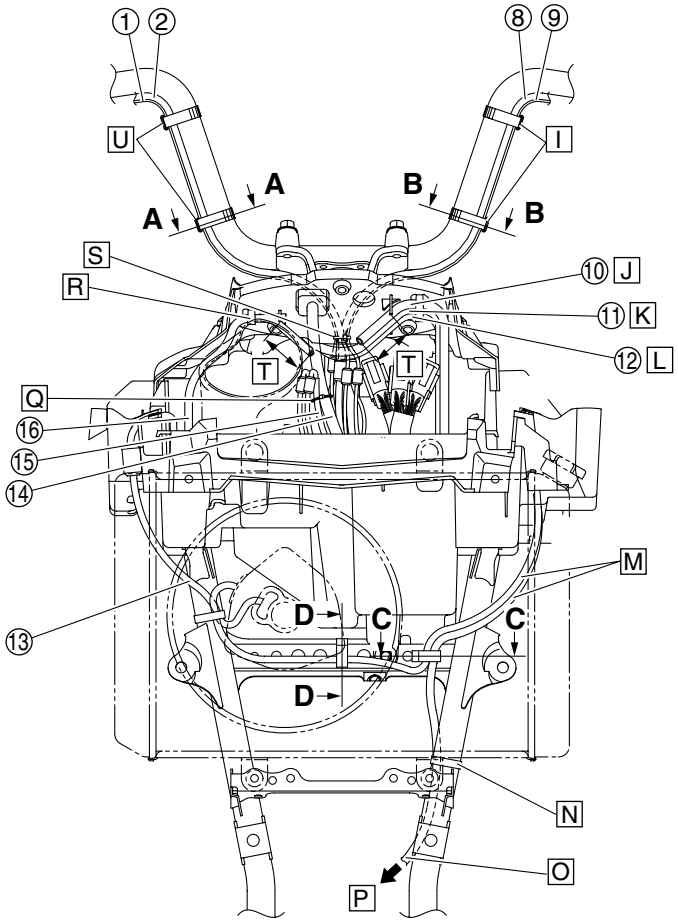
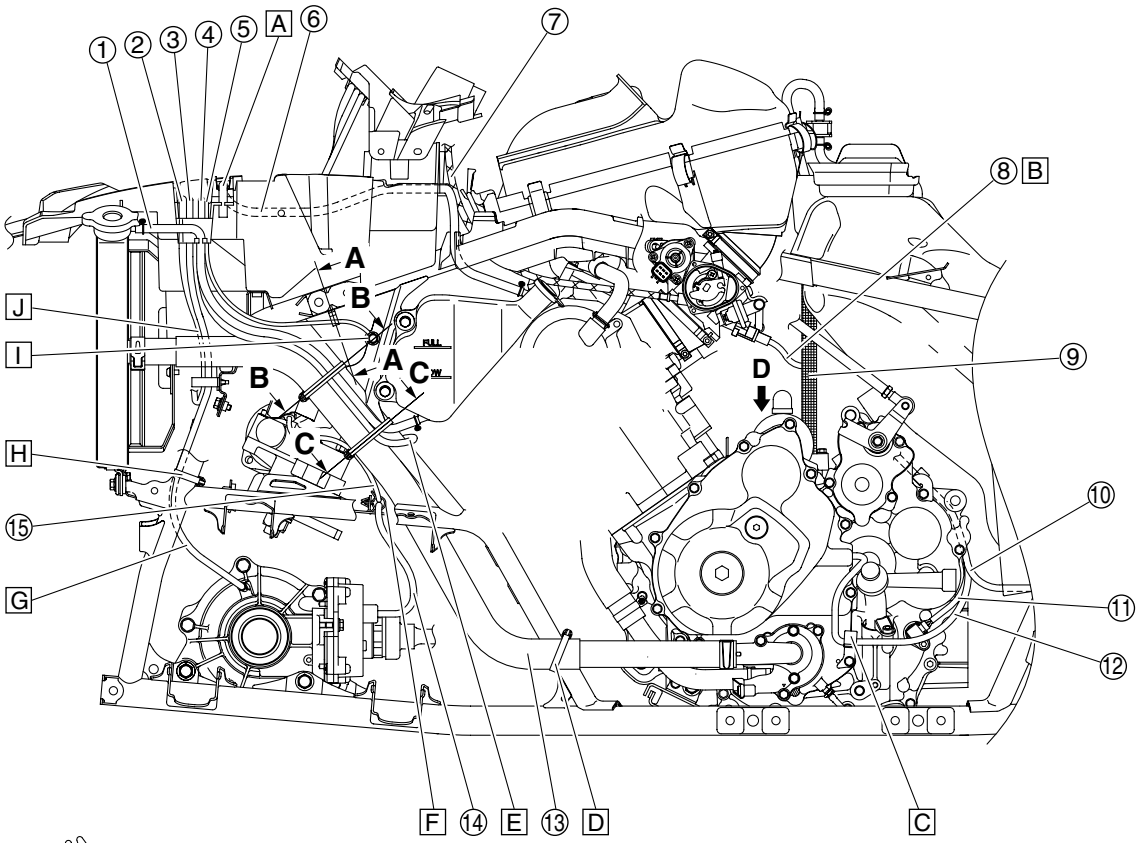




1. Front brake light switch lead
2. On-command four-wheel-drive motor switch and differential gear lock switch lead
3. Front brake hose
4. Throttle cable
5. Rear brake cable
6. Shift control cable
7. Rear brake hose
8. Left handlebar switch lead
9. Rear brake light switch lead
10. Differential case breather hose
11. Radiator fan motor breather hose
12. EPS motor breather hose (YFM5FGP/YFM7FGP only)
13. Radiator fan motor lead
14. Meter assembly lead
15. EPS control unit lead (YFM5FGP/YFM7FGP only)
16. Final drive case breather hose

A. Pass the front brake hose and throttle cable through the guide on the handlebar cover.
B. Pass the rear brake cable, shift control cable, and rear brake hose through the guide on the handlebar cover.
C. Route the rear brake cable, shift control cable, and rear brake hose in front of the left handlebar switch lead and rear brake light switch lead.
D. Pass the rear brake hose and throttle cable through the guide, making sure to route the cable behind the hose.
E. Pass the rear brake cable and shift control cable through the guide.
F. Pass the front brake hose through the guide.
G. Route the throttle cable behind the rear brake cable and shift control cable.
H. Route the front brake light switch lead, on-command four-wheel-drive motor switch and differential gear lock switch lead, left handlebar switch lead, and rear brake light switch lead over the throttle cable, rear brake cable, and shift control cable, then to the front of where the cables cross.
I. Fasten the left handlebar switch lead and rear brake light switch lead with the plastic bands at the bends in the handlebar, making sure to route the leads under the handlebar and to face the ends of the bands forward.
J. Pass the differential case breather hose through the guide on the meter bracket.
K. Pass the radiator fan motor breather hose through the guide on the meter bracket.
L. Pass the EPS motor breather hose through the guide on the meter bracket. (YFM5FGP/YFM7FGP only)
M. Route the radiator fan motor breather hose and differential case breather hose in front of the frame.
N. Fasten the differential case breather hose to the frame with the plastic band, making sure to face the end of the band inward.
O. Route the differential case breather hose to the inside of the frame.
P. To differential assembly
Q. Fasten the meter assembly lead and EPS control unit lead (YFM5FGP/YFM7FGP only) with a plastic locking tie. Be sure to fasten the plastic locking tie around the protective sleeves of the leads, not the leads themselves.
R. Pass the final drive case breather hose through the guide on the meter bracket.
S. Fasten the front brake light switch lead, on-command four-wheel-drive motor switch and differential gear lock switch lead, left handlebar switch lead, and rear brake light switch lead with a plastic locking tie. Be sure to fasten the plastic locking tie above the couplers and fasten it around the protective sleeves of the leads, not the leads themselves.
T. 20–50 mm (0.79–1.97 in)
U. Fasten the front brake light switch lead and on-command four-wheel-drive motor switch and differential gear lock switch lead with the plastic bands at the bends in the handlebar, making sure to route the leads under the handlebar and to face the ends of the bands forward.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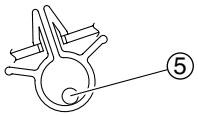
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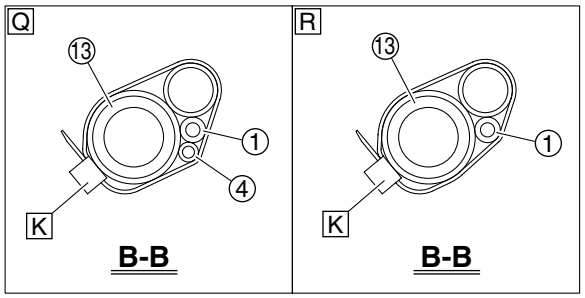
A-A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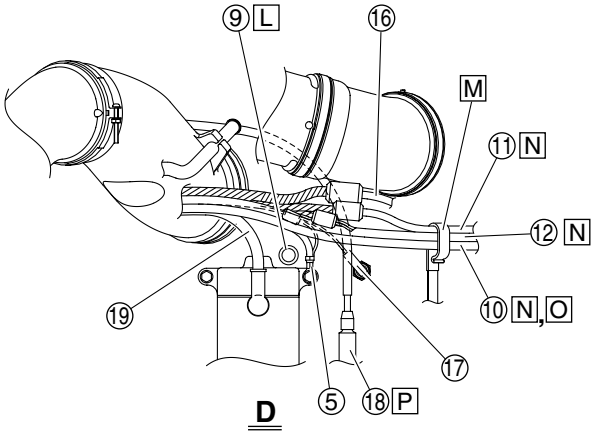
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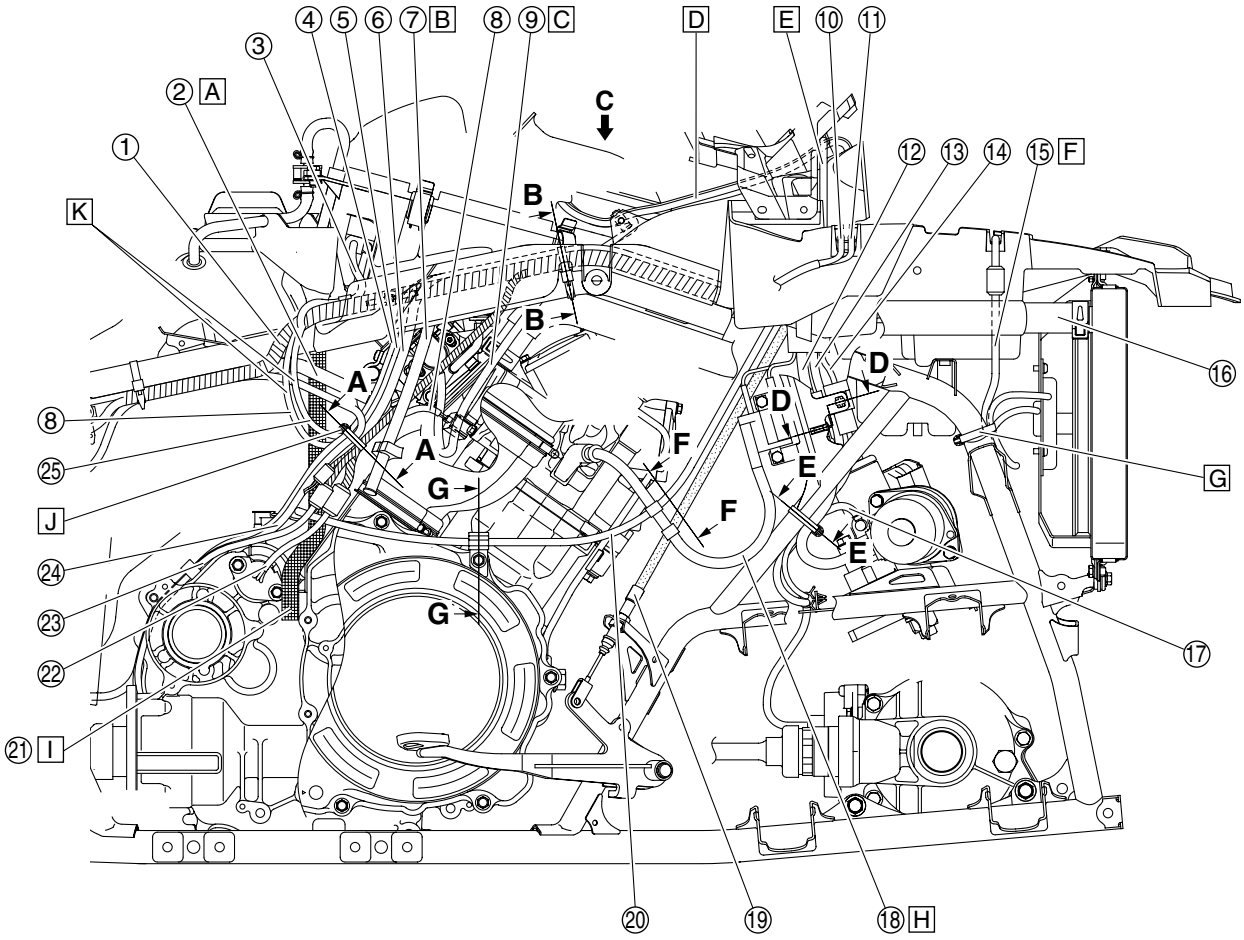
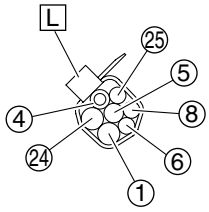
1. Coolant reservoir hose
2. Radiator fan motor breather hose
3. Differential case breather hose
4. EPS motor breather hose (YFM5FGP/YFM7FGP only)
5. Ground lead
6. Coolant reservoir breather hose
7. Throttle cable
8. Fuel injector lead
9. Fuel tank drain hose
10. Final drive case breather hose
11. Speed sensor lead
12. AC magneto/crankshaft position sensor lead
13. Radiator outlet hose
14. Differential motor lead
15. EPS torque sensor lead (YFM5FGP/YFM7FGP only)
16. Gear position switch lead
17. Reverse switch lead
18. Shift control cable
19. Starter motor lead

A. Face the end of the coolant reservoir breather hose downward.
B. Route the fuel injector lead to the inside of the fuel tank drain hose.
C. Pass the AC magneto/crankshaft position sensor lead through the holder.
D. Fasten the radiator outlet hose to the frame with the plastic band, making sure to face the end of the band inward.
E. Route the EPS motor breather hose under the coolant reservoir hose. (YFM5FGP/YFM7FGP only)
F. Place the EPS torque sensor lead (YFM5FGP/YFM7FGP only) and differential motor lead in the holder, and then insert the ends of the holder into the hole in the stay on the frame.
G. Route the differential case breather hose to the inside of the frame.
H. Fasten the differential case breather hose to the frame with the plastic band, making sure to face the end of the band inward.
I. Attach the ground lead terminal to the frame using the bolt.
J. Route the radiator fan motor breather hose and differential case breather hose to the inside of the radiator outlet hose.
K. Face the end of the plastic band inward.
L. Route the fuel tank drain hose as shown in the illustration.
M. Pass the speed sensor lead, AC magneto/crankshaft position sensor lead, and final drive case breather hose through the guide in the order listed.
N. Route the speed sensor lead, AC magneto/crankshaft position sensor lead, and final drive case breather hose to the right of the reverse switch.
O. Route the final drive case breather hose above the reverse switch lead and ground leads.
P. Route the shift control cable under the gear position switch lead, speed sensor lead, and AC magneto/crankshaft position sensor lead.
Q. YFM5FGP/YFM7FGP
R. YFM5FG/YFM7FG





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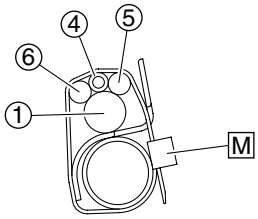

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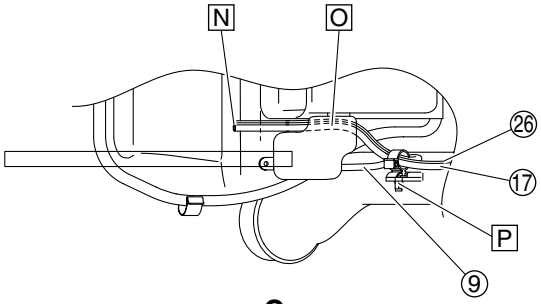

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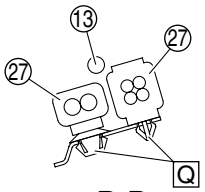

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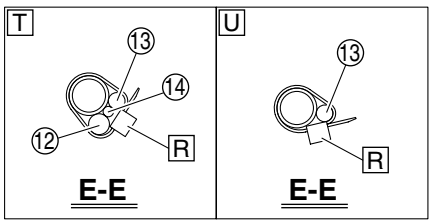

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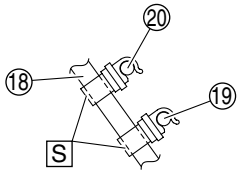
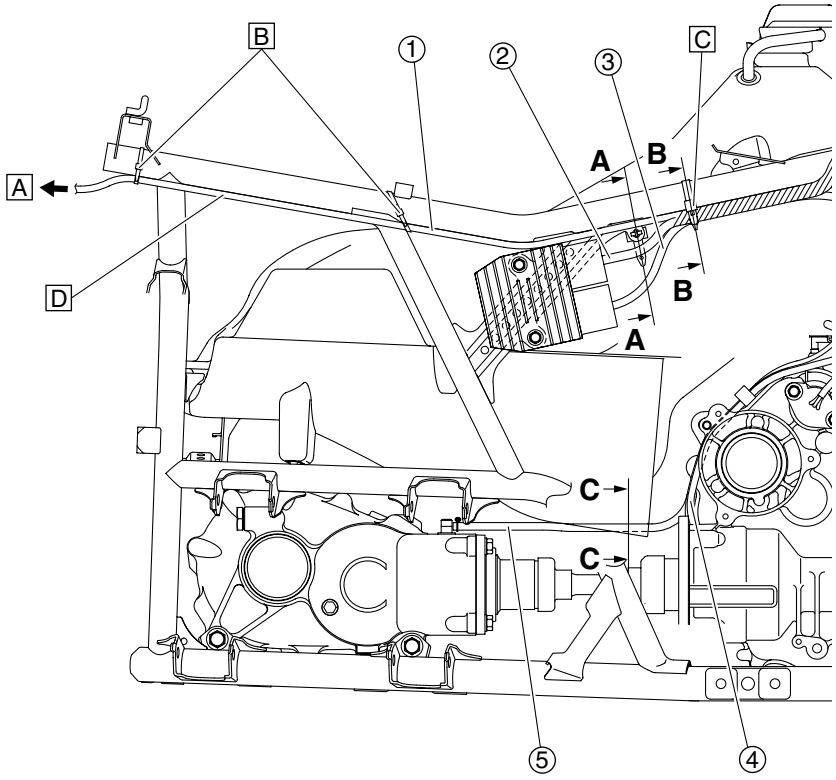


F-F

G-G

1. Wire harness
2. Fuel hose
3. Intake air temperature sensor lead
4. Final drive case breather hose
5. Ground lead
6. Starter motor lead
7. Air filter case breather hose
8. Coolant temperature sensor lead
9. Throttle body breather hose
10. Main switch lead
11. Auxiliary DC jack lead
12. EPS motor lead (YFM5FGP/YFM7FGP only)
13. Differential motor lead
14. EPS torque sensor lead (YFM5FGP/YFM7FGP only)
15. Radiator fan motor lead
16. Radiator inlet hose
17. EPS motor breather hose (YFM5FGP/YFM7FGP only)
18. Spark plug lead
19. Rear brake cable
20. Shift control cable
21. Fuel tank drain hose
22. Gear position switch lead
23. Speed sensor lead
24. AC magneto/crankshaft position sensor lead
25. Fuel injector lead
26. Radiator fan motor breather hose
27. EPS torque sensor coupler (YFM5FGP/YFM7FGP only)

A. Route the fuel hose between the wire harness and the fuel tank drain hose.
B. Route the air filter case breather hose to the outside of the leads, and then fasten the hose with the holder on V-belt cooling intake duct joint.
C. Route the throttle body breather hose under the coolant temperature sensor lead.
D. Route the EPS motor breather hose (YFM5FGP/YFM7FGP only) and radiator fan motor breather hose above the V-belt cooling intake duct.
E. Route the final drive case breather hose above the V-belt cooling intake duct.
F. Route the radiator fan motor lead between the electrical components tray and the radiator inlet hose.
G. Fasten the radiator fan motor lead and radiator fan motor breather hose to the frame with the plastic band, making sure to face the end of the band inward.
H. Route the spark plug lead to the outside of the rear brake cable and shift control cable.
I. Route the fuel tank drain hose to the inside of the leads and fuel hose, making sure to position the end of the drain hose as shown in the illustration.
J. Fasten the final drive case breather hose, ground lead, starter motor lead, fuel injector lead, coolant temperature sensor lead, AC magneto/crankshaft position sensor lead, and wire harness with the plastic band, making sure to position the band near the split in the wire harness.
K. Route the fuel injector lead and coolant temperature sensor lead to the inside of the ground lead, starter motor lead, final drive case breather hose, and wire harness.
L. Face the end of the plastic band inward.
M. Pass the plastic band through the hole in the plastic cover, and then fasten the wire harness, final drive case breather hose, ground lead, and starter motor lead with the band, making sure to face the end of the band downward.
N. The ends of the EPS motor breather hose (YFM5FGP/YFM7FGP only) and radiator fan motor breather hose should extend rearward past the inlet of air filter case as shown in the illustration.
O. Route the EPS motor breather hose (YFM5FGP/YFM7FGP only) and radiator fan motor breather hose under the air chamber.
P. Route the EPS motor breather hose (YFM5FGP/YFM7FGP only) and radiator fan motor breather hose rearward and pass them through the guide.
Q. Insert the projection on each coupler into the hole in the frame from the inside of the frame. (YFM5FGP/YFM7FGP only)
R. Face the end of the plastic band inward.
S. Fasten the spark plug lead with the larger diameter section of each holder.
T. YFM5FGP/YFM7FGP
U. YFM5FG/YFM7FG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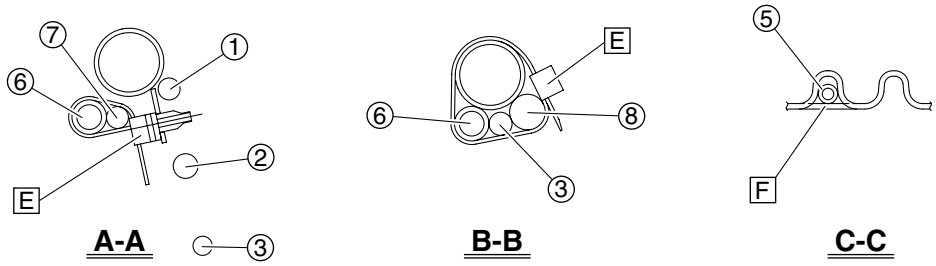
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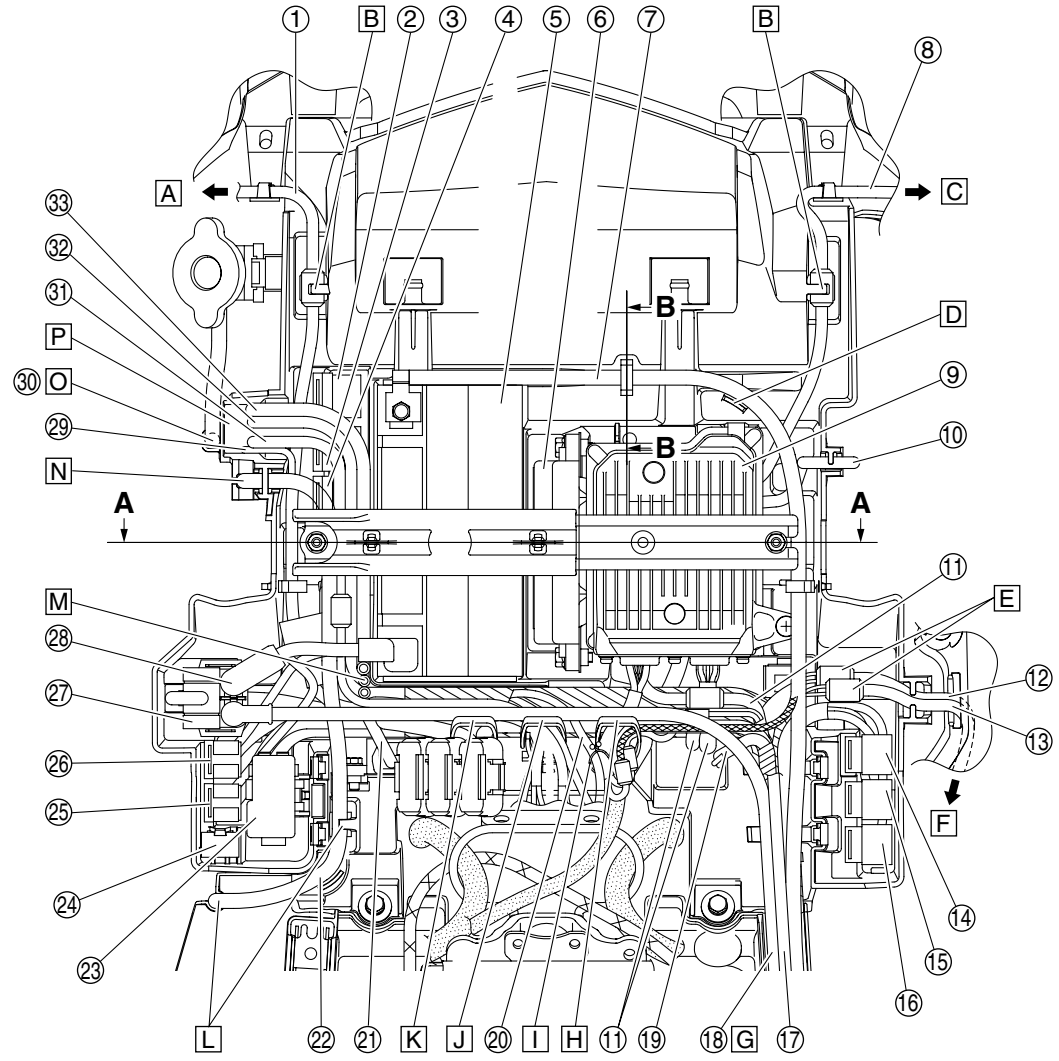
1. Tail/brake light lead
2. Rectifier/regulator lead
3. AC magneto lead
4. Speed sensor lead
5. Final drive case breather hose
6. Fuel hose
7. Fuel pump lead
8. Wire harness

A. To tail/brake light
B. Fasten the tail/brake light lead to the frame with plastic locking ties, making sure to face the end of each tie downward.
C. Install the plastic band near the split in the wire harness.
D. Route the tail/brake light lead to the outside of the frame.
E. Face the end of the plastic band downward.
F. Pass the final drive case breather hose through the guide.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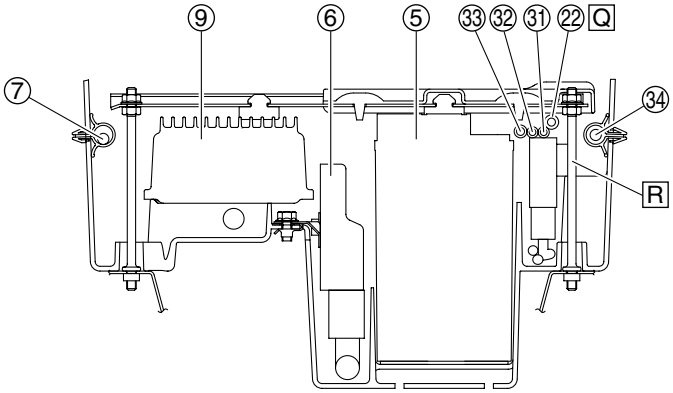
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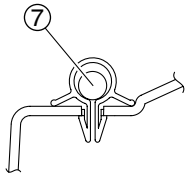
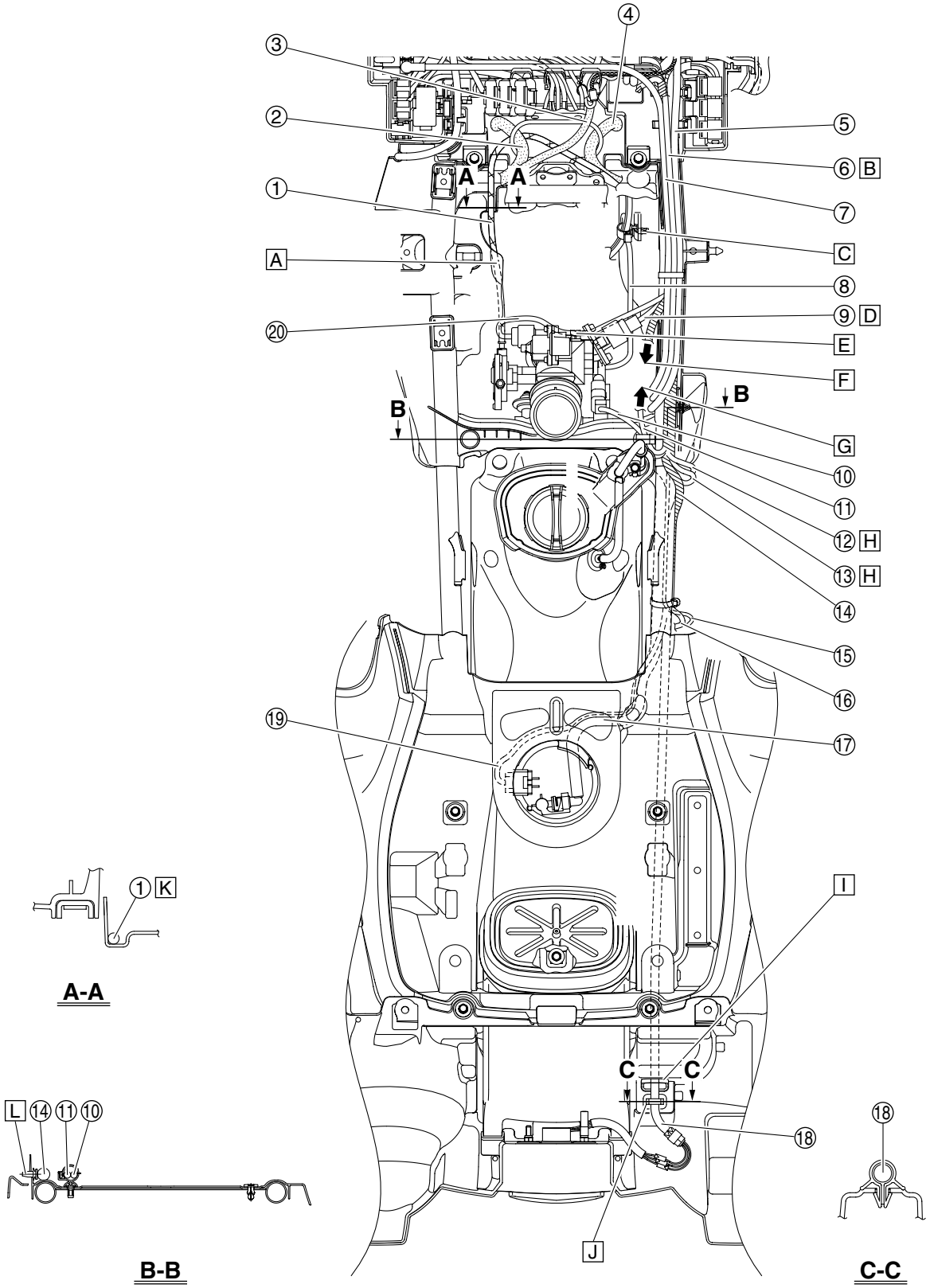

7

B-B

1. Left headlight lead
2. Four-wheel-drive motor relay 1
3. Four-wheel-drive motor relay 2
4. Headlight relay
5. Battery
6. ECU (engine control unit)
7. Negative battery lead
8. Right headlight lead
9. EPS (electric power steering) control unit (YFM5FGP/YFM7FGP only)
10. Radiator fan motor lead
11. EPS control unit lead (YFM5FGP/YFM7FGP only)
12. Auxiliary DC jack lead
13. Main switch lead
14. Radiator fan motor relay
15. Fuel injection system relay
16. Four-wheel-drive motor relay 3
17. Final drive case breather hose
18. Starter motor lead
19. Differential motor lead
20. Meter assembly lead
21. Lean angle sensor lead
22. Coolant reservoir breather hose
23. Fuse box
24. Spare fuse
25. Main fuse
26. EPS fuse (YFM5FGP/YFM7FGP only)
27. Starter relay
28. Positive battery lead
29. Ground lead
30. Coolant reservoir hose
31. EPS motor breather hose (YFM5FGP/YFM7FGP only)
32. Differential case breather hose
33. Radiator fan motor breather hose
34. Wire harness

A. To left headlight
B. Connect the headlight coupler, and then fasten the coupler with the holder on the electrical components tray.
C. To right headlight
D. Route the negative battery lead along the guide on the electrical components tray.
E. Place the couplers on the inside of the electrical components tray.
F. To main switch and auxiliary DC jack
G. Route the starter motor lead above the leads in the electrical components tray.
H. Fasten the EPS control unit lead with the holder. (YFM5FGP/YFM7FGP only)
I. Fasten the meter assembly lead and EPS control unit lead (YFM5FGP/YFM7FGP only) with the twist tie.
J. Fasten the left handlebar switch lead, on-command four-wheel-drive motor switch and differential gear lock switch lead, front brake light switch lead, and rear brake light switch lead with the holder.
K. Fasten the joint coupler lead with the holder.
L. Pass the coolant reservoir breather hose through the guides on the plastic cover and electrical components tray and route it under the positive battery lead and starter motor lead.
M. Route the hoses under the positive battery lead, and then route them upward, to the inside of the coolant reservoir breather hose.
N. Fasten the coolant reservoir breather hose with the holder on the electrical components tray.
O. Fasten the coolant reservoir hose with the holder on the electrical components tray.
P. Pass the hoses and ground lead through the opening in the electrical components tray.
Q. Route the coolant reservoir breather hose above the other hoses.
R. Route the hoses to the inside of the screw.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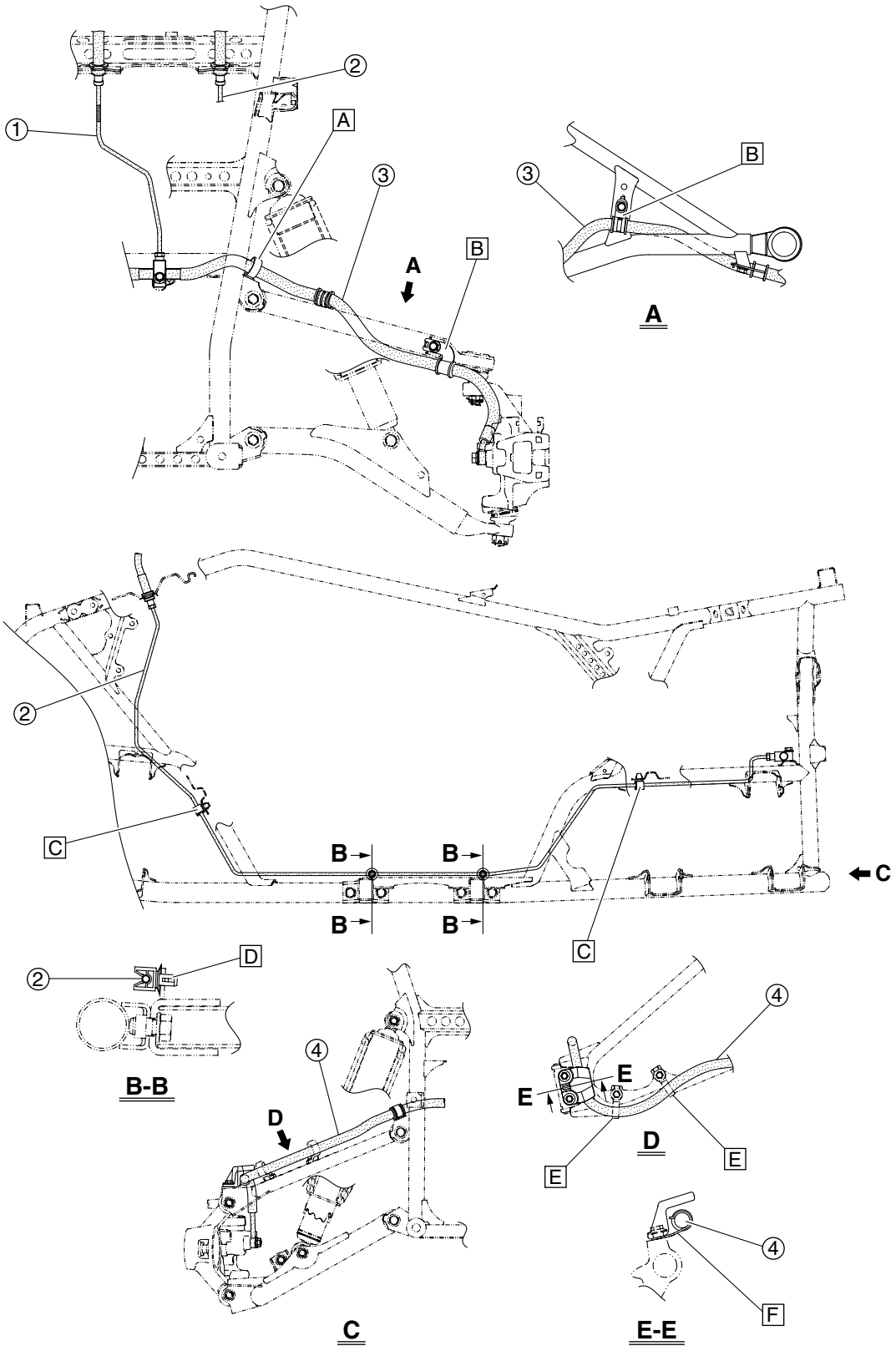
1. Throttle cable
2. Rear brake hose
3. Rear brake cable
4. Front brake hose
5. Negative battery lead
6. Final drive case breather hose
7. Starter motor lead
8. Throttle body breather hose
9. Intake air pressure sensor lead
10. TPS lead
11. Intake air temperature sensor lead
12. Fuel injector lead
13. Coolant temperature sensor lead
14. Wire harness
15. AC magneto lead
16. Rectifier/regulator lead
17. Fuel hose
18. Tail/brake light lead
19. Fuel pump lead
20. ISC unit lead

A. Route the throttle cable under the plastic cover.
B. Route the final drive case breather hose on top of the leads.
C. Fasten the radiator fan motor breather hose and throttle body breather hose with the holder.
D. Route the intake air pressure sensor lead to the front of the throttle body breather hose and above the ISC unit lead.
E. Fasten the ISC unit lead with the holder.
F. To engine
G. To air filter case
H. Route the fuel injector lead and coolant temperature sensor lead to the outside of the frame.
I. Pass the tail/brake light lead through the hole in the rear fender.
J. Fasten the tail/brake light lead with the holder, making sure that the coupler is positioned to the rear of the holder.
K. Pass the throttle cable through the guide on the plastic cover.
L. Insert the projection on the wire harness holder into the hole in the plastic cover.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1. Front brake pipe
2. Rear brake pipe
3. Front brake hose
4. Rear brake hose

A. Pass the front brake hose through the holder.
B. Fasten the front brake hose with the holder.
C. Pass the rear brake pipe through the holder.
D. Fasten the rear brake pipe with the holder.
E. Pass the rear brake hose through the holder.
F. Fasten the rear brake hose with the holder.

PERIODIC CHECKS AND ADJUSTMENTS

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EAS20450
PERIODIC MAINTENANCE

EAS20460
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.

EBU21742
PERIODIC MAINTENANCE CHART FOR THE EMISSION CONTROL SYSTEM
TIP
- For ATVs not equipped with an odometer or an hour meter, follow the month maintenance intervals.
- For ATVs equipped with an odometer or an hour meter, follow the km (mi) or hours maintenance intervals. However, keep in mind that if the ATV isn't used for a long period of time, the month maintenance intervals should be followed.
- Items marked with an asterisk should be performed by a Yamaha dealer as they require special tools, data and technical skills.

NO.		ITEM	CHECK OR MAINTENANCE JOB	Whichever comes first ⇨		INITIAL			EVERY	
					month	1	3	6	6	12
					km (mi)	320 (200)	1300 (800)	2500 (1600)	2500 (1600)	5000 (3200)
					hours	20	80	160	160	320
1	*	Fuel line	• Check fuel hoses for cracks or other damage, and replace if necessary.					√	√	√
2		Spark plug	• Check condition and clean, regap, or replace if necessary.			√	√	√	√	√
3	*	Valves	• Check valve clearance and adjust if necessary.			√		√	√	√
4	*	Crankcase breather system	• Check breather hose for cracks or other damage, and replace if necessary.					√	√	√
5	*	Exhaust system	• Check for leakage and replace gasket(s) if necessary. • Check for looseness and tighten all screw clamps and joints if necessary.					√	√	√
6		Spark arrester	• Clean.					√	√	√

EBU21864
GENERAL MAINTENANCE AND LUBRICATION CHART

NO.		ITEM	CHECK OR MAINTENANCE JOB	Whichever comes first ⇨		INITIAL			EVERY	
					month	1	3	6	6	12
					km (mi)	320 (200)	1300 (800)	2500 (1600)	2500 (1600)	5000 (3200)
					hours	20	80	160	160	320
1		Air filter element	• Clean and replace if necessary.			Every 20–40 hours (more often in wet or dusty areas)				
2	*	Front brake	• Check operation and correct if necessary. • Check fluid level and ATV for fluid leakage, and correct if necessary.			√	√	√	√	√
			• Replace brake pads.			Whenever worn to the limit				
3	*	Rear brake	• Check operation and correct if necessary. • Check brake pedal free play and adjust if necessary. • Check fluid level and ATV for fluid leakage, and correct if necessary.			√	√	√	√	√
			• Replace brake pads.			Whenever worn to the limit				

NO.		ITEM	CHECK OR MAINTENANCE JOB	Whichever comes first ⇨		INITIAL			EVERY	
					month	1	3	6	6	12
					km (mi)	320 (200)	1300 (800)	2500 (1600)	2500 (1600)	5000 (3200)
					hours	20	80	160	160	320
4	*	Brake hoses	• Check for cracks or other damage, and replace if necessary.				√	√	√	√
			• Replace.			Every 4 years				
5	*	Rear brake hose protectors	• Check for wear, cracks or other damage, and replace if necessary.			√	√	√	√	√
6	*	Wheels	• Check runout and for damage, and replace if necessary.			√		√	√	√
7	*	Tires	• Check tread depth and for damage, and replace if necessary. • Check air pressure and balance, and correct if necessary.			√		√	√	√
8	*	Wheel hub bearings	• Check for looseness or damage, and replace if necessary.			√		√	√	√
9	*	V-belt	• Check for wear, cracks or other damage, and replace if necessary.			√		√	√	√
10	*	Chassis fasteners	• Make sure that all nuts, bolts, and screws are properly tightened.			√	√	√	√	√
11	*	Shock absorber assemblies	• Check operation and correct if necessary. • Check for oil leakage and replace if necessary.					√	√	√
12	*	Stabilizer bushes	• Check for cracks or other damage, and replace if necessary.					√	√	√
13	*	Rear knuckle pivots	• Lubricate with lithium-soap-based grease.					√	√	√
14	*	Steering shaft	• Lubricate with lithium-soap-based grease.					√	√	√
15	*	Steering system	• Check operation and repair or replace if damaged. • Check toe-in and adjust if necessary.			√	√	√	√	√
16	*	Engine mount	• Check for cracks or other damage, and replace if necessary.					√	√	√
17	*	Axle boots	• Check for cracks or other damage, and replace if necessary.			√	√	√	√	√
18		Engine oil	• Change. • Check ATV for oil leakage, and correct if necessary.			√		√	√	√
19		Engine oil filter cartridge	• Replace.			√		√		√
20		Differential gear oil	• Change. • Check ATV for oil leakage, and correct if necessary.			√				√
21		Final gear oil	• Change. • Check ATV for oil leakage, and correct if necessary.			√				√
22		Cooling system	• Check coolant level and ATV for coolant leakage, and correct if necessary.			√	√	√	√	√
			• Replace coolant.			Every 2 years				
23	*	Moving parts and cables	• Lubricate.				√	√	√	√
24	*	Drive select lever safety system cable	• Check operation and adjust or replace if necessary.					√	√	√
25	*	Throttle lever housing and cable	• Check operation and correct if necessary. • Check throttle cable free play and adjust if necessary. • Lubricate throttle lever housing and cable.			√	√	√	√	√
26	*	Front and rear brake switches	• Check operation and correct if necessary.			√	√	√	√	√
27	*	Lights and switches	• Check operation and correct if necessary. • Adjust headlight beams.			√	√	√	√	√

EBU23070

TIP

- 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 cylinders and calipers, and change the brake fluid.
  - Replace the brake hoses every four years and if cracked or damaged.

EAS20472
ENGINE

EAS20520
ADJUSTING THE VALVE CLEARANCE

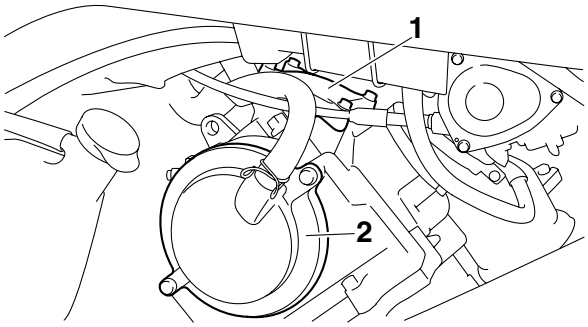
The following procedure applies to all of the valves.

TIP

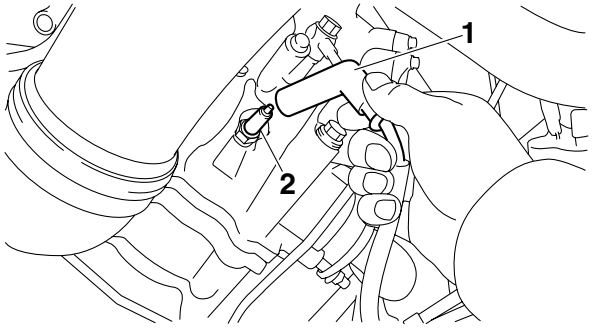
- Valve clearance adjustment should be made on a cold engine, at room temperature.
- When the valve clearance is to be measured or adjusted, the piston must be at top dead center (TDC) on the compression stroke.

1. Remove:
   - Left side panel
   - Right side panel
   - Front fender
   - Footrest board
   - Air filter case

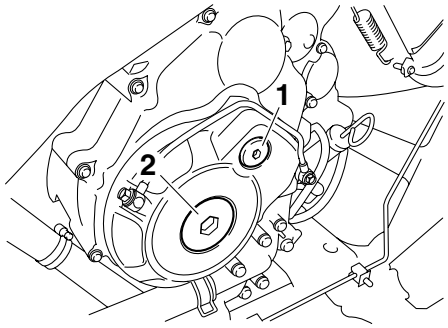
   Refer to "GENERAL CHASSIS" on page 4-1.
2. Remove:
   - Intake tappet cover "1"
   - Exhaust tappet cover
   - Camshaft sprocket cover "2"



3. Disconnect:
   - Spark plug cap "1"
4. Remove:
   - Spark plug "2"



5. Remove:
   - Timing mark accessing screw "1"
   - Crankshaft end accessing screw "2"



6. Measure:
   - Valve clearance

   Out of specification → Adjust.

Valve clearance (cold)
Intake
0.09–0.13 mm (0.0035–0.0051 in)
Exhaust
0.16–0.20 mm (0.0063–0.0079 in)

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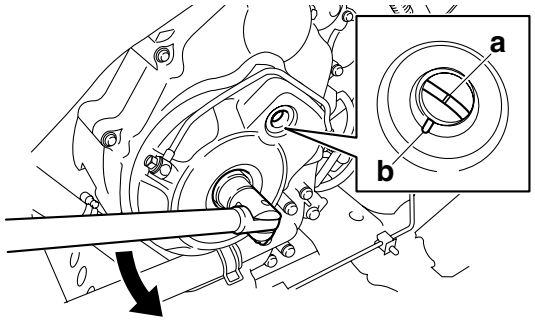
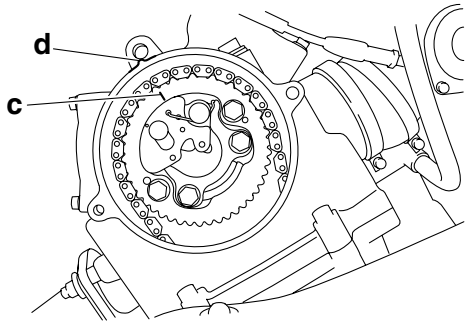
a. Turn the crankshaft counterclockwise.
b. When the piston is at TDC on the compression stroke, align the "I" mark "a" on the AC magneto rotor with the stationary pointer "b" on the AC magneto cover.



TIP

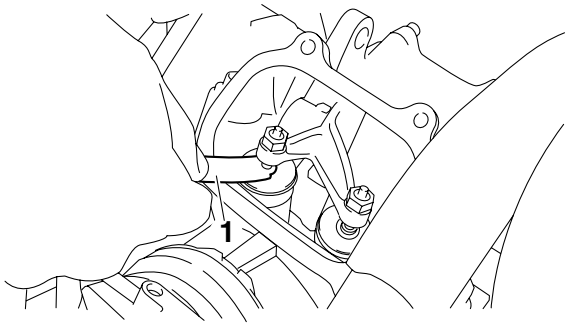
To position the piston at TDC on the compression stroke, align the "I" mark "c" on the camshaft sprocket with the stationary pointer "d" on the cylinder head, as shown in the illustration.



c. Measure the valve clearance with a thickness gauge "1".

Out of specification → Adjust.

Thickness gauge
90890-03079
Narrow gauge set
YM-34483



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7. Adjust:
   • Valve clearance

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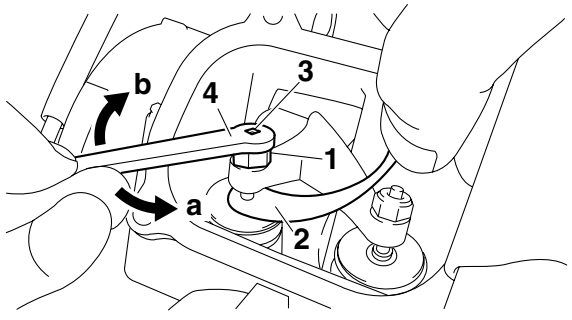
a. Loosen the locknut "1".
b. Insert a thickness gauge "2" between the end of the adjusting screw and the valve tip.
c. Turn the adjusting screw "3" in direction "a" or "b" with the tappet adjusting tool "4" until the specified valve clearance is obtained.

Tappet adjusting tool
90890-01311
Six piece tappet set
YM-A5970

Direction "a"
Valve clearance is increased.
Direction "b"
Valve clearance is decreased.



d. Hold the adjusting screw to prevent it from moving and tighten the locknut to specification.

Valve adjusting screw locknut
14 Nm (1.4 m·kg, 10 ft·lb)

e. Measure the valve clearance again.
f. If the valve clearance is still out of specification, repeat all of the valve clearance adjustment steps until the specified clearance is obtained.

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8. Install:
   • Timing mark accessing screw
   • Crankshaft end accessing screw

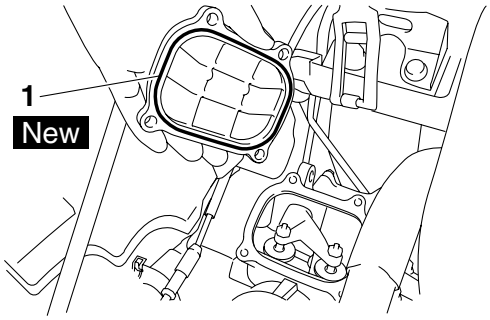
Timing mark accessing screw
6 Nm (0.6 m·kg, 4.3 ft·lb)
Crankshaft end accessing screw
10 Nm (1.0 m·kg, 7.2 ft·lb)

9. Install:
   • Spark plug

Spark plug
13 Nm (1.3 m·kg, 9.4 ft·lb)

10. Connect:
    • Spark plug cap
11. Install:
    • O-rings "1" New
    • Camshaft sprocket cover
    • Intake tappet cover
    • Exhaust tappet cover

Camshaft sprocket cover bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)
Tappet cover bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)

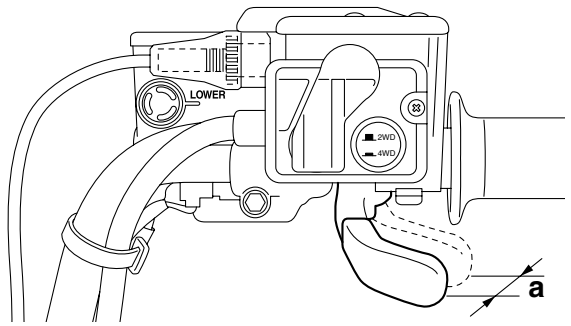


12. Install:
    • Air filter case
    • Footrest board
    • Front fender
    • Right side panel
    • Left side panel
    Refer to "GENERAL CHASSIS" on page 4-1.

EAS20660
ADJUSTING THE THROTTLE LEVER FREE PLAY

1. Check:
   • Throttle lever free play "a"
   Out of specification → Adjust.

Throttle lever free play
3.0–5.0 mm (0.12–0.20 in)



2. Remove:
   • Left side panel
   Refer to "GENERAL CHASSIS" on page 4-1.
3. Adjust:
   • Throttle lever free play

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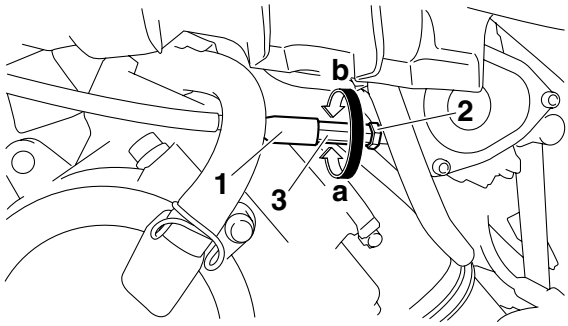
Throttle body side

a. Slide back the rubber cover "1".
b. Loosen the locknut "2" on the throttle body side.
c. Turn the adjusting nut "3" in direction "a" or "b" until the correct free play is obtained.

Direction "a"
Free play is increased.
Direction "b"
Free play is decreased.



d. Tighten the locknut.
e. Slide the rubber cover to its original position.

TIP

If the free play cannot be adjusted here, adjust it at the handlebar side of the cable.

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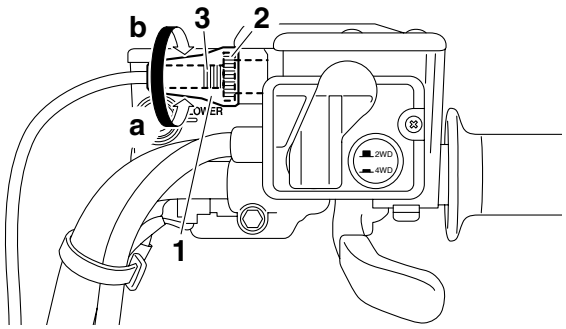
Handlebar side

a. Slide back the rubber cover "1".
b. Loosen the locknut "2".
c. Turn the adjusting bolt "3" in direction "a" or "b" until the correct free play is obtained.

Direction "a"
Free play is increased.
Direction "b"
Free play is decreased.



d. Tighten the locknut.
e. Slide the rubber cover to its original position.

EWA28P1004

⚠ WARNING

After adjusting the free play, turn the handlebar to the right and left to make sure that the engine idling speed does not increase.

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4. Install:
   • Left side panel
   Refer to "GENERAL CHASSIS" on page 4-1.

EAS29170
ADJUSTING THE SPEED LIMITER

The speed limiter keeps the throttle from becoming fully-opened even when the throttle lever is applied to the maximum position. Screwing in the adjusting screw stops the engine speed from increasing.

1. Measure:
   • Speed limiter length
   Out of specification → Adjust.

Speed limiter length
Less than 12 mm (0.47 in)

2. Adjust:
   • Speed limiter length “a”

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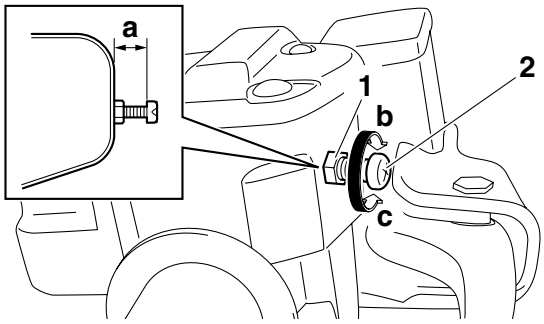
a. Loosen the locknut “1”.
b. Turn the adjuster “2” in direction “b” or “c” until the specified speed limiter length is obtained.

Direction “b”
Speed limiter length is decreased.
Direction “c”
Speed limiter length is increased.



c. Tighten the locknut.

EWA14880

⚠ WARNING

- **Particularly for a beginner rider, the speed limiter should be screwed in completely. Screw it out little by little as their riding technique improves. Never remove the speed limiter for a beginning rider.**
- **For proper throttle lever operation, do not turn out the adjuster more than the specified length. Also, always adjust the throttle cable free play to within specification.**

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EAS20690

CHECKING THE SPARK PLUG

1. Remove:
   • Right side panel
   Refer to “GENERAL CHASSIS” on page 4-1.
2. Disconnect:
   • Spark plug cap
3. Remove:
   • Spark plug

ECA13330

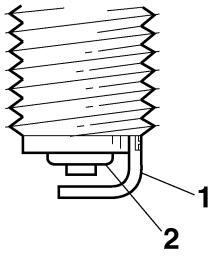
NOTICE

Before removing the spark plug, blow away any dirt accumulated in the spark plug well with compressed air to prevent it from falling into the cylinder.

4. Check:
   • Spark plug type
   Incorrect → Change.

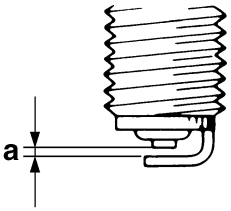
Manufacturer/model
NGK/LMAR6A-9

5. Check:
   • Electrode “1”
   Damage/wear → Replace the spark plug.
   • Insulator “2”
   Abnormal color → Replace the spark plug.
   Normal color is medium-to-light tan.



6. Clean:
   • Spark plug
   (with a spark plug cleaner or wire brush)
7. Measure:
   • Spark plug gap “a”
   (with a wire thickness gauge)
   Out of specification → Regap.

Spark plug gap
0.8–0.9 mm (0.031–0.035 in)



8. Install:
   • Spark plug

Spark plug
13 Nm (1.3 m·kg, 9.4 ft·lb)

TIP

Before installing the spark plug, clean the spark plug and gasket surface.

9. Connect:
   • Spark plug cap

10.Install:
- Right side panel
  Refer to “GENERAL CHASSIS” on page 4-1.

EAS20700
CHECKING THE IGNITION TIMING

TIP

Prior to checking the ignition timing, check the wiring connections of the entire ignition system. Make sure all connections are tight and free of corrosion.

1. Remove:
   - Left side panel
   - Right side panel
   - Footrest board
   Refer to “GENERAL CHASSIS” on page 4-1.
2. Connect:
   - Timing light
   (onto the spark plug lead)
   - Digital tachometer
   (onto the spark plug lead)

Digital tachometer
90890-06760
YU-39951-B
Timing light
90890-03141
Inductive clamp timing light
YU-03141

3. Check:
   - Ignition timing

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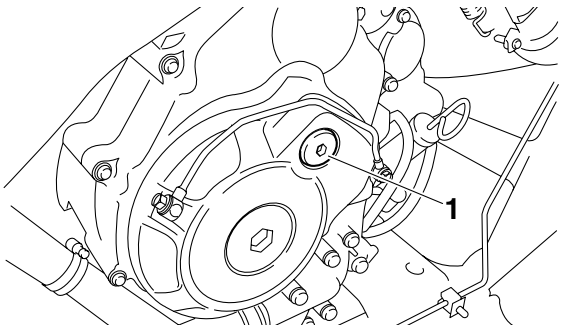
a. Start the engine, warm it up for several minutes, and then let it run at the specified engine idling speed.

Engine idling speed
1550–1650 r/min

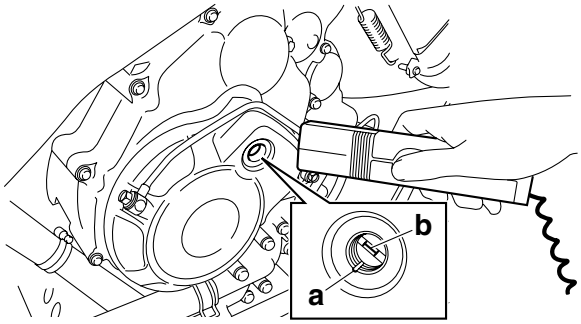
b. Remove the timing mark accessing screw “1”.



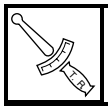
c. Visually check the stationary pointer “a” to verify it is within the required firing range “b” indicated on the AC magneto rotor.
   Incorrect firing range → Check the ignition system.

TIP

When checking the ignition timing, make sure that the timing light cord does not come in contact with the exhaust muffler.



d. Install the timing mark accessing screw.



Timing mark accessing screw
6 Nm (0.6 m·kg, 4.3 ft·lb)

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4. Detach:
   - Timing light
   - Tachometer
5. Install:
   - Footrest board
   - Right side panel
   - Left side panel
   Refer to “GENERAL CHASSIS” on page 4-1.

EAS20710
MEASURING THE COMPRESSION PRESSURE

TIP

Insufficient compression pressure will result in a loss of performance.

1. Measure:
   - Valve clearance
   Out of specification → Adjust.
   Refer to “ADJUSTING THE VALVE CLEARANCE” on page 3-4.
2. Start the engine, warm it up for several minutes, and then turn it off.
3. Remove:
   - Right side panel
   Refer to “GENERAL CHASSIS” on page 4-1.
4. Disconnect:
   - Spark plug cap
5. Remove:
   - Spark plug

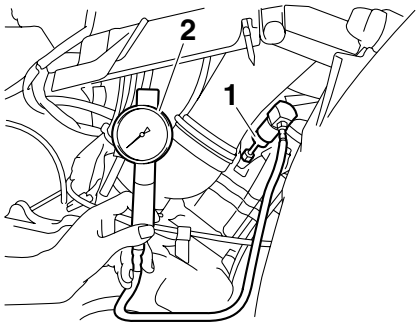
ECA28P1041

NOTICE

Before removing the spark plug, use compressed air to blow away any dirt accumulated in the spark plug well to prevent it from falling into the cylinder.

6. Attach:
   - Extension "1"
   - Compression gauge "2"

Compression gauge
90890-03081
Engine compression tester
YU-33223
Extension
90890-04082



7. Measure:
   - Compression pressure
     Out of specification → Refer to steps (c) and (d).

Standard compression pressure (at sea level)
480 kPa (4.8 kgf/cm², 68.3 psi) (YFM5FGY/YFM5FGPY)
450 kPa (4.5 kgf/cm², 64.0 psi) (YFM7FGY/YFM7FGPY)
Minimum–maximum
420–540 kPa (4.2–5.4 kgf/cm², 59.7–76.8 psi) (YFM5FGY/YFM5FGPY)
390–500 kPa (3.9–5.0 kgf/cm², 55.5–71.1 psi) (YFM7FGY/YFM7FGPY)

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a. Set the main switch to "ON".
b. With the throttle wide open, crank the engine until the reading on the compression gauge stabilizes.

EWA28P1005

⚠ WARNING

To prevent sparking, ground the spark plug lead before cranking the engine.

c. If the compression pressure is above the maximum specification, check the cylinder head, valve surfaces and piston crown for carbon deposits.
   Carbon deposits → Eliminate.
d. If the compression pressure is below the minimum specification, pour a teaspoonful of engine oil into the spark plug bore and measure again.
   Refer to the following table.

Compression pressure (with oil applied into the cylinder)	
Reading	Diagnosis
Higher than without oil	Piston ring(s) wear or damage → Repair.
Same as without oil	Piston, valves, cylinder head gasket or piston ring(s) possibly defective → Repair.

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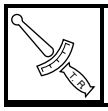
8. Install:
   - Spark plug



Spark plug
13 Nm (1.3 m·kg, 9.4 ft·lb)

9. Connect:
   - Spark plug cap
10. Install:
    - Right side panel
      Refer to "GENERAL CHASSIS" on page 4-1.

EAS20750

CHECKING THE ENGINE OIL LEVEL

1. Place the vehicle on a level surface.
2. Check the engine oil level on a cold engine.

TIP

If the engine was started before checking the oil level, be sure to warm up the engine sufficiently, and then wait at least 10 minutes until the oil settles for an accurate reading.

3. Remove:
   - Dipstick accessing panel
     Refer to "GENERAL CHASSIS" on page 4-1.
4. Check:
   - Engine oil level
     The engine oil level should be between the minimum level mark "a" and maximum level mark "b".
     Below the minimum level mark → Add the recommended engine oil to the proper level.

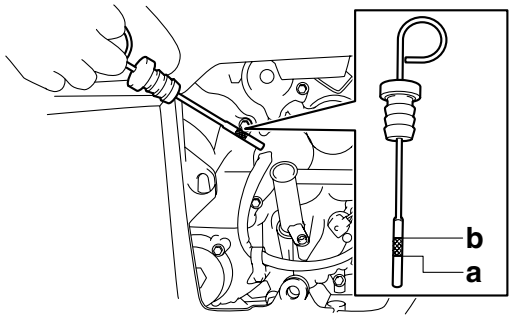
ECA28P1009

NOTICE

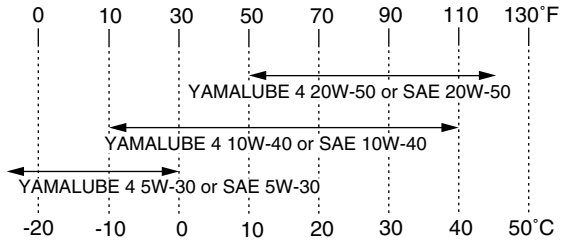
Do not allow foreign materials to enter the crankcase.

TIP

To obtain an accurate oil level reading, the dipstick must be inserted completely into the oil filter hole.



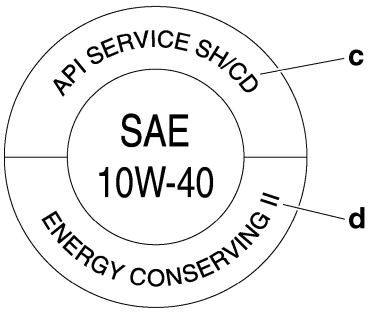
Type
YAMALUBE 4 5W-30 or 10W-40 or 20W-50, SAE 5W-30 or SAE 10W-40 or SAE 20W-50
Recommended engine oil grade
API service SG type or higher, JASO standard MA



ECA28P1004

NOTICE

- **Engine oil also lubricates the clutch and the wrong oil types or additives could cause clutch slippage. Therefore, do not add any chemical additives or use engine oils with a grade of CD "c" or higher and do not use oils labeled "ENERGY CONSERVING II" "d".**
- **Do not allow foreign materials to enter the crankcase.**



5. Check the engine oil level again.

ECA28P1010

NOTICE

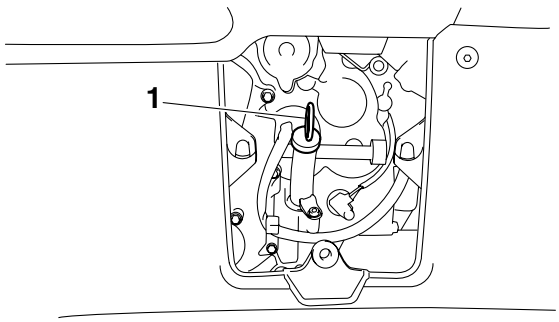
Be sure the engine oil is at the correct level, otherwise engine damage may result.

6. Install:
   - Dipstick accessing panel
     Refer to "GENERAL CHASSIS" on page 4-1.

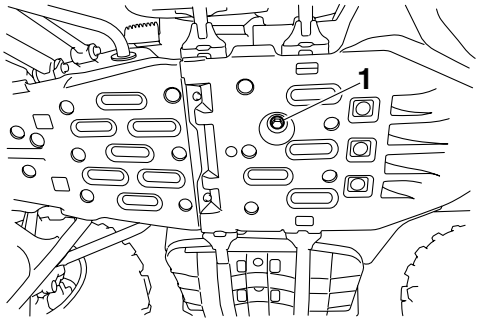
EAS20780

CHANGING THE ENGINE OIL

1. Start the engine, warm it up for several minutes, and then turn it off.
2. Place a container under the engine oil drain bolt.
3. Remove:
   - Dipstick accessing panel
     Refer to "GENERAL CHASSIS" on page 4-1.
4. Remove:
   - Dipstick "1"



5. Remove:
   - Engine oil drain bolt "1" (along with the gasket)



6. Drain:
   • Engine oil
   (completely from the crankcase)
7. If the oil filter cartridge is also to be replaced, perform the following procedure.

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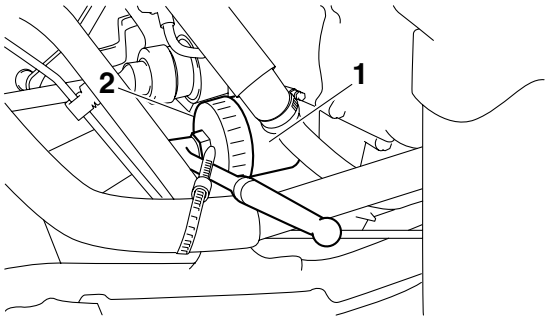
a. Remove the oil filter cartridge "1" with an oil filter wrench "2".

Oil filter wrench
90890-01426
YU-38411

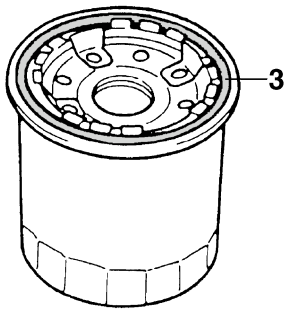


b. Lubricate the O-ring "3" of the new oil filter cartridge with a thin coat of engine oil.

ECA13390

NOTICE

Make sure the O-ring "3" is positioned correctly in the groove of the oil filter cartridge.



c. Tighten the new oil filter cartridge to specification with an oil filter wrench.

Oil filter cartridge
17 Nm (1.7 m·kg, 12 ft·lb)

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8. Check:
   • Engine oil drain bolt gasket
   Damage → Replace.
9. Install:
   • Engine oil drain bolt
   (along with the gasket)

Engine oil drain bolt
30 Nm (3.0 m·kg, 22 ft·lb)

10. Fill:
   • Crankcase
   (with the specified amount of the recommended engine oil)

Engine oil quantity
Total amount
2.40 L (2.54 US qt, 2.11 Imp.qt)
Without oil filter cartridge replacement
2.00 L (2.11 US qt, 1.76 Imp.qt)
With oil filter cartridge replacement
2.10 L (2.22 US qt, 1.85 Imp.qt)

11. Install:
   • Dipstick
12. Start the engine, warm it up for several minutes, and then turn it off.
13. Check:
   • Engine
   (for engine oil leaks)
14. Check:
   • Engine oil level
   Refer to "CHECKING THE ENGINE OIL LEVEL" on page 3-9.
15. Check:
   • Engine oil pressure

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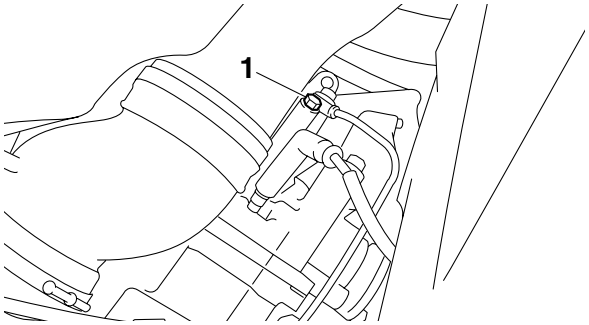
a. Slightly loosen the oil check bolt "1".



b. Start the engine and keep it idling until engine oil starts to seep from the oil check bolt. If no engine oil comes out after one minute, turn the engine off so that it will not seize.
c. Check the engine oil passages, the oil filter cartridge and the oil pump for damage or leakage. Refer to "CRANKSHAFT AND OIL PUMP" on page 5-68.
d. Start the engine after solving any problems and check the engine oil pressure again.
e. Tighten the oil check bolt to specification.

	Oil check bolt **10 Nm (1.0 m·kg, 7.2 ft·lb)**

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EAS20951

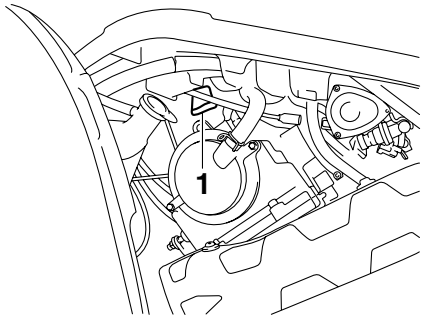
CLEANING THE AIR FILTER ELEMENT

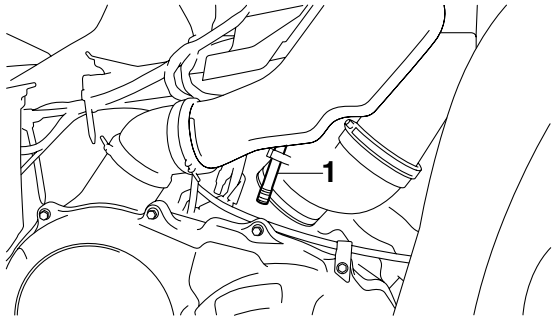
1. Remove:
   - Fuel tank cover
   - Left side panel
   - Right side panel

   Refer to "GENERAL CHASSIS" on page 4-1.

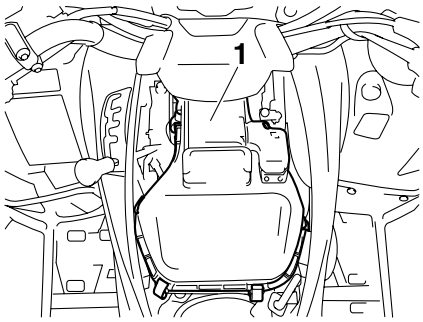
TIP

There are two check hoses "1" at the bottom of the air filter case. If dust and/or water collects in them, clean the air filter element, air filter mesh and air filter case.





2. Remove:
   - Air filter case cover "1"

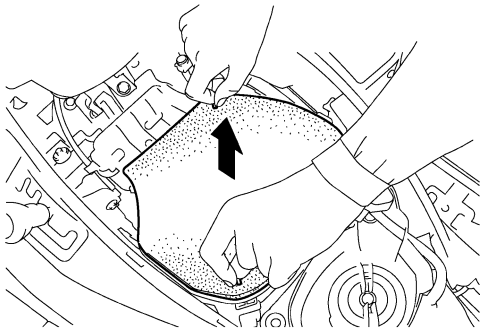


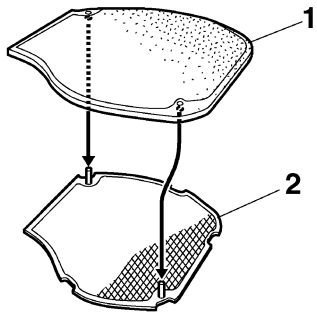
3. Remove:
   - Air filter element "1"
   - Air filter element frame "2"

ECA28P1011

NOTICE

The engine should never be run without the air filter; excessive piston and/or cylinder wear may result.





4. Check:
   - Air filter element
   - Air filter element frame

   Damage → Replace.
5. Clean:
   - Air filter element

   (with solvent)

EWA13020

⚠ WARNING

Never use low flash point solvents, such as gasoline, to clean the air filter element. Such solvents may cause a fire or an explosion.

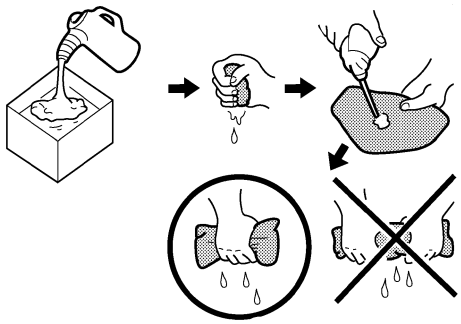
ECA13430

NOTICE

Do not twist the air filter element when squeezing it.

TIP

After cleaning, carefully pat the air filter element on a clean cloth to remove the excess solvent.



6. Apply the recommended oil to the entire surface of the air filter element and then carefully pat the air filter element on a clean cloth to remove the excess oil. The air filter element should be wet but not dripping.

Air filter oil grade
Foam air filter oil

7. Install:
   - Air filter element frame
   - Air filter element
   - Air filter case cover
     (along with the gasket)

TIP

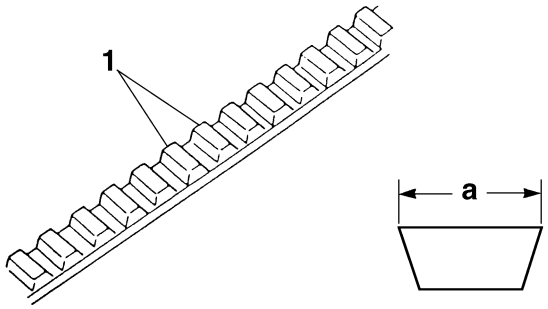
Make sure the air filter element and air filter element frame are properly installed in the air filter case.

8. Install:
   - Right side panel
   - Left side panel
   - Fuel tank cover
     Refer to "GENERAL CHASSIS" on page 4-1.

EAS20970
CHECKING THE V-BELT

1. Remove:
   - Drive belt cover
     Refer to "PRIMARY AND SECONDARY SHEAVES" on page 5-47.
2. Check:
   - V-belt "1"
     Cranks/damage/wear → Replace.
     Grease/oil → Clean the primary and secondary sheaves.
     Refer to "REPLACING THE V-BELT" on page 3-13.
3. Measure:
   - V-belt width "a"
     Out of specification → Replace.
     Refer to "REPLACING THE V-BELT" on page 3-13.

V-belt width
33.3 mm (1.31 in)
Limit
30.0 mm (1.18 in)



4. Install:
   - Drive belt cover
     Refer to "PRIMARY AND SECONDARY SHEAVES" on page 5-47.

EAS28P1006
REPLACING THE V-BELT

1. Replace:
   - V-belt

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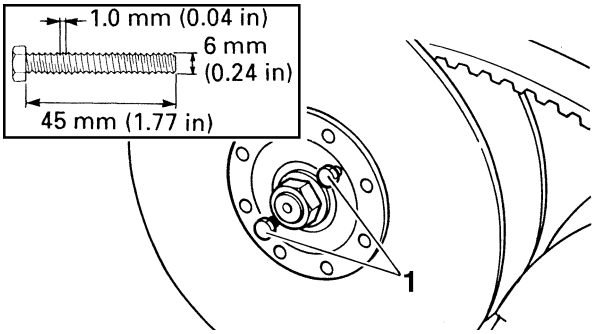
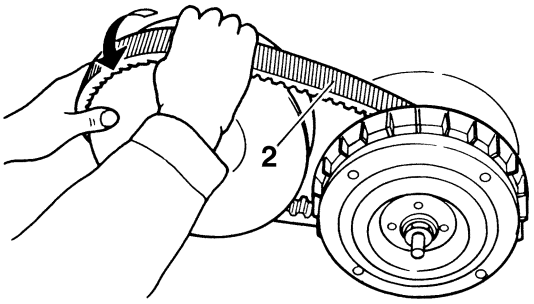
a. Install the bolts "1" (90101-06016) into the secondary fixed sheave holes.

TIP

Tightening the bolts "1" will push the secondary sliding sheave away, causing the gap between the secondary fixed and sliding sheaves to widen.



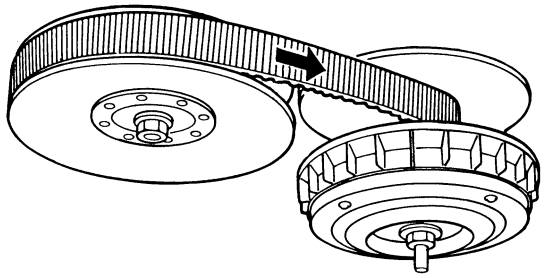
b. Remove the V-belt "2" from the primary sheave and secondary sheave.



c. Install the V-belt.

TIP

Install the V-belt so that its arrow faces the direction shown in the illustration.



d. Remove the bolts.

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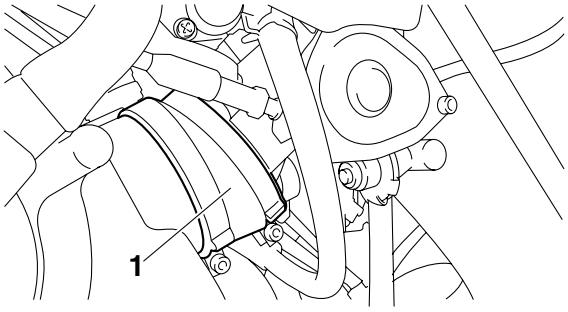
EAS21020

CHECKING THE THROTTLE BODY JOINT

1. Remove:
   - Left side panel
     Refer to "GENERAL CHASSIS" on page 4-1.
2. Check:
   - Throttle body joint "1"
     Cracks/damage → Replace.

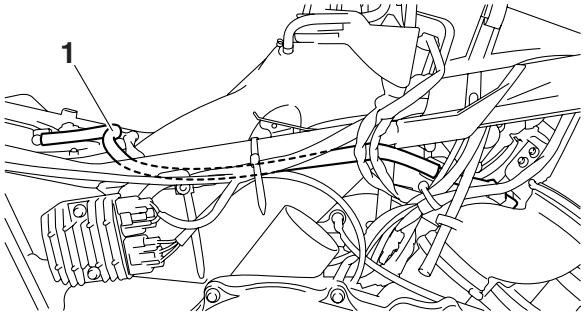


3. Install:
   - Left side panel
     Refer to "GENERAL CHASSIS" on page 4-1.

EAS21030

CHECKING THE FUEL LINE

1. Remove:
   - Seat
   - Right side panel
   - Rear fender
     Refer to "GENERAL CHASSIS" on page 4-1.
   - V-belt cooling exhaust duct
     Refer to "ENGINE REMOVAL" on page 5-1.
2. Check:
   - Fuel hose "1"
     Cracks/damage → Replace.
     Loose connection → Connect properly.



3. Install:
   - V-belt cooling exhaust duct
     Refer to "ENGINE REMOVAL" on page 5-1.
   - Rear fender
   - Right side panel
   - Seat
     Refer to "GENERAL CHASSIS" on page 4-1.

EAS21050

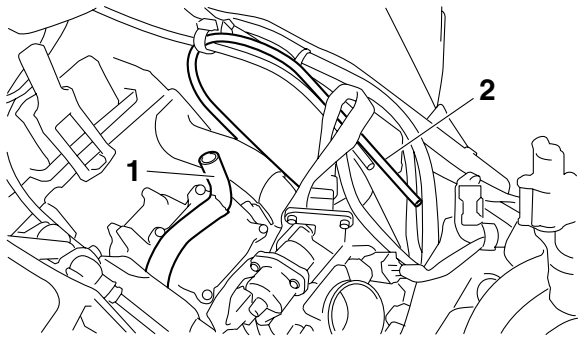
CHECKING THE BREATHER HOSES

1. Remove:
   - Left side panel
   - Air filter case
     Refer to "GENERAL CHASSIS" on page 4-1.
2. Check:
   - Cylinder head breather hose "1"
   - Throttle body breather hose "2"
     Cracks/damage → Replace.
     Loose connection → Connect properly.

ECA14920

NOTICE

Make sure the cylinder head breather hose is routed correctly.



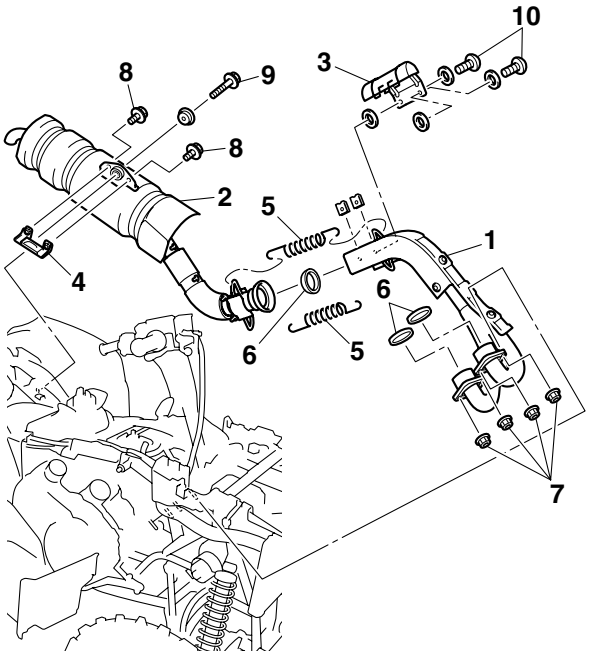
3. Install:
   - Air filter case

• Left side panel
Refer to “GENERAL CHASSIS” on page 4-1.

EAS21080
CHECKING THE EXHAUST SYSTEM

1. Check:
   • Exhaust pipe “1”
   • Muffler “2”
   • Exhaust pipe protector “3”
   • Muffler bracket “4”
   • Springs “5”
   Cracks/damage → Replace.
   • Gaskets “6”
   Exhaust gas leaks → Replace.
2. Check:
   • Tightening torque

Exhaust pipe nut “7”
14 Nm (1.4 m·kg, 10 ft·lb)
Muffler and muffler bracket bolt “8”
20 Nm (2.0 m·kg, 14 ft·lb)
Muffler bolt “9”
20 Nm (2.0 m·kg, 14 ft·lb)
Exhaust pipe protector bolt “10”
7 Nm (0.7 m·kg, 5.1 ft·lb)



EAS28970
CLEANING THE SPARK ARRESTER

1. Clean:
   • Spark arrester

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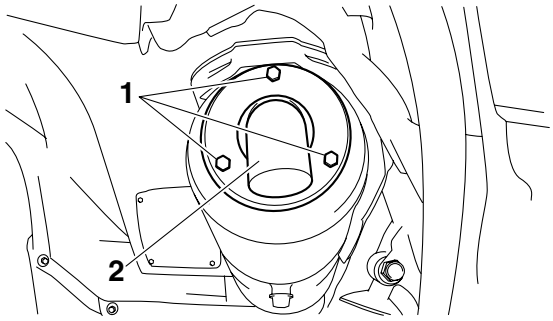
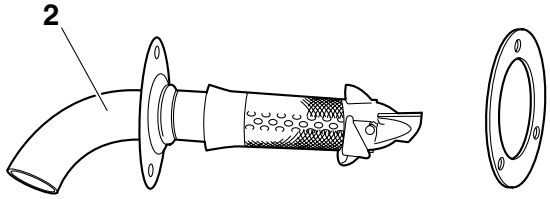
EWA28P1009
⚠ WARNING

- **Select a well-ventilated area free of combustible materials.**
- **Always let the exhaust system cool before performing this operation.**
- **Do not start the engine when removing the tailpipe from the muffler.**
- **Make sure that the transmission is in neutral.**

a. Remove the bolts “1”.
b. Remove the tailpipe “2” by pulling it out of the muffler and the gasket.

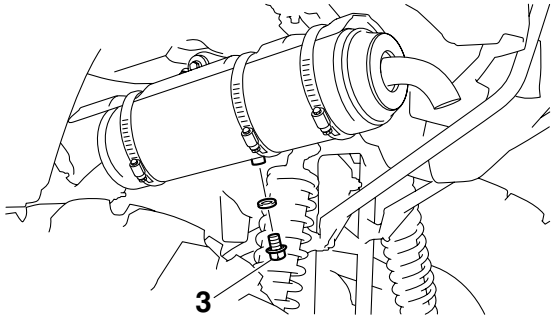




c. Tap the tailpipe lightly with a soft-face hammer or suitable tool, then use a wire brush to remove any carbon deposits from the spark arrester portion of the tailpipe and the inner contact surfaces of the muffler.
d. Install the gasket, and then insert the tailpipe into the muffler and align the bolt holes.
e. Insert the bolts “1” and tighten them.

Spark arrester bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)

f. Remove the purging bolt “3”.



g. Start the engine and rev it up approximately twenty times while momentarily creating exhaust system back pressure by blocking the end of the muffler with a shop towel.
h. Stop the engine and allow the exhaust pipe to cool.
i. Install the purging bolt and tighten it.

Purging bolt
27 Nm (2.7 m·kg, 19 ft·lb)

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EAS21110
CHECKING THE COOLANT LEVEL

1. Place the vehicle on a level surface.

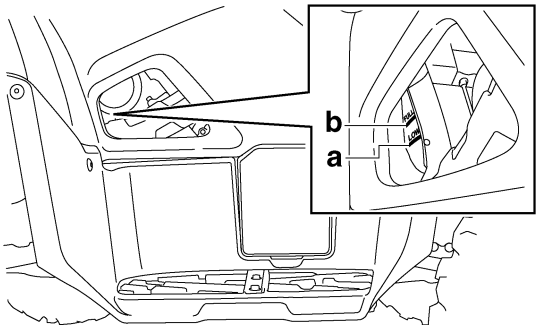
TIP

The coolant level must be checked on a cold engine since the level varies with engine temperature.

2. Check:
   • Coolant level
   The coolant level should be between the minimum level mark "a" and maximum level mark "b".
   Below the minimum level mark → Add the recommended coolant to the proper level.

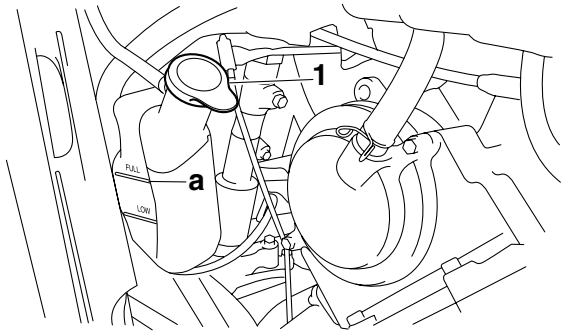
ECA13470
NOTICE

• Adding water instead of coolant lowers the antifreeze content of the coolant. If water is used instead of coolant check, and if necessary, correct the antifreeze concentration of the coolant.
• Use only distilled water. However, if distilled water is not available, soft water may be used.



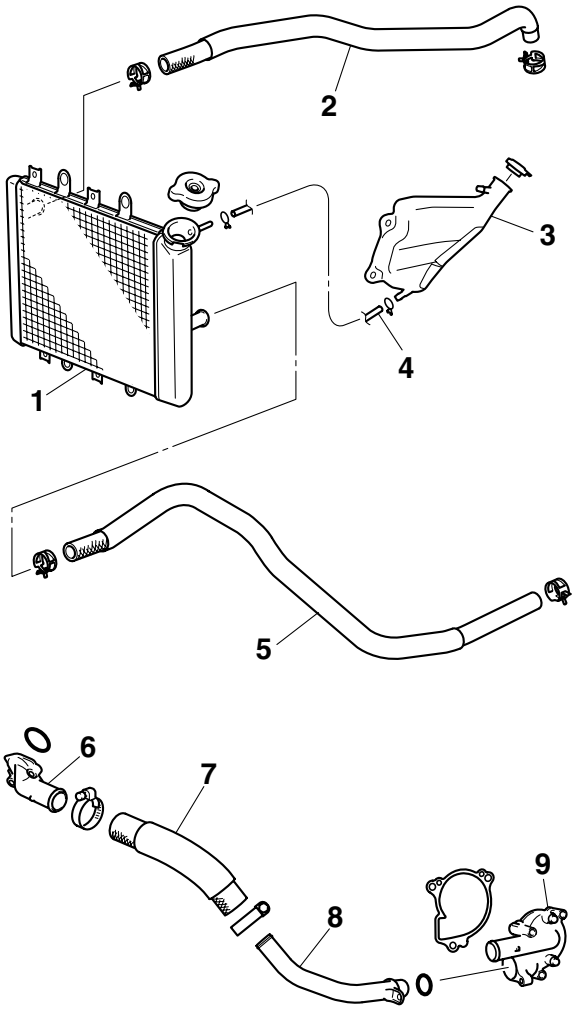
3. If the coolant is at or below the minimum level mark, remove the left side panel.
   Refer to "GENERAL CHASSIS" on page 4-1.
4. Remove the reservoir cap "1", add coolant or distilled water to the maximum level mark "a", install the reservoir cap, and then install the panel.

Coolant reservoir capacity (up to the maximum level mark)
0.24 L (0.25 US qt, 0.21 Imp.qt)



EAS21120
CHECKING THE COOLING SYSTEM

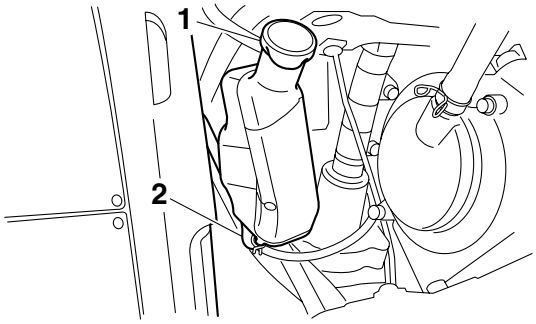
1. Remove:
   • Front fenders
   • Left footrest board
   Refer to "GENERAL CHASSIS" on page 4-1.
2. Check:
   • Radiator "1"
   • Radiator inlet hose "2"
   • Coolant reservoir "3"
   • Coolant reservoir hose "4"
   • Radiator outlet hose "5"
   • Water jacket joint "6"
   • Water pump outlet hose "7"
   • Water pump outlet pipe "8"
   • Water pump housing "9"
   Cracks/damage → Replace.
   Refer to "RADIATOR" on page 6-1 and "WATER PUMP" on page 6-7.



3. Install:
   • Left footrest board
   • Front fenders
   Refer to “GENERAL CHASSIS” on page 4-1.

EAS21130
CHANGING THE COOLANT

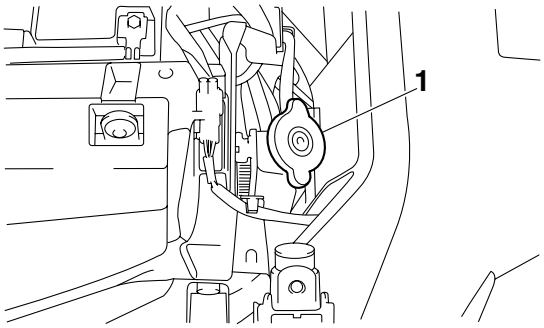
1. Remove:
   • Right side panel
   • Left side panel
   • Front carrier
   • Upper panel
   Refer to “GENERAL CHASSIS” on page 4-1.
2. Remove:
   • Coolant reservoir cap “1”
3. Disconnect:
   • Coolant reservoir hose “2”



4. Drain:
   • Coolant
   (from the coolant reservoir)
5. Connect:
   • Coolant reservoir hose
6. Remove:
   • Radiator cap “1”

EWA13030
⚠ WARNING

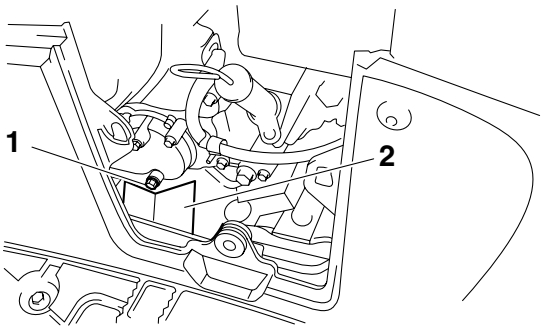
A hot radiator is under pressure. Therefore, do not remove the radiator cap when the engine is hot. Scalding hot fluid and steam may be blown out, which could cause serious injury. When the engine has cooled, open the radiator cap as follows:
Place a thick rag or a towel over the radiator cap and slowly turn the radiator cap counterclockwise toward the detent to allow any residual pressure to escape. When the hissing sound has stopped, press down on the radiator cap and turn it counterclockwise to remove.



7. Remove:
   • Coolant drain bolt “1”
   (along with the copper washer)

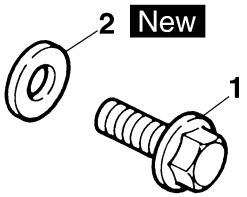
TIP

Place a container under the engine, and then remove the coolant drain bolt. (Use a trough “2” or a similar object as shown to prevent coolant from spilling on the engine guard.)



8. Drain:
   • Coolant
   (from the engine and radiator)
9. Check:
   • Coolant drain bolt “1”
   Damage → Replace.
10. Install:
   • Copper washer “2” New
   • Coolant drain bolt

	Coolant drain bolt **10 Nm (1.0 m·kg, 7.2 ft·lb)**



11. Fill:
   • Cooling system
   (with the specified amount of the recommended coolant)

	Recommended antifreeze **High-quality ethylene glycol antifreeze containing corrosion inhibitors for aluminum engines** **Mixing ratio** **1:1 (antifreeze:water)** **Radiator capacity (including all routes)** **1.99 L (2.10 US qt, 1.75 Imp.qt)** **Coolant reservoir capacity (up to the maximum level mark)** **0.24 L (0.25 US qt, 0.21 Imp.qt)**

Handling notes for coolant
Coolant is potentially harmful and should be handled with special care.

EWA13040

⚠ WARNING

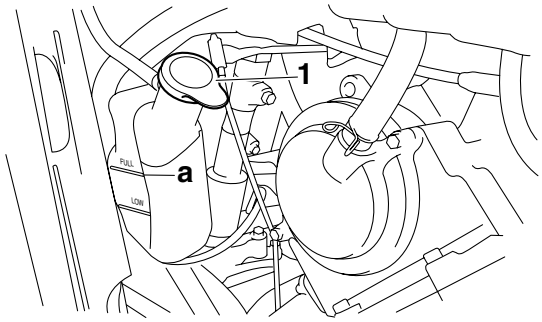
- **If coolant splashes in your eyes, thoroughly wash them with water and consult a doctor.**
- **If coolant splashes on your clothes, quickly wash it away with water and then with soap and water.**
- **If coolant is swallowed, induce vomiting and get immediate medical attention.**

ECA13480

NOTICE

- **Adding water instead of coolant lowers the antifreeze content of the coolant. If water is used instead of coolant check, and if necessary, correct the antifreeze concentration of the coolant.**
- **Use only distilled water. However, if distilled water is not available, soft water may be used.**
- **If coolant comes into contact with painted surfaces, immediately wash them with water.**
- **Do not mix different types of antifreeze.**

12. Fill:
   • Coolant reservoir
   (with the recommended coolant to the maximum level mark “a”)
13. Install:
   • Coolant reservoir cap “1”



14. Bleed:
   • Coolant system

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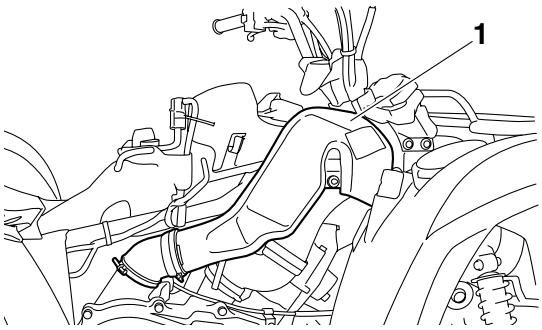
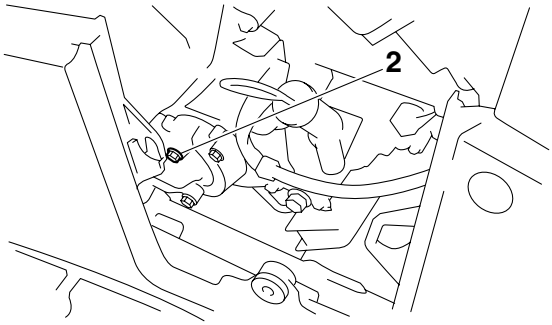
a. Remove the V-belt cooling exhaust duct “1”.



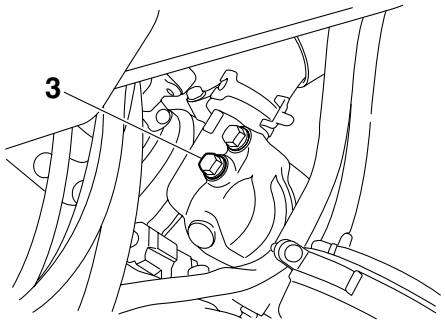
b. Loosen the water pump air bleed bolt "2", without removing it, to allow all of the air to escape from the air bleed bolt hole.



c. When coolant begins to flow out of the bolt hole, tighten the water pump air bleed bolt to specification.

	Water pump air bleed bolt **10 Nm (1.0 m·kg, 7.2 ft·lb)**

d. Loosen the cylinder head air bleed bolt "3", without removing it, to allow all of the air to escape from the air bleed bolt hole.



e. When coolant begins to flow out of the bolt hole, tighten the cylinder head air bleed bolt to specification.

	Cylinder head air bleed bolt **10 Nm (1.0 m·kg, 7.2 ft·lb)**

f. Install the V-belt cooling exhaust duct.

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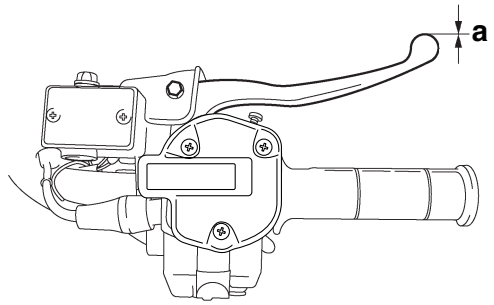
15. Start the engine, warm it up for ten minutes, and then rev the engine five times.
16. Pour the recommended coolant into the radiator until it is full.
17. Stop the engine and allow it to cool. If the coolant level has dropped after the engine has cooled, add sufficient coolant until it reaches the top of the radiator, and then install the radiator cap.
18. Start the engine, and then check for coolant leakage.
    - Coolant level
      Refer to "CHECKING THE COOLANT LEVEL" on page 3-16.
19. Install:
    - Upper panel
    - Front carrier
    - Left side panel
    - Right side panel
      Refer to "GENERAL CHASSIS" on page 4-1.

EAS29360
CHASSIS

EAS21170
ADJUSTING THE FRONT DISC BRAKE

1. Check:
   • Front brake lever free play “a”
   Out of specification → Bleed the front brake system.
   Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-23.

Front brake lever free play (lever end)
0 mm (0 in)



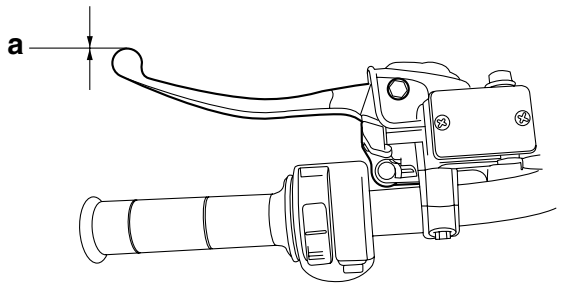
EAS29180
ADJUSTING THE REAR DISC BRAKE

EWA14890
⚠ WARNING

Always adjust both the brake pedal and the rear brake lever whenever adjusting the rear brake.

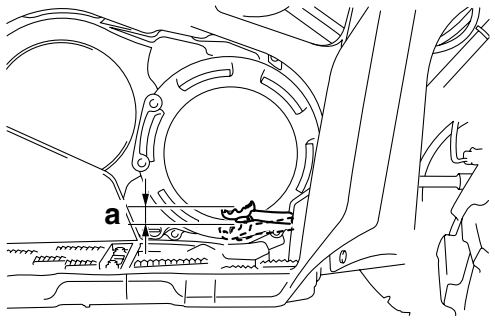
1. Check:
   • Rear brake lever free play “a”
   Out of specification → Bleed the rear brake system.
   Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-23.

Rear brake lever free play (lever end)
0 mm (0 in)



2. Check:
   • Brake pedal free play “a”
   Out of specification → Adjust.

Brake pedal free play
0.0–5.0 mm (0.00–0.20 in)



3. Adjust:
   • Brake pedal free play

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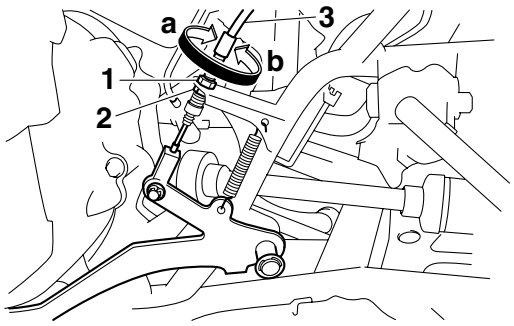
a. Remove the front fender inner panel.
   Refer to “GENERAL CHASSIS” on page 4-1.
b. Loosen the adjusting nut “1” and locknut “2”.
c. Turn the adjusting nut “1” in direction “a” until the rear brake cable “3” is taut.
d. Turn the adjusting nut “1” one turn in direction “b”, and then tighten the locknut “2”.
e. While holding the locknut “2”, tighten the adjusting nut “1”.

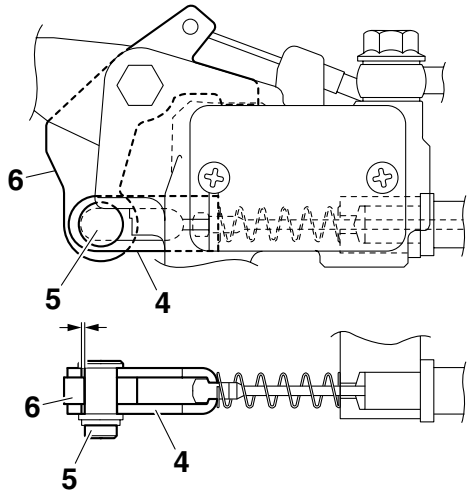
Brake pedal free play adjusting nut
7 Nm (0.7 m·kg, 5.1 ft·lb)



f. Check that there is a gap between the rear brake cable joint (rear brake master cylinder side) “4” and the pin “5”.
g. Check that the brake pedal free play is within the specified limits.

TIP

When checking the brake pedal free play, make sure that the brake lever bracket “6” does not move.



h. Adjust the drive select lever control cable.
Refer to "ADJUSTING THE DRIVE SELECT LEVER CONTROL CABLE AND SHIFT ROD" on page 3-24.

EWA14900

⚠ WARNING

After this adjustment is performed, lift the front and rear wheels off the ground by placing a block under the engine, and spin the rear wheels to ensure there is no brake drag. If any brake drag is noticed perform the above steps again.

i. Install the front fender inner panel.
Refer to "GENERAL CHASSIS" on page 4-1.

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EAS21240

CHECKING THE BRAKE FLUID LEVEL

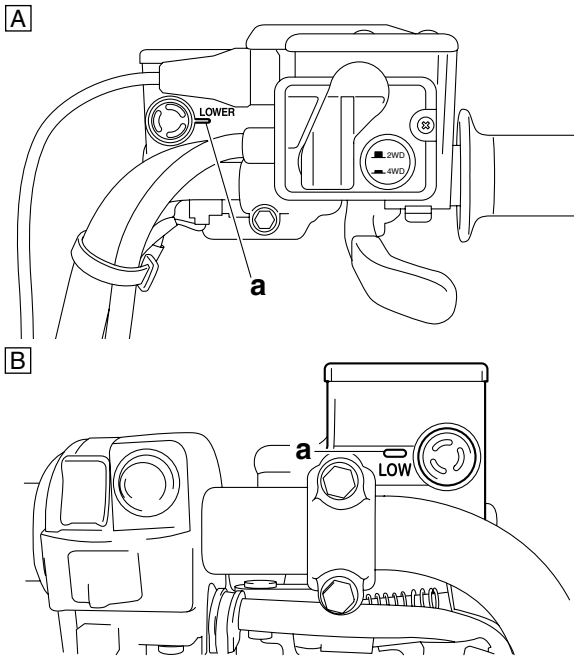
1. Place the vehicle on a level surface.

TIP

When checking the brake fluid level, make sure that the top of the brake fluid reservoir top is horizontal.

2. Check:
   - Brake fluid level
   Below the minimum level mark "a" → Add the recommended brake fluid to the proper level.

	Recommended fluid **DOT 4**



A. Front brake
B. Rear brake

EWA13090

⚠ WARNING

- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.**
- **When refilling, be careful that water does not enter the brake fluid reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.**

ECA13540

NOTICE

Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

TIP

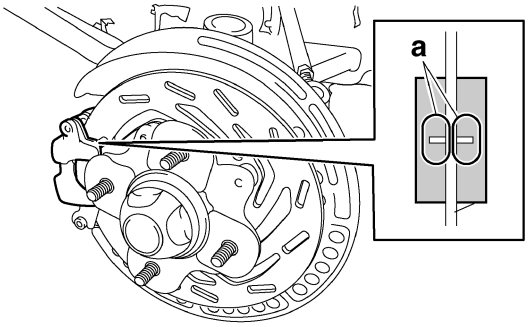
In order to ensure a correct reading of the brake fluid level, make sure the top of the brake fluid reservoir is horizontal.

EAS21250

CHECKING THE FRONT BRAKE PADS

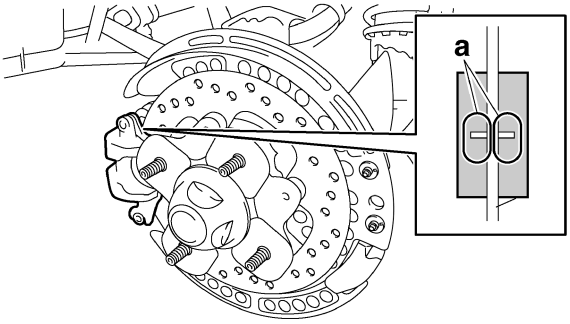
The following procedure applies to all of the brake pads.

1. Remove:
   • Front wheels
   Refer to “FRONT WHEELS” on page 4-14.
2. Operate the brake.
3. Check:
   • Front brake pads
   A wear indicator groove “a” has almost disappeared → Replace the brake pads and brake pad spring as a set.
   Refer to “FRONT BRAKE” on page 4-21.



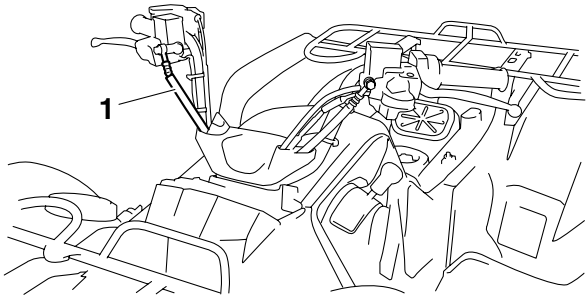
4. Install:
   • Front wheels
   Refer to “FRONT WHEELS” on page 4-14.

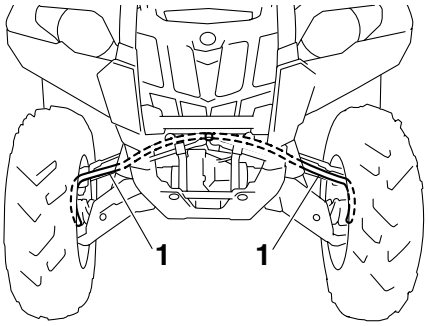
EAS21260
CHECKING THE REAR BRAKE PADS
The following procedure applies to all of the brake pads.
1. Remove:
   • Rear wheels
   Refer to “REAR WHEELS” on page 4-18.
2. Operate the brake.
3. Check:
   • Rear brake pads
   A wear indicator groove “a” has almost disappeared → Replace the brake pads and brake pad spring as a set.
   Refer to “REAR BRAKE” on page 4-32.



4. Install:
   • Rear wheels
   Refer to “REAR WHEELS” on page 4-18.

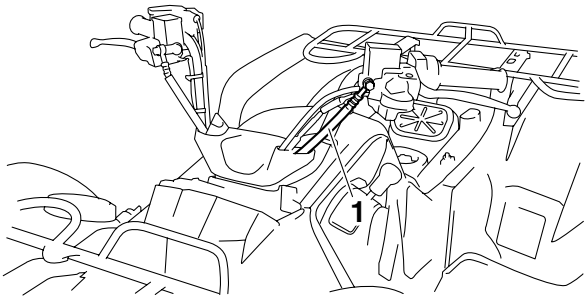
EAS21280
CHECKING THE FRONT BRAKE HOSES
The following procedure applies to all of the brake hoses and brake hose clamps.
1. Check:
   • Front brake hoses “1”
   Cracks/damage/wear → Replace.

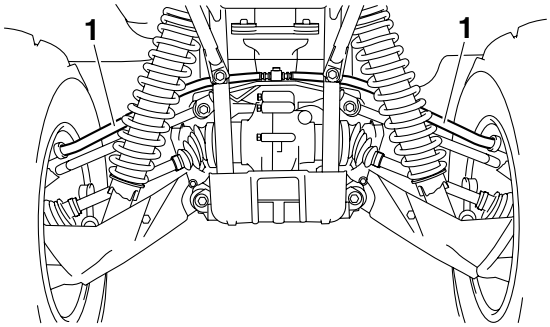




2. Check:
   • Brake hose holders
   Loose → Tighten the holder bolt.
3. Apply the brake several times.
4. Check:
   • Brake hoses
   Brake fluid leakage → Replace the damaged hose.
   Refer to “FRONT BRAKE” on page 4-21.

EAS21290
CHECKING THE REAR BRAKE HOSES
The following procedure applies to all of the brake hoses and brake hose clamps.
1. Check:
   • Rear brake hoses “1”
   Cracks/damage/wear → Replace.





2. Check:
   • Brake hose holders
   Loose → Tighten the clamp bolt.
3. Apply the brake several times.
4. Check:
   • Brake hoses
   Brake fluid leakage → Replace any damaged hose.
   Refer to "REAR BRAKE" on page 4-32.

EAS28P1007

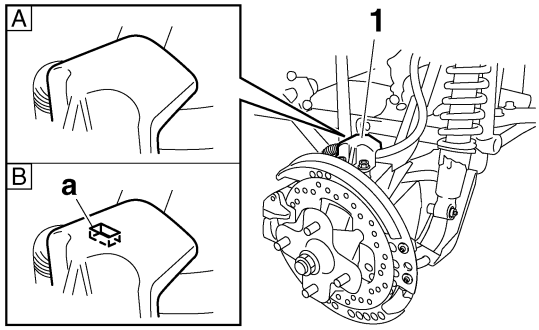
CHECKING THE REAR BRAKE HOSE PROTECTORS

The following procedure applies to both of the rear brake hose protectors.

1. Remove:
   • Rear wheels
   Refer to "REAR WHEELS" on page 4-18.
2. Check:
   • Rear brake hose protector "1"
   Wear indicator "a" becomes visible → Replace the rear brake hose protector.
   Refer to "REAR KNUCKLES AND STABILIZER" on page 4-64.

TIP

Stones and mud thrown up by the wheels will wear down the tops of the rear brake hose protectors.



A. Protector is normal.
B. Protector is worn.

3. Install:
   • Rear wheels
   Refer to "REAR WHEELS" on page 4-18.

EAS21350

BLEEDING THE HYDRAULIC BRAKE SYSTEM

EWA13100

WARNING

Bleed the hydraulic brake system whenever:
- **the system is disassembled.**
- **a brake hose is loosened, disconnected or replaced.**
- **the brake fluid level is very low.**
- **brake operation is faulty.**

TIP

- Be careful not to spill any brake fluid or allow the brake master cylinder reservoir or brake fluid reservoir to overflow.
- When bleeding the hydraulic brake system, make sure there is always enough brake fluid before applying the brake. Ignoring this precaution could allow air to enter the hydraulic brake system, considerably lengthening the bleeding procedure.
- If bleeding is difficult, it may be necessary to let the brake fluid settle for a few hours. Repeat the bleeding procedure when the tiny bubbles in the hose have disappeared.

1. Remove:
   • Rear wheels
   Refer to "REAR WHEELS" on page 4-18.
2. Bleed:
   • Hydraulic brake system

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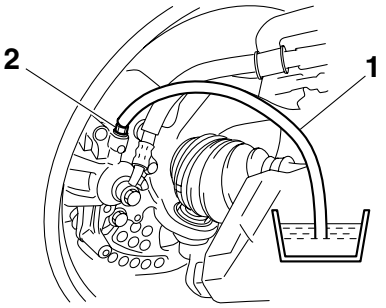
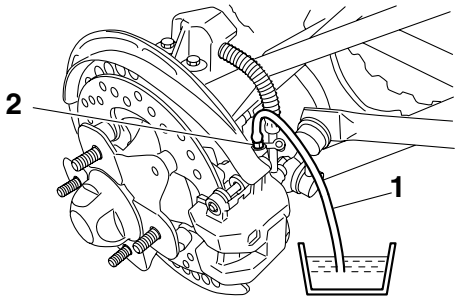
a. Fill the brake fluid reservoir to the proper level with the recommended brake fluid.
b. Install the diaphragm (brake master cylinder reservoir).
c. Connect a clear plastic hose "1" tightly to the bleed screw "2".

A



B



A. Front brake
B. Rear brake

d. Place the other end of the hose into a container.
e. Slowly apply the brake several times.
f. Fully pull the brake lever or fully press down the brake pedal and hold it in position.
g. Loosen the bleed screw.

TIP

Loosening the bleed screw will release the pressure and cause the brake lever to touch the throttle grip or the brake pedal to fully extend.

h. Tighten the bleed screw and then release the brake lever or brake pedal.
i. Repeat steps (e) to (h) until all of the air bubbles have disappeared from the brake fluid in the plastic hose.
j. Tighten the bleed screw to specification.

	Bleed screw **5 Nm (0.5 m·kg, 3.6 ft·lb)**

k. Fill the brake fluid reservoir to the proper level with the recommended brake fluid.
Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-21.

EWA13110

⚠ WARNING

After bleeding the hydraulic brake system, check the brake operation.

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3. Install:
• Rear wheels
Refer to "REAR WHEELS" on page 4-18.

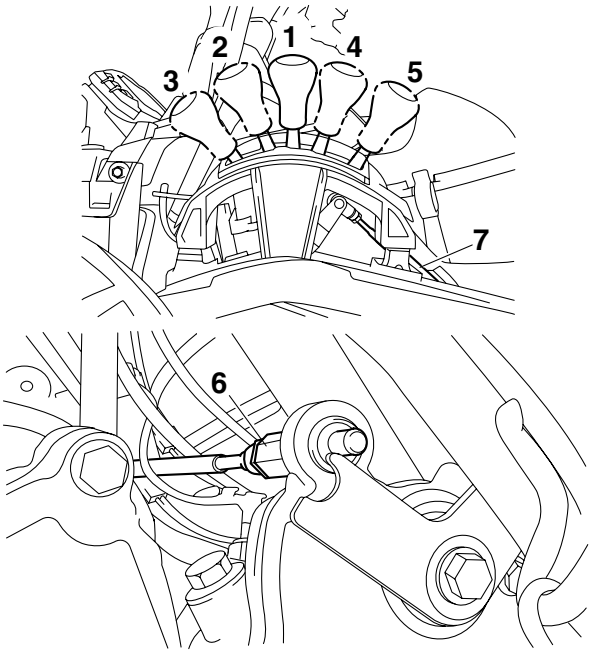
EAS29220

ADJUSTING THE DRIVE SELECT LEVER CONTROL CABLE AND SHIFT ROD

ECA28P1012

NOTICE

Before moving the drive select lever, bring the vehicle to a complete stop and return the throttle lever to its closed position. Otherwise, the transmission may be damaged.



1. "N" (neutral)
2. "H" (high)
3. "L" (low)
4. "R" (reverse)
5. "P" (park)
6. Drive select lever shift control cable
7. Drive select lever shift rod

1. Adjust:
• Brake pedal free play
Refer to "ADJUSTING THE REAR DISC BRAKE" on page 3-20.
2. Remove:
• Left side panel
Refer to "GENERAL CHASSIS" on page 4-1.
3. Adjust:
• Drive select lever shift control cable
• Drive select lever shift rod

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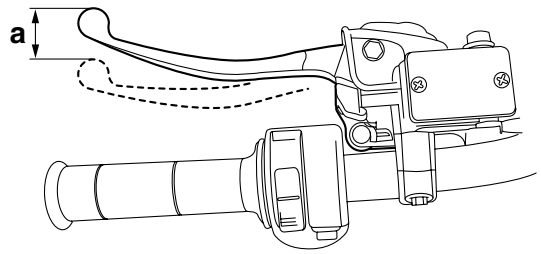
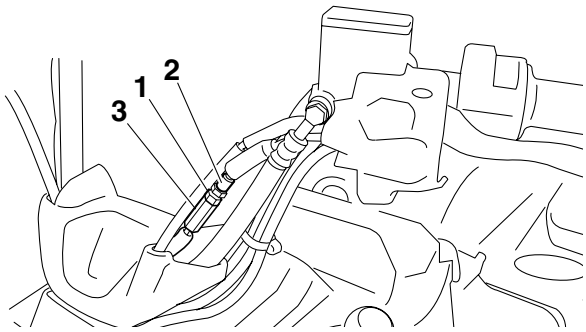
Drive select lever shift control cable:

a. Make sure that the drive select lever is in "N" (neutral).
b. Squeeze the brake lever 20 mm (0.79 in) "a", loosen the locknut "1", and then adjust the shift control cable "2" with the adjuster "3" so that the drive select lever can be shifted to "R" (reverse) from "N" (neutral), and to "P" (park) from "R" (reverse).





c. Release the brake lever so that "a" is 0 mm (0 in), and then verify that the drive select lever cannot be shifted to "R" (reverse) from "N" (neutral), or to "P" (park) from "R" (reverse).
d. If the operation of the drive select lever is incorrect, repeat steps (a) to (c).
e. Tighten the locknut.

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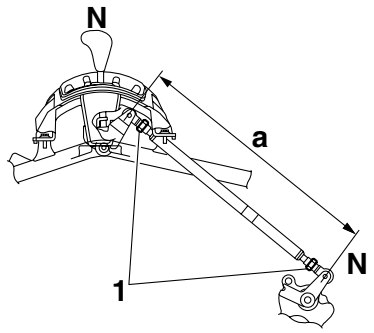
Drive select lever shift rod:

a. Make sure the drive select lever and transmission are in "N" (neutral).
b. Loosen both locknuts "1".
c. Adjust the length "a" of the shift rod to 413 mm (16.3 in).



d. Tighten the locknuts.

Drive select lever shift rod locknut
7 Nm (0.7 m·kg, 5.1 ft·lb)

e. Start the engine, and then check that the drive select lever can be shifted to each shift position and that the appropriate indicator light comes on when the lever is in each position.

TIP

If the neutral indicator light does not come on when the drive select lever is in the "N" (neutral) position, stop the engine. Then, with the drive select lever in the "N" (neutral) position and without opening the throttle, start the engine and check that the neutral indicator light comes on.

f. Adjust the shift control cable again if necessary.

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EAS21460

CHECKING THE FINAL GEAR OIL LEVEL

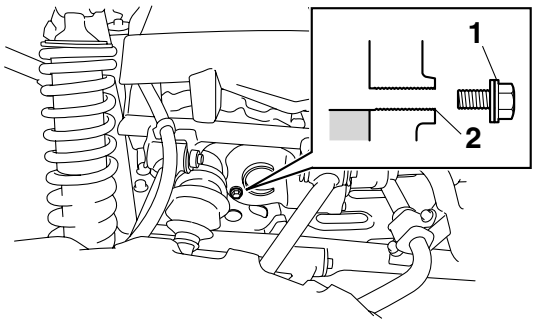
1. Place the vehicle on a level surface.
2. Remove:
   • Final gear oil level check bolt "1"
3. Check:
   • Final gear oil level
   The final gear oil level should be up to the brim "2" of the hole.
   Below the brim → Add the recommended final gear oil to the proper level.

Type
SAE 80 API GL-4 Hypoid gear oil

ECA28P1005

NOTICE

Take care not to allow foreign material to enter the final drive case.

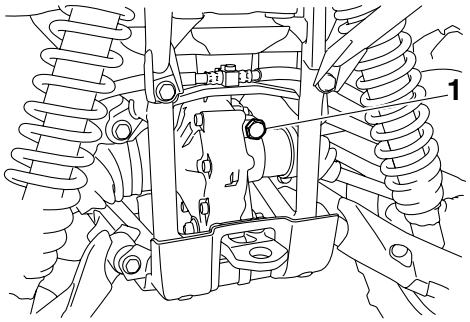


4. Install:
   • Final gear oil level check bolt

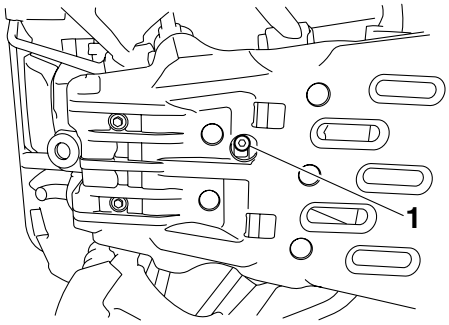
	Final gear oil level check bolt **10 Nm (1.0 m·kg, 7.2 ft·lb)**

EAS21470
CHANGING THE FINAL GEAR OIL

1. Place the vehicle on a level surface.
2. Place a container under the final drive case.
3. Remove:
   • Final gear oil filler bolt "1"



4. Remove:
   • Final gear oil level check bolt
   • Final gear oil drain bolt "1"
   Completely drain the final drive case of its oil.



5. Check:
   • Final gear oil drain bolt gasket
   Damage → Replace.
6. Install:
   • Final gear oil drain bolt
   (with the gasket)

	Final gear oil drain bolt **23 Nm (2.3 m·kg, 17 ft·lb)**

7. Fill:
   • Final drive case
   (with the specified amount of the recommended final gear oil)

	Total amount **0.25 L (0.26 US qt, 0.22 Imp.qt)** **Periodic oil change** **0.20 L (0.21 US qt, 0.18 Imp.qt)** **Type** **SAE 80 API GL-4 Hypoid gear oil**

ECA28P1005
NOTICE

Take care not to allow foreign material to enter the final drive case.

8. Check:
   • Oil level
   Refer to "CHECKING THE FINAL GEAR OIL LEVEL" on page 3-25.
9. Install:
   • Final gear oil level check bolt
   • Final gear oil filler bolt

	Final gear oil level check bolt **10 Nm (1.0 m·kg, 7.2 ft·lb)** **Final gear oil filler bolt** **23 Nm (2.3 m·kg, 17 ft·lb)**

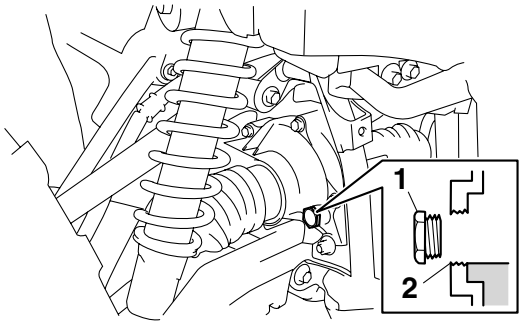
EAS29250
CHECKING THE DIFFERENTIAL GEAR OIL LEVEL

1. Place the vehicle on a level surface.
2. Remove:
   • Differential gear oil filler bolt "1"
3. Check:
   • Differential gear oil level
   The differential gear oil level should be up to the brim "2" of the hole.
   Below the brim → Add the recommended differential gear oil to the proper level.

	Type **SAE 80 API GL-4 Hypoid gear oil**

ECA16170
NOTICE

Take care not to allow foreign material to enter the differential case.

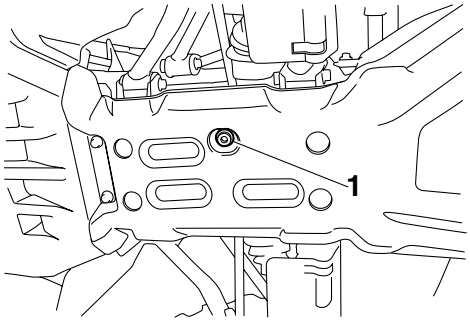


4. Install:
   • Differential gear oil filler bolt

	Differential gear oil filler bolt **23 Nm (2.3 m·kg, 17 ft·lb)**

EAS29260
CHANGING THE DIFFERENTIAL GEAR OIL

1. Place the vehicle on a level surface.
2. Place a receptacle under the differential case.
3. Remove:
   • Differential gear oil filler bolt
   • Differential gear oil drain bolt "1"
   Completely drain the differential case of its oil.



4. Check:
   • Differential gear oil drain bolt gasket
   Damage → Replace.
5. Install:
   • Differential gear oil drain bolt

	Differential gear oil drain bolt **10 Nm (1.0 m·kg, 7.2 ft·lb)**

6. Fill:
   • Differential case
   (with the specified amount of the recommended differential gear oil)

	Periodic oil change **0.22 L (0.23 US qt, 0.19 Imp.qt)** **Total amount** **0.23 L (0.24 US qt, 0.20 Imp.qt)** **Type** **SAE 80 API GL-4 Hypoid gear oil**

ECA16170
NOTICE

Take care not to allow foreign material to enter the differential case.

TIP

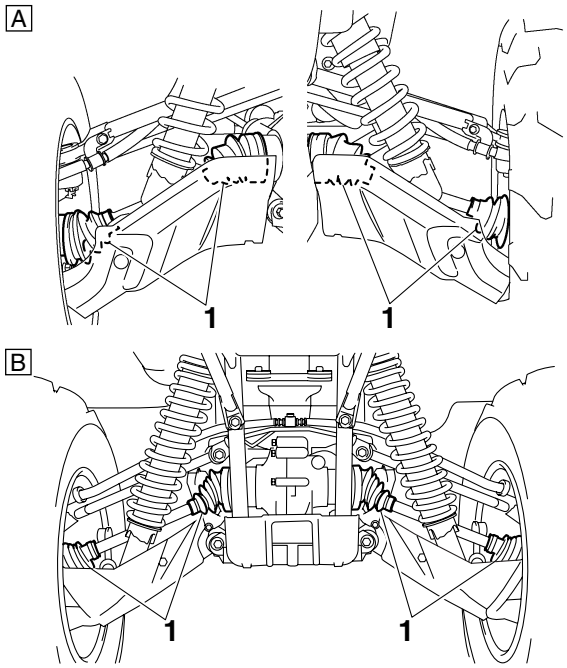
If gear oil is filled to the brim of the oil filler hole, oil may start leaking from the differential case breather hose. Therefore, check the quantity of the oil, not its level.

7. Check:
   • Oil level
   Refer to "CHECKING THE DIFFERENTIAL GEAR OIL LEVEL" on page 3-26
8. Install:
   • Differential gear oil filler bolt

	Differential gear oil filler bolt **23 Nm (2.3 m·kg, 17 ft·lb)**

EAS29270
CHECKING THE CONSTANT VELOCITY SHAFT ASSEMBLY DUST BOOTS

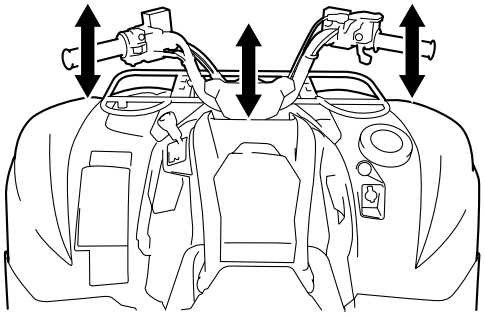
1. Check:
   • Dust boots "1"
   Damage → Replace.
   Refer to "FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES, DIFFERENTIAL ASSEMBLY AND FRONT DRIVE SHAFT" on page 8-3 and "REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT" on page 8-15.



A. Front
B. Rear

EAS29280
CHECKING THE STEERING SYSTEM

1. Place the vehicle on a level surface.
2. Check:
   • Steering assembly bushings
   Move the handlebar up and down, and back and forth.
   Excessive play → Replace the steering stem bushings.



3. Check:
   • Tie-rod ends
   Free play → Replace the tie-rod end.

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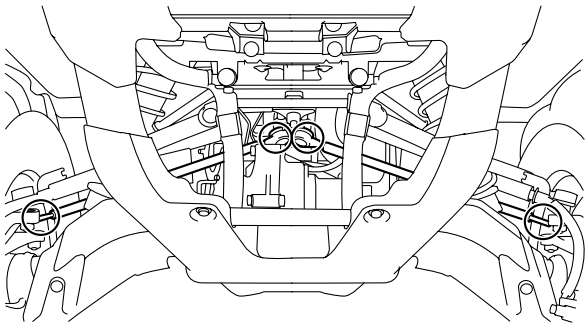
a. Turn the handlebar left until it stops.
b. Move the handlebar slightly to the right and left.
c. Check for play in the tie-rod ends.
d. Turn the handlebar right until it stops.
e. Move the handlebar slightly to the left and right.
f. Check for play in the tie-rod ends.



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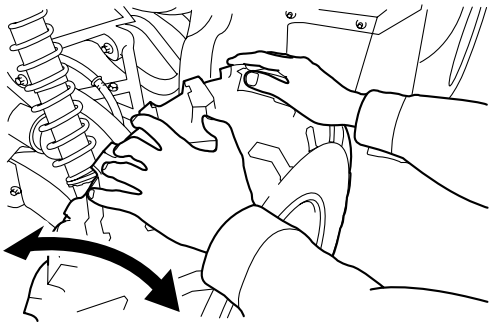
4. Raise the front end of the vehicle so that there is no weight on the front wheels.
5. Check:
   • Ball joints and wheel bearings
   Move the wheels laterally back and forth.
   Excessive free play → Replace the front arms (upper and lower) and/or wheel bearings.



6. Measure: (YFM5FGP/YFM7FGP only)
   • Steering tension
   Above specification → Adjust.

Steering tension
50 N (5.0 kgf)
(YFM5FGPY/YFM7FGPY)

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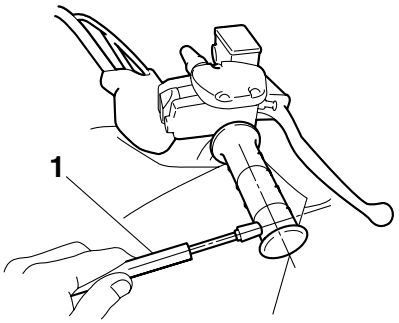
a. Set the main switch to “OFF”.
b. Place the vehicle on a suitable stand so that the front wheels are elevated.
c. Point the front wheels straight ahead.
d. Hold the belt tension gauge “1” at a 90° angle to the handlebar, push the gauge against the handlebar, and then record the measurement when the handlebar starts to turn.

Belt tension gauge
90890-03170
Rear drive belt tension gauge
YM-03170



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7. Adjust: (YFM5FGP/YFM7FGP only)
   • Steering tension

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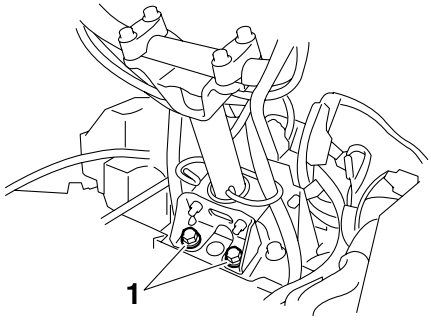
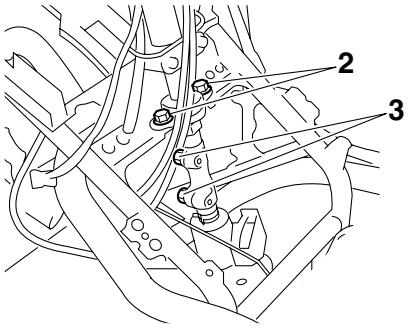
a. Remove the electrical components tray. Refer to "GENERAL CHASSIS" on page 4-1.
b. Loosen the steering stem bracket bolts "1", steering stem bearing bolts "2", and steering stem joint bolts "3" completely.

TIP

After loosening the bolts, be sure to check that the steering stem joint moves smoothly on the serrations of the steering stem and shaft of the EPS unit.





c. Tighten the steering stem bearing bolts to specification.

Steering stem bearing bolt
51 Nm (5.1 m·kg, 37 ft·lb)
LOCTITE®

d. Tighten the steering stem bracket bolts to specification.

Steering stem bracket bolt
51 Nm (5.1 m·kg, 37 ft·lb)
LOCTITE®

e. Tighten the steering stem joint bolts to specification.

Steering stem joint bolt
35 Nm (3.5 m·kg, 25 ft·lb)
LOCTITE®

f. Measure the steering tension again.
g. Repeat the above procedure until the steering tension is below specification.

Steering tension
50 N (5.0 kgf)
(YFM5FGPY/YFM7FGPY)

h. Install the electrical components tray. Refer to "GENERAL CHASSIS" on page 4-1.

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EAS29290

ADJUSTING THE TOE-IN

1. Place the vehicle on a level surface.
2. Measure:
   • Toe-in
   Out of specification → Adjust.

Toe-in (with tire touching the ground)
0.0–10.0 mm (0.00–0.39 in)

TIP

Before measuring the toe-in, make sure that the tire pressure is correct.

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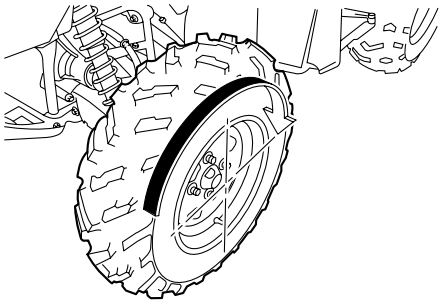
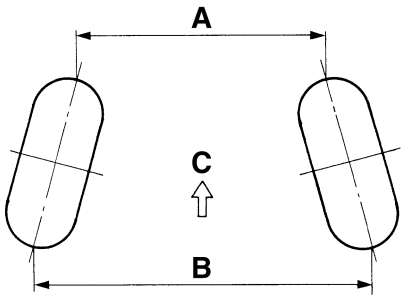
a. Mark both front tire tread centers.
b. Face the handlebar straight ahead.
c. Measure the width "A" between the marks.
d. Rotate the front tires 180° until the marks are exactly opposite one another.
e. Measure the width "B" between the marks.
f. Calculate the toe-in using the formula given below.

Toe-in = "B" - "A"

g. If the toe-in is incorrect, adjust it.





C. Forward

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3. Adjust:
   • Toe-in

EWA14910

⚠ WARNING

- **Be sure that both tie-rods are turned the same amount. If not, the vehicle will drift right or left even though the handlebar is positioned straight. This may lead to mishandling and an accident.**
- **After setting the toe-in to specification, run the vehicle slowly for some distance with both hands lightly holding the handlebar and check that the handlebar responds correctly. If not, turn either the right or left tie-rod within the toe-in specification.**

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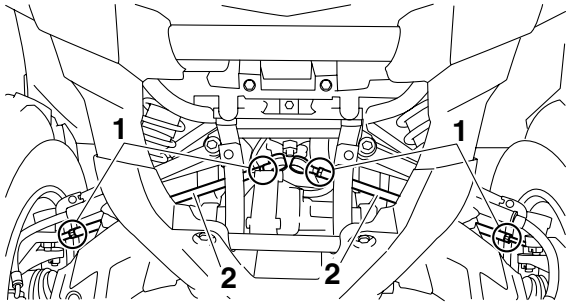
a. Mark both tie-rod ends.
   This reference point will be needed during adjustment.
b. Loosen the locknuts (tie-rod end) “1” of both tie-rods.
c. The same number of turns should be given to both the right and left tie-rods “2” until the specified toe-in is obtained. This is to keep the length of the tie-rods the same.

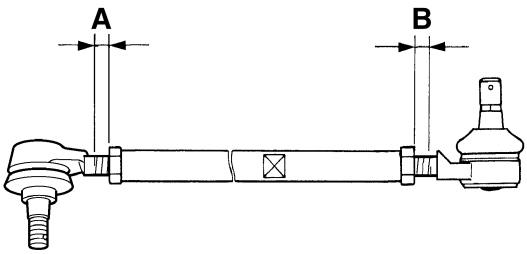


d. Tighten the rod end locknuts of both tie-rods.

	Tie-rod end locknut **15 Nm (1.5 m·kg, 11 ft·lb)**

TIP

Adjust the tie-rod ends so that “A” and “B” are equal.



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EAS29300

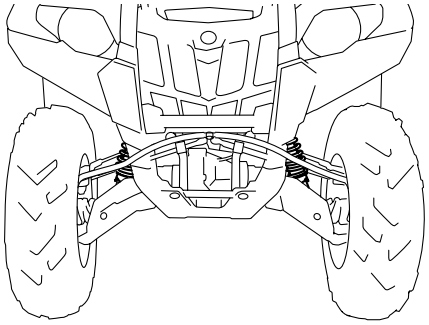
CHECKING THE FRONT SHOCK ABSORBER ASSEMBLIES

The following procedure applies to both of the front shock absorber assemblies.

1. Place the vehicle on a level surface.
2. Check:
   • Damper rod
   Bends/damage → Replace the front shock absorber assembly.
   Refer to “FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES” on page 4-59.
   • Oil leakage
   Excessive oil leakage → Replace the front shock absorber assembly.
   Refer to “FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES” on page 4-59.
   • Spring
   Fatigue → Replace the front shock absorber assembly.

Refer to “FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES” on page 4-59.

3. Check:
   • Operation
   Pump the front shock absorber assembly up and down several times.
   Rough operation → Replace front shock absorber assembly.
   Refer to “FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES” on page 4-59.



EAS29310
ADJUSTING THE FRONT SHOCK ABSORBER ASSEMBLIES

The following procedure applies to both of the front shock absorber assemblies.

EWA14920
⚠ WARNING

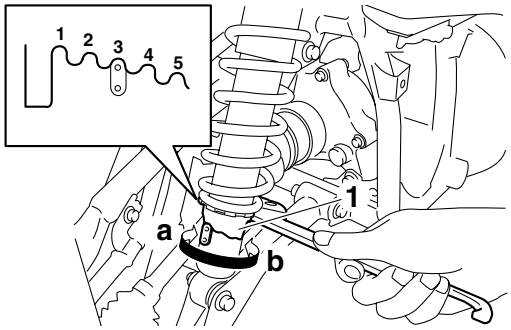
Always adjust the spring preload for both front shock absorber assemblies to the same setting. Uneven adjustment can cause poor handling and loss of stability.

1. Adjust:
   • Spring preload
   Turn the adjuster “1” in direction “a” or “b”.

Ring nut wrench
90890-01268
Spanner wrench
YU-01268

Direction “a”
Spring preload is increased (suspension is harder).
Direction “b”
Spring preload is decreased (suspension is softer).

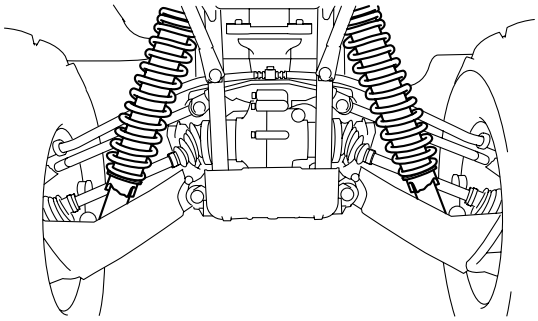
Spring preload adjusting positions
Minimum
1
Standard
3
Maximum
5



EAS29320
CHECKING THE REAR SHOCK ABSORBER ASSEMBLIES

The following procedure applies to both of the rear shock absorber assemblies.

1. Place the vehicle on a level surface.
2. Check:
   • Damper rod
   Bends/damage → Replace the rear shock absorber assembly.
   Refer to “REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES” on page 4-67.
   • Oil leakage
   Excessive oil leakage → Replace the rear shock absorber assembly.
   Refer to “REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES” on page 4-67.
   • Spring
   Fatigue → Replace the rear shock absorber assembly.
   Refer to “REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES” on page 4-67.
3. Check:
   • Operation
   Pump the rear shock absorber assembly up and down several times.
   Rough operation → Replace rear shock absorber assembly.
   Refer to “REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES” on page 4-67.



EAS29330
ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLIES

The following procedure applies to both of the rear shock absorber assemblies.

EWA14930
⚠ WARNING

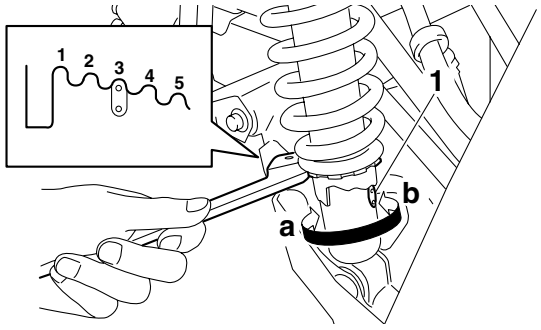
Always adjust the spring preload for both rear shock absorber assemblies to the same setting. Uneven adjustment can cause poor handling and loss of stability.

1. Adjust:
   - Spring preload
     Turn the adjuster "1" in direction "a" or "b".

Ring nut wrench
90890-01268
Spanner wrench
YU-01268

Direction "a"
Spring preload is increased (suspension is harder).
Direction "b"
Spring preload is decreased (suspension is softer).

Spring preload adjusting positions
Minimum
1
Standard
3
Maximum
5



EAS29340
CHECKING THE TIRES

The following procedure applies to all of the tires.

EWA14940
⚠ WARNING

This model is equipped with low-pressure tires. It is important that they be inflated correctly and maintained at the proper pressures.

Tire characteristics

EWA14950
⚠ WARNING

Tire characteristics influence the handling of vehicles. The tires listed below have been approved by Yamaha Motor Co., Ltd. for this model. If other tire combinations are used, they can adversely affect your vehicle's handling characteristics and are therefore not recommended.

Front tire
Type
Tubeless
Size
AT25 × 8–12
Manufacturer/model
DUNLOP/KT421
Rear tire
Type
Tubeless
Size
AT25 × 10–12
Manufacturer/model
DUNLOP/KT425

Tire pressure

EWA14960
⚠ WARNING

- **Tire pressure below the minimum specification could cause the tire to dislodge from the rim under severe riding conditions.**

• Use no more than the following pressures when seating the tire beads.
Front
250 kPa (2.5 kgf/cm², 36 psi)
Rear
250 kPa (2.5 kgf/cm², 36 psi)
Higher pressures and fast inflation may cause a tire to burst. Inflate the tires very slowly and carefully.

Tire air pressure (measured on cold tires)
Recommended
Front
35 kPa (0.35 kgf/cm², 5.0 psi)
Rear
30 kPa (0.30 kgf/cm², 4.4 psi)
Minimum
Front
32 kPa (0.32 kgf/cm², 4.6 psi)
Rear
27 kPa (0.27 kgf/cm², 4.0 psi)

Maximum loading limit

EWA14970

⚠ WARNING

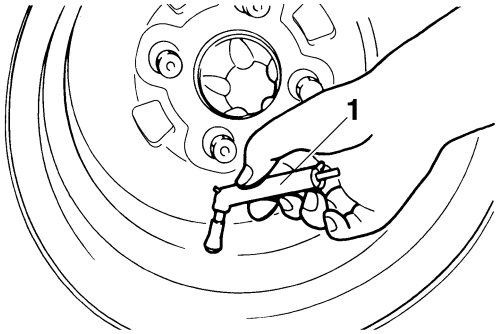
Be extra careful of the vehicle balance and stability when towing a trailer.

Maximum loading limit
220.0 kg (485 lb)
(Total weight of rider, cargo, accessories, and tongue)
Front carrier
45.0 kg (99 lb)
Rear carrier
85.0 kg (187 lb)
Front storage compartment
0.5 kg (1 lb)
Rear storage compartment
2.0 kg (4 lb)
Trailer hitch
Pulling load (total weight of trailer and cargo)
5880 N (600 kgf, 1322 lbf)
Tongue weight (vertical weight on trailer hitch point)
147 N (15 kgf, 33 lbf)

1. Measure:
   • Tire pressure
   Out of specification → Adjust.

Tire air pressure (measured on cold tires)
Recommended
Front
35 kPa (0.35 kgf/cm², 5.0 psi)
Rear
30 kPa (0.30 kgf/cm², 4.4 psi)
Minimum
Front
32 kPa (0.32 kgf/cm², 4.6 psi)
Rear
27 kPa (0.27 kgf/cm², 4.0 psi)

TIP
- The low-pressure tire gauge “1” is included as standard equipment.
- In order to ensure an accurate reading, make sure that the gauge is clean before use.



EWA14980

⚠ WARNING

Uneven or improper tire pressure may adversely affect the handling of this vehicle and may cause loss of control.
• Maintain proper tire pressures.
• Set tire pressures when the tires are cold.
• Tire pressures must be equal in both front tires and equal in both rear tires.

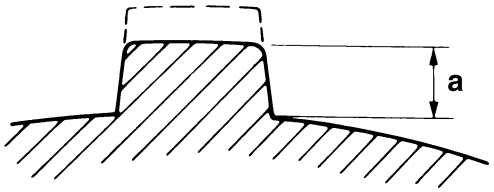
2. Check:
   • Tire surfaces
   Wear/damage → Replace.

Wear limit (front)
3 mm (0.12 in)
Wear limit (rear)
3 mm (0.12 in)

EWA28P1006

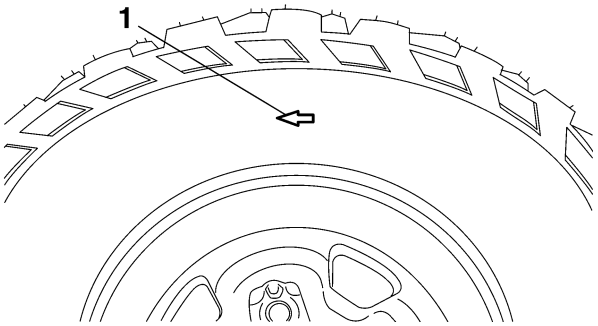
⚠ WARNING

It is dangerous to ride with a worn-out tire. When the tire tread reaches the wear limit “a”, replace the tire immediately.



TIP

The arrow mark "1" on the tire must point in the direction of wheel rotation.



EAS29350
CHECKING THE WHEELS

The following procedure applies to all of the wheels.

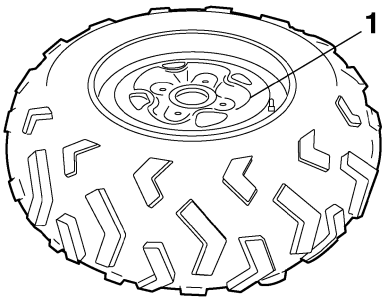
1. Check:
   - Wheel "1"
     Damage/bends → Replace.

EWA14990
WARNING

- **Never attempt even small repairs to the wheel.**
- **Ride conservatively after installing a tire to allow it to seat itself properly on the rim.**

TIP

Always balance the wheel when a tire or wheel has been changed or replaced.



EAS21690
CHECKING AND LUBRICATING THE CABLES

The following procedure applies to all of the inner and outer cables.

EWA13270
WARNING

Damaged outer cable may cause the cable to corrode and interfere with its movement. Replace damaged outer cable and inner cables as soon as possible.

1. Check:
   - Outer cable
     Damage → Replace.
2. Check:
   - Cable operation
     Rough movement → Lubricate.

Recommended lubricant
Engine oil or a suitable cable lubricant

TIP

Hold the cable end upright and pour a few drops of lubricant into the cable sheath or use a suitable lubricating device.

3. Apply:
   - Lithium-soap-based grease
     (onto end of the cable)

EAS21700
LUBRICATING THE LEVERS

Lubricate the pivoting point and metal-to-metal moving parts of the levers.

Recommended lubricant
Silicone grease

EAS21710
LUBRICATING THE PEDAL

Lubricate the pivoting point and metal-to-metal moving parts of the pedal.

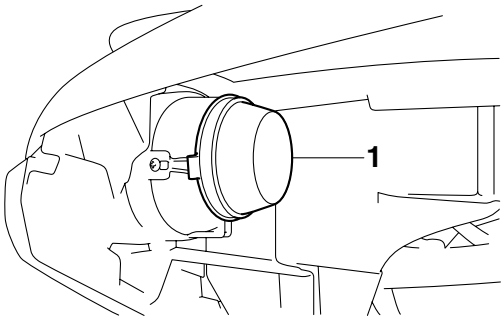
Recommended lubricant
Lithium-soap-based grease

EAS21750
ELECTRICAL SYSTEM

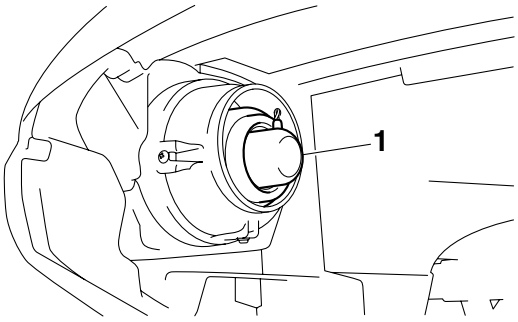
EAS21760
CHECKING AND CHARGING THE BATTERY
Refer to “ELECTRICAL COMPONENTS” on page 9-75.

EAS21770
CHECKING THE FUSES
Refer to “ELECTRICAL COMPONENTS” on page 9-75.

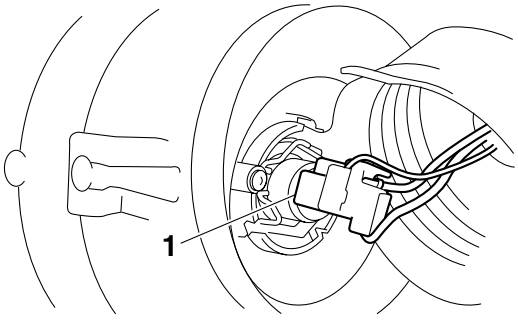
EAS21790
REPLACING THE HEADLIGHT BULBS
The following procedure applies to both of the headlight bulbs.
1. Remove:
   • Cover at the rear of the headlight “1”



2. Remove:
   • Headlight bulb cover “1”



3. Disconnect:
   • Headlight coupler “1”



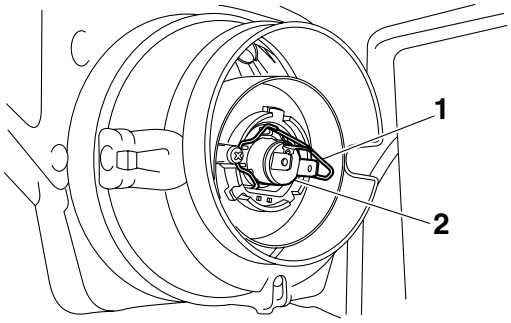
4. Remove:
   • Headlight bulb holder “1”
   • Headlight bulb “2”

EWA13320
⚠ WARNING

Since the headlight bulb gets extremely hot, keep flammable products and your hands away from the bulb until it has cooled down.

TIP

Unhook the headlight bulb holder, and then remove the defective bulb.



5. Install:
   • Headlight bulb New
   Secure the new headlight bulb with the headlight bulb holder.

ECA13690
NOTICE

Avoid touching the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.

6. Install:
   • Headlight bulb holder
7. Connect:
   • Headlight coupler
8. Install:
   • Headlight bulb cover
   • Cover at the rear of the headlight

EAS21810
ADJUSTING THE HEADLIGHT BEAMS
The following procedure applies to both of the headlights.
1. Adjust:
   • Headlight beam (vertically)

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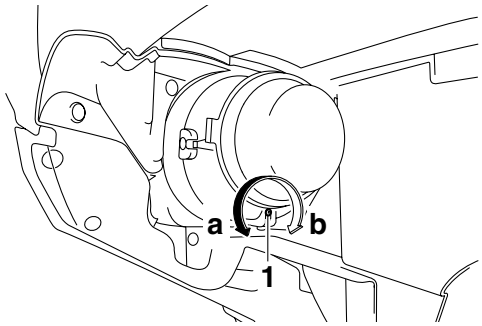
a. Turn the adjusting screw “1” in direction “a” or “b”.

Direction “a”
Headlight beam is raised.
Direction “b”
Headlight beam is lowered.



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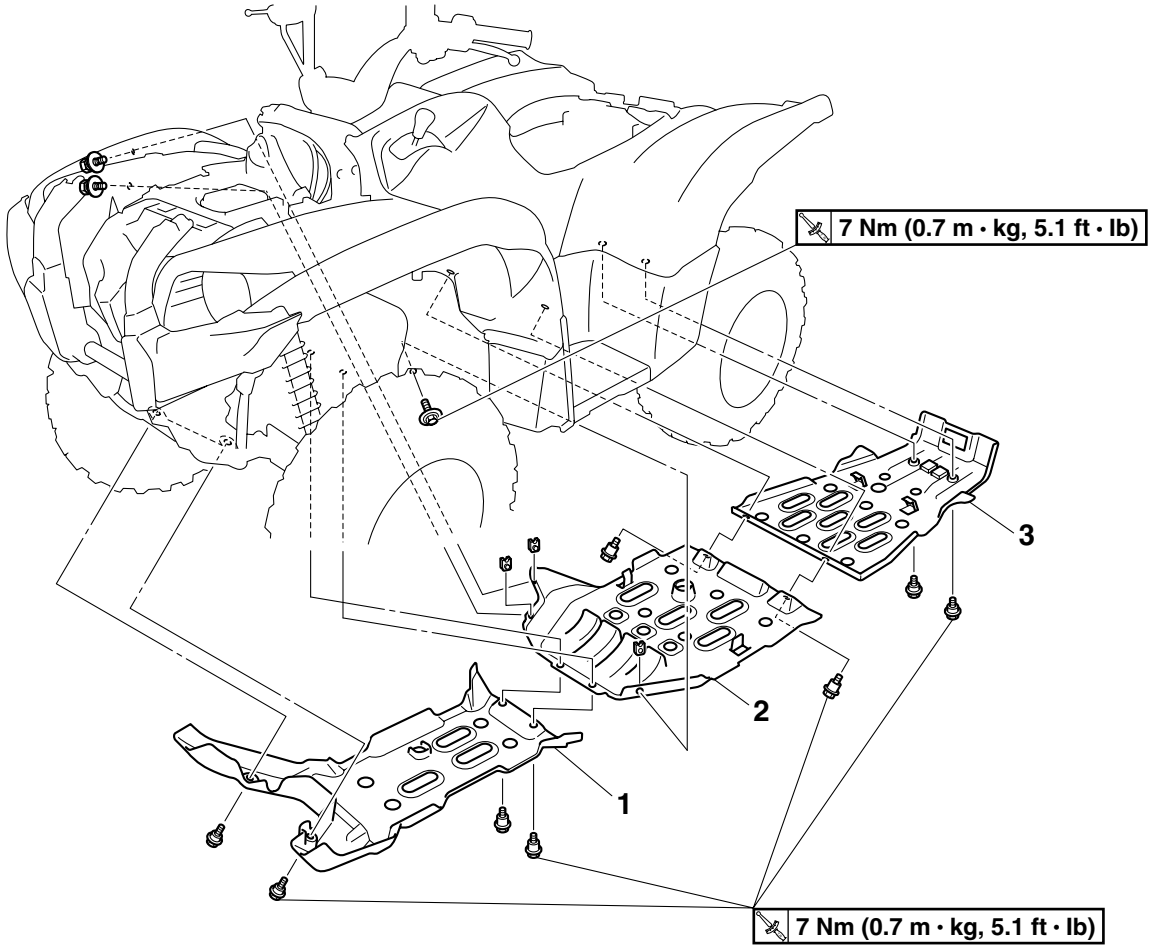
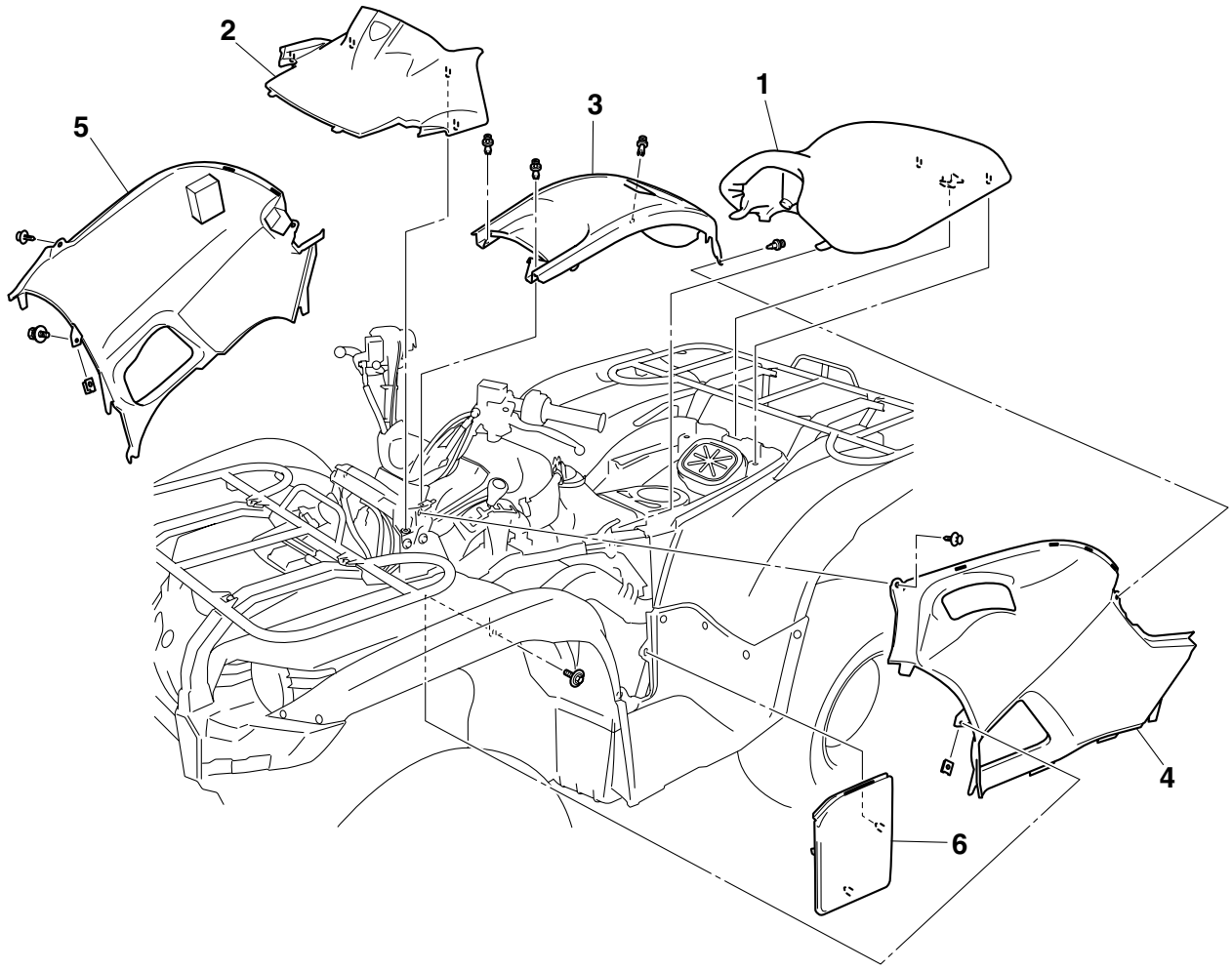
EAS21830
GENERAL CHASSIS

Removing the engine skid plates



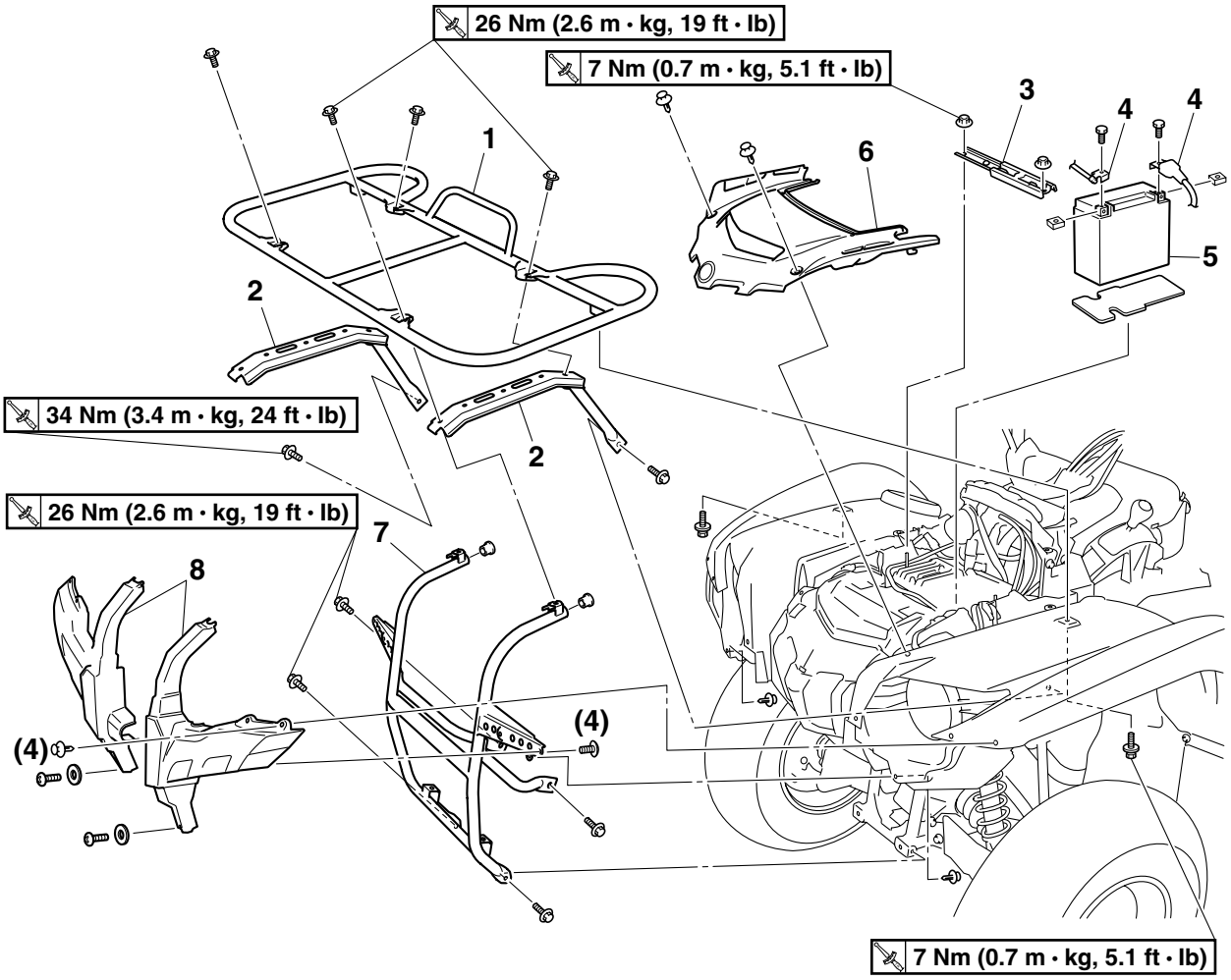
Order	Job/Parts to remove	Q'ty	Remarks
1	Front engine skid plate	1	
2	Center engine skid plate	1	
3	Rear engine skid plate	1	
			For installation, reverse the removal procedure.

Removing the seat and side panels



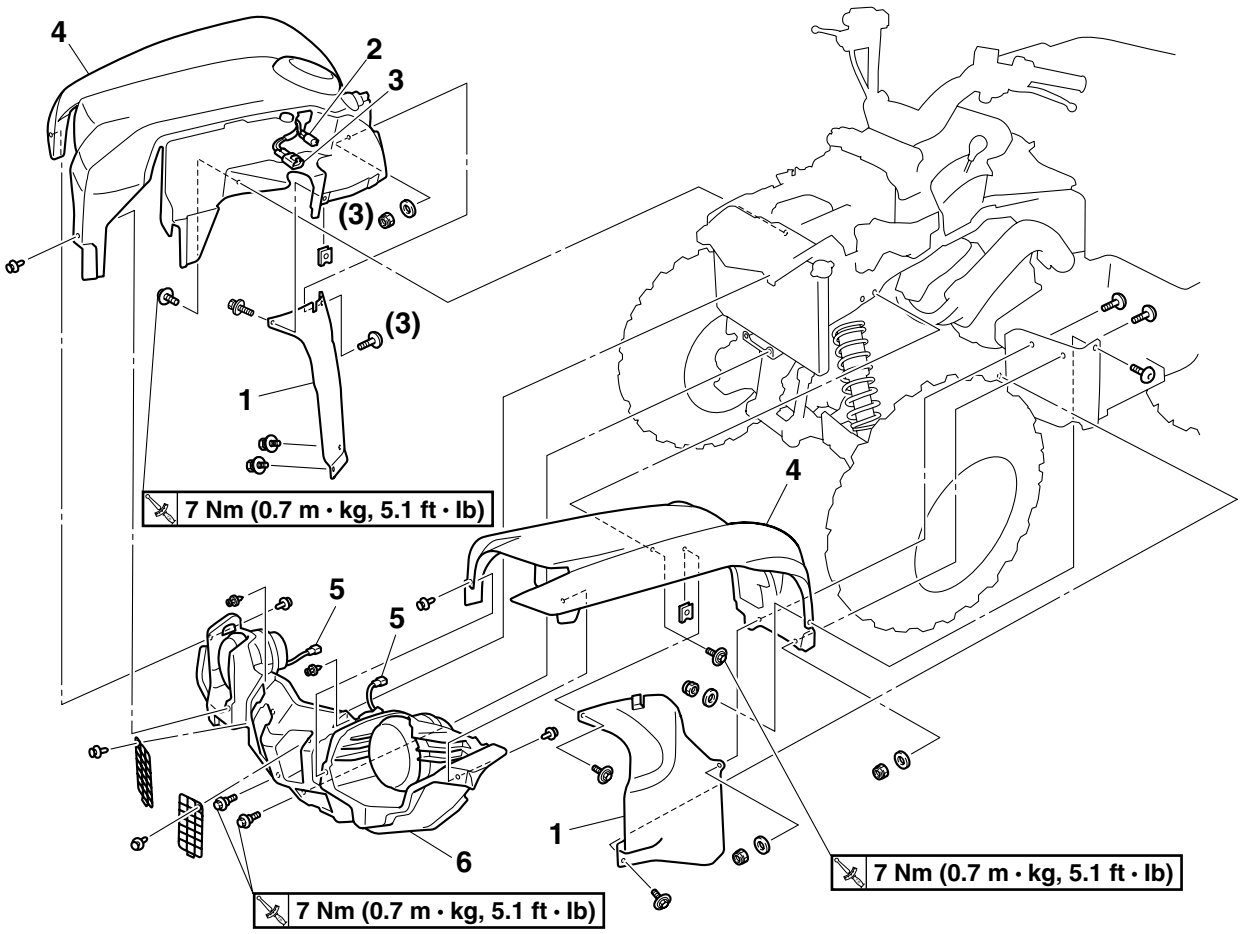
Order	Job/Parts to remove	Q'ty	Remarks
1	Seat	1	**TIP** Pull up the seat lock lever, then pull up on the rear of the seat.
2	Battery cover	1	
3	Fuel tank cover	1	
4	Left side panel	1	
5	Right side panel	1	
6	Dipstick accessing panel	1	
			For installation, reverse the removal procedure.

Removing the front carrier and front guard



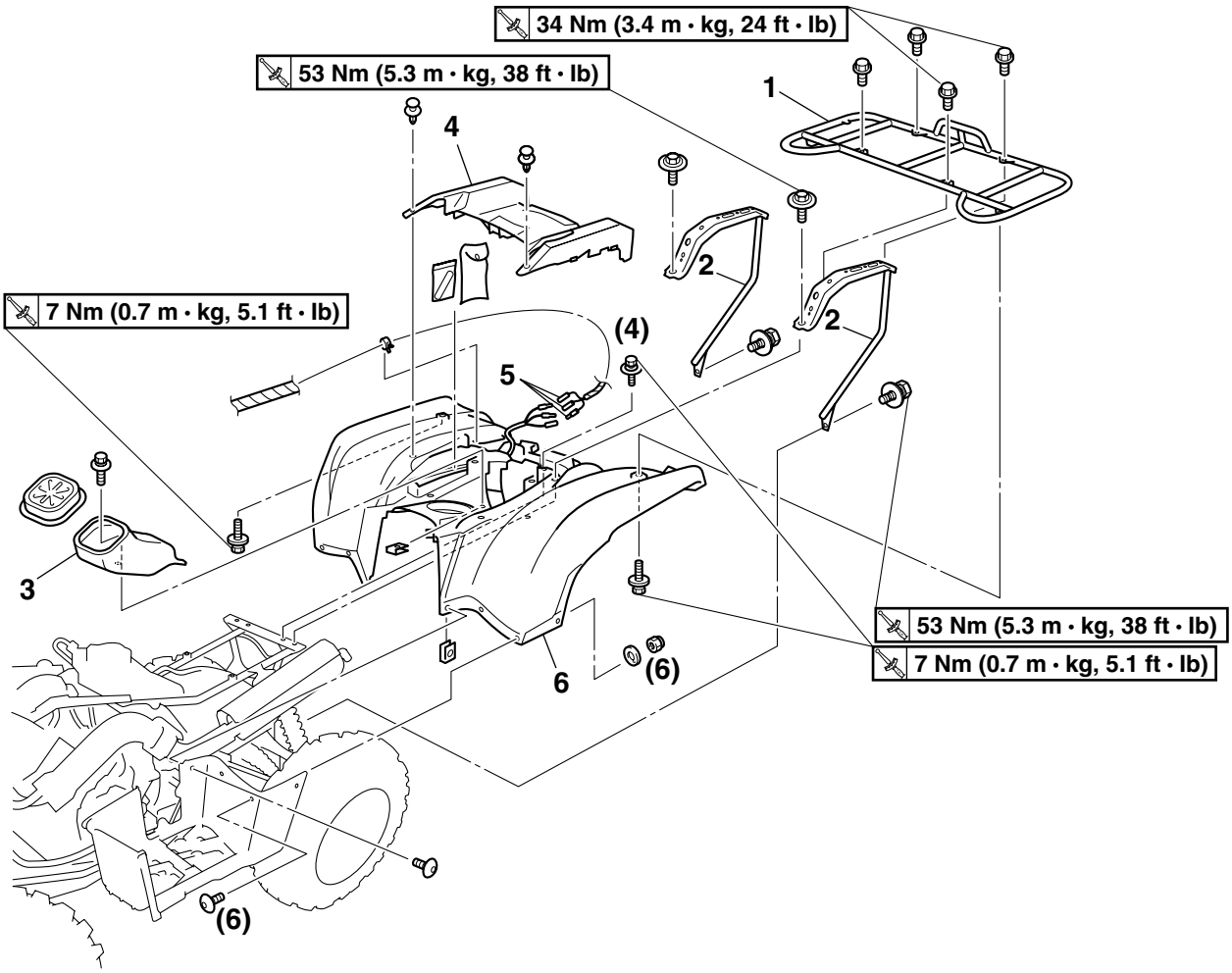
Order	Job/Parts to remove	Q'ty	Remarks
	Front engine skid plate		Refer to "Removing the engine skid plates".
1	Front carrier	1	
2	Front carrier bracket	2	
3	Battery holding bracket	1	
4	Battery lead	2	Disconnect. ECA28P1013 ***NOTICE*** **First disconnect the negative battery lead, then disconnect the positive lead.**
5	Battery	1	
6	Upper panel	1	
7	Front guard	1	
8	Front guard cover	2	
			For installation, reverse the removal procedure.

Removing the front fenders and front grill



Order	Job/Parts to remove	Q'ty	Remarks
	Seat/Side panels		Refer to "Removing the seat and side panels".
	Front carrier/Front guard		Refer to "Removing the front carrier and front guard".
1	Front fender inner panel	2	
2	Auxiliary DC jack coupler	1	Disconnect.
3	Main switch coupler	1	Disconnect.
4	Front fender	2	
5	Headlight coupler	2	Disconnect.
6	Front grill	1	
			For installation, reverse the removal procedure.

Removing the rear carrier and rear fender



Order	Job/Parts to remove	Q'ty	Remarks
	Seat/Side panels		Refer to "Removing the seat and side panels".
1	Rear carrier	1	
2	Rear carrier bracket	2	
3	Storage compartment	1	
4	Tail/brake light cover	1	
5	Tail/brake light connector	3	Disconnect.
6	Rear fender	1	
			For installation, reverse the removal procedure.

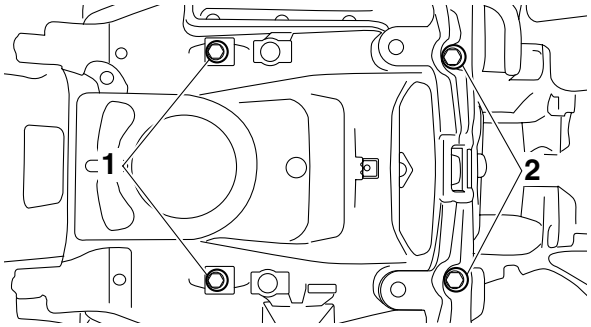
EAS28P1002
INSTALLING THE REAR FENDER

1. Install:
   • Rear fender

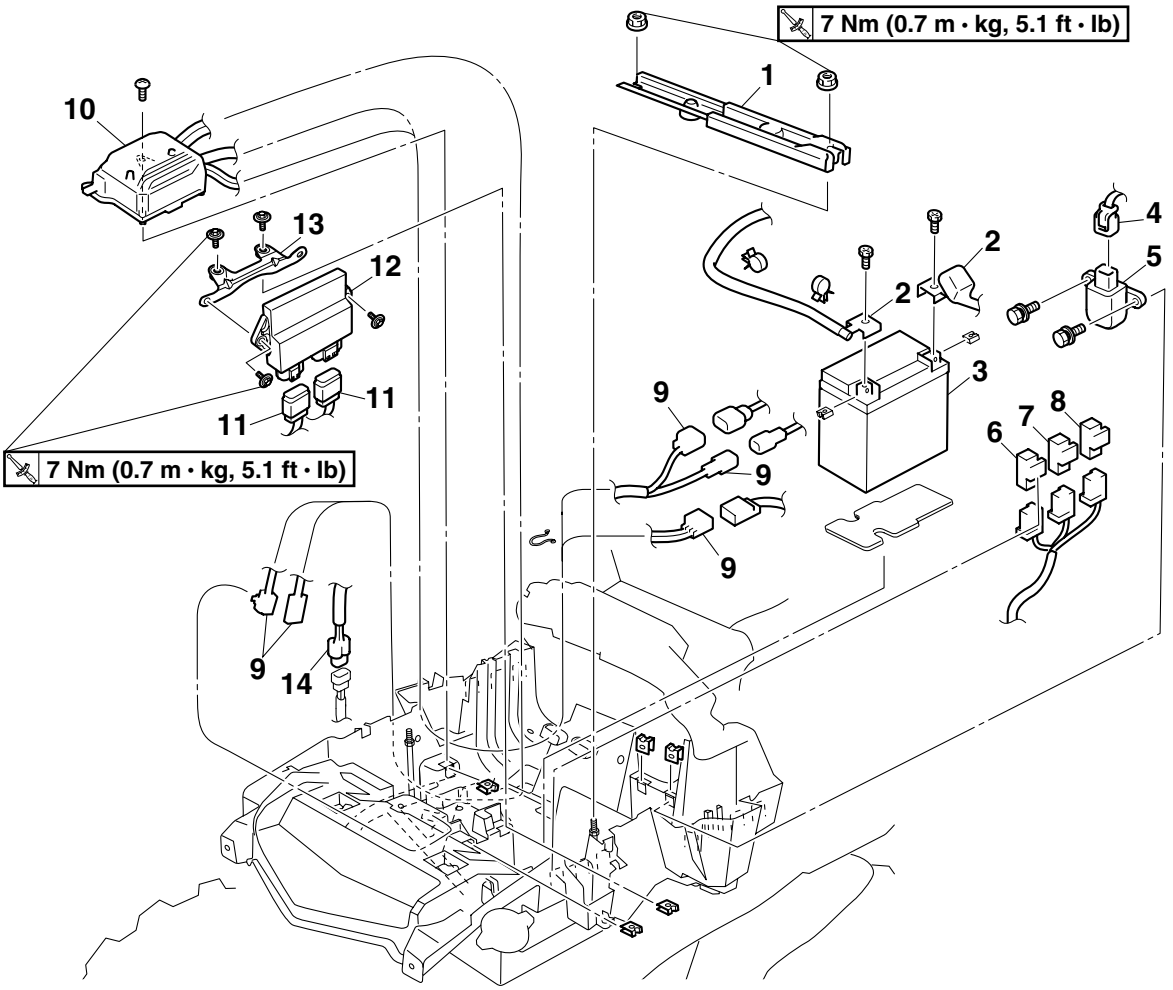
	Rear fender bolt **7 Nm (0.7 m·kg, 5.1 ft·lb)**

TIP

The bolts may be tightened to the specified torque in any tightening sequence. However, install the front bolts “1” and tighten them temporarily before installing the rear bolts “2”.

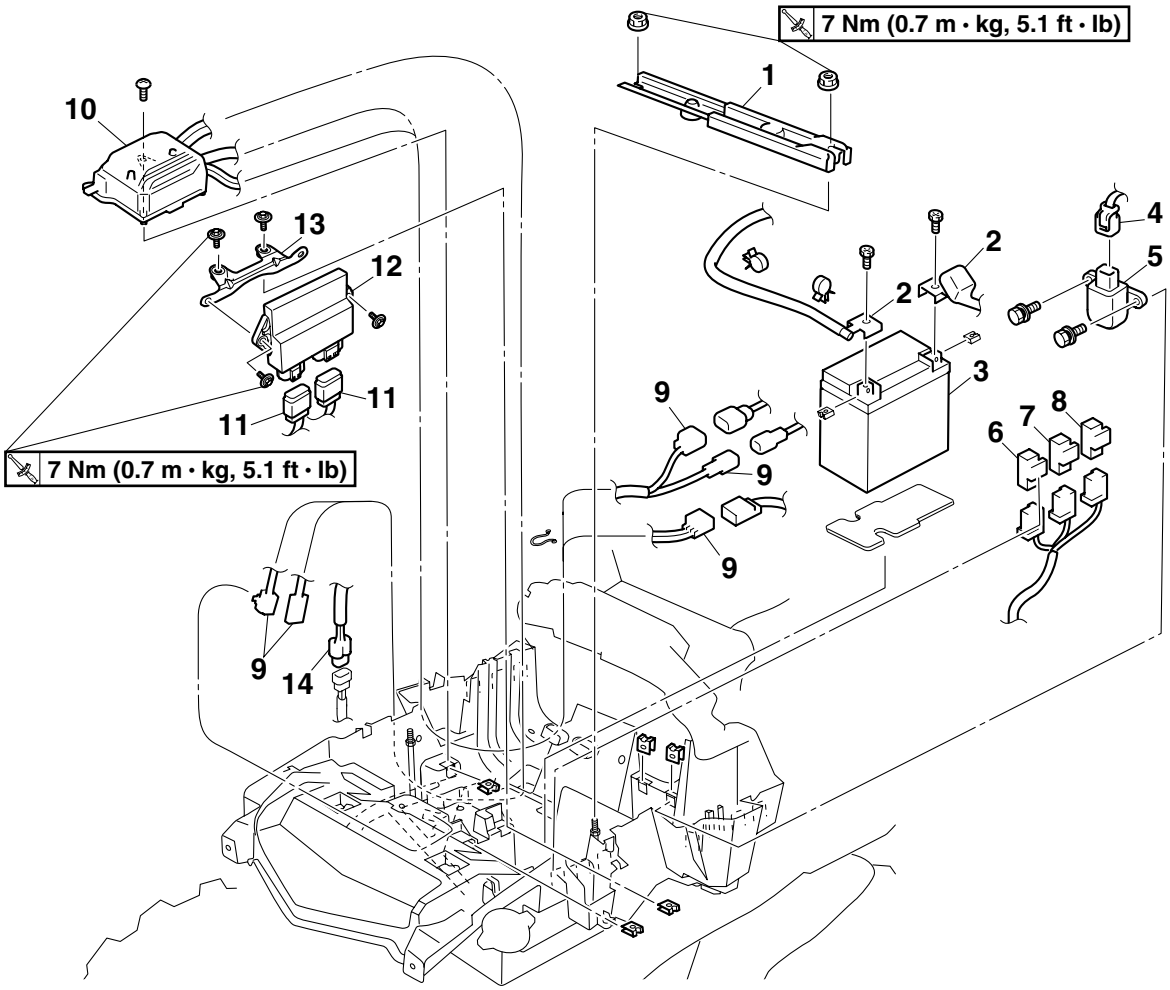


Removing the electrical components tray 1/2



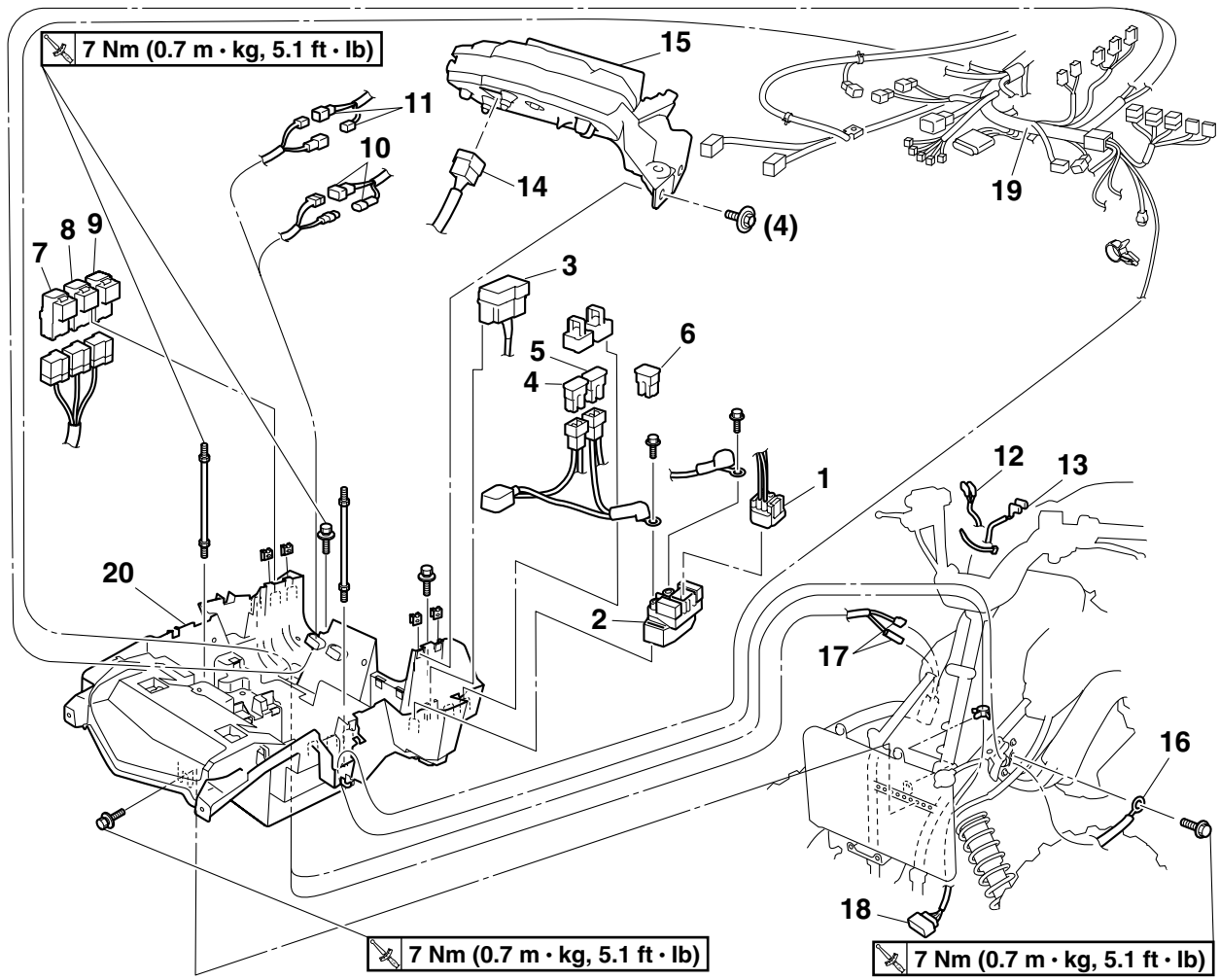
Order	Job/Parts to remove	Q'ty	Remarks
	Front fender/Front grill		Refer to "Removing the front fenders and front grill".
1	Battery holding bracket	1	
2	Battery lead	2	Disconnect. ECA28P1013 ***NOTICE*** **First disconnect the negative battery lead, then disconnect the positive lead.**
3	Battery	1	
4	Lean angle sensor coupler	1	Disconnect.
5	Lean angle sensor	1	
6	Four-wheel-drive motor relay 1	1	
7	Four-wheel-drive motor relay 2	1	
8	Headlight relay	1	
9	EPS control unit coupler	5	Disconnect. YFM5FGP/YFM7FGP only
10	EPS (electric power steering) control unit	1	YFM5FGP/YFM7FGP only
11	ECU coupler	2	Disconnect.
12	ECU (engine control unit)	1	

Removing the electrical components tray 1/2



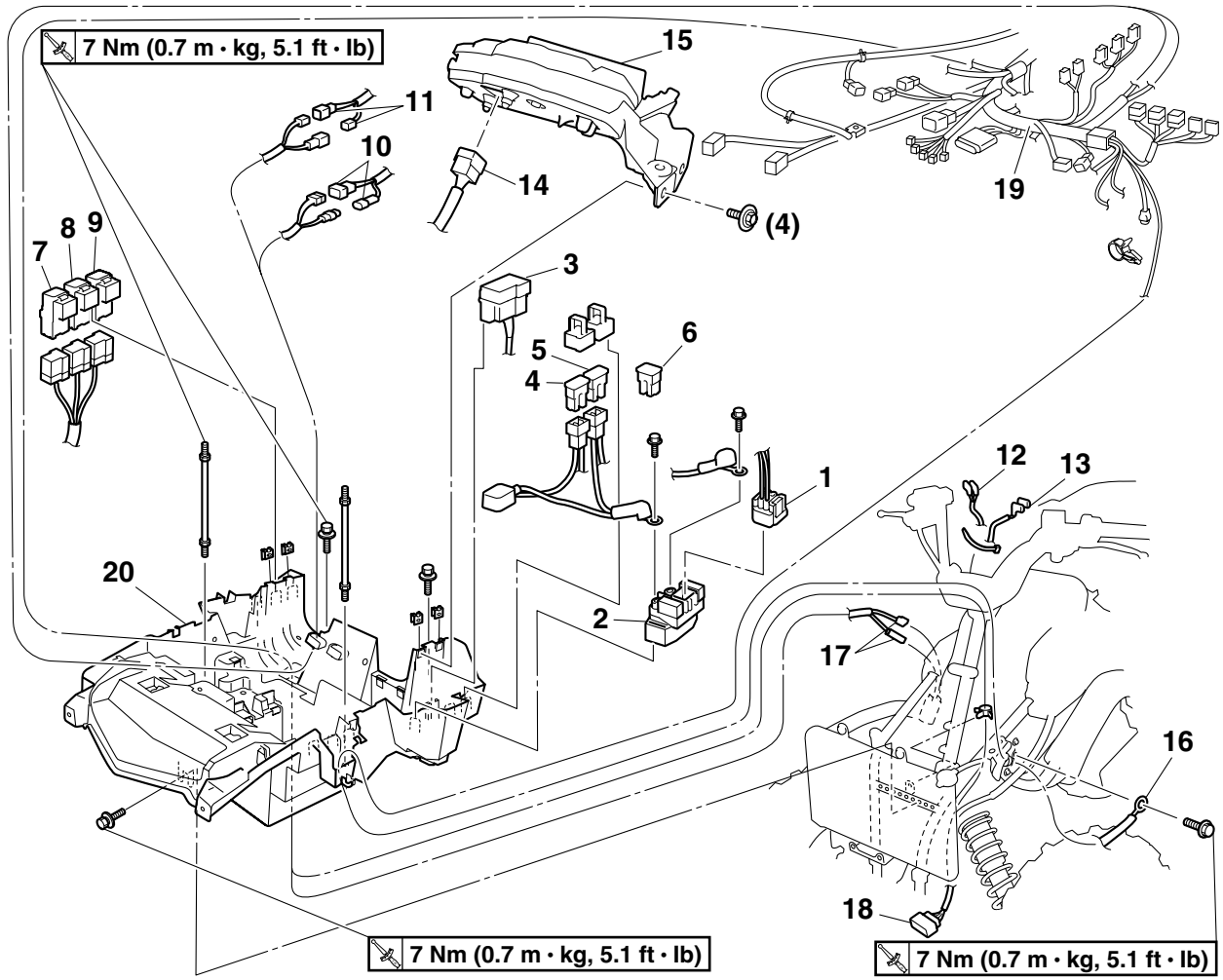
Order	Job/Parts to remove	Q'ty	Remarks
13	ECU bracket	1	
14	Radiator fan motor coupler	1	Disconnect.
			For installation, reverse the removal procedure.

Removing the electrical components tray 2/2



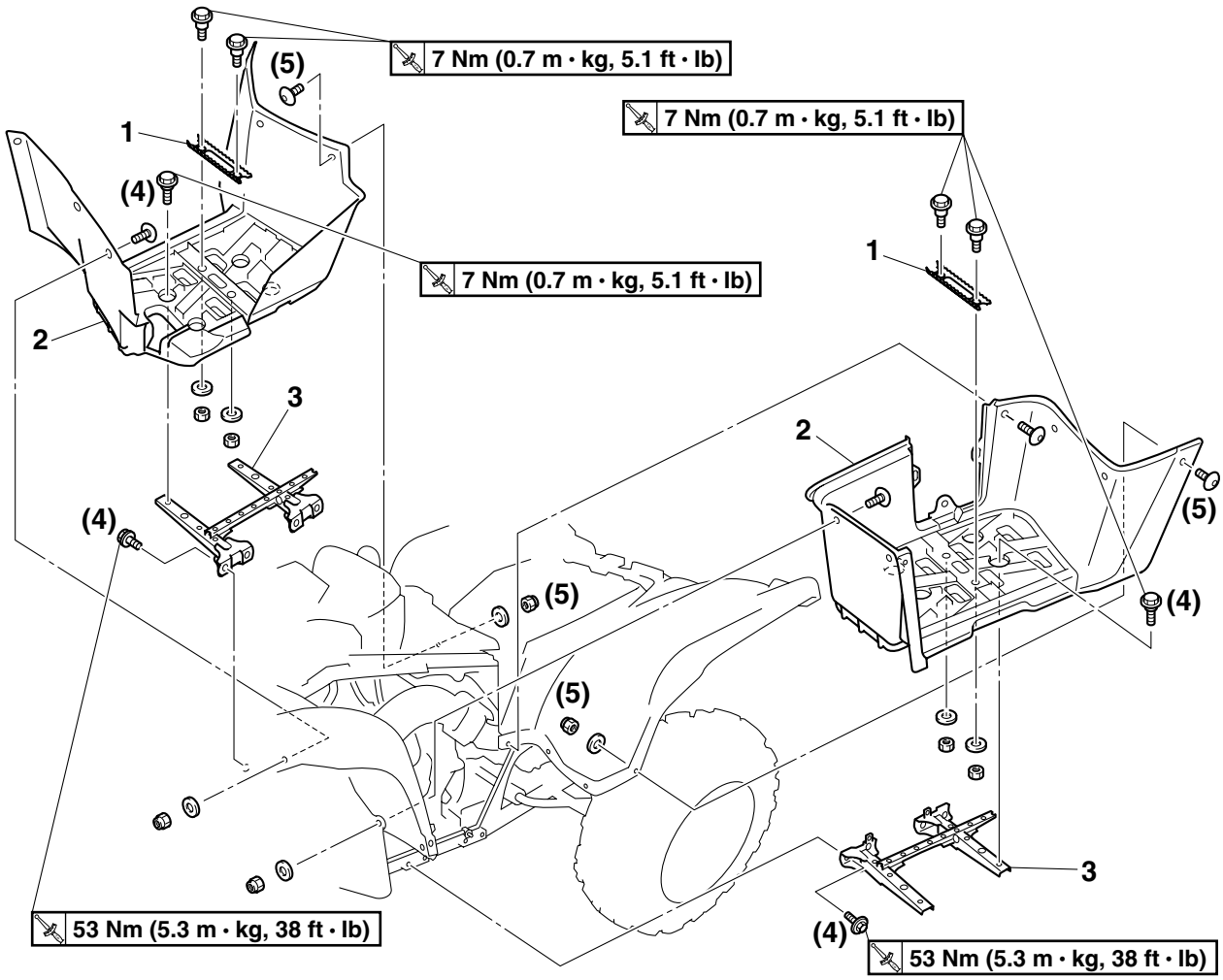
Order	Job/Parts to remove	Q'ty	Remarks
1	Starter relay coupler	1	Disconnect.
2	Starter relay	1	
3	Fuse box	1	
4	EPS fuse	1	YFM5FGP/YFM7FGP only
5	Main fuse	1	
6	Spare fuse	1	
7	Radiator fan motor relay	1	
8	Fuel injection system relay	1	
9	Four-wheel-drive motor relay 3	1	
10	Left handlebar switch coupler	2	Disconnect.
11	On-command four-wheel-drive motor switch and differential gear lock switch coupler	2	Disconnect.
12	Front brake light switch connector	2	Disconnect.
13	Rear brake light switch connector	2	Disconnect.
14	Meter assembly coupler	1	Disconnect.
15	Meter assembly	1	
16	Frame ground terminal	1	
17	Ignition coil connector	2	Disconnect.

Removing the electrical components tray 2/2



Order	Job/Parts to remove	Q'ty	Remarks
18	Differential motor coupler	1	Disconnect.
19	Wire harness	1	
20	Electrical components tray	1	
			For installation, reverse the removal procedure.

Removing the footrest boards



Order	Job/Parts to remove	Q'ty	Remarks
	Seat/Side panels		Refer to "Removing the seat and side panels".
1	Footrest	2	
2	Footrest board	2	
3	Footrest bracket	2	
			For installation, reverse the removal procedure.

EAS28P1003

INSTALLING THE FOOTREST BOARDS

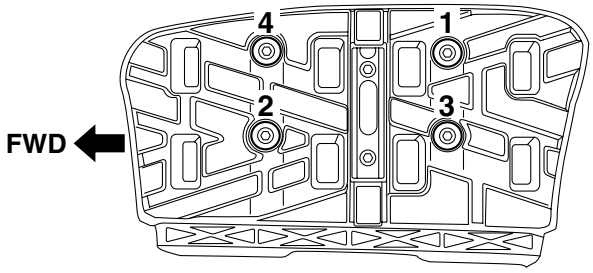
The following procedure applies to both of the footrest boards.

1. Install:
   • Footrest board

	Footrest board bolt **7 Nm (0.7 m·kg, 5.1 ft·lb)**

TIP

Tighten the footrest board bolts to the specified torque in the proper tightening sequence as shown.

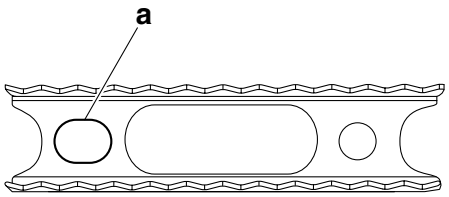


2. Install:
   • Footrest

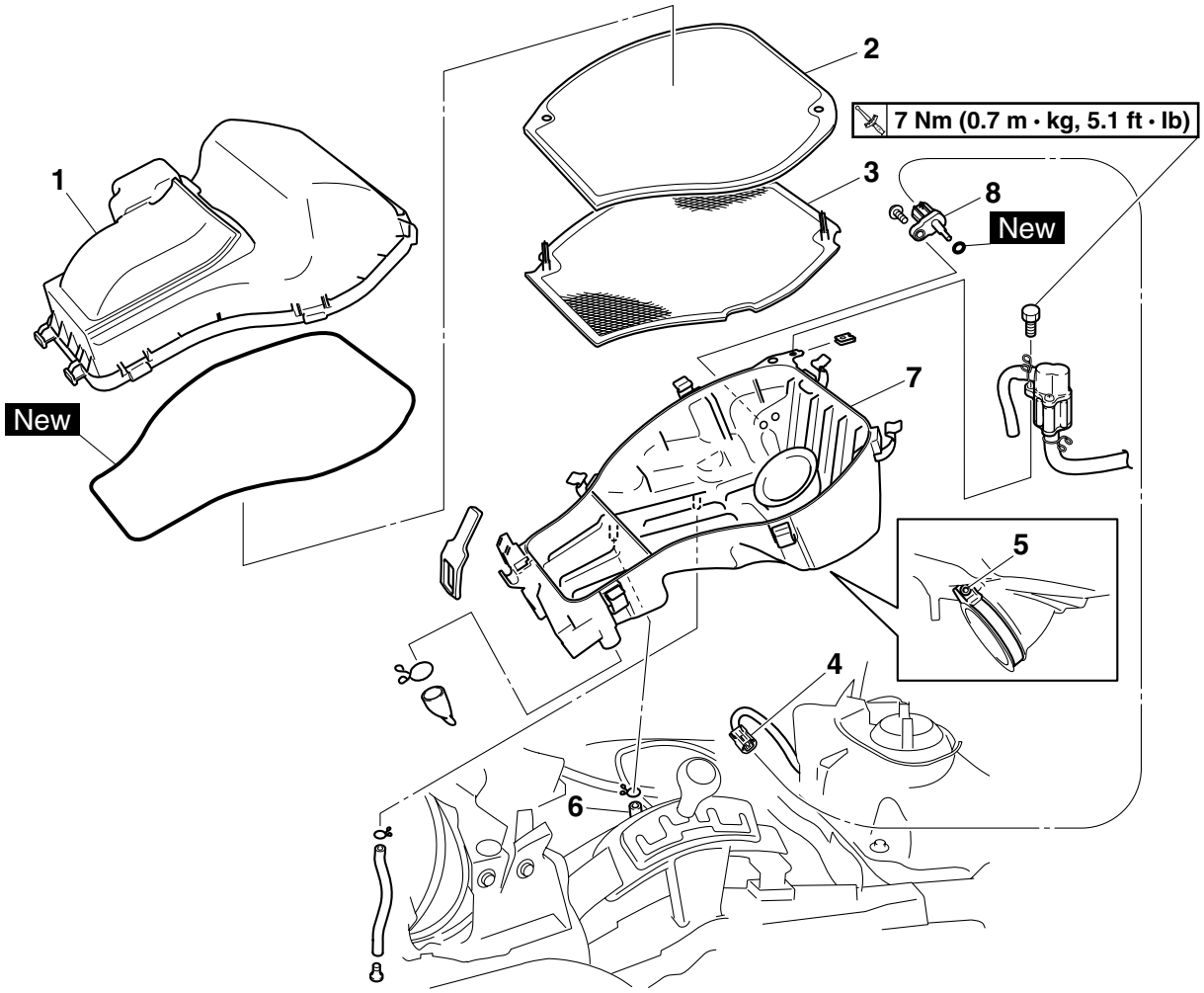
	Footrest bolt **7 Nm (0.7 m·kg, 5.1 ft·lb)**

TIP

Install the footrest with the oval hole “a” facing inward.



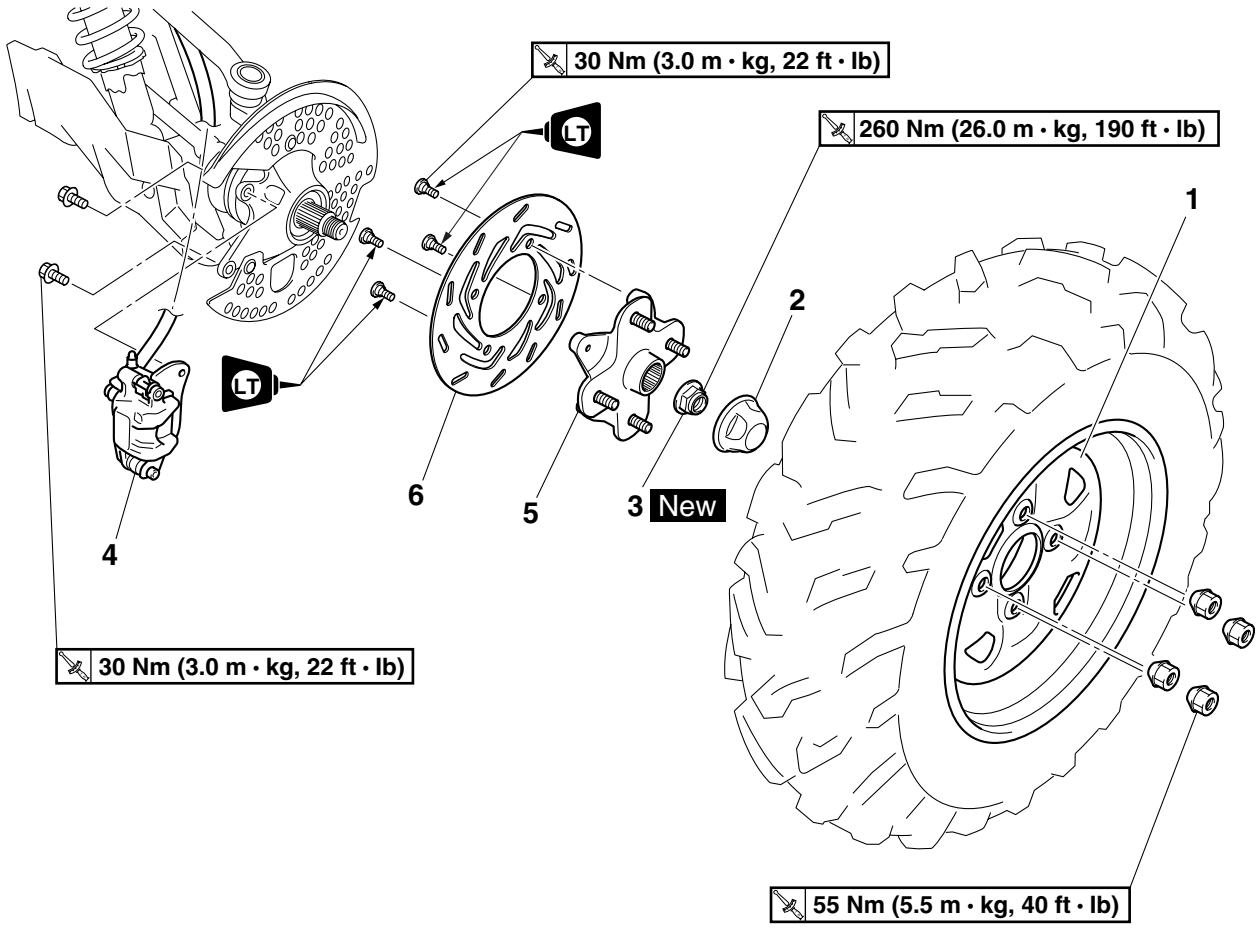
Removing the air filter case



Order	Job/Parts to remove	Q'ty	Remarks
	Seat/Side panels		Refer to "Removing the seat and side panels".
1	Air filter case cover	1	
2	Air filter element	1	
3	Air filter element frame	1	
4	Intake air temperature sensor coupler	1	Disconnect.
5	Air filter case joint clamp screw	1	Loosen.
6	Cylinder head breather hose	1	Disconnect.
7	Air filter case	1	
8	Intake air temperature sensor	1	
			For installation, reverse the removal procedure.

EAS21870
FRONT WHEELS

Removing the front wheels and brake discs



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front wheels. Place the vehicle on a level surface.
1	Front wheel	1	
2	Wheel cap	1	
3	Front wheel axle nut	1	
4	Front brake caliper assembly	1	**TIP** Do not squeeze the front brake lever when the brake caliper is off of the brake disc as the brake pads will be forced shut.
5	Front wheel hub	1	
6	Front brake disc	1	
			For installation, reverse the removal procedure.

EAS21890
REMOVING THE FRONT WHEELS
1. Place the vehicle on a level surface.
2. Elevate:
   • Front wheels

TIP

Place the vehicle on a suitable stand so that the front wheels are elevated.

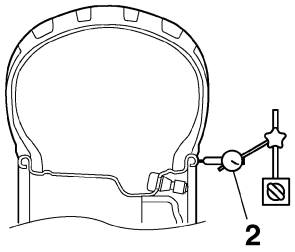
3. Remove:
   • Front brake calipers

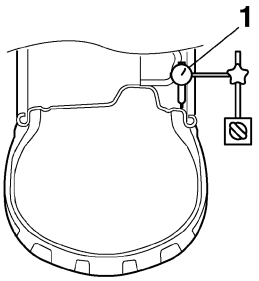
TIP

Do not apply the brake lever when removing the brake calipers.

EAS29380
CHECKING THE FRONT WHEELS
The following procedure applies to both of the front wheels.
1. Check:
   • Tire
   • Wheel
   Refer to "CHECKING THE TIRES" on page 3-32 and "CHECKING THE WHEELS" on page 3-34.
2. Measure:
   • Radial wheel runout "1"
   • Lateral wheel runout "2"
   Over the specified limit → Replace the wheel or check the wheel bearing play.
   Refer to "CHECKING THE STEERING KNUCKLES AND FRONT WHEEL BEARINGS" on page 4-56.

Radial wheel runout limit
2.0 mm (0.08 in)
Lateral wheel runout limit
2.0 mm (0.08 in)



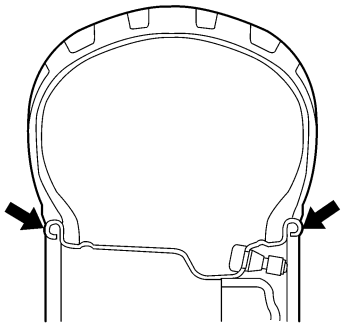


3. Check:
   • Wheel balance
   Out of balance → Adjust.

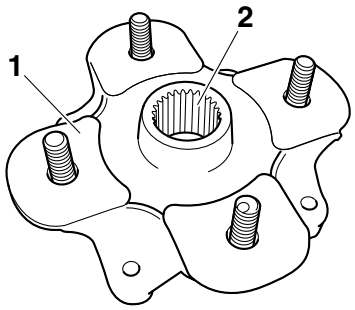
EWA15000

WARNING

After replacing the tire, ride conservatively to allow the tire to be properly seated in the rim. Failure to do so may cause an accident resulting in vehicle damage and possible injury.



EAS28P1008
CHECKING THE FRONT WHEEL HUBS
The following procedure applies to both of the front wheel hubs.
1. Check:
   • Wheel hub "1"
   Cracks/damage → Replace.
   • Splines (wheel hub) "2"
   Wear/damage → Replace the wheel hub.



EAS28P1009
INSTALLING THE FRONT BRAKE DISCS

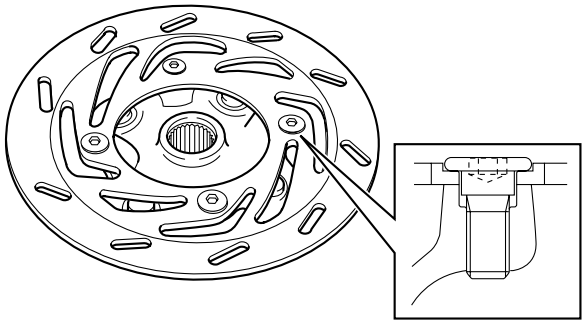
The following procedure applies to both of the front brake discs.

1. Install:
   • Brake disc

	Brake disc bolt **30 Nm (3.0 m·kg, 22 ft·lb)** **LOCTITE®**

TIP

Install the brake disc so that the recessed portion of the bolt hole faces away from the hub.



EAS28P1010
INSTALLING THE FRONT WHEEL HUBS

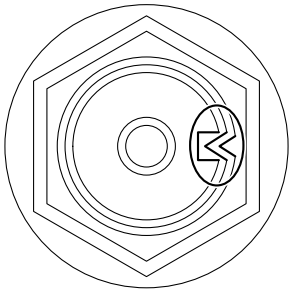
The following procedure applies to both of the front wheel hubs.

1. Install:
   • Wheel axle nut New

	Wheel axle nut **260 Nm (26.0 m·kg, 190 ft·lb)**

TIP

- Do not apply oil to the threads of the nut.
- After tightening the nut, stake the collar of the nut into the notch of the shaft.



2. Check:
   • Brake disc
   Refer to “CHECKING THE FRONT BRAKE DISCS” on page 4-26

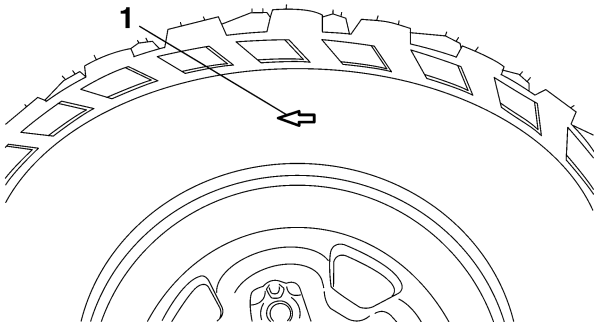
EAS28P1011
INSTALLING THE FRONT WHEELS

The following procedure applies to both of the front wheels.

1. Install:
   • Wheel

TIP

The arrow mark “1” on the tire must point in the direction of wheel rotation.



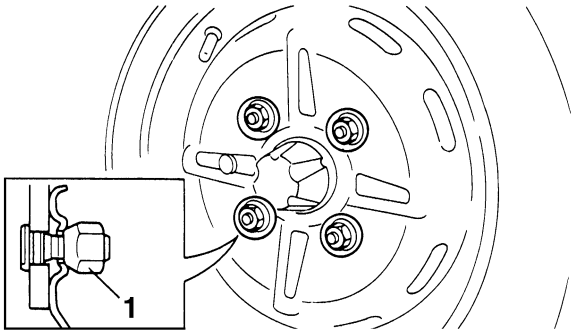
2. Tighten:
   • Wheel nuts “1”

	Wheel nut **55 Nm (5.5 m·kg, 40 ft·lb)**

EWA28P1007

⚠ WARNING

Tapered wheel nuts “1” are used for both the front and rear wheels. Install each nut with its tapered side towards the wheel.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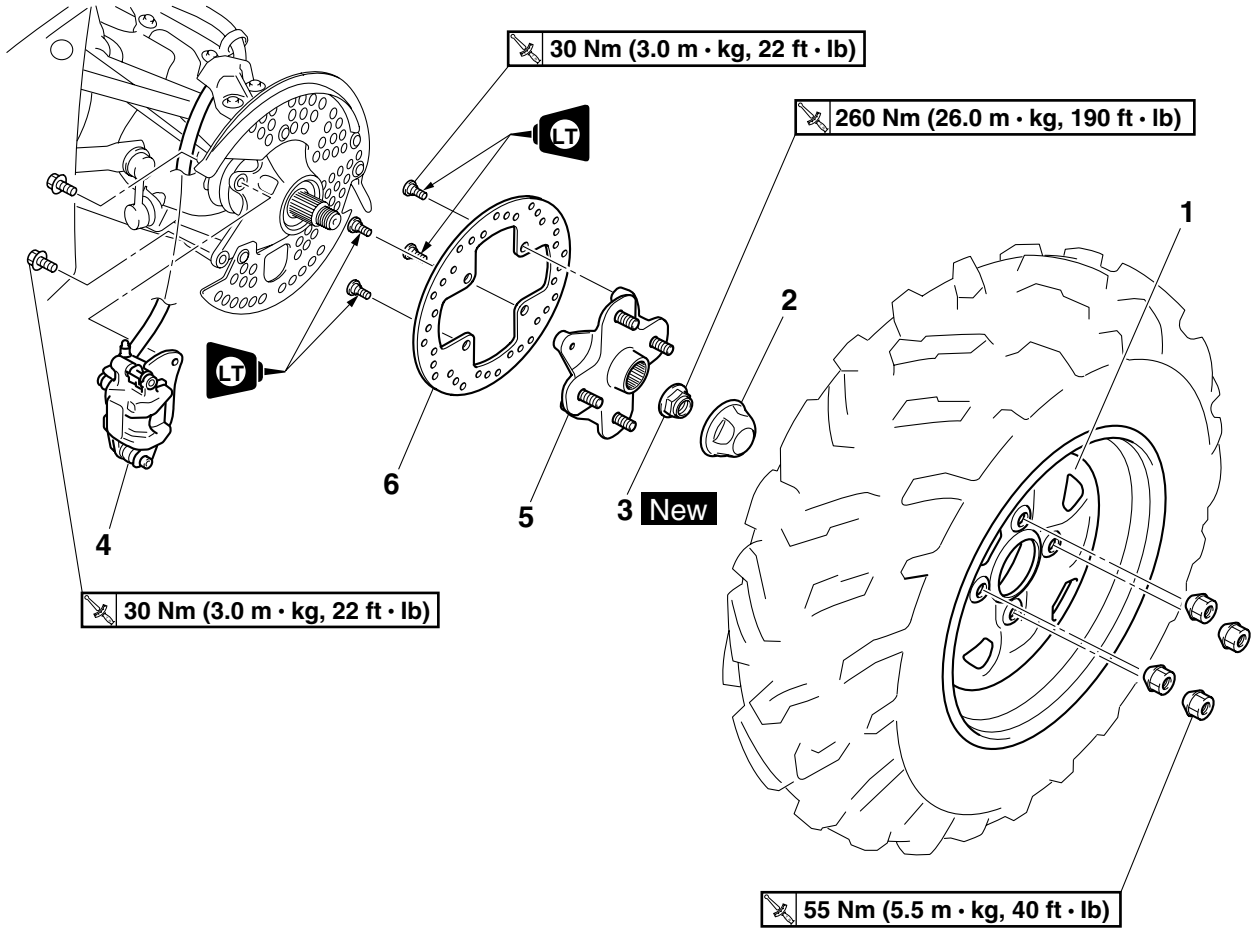
EAS22020

REAR WHEELS

Removing the rear wheels and brake discs



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the rear wheels. Place the vehicle on a level surface.
1	Rear wheel	1	
2	Wheel cap	1	
3	Rear wheel axle nut	1	
4	Rear brake caliper assembly	1	**TIP** Do not squeeze the rear brake lever and brake pedal when the brake caliper is off of the brake disc as the brake pads will be forced shut.
5	Rear wheel hub	1	
6	Rear brake disc	1	
			For installation, reverse the removal procedure.

EAS22040
REMOVING THE REAR WHEELS
1. Place the vehicle on a level surface.
2. Elevate:
   • Rear wheels

TIP

Place the vehicle on a suitable stand so that the rear wheels are elevated.

3. Remove:
   • Rear brake calipers

TIP

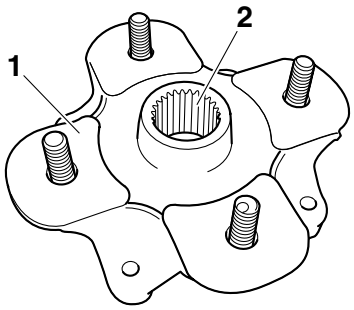
Do not apply the brake lever and depress the brake pedal when removing the brake calipers.

EAS29430
CHECKING THE REAR WHEELS
The following procedure applies to both of the rear wheels.
1. Check:
   • Tire
   • Wheel
   Refer to "CHECKING THE TIRES" on page 3-32 and "CHECKING THE WHEELS" on page 3-34.
2. Measure:
   • Radial wheel runout
   • Lateral wheel runout
   Refer to "CHECKING THE FRONT WHEELS" on page 4-15.
   Over the specified limit → Replace the wheel or check the wheel bearing play.
   Refer to "CHECKING THE REAR KNUCKLES AND REAR WHEEL BEARINGS" on page 4-66.

Radial wheel runout limit
2.0 mm (0.08 in)
Lateral wheel runout limit
2.0 mm (0.08 in)

3. Check:
   • Wheel balance
   Refer to "CHECKING THE FRONT WHEELS" on page 4-15.

EAS29440
CHECKING THE REAR WHEEL HUBS
The following procedure applies to both of the rear wheel hubs.
1. Check:
   • Wheel hub "1"
   Cracks/damage → Replace.
   • Splines (wheel hub) "2"
   Wear/damage → Replace.

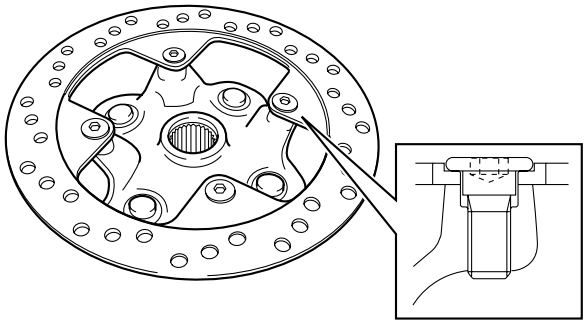


EAS28P1012
INSTALLING THE REAR BRAKE DISCS
The following procedure applies to both of the rear brake discs.
1. Install:
   • Brake disc

Brake disc bolt
30 Nm (3.0 m·kg, 22 ft·lb)
LOCTITE®

TIP

Install the brake disc so that the recessed portion of the bolt hole faces away from the hub.

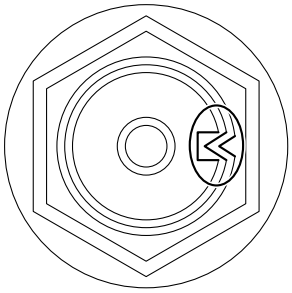


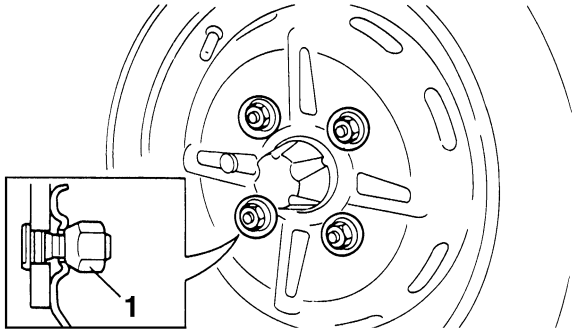
EAS28P1013
INSTALLING THE REAR WHEEL HUBS
The following procedure applies to both of the rear wheel hubs.
1. Install:
   • Wheel axle nut New

Wheel axle nut
260 Nm (26.0 m·kg, 190 ft·lb)

TIP

• Do not apply oil to the threads of the nut.
• After tightening the nut, stake the collar of the nut into the notch of the shaft.





2. Check:
   • Brake disc
   Refer to “CHECKING THE REAR BRAKE DISCS” on page 4-38.

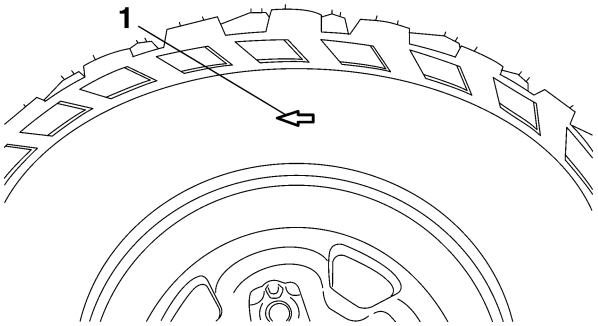
EAS28P1014
INSTALLING THE REAR WHEELS

The following procedure applies to both of the rear wheels.

1. Install:
   • Wheel

TIP

The arrow mark “1” on the tire must point in the direction of wheel rotation.



2. Tighten:
   • Wheel nuts “1”

	Wheel nut **55 Nm (5.5 m·kg, 40 ft·lb)**

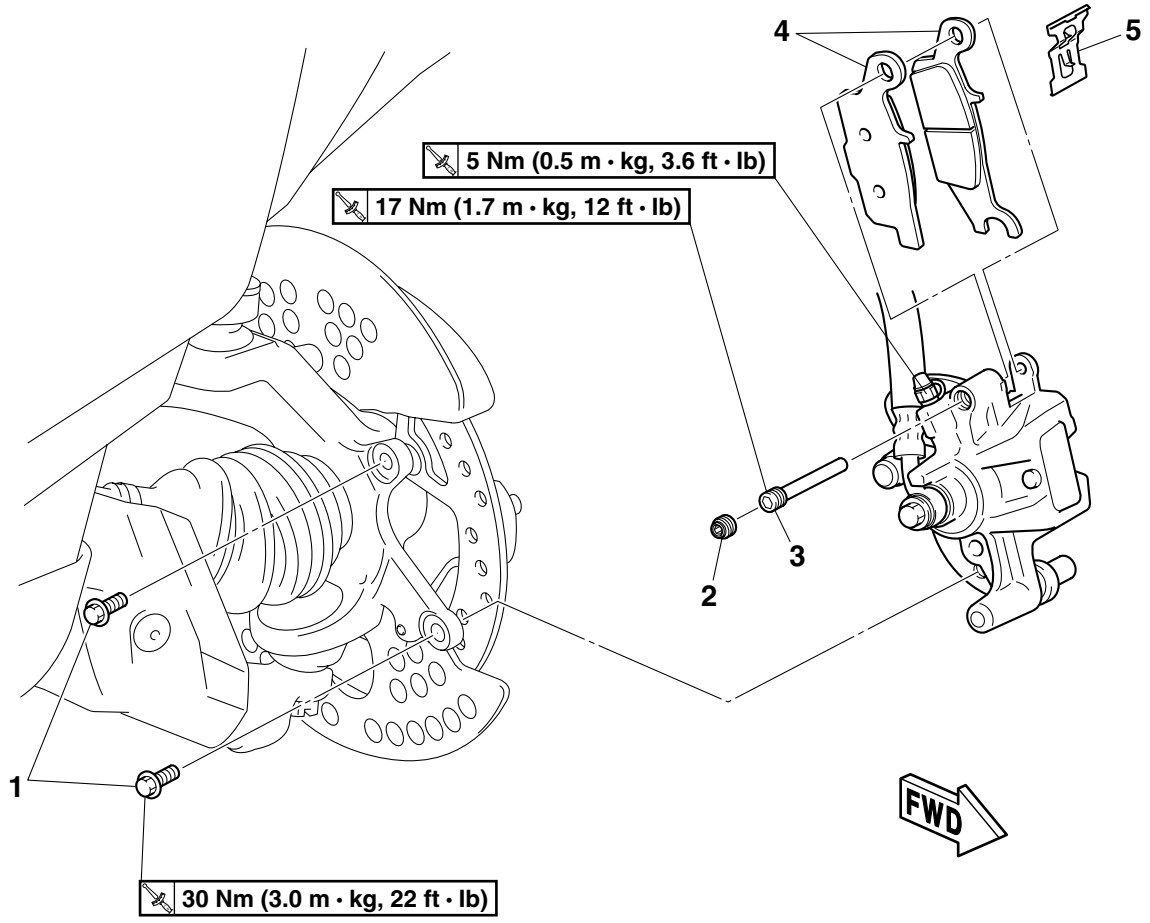
EWA28P1007

⚠ WARNING

Tapered wheel nuts “1” are used for both the front and rear wheels. Install each nut with its tapered side towards the wheel.

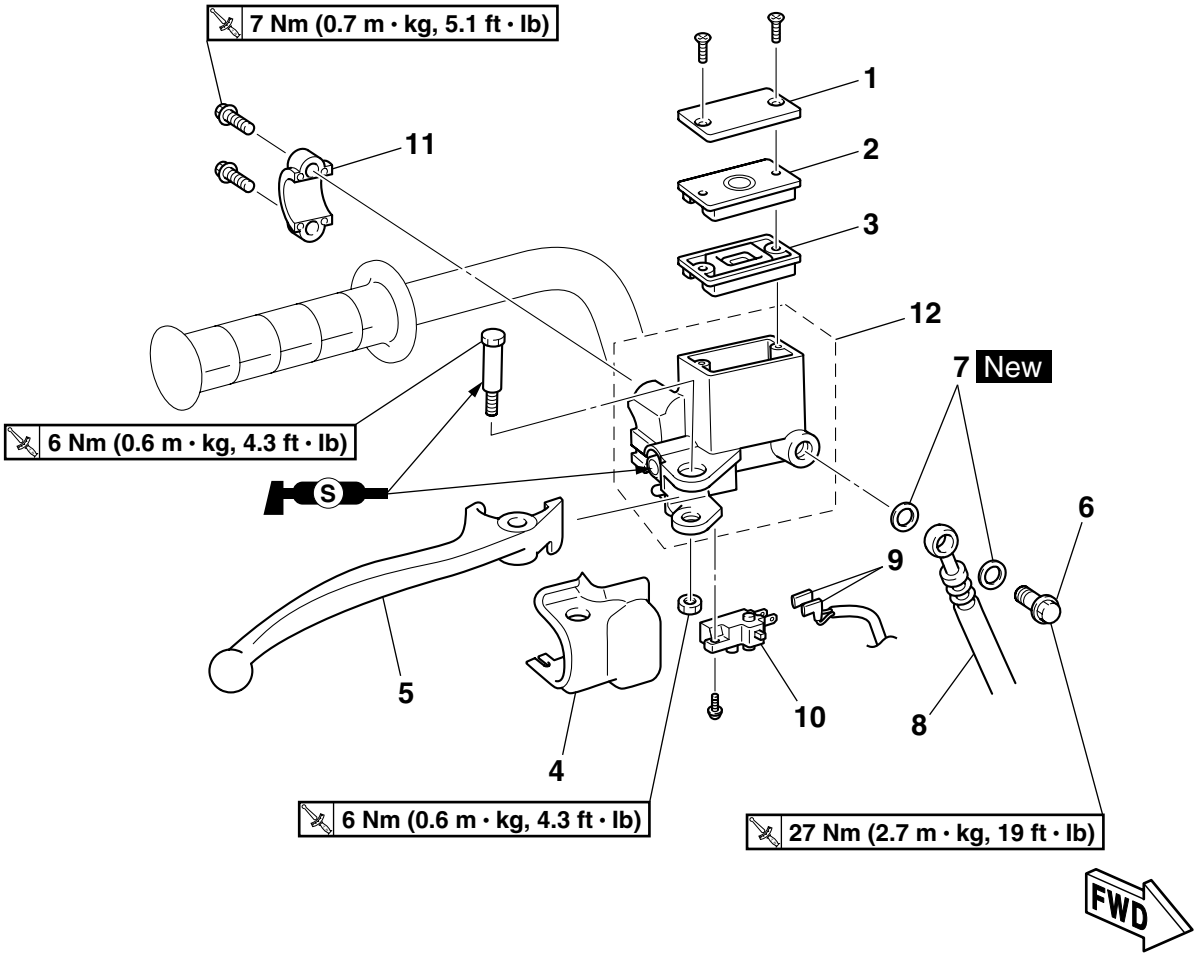
EAS22210
FRONT BRAKE

Removing the front brake pads



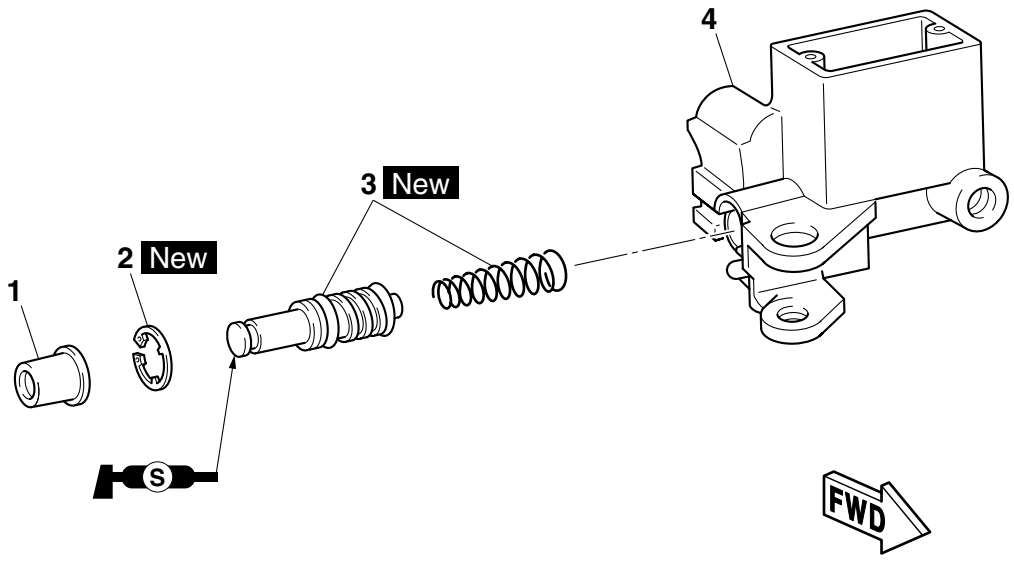
Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front brake calipers.
	Front wheel		Refer to "FRONT WHEELS" on page 4-14.
1	Front brake caliper bolt	2	
2	Brake pad holding bolt plug	1	
3	Brake pad holding bolt	1	
4	Front brake pad	2	
5	Brake pad spring	1	
			For installation, reverse the removal procedure.

Removing the front brake master cylinder



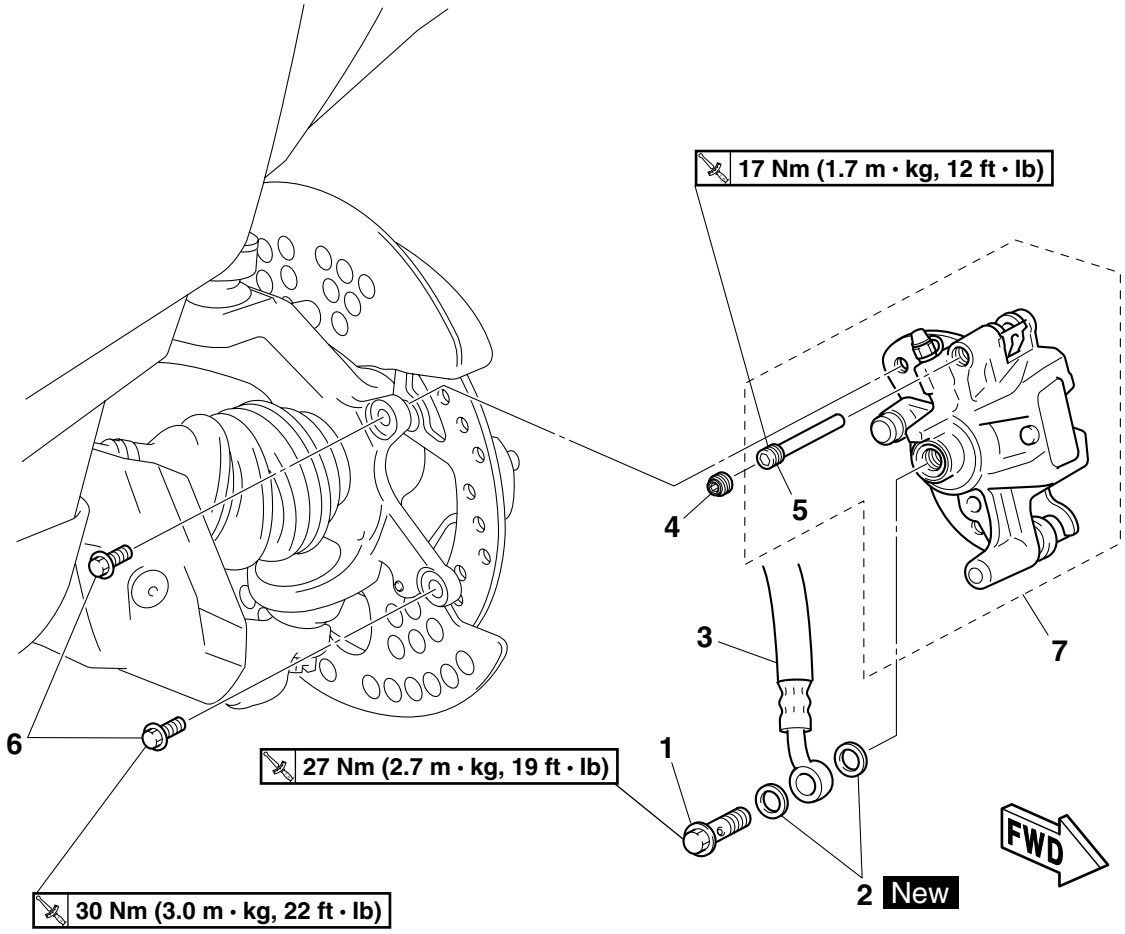
Order	Job/Parts to remove	Q'ty	Remarks
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-23.
	On-command four-wheel-drive motor switch and differential gear lock switch		Refer to "HANDLEBAR" on page 4-44.
1	Brake fluid reservoir cap	1	
2	Brake fluid reservoir diaphragm holder	1	
3	Brake fluid reservoir diaphragm	1	
4	Front brake lever cover	1	
5	Brake lever	1	
6	Union bolt	1	
7	Copper washer	2	
8	Front brake hose	1	Disconnect.
9	Front brake light switch connector	2	Disconnect.
10	Front brake light switch	1	
11	Front brake master cylinder holder	1	
12	Front brake master cylinder	1	
			For installation, reverse the removal procedure.

Disassembling the front brake master cylinder



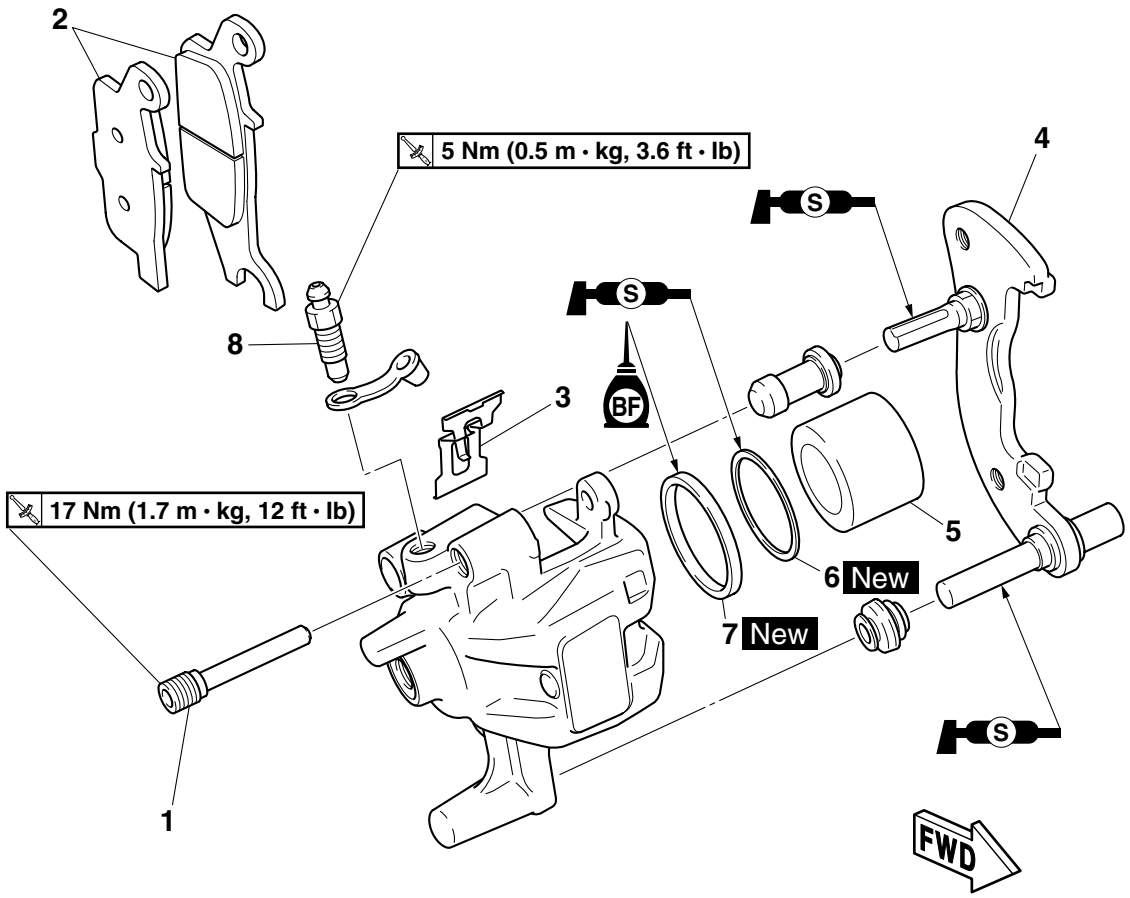
Order	Job/Parts to remove	Q'ty	Remarks
1	Dust boot	1	
2	Circlip	1	
3	Brake master cylinder kit	1	
4	Brake master cylinder body	1	
			For assembly, reverse the disassembly procedure.

Removing the front brake calipers



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front brake calipers.
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-23.
	Front wheel		Refer to "FRONT WHEELS" on page 4-14.
1	Union bolt	1	
2	Copper washer	2	
3	Front brake hose	1	Disconnect.
4	Brake pad holding bolt plug	1	
5	Brake pad holding bolt	1	Loosen.
6	Front brake caliper bolt	2	
7	Front brake caliper assembly	1	
			For installation, reverse the removal procedure.

Disassembling the front brake calipers



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front brake calipers.
1	Brake pad holding bolt	1	
2	Brake pad	2	
3	Brake pad spring	1	
4	Brake caliper bracket	1	
5	Brake caliper piston	1	
6	Brake caliper dust seal	1	
7	Brake caliper piston seal	1	
8	Bleed screw	1	
			For assembly, reverse the disassembly procedure.

EAS22220
INTRODUCTION
EWA14100
⚠ WARNING

Disc brake components rarely require disassembly. Therefore, always follow these preventive measures:
- **Never disassemble brake components unless absolutely necessary.**
- **If any connection on the hydraulic brake system is disconnected, the entire brake system must be disassembled, drained, cleaned, properly filled, and bled after reassembly.**
- **Never use solvents on internal brake components.**
- **Use only clean or new brake fluid for cleaning brake components.**
- **Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.**
- **Avoid brake fluid coming into contact with the eyes as it can cause serious injury.**
- **FIRST AID FOR BRAKE FLUID ENTERING THE EYES:**
- **Flush with water for 15 minutes and get immediate medical attention.**

EAS22240
CHECKING THE FRONT BRAKE DISCS
The following procedure applies to both brake discs.
1. Remove:
   - Front wheel
     Refer to "FRONT WHEELS" on page 4-14.
2. Check:
   - Brake disc
     Damage/galling → Replace.
3. Measure:
   - Brake disc deflection
     Out of specification → Correct the brake disc deflection or replace the brake disc.

Brake disc deflection limit
0.1 mm (0.004 in)

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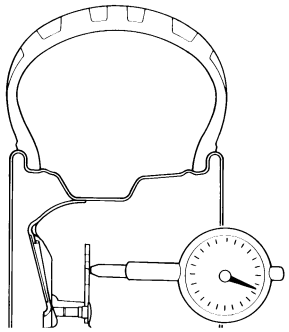
a. Hold the dial gauge at a right angle against the brake disc surface.
b. Measure the deflection 3.0 mm (0.12 in) below the edge of the brake disc.



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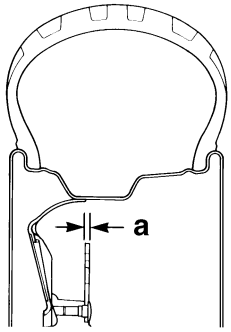
4. Measure:
   - Brake disc thickness "a"
     Measure the brake disc thickness at a few different locations.
     Out of specification → Replace.

Brake disc thickness limit
3.0 mm (0.12 in)



5. Adjust:
   - Brake disc deflection

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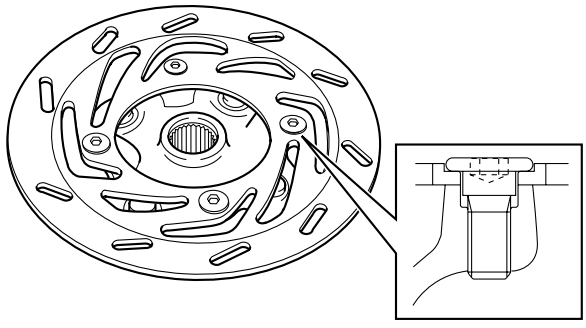
a. Remove the brake disc.
b. Rotate the brake disc by one bolt hole.
c. Install the brake disc.

Front brake disc bolt
30 Nm (3.0 m·kg, 22 ft·lb)
LOCTITE®

TIP

Install the brake disc so that the recessed portion of the bolt hole faces away from the hub.



d. Measure the brake disc deflection.
e. If out of specification, repeat the adjustment steps until the brake disc deflection is within specification.
f. If the brake disc deflection cannot be brought within specification, replace the brake disc.

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6. Install:
   • Front wheels
   Refer to "FRONT WHEELS" on page 4-14.

EAS22250

REPLACING THE FRONT BRAKE PADS

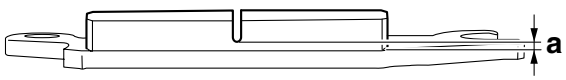
The following procedure applies to both brake calipers.

TIP

When replacing the brake pads, it is not necessary to disconnect the brake hose or disassemble the brake caliper.

1. Measure:
   • Brake pad wear limit "a"
   Out of specification → Replace the brake pads and brake pad spring as a set.

Brake pad lining thickness (inner)
4.4 mm (0.17 in)
Limit
1.0 mm (0.04 in)
Brake pad lining thickness (outer)
4.4 mm (0.17 in)
Limit
1.0 mm (0.04 in)



2. Install:
   • Brake pad spring
   • Brake pads

TIP

Always install new brake pads and a new brake pad spring as a set.

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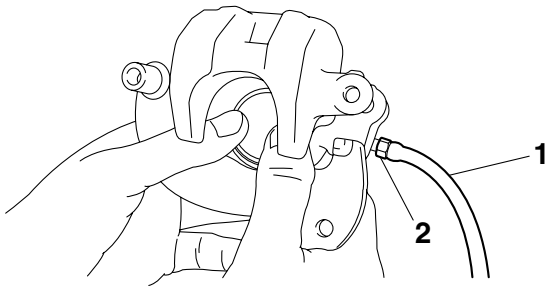
a. Connect a clear plastic hose "1" tightly to the bleed screw "2". Put the other end of the hose into an open container.



b. Loosen the bleed screw and push the brake caliper piston into the brake caliper with your finger.
c. Tighten the bleed screw.

Bleed screw
5 Nm (0.5 m·kg, 3.6 ft·lb)

d. Install new brake pads and a new brake pad spring.

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3. Install:
   • Brake pad holding bolt
   • Brake pad holding bolt plug
   • Brake caliper

Brake pad holding bolt
17 Nm (1.7 m·kg, 12 ft·lb)
Brake caliper bolt
30 Nm (3.0 m·kg, 22 ft·lb)

4. Check:
   • Brake fluid level
   Below the minimum level mark → Add the recommended brake fluid to the proper level.
   Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-21.
5. Check:
   • Brake lever operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-23.

EAS22310

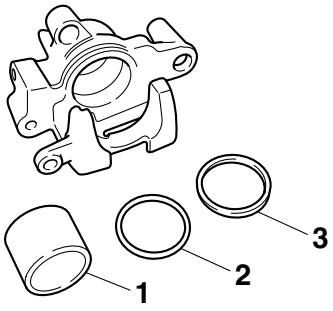
DISASSEMBLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

TIP

Before disassembling the brake caliper, drain the brake fluid from the entire brake system.

1. Remove:
   - Brake caliper piston "1"
   - Brake caliper dust seal "2"
   - Brake caliper piston seal "3"



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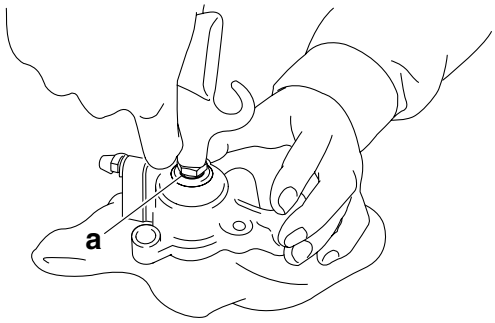
a. Blow compressed air into the brake hose joint opening "a" to force out the piston from the brake caliper.

EWA13550

⚠ WARNING

- **Cover the brake caliper piston with a rag. Be careful not to get injured when the piston is expelled from the brake caliper.**
- **Never try to pry out the brake caliper piston.**



b. Remove the brake caliper dust seal and brake caliper piston seal.

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EAS22390

CHECKING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

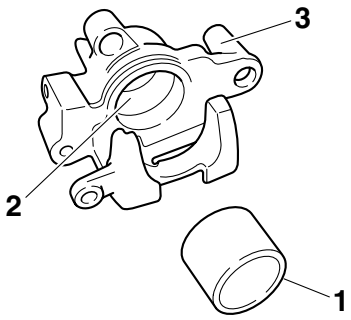
Recommended brake component replacement schedule	
Brake pads	If necessary
Piston seals, dust seals	Every two years
Brake hoses	Every four years
Brake fluid	Every two years and whenever the brake is disassembled

1. Check:
   - Brake caliper piston "1"
     Rust/scratches/wear → Replace the brake caliper piston.
   - Brake caliper cylinder "2"
     Scratches/wear → Replace the brake caliper assembly.
   - Brake caliper body "3"
     Cracks/damage → Replace the brake caliper assembly.
   - Brake fluid delivery passages (brake caliper body)
     Obstruction → Blow out with compressed air.

EWA28P1002

⚠ WARNING

Whenever a brake caliper is disassembled, replace the brake caliper piston seals and dust seals.



EAS22410

ASSEMBLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

EWA28P1003

⚠ WARNING

- **Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.**
- **Never use solvents on internal brake components as they will cause the piston seals to swell and distort.**

• Whenever a brake caliper is disassembled, replace the brake caliper piston seal and dust seal.

Recommended fluid
DOT 4

EAS22440
INSTALLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

1. Install:
   - Brake caliper assembly
   - Brake caliper bolts "1"
   - Brake hose "2"
   - Copper washers "3" New
   - Brake hose union bolt "4"

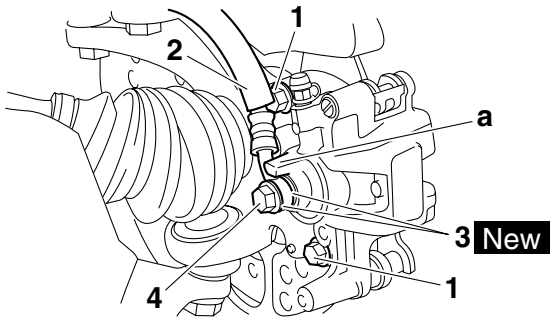
Brake caliper bolt
30 Nm (3.0 m·kg, 22 ft·lb)
Brake hose union bolt
27 Nm (2.7 m·kg, 19 ft·lb)

EWA13530
WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to "CABLE ROUTING" on page 2-33.

ECA28P1014
NOTICE

When installing the brake hose onto the brake caliper, make sure the brake pipe touches the projection "a" on the brake caliper.



2. Fill:
   - Brake master cylinder reservoir
     (with the specified amount of the recommended brake fluid)

Recommended fluid
DOT 4

EWA13090
WARNING

• Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.
• Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.
• When refilling, be careful that water does not enter the brake fluid reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.

ECA13540
NOTICE

Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

3. Bleed:
   - Brake system
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-23.
4. Check:
   - Brake fluid level
     Below the minimum level mark → Add the recommended brake fluid to the proper level.
     Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-21.
5. Check:
   - Brake lever operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-23.

EAS22500
CHECKING THE FRONT BRAKE MASTER CYLINDER

1. Check:
   - Brake master cylinder
     Damage/scratches/wear → Replace.
   - Brake fluid delivery passages
     (brake master cylinder body)
     Obstruction → Blow out with compressed air.
2. Check:
   - Brake master cylinder kit
     Damage/scratches/wear → Replace.
3. Check:
   - Brake master cylinder reservoir
     Cracks/damage → Replace.
   - Brake master cylinder reservoir diaphragm
     Cracks/damage → Replace.

4. Check:
   • Brake hoses
   Cracks/damage/wear → Replace.

EAS22520
ASSEMBLING THE FRONT BRAKE MASTER CYLINDER

EWA28P1008
⚠ WARNING

- **Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.**
- **Never use solvents on internal brake components.**
- **Whenever a master cylinder is disassembled, replace the brake master cylinder kit.**

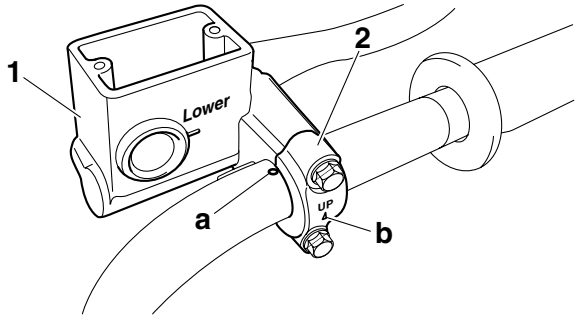
Recommended fluid
DOT 4

EAS22530
INSTALLING THE FRONT BRAKE MASTER CYLINDER

1. Install:
   • Brake master cylinder "1"
   • Brake master cylinder holder "2"

Brake master cylinder holder bolt
7 Nm (0.7 m·kg, 5.1 ft·lb)

TIP
- Align the end of the brake master cylinder holder with the punch mark "a" on the handlebar.
- Install the brake master cylinder holder with the "UP" mark "b" facing up.
- Install the brake master cylinder holder so that the gaps between the brake master cylinder and the brake master cylinder holder are equal.



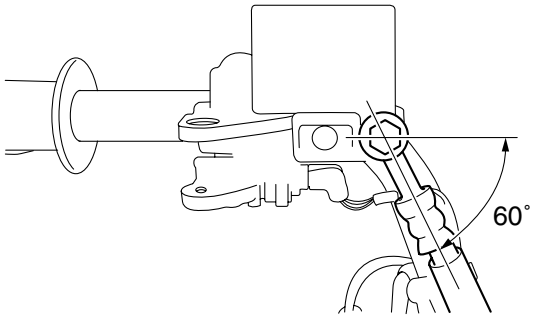
2. Install:
   • Brake hose
   • Copper washers New
   • Brake hose union bolt

Brake hose union bolt
27 Nm (2.7 m·kg, 19 ft·lb)

EWA13530
⚠ WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to "CABLE ROUTING" on page 2-33.

TIP
- While holding the brake hose, tighten the union bolt as shown.
- Turn the handlebar to the left and right to make sure the brake hose does not touch other parts (e.g., wire harness, cables, leads). Correct if necessary.



3. Install:
   • Front brake lever cover "1"

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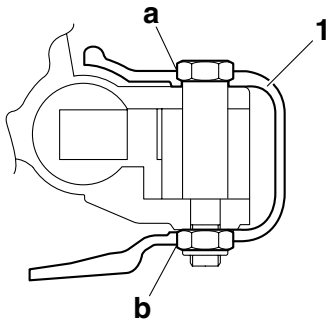
a. Spread apart the top and bottom of the front brake lever cover and fit the cover onto the front brake lever.
b. While keeping the top of the front brake lever cover horizontal, push straight down on the cover and fit the hole "a" in the cover over the bolt head.

TIP
- Do not fit the hole "b" in the front brake lever cover over the nut at this time.
- The hole "a" in the front brake lever cover is smaller than the bolt head; therefore, the hole will expand as it fits over the bolt head.



c. Fit the hole “b” in the front brake lever cover over the nut.

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4. Fill:
   • Brake master cylinder reservoir
   (with the specified amount of the recommended brake fluid)

Recommended fluid
DOT 4

EWA13540

⚠ WARNING

- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.**
- **When refilling, be careful that water does not enter the brake master cylinder reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.**

ECA13540

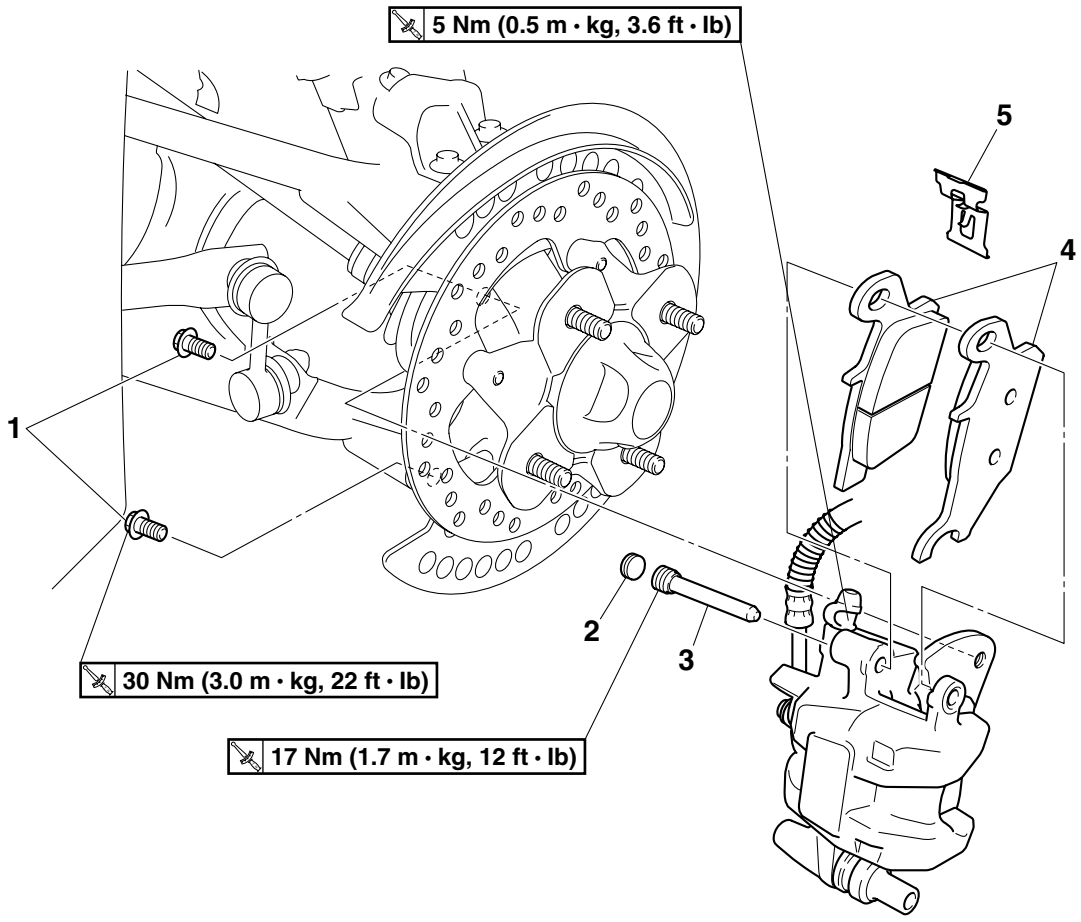
NOTICE

Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

5. Bleed:
   • Brake system
   Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-23.
6. Check:
   • Brake fluid level
   Below the minimum level mark → Add the recommended brake fluid to the proper level.
   Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-21.
7. Check:
   • Brake lever operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-23.

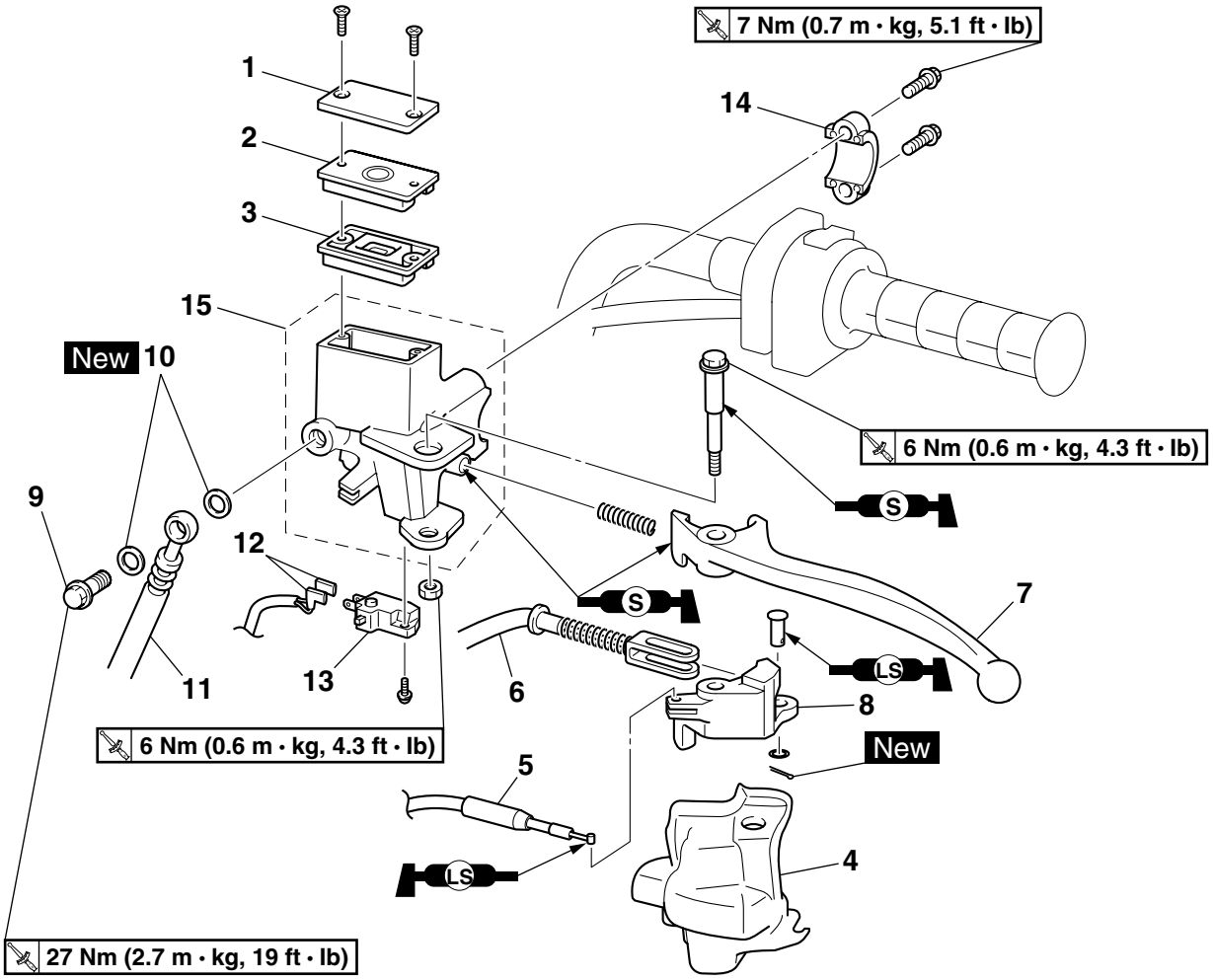
EAS22550
REAR BRAKE

Removing the rear brake pads



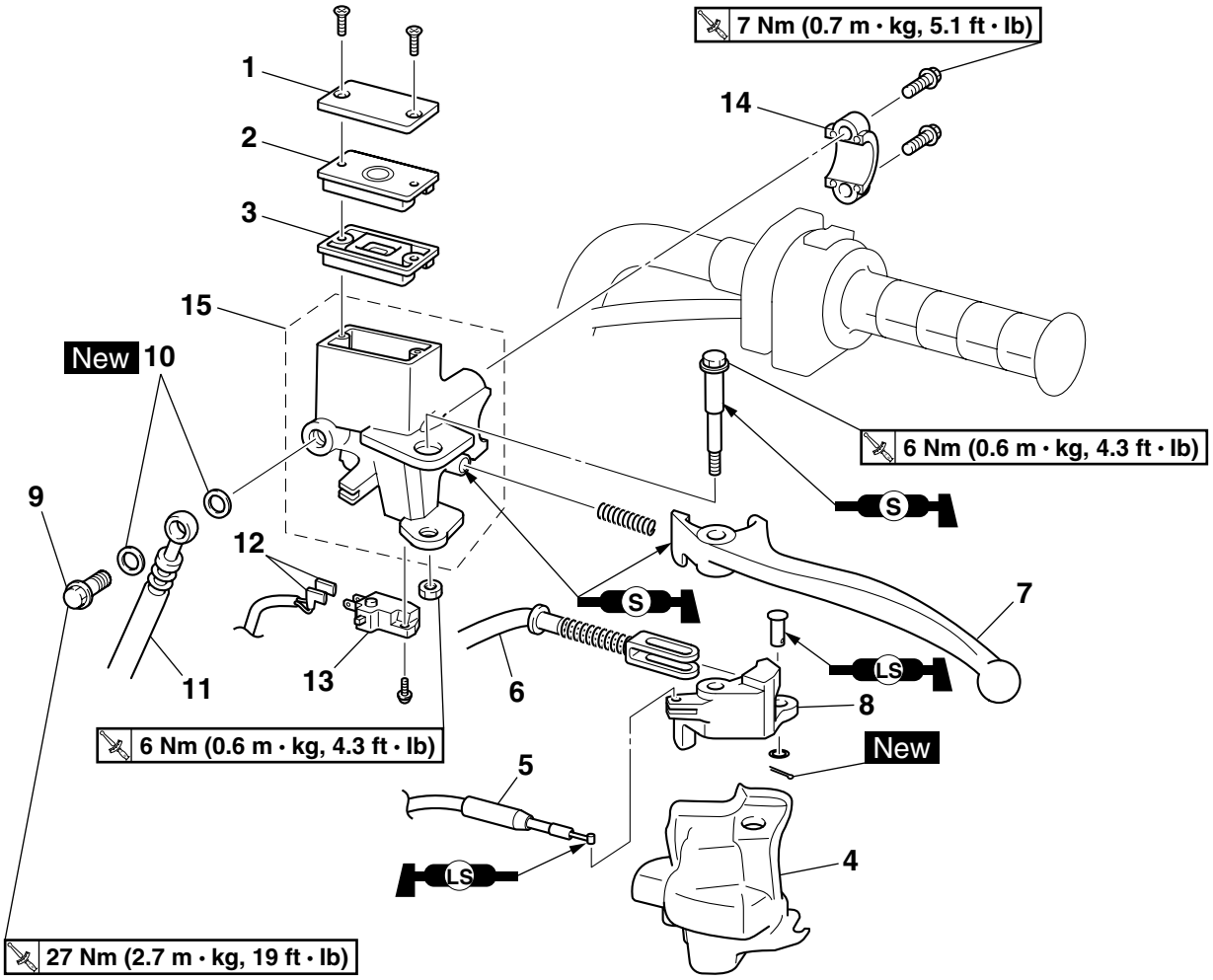
Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the rear brake calipers.
	Rear wheel		Refer to "REAR WHEELS" on page 4-18.
1	Rear brake caliper bolt	2	
2	Brake pad holding bolt plug	1	
3	Brake pad holding bolt	1	
4	Rear brake pad	2	
5	Brake pad spring	1	
			For installation, reverse the removal procedure.

Removing the rear brake master cylinder



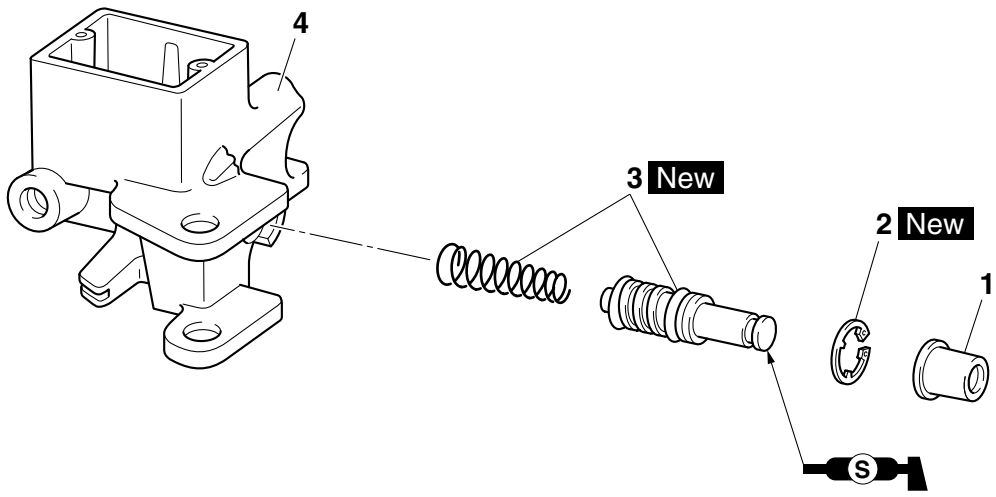
Order	Job/Parts to remove	Q'ty	Remarks
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-23.
1	Brake fluid reservoir cap	1	
2	Brake fluid reservoir diaphragm holder	1	
3	Brake fluid reservoir diaphragm	1	
4	Rear brake lever cover	1	
5	Shift control cable	1	Disconnect.
6	Rear brake cable	1	Disconnect.
7	Brake lever	1	
8	Brake lever bracket	1	
9	Union bolt	1	
10	Copper washer	2	
11	Rear brake hose	1	Disconnect.
12	Rear brake light switch connector	2	Disconnect.
13	Rear brake light switch	1	
14	Rear brake master cylinder holder	1	

Removing the rear brake master cylinder



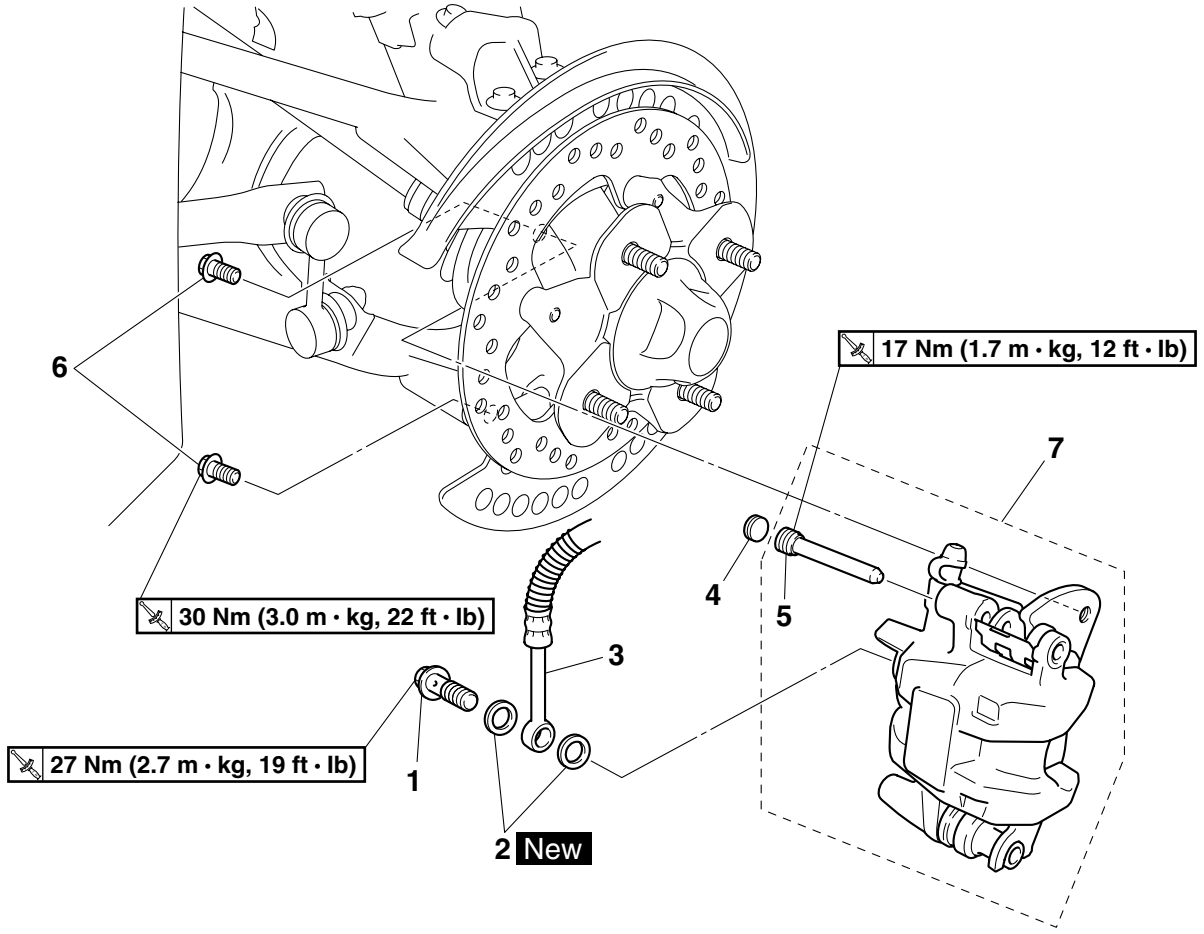
Order	Job/Parts to remove	Q'ty	Remarks
15	Rear brake master cylinder	1	
			For installation, reverse the removal procedure.

Disassembling the rear brake master cylinder



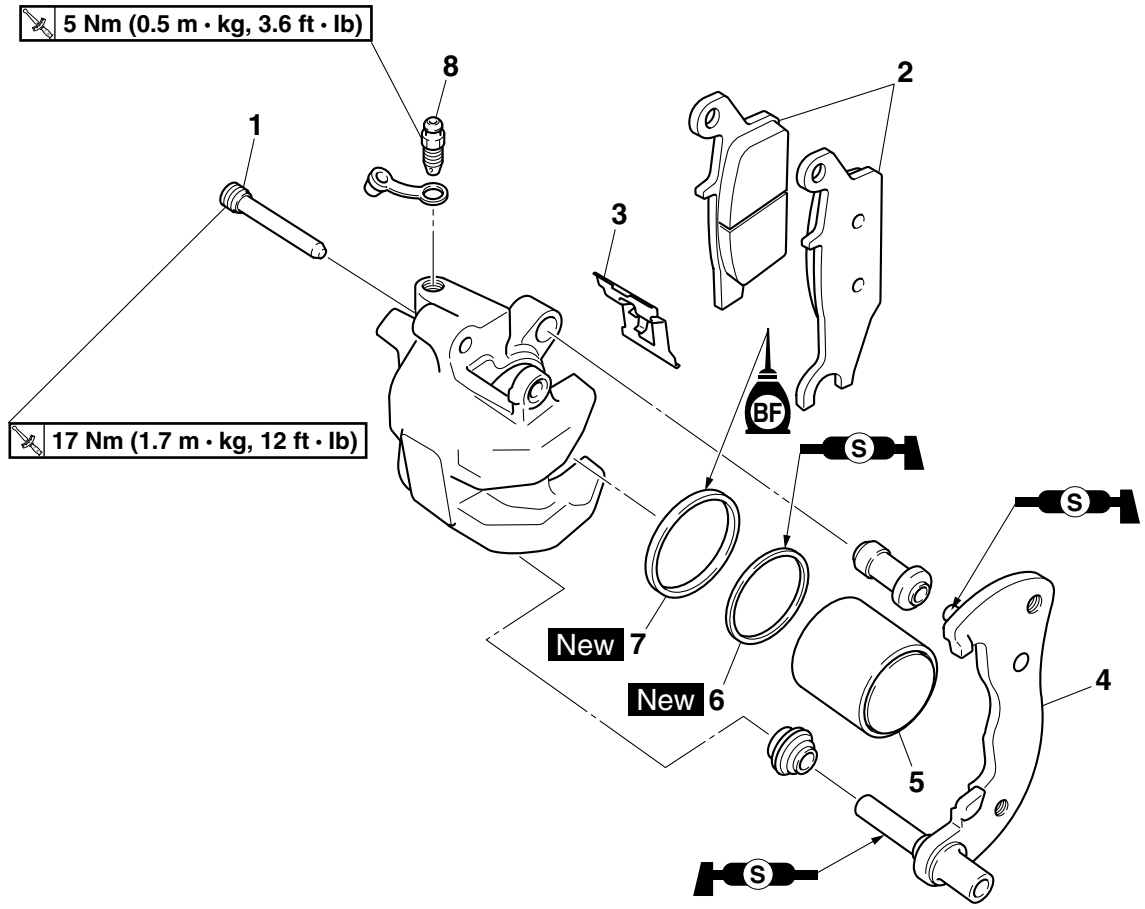
Order	Job/Parts to remove	Q'ty	Remarks
1	Dust boot	1	
2	Circlip	1	
3	Brake master cylinder kit	1	
4	Brake master cylinder body	1	
			For assembly, reverse the disassembly procedure.

Removing the rear brake calipers



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the rear brake calipers.
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-23.
	Rear wheel		Refer to "REAR WHEELS" on page 4-18.
1	Union bolt	1	
2	Copper washer	2	
3	Rear brake hose	1	Disconnect.
4	Brake pad holding bolt plug	1	
5	Brake pad holding bolt	1	Loosen.
6	Rear brake caliper bolt	2	
7	Rear brake caliper assembly	1	
			For installation, reverse the removal procedure.

Disassembling the rear brake calipers



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the rear brake calipers.
1	Brake pad holding bolt	1	
2	Brake pad	2	
3	Brake pad spring	1	
4	Brake caliper bracket	1	
5	Brake caliper piston	1	
6	Brake caliper dust seal	1	
7	Brake caliper piston seal	1	
8	Bleed screw	1	
			For assembly, reverse the disassembly procedure.

EAS22560
INTRODUCTION
EWA14100
⚠ WARNING

Disc brake components rarely require disassembly. Therefore, always follow these preventive measures:
- **Never disassemble brake components unless absolutely necessary.**
- **If any connection on the hydraulic brake system is disconnected, the entire brake system must be disassembled, drained, cleaned, properly filled, and bled after reassembly.**
- **Never use solvents on internal brake components.**
- **Use only clean or new brake fluid for cleaning brake components.**
- **Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.**
- **Avoid brake fluid coming into contact with the eyes as it can cause serious injury.**
- **FIRST AID FOR BRAKE FLUID ENTERING THE EYES:**
- **Flush with water for 15 minutes and get immediate medical attention.**

EAS22570
CHECKING THE REAR BRAKE DISCS
The following procedure applies to both brake discs.
1. Remove:
   - Rear wheel
     Refer to "REAR WHEELS" on page 4-18.
2. Check:
   - Brake disc
     Damage/galling → Replace.
3. Measure:
   - Brake disc deflection
     Out of specification → Correct the brake disc deflection or replace the brake disc.
     Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-26.

Brake disc deflection limit
0.1 mm (0.004 in)

4. Measure:
   - Brake disc thickness
     Measure the brake disc thickness at a few different locations.
     Out of specification → Replace.
     Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-26.

Brake disc thickness limit
3.0 mm (0.12 in)

5. Adjust:
   - Brake disc deflection
     Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-26.

Rear brake disc bolt
30 Nm (3.0 m·kg, 22 ft·lb)
LOCTITE®

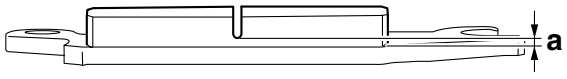
6. Install:
   - Rear wheels
     Refer to "REAR WHEELS" on page 4-18.

EAS22580
REPLACING THE REAR BRAKE PADS
TIP

When replacing the brake pads, it is not necessary to disconnect the brake hose or disassemble the brake caliper.

1. Measure:
   - Brake pad wear limit "a"
     Out of specification → Replace the brake pads and brake pad spring as a set.

Brake pad lining thickness (inner)
5.8 mm (0.23 in)
Limit
1.0 mm (0.04 in)
Brake pad lining thickness (outer)
5.8 mm (0.23 in)
Limit
1.0 mm (0.04 in)



2. Install:
   - Brake pad spring
   - Brake pads

TIP

Always install new brake pads and a brake pad spring as a set.

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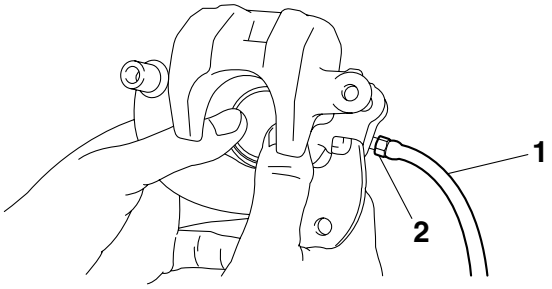
a. Connect a clear plastic hose "1" tightly to the bleed screw "2". Put the other end of the hose into an open container.



b. Loosen the bleed screw and push the brake caliper piston into the brake caliper with your finger.
c. Tighten the bleed screw.

	Bleed screw **5 Nm (0.5 m·kg, 3.6 ft·lb)**

d. Install new brake pads and a new brake pad spring.

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3. Install:
   • Brake pad holding bolt
   • Brake pad holding bolt plug
   • Brake caliper

	Brake pad holding bolt **17 Nm (1.7 m·kg, 12 ft·lb)** **Brake caliper bolt** **30 Nm (3.0 m·kg, 22 ft·lb)**

4. Check:
   • Brake fluid level
   Below the minimum level mark → Add the recommended brake fluid to the proper level.
   Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-21.
5. Check:
   • Brake lever and pedal operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-23.

EAS28P1004

REMOVING THE REAR BRAKE MASTER CYLINDER

1. Remove:
   • Brake lever
   • Brake lever bracket

ECA28P1006

NOTICE

The brake lever pivot bolt and nut have left-handed threads. To loosen the pivot bolt and nut, turn them clockwise.

EAS22600

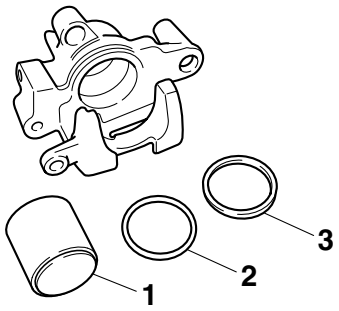
DISASSEMBLING THE REAR BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

TIP

Before disassembling the brake caliper, drain the brake fluid from the entire brake system.

1. Remove:
   • Brake caliper piston "1"
   • Brake caliper dust seal "2"
   • Brake caliper piston seal "3"



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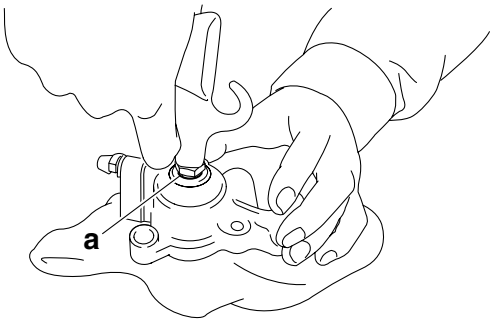
a. Blow compressed air into the brake hose joint opening "a" to force out the piston from the brake caliper.

EWA13550

⚠ WARNING

• Cover the brake caliper piston with a rag. Be careful not to get injured when the piston is expelled from the brake caliper.
• Never try to pry out the brake caliper piston.



b. Remove the brake caliper dust seal and brake caliper piston seal.

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EAS22640

CHECKING THE REAR BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

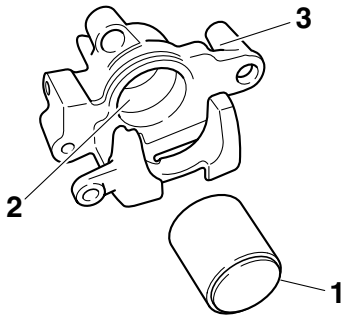
Recommended brake component replacement schedule	
Brake pads	If necessary
Piston seals, dust seals	Every two years
Brake hoses	Every four years
Brake fluid	Every two years and whenever the brake is disassembled

1. Check:
   - Brake caliper piston "1"
     Rust/scratches/wear → Replace the brake caliper piston.
   - Brake caliper cylinder "2"
     Scratches/wear → Replace the brake caliper assembly.
   - Brake caliper body "3"
     Cracks/damage → Replace the brake caliper assembly.
   - Brake fluid delivery passages (brake caliper body)
     Obstruction → Blow out with compressed air.

EWA28P1002

WARNING

Whenever a brake caliper is disassembled, replace the brake caliper piston seals and dust seals.



EAS22650

ASSEMBLING THE REAR BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

EWA28P1003

WARNING

- **Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.**
- **Never use solvents on internal brake components as they will cause the piston seals to swell and distort.**
- **Whenever a brake caliper is disassembled, replace the brake caliper piston seal and dust seal.**

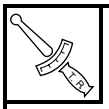
Recommended fluid
DOT 4

EAS22670

INSTALLING THE REAR BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

1. Install:
   - Brake caliper assembly
   - Brake caliper bolts "1"
   - Brake hose "2"
   - Copper washers "3" New
   - Brake hose union bolt "4"



Brake caliper bolt
30 Nm (3.0 m·kg, 22 ft·lb)
Brake hose union bolt
27 Nm (2.7 m·kg, 19 ft·lb)

EWA13530

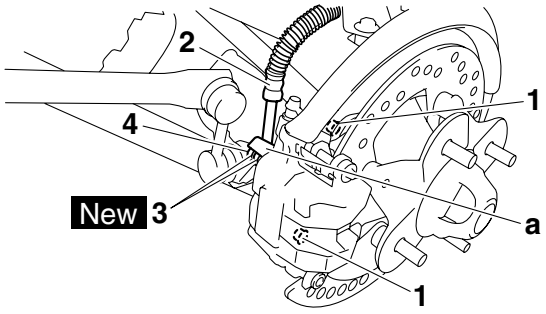
WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to "CABLE ROUTING" on page 2-33.

ECA28P1014

NOTICE

When installing the brake hose onto the brake caliper, make sure the brake pipe touches the projection "a" on the brake caliper.



2. Fill:
   - Brake master cylinder reservoir
     (with the specified amount of the recommended brake fluid)

	Recommended fluid **DOT 4**

EWA13090

⚠ WARNING

- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.**
- **When refilling, be careful that water does not enter the brake fluid reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.**

ECA13540

NOTICE

Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

3. Bleed:
   - Brake system
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-23.
4. Check:
   - Brake fluid level
     Below the minimum level mark → Add the recommended brake fluid to the proper level.
     Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-21.
5. Check:
   - Brake lever and pedal operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-23.

EAS22710

CHECKING THE REAR BRAKE MASTER CYLINDER

1. Check:
   - Brake master cylinder
     Damage/scratches/wear → Replace.
   - Brake fluid delivery passages
     (brake master cylinder body)
     Obstruction → Blow out with compressed air.
2. Check:
   - Brake master cylinder kit
     Damage/scratches/wear → Replace.
3. Check:
   - Brake master cylinder reservoir
     Cracks/damage → Replace.
   - Brake master cylinder reservoir diaphragm
     Cracks/damage → Replace.
4. Check:
   - Brake hoses
     Cracks/damage/wear → Replace.

EAS22730

ASSEMBLING THE REAR BRAKE MASTER CYLINDER

EWA28P1008

⚠ WARNING

- **Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.**
- **Never use solvents on internal brake components.**
- **Whenever a master cylinder is disassembled, replace the brake master cylinder kit.**

	Recommended fluid **DOT 4**

EAS22750

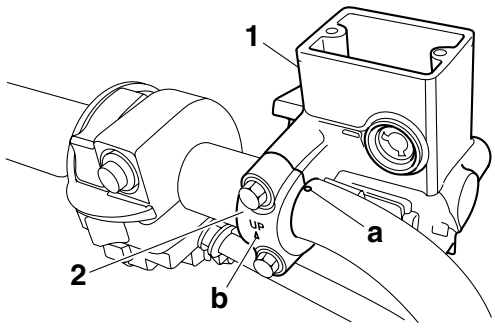
INSTALLING THE REAR BRAKE MASTER CYLINDER

1. Install:
   - Brake master cylinder "1"
   - Brake master cylinder holder "2"

	Brake master cylinder holder bolt **7 Nm (0.7 m·kg, 5.1 ft·lb)**

TIP

- Align the end of the brake master cylinder holder with the punch mark “a” on the handlebar.
- Install the brake master cylinder holder with the “UP” mark “b” facing up.
- Install the brake master cylinder holder so that the gaps between the brake master cylinder and the brake master cylinder holder are equal.



2. Install:
   - Brake hose
   - Copper washers New
   - Brake hose union bolt

	Brake hose union bolt 27 Nm (2.7 m·kg, 19 ft·lb)

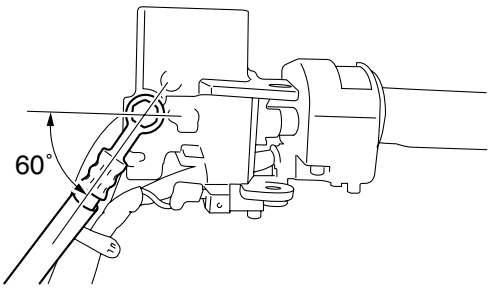
EWA13530

⚠ WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to “CABLE ROUTING” on page 2-33.

TIP

- While holding the brake hose, tighten the union bolt as shown.
- Turn the handlebar to the left and right to make sure the brake hose does not touch other parts (e.g., wire harness, cables, leads). Correct if necessary.



3. Install:
   - Brake lever bracket
   - Brake lever

	Brake lever pivot bolt 6 Nm (0.6 m·kg, 4.3 ft·lb) **Brake lever pivot nut 6 Nm (0.6 m·kg, 4.3 ft·lb)**

ECA28P1007

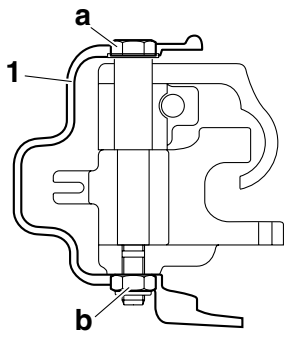
NOTICE

The brake lever pivot bolt and nut have left-handed threads. To tighten the pivot bolt and nut, turn them counterclockwise.

4. Install:
   - Rear brake lever cover “1”

TIP

Fit the holes in the rear brake lever cover over the bolt head “a” and nut “b”.



5. Fill:
   - Brake master cylinder reservoir (with the specified amount of the recommended brake fluid)

	Recommended fluid DOT 4

EWA13540

⚠ WARNING

- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.**
- **When refilling, be careful that water does not enter the brake master cylinder reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.**

ECA13540

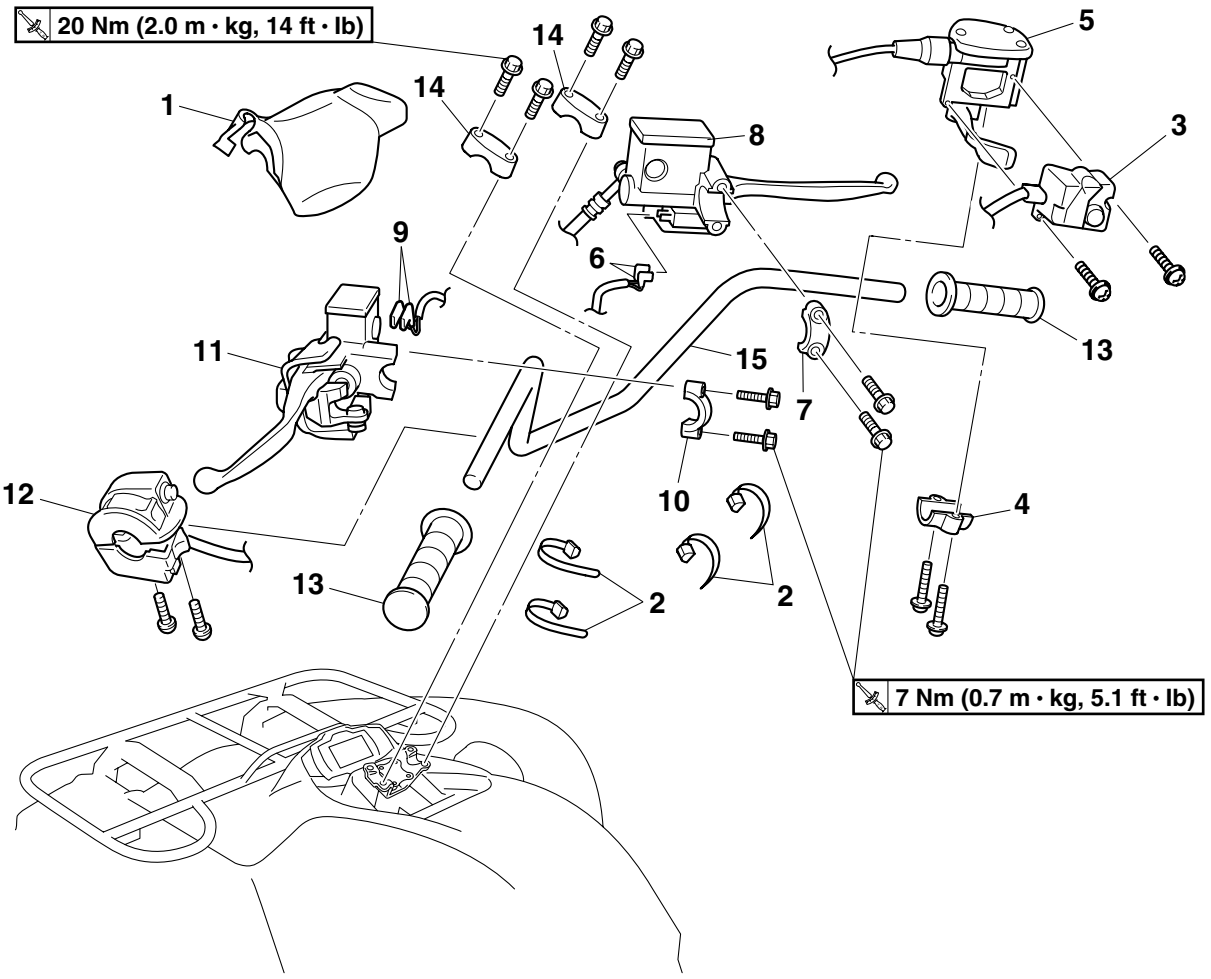
NOTICE

Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

6. Bleed:
   - Brake system
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-23.
7. Check:
   - Brake fluid level
     Below the minimum level mark → Add the recommended brake fluid to the proper level.
     Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-21.
8. Check:
   - Brake lever and pedal operation
     Soft or spongy feeling → Bleed the brake system.
     Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-23.

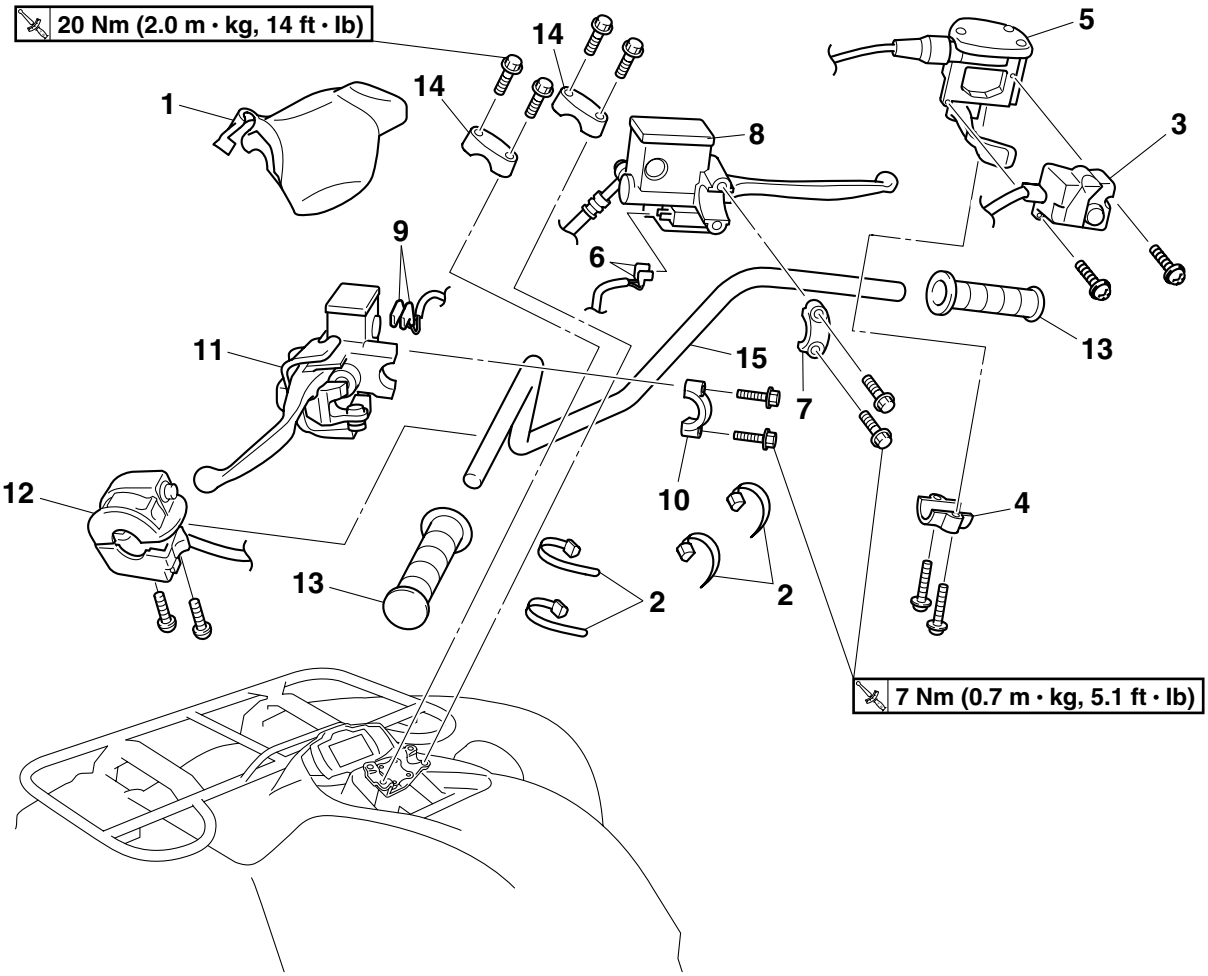
EAS22840
HANDLEBAR

Removing the handlebar



Order	Job/Parts to remove	Q'ty	Remarks
1	Handlebar cover	1	
2	Plastic band	4	
3	On-command four-wheel-drive motor switch and differential gear lock switch	1	
4	Throttle lever assembly holder	1	
5	Throttle lever assembly	1	
6	Front brake light switch connector	2	Disconnect.
7	Front brake master cylinder holder	1	
8	Front brake master cylinder	1	
9	Rear brake light switch connector	2	Disconnect.
10	Rear brake master cylinder holder	1	
11	Rear brake master cylinder	1	
12	Left handlebar switch	1	
13	Handlebar grip	2	
14	Handlebar holder	2	

Removing the handlebar

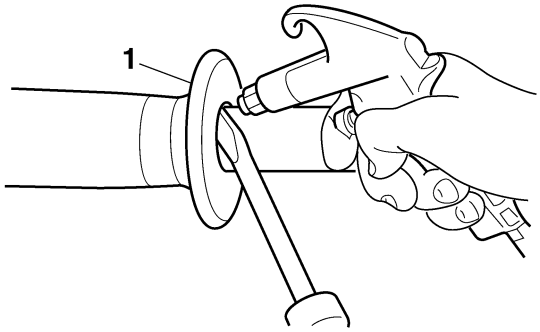


Order	Job/Parts to remove	Q'ty	Remarks
15	Handlebar	1	
			For installation, reverse the removal procedure.

EAS22860
REMOVING THE HANDLEBAR
1. Place the vehicle on a level surface.
2. Remove:
   • Handlebar grip “1”

TIP

Blow compressed air between the left handlebar end and the handlebar grip, and gradually push the grip off the handlebar.



EAS22880
CHECKING THE HANDLEBAR
1. Check:
   • Handlebar
   Bends/cracks/damage → Replace.

EWA13690

⚠ WARNING

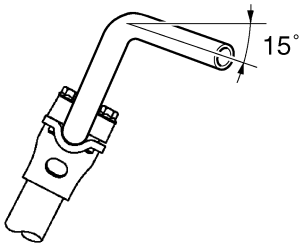
Do not attempt to straighten a bent handlebar as this may dangerously weaken it.

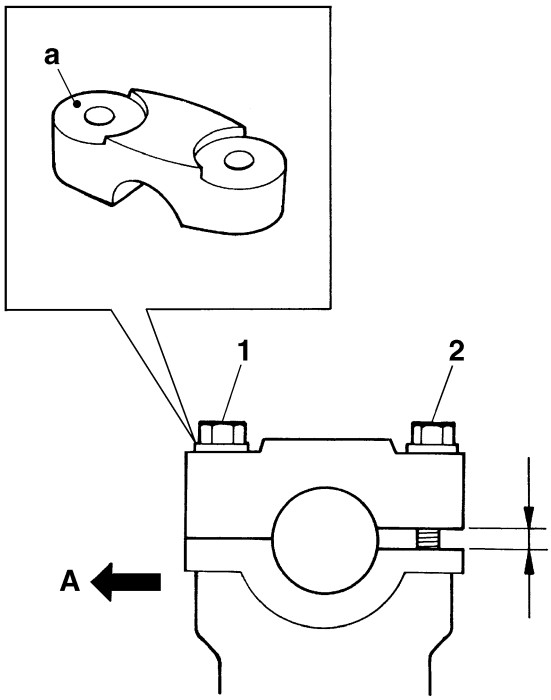
EAS22940
INSTALLING THE HANDLEBAR
1. Place the vehicle on a level surface.
2. Install:
   • Handlebar
   • Handlebar holders

	Handlebar holder bolt 20 Nm (2.0 m·kg, 14 ft·lb)

TIP

- Install the handlebar within 15° from the horizontal line shown in the illustration.
- The upper handlebar holders should be installed with the punch mark “a” forward “A”.
- First tighten the bolts “1” on the front side of the handlebar holders, and then tighten the bolts “2” on the rear side.





3. Install:
   • Handlebar grip “1”

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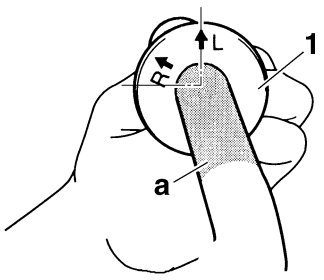
a. Wipe off grease or oil on the handlebar surface “a” with a lacquer thinner.
b. Apply a thin coat of rubber adhesive onto the left and right ends of the handlebar.
c. Install the handlebar grips to the handlebar so that arrow mark “L” faces up on the left handlebar grip and the arrow mark “R” faces up on the right handlebar.
d. Wipe off any excess rubber adhesive with a clean rag.

EWA13700

⚠ WARNING

Do not touch the handlebar grip until the rubber adhesive has fully dried.



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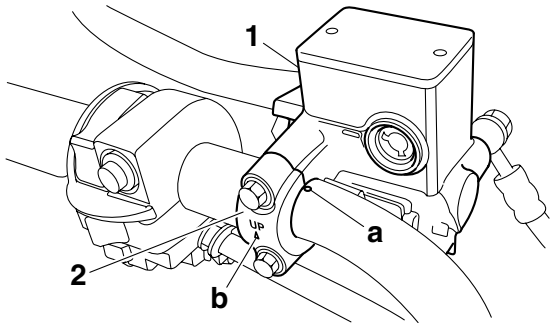
4. Install:
   - Left handlebar switch
   - Rear brake master cylinder “1”
   - Rear brake master cylinder holder “2”

	Rear brake master cylinder holder bolt **7 Nm (0.7 m·kg, 5.1 ft·lb)**

TIP

- Align the end of the brake master cylinder holder with the punch mark “a” on the handlebar.
- The “UP” mark “b” on the brake master cylinder holder should face up.
- Install the brake master cylinder holder so that the gaps between the brake master cylinder and the brake master cylinder holder are equal.

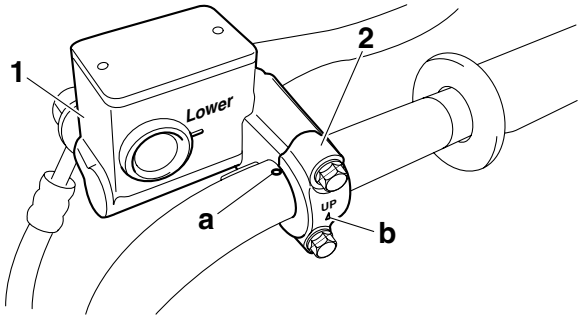


5. Install:
   - Front brake master cylinder “1”
   - Front brake master cylinder holder “2”

	Front brake master cylinder holder bolt **7 Nm (0.7 m·kg, 5.1 ft·lb)**

TIP

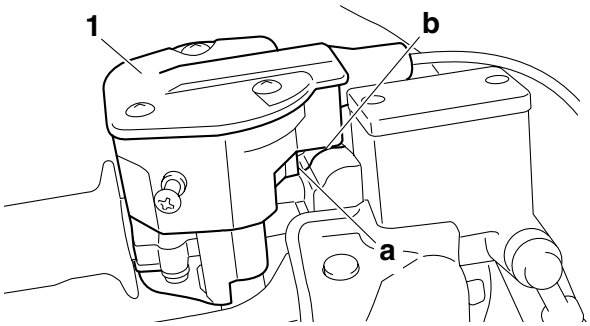
- Align the end of the brake master cylinder holder with the punch mark “a” on the handlebar.
- The “UP” mark “b” on the brake master cylinder holder should face up.
- Install the brake master cylinder holder so that the gaps between the brake master cylinder and the brake master cylinder holder are equal.



6. Install:
   - Throttle lever assembly “1”
   - Throttle lever assembly holder

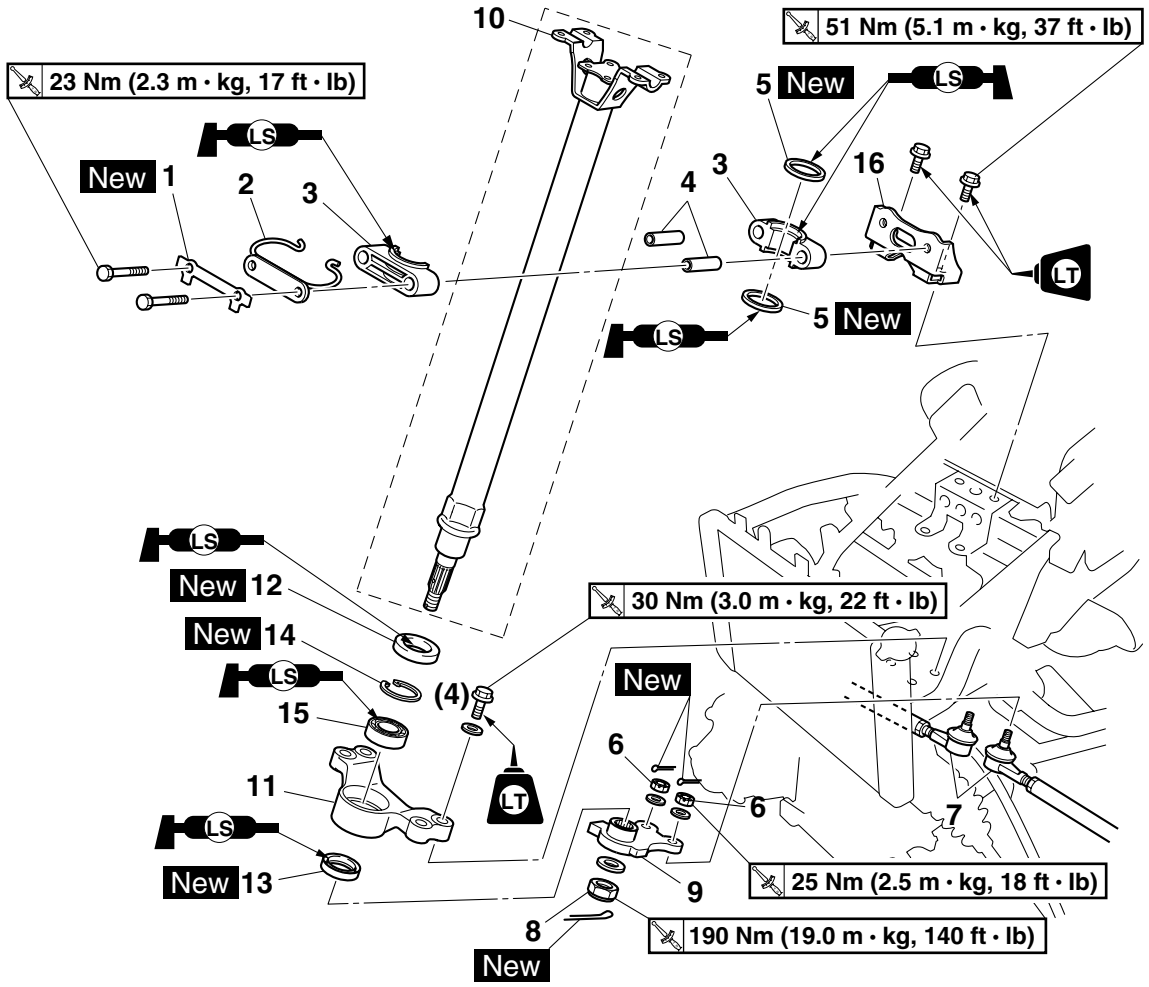
TIP

Align the projection “a” on the throttle lever assembly with the end of the brake master cylinder holder “b”.



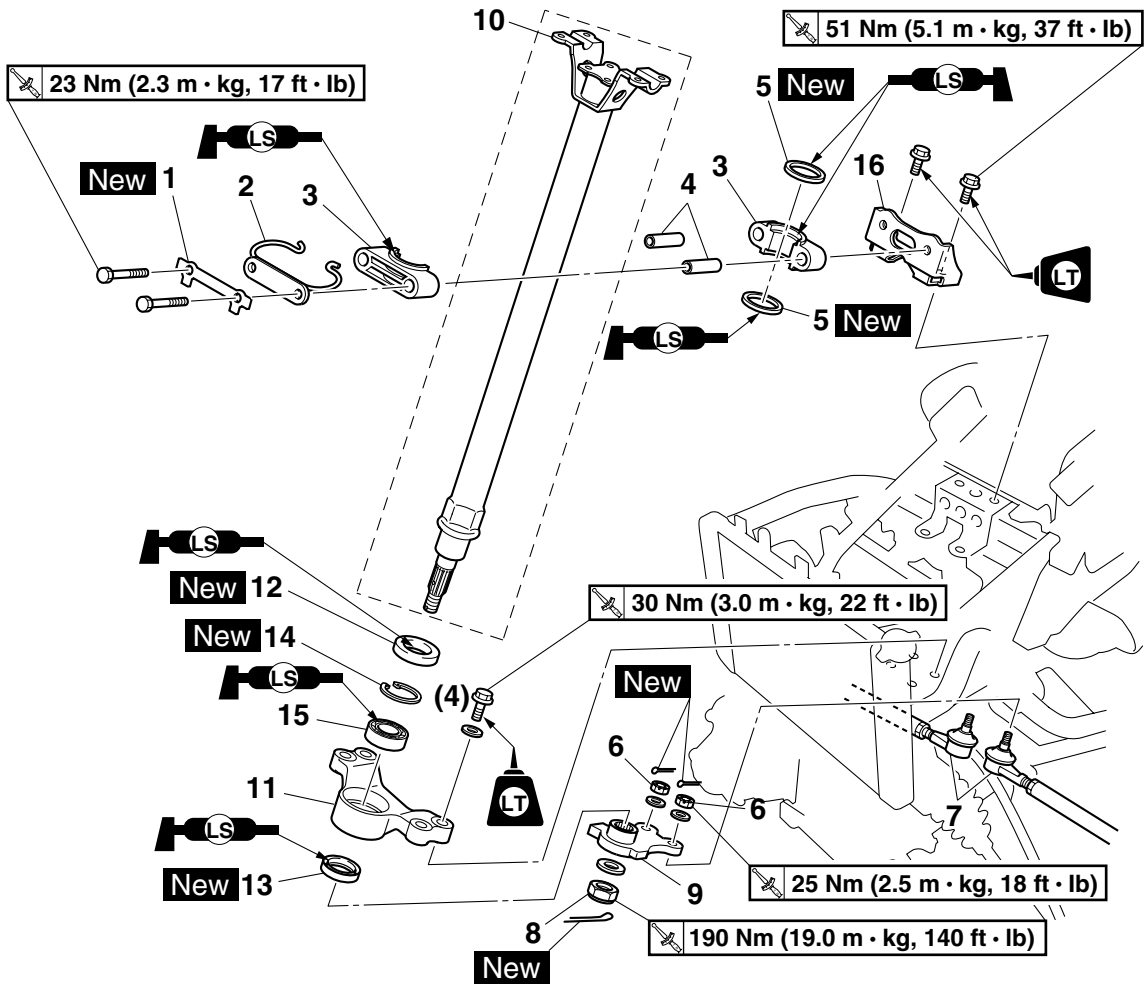
EAS29540
STEERING STEM

Removing the steering stem (for YFM5FG/YFM7FG)



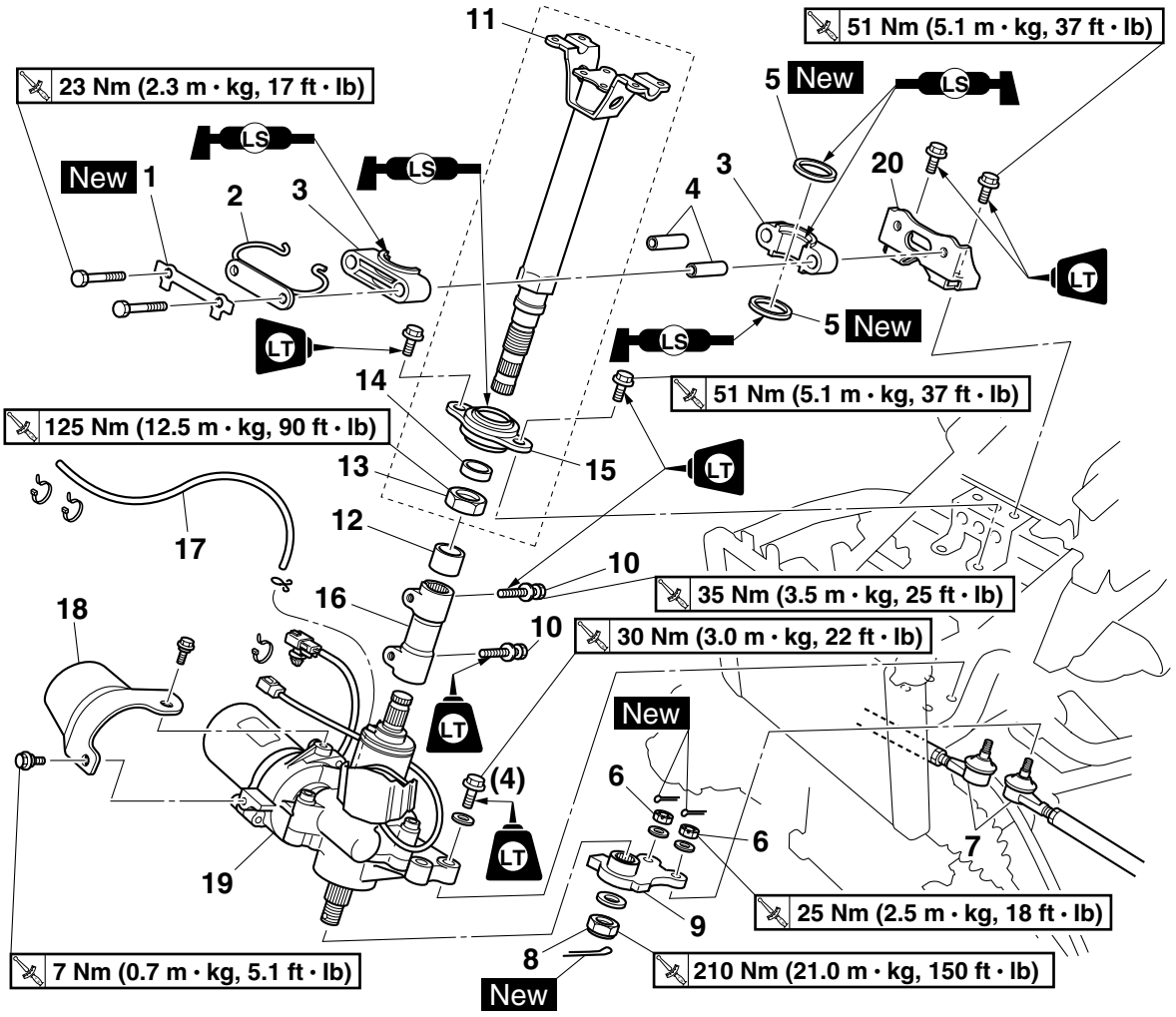
Order	Job/Parts to remove	Q'ty	Remarks
	Front fender/Air filter case/Electrical components tray		Refer to "GENERAL CHASSIS" on page 4-1
	Handlebar		Refer to "HANDLEBAR" on page 4-44
1	Lock washer	1	
2	Cable guide	1	
3	Steering stem bushing	2	
4	Collar	2	
5	Oil seal	2	
6	Tie-rod end nut	2	
7	Tie-rod	2	Disconnect.
8	Pitman arm nut	1	
9	Pitman arm	1	
10	Steering stem	1	
11	Steering stem support	1	
12	Oil seal	1	
13	Oil seal	1	

Removing the steering stem (for YFM5FG/YFM7FG)



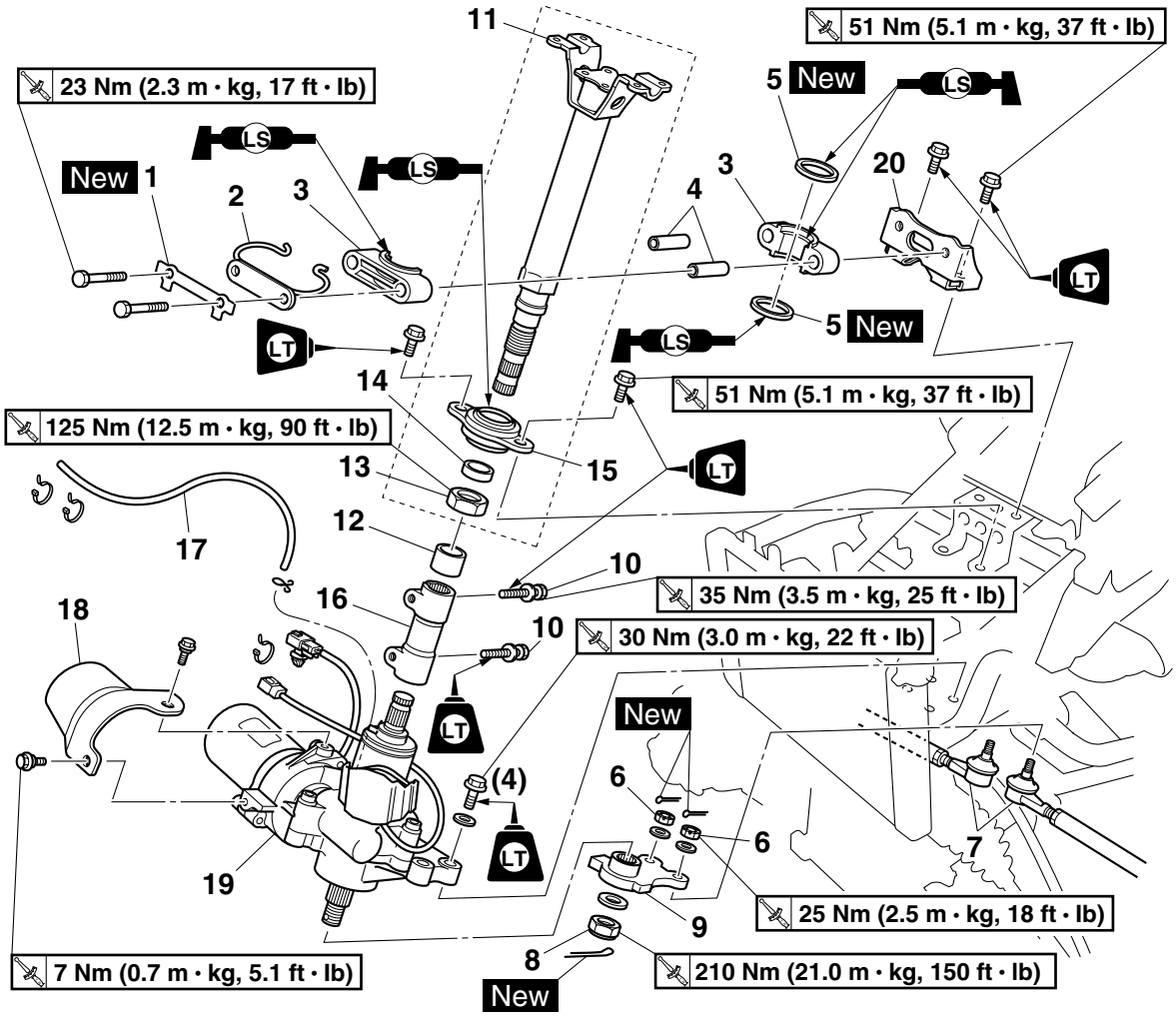
Order	Job/Parts to remove	Q'ty	Remarks
14	Circlip	1	
15	Bearing	1	
16	Steering stem bracket	1	
			For installation, reverse the removal procedure.

Removing the steering stem (for YFM5FGP/YFM7FGP)



Order	Job/Parts to remove	Q'ty	Remarks
	Front fender/Air filter case/Electrical components tray		Refer to "GENERAL CHASSIS" on page 4-1
	Handlebar		Refer to "HANDLEBAR" on page 4-44
1	Lock washer	1	
2	Cable guide	1	
3	Steering stem bushing	2	
4	Collar	2	
5	Oil seal	2	
6	Tie-rod end nut	2	
7	Tie-rod	2	Disconnect.
8	Pitman arm nut	1	
9	Pitman arm	1	
10	Steering stem joint bolt	2	
11	Steering stem	1	
12	Collar	1	
13	Bearing nut	1	
14	Collar	1	
15	Steering stem bearing	1	

Removing the steering stem (for YFM5FGP/YFM7FGP)



Order	Job/Parts to remove	Q'ty	Remarks
16	Steering stem joint	1	
17	EPS motor breather hose	1	
18	EPS motor cover	1	
19	EPS unit	1	ECA28P1008 ***NOTICE*** **The EPS unit should not be disassembled.**
20	Steering stem bracket	1	
			For installation, reverse the removal procedure.

EAS29560
CHECKING THE STEERING STEM

1. Check:
   - Steering stem
     Bends → Replace.

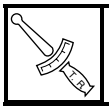
EWA15030
⚠ WARNING

Do not attempt to straighten a bent stem; this may dangerously weaken the stem.

2. Check:
   - Oil seals
   - Steering stem bushings
     Wear/damage → Replace.
3. Check: (YFM5FGP/YFM7FGP only)
   - Steering stem joint
     Cracks/damage → Replace.

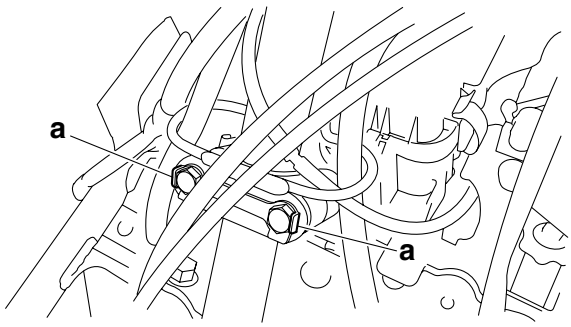
EAS29580
INSTALLING THE STEERING STEM (for YFM5FG/YFM7FG)

1. Install:
   - Cable guide
   - Lock washer New
   - Steering stem bolts

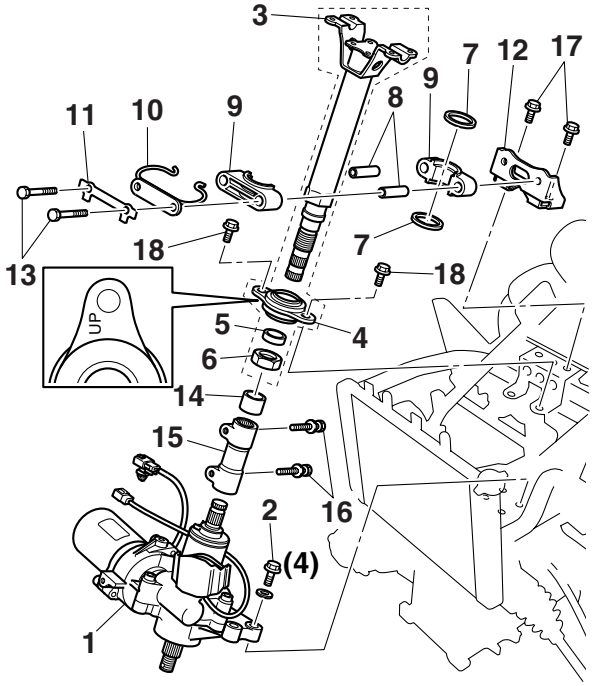
	**Steering stem bolt** **23 Nm (2.3 m·kg, 17 ft·lb)**

TIP

- Bend the lock washer tab “a” along a flat side of the bolt.
- Pass the cable and hoses through the cable guide. Refer to “CABLE ROUTING” on page 2-33.



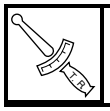
EAS28P1015
INSTALLING THE STEERING STEM (for YFM5FGP/YFM7FGP)



1. Install:
   - EPS unit “1”
   - Washers
   - EPS unit bolts “2”

	EPS unit bolt **30 Nm (3.0 m·kg, 22 ft·lb)** **LOCTITE®**

2. Install:
   - Steering stem “3”
   - Steering stem bearing “4”
   - Collar “5”
   - Bearing nut “6”

	**Bearing nut** **125 Nm (12.5 m·kg, 90 ft·lb)**

TIP

Install the steering stem bearing with the “UP” mark facing up.

3. Install:
   - Oil seals “7” New
   - Collars “8”
   - Steering stem bushings “9”
   - Cable guide “10”
   - Lock washer “11” New
   - Steering stem bracket “12”

• Steering stem bolts “13” (temporarily tighten)

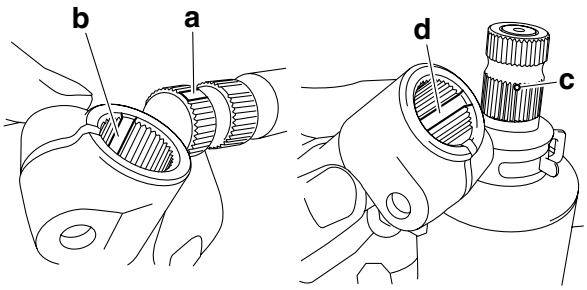
TIP

Apply lithium-soap-based grease to the oil seals and steering stem bushings.

4. Install:
   • Collar “14”
   • Steering stem joint “15”
   • Steering stem joint bolts “16” (temporarily tighten)

TIP

• Apply LOCTITE® to the steering stem joint bolts.
• Align the spline “a” on the steering stem with the groove “b” in the steering stem joint.
• Align the punch mark “c” on the EPS unit with the groove “d” in the steering stem joint.



5. Tighten:
   • Steering stem bracket bolts “17”
   • Steering stem bearing bolts “18”
   • Steering stem joint bolts “16”

Steering stem bracket bolt
51 Nm (5.1 m·kg, 37 ft·lb)
LOCTITE®
Steering stem bearing bolt
51 Nm (5.1 m·kg, 37 ft·lb)
LOCTITE®
Steering stem joint bolt
35 Nm (3.5 m·kg, 25 ft·lb)

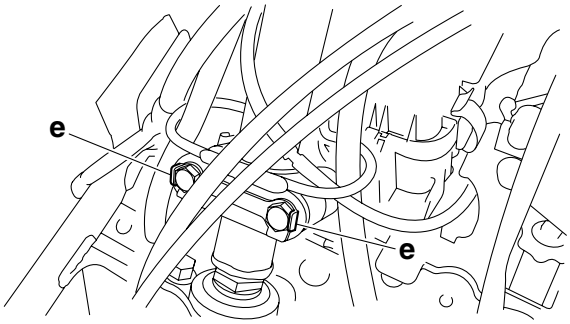
6. Tighten:
   • Steering stem bolts “13”

Steering stem bolt
23 Nm (2.3 m·kg, 17 ft·lb)

TIP

• Bend the lock washer tab “e” along a flat side of the bolt.

• Pass the cable and hoses through the cable guide. Refer to “CABLE ROUTING” on page 2-33.



EAS28P1016

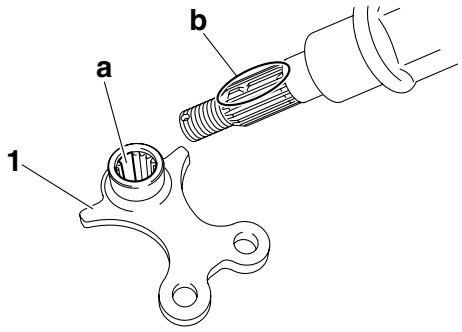
INSTALLING THE PITMAN ARM (for YFM5FG/YFM7FG)

1. Install:
   • Pitman arm “1”
   • Washer
   • Pitman arm nut
   • Cotter pin New

Pitman arm nut
190 Nm (19.0 m·kg, 140 ft·lb)

TIP

Align the groove “a” in the pitman arm with the steering stem spline “b” that is indented.



EAS29590

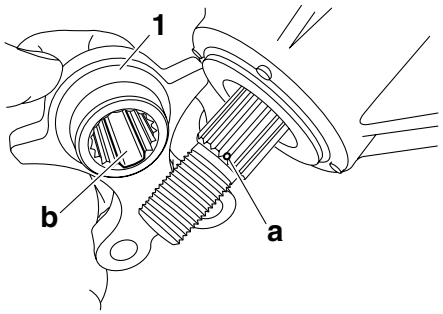
INSTALLING THE PITMAN ARM (for YFM5FGP/YFM7FGP)

1. Install:
   • Pitman arm “1”
   • Washer
   • Pitman arm nut
   • Cotter pin New

Pitman arm nut
210 Nm (21.0 m·kg, 150 ft·lb)

TIP

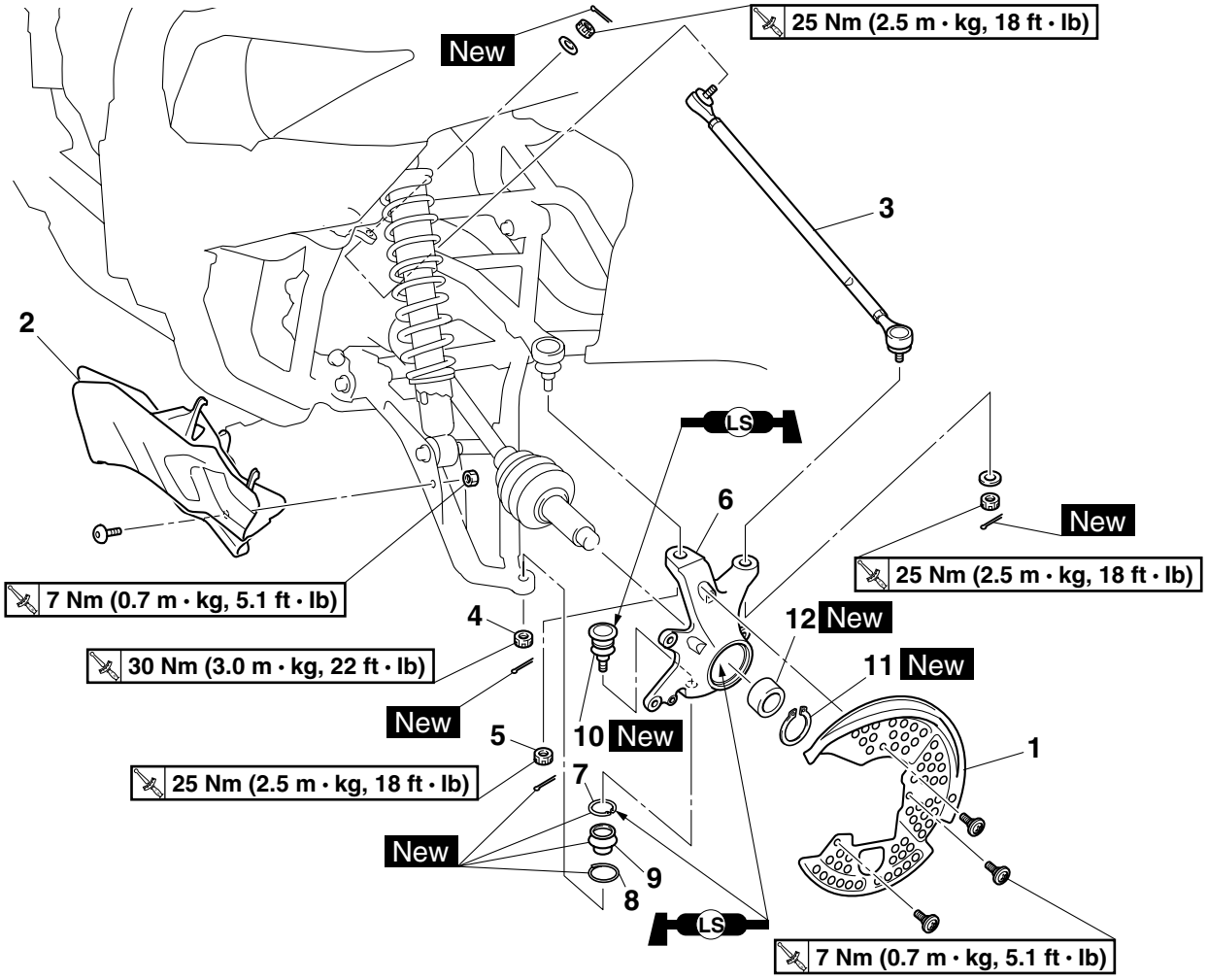
Align the punch mark “a” on the EPS unit with the groove “b” in the pitman arm.



EAS29660

TIE-RODS AND STEERING KNUCKLES

Removing the tie-rods and steering knuckles

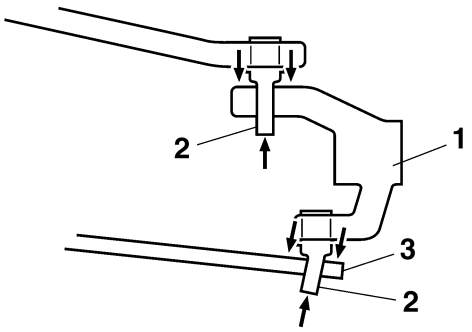


Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the tie-rods and steering knuckles.
	Front wheel hub		Refer to "FRONT WHEELS" on page 4-14
1	Brake disc guard	1	
2	Front arm protector	1	
3	Tie-rod	1	
4	Nut	1	
5	Nut	1	
6	Steering knuckle	1	
7	Circlip	1	
8	Clip	1	
9	Rubber boot	1	
10	Ball joint	1	
11	Circlip	1	
12	Wheel bearing	1	
			For installation, reverse the removal procedure.

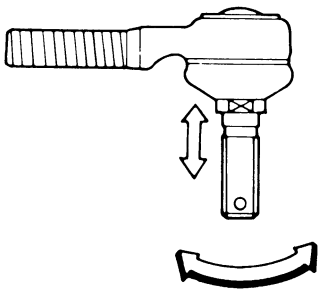
EAS29670
REMOVING THE STEERING KNUCKLES
The following procedure applies to both of the steering knuckles.
1. Remove:
   • Steering knuckle “1”

TIP

Use a general puller to separate the ball joints “2” from the steering knuckle “1” or the front lower arm “3”.



EAS29680
CHECKING THE TIE-RODS
The following procedure applies to both of the tie-rods.
1. Check:
   • Tie-rod free play and movement
     Free play → Replace the tie-rod end.
     Rough movement → Replace the tie-rod end.
2. Check:
   • Tie-rod
     Bends/damage → Replace.



EAS29690
CHECKING THE STEERING KNUCKLES AND FRONT WHEEL BEARINGS
The following procedure applies to both of the steering knuckles and front wheel bearings.
1. Check:
   • Steering knuckle
     Damage/pitting → Replace.
2. Check:
   • Front wheel bearing “1”
     Rough movement/excessive free play → Replace.

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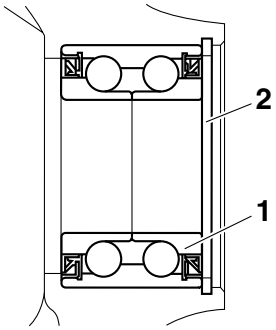
a. Clean the surface of the steering knuckle.
b. Remove the circlip “2”.
c. Drive out the bearing.

EWA15040
⚠ WARNING

Eye protection is recommended when using striking tools.



d. Apply lithium-soap-based grease to the balls of the new bearing.
e. Install the new bearing.

ECA16190
NOTICE

Do not strike the center race or balls of the bearing. Contact should be made only with the outer race.

f. Install a new circlip.

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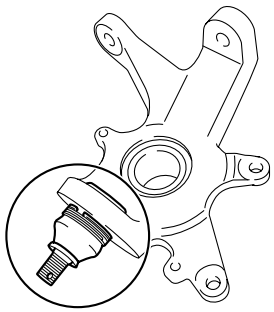
EAS28P1030
CHECKING THE STEERING KNUCKLE BALL JOINTS
The following procedure applies to both of the steering knuckle ball joints.
1. Check:
   • Ball joint (steering knuckle)
     Damage/pitting → Replace the ball joint.
     Free play → Replace the ball joint.
     Rough movement → Replace the ball joint.



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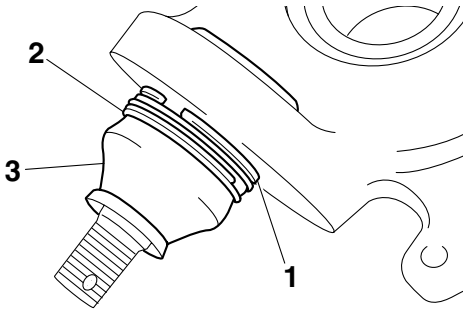
a. Clean the surface of the steering knuckle.
b. Remove the circlip “1”, clip “2” and rubber boot “3”.

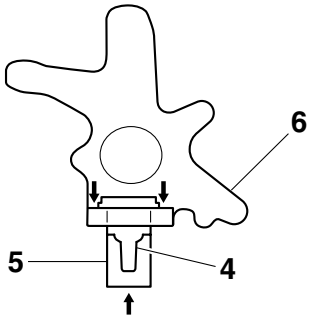


c. Remove the ball joint "4".

TIP

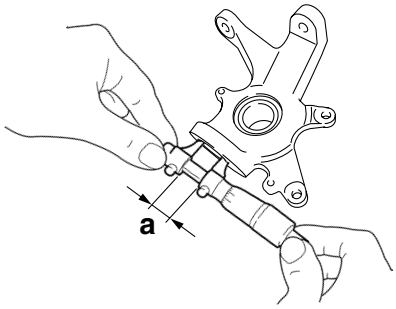
Use a ball joint remover "5" to separate the ball joint "4" from the steering knuckle "6".

Ball joint remover
90890-01474
YM-01474



d. Measure the ball joint bore inside diameter "a".
Out of specification → Replace the steering knuckle.

Ball joint bore inside diameter
32.45–32.50 mm (1.278–1.280 in)



e. Attach the ball joint remover/attachment set/short shaft set and new ball joint (with rubber boot and retaining ring) "7" to the steering knuckle "8".

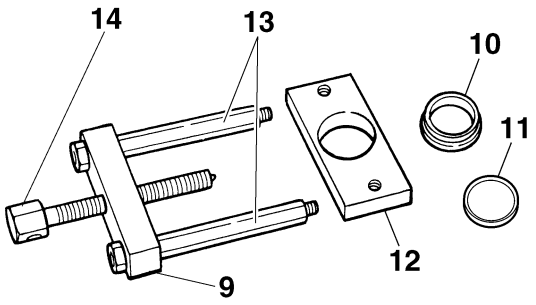
TIP

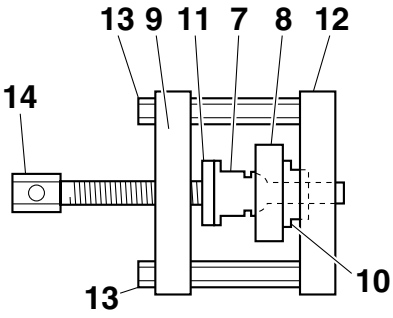
• Always use a new ball joint set.

• Do not tap or damage the top of the ball joint.

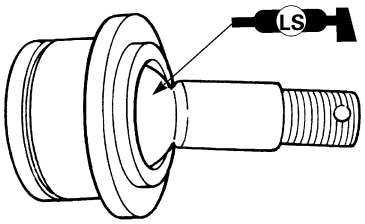
Ball joint remover
90890-01474
YM-01474
Ball joint remover attachment set
90890-01480
Ball joint adapter set
YM-01480
Ball joint remover short shaft set
90890-01514
YM-01514

9	Body	90890-01474 YM-01474
10	Installer spacer	90890-01480 YM-01480
11	Installer washer	
12	Base	
13	Guide bolt	90890-01514 YM-01514
14	Short bolt	





f. Hold the base "12" in place while turning in the short bolt "14" to install the new ball joint "7" into the steering knuckle "8".
g. Remove the ball joint remover/attachment set/short shaft set.
h. Apply lithium-soap-based grease to the new ball joint.



i. Install a new circlip.

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EAS29700
INSTALLING THE TIE-RODS

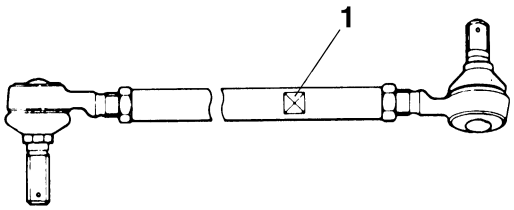
The following procedure applies to both of the tie-rods.

1. Install:
   • Tie-rod

	Tie-rod nut **25 Nm (2.5 m·kg, 18 ft·lb)**

TIP

Install the tie-rod so that the groove "1" is on the wheel side.



2. Adjust:
   • Toe-in
   Refer to "ADJUSTING THE TOE-IN" on page 3-29.

EAS28P1070
INSTALLING THE FRONT ARM PROTECTORS

The following procedure applies to both of the front arm protectors.

1. Install:
   • Front arm protector "1"

	Front arm protector nut **7 Nm (0.7 m·kg, 5.1 ft·lb)**

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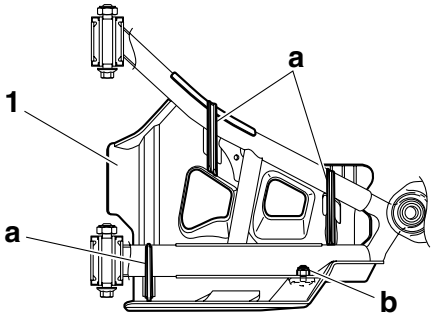
a. Fit the holders "a" on the front arm protector onto the lower arm.

b. Tighten the nut "b".



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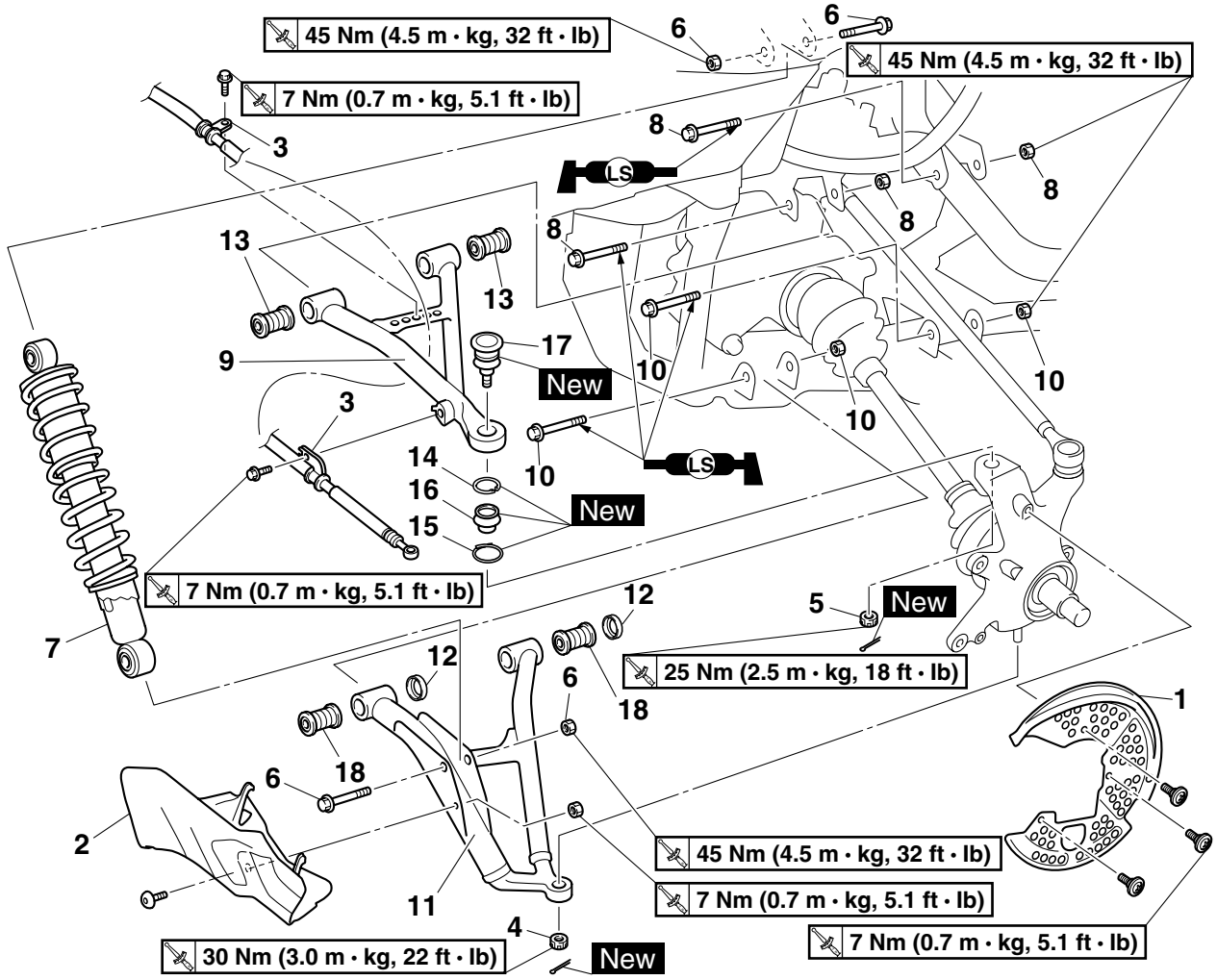
EAS29710

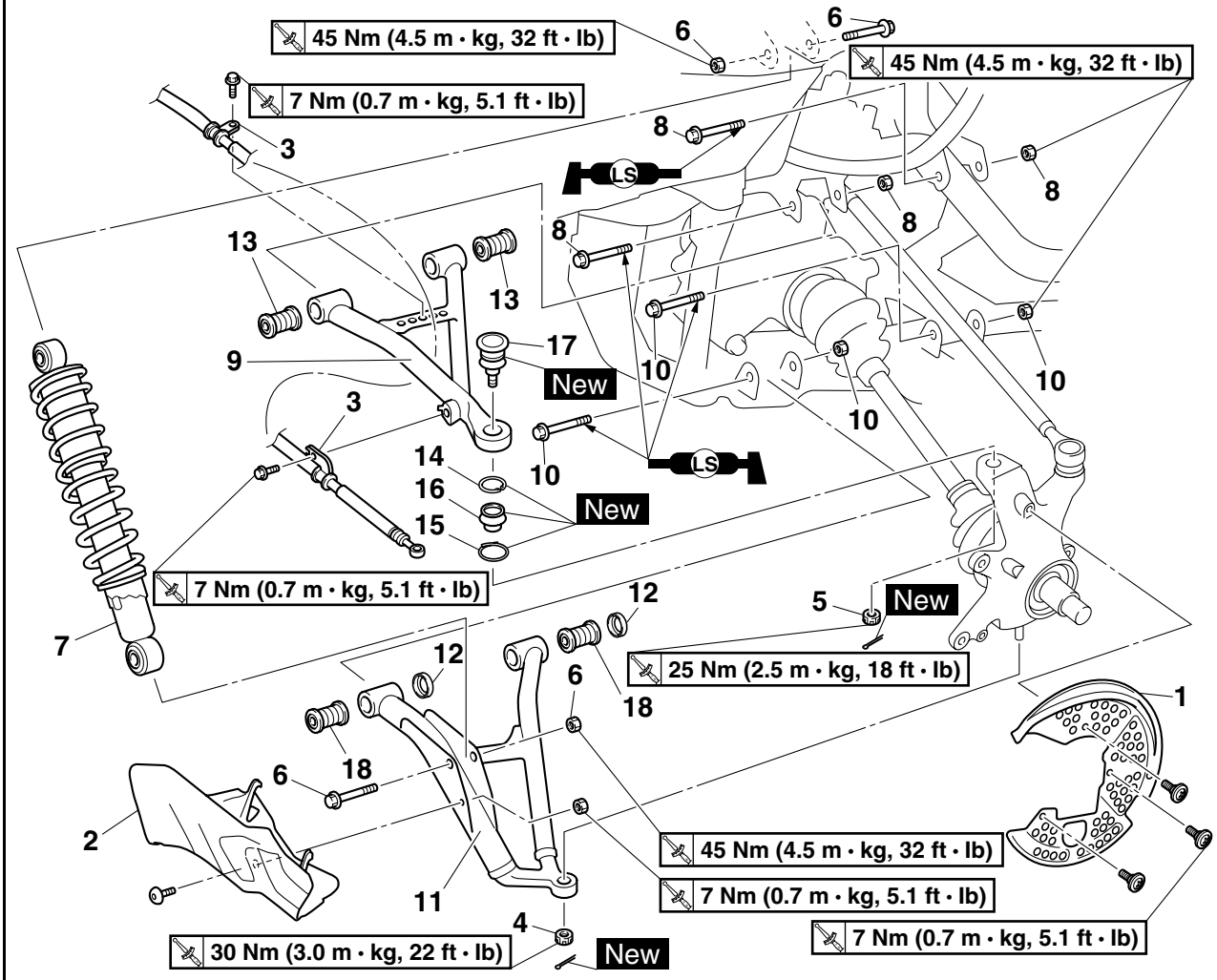
FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES

Removing the front arms and front shock absorber assemblies



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front upper arms, front lower arms, and front shock absorber assemblies.
	Front wheel hub		Refer to "FRONT WHEELS" on page 4-14
	Front brake caliper assembly		Refer to "FRONT BRAKE" on page 4-21
1	Brake disc guard	1	
2	Front arm protector	1	
3	Front brake hose holder	2	
4	Nut	1	
5	Nut	1	
6	Nut/bolt	2/2	
7	Front shock absorber assembly	1	
8	Nut/bolt	2/2	
9	Front upper arm	1	
10	Nut/bolt	2/2	
11	Front lower arm	1	
12	Dust cover	2	

Removing the front arms and front shock absorber assemblies



Order	Job/Parts to remove	Q'ty	Remarks
13	Bushing	2	
14	Circlip	1	
15	Clip	1	
16	Rubber boot	1	
17	Ball joint	1	
18	Bushing	2	
			For installation, reverse the removal procedure.

EAS29730
CHECKING THE FRONT ARMS
The following procedure applies to both of the front upper arms and front lower arms.
1. Check:
   • Front arm free play

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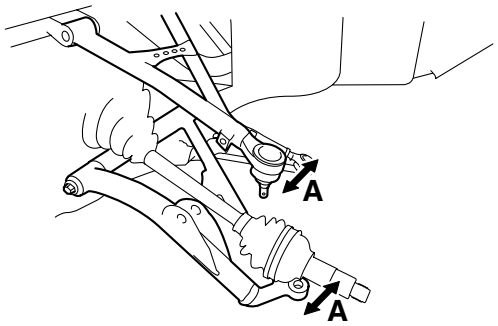
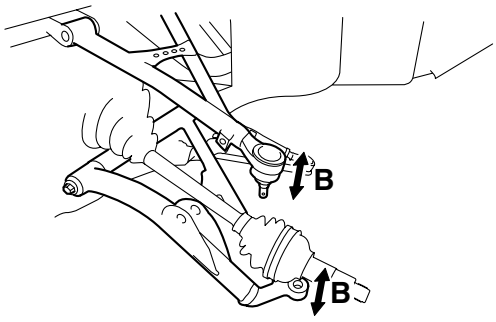
a. Check the front arm side play "A" by moving it from side to side.
   If side play is noticeable, check the bushings.



b. Check the front arm vertical movement "B" by moving it up and down.
   If the vertical movement is tight or rough, or if there is binding, check the bushings.



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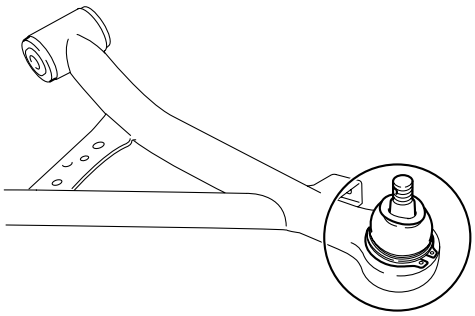
2. Check:
   • Front upper arm
   • Front lower arm
   Bends/damage → Replace.
3. Check:
   • Bushings
   Wear/damage → Replace.

EAS29760
CHECKING THE FRONT SHOCK ABSORBER ASSEMBLIES
The following procedure applies to both of the front shock absorber assemblies.
1. Check:
   • Front shock absorber assembly
   Oil leaks → Replace the front shock absorber assembly.
   • Front shock absorber rod
   Bends/damage → Replace the front shock absorber assembly.
   • Spring
   Move the spring up and down.
   Fatigue → Replace the front shock absorber assembly.

EAS29770
CHECKING THE FRONT ARM BALL JOINTS
The following procedure applies to both of the front arm ball joints.
1. Check:
   • Ball joint (front upper arm)
   Damage/pitting → Replace the ball joint.
   Free play → Replace the ball joint.
   Rough movement → Replace the ball joint.



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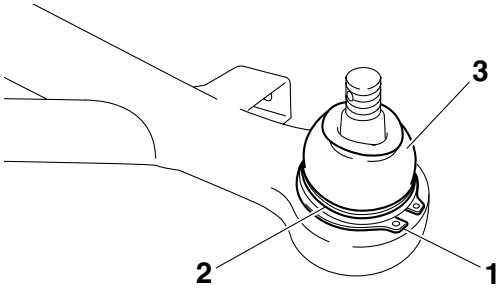
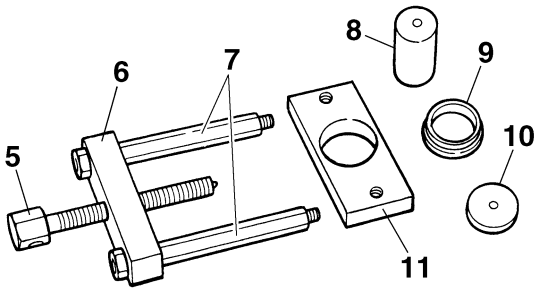
a. Clean the surface of the front upper arm.
b. Remove the circlip "1", clip "2" and rubber boot "3".

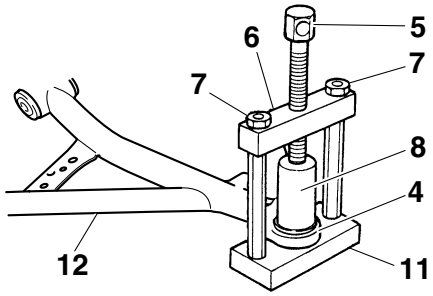


c. Attach the ball joint remover/attachment set to the ball joint (front upper arm) "4".

Ball joint remover
90890-01474
YM-01474
Ball joint remover attachment set
90890-01480
Ball joint adapter set
YM-01480

5	Long bolt	90890-01474 YM-01474
6	Body	
7	Guide bolt	
8	Remover attachment	
9	Installer spacer	90890-01480 YM-01480
10	Installer washer	
11	Base	

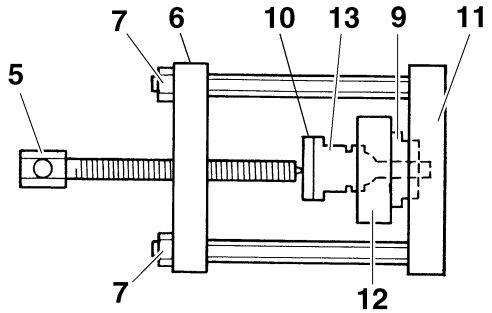




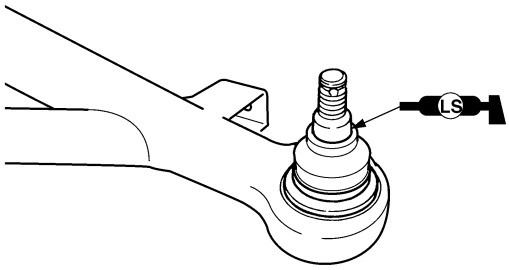
d. Hold the base “11” in place while turning in the long bolt “5” to remove the ball joint “4” from the front upper arm “12”.
e. Remove the ball joint remover/attachment set.
f. Attach the ball joint remover/attachment set and new ball joint (with rubber boot and retaining ring) “13” to the front upper arm “12”.

TIP

- Always use a new ball joint set.
- Do not tap or damage the top of the ball joint.



g. Hold the base “11” in place while turning in the long bolt “5” to install the new ball joint “13” into the front upper arm “12”.
h. Remove the ball joint remover/attachment set.
i. Apply lithium-soap-based grease to the new ball joint.



j. Install a new circlip.

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EAS29790

INSTALLING THE FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES

The following procedure applies to both of the front upper arms, front lower arms, and front shock absorber assemblies.

1. Install:
   - Front upper arm
   - Front lower arm
   - Front shock absorber assembly

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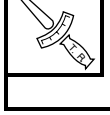
a. Install the front upper arm “1” and front lower arm “2”.

TIP

- Lubricate the front upper and lower arm bolts “3” with lithium-soap-based grease.
- Be sure to position the front upper and lower arm bolts “3” so that the bolt heads face forward.
- Temporarily tighten the front upper and lower arm nuts “4”.

b. Install the front shock absorber assembly “5”, bolts “6”, and nuts “7”.

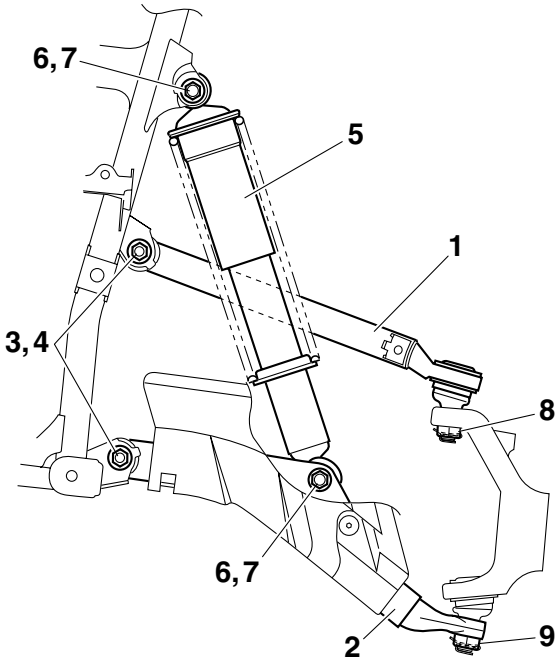
	**Front shock absorber assembly nut** **45 Nm (4.5 m·kg, 32 ft·lb)**

c. Install the steering knuckle, upper steering knuckle nut “8”, and lower steering knuckle nut “9”.

	Upper steering knuckle nut **25 Nm (2.5 m·kg, 18 ft·lb)** **Lower steering knuckle nut** **30 Nm (3.0 m·kg, 22 ft·lb)**

d. Install the new cotter pins.
e. Tighten the front upper and lower arm nuts "4" to specification.

	Front arm nut **45 Nm (4.5 m·kg, 32 ft·lb)**



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EAS28P1071

INSTALLING THE FRONT ARM PROTECTORS

The following procedure applies to both of the front arm protectors.

1. Install:
   • Front arm protector "1"

	Front arm protector nut **7 Nm (0.7 m·kg, 5.1 ft·lb)**

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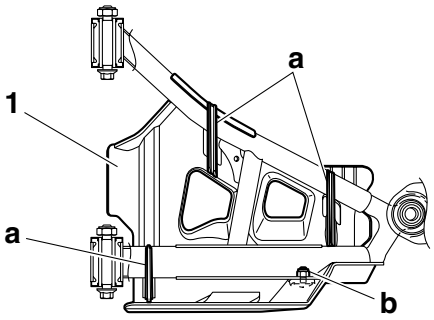
a. Fit the holders "a" on the front arm protector onto the lower arm.
b. Tighten the nut "b".



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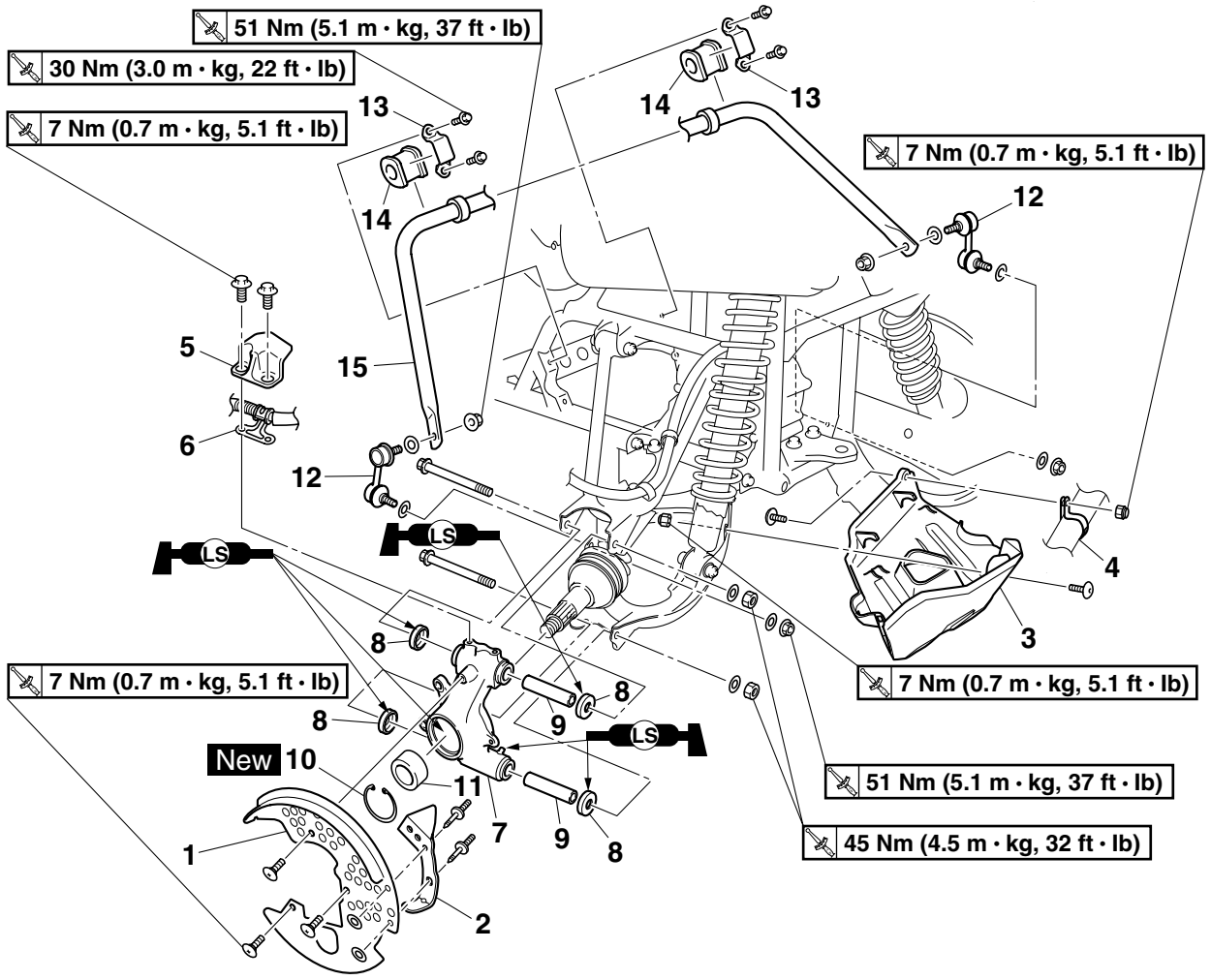
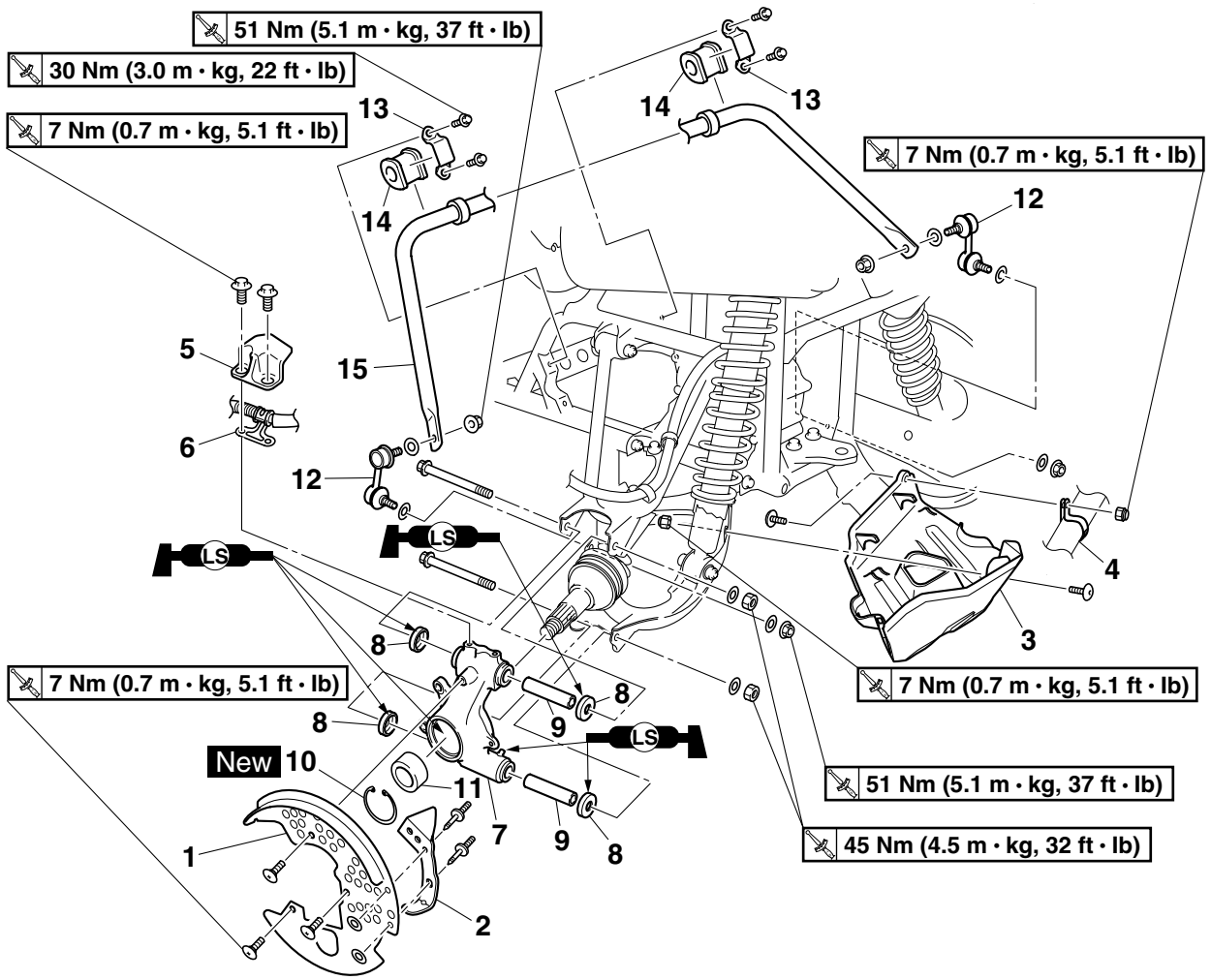
EAS29800
REAR KNUCKLES AND STABILIZER

Removing the rear knuckles and stabilizer



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the rear knuckles.
	Rear wheel hub		Refer to "REAR WHEELS" on page 4-18
1	Brake disc guard	1	
2	Plate	1	
3	Rear arm protector	1	
4	Rear arm protector holder	1	
5	Rear brake hose protector	1	
6	Rear brake hose holder	1	
7	Rear knuckle	1	
8	Spacer cover	4	
9	Spacer	2	
10	Circlip	1	
11	Wheel bearing	1	
12	Stabilizer joint	2	
13	Stabilizer holder	2	

Removing the rear knuckles and stabilizer



Order	Job/Parts to remove	Q'ty	Remarks
14	Bushing	2	
15	Stabilizer	1	
			For installation, reverse the removal procedure.

EAS29810
CHECKING THE REAR KNUCKLES AND REAR WHEEL BEARINGS

The following procedure applies to both of the rear knuckles and rear wheel bearings.

1. Check:
   - Rear knuckle
     Damage/pitting → Replace.
2. Check:
   - Rear wheel bearing "1"
     Rough movement/excessive free play → Replace.

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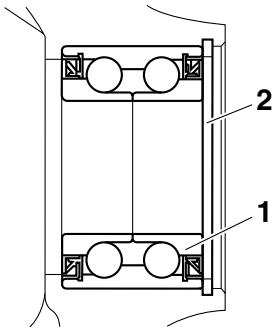
a. Clean the surface of the rear knuckle.
b. Remove the circlip "2".
c. Drive out the bearing.

EWA15040

⚠ WARNING

Eye protection is recommended when using striking tools.



d. Apply lithium-soap-based grease to the bearing.
e. Install the new bearing.

ECA16190

NOTICE

Do not strike the center race or balls of the bearing. Contact should be made only with the outer race.

f. Install the new circlip.

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EAS29820
CHECKING THE STABILIZER

1. Check:
   - Stabilizer
     Bends/cracks/damage → Replace.

EAS28P1005
INSTALLING THE REAR ARM PROTECTORS

The following procedure applies to both of the rear arm protectors.

1. Install:
   - Rear arm protector "1"
   - Rear arm protector holder "2"

Rear arm protector nut
7 Nm (0.7 m·kg, 5.1 ft·lb)
Rear arm protector holder nut
7 Nm (0.7 m·kg, 5.1 ft·lb)

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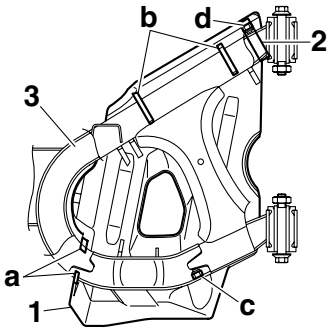
a. Install the rear arm protector holder to the lower arm "3".
b. Fit the holder "a" on the rear arm protector onto the lower arm.
c. Fit the holders "b" on the rear arm protector onto the lower arm.
d. Tighten the nut "c".
e. Tighten the nut "d".



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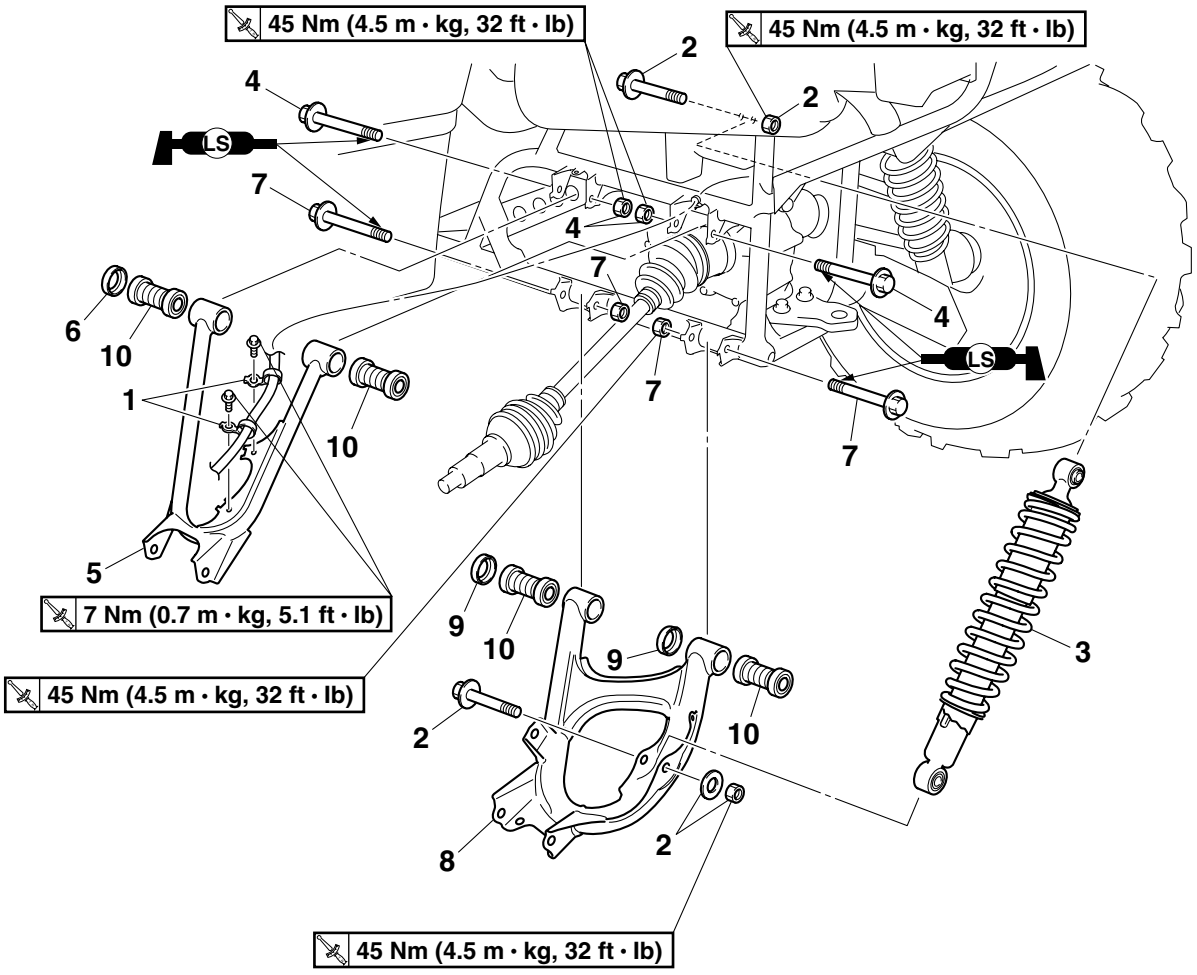
EAS29840

REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES

Removing the rear arms and rear shock absorber assemblies



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the rear upper arms, rear lower arms, and rear shock absorber assemblies.
	Rear knuckle/Stabilizer		Refer to "REAR KNUCKLES AND STABILIZER" on page 4-64
1	Rear brake hose guide	2	
2	Nut/Washer/Bolt	2/1/2	
3	Rear shock absorber assembly	1	
4	Nut/Bolt	2/2	
5	Rear upper arm	1	
6	Dust cover	1	
7	Nut/Bolt	2/2	
8	Rear lower arm	1	
9	Dust cover	2	
10	Bushing	4	
			For installation, reverse the removal procedure.

EAS29850
CHECKING THE REAR ARMS
The following procedure applies to both of the rear upper arms and rear lower arms.
1. Check:
   • Rear arm free play

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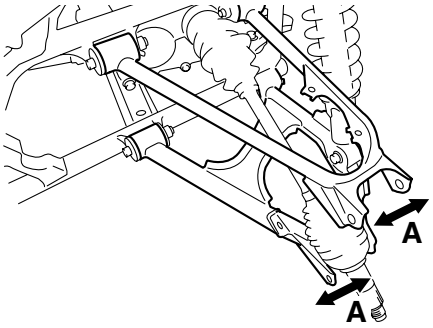
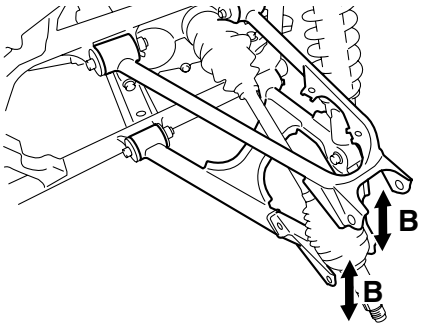
a. Check the rear arm side play "A" by moving it from side to side.
   If side play is noticeable, check the bushings.



b. Check the rear arm vertical movement "B" by moving it up and down.
   If the vertical movement is tight or rough, or if there is binding, check the bushings.



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2. Check:
   • Rear upper arm
   • Rear lower arm
   Bends/damage → Replace.
3. Check:
   • Bushings
   Wear/damage → Replace.

EAS29860
CHECKING THE REAR SHOCK ABSORBER ASSEMBLIES
The following procedure applies to both of the rear shock absorber assemblies.
1. Check:
   • Rear shock absorber assembly
   Oil leaks → Replace the rear shock absorber assembly.
   • Rear shock absorber rod
   Bends/damage → Replace the rear shock absorber assembly.
   • Spring
   Move the spring up and down.
   Fatigue → Replace the rear shock absorber assembly.

EAS29870
INSTALLING THE REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES
The following procedure applies to both of the rear upper arms, rear lower arms, and rear shock absorber assemblies.
1. Install:
   • Rear upper arm
   • Rear lower arm
   • Rear shock absorber assembly

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a. Install the rear upper arm "1" and rear lower arm "2".

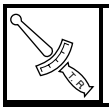
TIP

- Lubricate the rear upper and lower arm bolts "3" with lithium-soap-based grease.
- Be sure to position the rear upper and lower arm bolts "3" so that the bolt heads face outward.
- Temporarily tighten the rear upper and lower arm nuts "4".

b. Install the rear shock absorber assembly "5", bolts "6", and nuts "7".

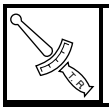
Rear shock absorber assembly nut
45 Nm (4.5 m·kg, 32 ft·lb)

c. Install the rear knuckle and nuts "8".

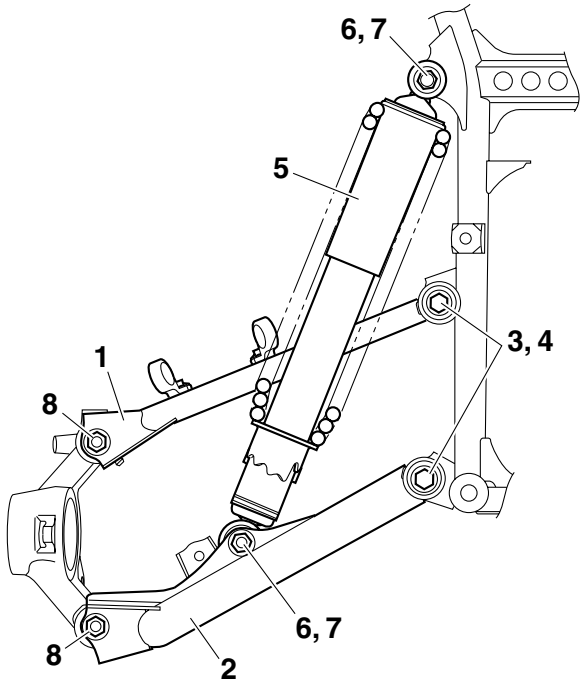


Rear knuckle nut
45 Nm (4.5 m·kg, 32 ft·lb)

d. Tighten the rear upper and lower arm nuts "4" to specification.



Rear arm nut
45 Nm (4.5 m·kg, 32 ft·lb)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5
3, 4
1
8
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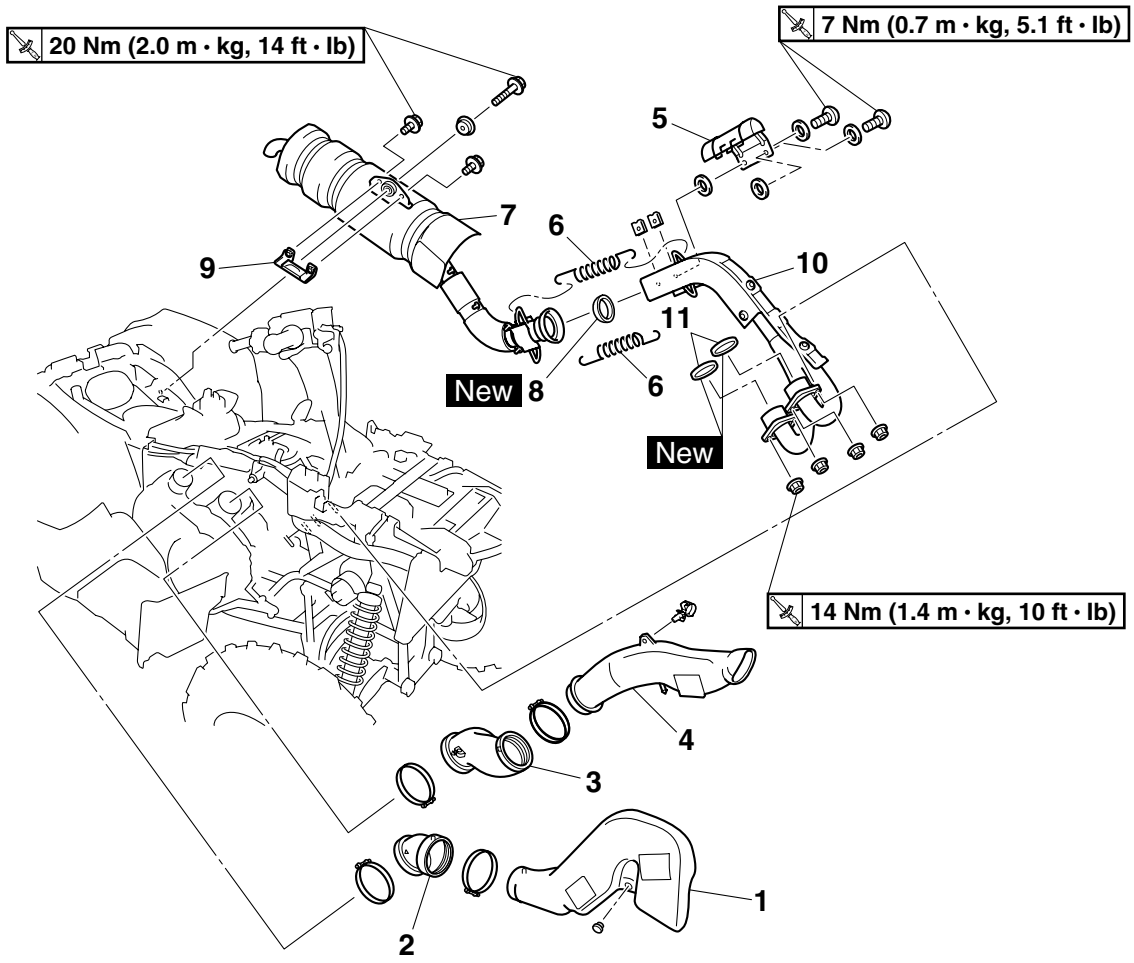
EAS23710
ENGINE REMOVAL

Removing the V-belt cooling ducts, muffler and exhaust pipe



Order	Job/Parts to remove	Q'ty	Remarks
	Front fender/Rear fender/Left footrest board/Air filter case/Meter assembly		Refer to "GENERAL CHASSIS" on page 4-1.
1	V-belt cooling exhaust duct	1	
2	V-belt cooling exhaust duct joint	1	
3	V-belt cooling intake duct joint	1	
4	V-belt cooling intake duct	1	
5	Exhaust pipe protector	1	
6	Spring	2	
7	Muffler	1	
8	Gasket	1	
9	Muffler bracket	1	
10	Exhaust pipe	1	
11	Gasket	2	
			For installation, reverse the removal procedure.

EAS28P1023
INSTALLING THE MUFFLER

1. Install:
   - Gaskets “1” New
   - Exhaust pipe “2”
   - Exhaust pipe nuts “3”

	Exhaust pipe nut **14 Nm (1.4 m·kg, 10 ft·lb)**

2. Install:
   - Muffler bracket “4”
   - Muffler bracket bolts “5”

	Muffler bracket bolt **20 Nm (2.0 m·kg, 14 ft·lb)**

3. Install:
   - Gasket “6” New
   - Muffler “7”
   - Washer “8”
   - Muffler bolt “9”

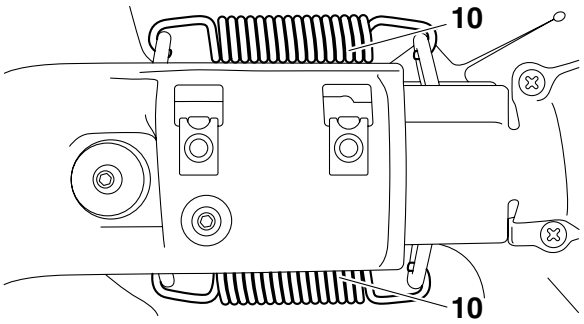
TIP

Do not fully tighten the muffler bolt.

4. Install:
   - Springs “10”

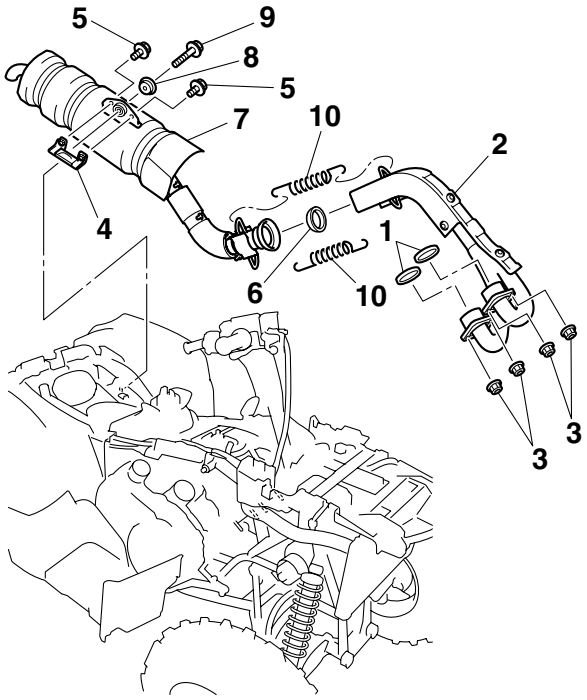
TIP

Install the springs so that the spring ends are pointing inward as shown in the illustration.



5. Tighten:
   - Muffler bolt “9”

	Muffler bolt **20 Nm (2.0 m·kg, 14 ft·lb)**



EAS28P1024
INSTALLING THE V-BELT COOLING DUCTS

1. Install:
   - V-belt cooling intake duct joint “1”
   - V-belt cooling intake duct “2”

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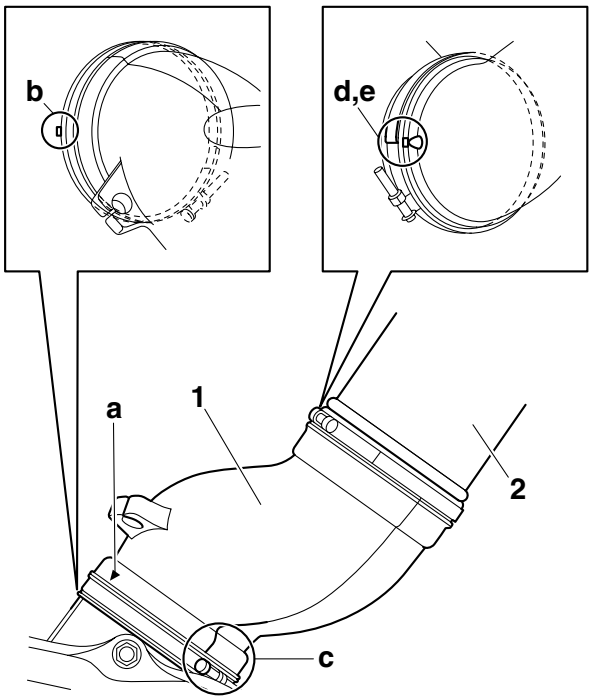
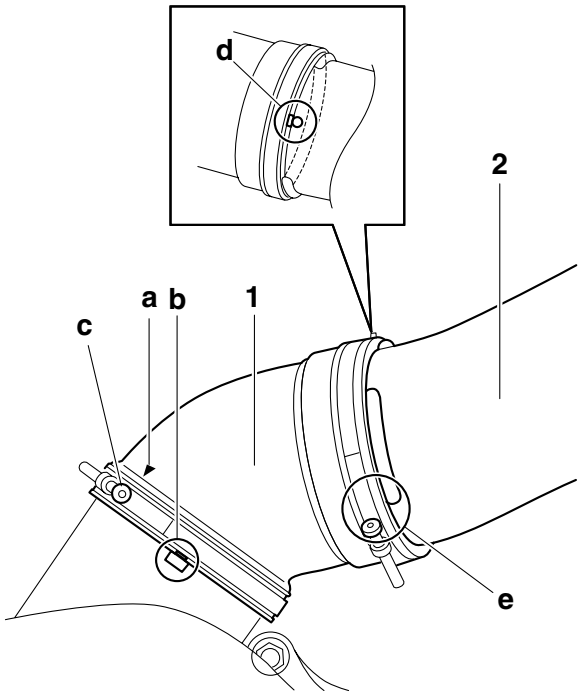
a. Position the V-belt cooling intake duct joint with its arrow mark “a” pointing toward the engine.
b. Align the projection on the V-belt cooling intake duct joint with the rib on the crankcase in the area “b” shown in the illustration.
c. Align the screw head with the seam on the V-belt cooling intake duct joint in the area “c” shown in the illustration.
d. Align the projection on the V-belt cooling intake duct with the projection on the V-belt cooling intake duct joint in the area “d” shown in the illustration.
e. Align the bend in the screw clamp with the projection on the V-belt cooling intake duct joint in the area “e” shown in the illustration.





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2. Install:
   - V-belt cooling exhaust duct joint “1”
   - V-belt cooling exhaust duct “2”

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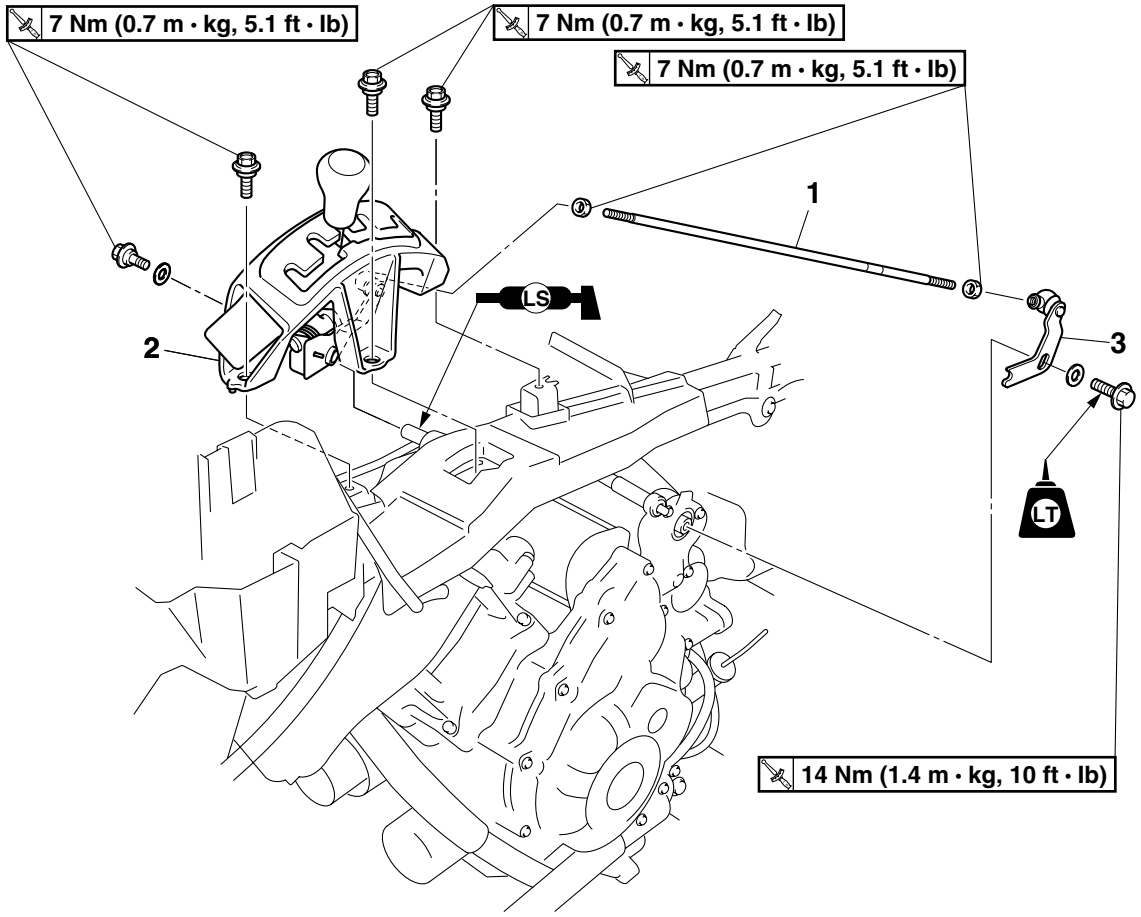
a. Position the V-belt cooling exhaust duct joint with its arrow mark “a” pointing toward the engine.
b. Align the projection on the V-belt cooling exhaust duct joint with the projection on the drive belt case in the area “b” shown in the illustration.
c. Align the screw head with the arrow mark “a” on the V-belt cooling exhaust duct joint in the area “c” shown in the illustration.
d. Align the projection on the V-belt cooling exhaust duct with the projection on the V-belt cooling exhaust duct joint in the area “d” shown in the illustration.
e. Align the screw head with the rib on the V-belt cooling exhaust duct in the area “e” shown in the illustration.

Removing the drive select lever unit

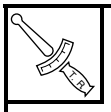


Order	Job/Parts to remove	Q'ty	Remarks
1	Drive select lever shift rod	1	
2	Drive select lever unit	1	
3	Shift arm	1	
			For installation, reverse the removal procedure.

EAS28P1025

INSTALLING THE DRIVE SELECT LEVER UNIT

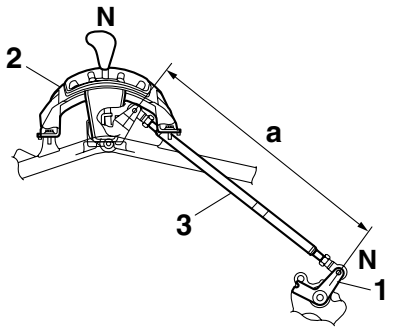
1. Install:
   - Shift arm “1”
   - Drive select lever unit “2”
   - Drive select lever shift rod “3”



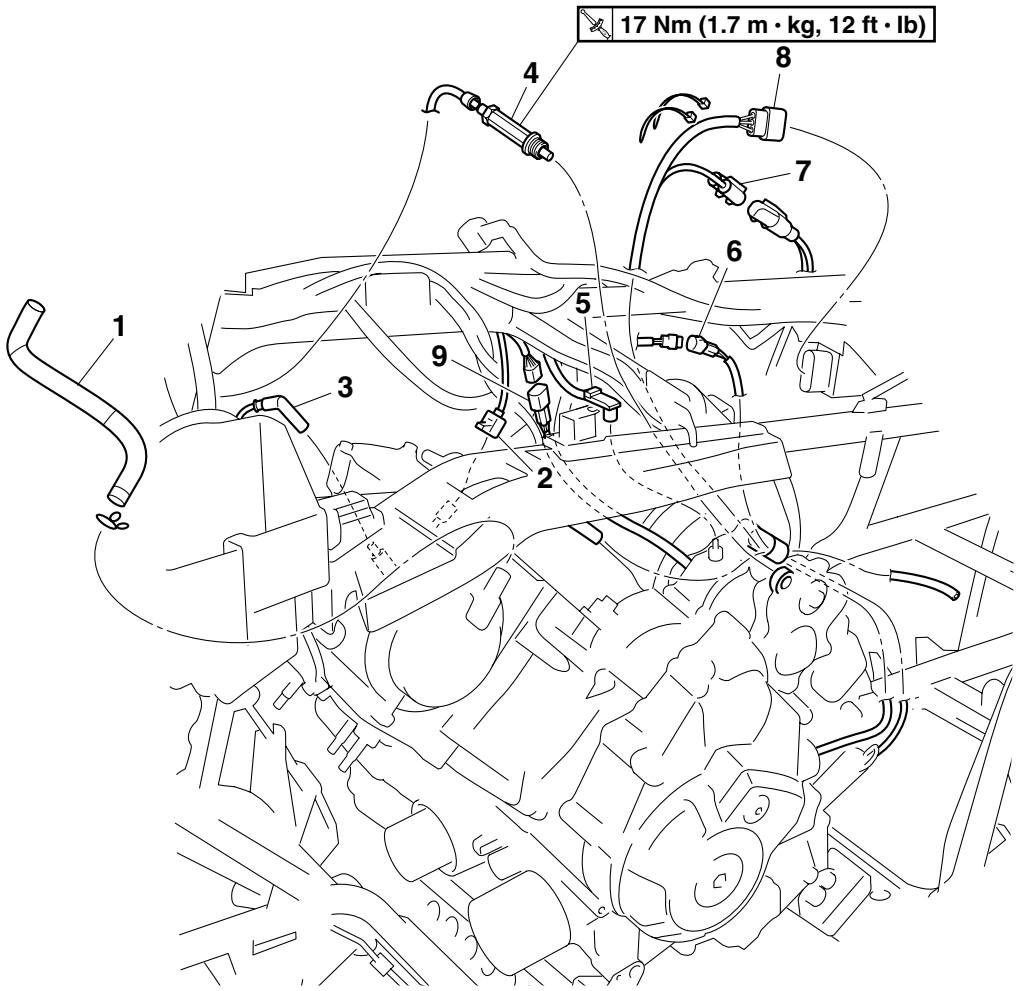
Shift arm bolt
14 Nm (1.4 m·kg, 10 ft·lb)
LOCTITE®
Drive select lever unit bolt
7 Nm (0.7 m·kg, 5.1 ft·lb)
Drive select lever shift rod locknut
7 Nm (0.7 m·kg, 5.1 ft·lb)

TIP

- Make sure that the drive select lever and transmission are in “N” (neutral).
- The installed length “a” of the shift rod is 413 mm (16.3 in).

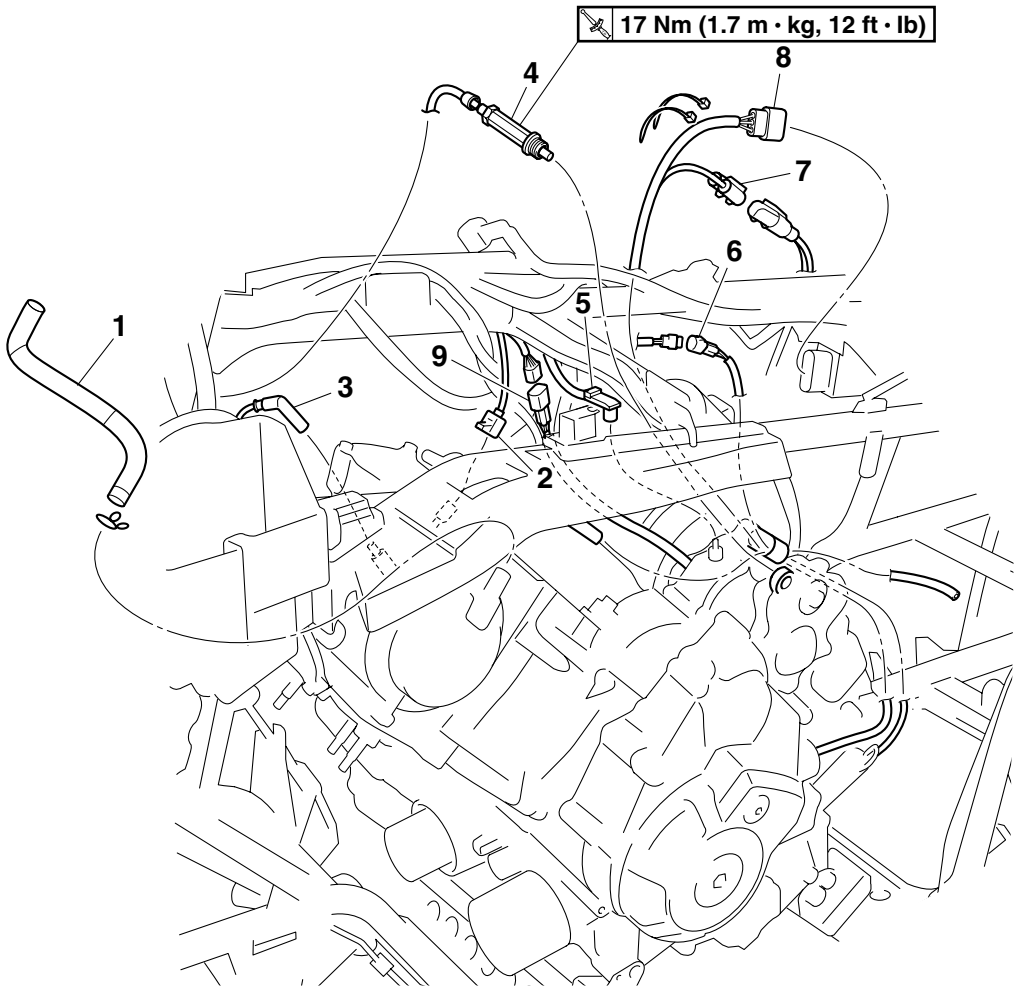


Disconnecting the leads, cables and hoses



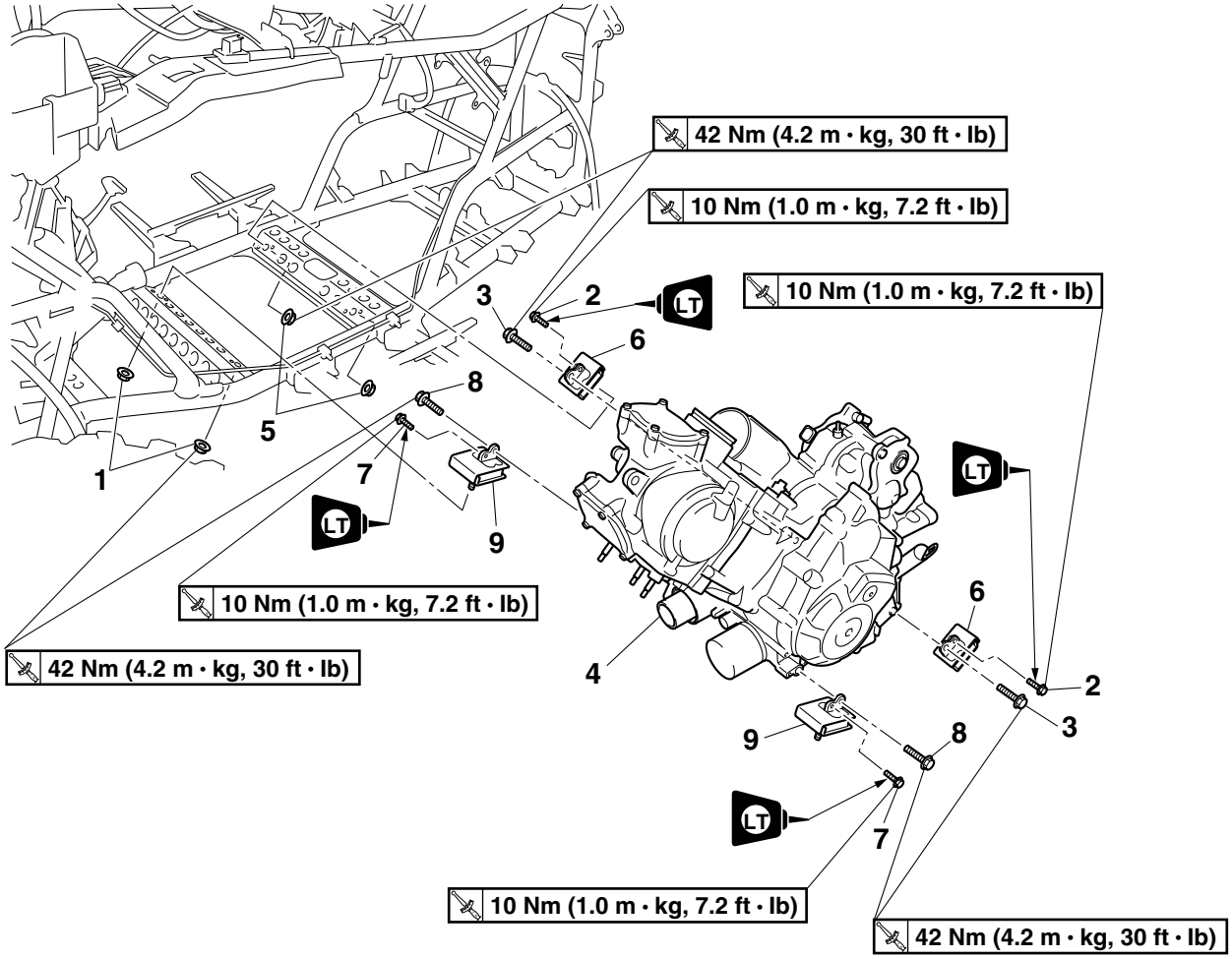
Order	Job/Parts to remove	Q'ty	Remarks
	Footrest board/Air filter case		Refer to "GENERAL CHASSIS" on page 4-1.
	Throttle body assembly		Refer to "THROTTLE BODY" on page 7-4.
	Fuel tank/Fuel tank shield		Refer to "FUEL TANK" on page 7-1.
	Coolant reservoir		Refer to "RADIATOR" on page 6-1.
	Thermostat		Refer to "THERMOSTAT" on page 6-4.
	Water pump assembly		Refer to "WATER PUMP" on page 6-7.
	Oil delivery pipe 2		Refer to "CYLINDER HEAD" on page 5-10.
	Oil delivery pipe 1		Refer to "AC MAGNETO AND STARTER CLUTCH" on page 5-34.
	Differential assembly		Refer to "FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES, DIFFERENTIAL ASSEMBLY AND FRONT DRIVE SHAFT" on page 8-3.
	Final drive assembly		Refer to "REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT" on page 8-15.
	Starter motor		Refer to "ELECTRIC STARTER" on page 5-40.

Disconnecting the leads, cables and hoses



Order	Job/Parts to remove	Q'ty	Remarks
	Drive belt case		Refer to "PRIMARY AND SECONDARY SHEAVES" on page 5-47.
1	Cylinder head breather hose	1	
2	Coolant temperature sensor coupler	1	Disconnect.
3	Spark plug cap	1	
4	Shift control cable	1	Disconnect.
5	Reverse switch lead	1	Disconnect.
6	Speed sensor coupler	1	Disconnect.
7	Crankshaft position sensor coupler	1	Disconnect.
8	AC magneto coupler	1	Disconnect.
9	Gear position switch coupler	1	Disconnect.
			For installation, reverse the removal procedure.

Removing the engine



Order	Job/Parts to remove	Q'ty	Remarks
1	Rubber damper nut (front side)	2	
2	Engine mounting bolt (rear upper side)	2	
3	Engine mounting bolt (rear lower side)	2	
4	Engine	1	ECA28P1024 ***NOTICE*** **Make sure that the engine does not strike the brake pipe when removing it.** **TIP** Remove the engine from the left side of the vehicle.
5	Rubber damper nut (rear side)	2	
6	Rubber damper (rear side)	2	
7	Engine mounting bolt (front upper side)	2	
8	Engine mounting bolt (front lower side)	2	
9	Rubber damper (front side)	2	
			For installation, reverse the removal procedure.

EAS23720
INSTALLING THE ENGINE

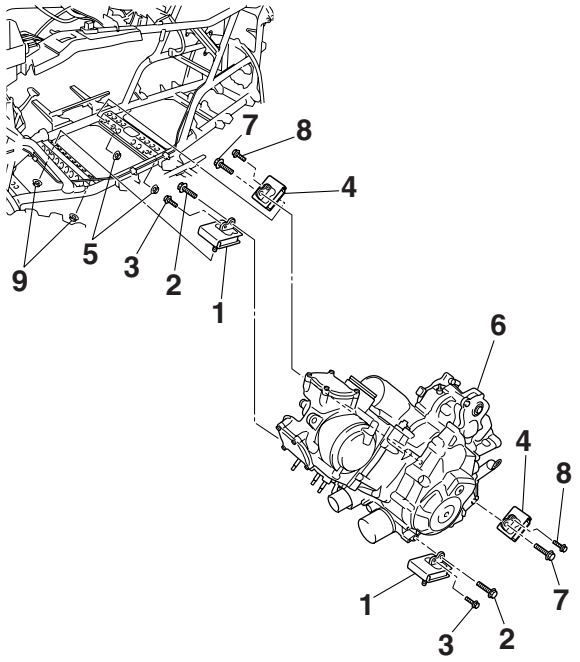
1. Install:
   - Rubber dampers (front side) “1”
   - Engine mounting bolts (front lower side) “2”
   - Engine mounting bolts (front upper side) “3”
   - Rubber dampers (rear side) “4”
   - Rubber damper nuts (rear side) “5”
   - Engine “6”
   - Engine mounting bolts (rear lower side) “7”
   - Engine mounting bolts (rear upper side) “8”
   - Rubber damper nuts (front side) “9”

ECA28P1025
NOTICE

Make sure that the engine does not strike the brake pipe when installing it.

TIP

Do not fully tighten the bolts and nuts.

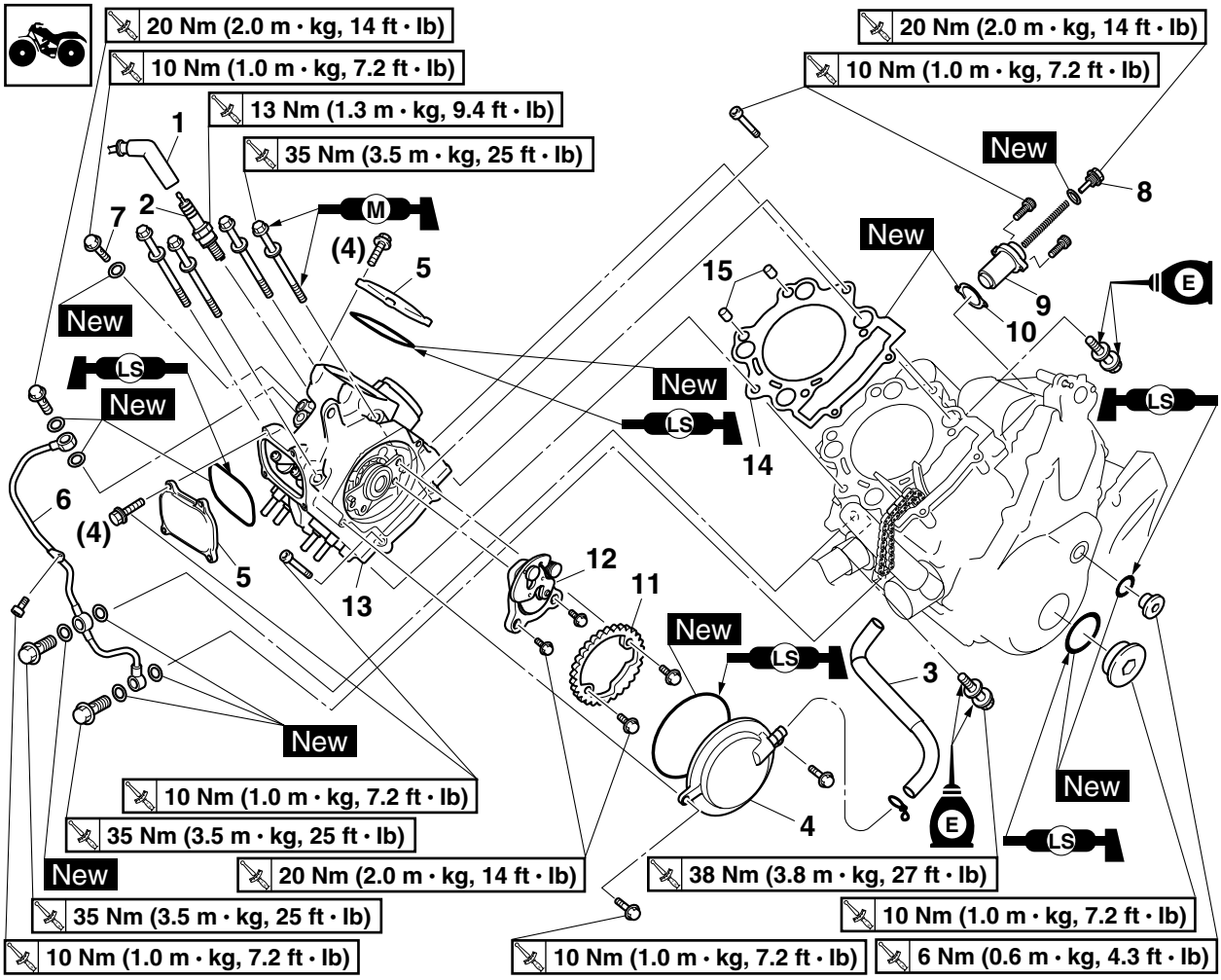


2. Tighten:
   - Engine mounting bolts (front lower side) “2”
   - Engine mounting bolts (front upper side) “3”
   - Engine mounting bolts (rear lower side) “7”
   - Engine mounting bolts (rear upper side) “8”
   - Rubber damper nuts (front side) “9”
   - Rubber damper nuts (rear side) “5”

Engine mounting bolt (front lower side)
42 Nm (4.2 m·kg, 30 ft·lb)
Engine mounting bolt (front upper side)
10 Nm (1.0 m·kg, 7.2 ft·lb)
LOCTITE®
Engine mounting bolt (rear lower side)
42 Nm (4.2 m·kg, 30 ft·lb)
Engine mounting bolt (rear upper side)
10 Nm (1.0 m·kg, 7.2 ft·lb)
LOCTITE®
Rubber damper nut (front side)
42 Nm (4.2 m·kg, 30 ft·lb)
Rubber damper nut (rear side)
42 Nm (4.2 m·kg, 30 ft·lb)

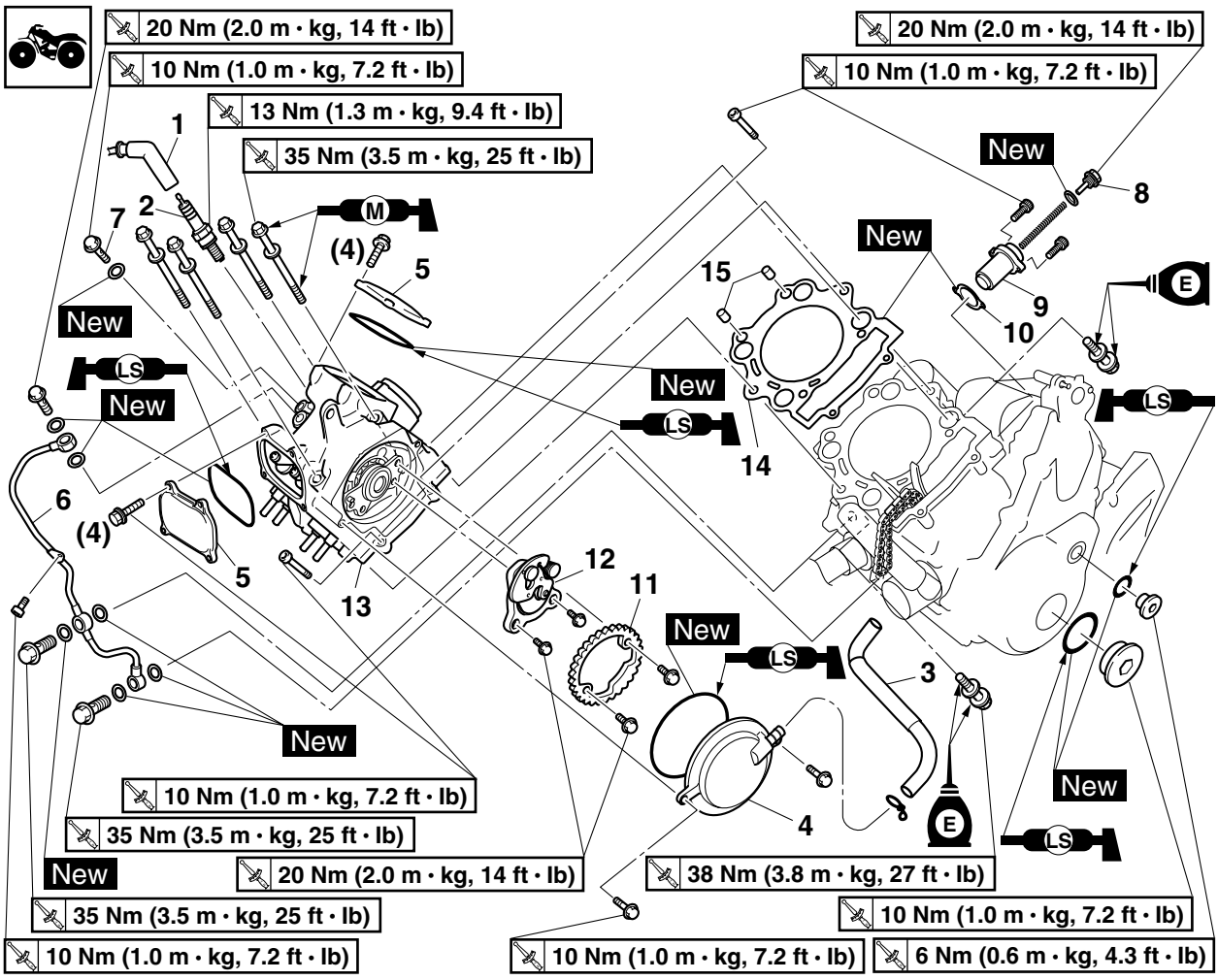
EAS24100
CYLINDER HEAD

Removing the cylinder head



Order	Job/Parts to remove	Q'ty	Remarks
	Throttle body assembly		Refer to "THROTTLE BODY" on page 7-4.
	Thermostat/Coolant temperature sensor		Refer to "THERMOSTAT" on page 6-4.
	V-belt cooling ducts/Exhaust pipe		Refer to "ENGINE REMOVAL" on page 5-1.
1	Spark plug cap	1	Disconnect.
2	Spark plug	1	
3	Cylinder head breather hose	1	
4	Camshaft sprocket cover	1	
5	Tappet cover	2	
6	Oil delivery pipe 2	1	
7	Oil check bolt	1	
8	Timing chain tensioner cap bolt	1	
9	Timing chain tensioner	1	
10	Gasket	1	
11	Camshaft sprocket	1	
12	Decompressor assembly	1	
13	Cylinder head	1	

Removing the cylinder head



Order	Job/Parts to remove	Q'ty	Remarks
14	Cylinder head gasket	1	
15	Dowel pin	2	
			For installation, reverse the removal procedure.

EAS24130
REMOVING THE CYLINDER HEAD

1. Align:
   - "I" mark "a" on the AC magneto rotor (with the stationary pointer "b" on the AC magneto cover)

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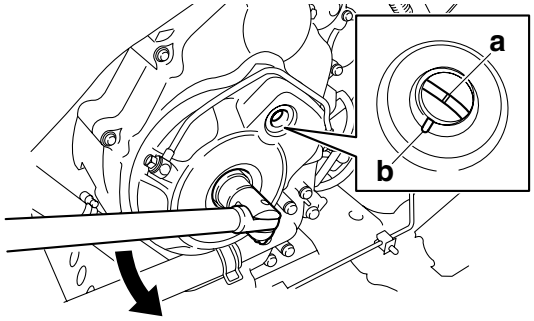
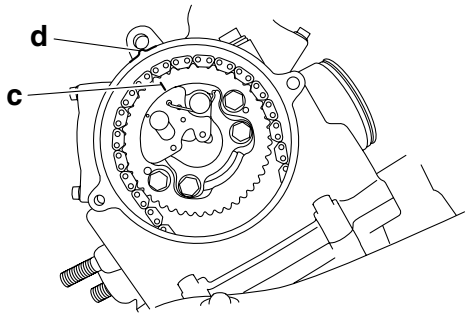
a. Turn the crankshaft counterclockwise.



b. When the piston is at TDC on the compression stroke, align the "I" mark "c" on the camshaft sprocket with the stationary pointer "d" on the cylinder head.



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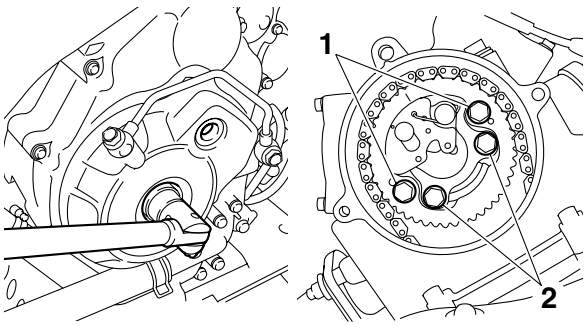
2. Loosen:
   - Camshaft sprocket bolts "1"
   - Decompressor assembly bolts "2"

TIP

While holding the AC magneto rotor nut with a wrench, loosen the camshaft sprocket bolts and decompressor assembly bolts.



3. Loosen:
   - Timing chain tensioner cap bolt

4. Remove:
   - Timing chain tensioner (along with the gasket)
   - Camshaft sprocket
   - Timing chain

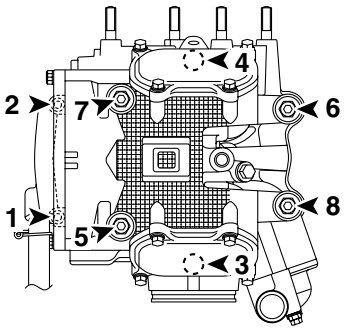
TIP

To prevent the timing chain from falling into the crankcase, fasten it with a wire.

5. Remove:
   - Cylinder head

TIP

- Loosen the bolts in the proper sequence as shown.
- Loosen each bolt 1/2 of a turn at a time. After all of the bolts are fully loosened, remove them.



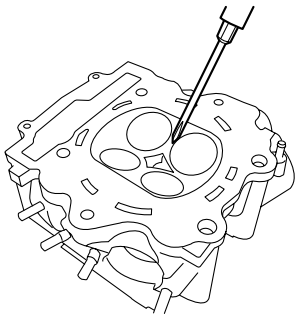
EAS24160
CHECKING THE CYLINDER HEAD

1. Eliminate:
   - Combustion chamber carbon deposits (with a rounded scraper)

ECA28P1030

NOTICE

Do not use a sharp instrument; otherwise, the following may be damaged or scratched:
- **Spark plug bore threads**
- **Valve seats**



2. Check:
   - Cylinder head
     Damage/scratches → Replace.
   - Cylinder head water jacket
     Mineral deposits/rust → Eliminate.

3. Measure:
   • Cylinder head warpage
   Out of specification → Resurface the cylinder head.

	Warpage limit **0.03 mm (0.0012 in)**

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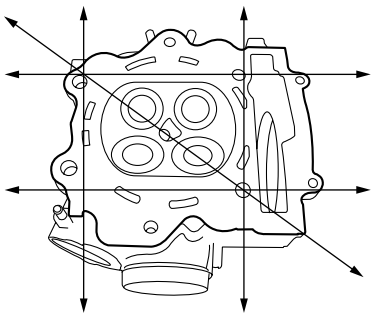
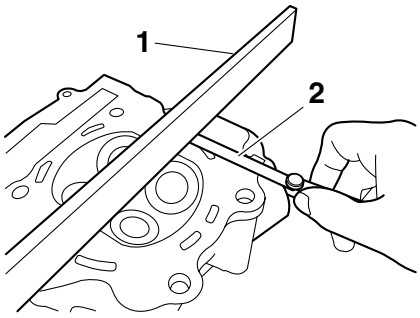
a. Place a straightedge "1" and a thickness gauge "2" across the cylinder head.





b. Measure the warpage.
c. If the limit is exceeded, resurface the cylinder head as follows.
d. Place a 400–600 grit wet sandpaper on the surface plate and resurface the cylinder head using a figure-eight sanding pattern.

TIP

To ensure an even surface, rotate the cylinder head several times.

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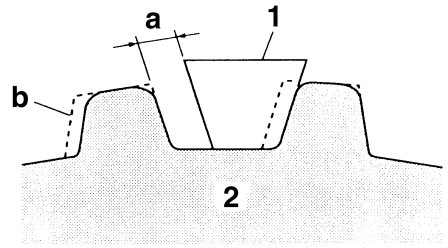
EAS28P1026

CHECKING THE CAMSHAFT SPROCKET

1. Check:
   • Camshaft sprocket
   More than 1/4 tooth wear "a" → Replace the camshaft sprocket and the timing chain as a set.



a. 1/4 tooth
b. Correct
1. Timing chain roller
2. Camshaft sprocket

EAS23940

CHECKING THE TAPPET COVERS AND CAMSHAFT SPROCKET COVER

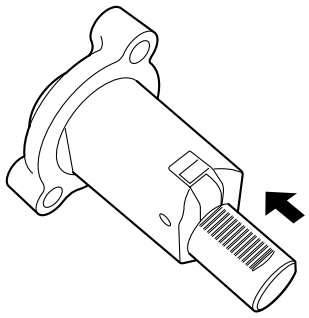
The following procedure applies to both of the tappet covers.

1. Check:
   • Tappet cover
   • Camshaft sprocket cover
   Damage/wear → Replace.

EAS23960

CHECKING THE TIMING CHAIN TENSIONER

1. Check:
   • Timing chain tensioner
   Cracks/damage → Replace.
2. Check:
   • One-way cam operation
   Rough movement → Replace the timing chain tensioner.
3. Check:
   • Timing chain tensioner cap bolt
   • Spring
   • One-way cam
   • Timing chain tensioner rod
   Damage/wear → Replace the defective part(s).



EAS24230
INSTALLING THE CYLINDER HEAD

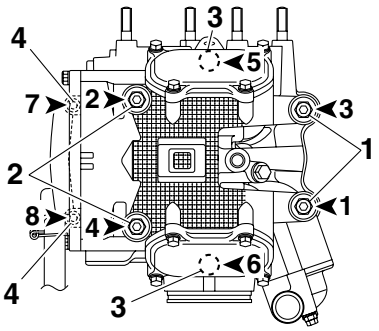
1. Install:
   - Cylinder head gasket **New**
   - Dowel pins
2. Install:
   - Cylinder head
   - Cylinder head bolts

	Cylinder head bolt "1" **35 Nm (3.5 m·kg, 25 ft·lb)** **Cylinder head bolt "2"** **35 Nm (3.5 m·kg, 25 ft·lb)** **Cylinder head bolt "3"** **38 Nm (3.8 m·kg, 27 ft·lb)** **Cylinder head bolt "4"** **10 Nm (1.0 m·kg, 7.2 ft·lb)**

Cylinder head bolts "1"
Length: 135 mm (5.31 in)
Cylinder head bolts "2"
Length: 145 mm (5.71 in)

TIP

- Lubricate the cylinder head bolt "1" and "2" threads and mating surface with molybdenum disulfide grease.
- Lubricate the cylinder head bolts "3" threads and mating surface with engine oil.
- Tighten the cylinder head bolts in the proper tightening sequence as shown and torque them in two stages.



3. Install:
   - Decompressor assembly
   - Camshaft sprocket
     (onto the camshaft)

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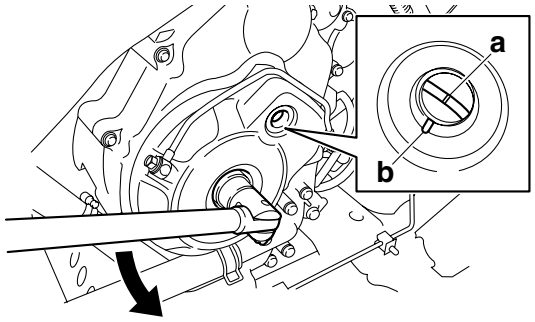
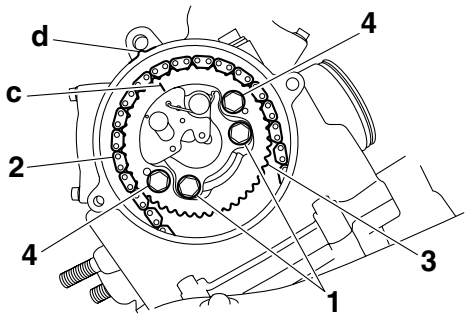
a. Install the decompressor assembly onto the camshaft, and then finger tighten the decompressor assembly bolts "1".
b. Turn the crankshaft counterclockwise.
c. Align the "I" mark "a" on the AC magneto rotor with the stationary pointer "b" on the AC magneto cover.
d. Align the "I" mark "c" on the camshaft sprocket with the stationary pointer "d" on the cylinder head.
e. Install the timing chain "2" onto the camshaft sprocket "3", and then install the camshaft sprocket onto the camshaft, and then finger tighten the camshaft sprocket bolts "4".





TIP

When installing the camshaft sprocket, be sure to keep the timing chain as tight as possible on the exhaust side.

ECA28P1031
NOTICE

Do not turn the crankshaft when installing the camshaft to avoid damage or improper valve timing.

f. Remove the wire from the timing chain.

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4. Install:
   - Timing chain tensioner

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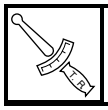
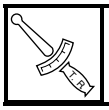
a. Remove the timing chain tensioner cap bolt "1", copper washer "2" and spring "3".
b. Release the timing chain tensioner one-way cam "4" and push the timing chain tensioner rod "5" all the way into the timing chain tensioner housing.
c. Install the timing chain tensioner and gasket "6" onto the cylinder.

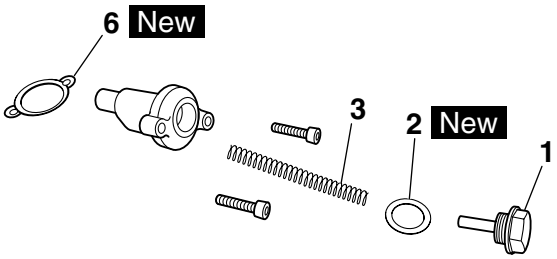
	**Timing chain tensioner bolt** **10 Nm (1.0 m·kg, 7.2 ft·lb)**

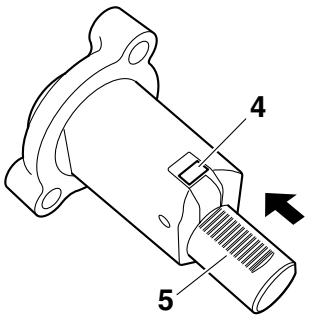
TIP

Install the gasket with its beaded side facing the timing chain tensioner end.

d. Install the spring, copper washer and timing chain tensioner cap bolt.

	**Timing chain tensioner cap bolt 20 Nm (2.0 m·kg, 14 ft·lb)**





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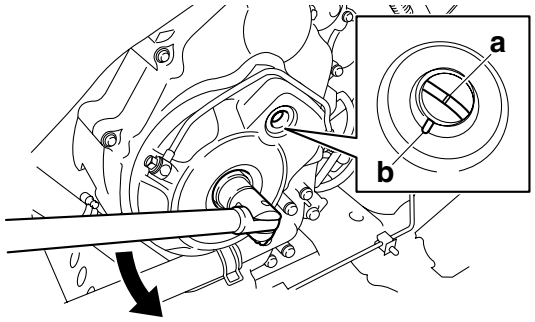
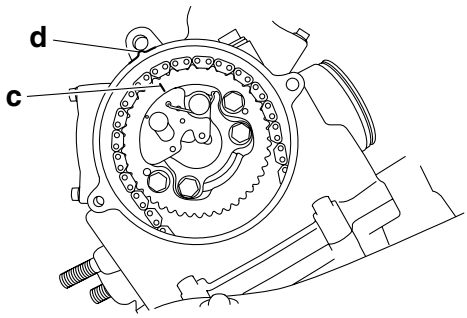
5. Turn:
   • Crankshaft
   (several turns counterclockwise)
6. Check:
   • "I" mark "a"
   Align the "I" mark on the AC magneto rotor with the stationary pointer "b" on the AC magneto cover.
   • "I" mark "c"
   Align the "I" mark on the camshaft sprocket with the stationary pointer "d" on the cylinder head.
   Out of alignment → Correct.
   Refer to the installation steps above.





7. Tighten:
   • Camshaft sprocket bolts "1"
   • Decompressor assembly bolts "2"

	Camshaft sprocket bolt 20 Nm (2.0 m·kg, 14 ft·lb) **Decompressor assembly bolt 20 Nm (2.0 m·kg, 14 ft·lb)**

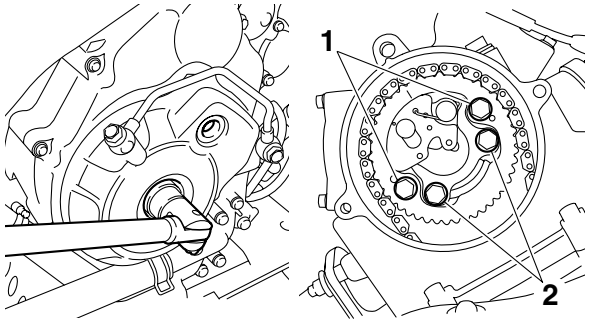
ECA13750

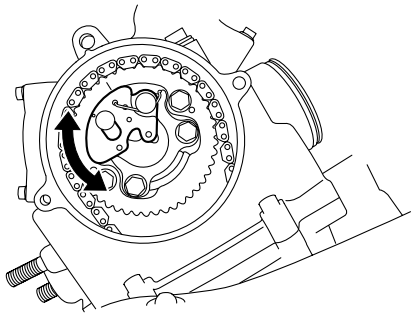
NOTICE

Be sure to tighten the camshaft sprocket bolts to the specified torque to avoid the possibility of the bolts coming loose and damaging the engine.

TIP

- While holding the AC magneto rotor nut with a wrench, tighten the camshaft sprocket bolts and decompressor assembly bolts.
- After tightening the decompressor assembly bolts, check that decompressor assembly moves smoothly.



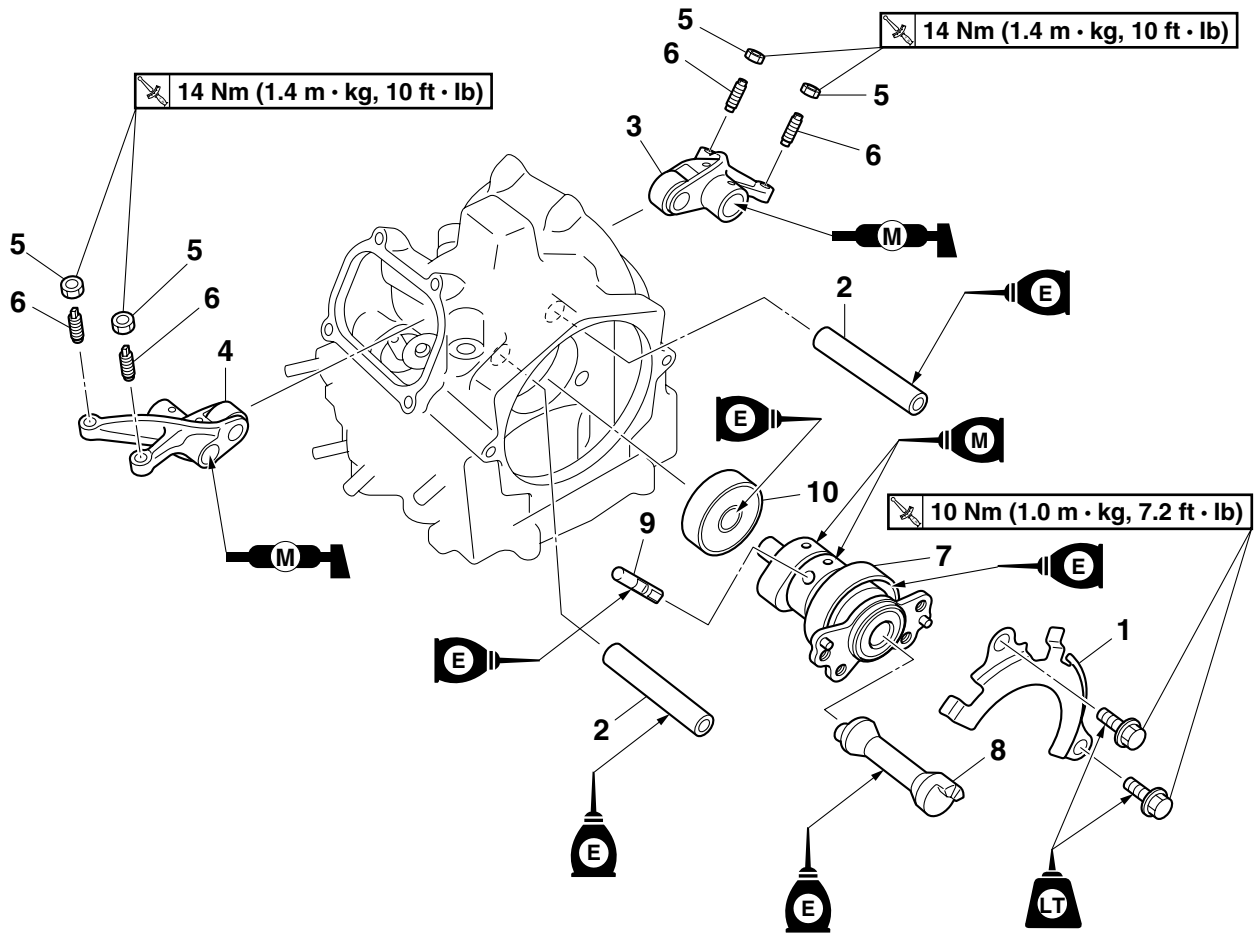


8. Measure:
   • Valve clearance
   Out of specification → Adjust.
   Refer to “ADJUSTING THE VALVE CLEARANCE” on page 3-4.

EAS28P1027

ROCKER ARMS AND CAMSHAFT

Removing the rocker arms and camshaft



Order	Job/Parts to remove	Q'ty	Remarks
	Cylinder head		Refer to "CYLINDER HEAD" on page 5-10.
1	Bearing retainer	1	
2	Rocker arm shaft	2	
3	Intake rocker arm	1	
4	Exhaust rocker arm	1	
5	Locknut	4	
6	Valve adjusting screw	4	
7	Camshaft	1	ECA28P1026 ***NOTICE*** **Do not disassemble the camshaft assembly.**
8	Decompressor lever	1	
9	Decompressor lever pin	1	
10	Bearing	1	
			For installation, reverse the removal procedure.

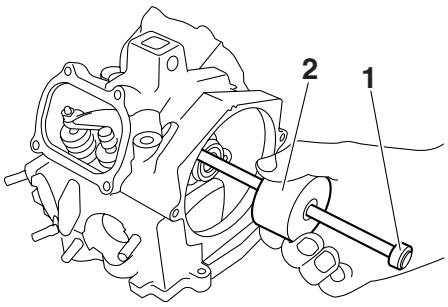
EAS23770
REMOVING THE ROCKER ARMS AND CAMSHAFT

1. Loosen:
   - Locknuts
   - Valve clearance adjusting screws
2. Remove:
   - Intake rocker arm shaft
   - Exhaust rocker arm shaft
   - Intake rocker arm
   - Exhaust rocker arm

TIP

Remove the rocker arm shafts with the slide hammer bolt “1” and weight “2”.

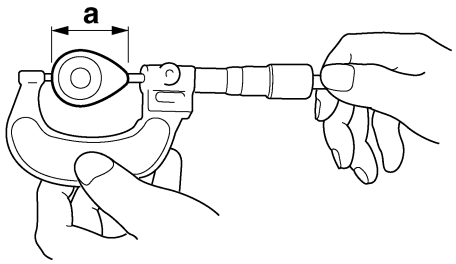
Slide hammer bolt
90890-01083
Slide hammer bolt 6 mm
YU-01083-1
Weight
90890-01084
YU-01083-3

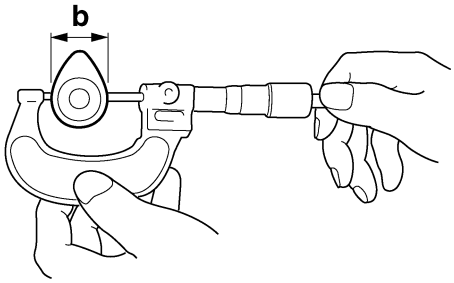


EAS23840
CHECKING THE CAMSHAFT

1. Check:
   - Camshaft lobes
     Blue discoloration/pitting/scratches → Replace the camshaft.
2. Measure:
   - Camshaft lobe dimensions “a” and “b”
     Out of specification → Replace the camshaft.

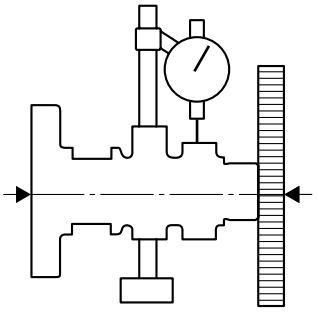
Camshaft lobe dimensions
Intake A
43.488–43.588 mm (1.7121–1.7161 in)
Limit
43.388 mm (1.7082 in)
Intake B
36.959–37.059 mm (1.4551–1.4590 in)
Limit
36.859 mm (1.4511 in)
Exhaust A
43.129–43.229 mm (1.6980–1.7019 in)
Limit
43.029 mm (1.6941 in)
Exhaust B
37.007–37.107 mm (1.4570–1.4609 in)
Limit
36.907 mm (1.4530 in)





3. Measure:
   - Camshaft runout
     Out of specification → Replace the camshaft.

Camshaft runout limit
0.015 mm (0.0006 in)



EAS28P1028
CHECKING THE DECOMPRESSION SYSTEM

1. Check:
   • Decompression system

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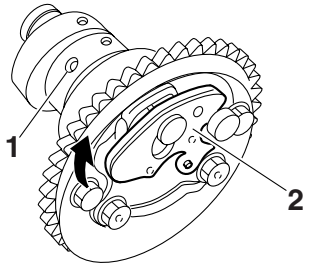
a. Check the decompression system with the camshaft sprocket installed on the decompressor lever and pin installed in the camshaft.
b. Check that the decompressor lever pin "1" projects from the camshaft.
c. Check that the decompressor cam "2" moves smoothly.



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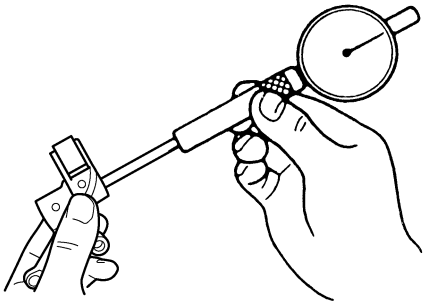
EAS23880
CHECKING THE ROCKER ARMS AND ROCKER ARM SHAFTS

The following procedure applies to all of the rocker arms and rocker arm shafts.

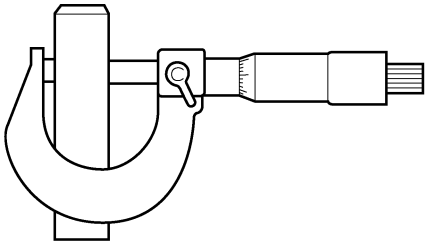
1. Check:
   • Rocker arm
   Damage/wear → Replace.
2. Check:
   • Rocker arm shaft
   Blue discoloration/excessive wear/pitting/scratches → Replace or check the lubrication system.
3. Measure:
   • Rocker arm inside diameter
   Out of specification → Replace.

Rocker arm inside diameter
12.000–12.018 mm (0.4724–0.4731 in)



4. Measure:
   • Rocker arm shaft outside diameter
   Out of specification → Replace.

Rocker arm shaft outside diameter
11.981–11.991 mm (0.4717–0.4721 in)



5. Calculate:
   • Rocker-arm-to-rocker-arm-shaft clearance
   Out of specification → Replace the defective part(s).

Rocker-arm-to-rocker-arm-shaft clearance
0.009–0.037 mm (0.0004–0.0015 in)

TIP

Calculate the clearance by subtracting the rocker arm shaft outside diameter from the rocker arm inside diameter.

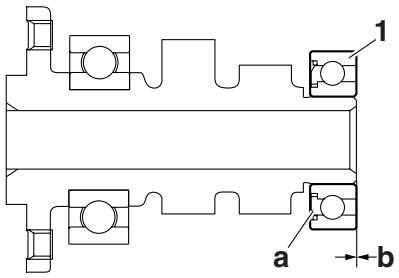
EAS24040
INSTALLING THE CAMSHAFT AND ROCKER ARMS

1. Install:
   • Bearing "1"
   (onto the cylinder head)

TIP

- Apply engine oil to the bearing.
- Install the bearing so that the seal is facing "a" the camshaft.

Installed depth
0 mm (0 in)



b. Installed depth

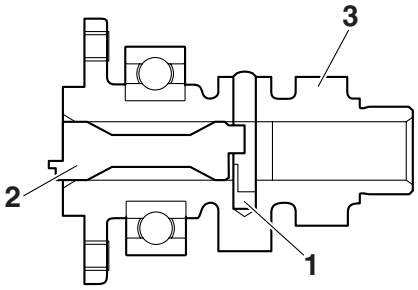
2. Lubricate:
   - Camshaft
   - Decompressor lever pin
   - Decompressor lever

Recommended lubricant
Camshaft
Molybdenum disulfide oil
Camshaft bearing, decompressor lever pin, decompressor lever
Engine oil

3. Install:
   - Decompressor lever pin "1"
   - Decompressor lever "2"

TIP

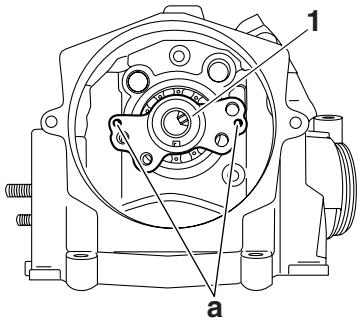
Install the decompressor lever pin "1" and decompressor lever "2" in the camshaft "3" as shown in the illustration.



4. Install:
   - Camshaft "1"

TIP

Install the camshaft so that the pins "a" become horizontal.



5. Lubricate:
   - Rocker arms
   - Rocker arm shafts

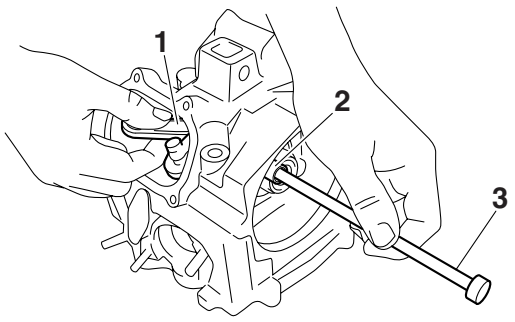
Recommended lubricant
Rocker arm inner surface
Molybdenum disulfide grease
Rocker arm shaft
Engine oil

6. Install:
   - Exhaust rocker arm "1"
   - Exhaust rocker arm shaft "2"
   - Intake rocker arm
   - Intake rocker arm shaft

TIP

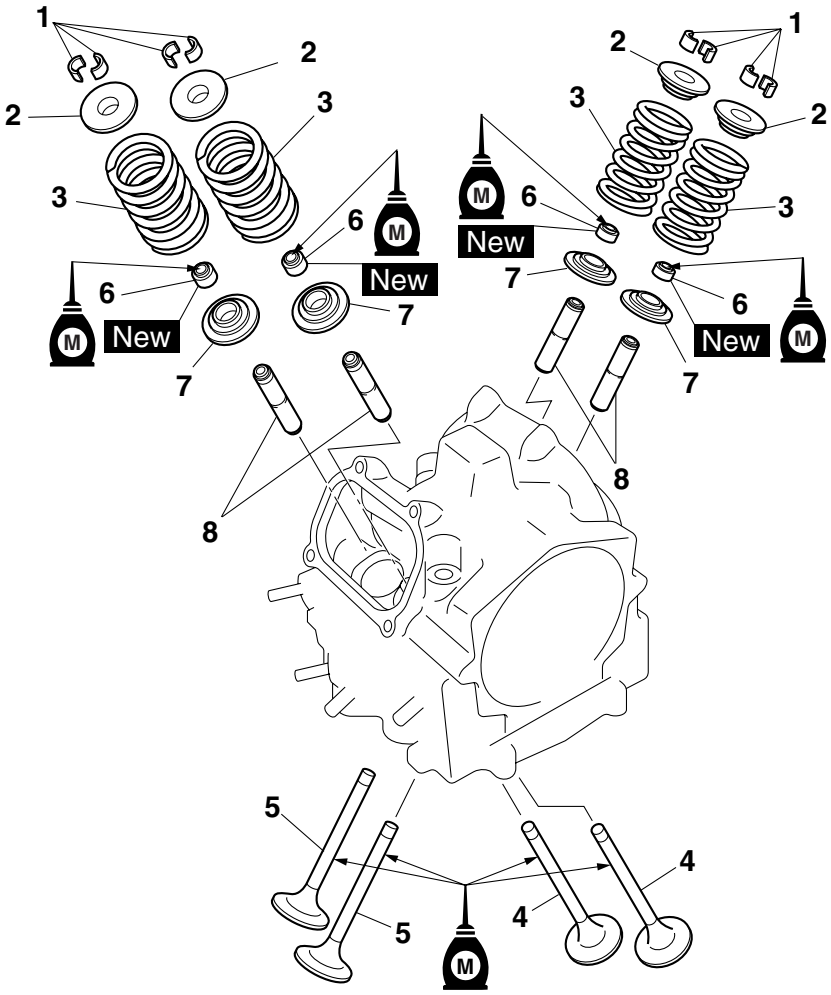
- Use a slide hammer bolt "3" to install the rocker arm shaft.
- Make sure the rocker arm shafts are completely pushed into the cylinder head.

Slide hammer bolt
90890-01083
Slide hammer bolt 6 mm
YU-01083-1



EAS24270
VALVES AND VALVE SPRINGS

Removing the valves and valve springs



Order	Job/Parts to remove	Q'ty	Remarks
	Cylinder head		Refer to "CYLINDER HEAD" on page 5-10.
	Rocker arms/Rocker arm shafts/Camshaft		Refer to "ROCKER ARMS AND CAMSHAFT" on page 5-17.
1	Valve cotter	8	
2	Valve spring retainer	4	
3	Valve spring	4	
4	Exhaust valve	2	
5	Intake valve	2	
6	Valve stem seal	4	
7	Valve spring seat	4	
8	Valve guide	4	
			For installation, reverse the removal procedure.

EAS24280
REMOVING THE VALVES

The following procedure applies to all of the valves and related components.

TIP

Before removing the internal parts of the cylinder head (e.g., valves, valve springs, valve seats), make sure the valves properly seal.

1. Check:
   - Valve sealing
     Leakage at the valve seat → Check the valve face, valve seat, and valve seat width.
     Refer to "CHECKING THE VALVE SEATS" on page 5-24.

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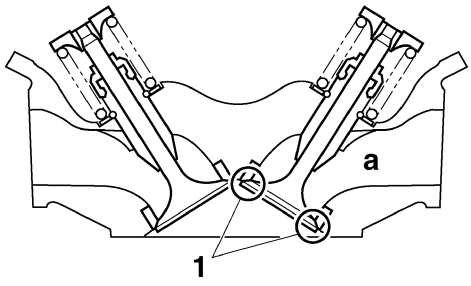
a. Pour a clean solvent "a" into the intake and exhaust ports.
b. Check that the valves properly seal.

TIP

There should be no leakage at the valve seat "1".



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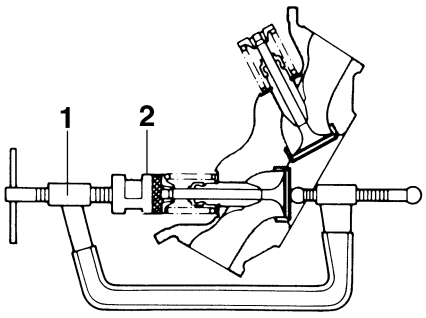
2. Remove:
   - Valve cotters

TIP

Remove the valve cotters by compressing the valve spring with the valve spring compressor "1" and the valve spring compressor attachment "2".

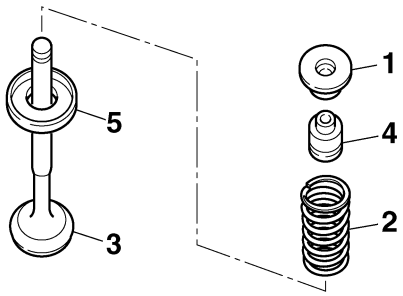
Valve spring compressor
90890-04019
YM-04019
Valve spring compressor attachment
90890-01243
Valve spring compressor adapter (26 mm)
YM-01253-1



3. Remove:
   - Valve spring retainer "1"
   - Valve spring "2"
   - Valve "3"
   - Valve stem seal "4"
   - Valve spring seat "5"

TIP

Identify the position of each part very carefully so that it can be reinstalled in its original place.



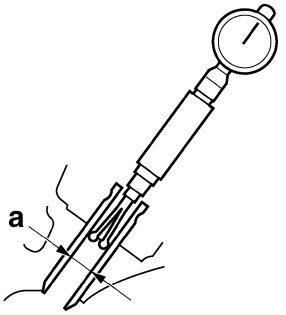
EAS24290
CHECKING THE VALVES AND VALVE GUIDES

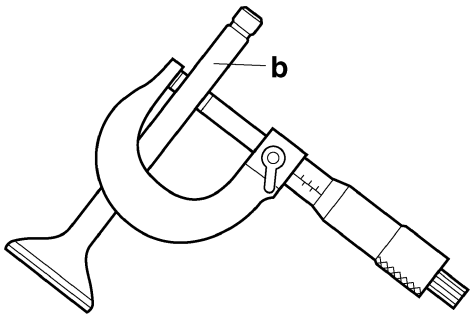
The following procedure applies to all of the valves and valve guides.

1. Measure:
   - Valve-stem-to-valve-guide clearance
     Out of specification → Replace the valve guide.

- Valve-stem-to-valve-guide clearance = Valve guide inside diameter "a" - Valve stem diameter "b"

Valve-stem-to-valve-guide clearance (intake)
0.010–0.037 mm (0.0004–0.0015 in)
Limit
0.080 mm (0.0031 in)
Valve-stem-to-valve-guide clearance (exhaust)
0.025–0.052 mm (0.0010–0.0020 in)
Limit
0.100 mm (0.0039 in)





2. Replace:
• Valve guide

TIP

To ease valve guide removal and installation, and to maintain the correct fit, heat the cylinder head to 100 °C (212 °F) in an oven.

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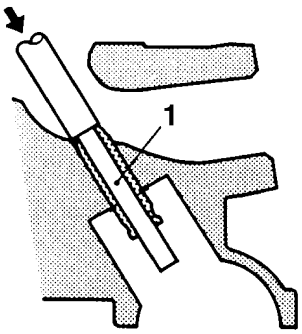
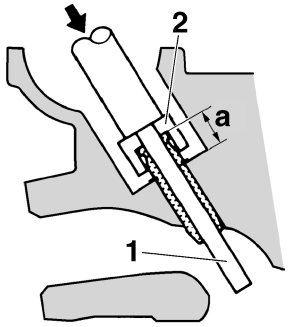
a. Remove the valve guide with the valve guide remover “1”.



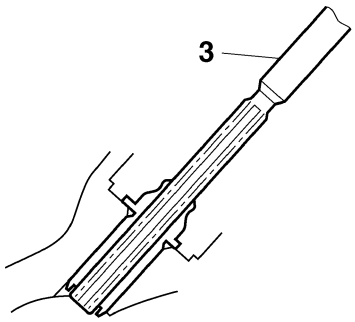
b. Install the new valve guide with the valve guide installer “2” and valve guide remover “1”.

Valve guide position
12.7–13.1 mm (0.50–0.52 in)



a. Valve guide position

c. After installing the valve guide, bore the valve guide with the valve guide reamer “3” to obtain the proper valve-stem-to-valve-guide clearance.



TIP

After replacing the valve guide, reface the valve seat.

Valve guide remover (ø6)
90890-04064
Valve guide remover (6.0 mm)
YM-04064-A
Valve guide installer (ø6)
90890-04065
Valve guide installer (6.0 mm)
YM-04065-A
Valve guide reamer (ø6)
90890-04066
Valve guide reamer (6.0 mm)
YM-04066

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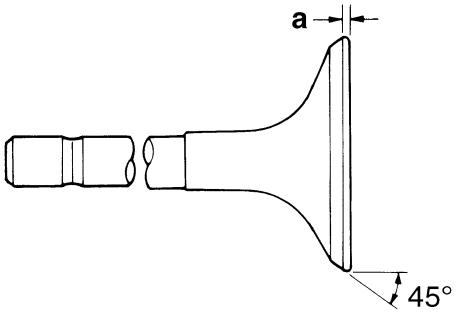
3. Eliminate:
• Carbon deposits
(from the valve face and valve seat)

4. Check:
   • Valve face
   Pitting/wear → Grind the valve face.
   • Valve stem end
   Mushroom shape or diameter larger than the body of the valve stem → Replace the valve.
5. Measure:
   • Valve margin thickness “a”
   Out of specification → Replace the valve.

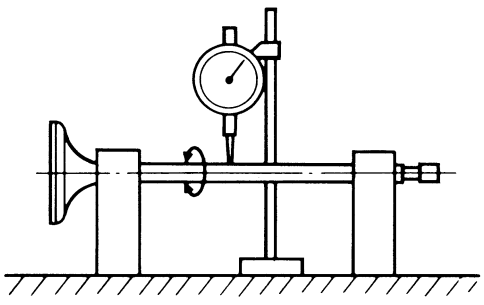
Valve margin thickness D (intake)
0.80–1.20 mm (0.0315–0.0472 in)
Limit
0.4 mm (0.02 in)
Valve margin thickness D (exhaust)
0.80–1.20 mm (0.0315–0.0472 in)
Limit
0.4 mm (0.02 in)



6. Measure:
   • Valve stem runout
   Out of specification → Replace the valve.

TIP
- When installing a new valve, always replace the valve guide.
- If the valve is removed or replaced, always replace the valve stem seal.

Valve stem runout
0.040 mm (0.0016 in)

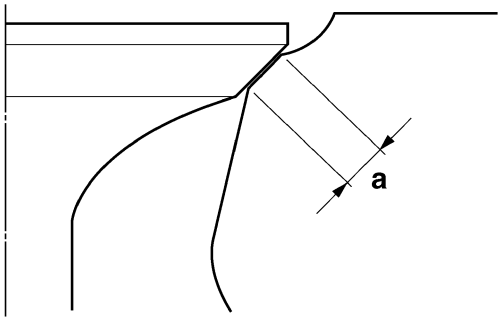


EAS24300
CHECKING THE VALVE SEATS

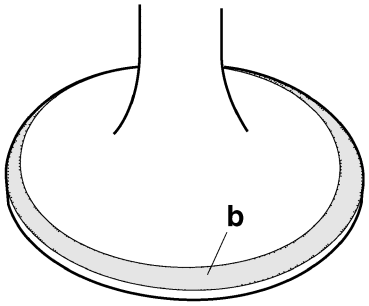
The following procedure applies to all of the valves and valve seats.

1. Eliminate:
   • Carbon deposits
   (from the valve face and valve seat)
2. Check:
   • Valve seat
   Pitting/wear → Replace the cylinder head.
3. Measure:
   • Valve seat width C “a”
   Out of specification → Replace the cylinder head.

Valve seat width C (intake)
1.00–1.20 mm (0.0394–0.0472 in)
Limit
1.60 mm (0.0630 in)
Valve seat width C (exhaust)
1.00–1.20 mm (0.0394–0.0472 in)
Limit
1.60 mm (0.0630 in)



a. Apply Mechanic’s blueing dye (Dykem) “b” onto the valve face.



b. Install the valve into the cylinder head.
c. Press the valve through the valve guide and onto the valve seat to make a clear impression.
d. Measure the valve seat width.

TIP

Where the valve seat and valve face contacted one another, the blueing will have been removed.

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4. Lap:
   - Valve face
   - Valve seat

TIP

After replacing the cylinder head or replacing the valve and valve guide, the valve seat and valve face should be lapped.

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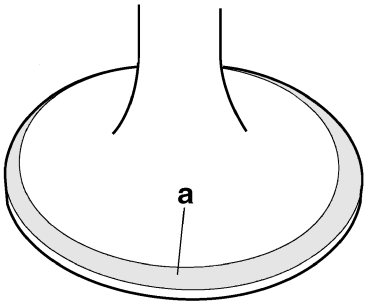
a. Apply a coarse lapping compound “a” to the valve face.

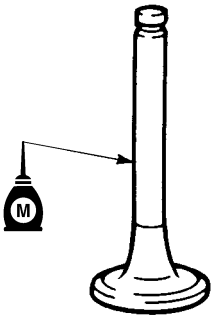
ECA13790

NOTICE

Do not let the lapping compound enter the gap between the valve stem and the valve guide.



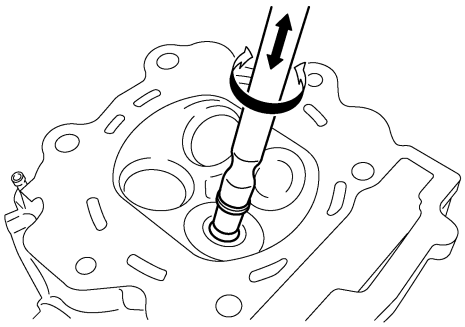
b. Apply molybdenum disulfide oil onto the valve stem.



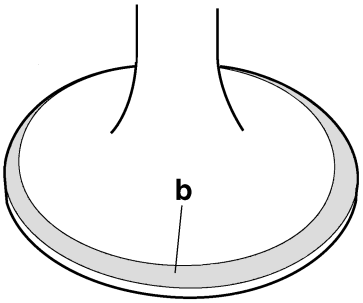
c. Install the valve into the cylinder head.
d. Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the lapping compound.

TIP

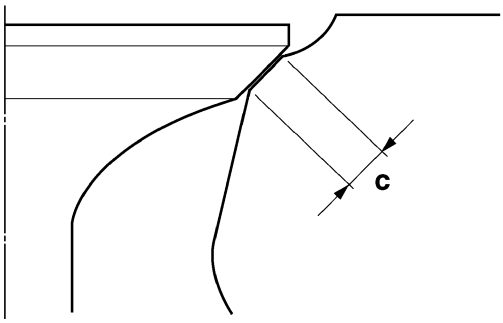
For the best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.



e. Apply a fine lapping compound to the valve face and repeat the above steps.
f. After every lapping procedure, be sure to clean off all of the lapping compound from the valve face and valve seat.
g. Apply Mechanic’s blueing dye (Dykem) “b” onto the valve face.



h. Install the valve into the cylinder head.
i. Press the valve through the valve guide and onto the valve seat to make a clear impression.
j. Measure the valve seat width “c” again. If the valve seat width is out of specification, reface and lap the valve seat.



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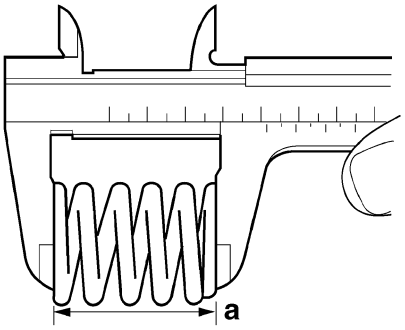
EAS24310

CHECKING THE VALVE SPRINGS

The following procedure applies to all of the valve springs.

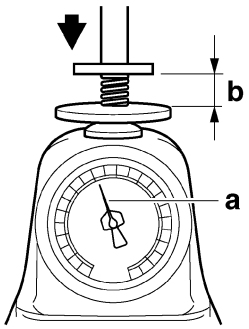
1. Measure:
   - Valve spring free length “a”
     Out of specification → Replace the valve spring.

Free length (intake)
40.38 mm (1.59 in)
Limit
38.36 mm (1.51 in)
Free length (exhaust)
40.38 mm (1.59 in)
Limit
38.36 mm (1.51 in)



2. Measure:
   • Compressed valve spring force “a”
   Out of specification → Replace the valve spring.

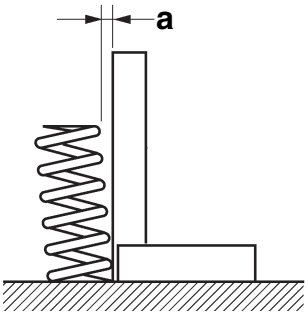
Installed compression spring force (intake)
171.00–197.00 N (17.44–20.09 kgf, 38.44–44.29 lbf)
Installed compression spring force (exhaust)
171.00–197.00 N (17.44–20.09 kgf, 38.44–44.29 lbf)
Installed length (intake)
35.00 mm (1.38 in)
Installed length (exhaust)
35.00 mm (1.38 in)



b. Installed length

3. Measure:
   • Valve spring tilt “a”
   Out of specification → Replace the valve spring.

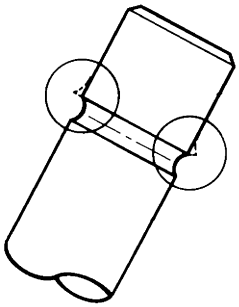
Spring tilt (intake)
2.5°/1.80 mm
Spring tilt (exhaust)
2.5°/1.80 mm



EAS24340
INSTALLING THE VALVES

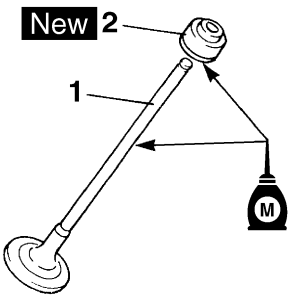
The following procedure applies to all of the valves and related components.

1. Deburr:
   • Valve stem end
   (with an oil stone)



2. Lubricate:
   • Valve stem “1”
   • Valve stem seal “2” New
   (with the recommended lubricant)

Recommended lubricant
Molybdenum disulfide oil

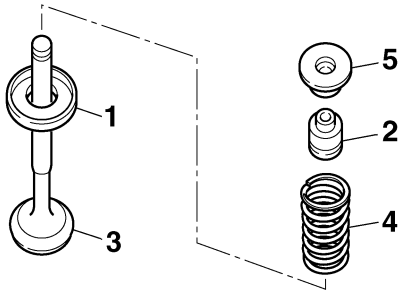


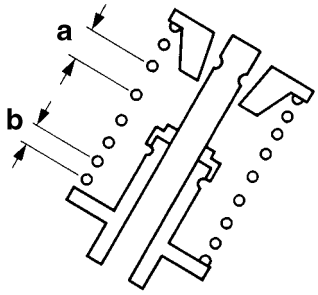
3. Install:
   • Valve spring seat “1”
   • Valve stem seal “2” New

- Valve “3”
- Valve spring “4”
- Valve spring retainer “5” (into the cylinder head)

TIP

- Make sure each valve is installed in its original place.
- Install the valve springs with the larger pitch “a” facing up.





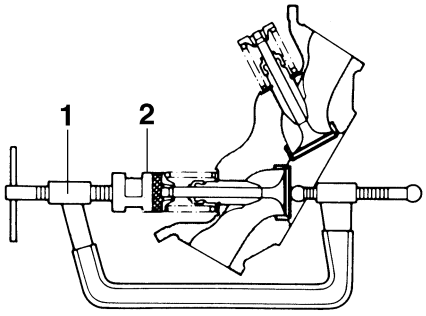
b. Smaller pitch

4. Install:
   - Valve cotters

TIP

Install the valve cotters by compressing the valve spring with the valve spring compressor “1” and the valve spring compressor attachment “2”.

Valve spring compressor
90890-04019
YM-04019
Valve spring compressor attachment
90890-01243
Valve spring compressor adapter (26 mm)
YM-01253-1

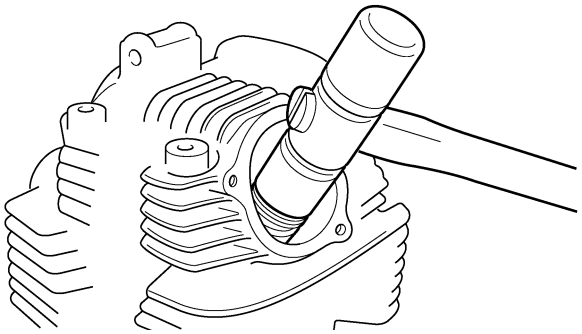


5. To secure the valve cotters onto the valve stem, lightly tap the valve tip with a soft-face hammer.

ECA13800

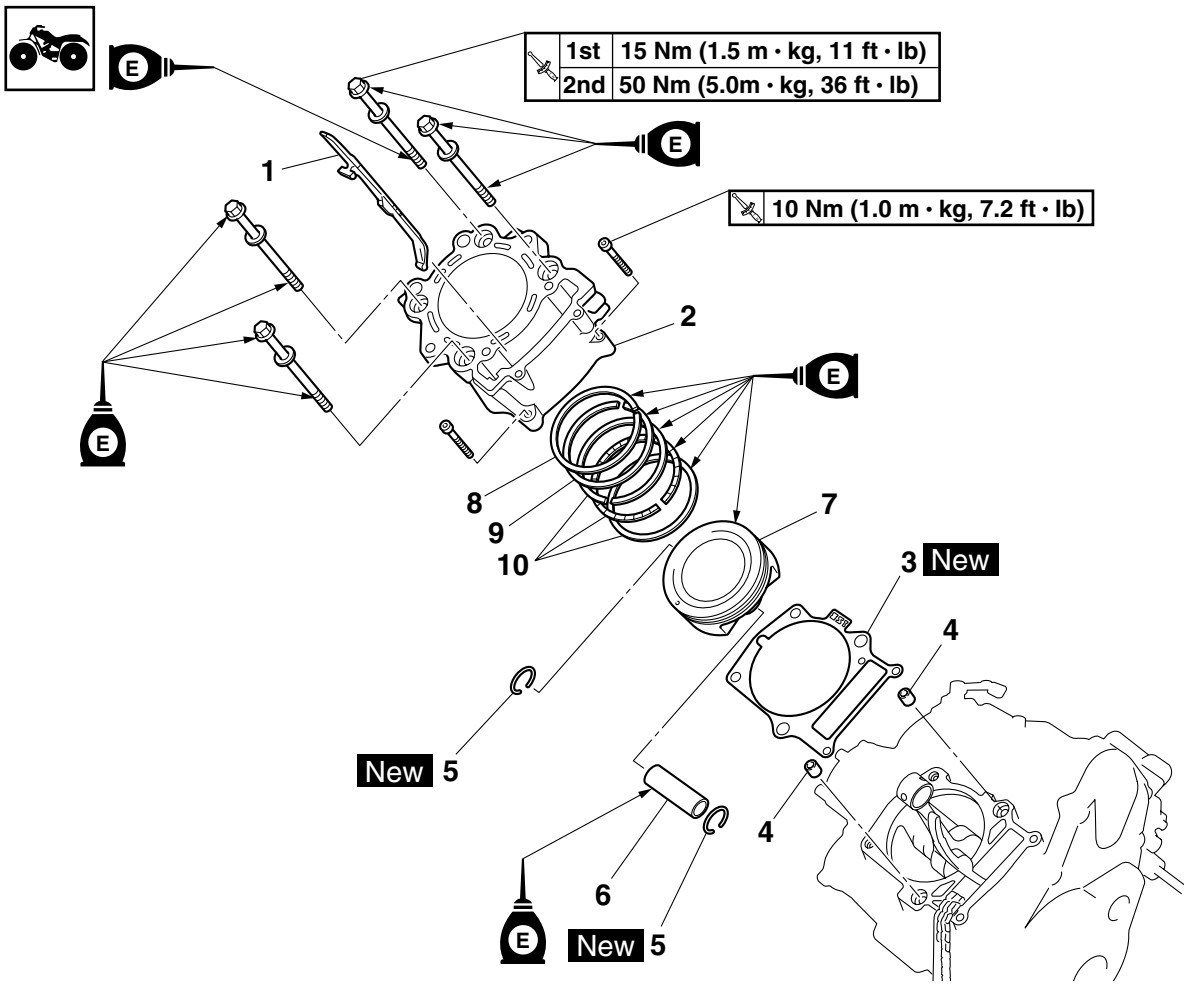
NOTICE

Hitting the valve tip with excessive force could damage the valve.



EAS24350
CYLINDER AND PISTON

Removing the cylinder and piston



Order	Job/Parts to remove	Q'ty	Remarks
	Cylinder head		Refer to "CYLINDER HEAD" on page 5-10.
	Water jacket joint		Refer to "WATER PUMP" on page 6-7.
1	Timing chain guide (exhaust side)	1	
2	Cylinder	1	
3	Cylinder gasket	1	
4	Dowel pin	2	
5	Piston pin clip	2	
6	Piston pin	1	
7	Piston	1	
8	Top ring	1	
9	2nd ring	1	
10	Oil ring	1	
			For installation, reverse the removal procedure.

EAS24380
REMOVING THE PISTON

1. Remove:
   - Piston pin clips “1”
   - Piston pin “2”
   - Piston “3”

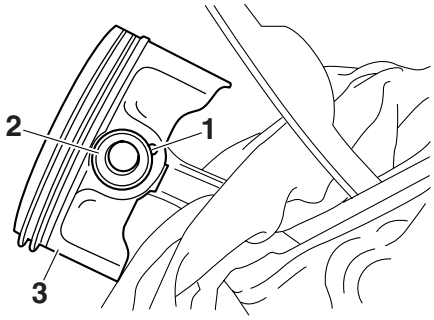
ECA13810
NOTICE

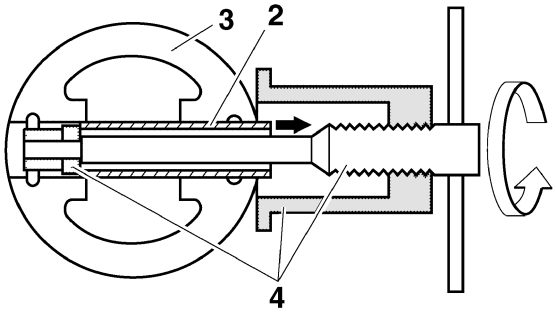
Do not use a hammer to drive the piston pin out.

TIP

- Before removing the piston pin clips, cover the crankcase opening with a clean rag to prevent the piston pin clips from falling into the crankcase.
- Before removing the piston pin, deburr the piston pin clip grooves and the piston pin bore area. If both areas are deburred and the piston pin is still difficult to remove, remove it with the piston pin puller set “4”.

Piston pin puller set
90890-01304
Piston pin puller
YU-01304

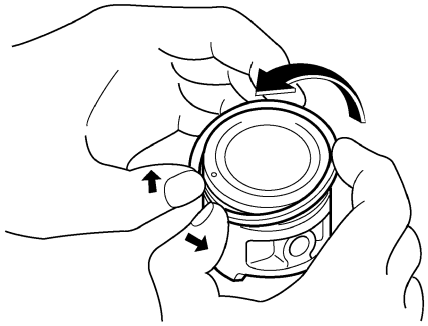




2. Remove:
   - Top ring
   - 2nd ring
   - Oil ring

TIP

When removing a piston ring, open the end gap with your fingers and lift the other side of the ring over the piston crown.



EAS24400
CHECKING THE CYLINDER AND PISTON

1. Check:
   - Piston wall
   - Cylinder wall
     Vertical scratches → Replace the cylinder, and replace the piston and piston rings as a set.
2. Measure:
   - Piston-to-cylinder clearance

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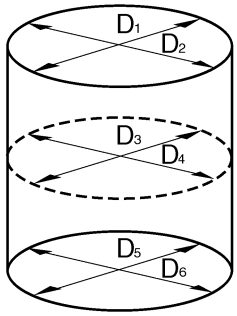
a. Measure cylinder bore “C” with the cylinder bore gauge.



TIP

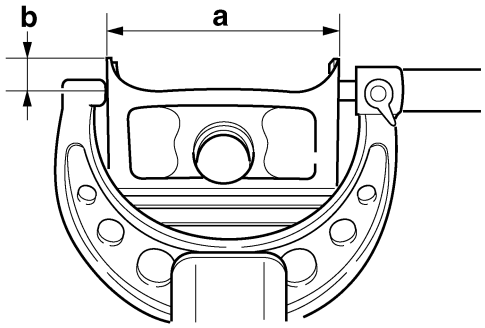
Measure cylinder bore “C” by taking side-to-side and front-to-back measurements of the cylinder. Then, find the average of the measurements.

Bore
92.000–92.010 mm (3.6220–3.6224 in)
(YFM5FGY/YFM5FGPY)
102.000–102.010 mm (4.0157–4.0161 in)
(YFM7FGY/YFM7FGPY)
Wear limit
92.080 mm (3.6252 in)
(YFM5FGY/YFM5FGPY)
102.080 mm (4.0189 in)
(YFM7FGY/YFM7FGPY)
Taper limit
0.05 mm (0.002 in)
Out of round limit
0.05 mm (0.002 in)

"C" = maximum of D_1–D_6
"T" = maximum of D_1 or D_2 - maximum of D_5 or D_6
"R" = maximum of D_1, D_3 or D_5 - minimum of D_2, D_4 or D_6

b. If out of specification, replace the cylinder, and replace the piston and piston rings as a set.
c. Measure piston skirt diameter D "a" with the micrometer.

Diameter D
91.955–91.970 mm (3.6203–3.6209 in)
(YFM5FGY/YFM5FGPY)
101.955–101.970 mm (4.0140–4.0146 in)
(YFM7FGY/YFM7FGPY)



b. 10 mm (0.39 in) from the bottom edge of the piston

d. If out of specification, replace the piston and piston rings as a set.
e. Calculate the piston-to-cylinder clearance with the following formula.

• Piston-to-cylinder clearance = Cylinder bore "C" - Piston skirt diameter "D"

Piston-to-cylinder clearance
0.030–0.055 mm (0.0012–0.0022 in)
Limit
0.10 mm (0.0039 in)
(YFM5FGY/YFM5FGPY)
0.13 mm (0.0051 in)
(YFM7FGY/YFM7FGPY)

f. If out of specification, replace the cylinder, and replace the piston and piston rings as a set.

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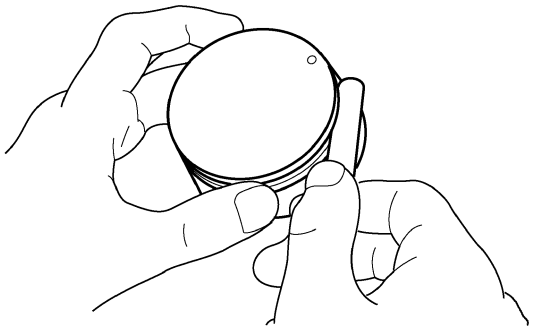
EAS24430
CHECKING THE PISTON RINGS

1. Measure:
   • Piston ring side clearance
   Out of specification → Replace the piston and piston rings as a set.

TIP
Before measuring the piston ring side clearance, eliminate any carbon deposits from the piston ring grooves and piston rings.

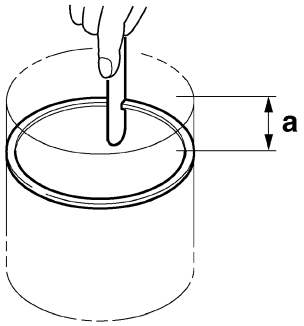
Top ring
Ring side clearance
0.030–0.070 mm (0.0012–0.0028 in)
Limit
0.12 mm (0.0047 in)
2nd ring
Ring side clearance
0.020–0.060 mm (0.0008–0.0024 in) (YFM5FGY/YFM5FGPY)
0.030–0.070 mm (0.0012–0.0028 in) (YFM7FGY/YFM7FGPY)
Limit
0.12 mm (0.0047 in)
(YFM5FGY/YFM5FGPY)
0.13 mm (0.0051 in)
(YFM7FGY/YFM7FGPY)
Oil ring
Ring side clearance
0.04–0.13 mm (0.0016–0.0051 in)
(YFM5FGY/YFM5FGPY)
0.060–0.150 mm (0.0024–0.0059 in) (YFM7FGY/YFM7FGPY)



2. Install:
   • Piston ring
   (into the cylinder)

TIP

Level the piston ring into the cylinder with the piston crown.



a. 50 mm (1.97 in)

3. Measure:
   • Piston ring end gap
   Out of specification → Replace the piston ring.

TIP

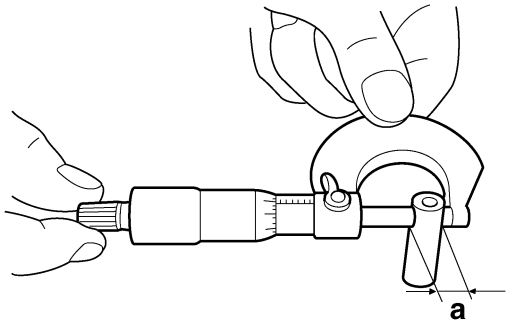
The oil ring expander spacer end gap cannot be measured. If the oil ring rail gap is excessive, replace all three piston rings.

Top ring
End gap (installed)
0.20–0.35 mm (0.008–0.014 in)
Limit
0.60 mm (0.024 in)
2nd ring
End gap (installed)
0.75–0.90 mm (0.03–0.04 in)
Limit
1.25 mm (0.049 in)
Oil ring
End gap (installed)
0.20–0.70 mm (0.01–0.03 in)

EAS24440
CHECKING THE PISTON PIN

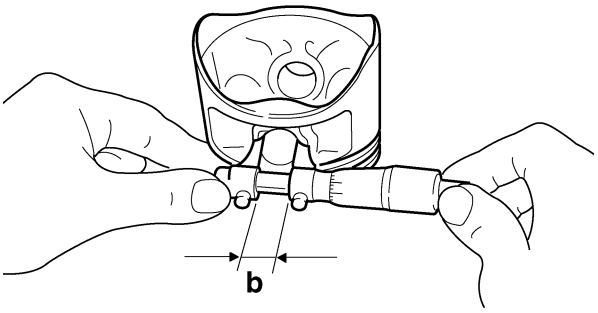
1. Check:
   • Piston pin
   Blue discoloration/grooves → Replace the piston pin and then check the lubrication system.
2. Measure:
   • Piston pin outside diameter “a”
   Out of specification → Replace the piston pin.

Piston pin outside diameter
22.991–23.000 mm (0.9052–0.9055 in)
Limit
22.971 mm (0.9044 in)



3. Measure:
   • Piston pin bore diameter “b”
   Out of specification → Replace the piston.

Piston pin bore inside diameter
23.004–23.015 mm (0.9057–0.9061 in)
Limit
23.045 mm (0.9073 in)



4. Calculate:
   • Piston-pin-to-piston-pin-bore clearance
   Out of specification → Replace the piston pin and piston as a set.

• Piston-pin-to-piston-pin-bore clearance = Piston pin bore diameter “b” - Piston pin outside diameter “a”

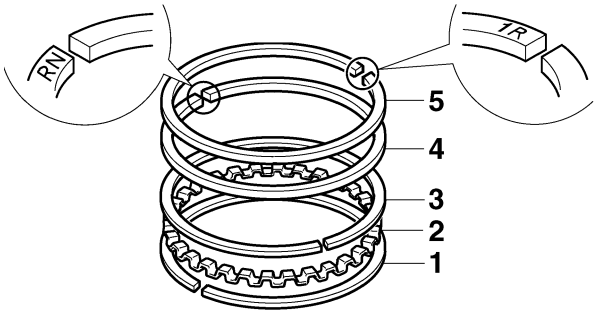
Piston-pin-to-piston-pin-bore clearance
0.004–0.024 mm (0.0002–0.0009 in)
Limit
0.0740 mm (0.0029 in)

EAS24450
INSTALLING THE PISTON AND CYLINDER

1. Install:
   - Lower oil ring rail “1”
   - Oil ring expander “2”
   - Upper oil ring rail “3”
   - 2nd ring “4”
   - Top ring “5”

TIP

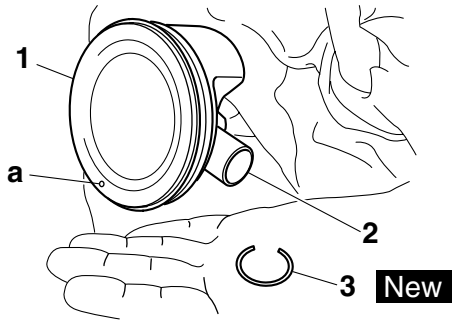
Be sure to install the piston rings so that the manufacturer’s marks or numbers face up.



2. Install:
   - Piston “1”
   - Piston pin “2”
   - Piston pin clips “3” New

TIP

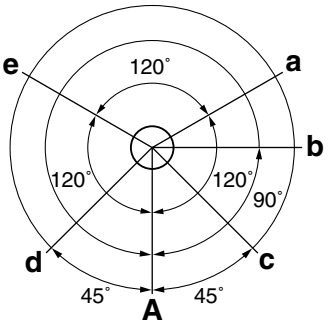
- Apply engine oil to the piston pin.
- Make sure the punch mark “a” on the piston points towards the exhaust side of the cylinder.
- Before installing the piston pin clips, cover the crankcase opening with a clean rag to prevent the clips from falling into the crankcase.



3. Install:
   - Cylinder gasket New
   - Dowel pins
4. Lubricate:
   - Piston
   - Piston rings
   - Cylinder
     (with the recommended lubricant)

Recommended lubricant
Engine oil

5. Offset:
   - Piston ring end gaps

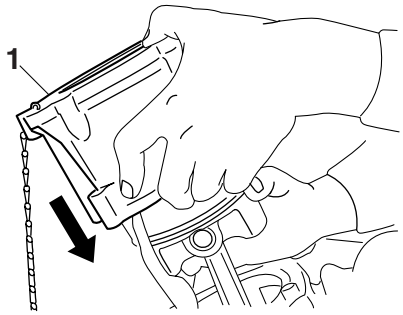


a. Top ring
b. Oil ring expander
c. Upper oil ring rail
d. Lower oil ring rail
e. 2nd ring
A. Exhaust side

6. Install:
   - Cylinder “1”
   - Timing chain guide (exhaust side)

TIP

- While compressing the piston rings with one hand, install the cylinder with the other hand.
- Pass the timing chain and timing chain guide (exhaust side) through the timing chain cavity.



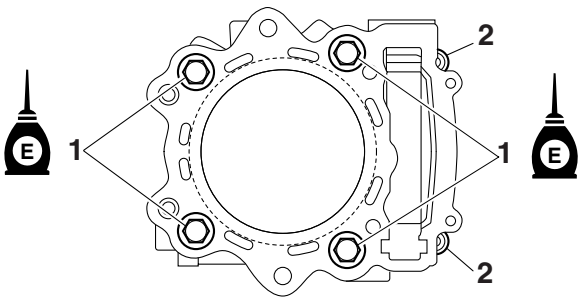
7. Install:
   - Cylinder bolts “1”

TIP

Lubricate the cylinder bolt “1” threads and mating surface with engine oil.

8. Tighten:
   • Cylinder bolts “1”
   • Cylinder bolts (timing chain side) “2”

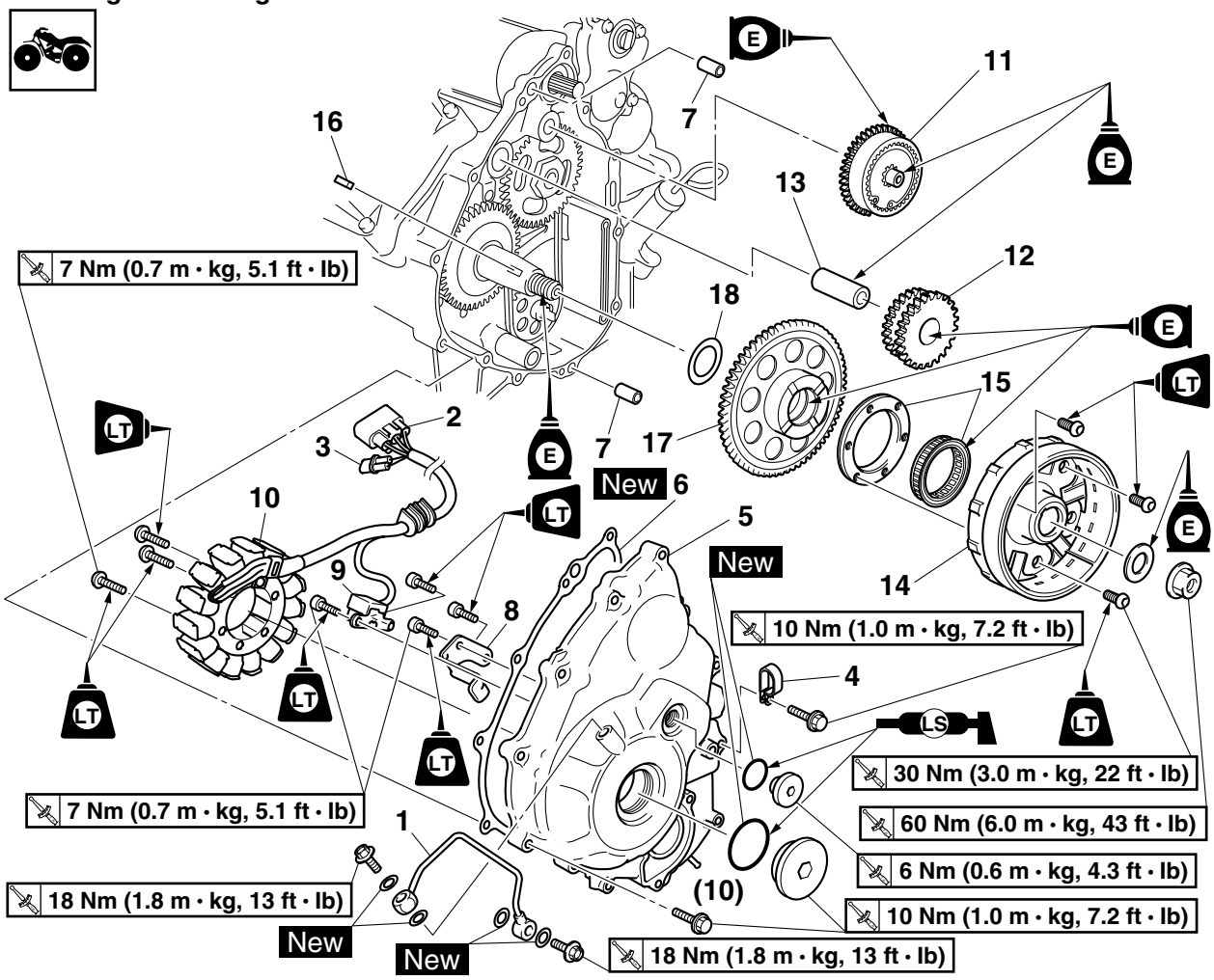
Cylinder bolt
1st
15 Nm (1.5 m·kg, 11 ft·lb)
2nd
50 Nm (5.0 m·kg, 36 ft·lb)
Cylinder bolt (timing chain side)
10 Nm (1.0 m·kg, 7.2 ft·lb)



EAS28P1029

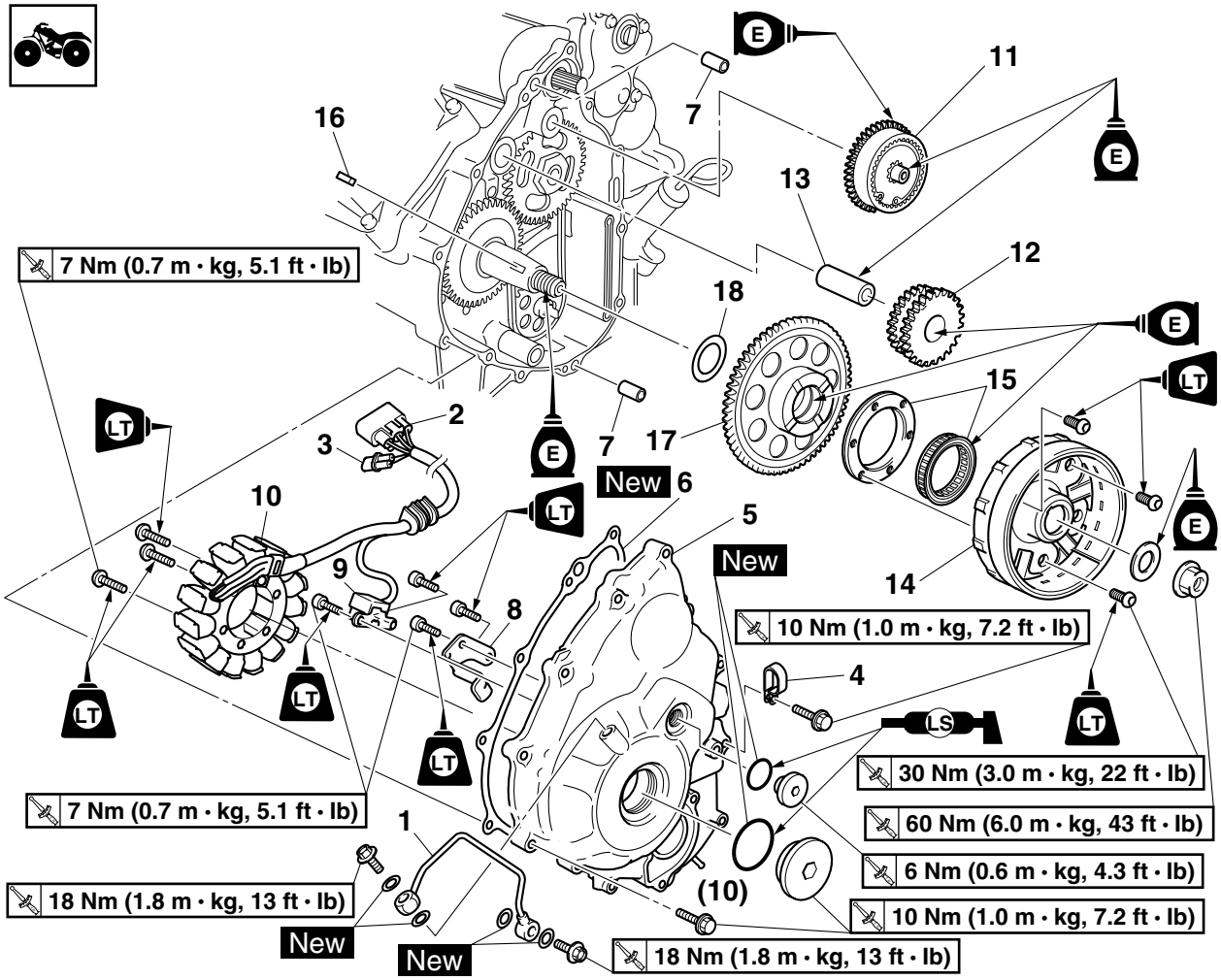
AC MAGNETO AND STARTER CLUTCH

Removing the AC magneto and starter clutch



Order	Job/Parts to remove	Q'ty	Remarks
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-10.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-17.
	Left footrest board		Refer to "GENERAL CHASSIS" on page 4-1.
	Drive select lever unit		Refer to "ENGINE REMOVAL" on page 5-1.
	Water pump		Refer to "WATER PUMP" on page 6-7.
1	Oil delivery pipe 1	1	
2	AC magneto coupler	1	Disconnect.
3	Crankshaft position sensor coupler	1	Disconnect.
4	Lead holder	1	
5	AC magneto cover	1	
6	AC magneto cover gasket	1	
7	Dowel pin	2	
8	Lead holder	1	

Removing the AC magneto and starter clutch

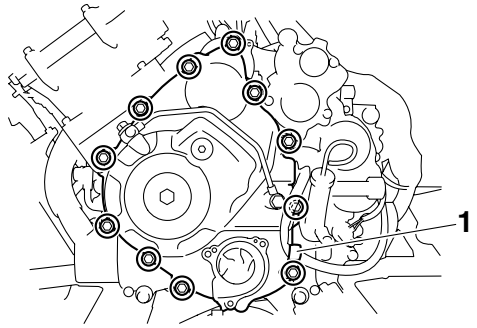


Order	Job/Parts to remove	Q'ty	Remarks
9	Crankshaft position sensor	1	
10	Stator coil	1	
11	Torque limiter	1	
12	Starter idle gear	1	
13	Starter idle gear shaft	1	
14	AC magneto rotor	1	
15	Starter clutch	1	
16	Woodruff key	1	
17	Starter wheel gear	1	
18	Washer	1	
			For installation, reverse the removal procedure.

EAS24490
REMOVING THE AC MAGNETO ROTOR
1. Remove:
   • Lead holder “1”
   • AC magneto cover

TIP

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.

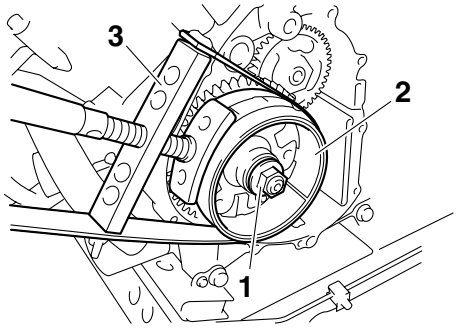


2. Remove:
   • AC magneto rotor nut “1”
   • Washer

TIP

- Hold the AC magneto rotor “2” with the sheave holder “3” while loosening the AC magneto rotor nut.
- Do not allow the sheave holder to touch the projection on the rotor.

Sheave holder
90890-01701
Primary clutch holder
YS-01880-A



3. Remove:
   • AC magneto rotor “1”
   (with the starter clutch)
   • Woodruff key

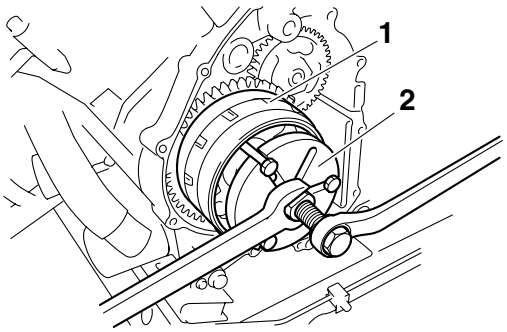
ECA13880
NOTICE

To protect the end of the crankshaft, place an appropriate sized socket between the flywheel puller set center bolt and the crankshaft.

TIP

- Use the flywheel puller “2”.
- Install the flywheel puller bolts to the threaded holes of the starter clutch.
- Make sure the flywheel puller is centered over the AC magneto rotor.

Flywheel puller
90890-01362
Heavy duty puller
YU-33270-B

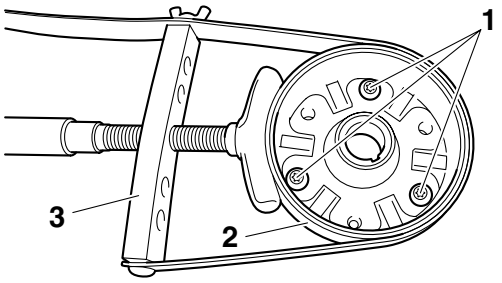


EAS24560
REMOVING THE STARTER CLUTCH
1. Remove:
   • Starter clutch bolts “1”

TIP

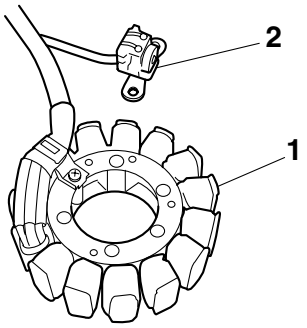
- Hold the AC magneto rotor “2” with the sheave holder “3” while removing the starter clutch bolts.
- Do not allow the sheave holder to touch the projection on the AC magneto rotor.

Sheave holder
90890-01701
Primary clutch holder
YS-01880-A



EAS28P1038
CHECKING THE STATOR COIL AND CRANKSHAFT POSITION SENSOR

1. Check:
   - Stator coil "1"
   - Crankshaft position sensor "2"
     Damage → Replace the crankshaft position sensor/stator assembly.



EAS24570
CHECKING THE STARTER CLUTCH

1. Check:
   - Starter clutch rollers
     Damage/wear → Replace.
2. Check:
   - Starter idle gear
   - Starter wheel gear
     Burrs/chips/roughness/wear → Replace the defective part(s).
3. Check:
   - Starter clutch gear contact surfaces
     Damage/pitting/wear → Replace the defective part(s).
4. Check:
   - Starter clutch operation

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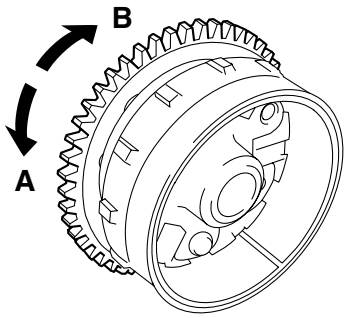
a. Install the starter wheel gear onto the starter clutch, and then hold the starter clutch.
b. When turning the starter wheel gear counterclockwise "A", the starter clutch and the starter wheel gear should engage; otherwise, the starter clutch is faulty and must be replaced.
c. When turning the starter wheel gear clockwise "B", it should turn freely; otherwise, the starter clutch is faulty and must be replaced.



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EAS28P1039
CHECKING THE TORQUE LIMITER

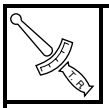
1. Check:
   - Torque limiter
     Damage/wear → Replace.

TIP

Do not disassemble the torque limiter.

EAS24600
INSTALLING THE STARTER CLUTCH

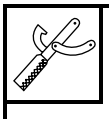
1. Install:
   - Starter clutch
   - Starter clutch bolts "1"



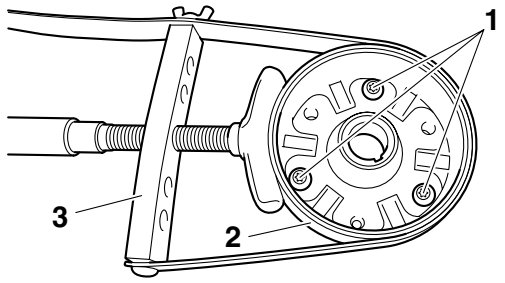
Starter clutch bolt
30 Nm (3.0 m·kg, 22 ft·lb)
LOCTITE®

TIP

- While holding the AC magneto rotor "2" with the sheave holder "3", tighten the starter clutch bolts.
- Do not allow the sheave holder to touch the projection on the AC magneto rotor.



Sheave holder
90890-01701
Primary clutch holder
YS-01880-A



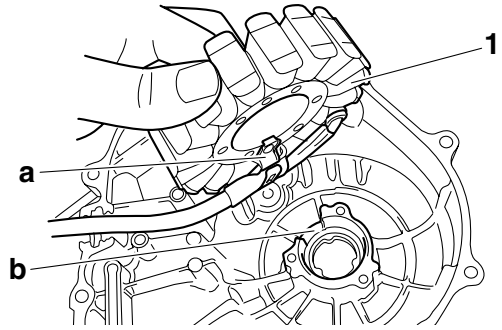
EAS28P1068
INSTALLING THE AC MAGNETO

1. Install:
   • Stator coil "1"

	Stator coil bolt **7 Nm (0.7 m·kg, 5.1 ft·lb)** **LOCTITE®**

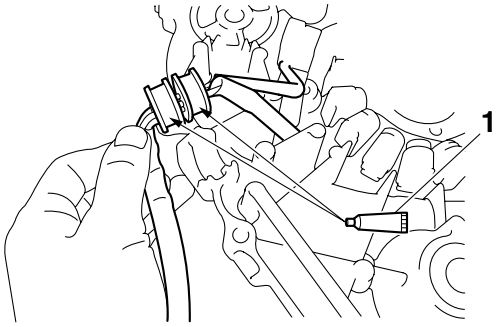
TIP

Align the projection "a" on the stator coil with the slot "b" in the AC magneto cover.



2. Apply:
   • Sealant "1"
   (onto the crankshaft position sensor/stator assembly lead grommet)

	Yamaha bond No. 1215 **90890-85505** **(Three Bond No.1215®)**



3. Install:
   • Woodruff key
   • AC magneto rotor
   • Washer
   • AC magneto rotor nut

TIP

- Clean the tapered portion of the crankshaft and the AC magneto rotor hub.
- When installing the AC magneto rotor, make sure the woodruff key is properly seated in the keyway of the crankshaft.

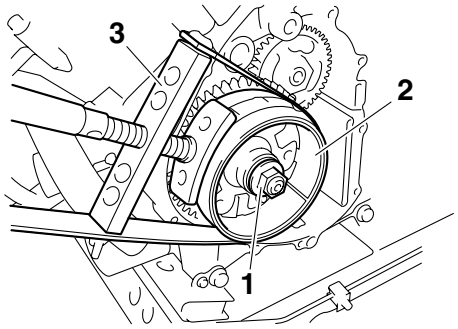
4. Tighten:
   • AC magneto rotor nut "1"

	AC magneto rotor nut **60 Nm (6.0 m·kg, 43 ft·lb)**

TIP

- Hold the AC magneto rotor "2" with the sheave holder "3" while tightening the AC magneto rotor nut.
- Do not allow the sheave holder to touch the projection on the AC magneto rotor.

	Sheave holder **90890-01701** **Primary clutch holder** **YS-01880-A**

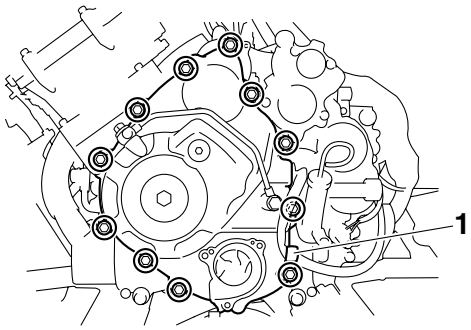


5. Install:
   • AC magneto cover
   • Lead holder "1"
   • AC magneto cover bolts

	AC magneto cover bolt **10 Nm (1.0 m·kg, 7.2 ft·lb)**

TIP

Tighten the AC magneto cover bolts in stages, using a crisscross pattern.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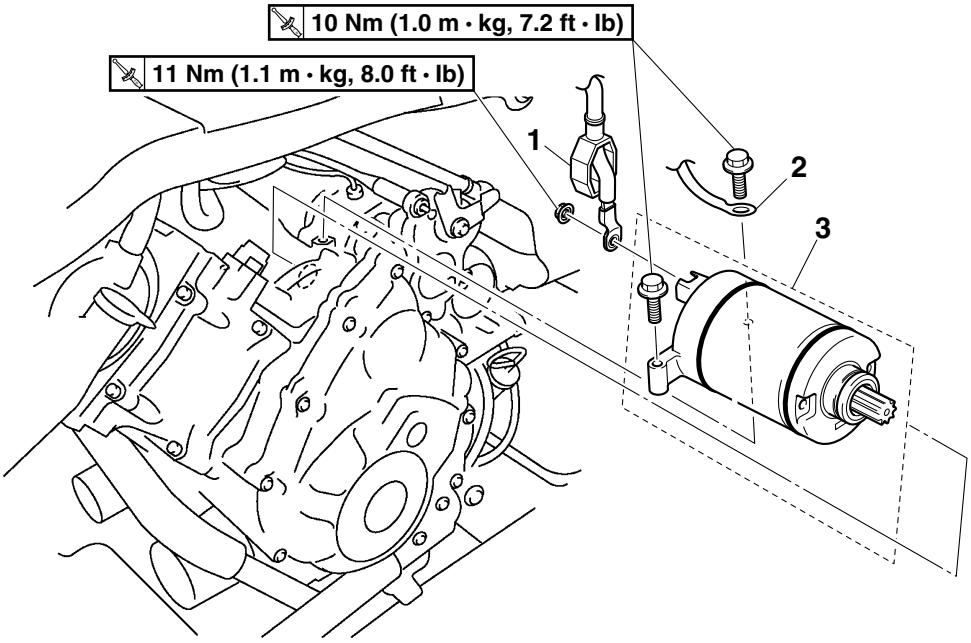
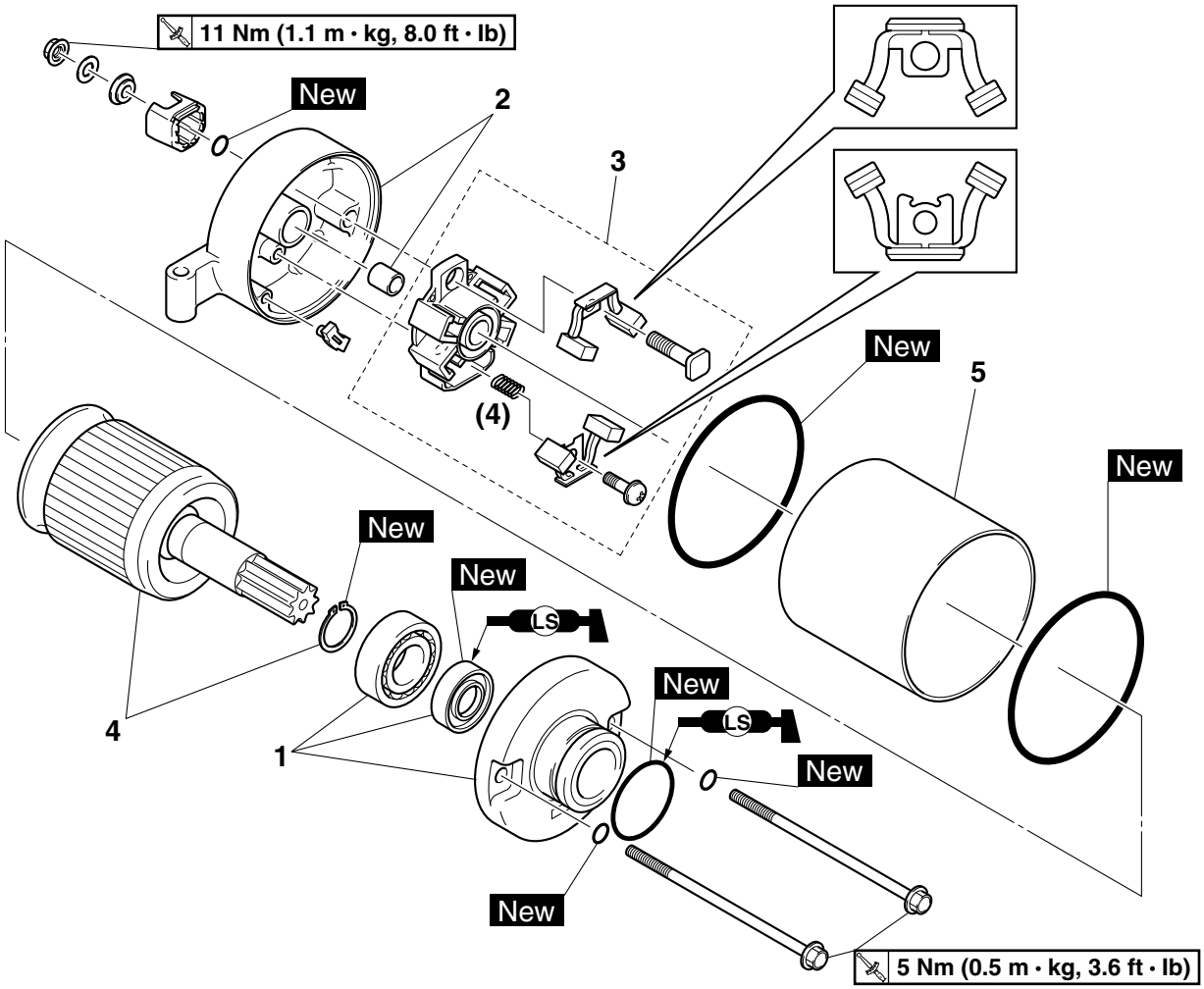
EAS24780
ELECTRIC STARTER

Removing the starter motor



Order	Job/Parts to remove	Q'ty	Remarks
	Muffler		Refer to "ENGINE REMOVAL" on page 5-1.
1	Starter motor lead	1	Disconnect.
2	Ground lead	1	Disconnect.
3	Starter motor	1	
			For installation, reverse the removal procedure.

Disassembling the starter motor



Order	Job/Parts to remove	Q'ty	Remarks
1	Starter motor front cover	1	
2	Starter motor rear cover	1	
3	Brush holder set	1	
4	Armature assembly	1	
5	Starter motor yoke	1	
			For assembly, reverse the disassembly procedure.

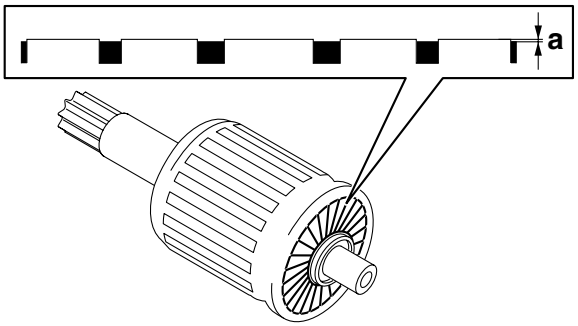
EAS24790
CHECKING THE STARTER MOTOR

1. Check:
   • Commutator
   Dirt → Clean with 600 grit sandpaper.
2. Measure:
   • Mica undercut “a”
   Out of specification → Cut the mica to the proper measurement with a hacksaw blade that has been grounded to fit the commutator.

Mica undercut (depth)
0.70 mm (0.03 in)

TIP

The mica of the commutator must be undercut to ensure proper operation of the commutator.



3. Measure:
   • Armature assembly resistances (commutator and insulation)
   Out of specification → Replace the starter motor.

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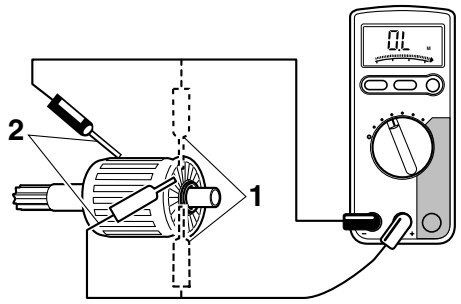
a. Measure the armature assembly resistances with the digital circuit tester.

Digital circuit tester
90890-03174
Model 88 Multimeter with tachometer
YU-A1927

Armature coil
Commutator resistance “1”
0.0050–0.0150 Ω at 20 °C (68 °F)
Insulation resistance “2”
Above 1 MΩ at 20 °C (68 °F)

b. If any resistance is out of specification, replace the starter motor.



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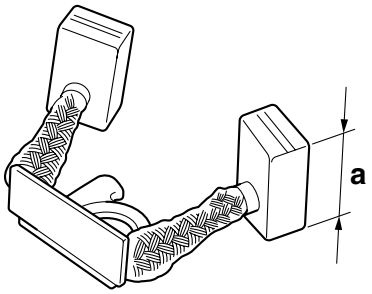
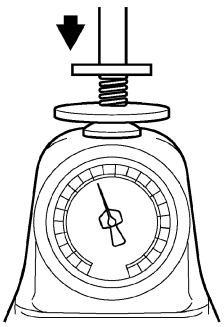
4. Measure:
   • Brush length “a”
   Out of specification → Replace the brushes as a set.

Brush overall length
12.0 mm (0.47 in)
Limit
6.50 mm (0.26 in)



5. Measure:
   • Brush spring force
   Out of specification → Replace the brush springs as a set.

Brush spring force
6.02–6.51 N (614–664 gf, 21.69–23.45 oz)



6. Check:
   • Gear teeth
   Damage/wear → Replace the gear.

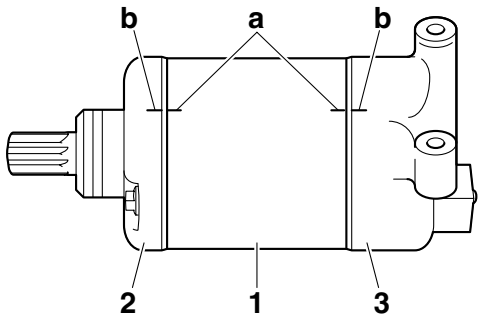
7. Check:
   • Bearing
   • Oil seal
   Damage/wear → Replace the defective part(s).

EAS24800
ASSEMBLING THE STARTER MOTOR

1. Install:
   • Starter motor yoke “1”
   • Starter motor front cover “2”
   • Starter motor rear cover “3”

TIP

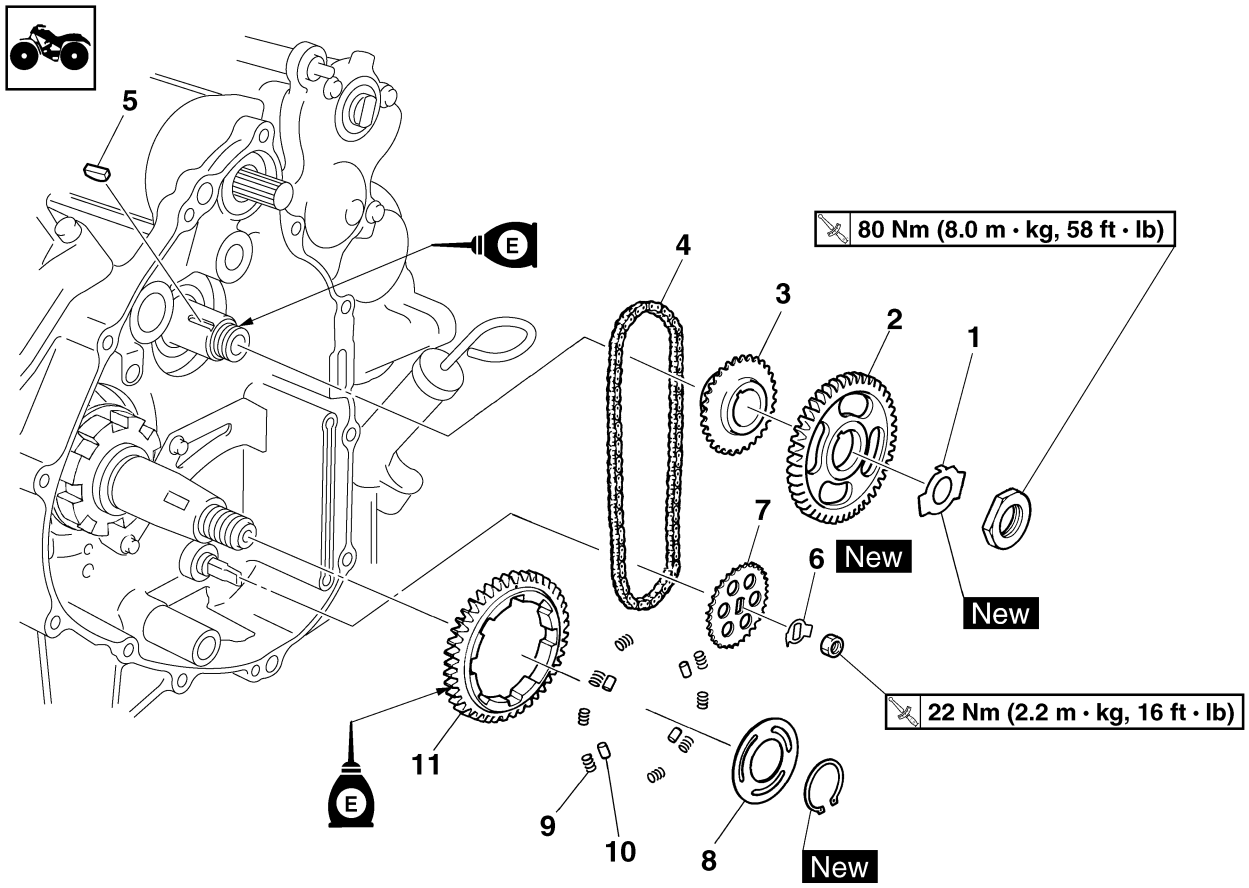
Align the alignment marks “a” on the starter motor yoke with the match marks “b” on the front and starter motor rear covers.



EAS28P1040

BALANCER GEARS AND OIL PUMP GEARS

Removing the balancer gears and oil pump gears

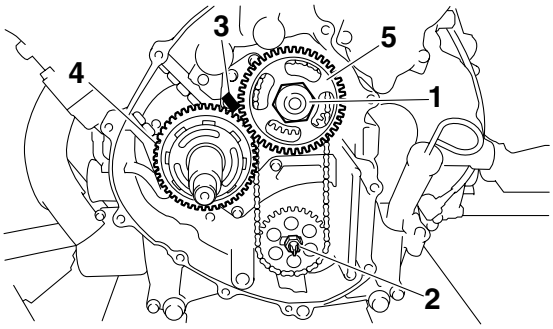


Order	Job/Parts to remove	Q'ty	Remarks
	Starter wheel gear		Refer to "AC MAGNETO AND STARTER CLUTCH" on page 5-34.
1	Lock washer	1	
2	Balancer driven gear	1	
3	Oil pump drive gear	1	
4	Chain	1	
5	Straight key	1	
6	Lock washer	1	
7	Oil pump driven gear	1	
8	Plate	1	
9	Spring	8	
10	Pin	4	
11	Balancer drive gear	1	
			For installation, reverse the removal procedure.

EAS28P1041
REMOVING THE BALANCER DRIVEN GEAR AND OIL PUMP DRIVEN GEAR
1. Straighten the lock washer tabs.
2. Loosen:
   - Balancer driven gear nut “1”
   - Oil pump driven gear nut “2”

TIP

Place an aluminum plate “3” between the teeth of the balancer drive gear “4” and balancer driven gear “5”, then loosen the nuts.



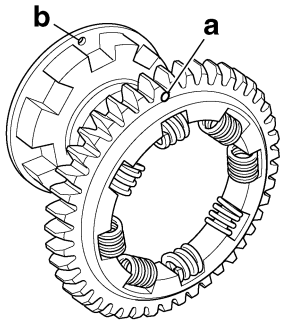
EAS28P1042
CHECKING THE OIL PUMP DRIVE
1. Check:
   - Oil pump drive gear
   - Oil pump driven gear
     Cracks/wear/damage → Replace.

EAS28P1043
CHECKING THE BALANCER DRIVE
1. Check:
   - Balancer drive gear
   - Balancer driven gear
     Damage/wear → Replace the balancer drive gear and balancer driven gear as a set.
     Excessive noise during operation → Replace the balancer drive gear and balancer driven gear as a set.

EAS28P1044
INSTALLING THE BALANCER DRIVE GEAR, BALANCER DRIVEN GEAR, AND OIL PUMP DRIVEN GEAR
1. Install:
   - Pin
   - Spring
   - Balancer drive gear
     (onto the buffer boss)

TIP

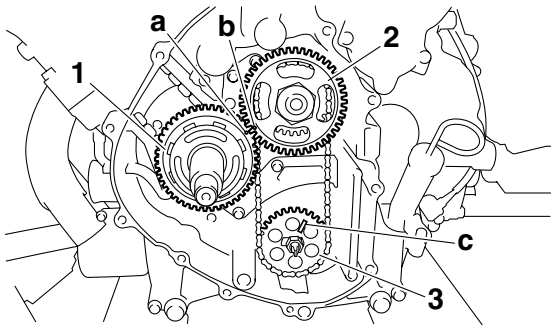
Align the punch mark “a” on the balancer drive gear with the hole “b” to the buffer boss.



2. Install:
   - Balancer drive gear “1”
   - Balancer driven gear “2”
   - Oil pump driven gear “3”

TIP

- Align the punch mark “a” on the balancer drive gear with the punch mark “b” on the balancer driven gear.
- Install the oil pump driven gear with the “3B4” mark “c” facing out.

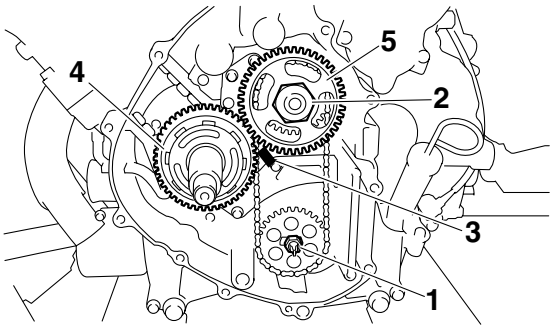


3. Install:
   - Lock washers New
   - Oil pump driven gear nut “1”
   - Balancer driven gear nut “2”

Oil pump driven gear nut
22 Nm (2.2 m·kg, 16 ft·lb)
Balancer driven gear nut
80 Nm (8.0 m·kg, 58 ft·lb)

TIP

- Place an aluminum plate “3” between the teeth of the balancer drive gear “4” and balancer driven gear “5”, then tighten the nuts.
- Apply the engine oil to the thread of axles and nuts.

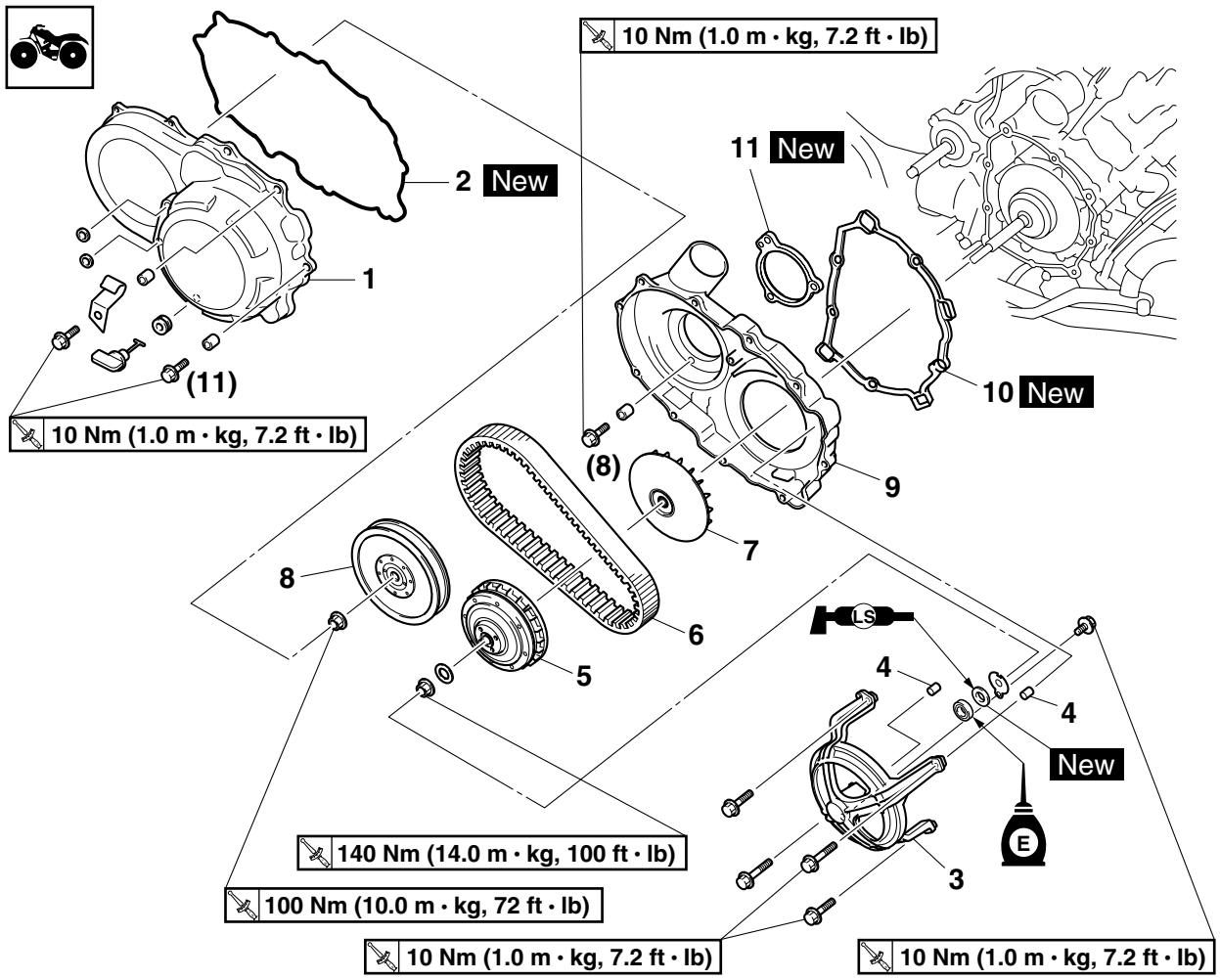


4. Bend the lock washer tabs along the balancer driven gear nut and oil pump driven gear nut.

EAS28P1045

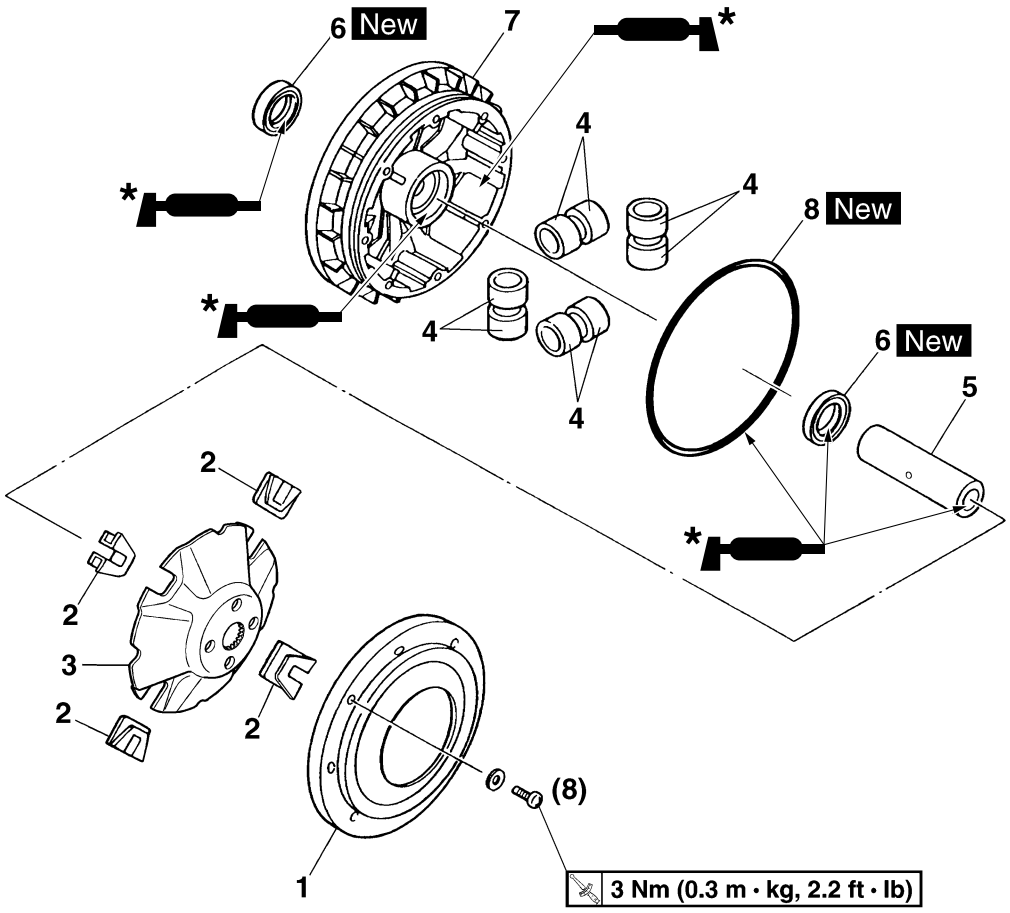
PRIMARY AND SECONDARY SHEAVES

Removing the primary and secondary sheaves



Order	Job/Parts to remove	Q'ty	Remarks
	Front fender/Rear fender/Right footrest board		Refer to "GENERAL CHASSIS" on page 4-1.
	V-belt cooling ducts		Refer to "ENGINE REMOVAL" on page 5-1.
1	Drive belt cover	1	
2	Rubber gasket	1	
3	Bearing housing	1	
4	Dowel pin	2	
5	Primary sheave assembly	1	
6	V-belt	1	
7	Primary fixed sheave	1	
8	Secondary sheave assembly	1	
9	Drive belt case	1	
10	Rubber gasket	1	
11	Rubber gasket	1	
			For installation, reverse the removal procedure.

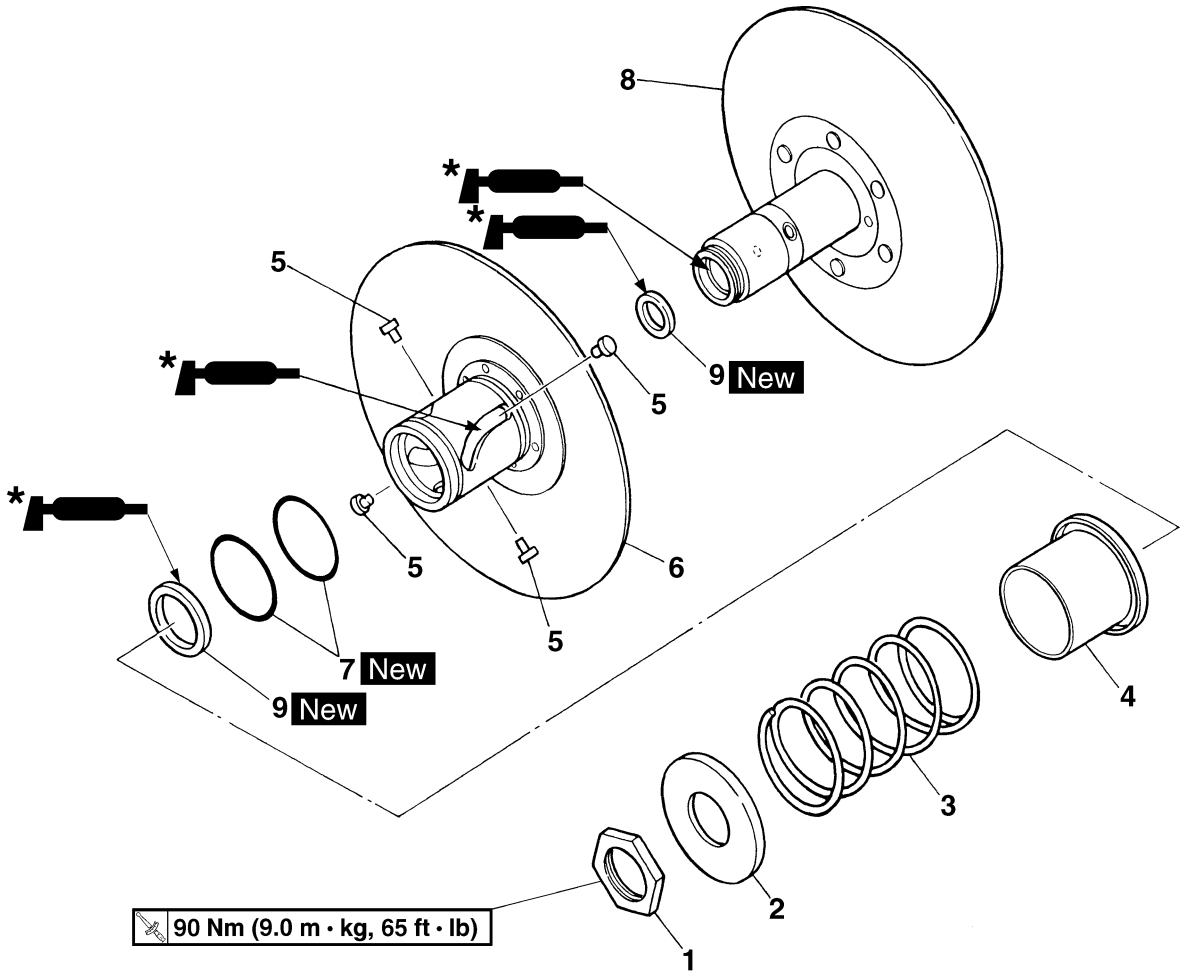
Disassembling the primary sheave



Order	Job/Parts to remove	Q'ty	Remarks
1	Primary sheave cap	1	
2	Primary sheave slider	4	
3	Primary sheave cam	1	
4	Primary sheave weight	8	
5	Collar	1	
6	Oil seal	2	
7	Primary sliding sheave	1	
8	O-ring	1	
			For assembly, reverse the disassembly procedure.

* Apply Yamaha Grizzly grease.

Disassembling the secondary sheave



Order	Job/Parts to remove	Q'ty	Remarks
1	Nut	1	
2	Spring seat	1	
3	Compression spring	1	
4	Spring seat	1	
5	Guide pin	4	
6	Secondary sliding sheave	1	
7	O-ring	2	
8	Secondary fixed sheave	1	
9	Oil seal	2	
			For assembly, reverse the disassembly procedure.

* Apply BEL-RAY assembly lube®.

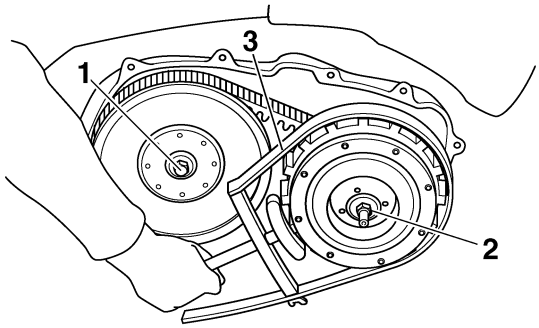
EAS28P1046
REMOVING THE PRIMARY AND SECONDARY SHEAVES

1. Loosen:
   - Secondary sheave nut “1”
   - Primary sheave nut “2”

TIP

- Use the sheave holder “3” to hold the primary sheave.
- First, loosen the secondary sheave nut “2”, then loosen the primary sheave nut “1”.

Sheave holder
90890-01701
Primary clutch holder
YS-01880-A



EAS24640
DISASSEMBLING THE SECONDARY SHEAVE

1. Remove:
   - Nut “1”

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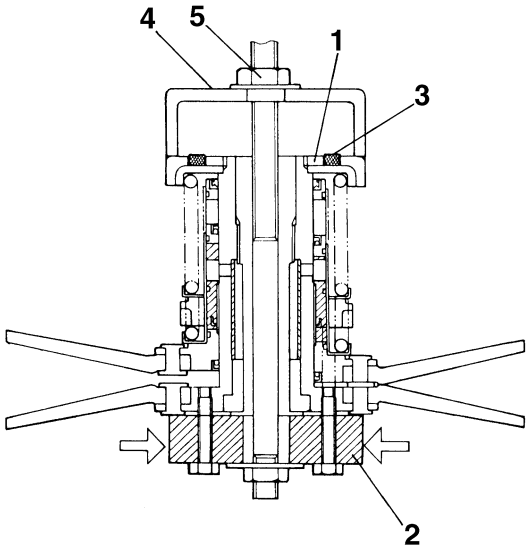
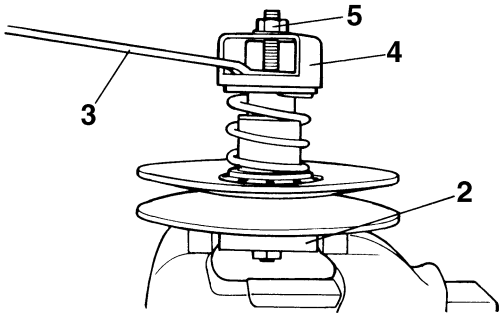
a. Attach the sheave fixed block “2”, locknut wrench “3” and sheave spring compressor “4” to the secondary sheave assembly.

Sheave fixed block
90890-04135
Sheave fixed bracket
YM-04135
Locknut wrench
90890-01348
YM-01348
Sheave spring compressor
90890-04134
YM-04134

b. Place the sheave fixed block in a vise and secure it.
c. Tighten the sheave spring compressor nut “5” and compress the spring.
d. Loosen the nut “1” with the locknut wrench “3”.
e. Remove the nut “1”.
f. Remove the sheave spring compressor and locknut wrench.





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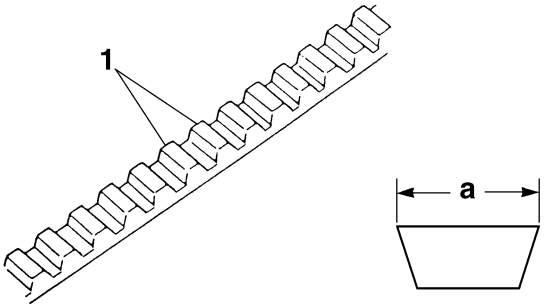
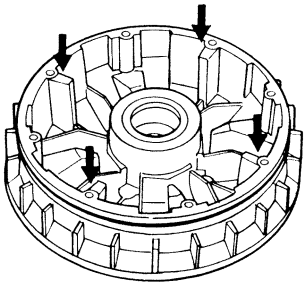
EAS24670
CHECKING THE V-BELT

1. Check:
   - V-belt “1”
     Cracks/damage/wear → Replace.
     Grease/oil → Clean the primary and secondary sheave.
2. Measure:
   - V-belt width “a”
     Out of specification → Replace.

V-belt width
33.3 mm (1.31 in)
Limit
30.0 mm (1.18 in)

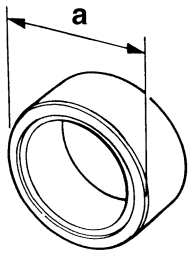


EAS24680
CHECKING THE PRIMARY SHEAVE
1. Check:
   - Primary sliding sheave splines
     Wear/cracks/damage → Replace.
   - Primary sheave cam
     Cracks/damage → Replace.
2. Check:
   - Primary sliding sheave
   - Primary fixed sheave
     Cracks/damage → Replace.



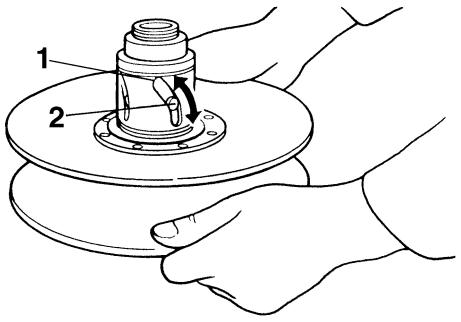
EAS24690
CHECKING THE PRIMARY SHEAVE WEIGHTS
The following procedure applies to all of the primary sheave weights.
1. Check:
   - Primary sheave weight
     Cracks/damage/wear → Replace.
2. Measure:
   - Primary sheave weight outside diameter “a”
     Out of specification → Replace.

Primary sheave weight outside diameter
30 mm (1.16 in)
Limit
29.5 mm (1.16 in)



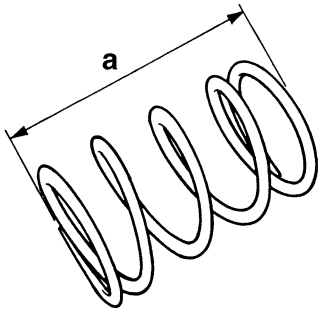
EAS24700
CHECKING THE PRIMARY SHEAVE SLIDERS
The following procedure applies to all of the primary sheave sliders.
1. Check:
   - Primary sheave slider
     Cracks/damage/wear → Replace.

EAS24710
CHECKING THE SECONDARY SHEAVE
1. Check:
   - Secondary fixed sheave
   - Secondary sliding sheave
     Cracks/damage/wear → Replace the secondary fixed and sliding sheaves as a set.
2. Check:
   - Torque cam grooves “1”
     Damage/wear → Replace the secondary fixed and sliding sheaves as a set.
3. Check:
   - Guide pins “2”
     Damage/wear → Replace the secondary fixed and sliding sheaves as a set.



4. Check:
   - Secondary sheave spring
     Damage → Replace.
5. Measure:
   - Secondary sheave spring free length “a”
     Out of specification → Replace the secondary sheave spring.

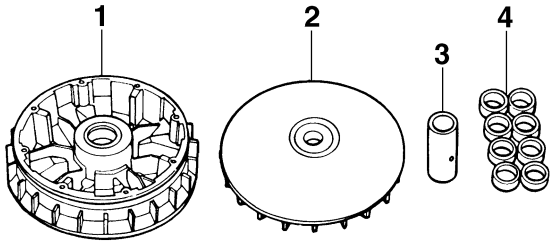
Free length
124.2 mm (4.89 in)
(YFM5FGY/YFM5FGPY)
130.6 mm (5.14 in)
(YFM7FGY/YFM7FGPY)
Limit
121.7 mm (4.79 in)
(YFM5FGY/YFM5FGPY)
128.0 mm (5.04 in)
(YFM7FGY/YFM7FGPY)



EAS24720
ASSEMBLING THE PRIMARY SHEAVE

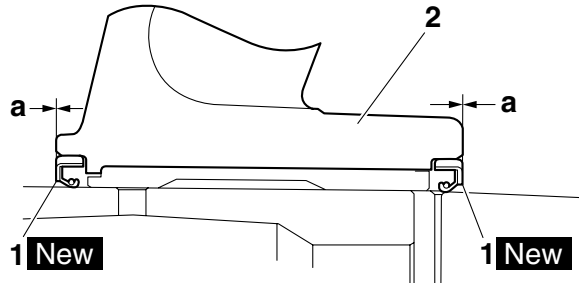
1. Clean:
   - Primary sliding sheave “1”
   - Primary fixed sheave “2”
   - Collar “3”
   - Primary sheave weights “4”
   - Primary sliding sheave cam face

TIP
Remove any excess grease.



2. Install:
   - Oil seals “1” New

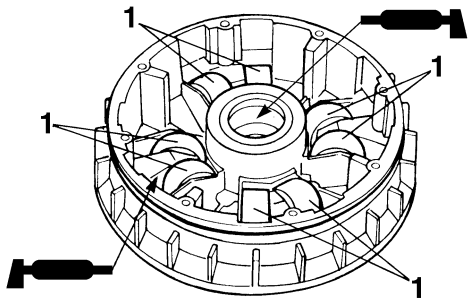
Installed depth “a”
0 mm (0 in)



2. Primary sliding sheave

3. Install:
   - Primary sheave weights “1”

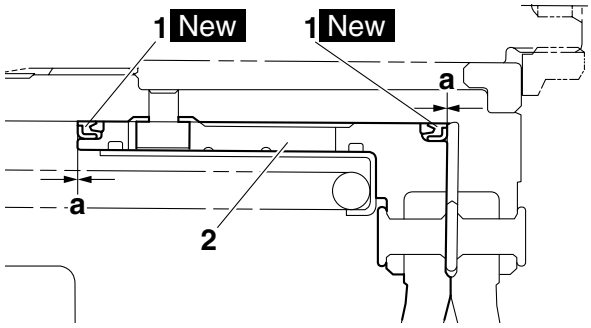
TIP
- Apply Yamaha Grizzly grease (90 g) to the whole outer surface of the weights and install.
- Apply Yamaha Grizzly grease (2.5 g) to the inner surface of the collar.
- Apply Yamaha Grizzly grease (2.5 g) to the inner surface of the primary sliding sheave.



EAS24730
ASSEMBLING THE SECONDARY SHEAVE

1. Install:
   - Oil seals “1” New

Installed depth “a”
0 mm (0 in)



2. Secondary sliding sheave

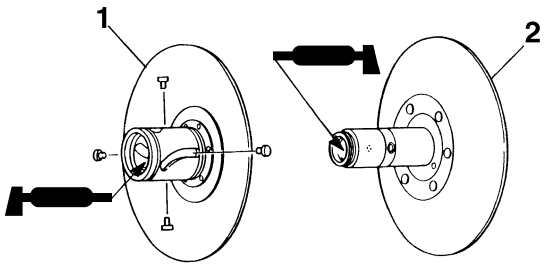
2. Lubricate:
   - Secondary sliding sheave “1”

• Secondary fixed sheave “2”
(with the recommended lubricant)

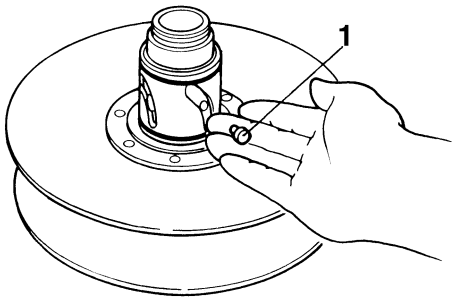
	Recommended lubricant **BEL-RAY assembly lube®**

TIP

Apply BEL-RAY assembly lube® (15 g) to the inner surface of the secondary fixed sheave.



3. Install:
   • Secondary sliding sheave
4. Install:
   • Guide pins “1”

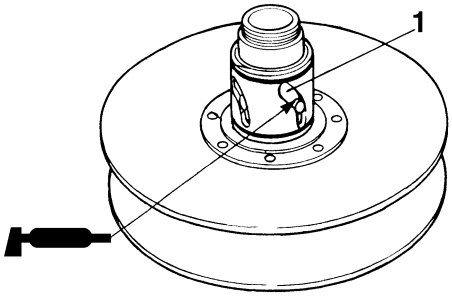


5. Lubricate:
   • Guide pin grooves “1”
   (with the recommended lubricant)

	Recommended lubricant **BEL-RAY assembly lube®**

TIP

Apply BEL-RAY assembly lube® (5.0 g) to the guide pin grooves.



6. Install:
   • Spring seat
   • Compression spring
   • Spring seat
   • Nut

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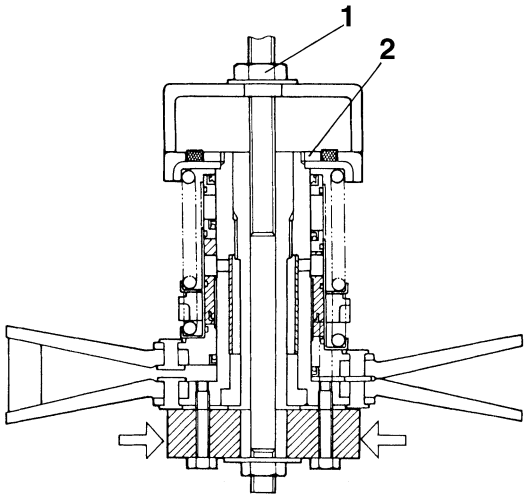
a. Attach the sheave fixed block, locknut wrench and sheave spring compressor to the secondary sheave.

	Sheave fixed block **90890-04135** **Sheave fixed bracket** **YM-04135** **Locknut wrench** **90890-01348** **YM-01348** **Sheave spring compressor** **90890-04134** **YM-04134**

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

	Nut **90 Nm (9.0 m·kg, 65 ft·lb)**



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

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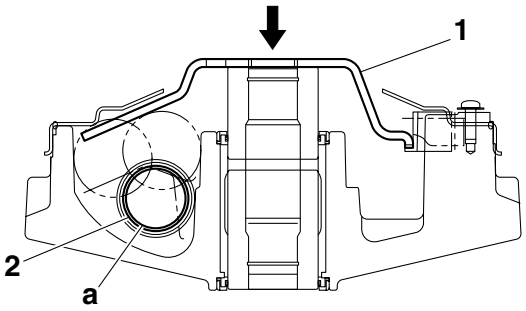
EAS28P1047

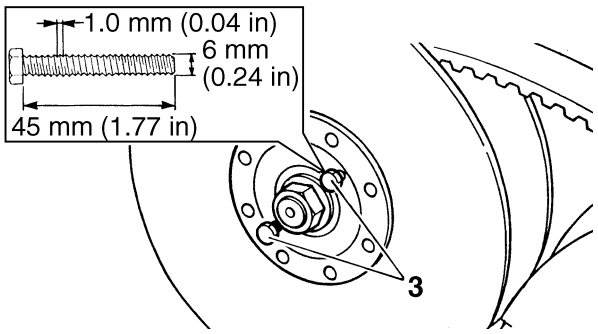
INSTALLING THE PRIMARY AND SECONDARY SHEAVES

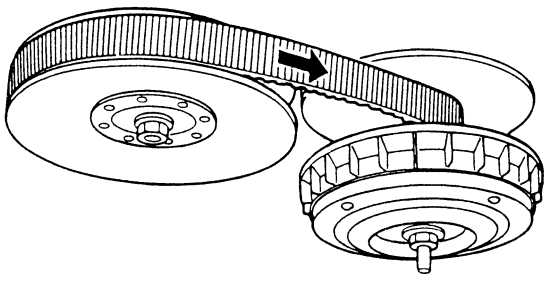
1. Install:
   - Secondary sheave
   - V-belt
   - Primary sheave

TIP

- Be sure to push in the primary sheave cam "1" when installing the primary sheave so that the primary sheave weights "2" will be properly position "a".
- Tightening the bolts "3" will push the secondary sliding sheave away, causing the gap between the secondary fixed and sliding sheaves to widen.
- Install the V-belt so that its arrow points in the direction of rotation as shown in the illustration.



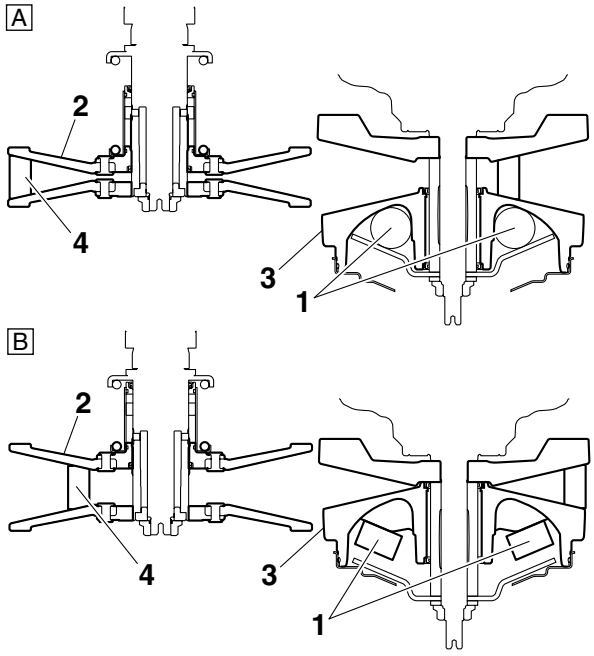




2. Check:
   - Primary sheave weights position
     Out of specification → Repeat step (1).

TIP

To check that the primary sheave weights "1" are installed correctly, make sure that the secondary sheave "2", primary sheave "3", and V-belt "4" are positioned as shown in the illustration.



A. Correct position
B. Incorrect position

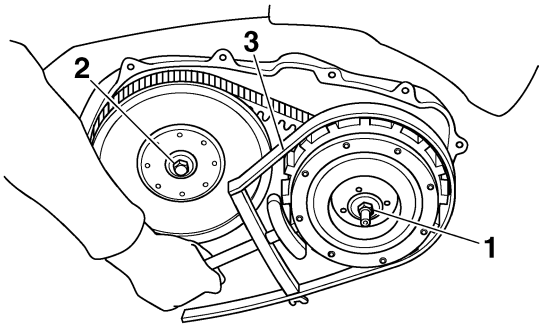
3. Tighten:
   - Primary sheave nut "1"
   - Secondary sheave nut "2"

Primary sheave nut
140 Nm (14.0 m·kg, 100 ft·lb)
Secondary sheave nut
100 Nm (10.0 m·kg, 72 ft·lb)

TIP

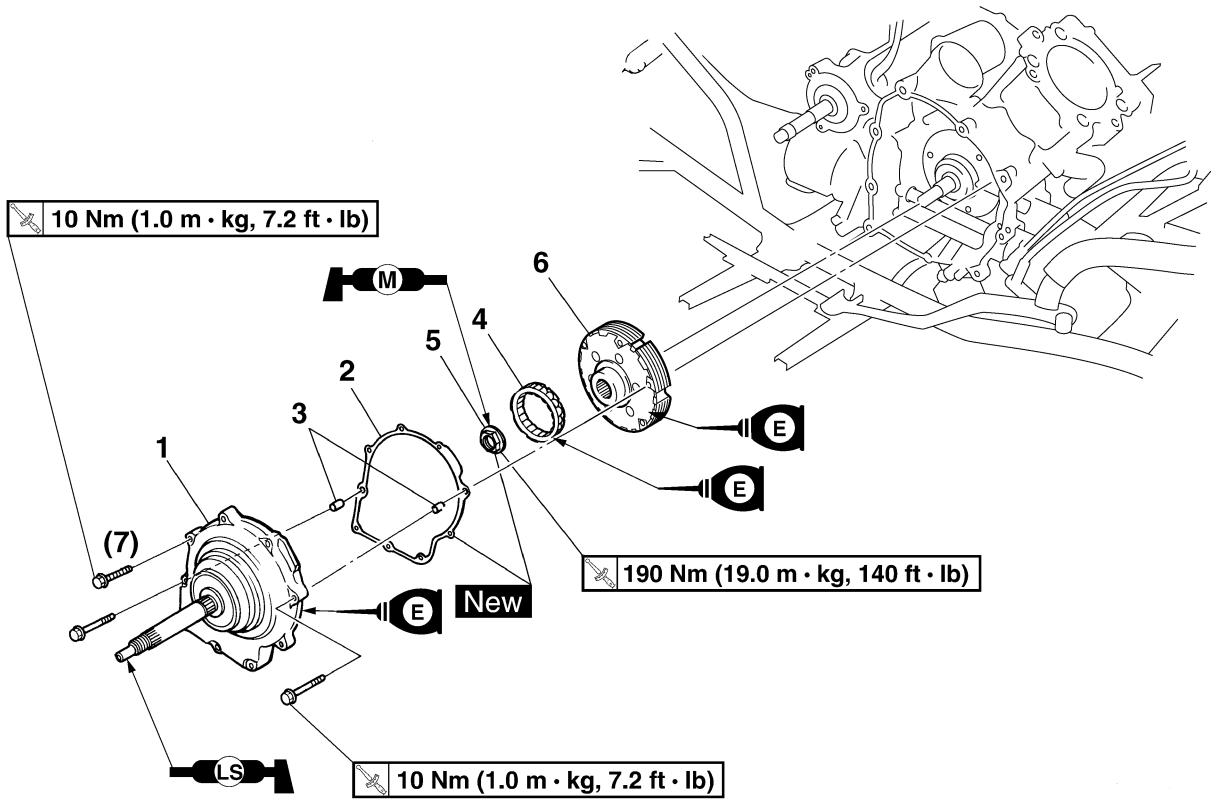
- Use the sheave holder "3" to hold the primary sheave.
- First, tighten the primary sheave nut "1", then tighten the secondary sheave nut "2".

Sheave holder
90890-01701
Primary clutch holder
YS-01880-A


3
2
1

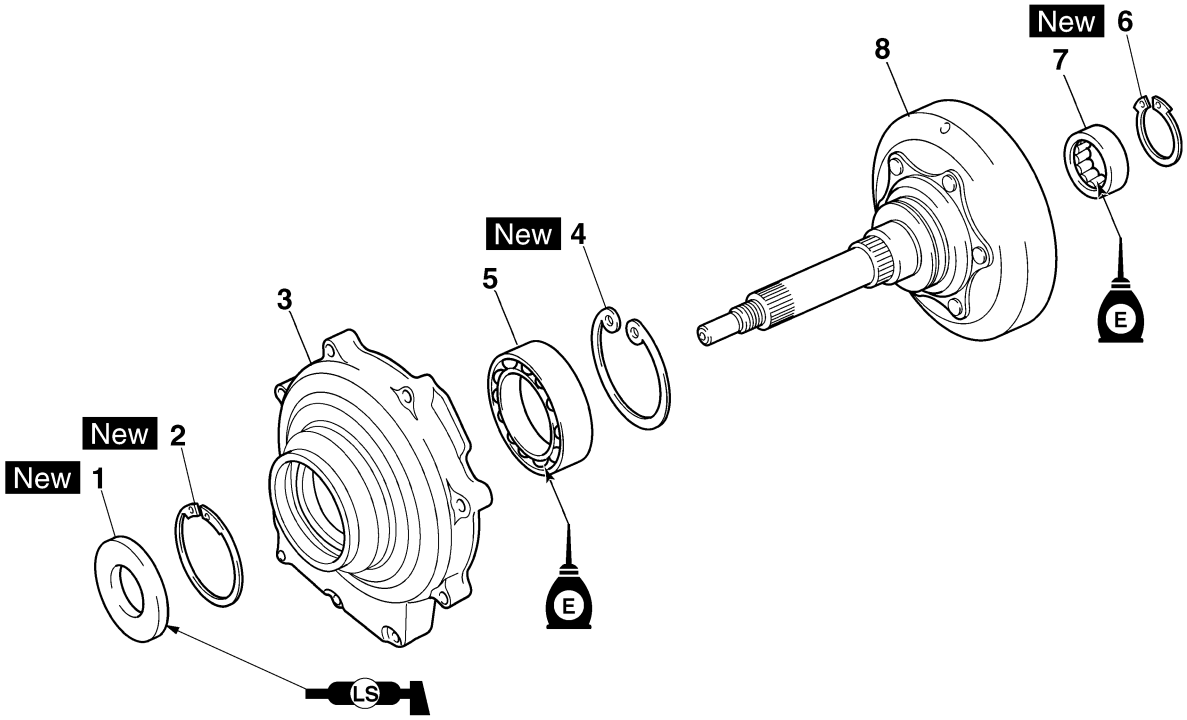
EAS25061
CLUTCH

Removing the clutch



Order	Job/Parts to remove	Q'ty	Remarks
	Primary sheave/Secondary sheave		Refer to "PRIMARY AND SECONDARY SHEAVES" on page 5-47.
1	Clutch housing assembly	1	
2	Gasket	1	
3	Dowel pin	2	
4	One-way clutch bearing	1	
5	Nut	1	
6	Clutch carrier assembly	1	
			For installation, reverse the removal procedure.

Disassembling the clutch housing assembly



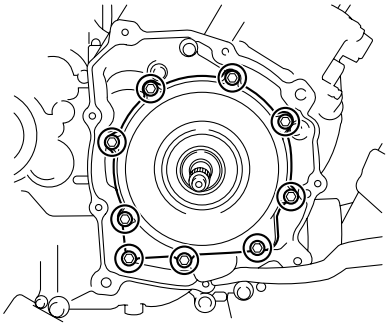
Order	Job/Parts to remove	Q'ty	Remarks
1	Oil seal	1	
2	Circlip	1	
3	Bearing housing	1	
4	Circlip	1	
5	Bearing	1	
6	Circlip	1	
7	Bearing	1	
8	Clutch housing	1	
			For assembly, reverse the disassembly procedure.

EAS25070
REMOVING THE CLUTCH

1. Remove:
   - Clutch housing assembly
   - Gasket
   - Dowel pins

TIP

Working in crisscross pattern, loosen each bolt 1/4 of a turn. Remove them after all of them are loosened.



2. Straighten:
   - Punched portion “a” of the nut “1”
3. Remove:
   - Nut “1”

ECA28P1032

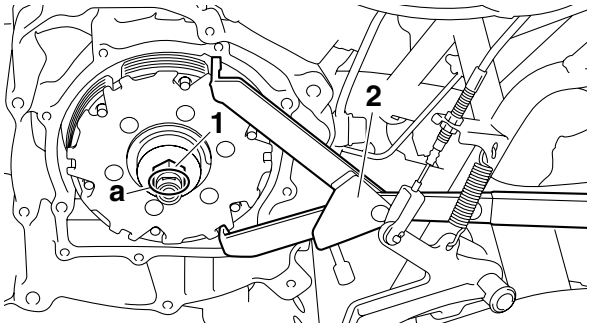
NOTICE

The clutch carrier assembly nut has left-handed threads. To loosen the clutch carrier assembly nut, turn it clockwise.

TIP

Use a clutch holding tool “2” to hold the clutch carrier assembly.

Universal clutch holder
90890-04086
YM-91042



EAS28P1048
CHECKING THE CLUTCH

1. Check:
   - Clutch housing
     Damage/wear → Replace.
   - One-way clutch bearing
     Chafing/wear/damage → Replace.

TIP

- Replace the one-way clutch assembly and clutch housing as a set.
- The one-way clutch bearing must be installed with the flange side facing in.

2. Check:
   - One-way clutch operation

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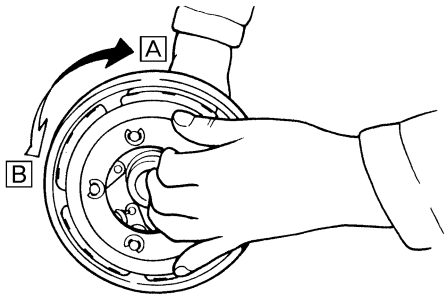
a. Install the one-way clutch bearing and clutch carrier assembly to the clutch housing and hold the clutch carrier assembly.
b. When turning the clutch housing clockwise “A”, it should turn freely; otherwise, the one-way clutch assembly is faulty and must be replaced.
c. When turning the clutch housing counterclockwise “B”, the clutch housing and crankshaft should engage; otherwise, the one-way clutch assembly is faulty and must be replaced.



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EAS28990
CHECKING THE CLUTCH SHOE

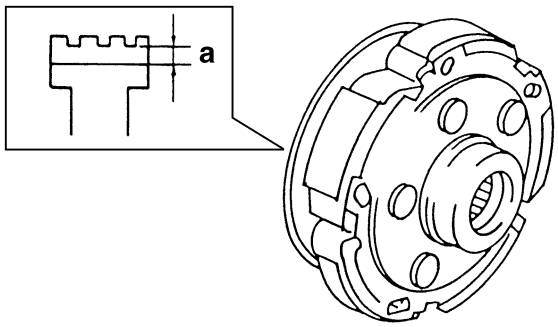
1. Check:
   - Clutch shoe
     Damage/wear → Replace.
     Glazed areas → Sand with coarse sandpaper.

TIP

After sanding the glazed areas, clean the clutch with a cloth.

2. Measure:
   - Clutch shoe thickness
     Out of specification → Replace.

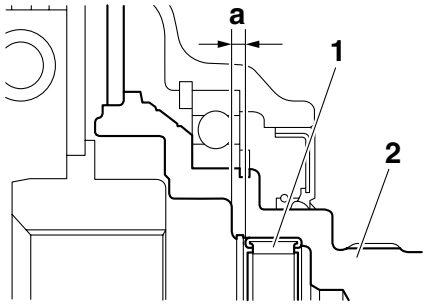
Clutch shoe thickness
1.5 mm (0.06 in)
Limit
1.0 mm (0.04 in)



EAS28P1037
ASSEMBLING THE CLUTCH HOUSING

1. Install:
   • Bearing “1”

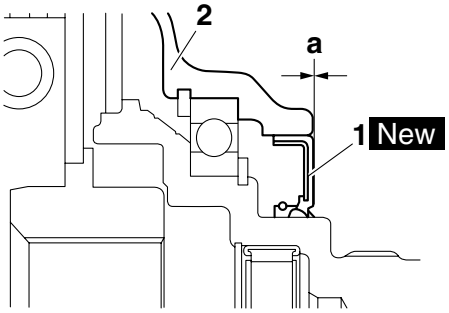
Installed depth “a”
2.5–2.7 mm (0.10–0.11 in)



2. Clutch housing

2. Install:
   • Oil seal “1” New

Installed depth “a”
0 mm (0 in)



2. Bearing housing

EAS28P1049
INSTALLING THE CLUTCH

1. Install:
   • Clutch carrier assembly
   • Nut “1” New

Clutch carrier assembly nut
190 Nm (19.0 m·kg, 140 ft·lb)

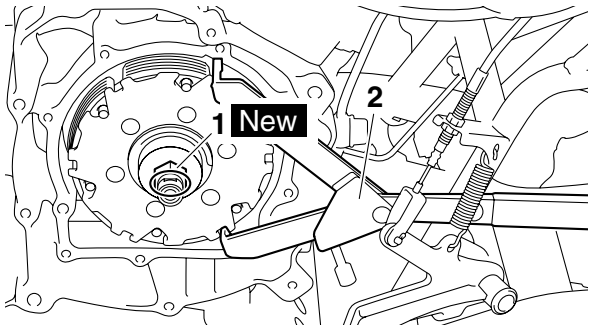
ECA28P1033
NOTICE

The clutch carrier assembly nut has left-handed threads. To tighten the clutch carrier assembly nut, turn it counterclockwise.

TIP

Use a clutch holding tool “2” to hold the clutch carrier assembly.

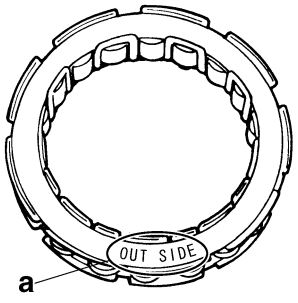
Universal clutch holder
90890-04086
YM-91042



2. Lock the threads with a drift punch.
3. Install:
   • One-way clutch bearing

TIP

The one-way clutch bearing should be installed in the clutch carrier assembly with the “OUT SIDE” mark “a” facing toward the clutch housing.

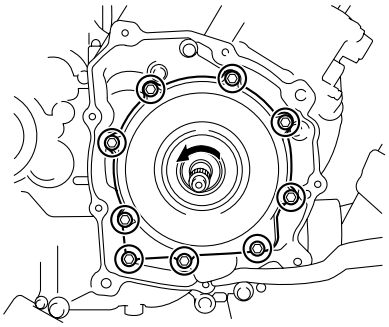


4. Install:
   • Dowel pins
   • Gasket New
   • Clutch housing assembly

Clutch housing assembly bolt
10 Nm (1.0 m·kg, 7.2 ft·lb)

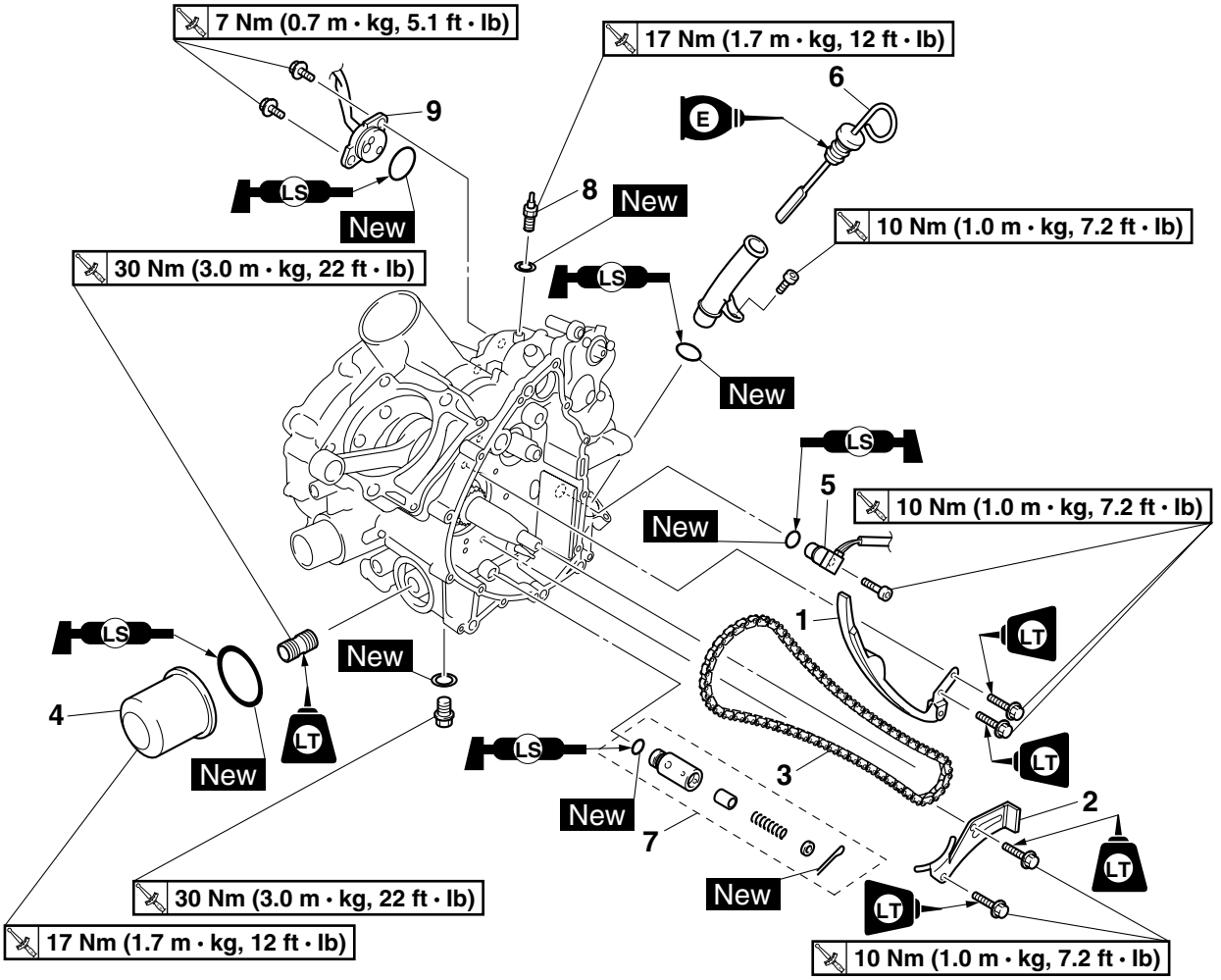
TIP

- Tighten the bolts in stages, using a crisscross pattern.
- After tightening the bolts, check that the clutch housing assembly rotates smoothly.



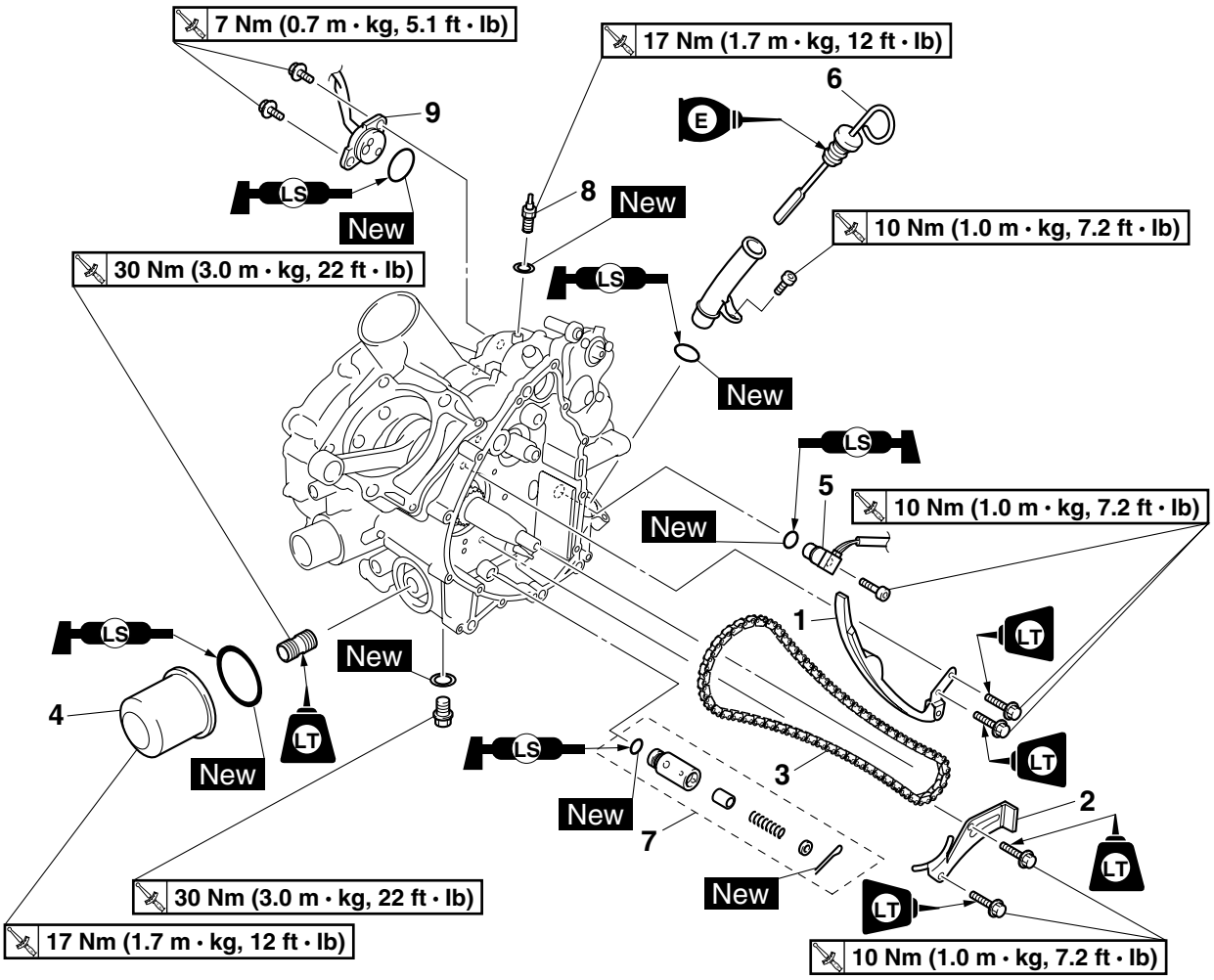
EAS25540
CRANKCASE

Removing the timing chain and oil filter cartridge



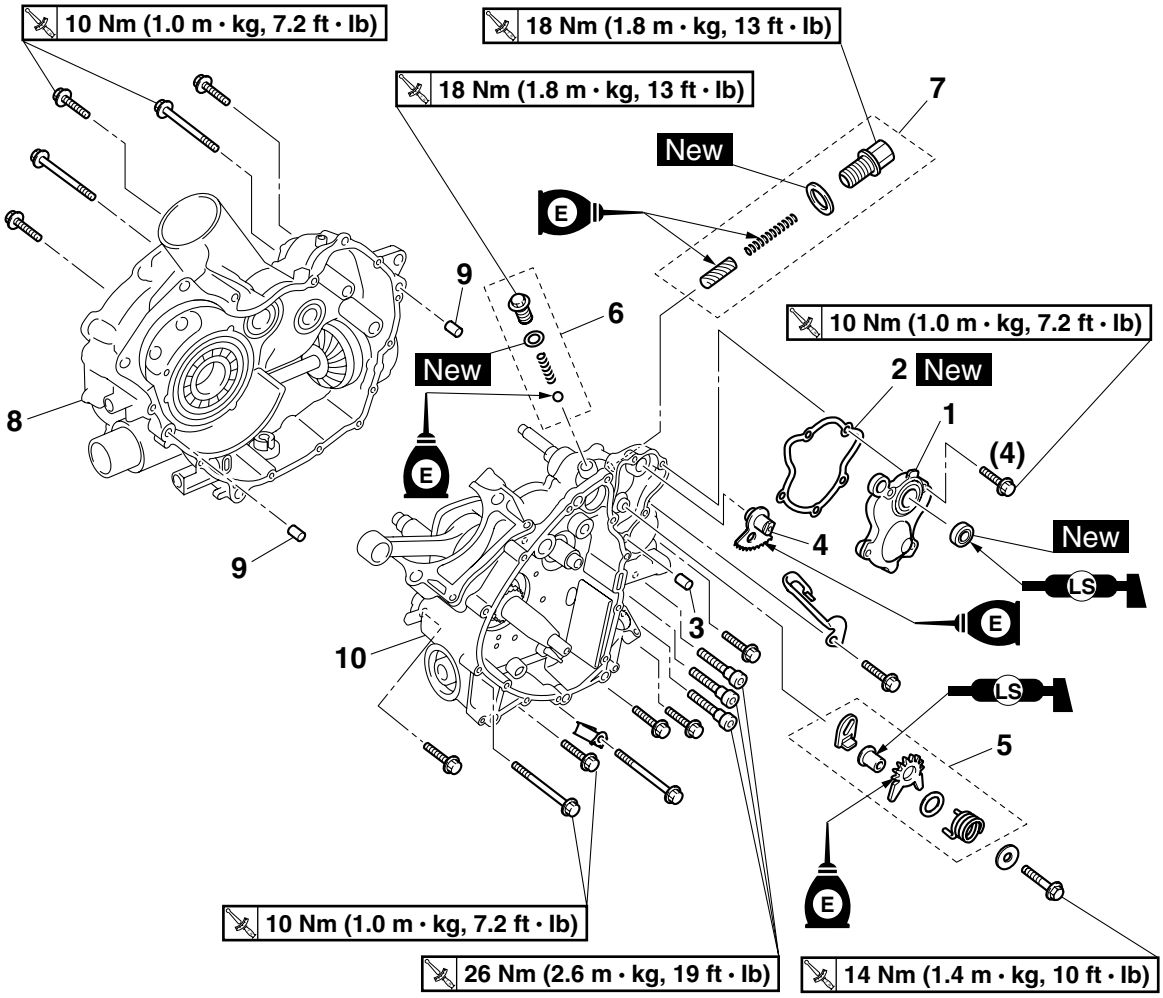
Order	Job/Parts to remove	Q'ty	Remarks
	Engine		Refer to "ENGINE REMOVAL" on page 5-1.
	Cylinder head		Refer to "CYLINDER HEAD" on page 5-10.
	Cylinder/Piston		Refer to "CYLINDER AND PISTON" on page 5-28.
	AC magneto rotor/Starter wheel gear		Refer to "AC MAGNETO AND STARTER CLUTCH" on page 5-34.
	Balancer driven gear/Oil pump driven gear		Refer to "BALANCER GEARS AND OIL PUMP GEARS" on page 5-44.
	Primary sheave assembly/Secondary sheave assembly		Refer to "PRIMARY AND SECONDARY SHEAVES" on page 5-47.
	Clutch carrier assembly		Refer to "CLUTCH" on page 5-56.
1	Timing chain guide (intake side)	1	
2	Timing chain guide (lower)	1	
3	Timing chain	1	
4	Oil filter cartridge	1	
5	Speed sensor	1	
6	Dipstick	1	

Removing the timing chain and oil filter cartridge



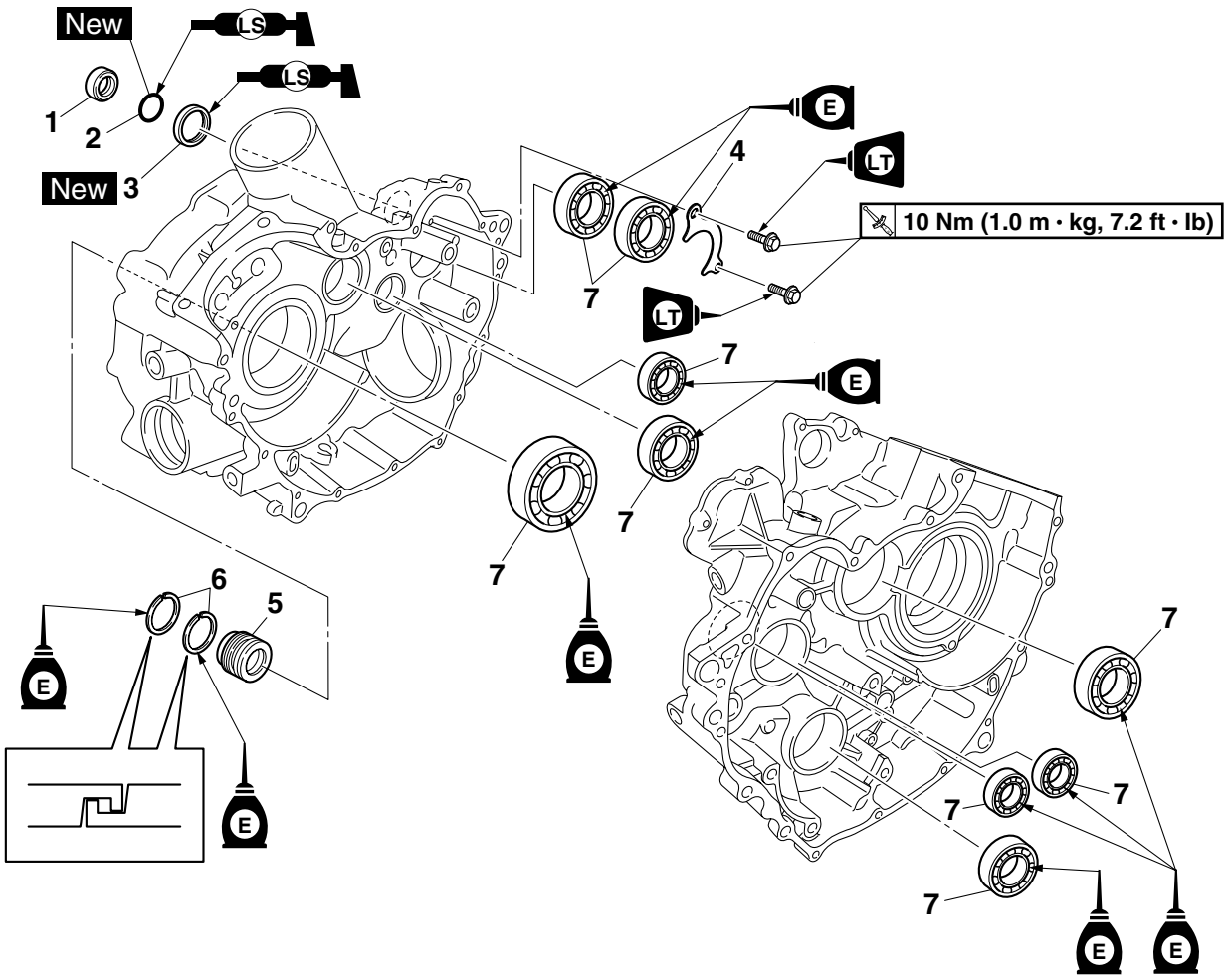
Order	Job/Parts to remove	Q'ty	Remarks
7	Relief valve assembly	1	
8	Reverse switch	1	
9	Gear position switch	1	
			For installation, reverse the removal procedure.

Separating the crankcase



Order	Job/Parts to remove	Q'ty	Remarks
1	Shift lever cover	1	
2	Gasket	1	
3	Dowel pin	1	
4	Shift lever 1	1	
5	Shift lever 2 assembly	1	
6	Shift drum stopper	1	Spring identification color: white
7	Stopper lever stopper	1	Spring identification color: red
8	Right crankcase	1	
9	Dowel pin	2	
10	Left crankcase	1	
			For assembly, reverse the disassembly procedure.

Removing the crankcase bearings



Order	Job/Parts to remove	Q'ty	Remarks
	Crankshaft/Oil pump		Refer to "CRANKSHAFT AND OIL PUMP" on page 5-68.
	Transmission		Refer to "TRANSMISSION" on page 5-73
	Middle drive shaft/Middle driven shaft		Refer to "MIDDLE GEAR" on page 5-79
1	Collar	1	
2	O-ring	1	
3	Oil seal	1	
4	Bearing retainer	1	
5	Spacer	1	
6	Crank seal	2	
7	Bearing	9	
			For installation, reverse the removal procedure.

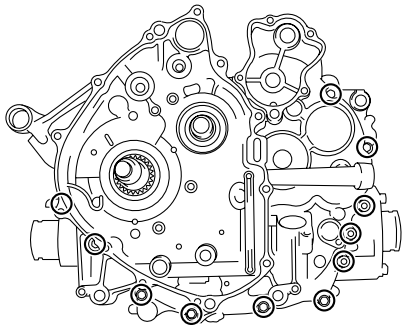
EAS25560
SEPARATING THE CRANKCASE

1. Remove:
   • Crankcase bolts
   • Lead holders

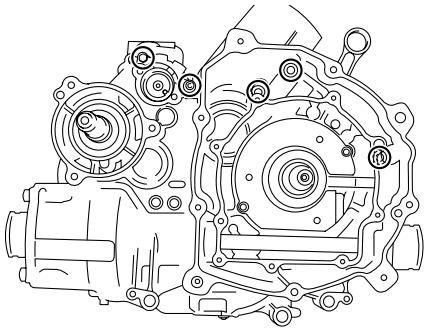
TIP

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.

A



B



A. Left crankcase
B. Right crankcase

2. Remove:
   • Right crankcase
   • Dowel pins

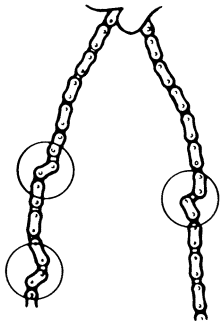
ECA13900

NOTICE

Tap on one side of the crankcase with a soft-face hammer. Tap only on reinforced portions of the crankcase, not on the crankcase mating surfaces. Work slowly and carefully and make sure the crankcase halves separate evenly.

EAS24180
CHECKING THE TIMING CHAIN AND TIMING CHAIN GUIDE

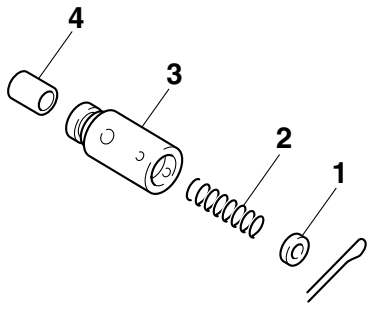
1. Check:
   • Timing chain
   Damage/stiffness → Replace the timing chain and camshaft sprocket as a set.



2. Check:
   • Timing chain guide (intake side)
   Damage/wear → Replace.

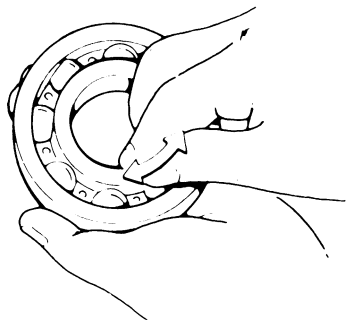
EAS28P1050
CHECKING THE RELIEF VALVE

1. Check:
   • Spring seat “1”
   • Spring “2”
   • Relief valve body “3”
   • Relief valve “4”
   Damage/wear → Replace the defective part(s).



EAS28P1051
CHECKING THE BEARINGS

1. Check:
   • Bearings
   Clean and lubricate, then rotate the inner race with a finger.
   Roughness → Replace.



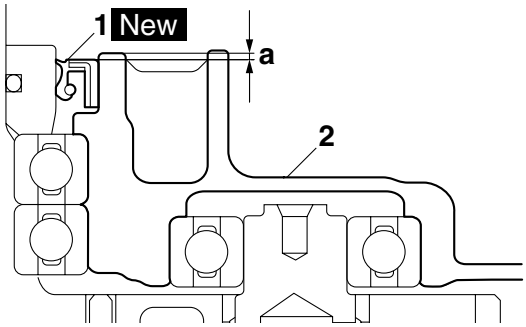
EAS25580
CHECKING THE CRANKCASE

1. Thoroughly wash the crankcase halves in a mild solvent.
2. Thoroughly clean all the gasket surfaces and crankcase mating surfaces.
3. Check:
   - Crankcase
     Cracks/damage → Replace.
   - Oil delivery passages
     Obstruction → Blow out with compressed air.

EAS25700
ASSEMBLING THE CRANKCASE

1. Install:
   - Oil seal “1” New

	Installed depth “a” **1.0–1.5 mm (0.04–0.06 in)**



2. Crankcase

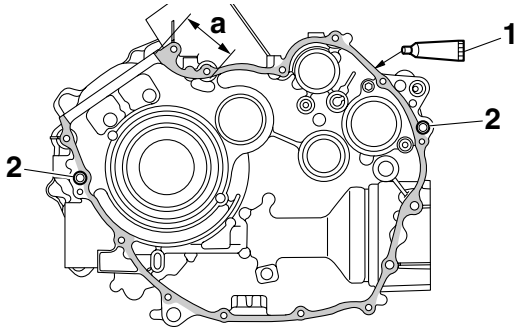
2. Thoroughly clean the crankcase mating surfaces.
3. Apply:
   - Sealant “1”
     (onto the crankcase mating surfaces)

	Yamaha bond No. 1215 **90890-85505** **(Three Bond No.1215®)**

TIP

- Apply two coats of sealant to the area “a” shown in the illustration.
- Do not allow any sealant to come into contact with the oil gallery.

4. Install:
   - Dowel pins “2”



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

ECA28P1034
NOTICE

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

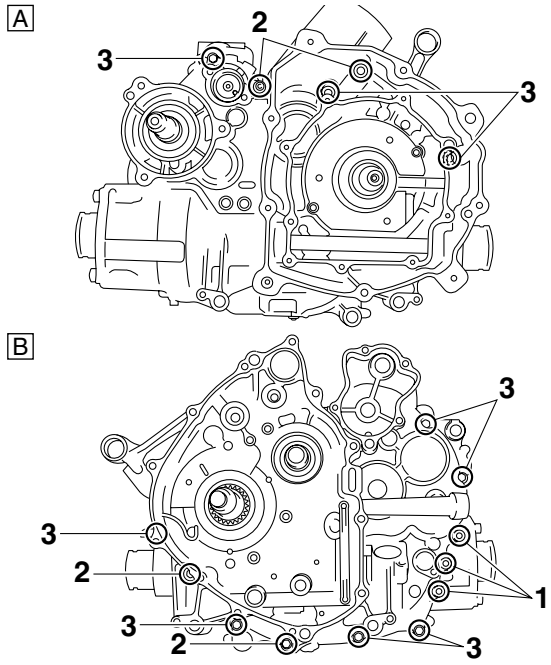
6. Install:
   - Lead holders
   - Crankcase bolts
7. Tighten:
   - Crankcase bolts

	Crankcase bolt “1” **26 Nm (2.6 m·kg, 19 ft·lb)** **Crankcase bolt “2”, “3”** **10 Nm (1.0 m·kg, 7.2 ft·lb)**

M8 × 40 mm “1”
M6 × 60 mm “2”
M6 × 30 mm “3”

TIP

Tighten the bolts in stages, using a crisscross pattern.



A. Right crankcase
B. Left crankcase

8. Apply:
   • 4-stroke engine oil
   (to the crankshaft pin, bearings and oil delivery hole)
9. Check:
   • Crankshaft and transmission operation
   Rough operation → Repair.

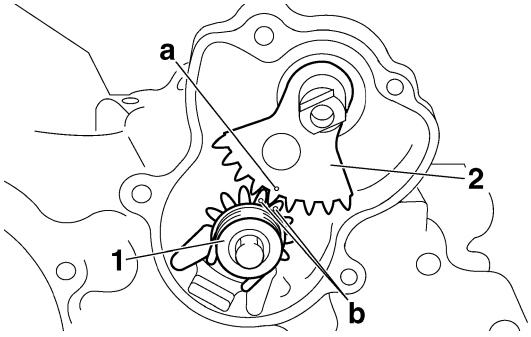
EAS28P1052
INSTALLING THE SHIFT LEVER

1. Install:
   • Shift lever 2 assembly “1”
   • Shift lever 1 “2”

	Shift lever 2 assembly bolt 14 Nm (1.4 m·kg, 10 ft·lb)

TIP

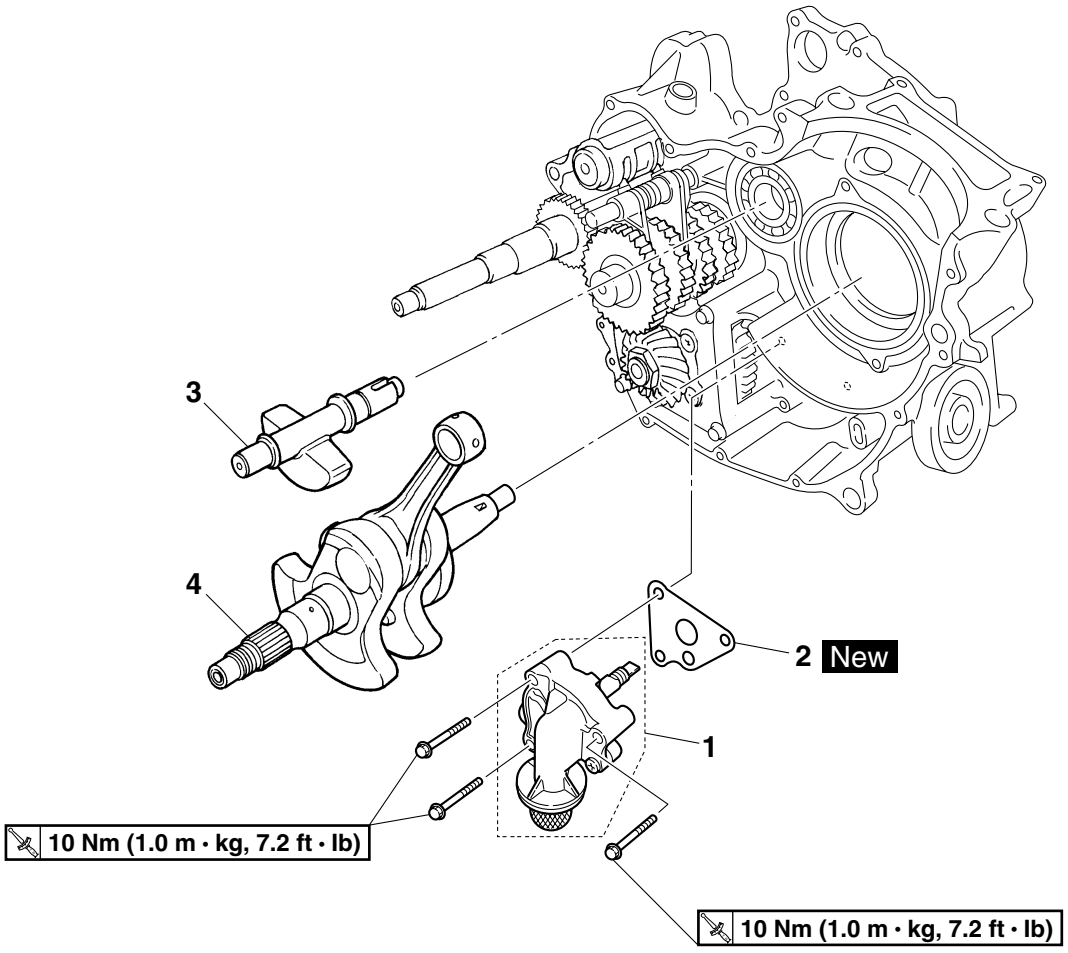
When installing the shift lever 1, align the punch mark “a” on the shift lever 1 with the punch marks “b” on the shift lever 2.



EAS28P1053

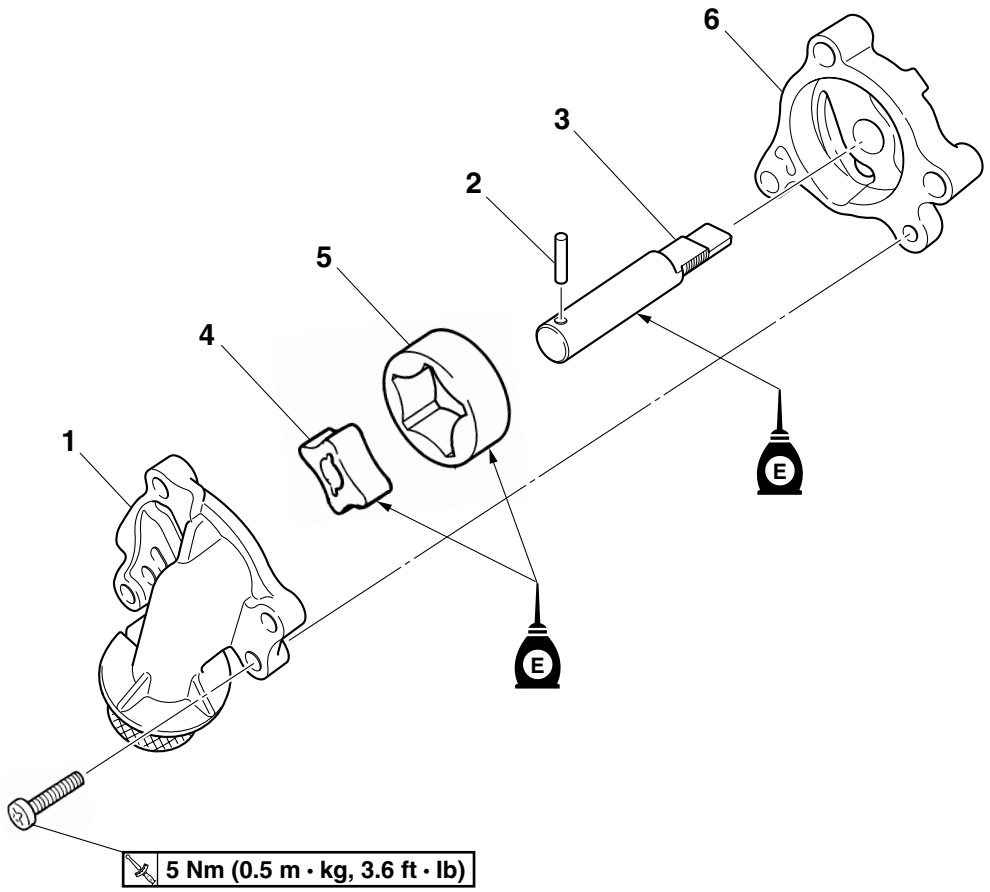
CRANKSHAFT AND OIL PUMP

Removing the crankshaft and oil pump



Order	Job/Parts to remove	Q'ty	Remarks
	Crankcase		Separate. Refer to "CRANKCASE" on page 5-61.
1	Oil pump	1	
2	Gasket	1	
3	Balancer	1	
4	Crankshaft	1	
			For installation, reverse the removal procedure.

Disassembling the oil pump



Order	Job/Parts to remove	Q'ty	Remarks
1	Oil pump housing cover	1	
2	Pin	1	
3	Oil pump shaft	1	
4	Inner rotor	1	
5	Outer rotor	1	
6	Oil pump housing	1	
			For assembly, reverse the disassembly procedure.

EAS28P1054
REMOVING THE CRANKSHAFT

1. Remove:
   • Crankshaft “1”

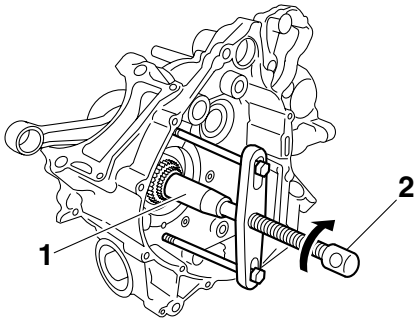
TIP

• Remove the crankshaft with the crankcase separating tool “2”.
• Make sure the crankcase separating tool is centered over the crankshaft.

ECA28P1029
NOTICE

• To protect the end of the crankshaft, place an appropriate sized socket between the crankcase separating tool bolt and the crankshaft.
• Do not tap on the crankshaft.

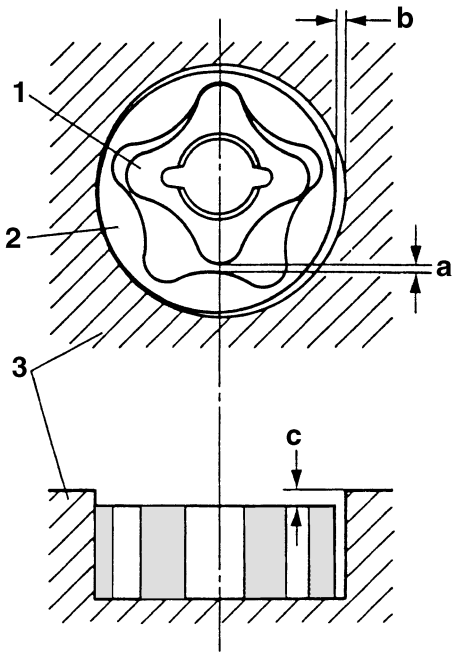
Crankcase separating tool
90890-01135
Crankcase separator
YU-01135-B



EAS24960
CHECKING THE OIL PUMP

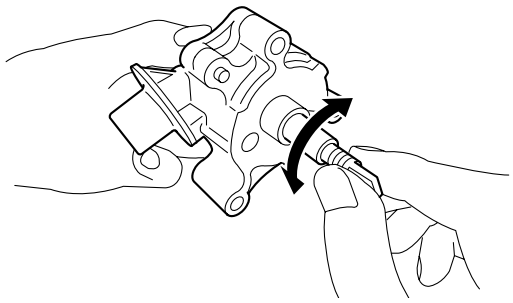
1. Check:
   • Oil pump housing
   • Oil pump housing cover
   Cracks/damage/wear → Replace the defective part(s).
2. Measure:
   • Inner-rotor-to-outer-rotor-tip clearance “a”
   • Outer-rotor-to-oil-pump-housing clearance “b”
   • Oil-pump-housing-to-inner-rotor-and-outer-rotor clearance “c”
   Out of specification → Replace the oil pump.

Inner-rotor-to-outer-rotor-tip clearance
Less than 0.12 mm (0.0047 in)
Limit
0.20 mm (0.0079 in)
Outer-rotor-to-oil-pump-housing clearance
0.090–0.170 mm (0.0035–0.0067 in)
Limit
0.24 mm (0.0094 in)
Oil-pump-housing-to-inner-and-outer-rotor clearance
0.03–0.10 mm (0.0012–0.0039 in)
Limit
0.17 mm (0.0067 in)



1. Inner rotor
2. Outer rotor
3. Oil pump housing

3. Check:
   • Oil pump operation
   Rough movement → Repeat steps (1) and (2) or replace the defective part(s).



EAS24990
CHECKING THE OIL STRAINER
1. Check:
   • Oil strainer
   Damage → Replace.
   Contaminants → Clean with solvent.

EAS28P1055
CHECKING THE CRANKSHAFT
1. Measure:
   • Crankshaft width A “a”
   Out of specification → Replace the crankshaft.

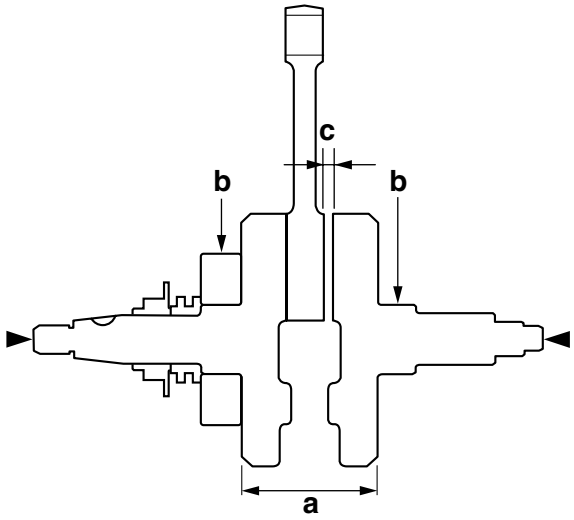
	Width A **74.95–75.00 mm (2.951–2.953 in)**

2. Measure:
   • Crankshaft runout C “b”
   Out of specification → Replace the crankshaft.

	Runout limit C **0.030 mm (0.0012 in)**

3. Measure:
   • Big end side clearance D “c”
   Out of specification → Replace the crankshaft.

	Big end side clearance D **0.350–0.650 mm (0.0138–0.0256 in)**



4. Check:
   • Crankshaft sprocket
   Damage/wear → Replace the crankshaft.
   • Bearing
   Cracks/damage/wear → Replace the crankshaft.
5. Check:
   • Crankshaft journal
   Scratches/wear → Replace the crankshaft.
   • Crankshaft journal oil passage
   Obstruction → Blow out with compressed air.

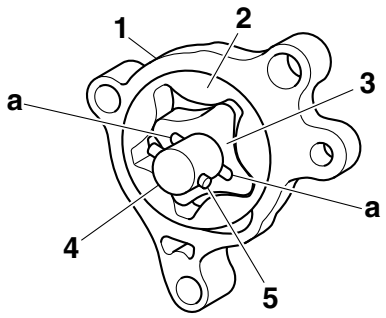
EAS25010
ASSEMBLING THE OIL PUMP
1. Lubricate:
   • Inner rotor
   • Outer rotor
   • Oil pump shaft
   (with the recommended lubricant)

	Recommended lubricant **Engine oil**

2. Install:
   • Oil pump housing “1”
   • Outer rotor “2”
   • Inner rotor “3”
   • Oil pump shaft “4”
   • Pin “5”

TIP

To install the oil pump shaft “4”, align the pin “5” with the groove “a” in the inner rotor “3”.



3. Check:
   • Oil pump operation
   Refer to "CHECKING THE OIL PUMP" on page 5-70.

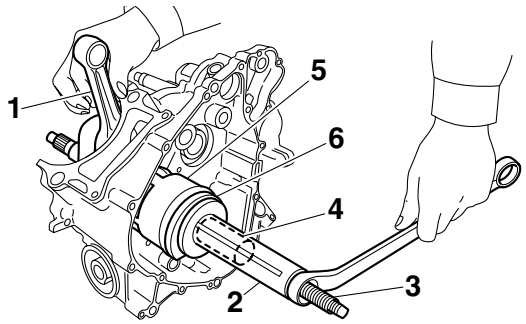
EAS28P1056
INSTALLING THE CRANKSHAFT

1. Install:
   • Crankshaft "1"

TIP

Install the crankshaft assembly with the crankshaft installer pot "2", crankshaft installer bolt "3", adapter (M16) "4", spacer (crankshaft installer) "5" and spacer "6".

Crankshaft installer pot
90890-01274
Installing pot
YU-90058
Crankshaft installer bolt
90890-01275
Bolt
YU-90060
Adapter (M16)
90890-04130
Adapter #13
YM-04059
Spacer (crankshaft installer)
90890-04081
Pot spacer
YM-91044
Spacer
90890-01309
Pot spacer
YU-90059



ECA28P1035

NOTICE

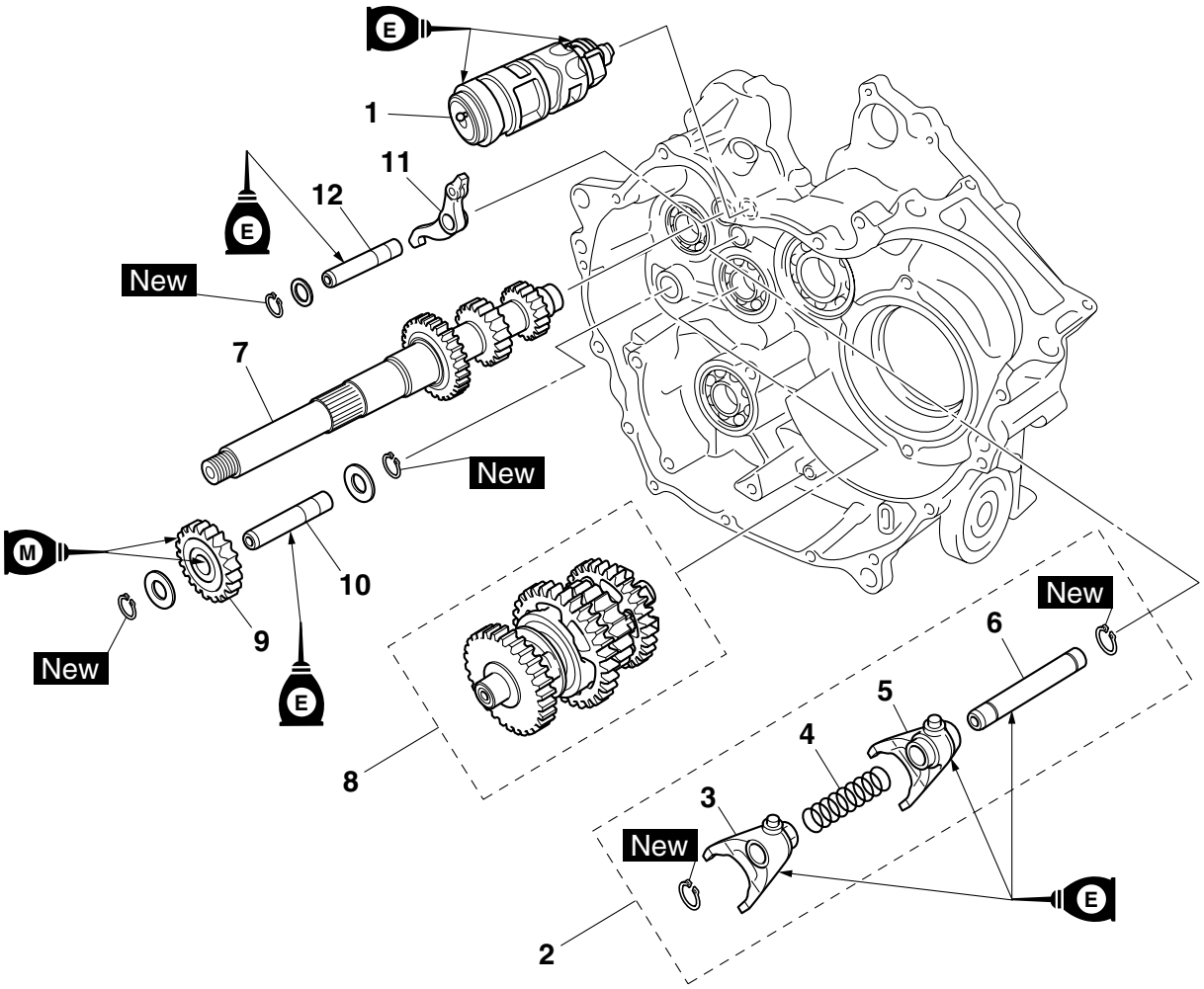
Apply engine oil to each bearing to protect the crankshaft against scratches and to make installation easier.

TIP

Hold the connecting rod at top dead center (TDC) with one hand while turning the nut of the crankshaft installer bolt with the other. Turn the crankshaft installer bolt until the crankshaft assembly bottoms against the bearing.

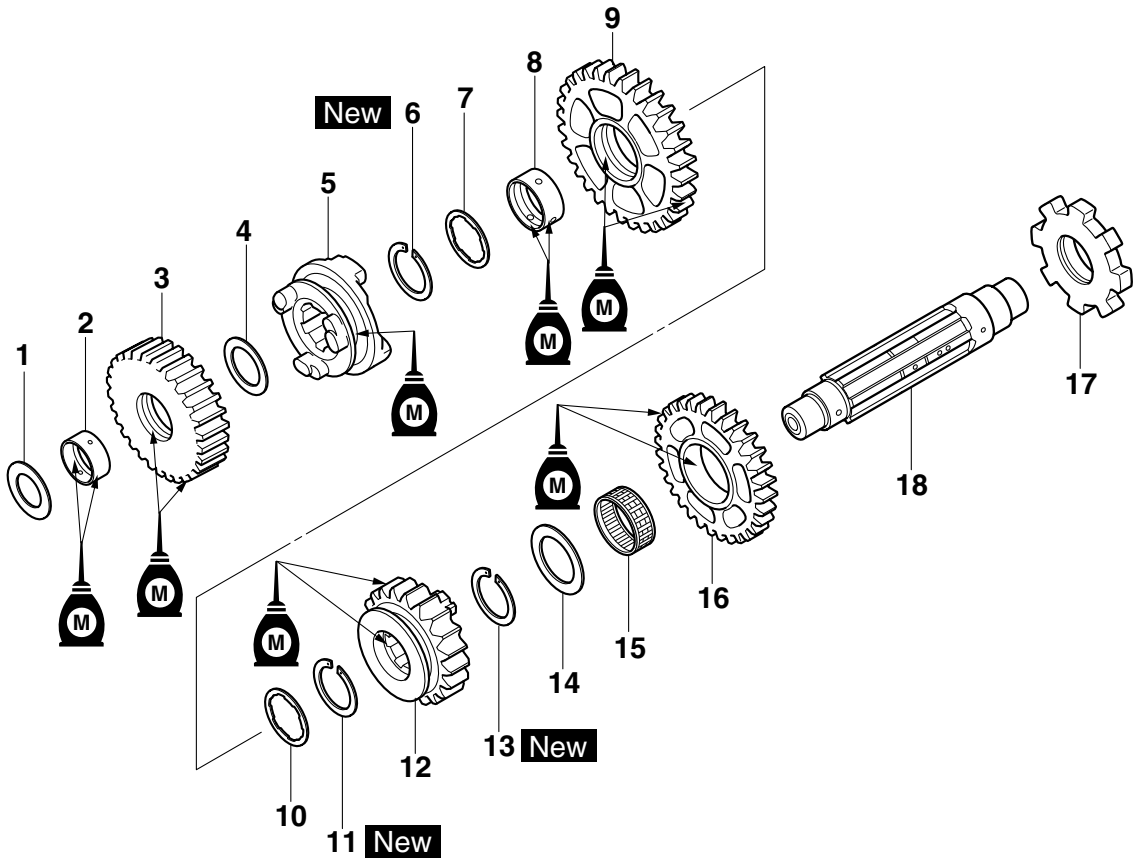
EAS26241
TRANSMISSION

Removing the transmission, shift drum and shift forks



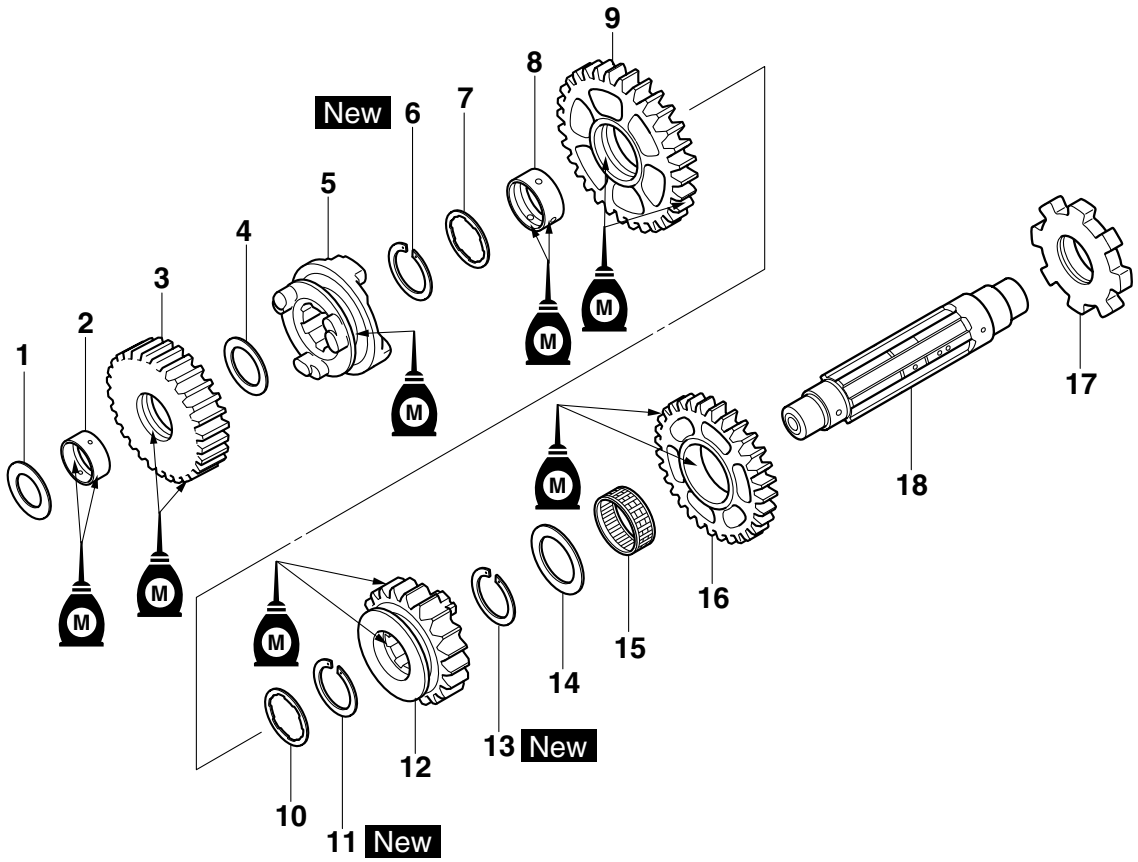
Order	Job/Parts to remove	Q'ty	Remarks
	Crankcase		Separate. Refer to "CRANKCASE" on page 5-61
	Middle driven gear		Refer to "MIDDLE GEAR" on page 5-79
1	Shift drum	1	
2	Shift fork assembly	1	
3	Shift fork "R"	1	
4	Spring	1	
5	Shift fork "L"	1	
6	Shift fork guide bar	1	
7	Secondary shaft	1	
8	Drive axle assembly	1	
9	Reverse idle gear	1	
10	Reverse idle gear shaft	1	
11	Stopper lever	1	
12	Stopper lever shaft	1	
			For installation, reverse the removal procedure.

Disassembling the drive axle assembly



Order	Job/Parts to remove	Q'ty	Remarks
1	Washer	1	
2	Collar	1	
3	High wheel gear	1	
4	Washer	1	
5	Clutch dog	1	
6	Circlip	1	
7	Washer	1	
8	Collar	1	
9	Low wheel gear	1	
10	Washer	1	
11	Circlip	1	
12	Middle drive gear	1	
13	Circlip	1	
14	Washer	1	
15	Bearing	1	
16	Reverse wheel gear	1	
17	Stopper wheel	1	

Disassembling the drive axle assembly



Order	Job/Parts to remove	Q'ty	Remarks
18	Drive axle	1	
			For assembly, reverse the disassembly procedure.

EAS26250
REMOVING THE TRANSMISSION

1. Remove:
   - Shift drum “1”
   - Shift fork assembly “2”

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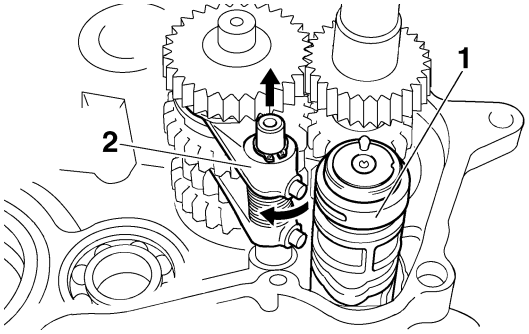
a. Pull out the guide bar from the left crankcase.
b. Push down on the drive shaft, and then slide the shift fork assembly to remove the shift fork cam followers.
c. Remove the shift drum.
d. Remove the shift fork assembly.



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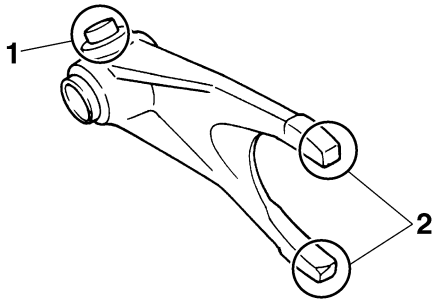
EAS26260
CHECKING THE SHIFT FORKS

The following procedure applies to all of the shift forks.

1. Check:
   - Shift fork cam follower “1”
   - Shift fork pawl “2”
     Bends/damage/scoring/wear → Replace the shift fork.

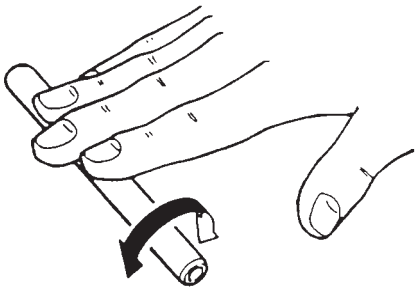


2. Check:
   - Shift fork guide bar
     Roll the shift fork guide bar on a flat surface.
     Bends → Replace.

EWA12840

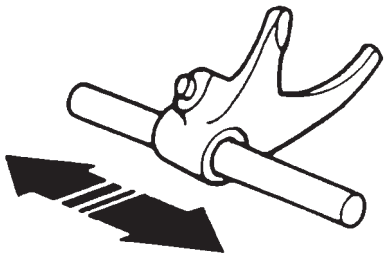
⚠ WARNING

Do not attempt to straighten a bent shift fork guide bar.



319-010

3. Check:
   - Shift fork movement
     (along the shift fork guide bar)
     Rough movement → Replace the shift forks and shift fork guide bar as a set.

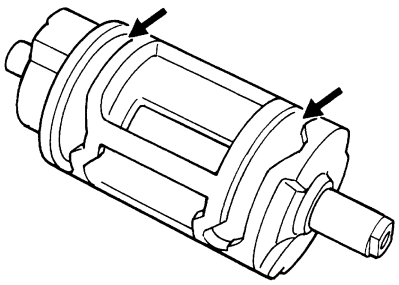


319-011

4. Check:
   - Spring
     Cracks/damage → Replace.

EAS28P1057
CHECKING THE SHIFT DRUM

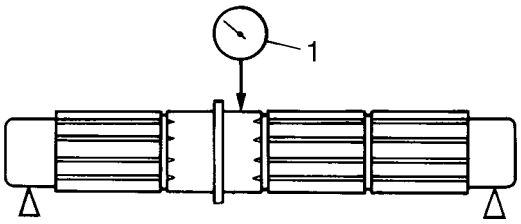
1. Check:
   - Shift drum grooves
     Damage/scratches/wear → Replace the shift drum.



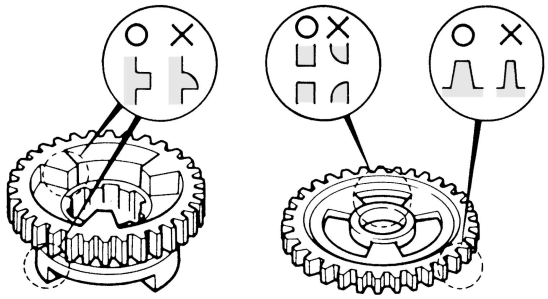
EAS26300
CHECKING THE TRANSMISSION

1. Measure:
   - Drive axle runout
     (with a centering device and dial gauge “1”)
     Out of specification → Replace the drive axle.

	Drive axle runout limit **0.06 mm (0.0024 in)**



2. Check:
   - Transmission gears
     Blue discoloration/pitting/wear → Replace the defective gear(s).
   - Transmission gear dogs
     Cracks/damage/rounded edges → Replace the defective gear(s).



3. Check:
   - Transmission gear engagement
     (each pinion gear to its respective wheel gear)
     Incorrect → Reassemble the transmission axle assemblies.
4. Check:
   - Transmission gear movement
     Rough movement → Replace the defective part(s).
5. Check:
   - Circlips
     Bends/damage/looseness → Replace.

EAS28P1058

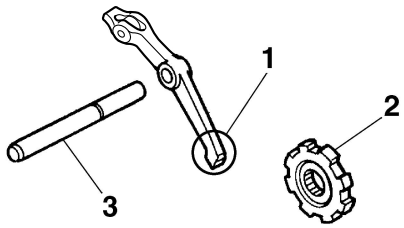
CHECKING THE SECONDARY SHAFT

1. Check:
   - Gear teeth
     Blue discoloration/pitting/wear → Replace.

EAS28P1059

CHECKING THE STOPPER LEVER AND STOPPER WHEEL

1. Check:
   - Stopper lever pawl “1”
     Bends/damage/wear → Replace the stopper lever and stopper wheel as a set.
   - Stopper wheel “2”
     Damage/wear → Replace the stopper wheel and stopper lever as a set.
   - Stopper lever shaft “3”
     Bends/damage/wear → Replace.



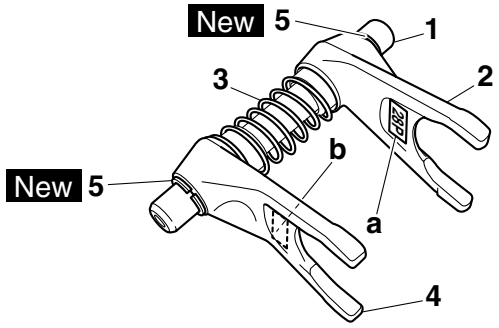
EAS28P1060

ASSEMBLING THE SHIFT FORK ASSEMBLY

1. Install:
   - Shift fork guide bar “1”
   - Shift fork “L” “2”
   - Spring “3”
   - Shift fork “R” “4”
   - Circlip “5” New

TIP

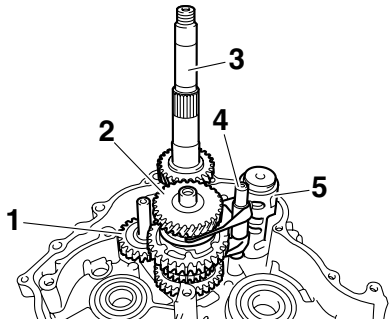
Install the shift forks with “28P” mark “a” and “3B4” mark “b” facing each other.



EAS28P1061

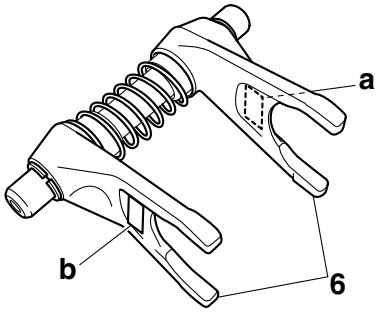
INSTALLING THE SHIFT FORKS AND SHIFT DRUM

1. Install:
   - Stopper lever shaft
   - Stopper lever
   - Reverse idle gear “1”
   - Drive axle assembly “2”
   - Secondary shaft “3”
   - Shift fork assembly “4”
   - Shift drum “5”



TIP

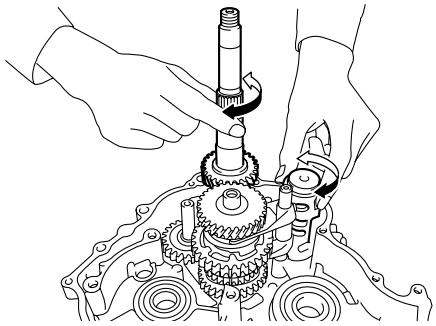
Install the shift forks “6” with the “L” mark “a” and “R” mark “b” facing towards the left and right sides of the crankcase respectively.



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

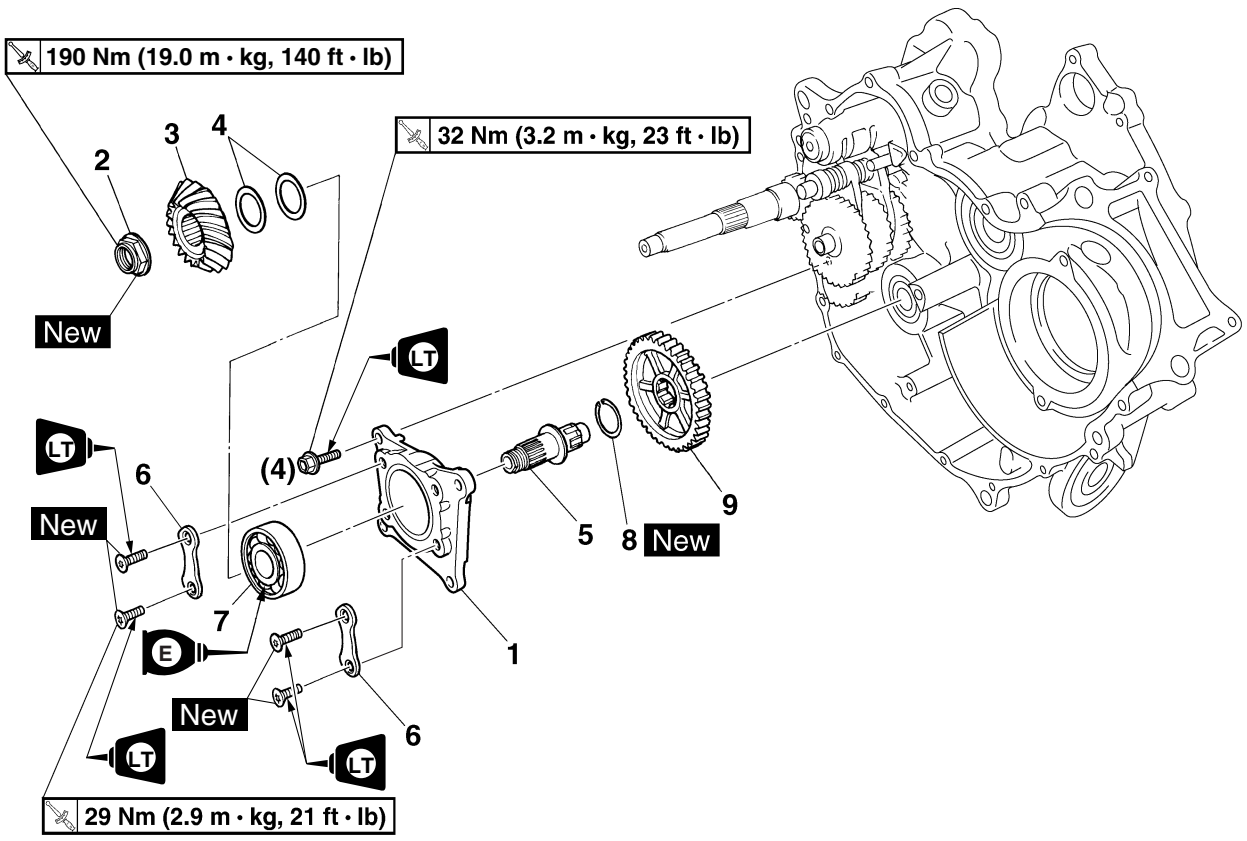
TIP

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



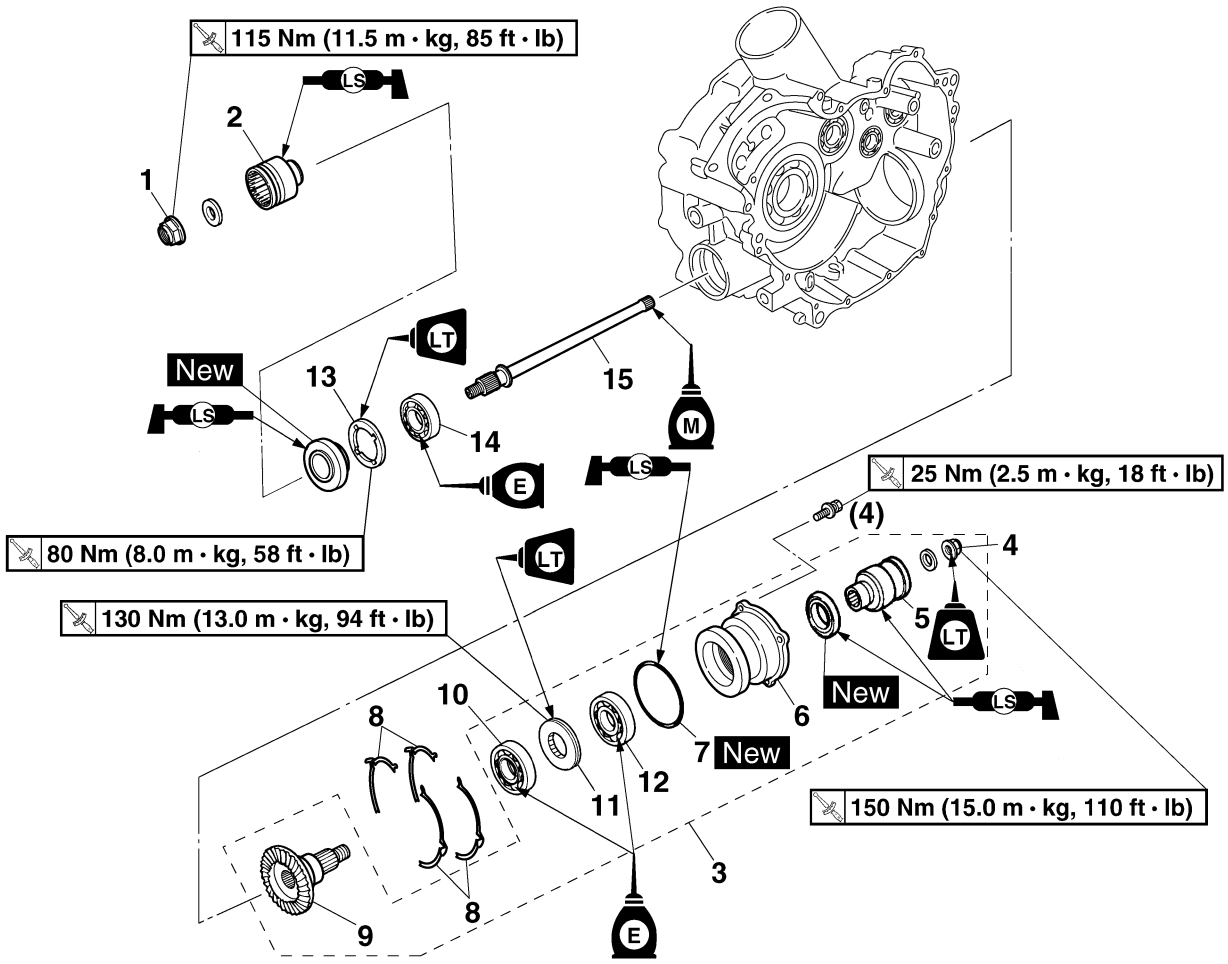
EAS25710
MIDDLE GEAR

Removing the middle drive shaft



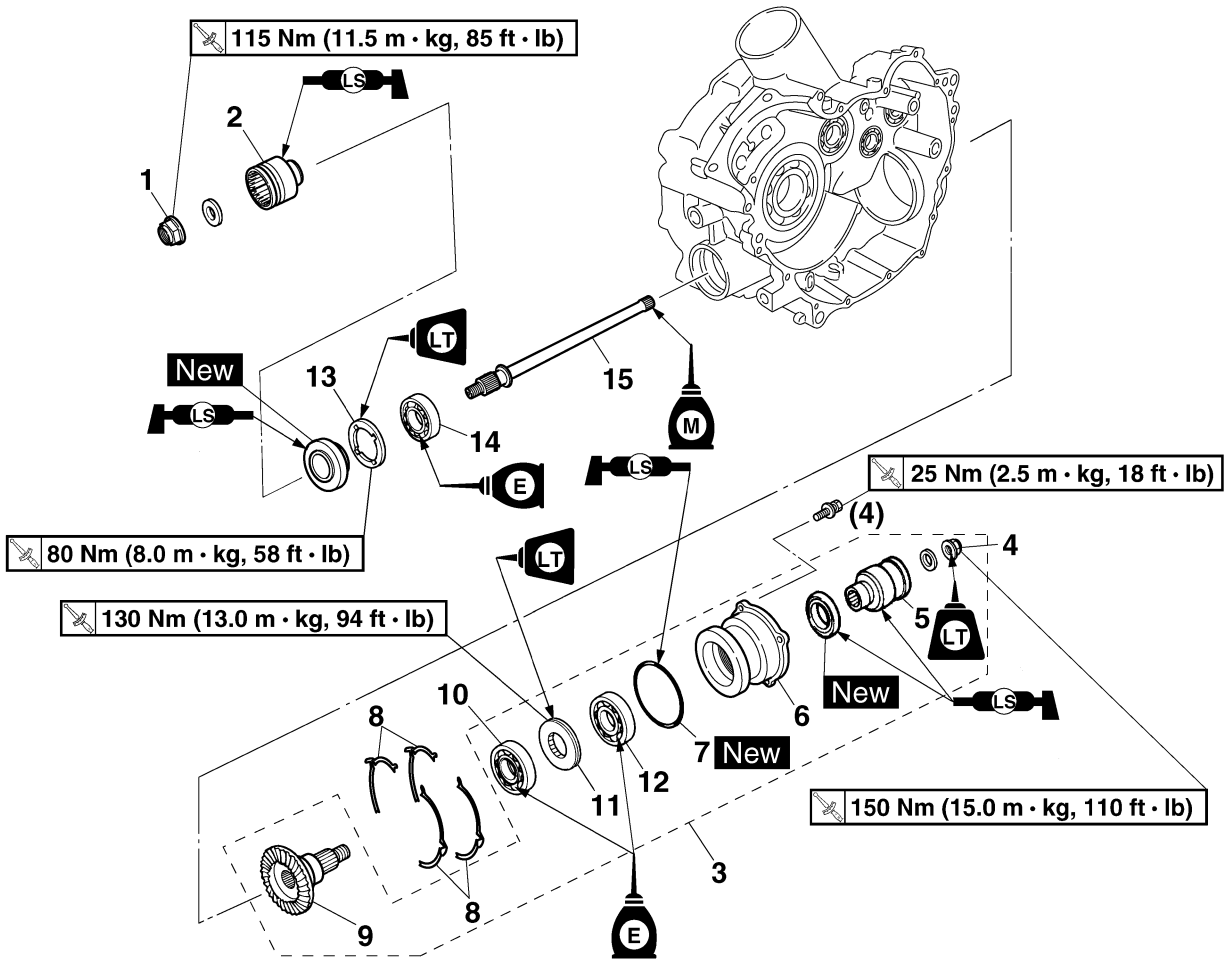
Order	Job/Parts to remove	Q'ty	Remarks
	Crankcase		Separate. Refer to "CRANKCASE" on page 5-61.
1	Bearing housing	1	
2	Middle drive pinion gear nut	1	
3	Middle drive pinion gear	1	
4	Middle drive pinion gear shim		Refer to "ALIGNING THE MIDDLE GEAR" on page 5-87.
5	Middle drive shaft	1	
6	Bearing retainer	2	
7	Bearing	1	
8	Circlip	1	
9	Middle driven gear	1	
			For installation, reverse the removal procedure.

Removing the middle driven shaft



Order	Job/Parts to remove	Q'ty	Remarks
	Crankcase		Separate. Refer to "CRANKCASE" on page 5-61.
1	Front drive shaft yoke nut (middle gear side)	1	
2	Front drive shaft yoke (middle gear side)	1	
3	Middle driven pinion gear assembly	1	
4	Rear drive shaft yoke nut (middle gear side)	1	
5	Rear drive shaft yoke (middle gear side)	1	
6	Bearing housing	1	
7	O-ring	1	
8	Middle driven pinion gear shim		Refer to "ALIGNING THE MIDDLE GEAR" on page 5-87.
9	Middle driven pinion gear	1	
10	Bearing	1	
11	Middle driven pinion gear bearing retainer	1	
12	Bearing	1	
13	Middle driven shaft bearing retainer	1	
14	Bearing	1	

Removing the middle driven shaft

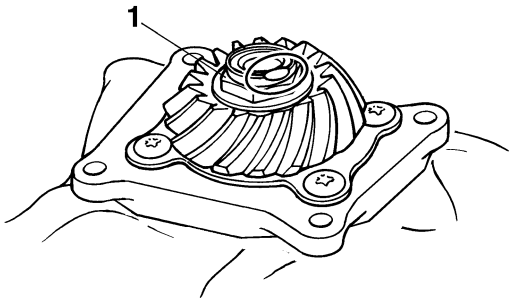


Order	Job/Parts to remove	Q'ty	Remarks
15	Middle driven shaft	1	
			For installation, reverse the removal procedure.

EAS28P1062
REMOVING THE MIDDLE DRIVE SHAFT
1. Straighten:
   • Punched portion of the middle drive pinion gear nut
2. Loosen:
   • Middle drive pinion gear nut "1"

TIP

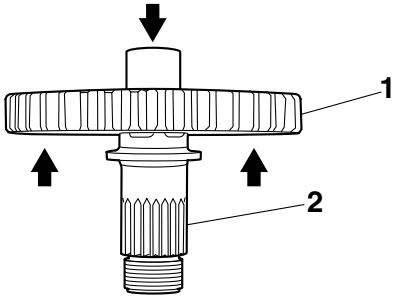
Wrap the middle drive shaft in a folded rag, and then secure it in a vise.



3. Remove:
   • Middle drive pinion gear nut
   • Middle drive pinion gear
   • Shim(s)
4. Remove:
   • Middle driven gear "1"
   • Circlip
   • Middle drive shaft "2"

TIP

Press the middle drive shaft end and remove the middle driven gear.

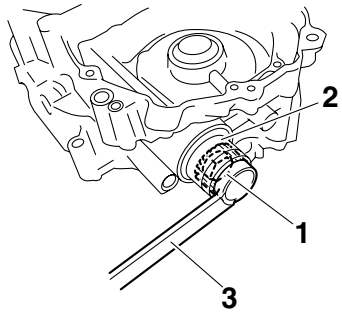


EAS28P1063
REMOVING THE MIDDLE DRIVEN SHAFT
1. Remove:
   • Front drive shaft yoke nut (middle gear side) "1"
   • Washer
   • Front drive shaft yoke (middle gear side) "2"

TIP

Use the coupling gear/middle shaft tool "3" to hold the front drive shaft coupling sleeve.

Coupling gear/middle shaft tool
90890-01229
Gear holder
YM-01229

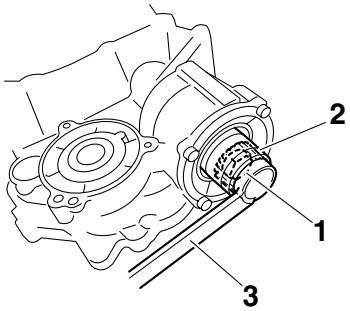


2. Remove:
   • Rear drive shaft yoke nut (middle gear side) "1"
   • Washer
   • Rear drive shaft yoke (middle gear side) "2"

TIP

Use the coupling gear/middle shaft tool "3" to hold the rear drive shaft coupling sleeve.

Coupling gear/middle shaft tool
90890-01229
Gear holder
YM-01229



3. Remove:
   • Bearing housing assembly "1"

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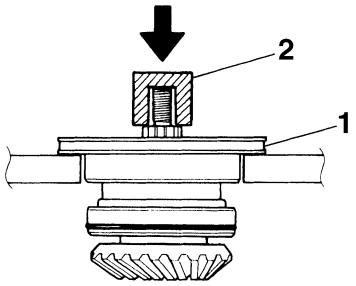
a. Clean the surface of the bearing housing assembly.
b. Place the bearing housing assembly onto a hydraulic press.

ECA28P1036
NOTICE

• Never directly press the middle driven pinion gear end with a hydraulic press, this will result in damage to the middle driven pinion gear thread.

• Install a suitable socket "2" on the middle driven pinion gear end to protect the thread from damage.

c. Press the middle driven pinion gear end and remove the bearing housing.



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4. Remove:
   • Middle driven pinion gear bearing retainer
   • Bearing

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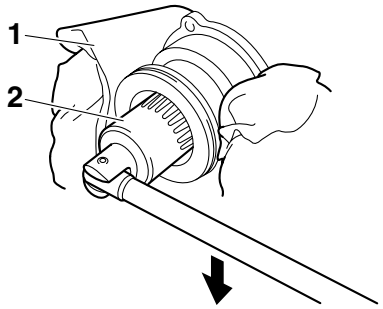
a. Wrap the bearing housing in a folded rag "1", and then secure the bearing housing edge in a vise.
b. Attach the bearing retainer wrench "2".

Bearing retainer wrench
90890-04128
Middle gear bearing retainer
YM-04128

ECA28P1037

NOTICE

The middle driven pinion gear bearing retainer has left-handed threads. To loosen the retainer, turn it clockwise.



c. Remove the bearing retainer and bearing.

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5. Remove:
   • Oil seal "1"
   • Middle driven shaft bearing retainer "2"

TIP

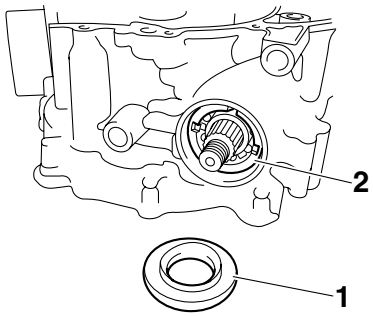
Attach the ring nut wrench "3".

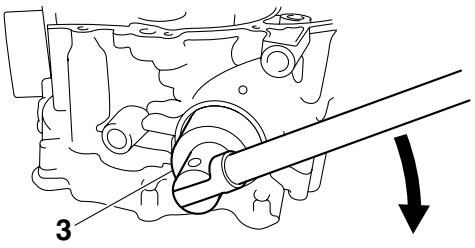
Ring nut wrench
90890-01430
YM-38404

ECA28P1038

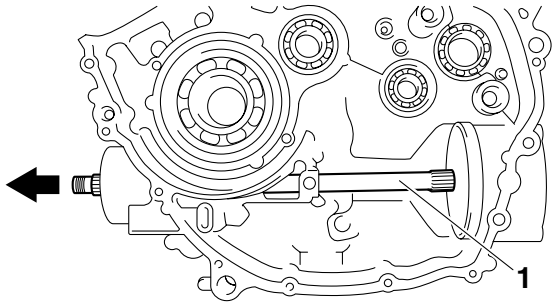
NOTICE

The middle driven shaft bearing retainer has left-handed threads. To loosen the retainer turn it clockwise.





6. Remove:
   • Middle driven shaft "1" (with bearing)



EAS28P1064

CHECKING THE PINION GEARS

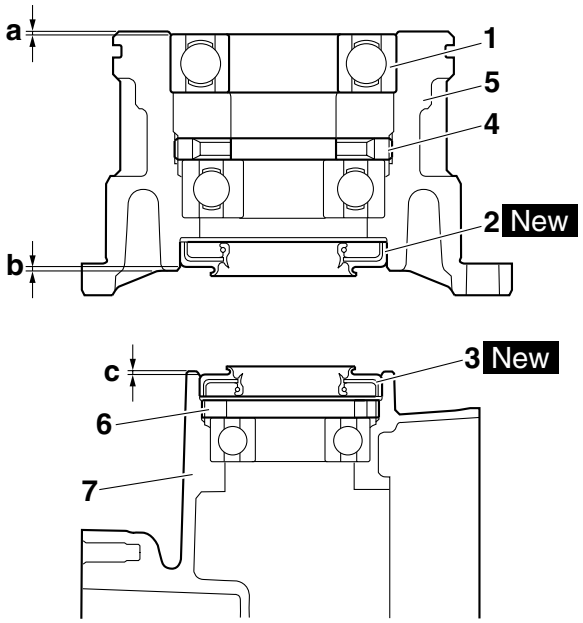
1. Check:
   • Drive pinion gear teeth
   • Driven pinion gear teeth
   Pitting/galling/wear → Replace.
2. Check:
   • O-ring
   Damage → Replace.

• Bearings
Pitting/damage → Replace.

EAS28P1065
INSTALLING THE BEARING AND OIL SEALS

1. Install:
• Bearing “1”
• Oil seal “2” New
• Oil seal “3” New

Installed depth of bearing “a”
0.9–1.4 mm (0.035–0.055 in)
Installed depth of oil seal “b”
1.0–1.5 mm (0.039–0.059 in)
Installed depth of oil seal “c”
1.0–1.5 mm (0.039–0.059 in)



4. Middle drive pinion gear bearing retainer
5. Bearing housing
6. Middle driven shaft bearing retainer
7. Crankcase

EAS28P1066
INSTALLING THE MIDDLE DRIVEN SHAFT

1. Install:
• Middle driven shaft bearing retainer “1”

Middle driven shaft bearing retainer
80 Nm (8.0 m·kg, 58 ft·lb)
LOCTITE®

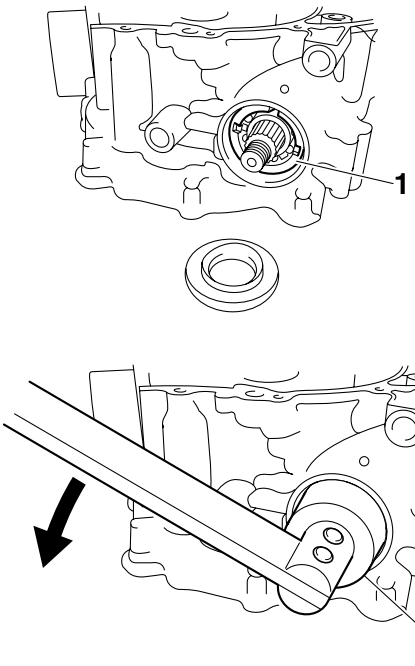
TIP

Attach the ring nut wrench “2”.

Ring nut wrench
90890-01430
YM-38404

ECA28P1039
NOTICE

The middle driven shaft bearing retainer has left-handed threads. To tighten the retainer turn it counterclockwise.



2. Install:
• Middle driven pinion gear bearing retainer “1”

a. Wrap the bearing housing in a folded rag, and then secure the bearing housing edge in a vise.
b. Attach the bearing retainer wrench “2”.

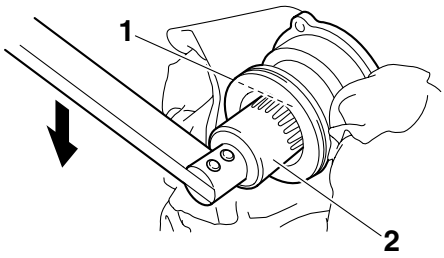
Bearing retainer wrench
90890-04128
Middle gear bearing retainer
YM-04128

c. Tighten the bearing retainer.

Bearing retainer
130 Nm (13.0 m·kg, 94 ft·lb)
LOCTITE®

ECA28P1040
NOTICE

The middle driven pinion gear bearing retainer has left-handed threads. To tighten the retainer turn it counterclockwise.



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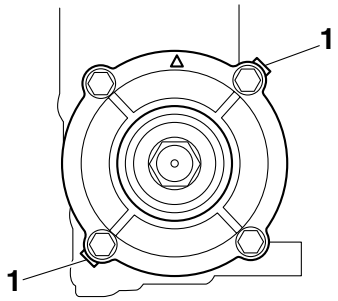
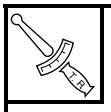
3. Install:
   • Middle driven pinion gear shim(s) “1”
   • Bearing housing

TIP

Install the shim(s) so that the tabs are positioned as shown in the illustration.



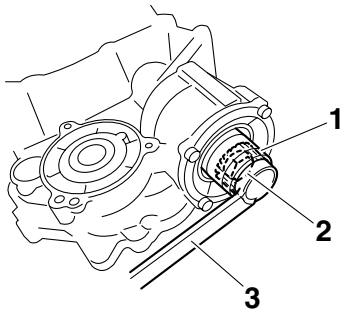
4. Install:
   • Rear drive shaft yoke (middle gear side) “1”
   • Washer
   • Rear drive shaft yoke nut (middle gear side) “2”

	**Rear drive shaft yoke nut (middle gear side)** **150 Nm (15.0 m·kg, 110 ft·lb)** **LOCTITE®**

TIP

Use the coupling gear/middle shaft tool “3” to hold the coupling yoke.

	Coupling gear/middle shaft tool **90890-01229** **Gear holder** **YM-01229**



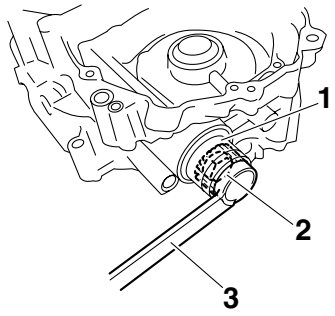
5. Install:
   • Front drive shaft yoke (middle gear side) “1”
   • Washer
   • Front drive shaft yoke nut (middle gear side) “2”

	Front drive shaft yoke nut (middle gear side) **115 Nm (11.5 m·kg, 85 ft·lb)**

TIP

Use the coupling gear/middle shaft tool “3” to hold the coupling yoke.

	Coupling gear/middle shaft tool **90890-01229** **Gear holder** **YM-01229**

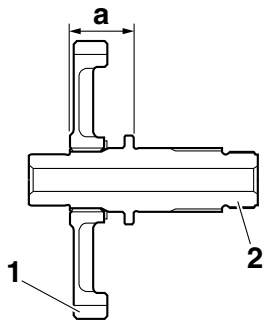


EAS28P1067

INSTALLING THE MIDDLE DRIVE SHAFT

1. Install:
   • Circlip
   • Middle driven gear “1”
   (to the middle drive shaft “2”)

	Installed depth of middle driven gear “a” **24.7–24.9 mm (0.97–0.98 in)**



2. Tighten:
   - Bearing retainer bolts “1” New
   - Middle drive pinion gear nut “2” New

Bearing retainer bolt
29 Nm (2.9 m·kg, 21 ft·lb)
LOCTITE®
Middle drive pinion gear nut
190 Nm (19.0 m·kg, 140 ft·lb)

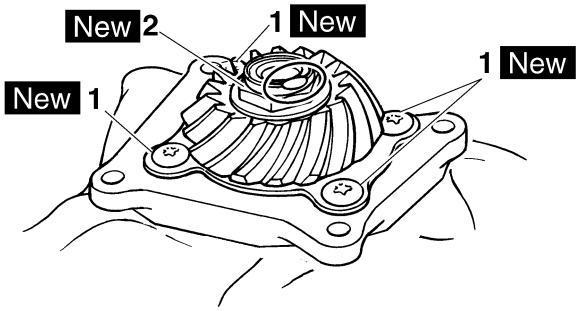
TIP

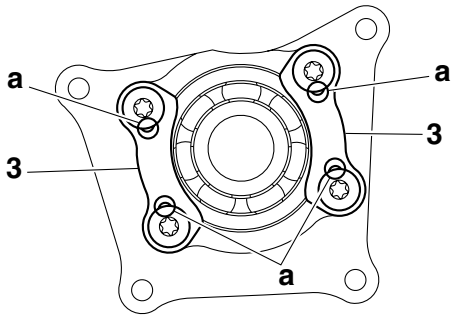
Wrap the middle drive shaft in a folded rag, and then secure it in a vise.

3. Lock the threads with a drift punch.

TIP

Stake the bearing retainer bolts at the cutouts “a” in the bearing retainers “3”.





EAS25890

MEASURING THE MIDDLE GEAR BACKLASH

1. Measure:
   - Middle gear backlash
     Out of specification → Refer to “ALIGNING THE MIDDLE GEAR” on page 5-87.

Middle gear backlash
0.10–0.30 mm (0.004–0.012 in)

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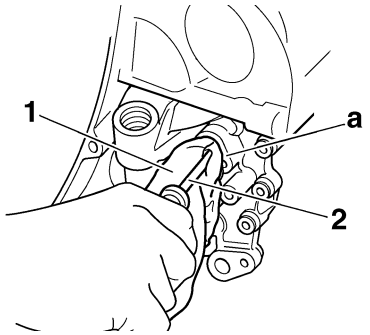
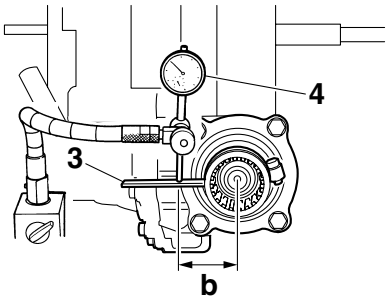
a. Temporarily install the left crankcase.
b. Wrap a rag “1” around a screwdriver “2”, and then insert it into the installation hole “a” of the left crankcase speed sensor to hold the middle driven gear.



c. Attach the final gear backlash band “3” and dial gauge “4”.

Final gear backlash band
90890-01511
Middle drive gear lash tool
YM-01230



b. 45 mm (1.8 in)

d. Measure the gear lash while rotating the middle driven shaft back and forth.

TIP

Measure the gear lash at 4 positions. Rotate the middle driven gear 90° each time.

e. If the gear lash is incorrect, adjust the gear lash by middle driven pinion gear shims and/or middle drive pinion gear shim(s).

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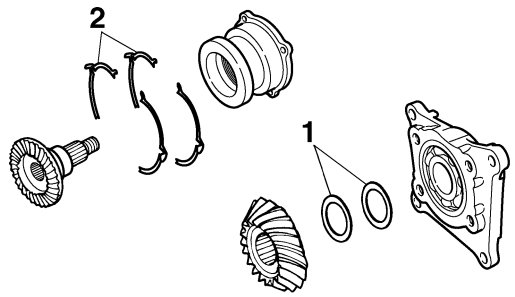
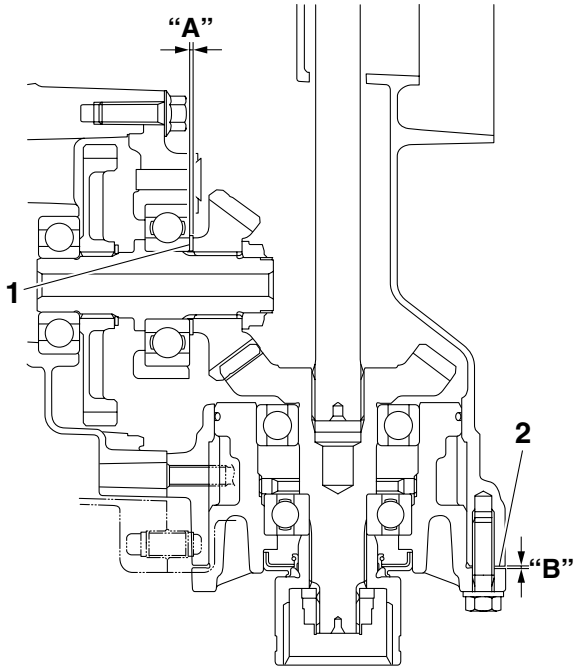
EAS25930
ALIGNING THE MIDDLE GEAR

TIP

Aligning the middle gear is necessary when any of the following parts are replaced:
- Crankcase
- Middle drive gear
- Middle driven gear
- Middle driven shaft bearing housing

1. Select:
   - Middle drive pinion gear shim(s) “1”
   - Middle driven pinion gear shim(s) “2”





A. Middle drive pinion gear shim thickness
B. Middle driven pinion gear shim thickness

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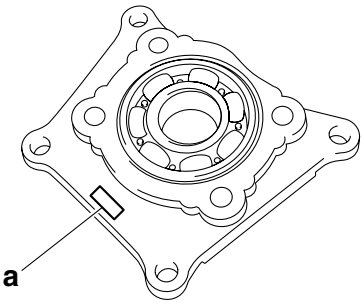
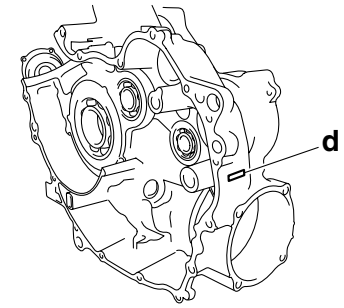
a. Position the middle gears with the appropriate shim(s) that has had its respective thickness calculated from information marked on the crankcase, middle driven shaft bearing housing and middle driven pinion gear.
b. To find middle drive pinion gear shim thickness “A”, use the following formula.

Middle drive pinion gear shim thickness
“A” = “e” + “d” - “b” - “c” - “a”

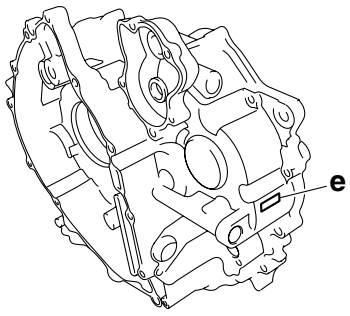
“a” = a numeral (usually a decimal number) on the bearing housing is either added to or subtracted from “0.6”
“b” = 17.0
“c” = 55.0
“d” = a numeral (usually a decimal number) on the right crankcase specifies a thickness of “65.0”
“e” = a numeral (usually a decimal number) on the left crankcase specifies a thickness of “9.0”
Example:
If the bearing housing is marked “-02”,
“a” is 0.58



“b” is 17.0
“c” is 55.0
If the right crankcase is marked “64.97”,
“d” is 64.97



If the left crankcase is marked “9.01”,
“e” is 9.01



Therefore, "A" is 1.40.
"A" = 9.01 + 64.97 - 17.0 - 55.0 - 0.58 = 1.40
Round off hundredths digit and select appropriate shim(s).
In the above example, the calculated shim thickness is 1.40 mm. The following chart instructs you, however, to round off 0 to 0.

Hundredth	Rounded value
0, 1, 2	0
3, 4, 5, 6, 7	5
8, 9	10

Shims are supplied in the following thicknesses.

Middle drive pinion gear shim Thickness (mm)
0.50 0.55 0.60 0.70 0.80 0.90 1.00

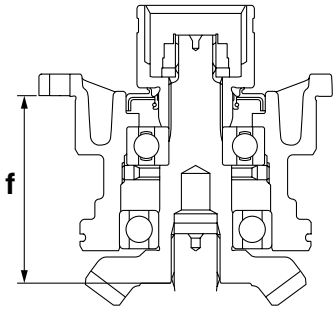
c. To find middle driven pinion gear shim thickness "B", use the following formula.

Middle driven pinion gear shim thickness
"B" = "f" - "g" + "h" - "i" - "j" - 0.05

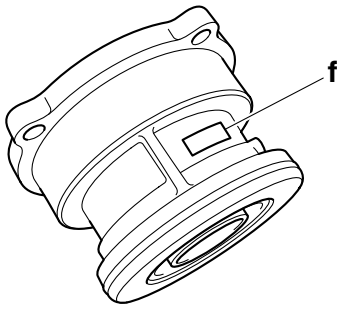
"f" = a numeral (usually a decimal number) on the bearing housing is either added to or subtracted from "77.5"

TIP

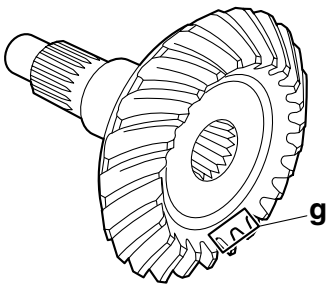
After replacing any part in the middle driven pinion gear assembly, the overall length of the assembly will change. Therefore, be sure to measure distance "f" to select the correct middle driven pinion gear shim thickness.



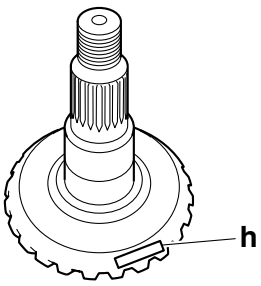
"g" = a numeral (usually a decimal number) on the middle driven pinion gear is either added to or subtracted from "49.0"
"h" = a numeral (usually a decimal number) on the middle driven pinion gear is either added to or subtracted from "80.5"
"i" = a numeral (usually a decimal number) on the left crankcase specifies a thickness of "99.98"
"j" = a numeral (usually a decimal number) on the right crankcase specifies a thickness of "8.12"
Example:
If the bearing housing is marked "+03",
"f" is 77.53



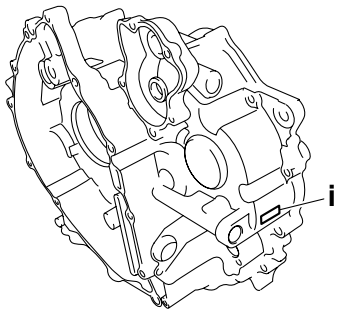
If the driven pinion gear is marked "+0",
"g" is 49.0



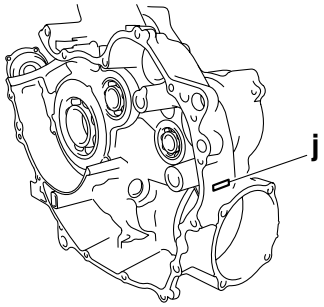
If the driven pinion gear is marked "-10",
"h" is 80.40



If the left crankcase is marked “99.99”,
“i” is 99.99



If the right crankcase is marked “8.17”,
“j” is 8.17



Therefore, “B” is 0.72.
“B” = 77.53 - 49.0 + 80.40 - 99.99 - 8.17 - 0.05 = 0.72
Round off hundredth digit and select appropriate shim(s).
In the example above, the calculated shim thickness is 0.72 mm. The chart instructs you, however, to round off 2 to 0.

Hundredth	Rounded value
0, 1, 2	0
3, 4, 5, 6, 7	5
8, 9	10

Shims are supplied in the following thicknesses.

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

COOLING SYSTEM

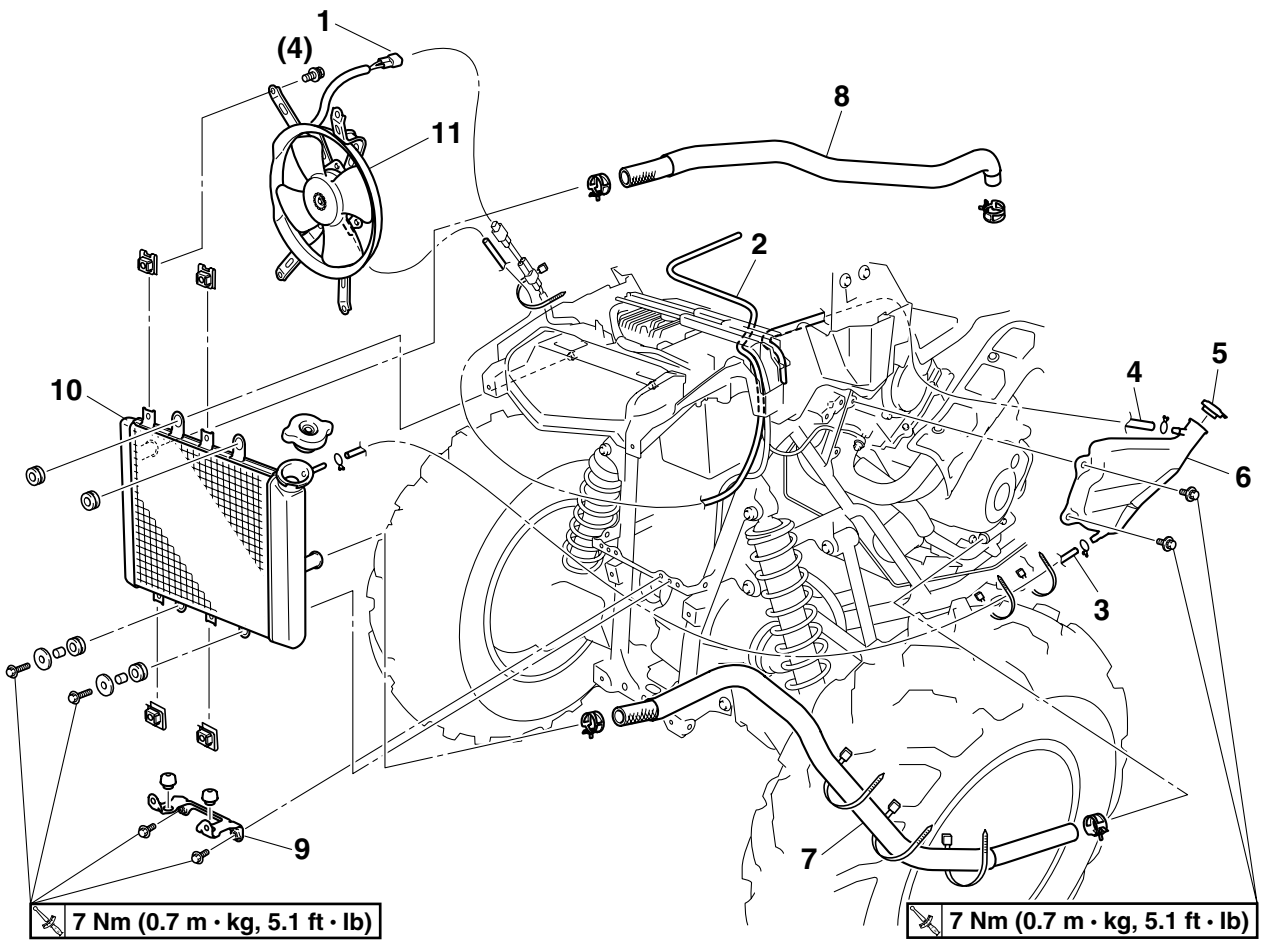
RADIATOR 6-1
CHECKING THE RADIATOR 6-3
INSTALLING THE RADIATOR 6-3

THERMOSTAT 6-4
CHECKING THE THERMOSTAT 6-5
INSTALLING THE THERMOSTAT 6-5

WATER PUMP 6-7
DISASSEMBLING THE WATER PUMP 6-9
CHECKING THE WATER PUMP 6-9
ASSEMBLING THE WATER PUMP 6-9

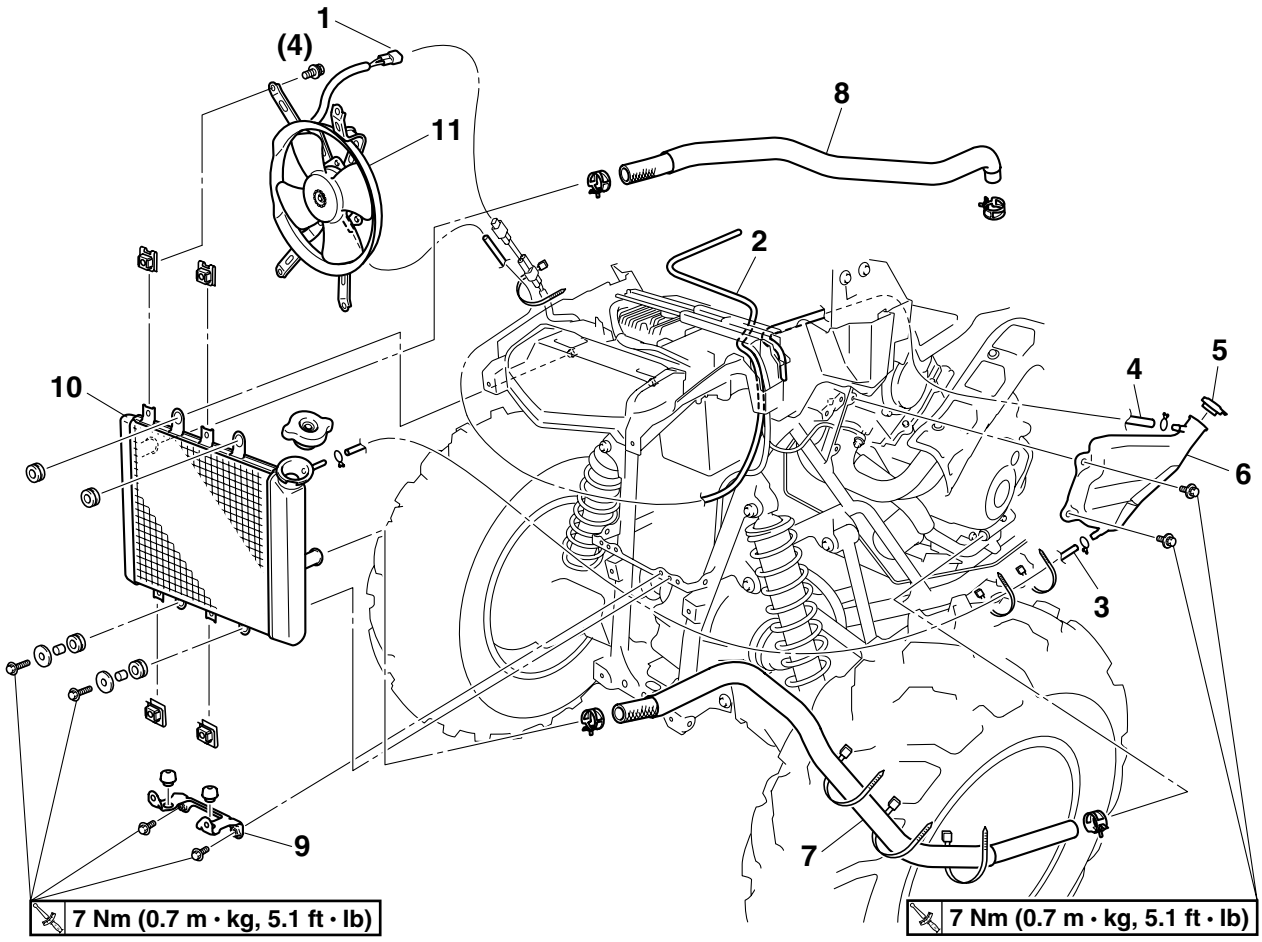
EAS26380
RADIATOR

Removing the radiator



Order	Job/Parts to remove	Q'ty	Remarks
	Front fenders/Front guard/Left footrest board/Air filter case		Refer to "GENERAL CHASSIS" on page 4-1.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-17.
1	Radiator fan motor coupler	1	Disconnect.
2	Radiator fan motor breather hose	1	
3	Coolant reservoir hose	1	
4	Coolant reservoir breather hose	1	
5	Coolant reservoir cap	1	
6	Coolant reservoir	1	
7	Radiator outlet hose	1	
8	Radiator inlet hose	1	
9	Radiator bracket	1	
10	Radiator	1	

Removing the radiator



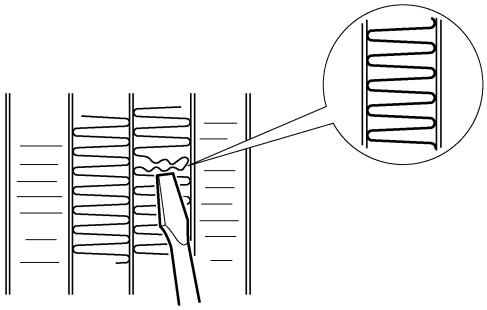
Order	Job/Parts to remove	Q'ty	Remarks
11	Radiator fan	1	
			For installation, reverse the removal procedure.

EAS26390
CHECKING THE RADIATOR

1. Check:
   • Radiator fins
   Obstruction → Clean.
   Apply compressed air to the rear of the radiator.
   Damage → Repair or replace.

TIP

Straighten any flattened fins with a thin, flat-head screwdriver.



2. Check:
   • Radiator hoses
   Cracks/damage → Replace.
3. Measure:
   • Radiator cap opening pressure
   Below the specified pressure → Replace the radiator cap.

Radiator cap opening pressure
93.3–122.7 kPa (0.95–1.25 kgf/cm², 13.5–17.8 psi)

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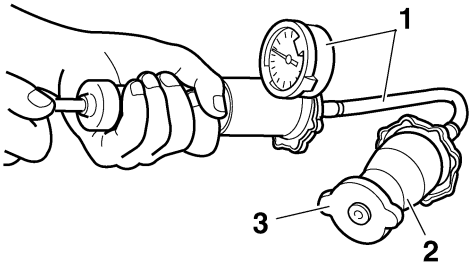
a. Install the radiator cap tester "1" and radiator cap tester adapter "2" to the radiator cap "3".

Radiator cap tester
90890-01325
Radiator pressure tester
YU-24460-01
Radiator cap tester adapter
90890-01352
Radiator pressure tester adapter
YU-33984



b. Apply the specified pressure for ten seconds and make sure there is no drop in pressure.

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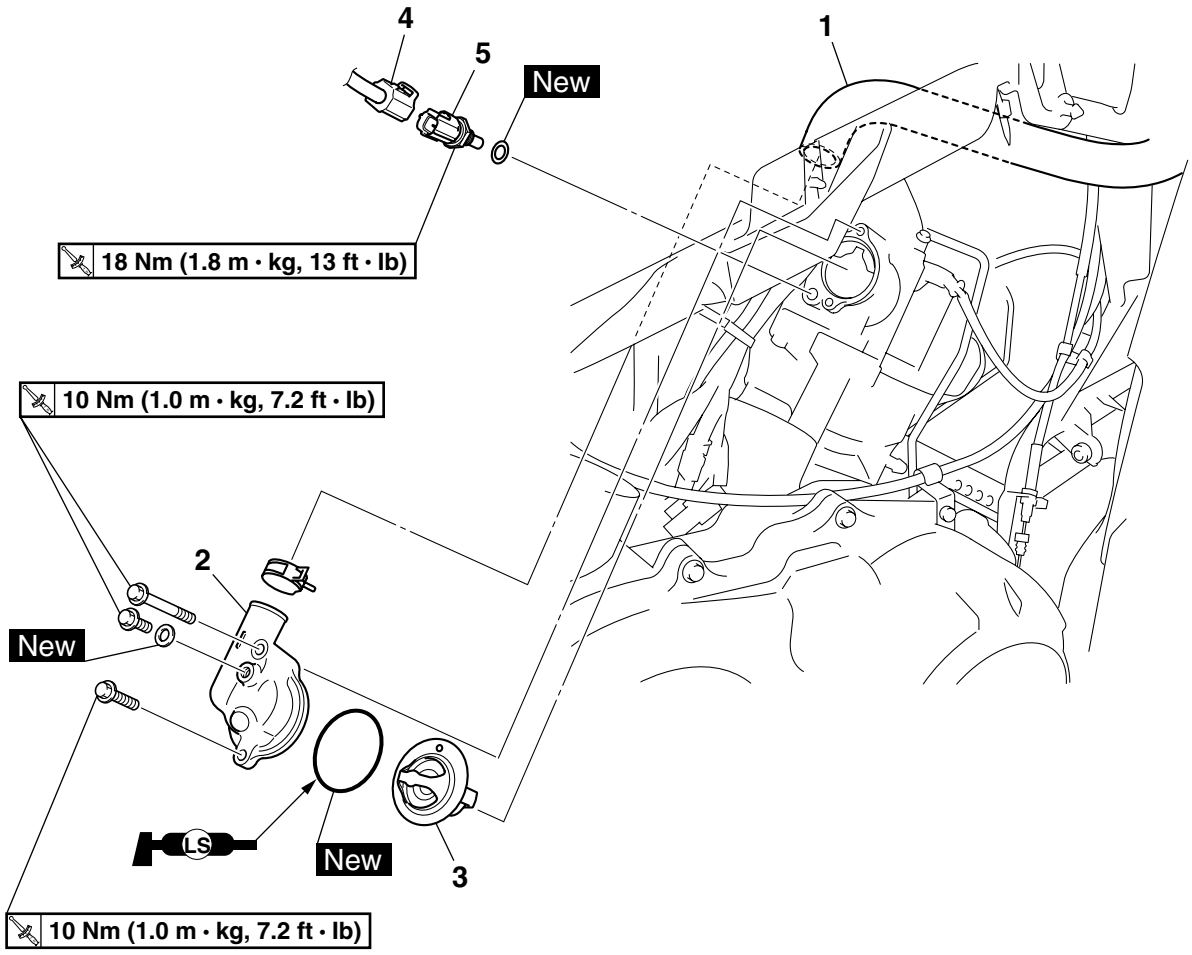
4. Check:
   • Radiator fan
   Damage → Replace.
   Malfunction → Check and repair.
   Refer to "COOLING SYSTEM" on page 9-27.

EAS26400
INSTALLING THE RADIATOR

1. Fill:
   • Cooling system
   (with the specified amount of the recommended coolant)
   Refer to "CHANGING THE COOLANT" on page 3-17.
2. Check:
   • Cooling system
   Leaks → Repair or replace any faulty part.
3. Measure:
   • Radiator cap opening pressure
   Below the specified pressure → Replace the radiator cap.
   Refer to "CHECKING THE RADIATOR" on page 6-3.

EAS26440
THERMOSTAT

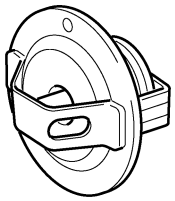
Removing the thermostat



Order	Job/Parts to remove	Q'ty	Remarks
	Air filter case		Refer to "GENERAL CHASSIS" on page 4-1.
	V-belt cooling exhaust duct/V-belt cooling intake duct		Refer to "ENGINE REMOVAL" on page 5-1.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-17".
1	Radiator inlet hose	1	Disconnect.
2	Thermostat cover	1	
3	Thermostat	1	
4	Coolant temperature sensor coupler	1	Disconnect.
5	Coolant temperature sensor	1	
			For installation, reverse the removal procedure.

EAS26450
CHECKING THE THERMOSTAT

1. Check:
   - Thermostat
     Does not open at 50–54 °C (122–129.2 °F) → Replace.



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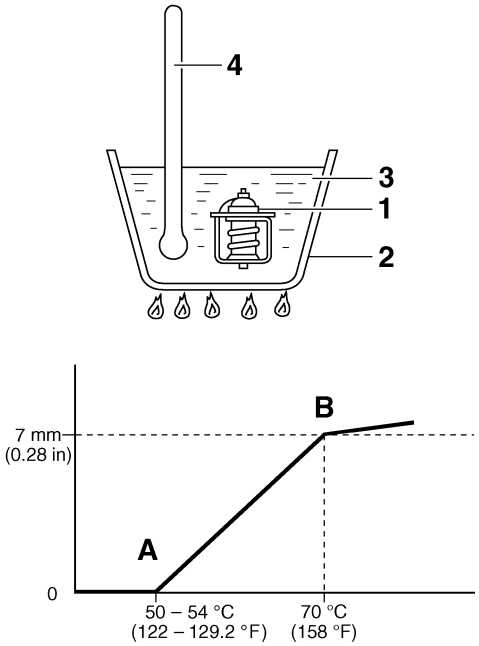
a. Suspend the thermostat "1" in a container "2" filled with water.
b. Slowly heat the water "3".
c. Place a thermometer "4" in the water.
d. While stirring the water, observe the thermostat and the temperature indicated on the thermometer.



A. Fully closed
B. Fully open

TIP

If the accuracy of the thermostat is in doubt, replace it. A faulty thermostat could cause serious overheating or overcooling.

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2. Check:
   - Thermostat housing cover
   - Thermostat housing (cylinder head)
     Cracks/damage → Replace.

EAS26480
INSTALLING THE THERMOSTAT

1. Install:
   - Copper washer New
   - Coolant temperature sensor

	Coolant temperature sensor 18 Nm (1.8 m·kg, 13 ft·lb)

ECA28P1016

NOTICE

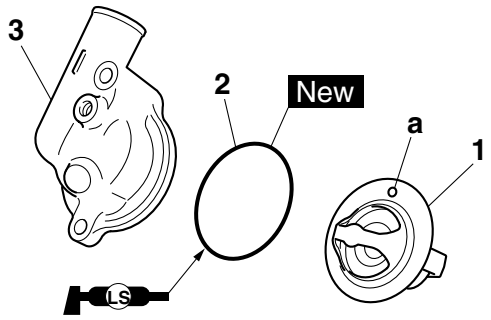
Use extreme care when handling the coolant temperature sensor. Replace any part that was dropped or subjected to a strong impact.

2. Install:
   - Thermostat "1"
   - O-ring "2" New
   - Thermostat cover "3"

	Thermostat cover bolt 10 Nm (1.0 m·kg, 7.2 ft·lb)

TIP

Install the thermostat with its breather hole "a" facing up.

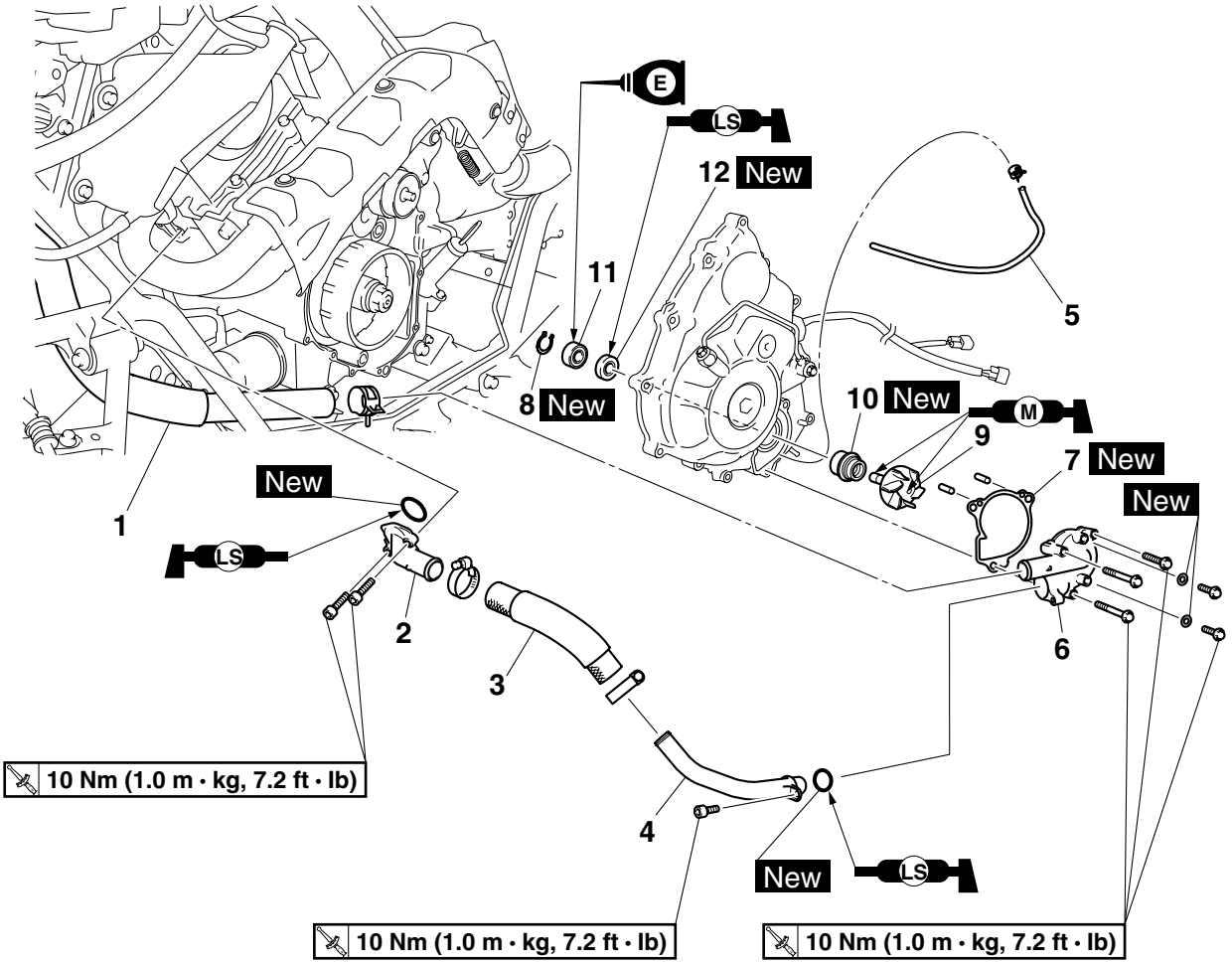


3. Fill:
   - Cooling system
     (with the specified amount of the recommended coolant)
     Refer to "CHANGING THE COOLANT" on page 3-17.
4. Check:
   - Cooling system
     Leaks → Repair or replace any faulty part.

5. Measure:
   • Radiator cap opening pressure
   Below the specified pressure → Replace the radiator cap.
   Refer to “CHECKING THE RADIATOR” on page 6-3.

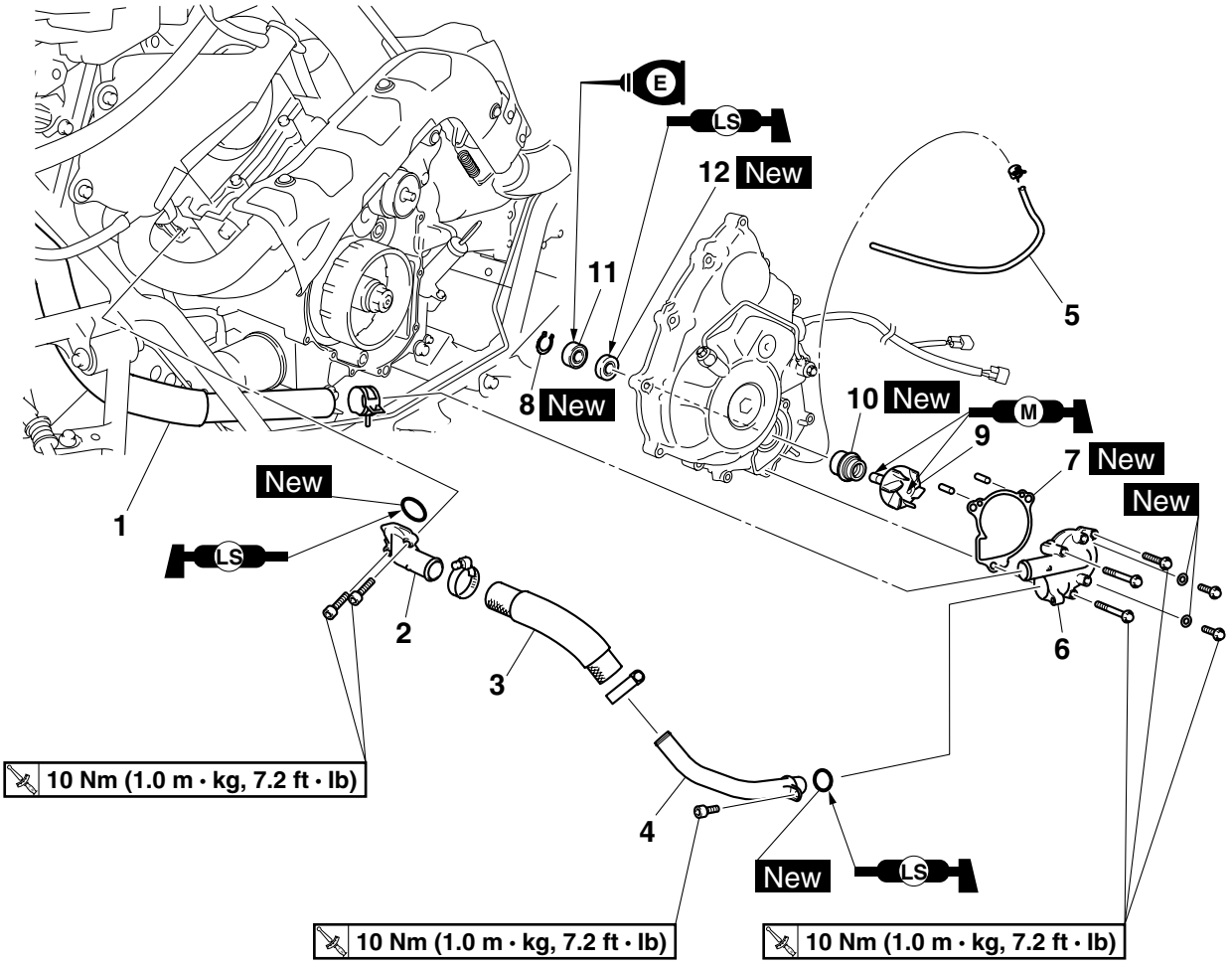
EAS26500
WATER PUMP

Removing the water pump



Order	Job/Parts to remove	Q'ty	Remarks
	Left footrest board/Left front fender		Refer to "GENERAL CHASSIS" on page 4-1.
	AC magneto cover		Refer to "AC MAGNETO AND STARTER CLUTCH" on page 5-34.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-17.
1	Radiator outlet hose	1	Disconnect.
2	Water jacket joint	1	
3	Water pump outlet hose	1	
4	Water pump outlet pipe	1	
5	Water pump breather hose	1	
6	Water pump housing	1	
7	Gasket	1	
8	Circlip	1	
9	Impeller shaft	1	
10	Water pump seal	1	

Removing the water pump



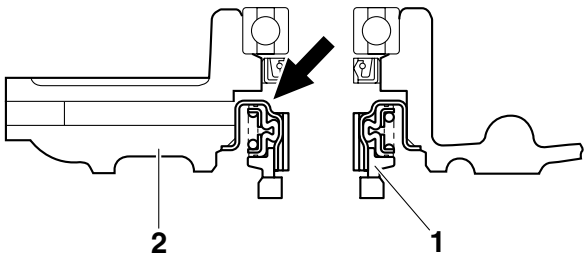
Order	Job/Parts to remove	Q'ty	Remarks
11	Bearing	1	
12	Oil seal	1	
			For installation, reverse the removal procedure.

EAS26510
DISASSEMBLING THE WATER PUMP

1. Remove:
   • Water pump seal “1”

TIP

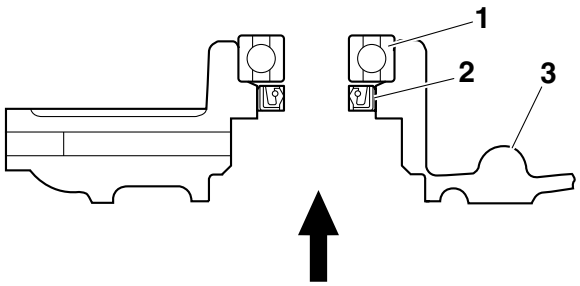
Remove the water pump seal from the inside of the AC magneto cover “2”.



2. Remove:
   • Bearing “1”
   • Oil seal “2”

TIP

Remove the bearing and oil seal from the outside of the AC magneto cover “3”.



EAS26540
CHECKING THE WATER PUMP

1. Check:
   • Water pump housing
   • Impeller shaft
   • Water pump seal
   • Oil seal
   Cracks/damage/wear → Replace.
2. Check:
   • Bearing
   Rough movement → Replace.
3. Check:
   • Water jacket joint
   • Water pump outlet pipe
   • Water pump outlet hose
   Cracks/damage/wear → Replace.

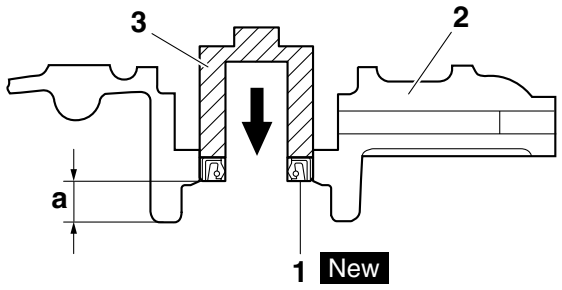
EAS26560
ASSEMBLING THE WATER PUMP

1. Install:
   • Oil seal “1” New
   (into the AC magneto cover “2”)

TIP

- Before installing the oil seal, apply tap water or coolant onto its outer surface.
- Install the oil seal with a socket “3” that matches its outside diameter.

Installed depth of oil seal “a”
8.1–8.7 mm (0.32–0.34 in)



2. Install:
   • Water pump seal “1” New
   (into the AC magneto cover “2”)

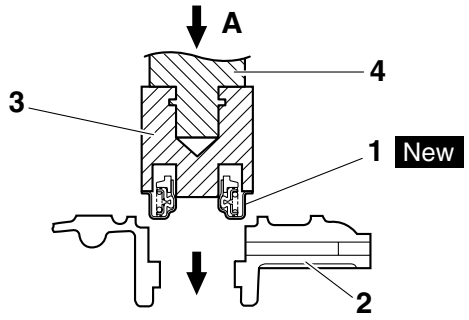
ECA14080
NOTICE

Never lubricate the water pump seal surface with oil or grease.

TIP

Install the water pump seal with the special tools.

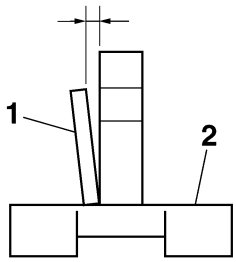
Mechanical seal installer
90890-04132
Water pump seal installer
YM-33221-A
Middle driven shaft bearing driver
90890-04058
Bearing driver 40 mm
YM-04058



3. Mechanical seal installer
4. Middle driven shaft bearing driver
A. Push down.

3. Measure:
• Impeller shaft tilt
Out of specification → Replace.

	Impeller shaft tilt limit **0.15 mm (0.006 in)**

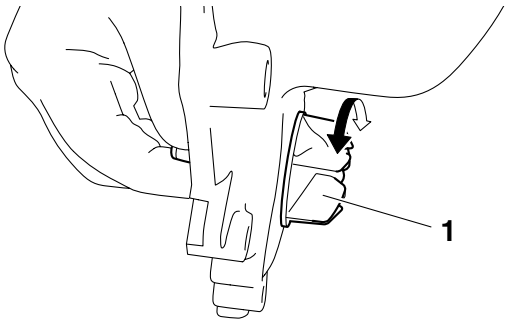


1. Straightedge
2. Impeller

4. Install:
• Impeller shaft “1”
• Circlip New

TIP

After installation, check that the impeller shaft rotates smoothly.



FUEL SYSTEM

FUEL TANK.....7-1
REMOVING THE FUEL TANK.....7-2
REMOVING THE FUEL PUMP.....7-2
CHECKING THE FUEL PUMP BODY.....7-2
CHECKING THE FUEL TANK BREATHER HOSE JOINT.....7-2
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INSTALLING THE FUEL TANK.....7-3

THROTTLE BODY.....7-4
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CHECKING THE INJECTOR.....7-6
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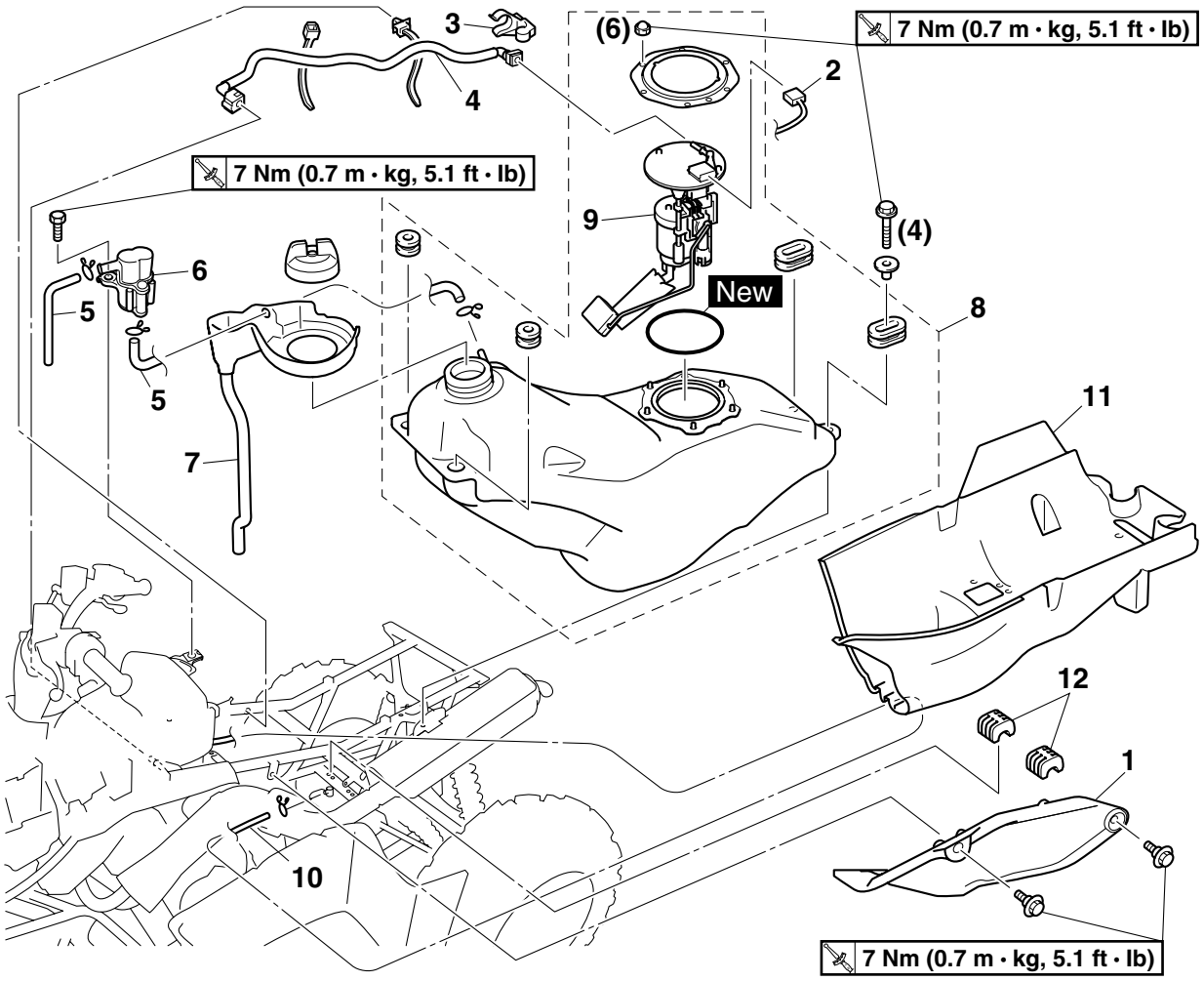
CHECKING THE FUEL PRESSURE.....7-7
ADJUSTING THE THROTTLE POSITION SENSOR.....7-7

EAS26620
FUEL TANK

Removing the fuel tank



Order	Job/Parts to remove	Q'ty	Remarks
	Rear fender		Refer to "GENERAL CHASSIS" on page 4-1.
1	Fuel tank side cover	1	
2	Fuel pump coupler	1	Disconnect.
3	Fuel hose connector holder	1	
4	Fuel hose	1	
5	Fuel tank breather hose	2	
6	Fuel tank breather hose joint	1	
7	Fuel tank overflow hose	1	
8	Fuel tank	1	
9	Fuel pump assembly	1	
10	Final drive case breather hose	1	Disconnect.
11	Fuel tank shield	1	
12	Damper	2	
			For installation, reverse the removal procedure.

EAS26630
REMOVING THE FUEL TANK

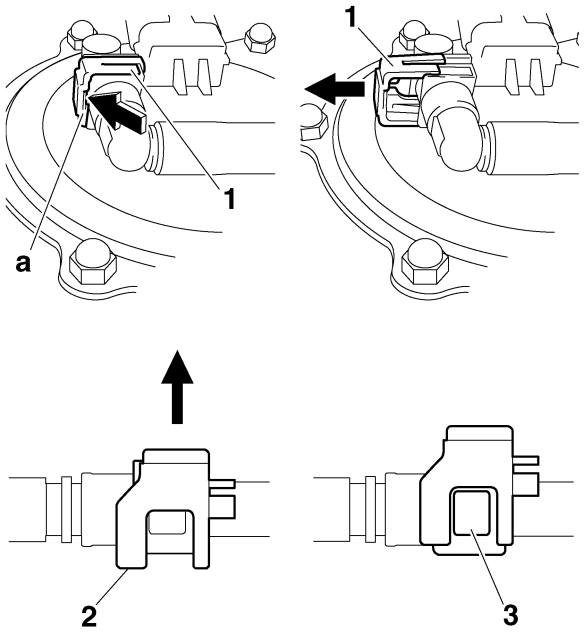
1. Extract the fuel in the fuel tank through the fuel tank cap with a pump.
2. Remove:
   - Fuel hose connector holder
   - Fuel hose

ECA28P1019
NOTICE

- **Be sure to disconnect the fuel hose by hand. Do not forcefully disconnect the hose with tools.**
- **Although the fuel has been removed from the fuel tank, be careful when removing the fuel hose, since there may be fuel remaining in it.**

TIP

- When removing the fuel hose from the fuel pump, remove the fuel hose connector holder first, and next, insert a slotted head screwdriver etc. in the slot part "a" of the fuel hose connector cover "1", then slide it in the direction of the arrow, and remove the fuel hose.
- To remove the fuel hose from the throttle body, slide the fuel hose connector cover "2" on the end of the hose in direction of the arrow shown, press the two buttons "3" on the sides of the connector, and then remove the hose.
- Before removing the hose, place a few rags in the area under where it will be removed.



3. Remove:
   - Fuel tank

TIP

Do not set the fuel tank down on the installation surface of the fuel pump. Be sure to lean the fuel tank in an upright position.

EAS26640
REMOVING THE FUEL PUMP

1. Remove:
   - Fuel pump bracket
   - Fuel pump
   - Fuel pump gasket

ECA14720
NOTICE

- **Do not drop the fuel pump or give it a strong shock.**
- **Do not touch the base section of the fuel sender.**

EAS26670
CHECKING THE FUEL PUMP BODY

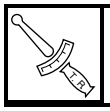
1. Check:
   - Fuel pump body
     Obstruction → Clean.
     Cracks/damage → Replace the fuel pump assembly.

EAS28P1069
CHECKING THE FUEL TANK BREATHER HOSE JOINT

1. Check:
   - Fuel tank breather hose joint
     Damage/faulty → Replace.

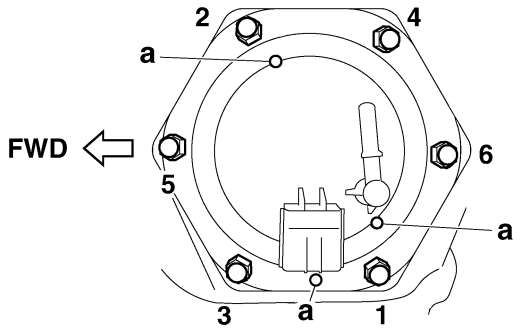
EAS26700
INSTALLING THE FUEL PUMP

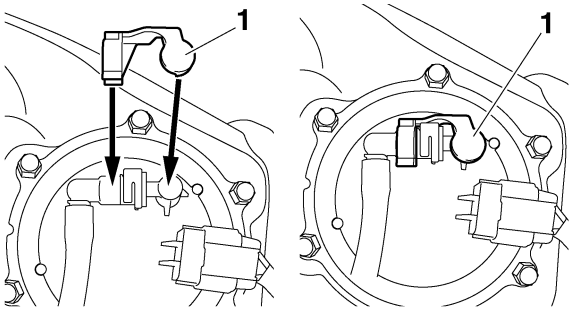
1. Install:
   - Fuel pump gasket New
   - Fuel pump
   - Fuel pump bracket

	**Fuel pump nut** **7 Nm (0.7 m·kg, 5.1 ft·lb)**

TIP

- Do not damage the installation surfaces of the fuel tank when installing the fuel pump.
- Always use a new fuel pump gasket.
- Install the fuel pump in the direction shown in the illustration.
- Install the fuel pump bracket by aligning the projections "a" on the fuel pump with the projections on the fuel tank.
- Tighten the fuel pump nuts in the proper tightening sequence as shown.





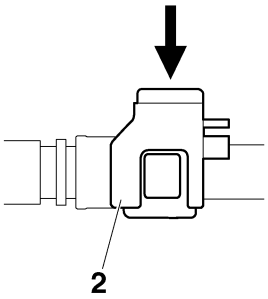
EAS28P1021

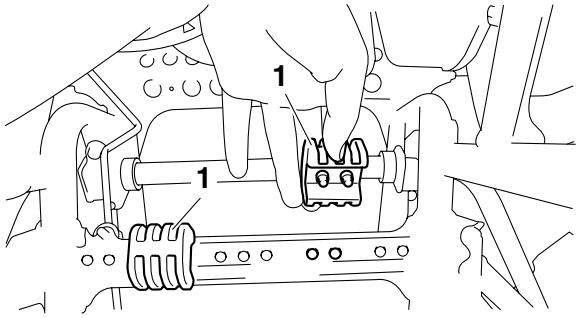
INSTALLING THE FUEL TANK

1. Install:
   • Dampers “1”

TIP

Fit the projections on each damper into the 3rd and 4th holes in the frame. Determine the 3rd and 4th holes by counting outward from the center hole in the frame.





2. Install:
   • Fuel hose
   • Fuel hose connector holder “1”
   • Fuel pump coupler

ECA28P1020

NOTICE

When installing the fuel hose, make sure that it is securely connected, and that the fuel hose holder is in the correct position, otherwise the fuel hose will not be properly installed.

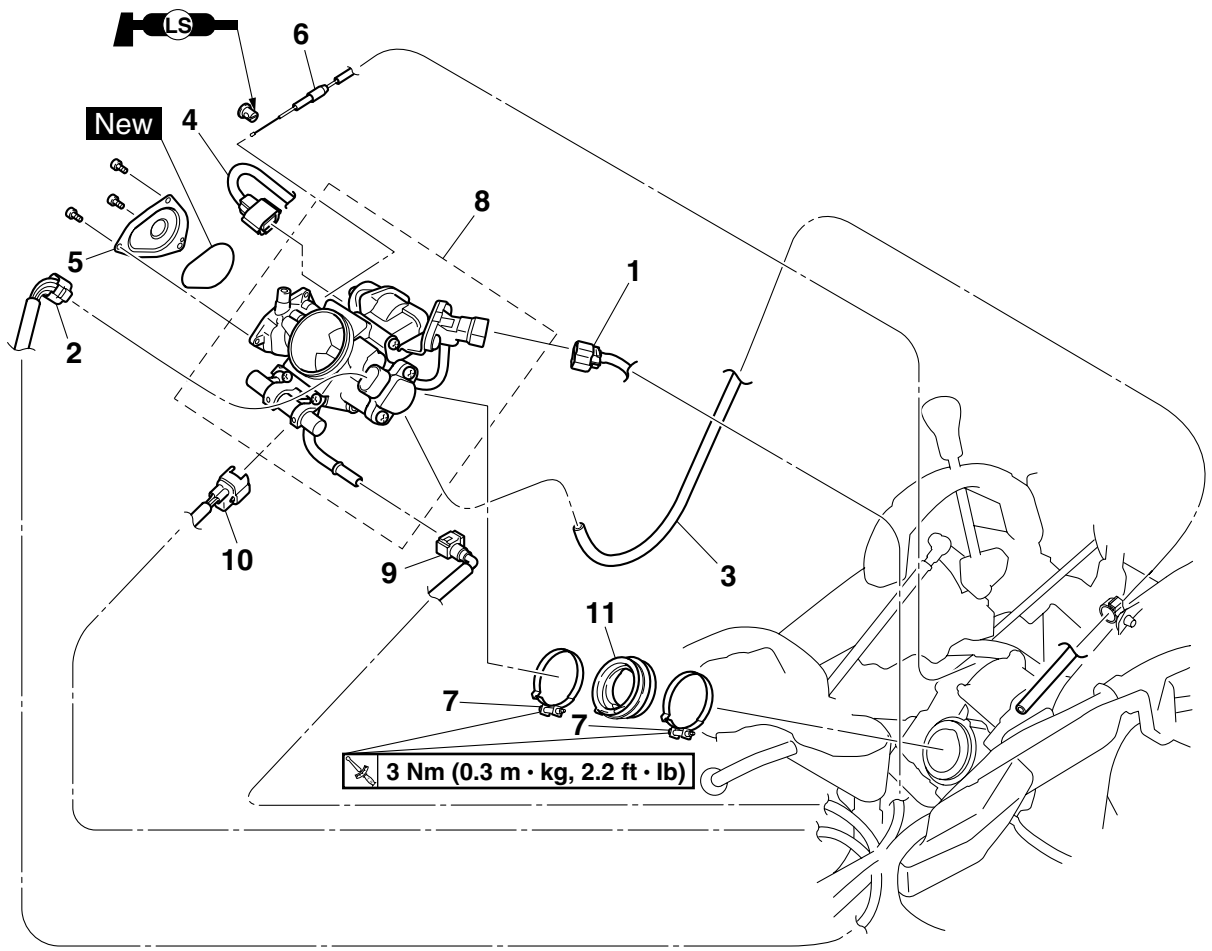
TIP

- Install the fuel hose connector holder “1” securely onto the fuel pump until a distinct “click” is heard, and then make sure that it does not come loose.
- To install the fuel hose onto the throttle body, slide the fuel hose connector cover “2” on the end of the hose in direction of the arrow shown.

EAS26970

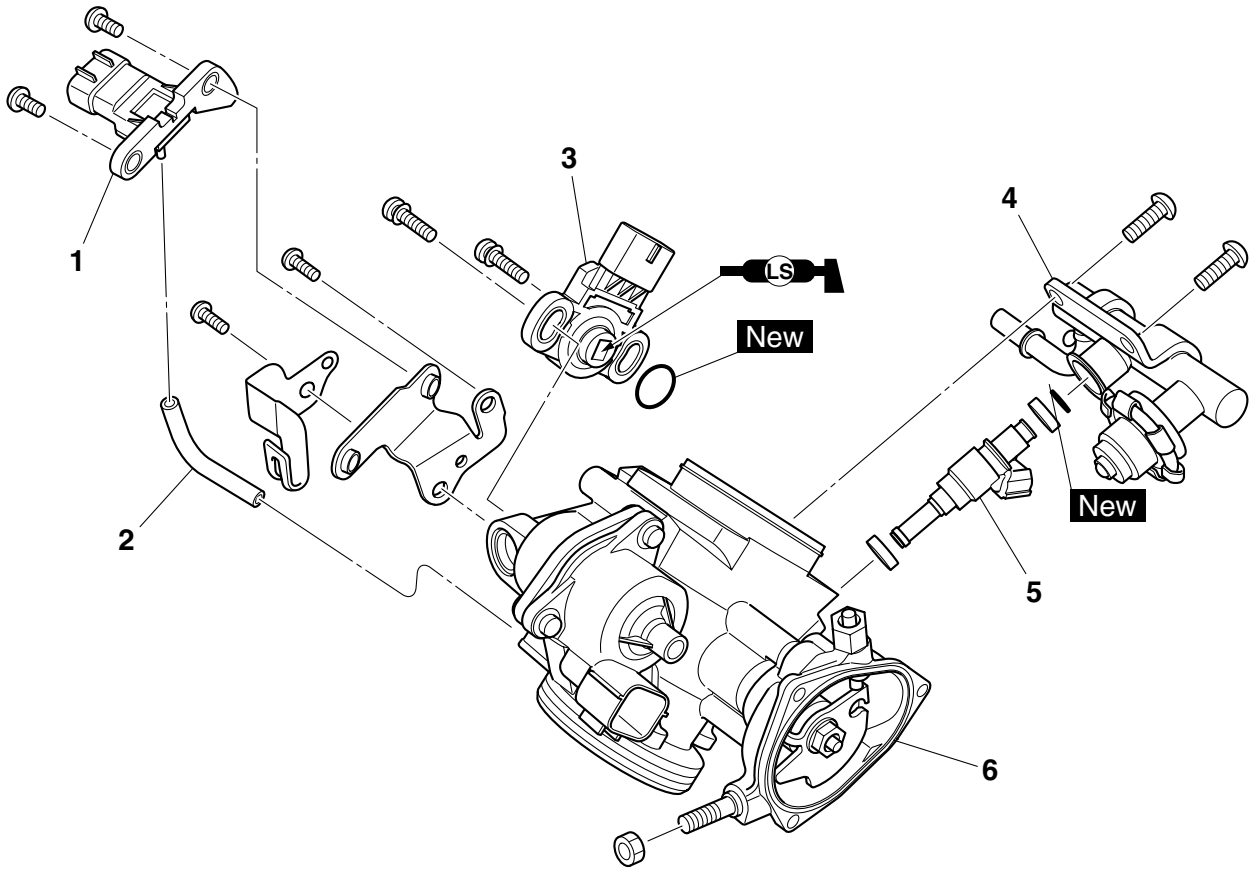
THROTTLE BODY

Removing the throttle body



Order	Job/Parts to remove	Q'ty	Remarks
	Air filter case		Refer to "GENERAL CHASSIS" on page 4-1.
1	Intake air pressure sensor coupler	1	Disconnect.
2	Throttle position sensor coupler	1	Disconnect.
3	Throttle body breather hose	1	
4	ISC unit coupler	1	Disconnect.
5	Throttle cable housing cover	1	
6	Throttle cable	1	Disconnect.
7	Throttle body joint clamp screw	2	Loosen.
8	Throttle body assembly	1	
9	Fuel hose	1	Disconnect.
10	Fuel injector coupler	1	Disconnect.
11	Throttle body joint	1	
			For installation, reverse the removal procedure.

Disassembling the throttle body assembly



Order	Job/Parts to remove	Q'ty	Remarks
1	Intake air pressure sensor	1	
2	Intake air pressure sensor hose	1	
3	Throttle position sensor	1	
4	Injector fuel rail	1	
5	Fuel injector	1	
6	Throttle body	1	ECA28P1021 ***NOTICE*** **The throttle body should not be disassembled.**
			For assembly, reverse the disassembly procedure.

EAS28P1036
REMOVING THE THROTTLE BODY ASSEMBLY

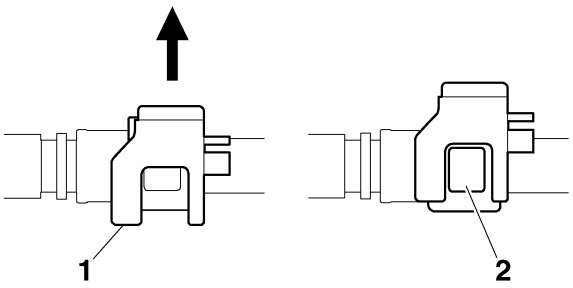
1. Disconnect:
   • Fuel hose

ECA28P1022
NOTICE

• Be sure to disconnect the fuel hose by hand. Do not forcefully disconnect the hose with tools.
• Although the fuel has been removed from the fuel tank, be careful when disconnecting the fuel hose, since there may be fuel remaining in it.

TIP

• To disconnect the fuel hose from the throttle body, slide the fuel hose connector cover "1" on the end of the hose in direction of the arrow shown, press the two buttons "2" on the sides of the connector, and then disconnect the hose.
• Before disconnecting the hose, place a few rags in the area under where it will be disconnected.



EAS26980
CHECKING THE INJECTOR

1. Check:
   • Injector
   Damage → Replace.

EAS26990
CHECKING THE THROTTLE BODY

1. Check:
   • Throttle body
   Cracks/damage → Replace the throttle body.
2. Check:
   • Fuel passages
   Obstructions → Clean.

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a. Wash the throttle body in a petroleum- based solvent.
   Do not use any caustic carburetor cleaning solution.
b. Blow out all of the passages with compressed air.

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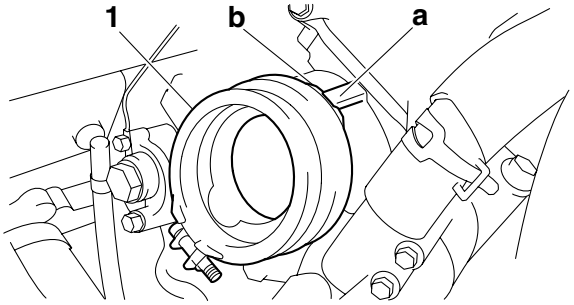
EAS28P1022
INSTALLING THE THROTTLE BODY ASSEMBLY

1. Install:
   • Throttle body joint "1"

TIP

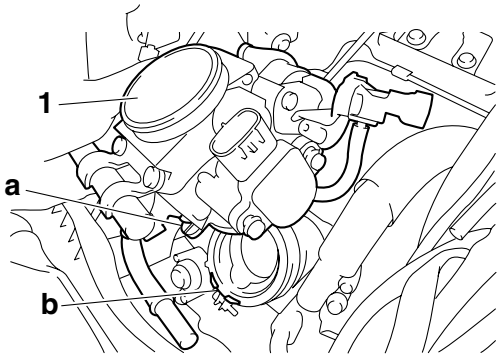
Align the projection "a" on the cylinder head with the slot "b" in the throttle body joint.



2. Install:
   • Throttle body assembly "1"

TIP

Align the projection "a" on the throttle body assembly with the slot "b" in the throttle body joint.



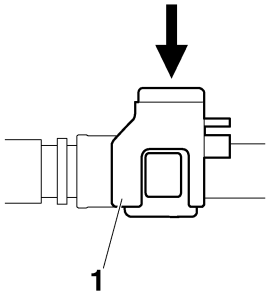
3. Connect:
   • Fuel hose

ECA28P1023
NOTICE

When connecting the fuel hose, make sure that it is securely connected, and that the fuel hose connector cover is in the correct position, otherwise the fuel hose will not be properly connected.

TIP

To connect the fuel hose onto the throttle body, slide the fuel hose connector cover "1" on the end of the hose in direction of the arrow shown.



EAS27010
CHECKING THE FUEL PRESSURE

1. Check:
   • Fuel pressure

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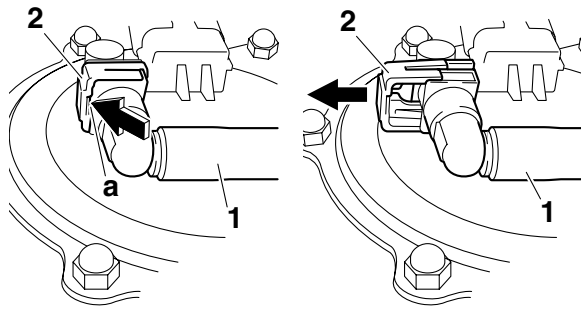
a. Remove the rear fender.
   Refer to "GENERAL CHASSIS" on page 4-1.
b. Remove the fuel hose connector holder.
c. Disconnect the fuel hose "1" from the fuel pump.

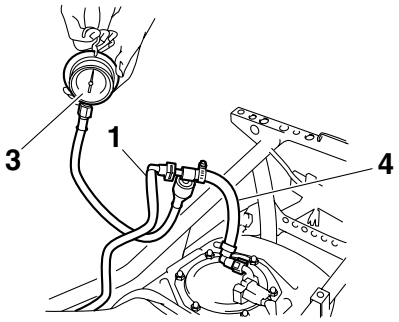
TIP

- When removing the fuel hose from the fuel pump, remove the fuel hose connector holder first, and next, insert a slotted head screwdriver etc. in the slot part "a" of the fuel hose connector cover "2", then slide it in the direction of the arrow, and remove the fuel hose.
- Before removing the hose, place a few rags in the area under where it will be removed.



d. Connect the pressure gauge "3" and adapter "4" to the fuel pump and fuel hose.

Pressure gauge
90890-03153
YU-03153
Fuel pressure adapter
90890-03176
YM-03176



e. Start the engine.
f. Measure the fuel pressure.
   Out of specification → Replace the fuel pump.

Fuel pressure
324 kPa (3.24 kgf/cm², 46.1 psi)

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EAS27030
ADJUSTING THE THROTTLE POSITION SENSOR

1. Check:
   • Throttle position sensor
   Refer to "CHECKING THE THROTTLE POSITION SENSOR" on page 9-96.
2. Adjust:
   • Throttle position sensor angle

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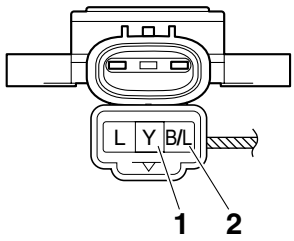
a. Connect the throttle position sensor coupler to the throttle position sensor.
b. Connect the digital circuit tester to the throttle position sensor coupler.

- Positive tester probe
  yellow "1"
- Negative tester probe
  black/blue "2"

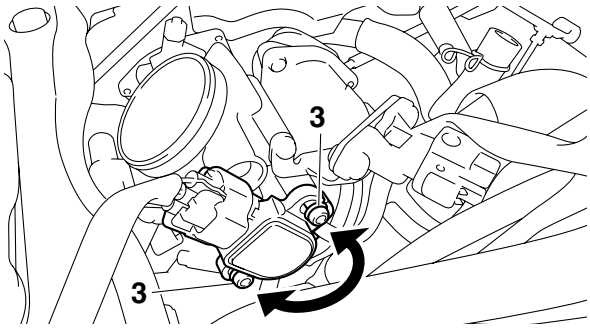
Digital circuit tester
90890-03174
Model 88 Multimeter with tachometer
YU-A1927



c. Turn the main switch to “ON”.
d. Measure the throttle position sensor voltage.
e. Adjust the throttle position sensor angle so that the voltage is within the specified range.

Throttle position sensor output voltage
0.63–0.73 V (yellow–black/blue)

f. After adjusting the throttle position sensor angle, tighten the throttle position sensor screws “3”.



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DRIVE TRAIN

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EAS29890
TROUBLESHOOTING

The following conditions may indicate damaged shaft drive components:

Symptoms	Possible Causes
1. A pronounced hesitation or "jerky" movement during acceleration, deceleration, or sustained speed. (This must not be confused with engine surging or transmission characteristics.) 2. A "rolling rumble" noticeable at low speed; a high-pitched whine; a "clunk" from a shaft drive component or area. 3. A locked-up condition of the shaft drive train mechanism, no power transmitted from the engine to the front and/or rear wheels.	A. Bearing damage. B. Improper gear backlash. C. Gear tooth damage. D. Broken drive shaft. E. Broken gear teeth. F. Seizure due to lack of lubrication. G. Small foreign objects lodged between the moving parts.

TIP

Areas A, B, and C above may be extremely difficult to diagnose. The symptoms are quite subtle and difficult to distinguish from normal vehicle operating noise. If there is reason to believe these components are damaged, remove the components and check them.

EAS29900
CHECKING NOISES

1. Investigate any unusual noises.

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The following "noises" may indicate a mechanical defect:

a. A "rolling rumble" noise during coasting, acceleration, or deceleration. The noise increases with front and/or rear wheel speed, but it does not increase with higher engine or transmission speeds.
   Diagnosis: Possible wheel bearing damage.
   Refer to "TROUBLESHOOTING CHART" on page 8-2.
b. A "whining" noise that varies with acceleration and deceleration.
   Diagnosis: Possible incorrect reassembly, too little gear backlash.
   Refer to "TROUBLESHOOTING CHART" on page 8-2.

EWA13780
⚠ WARNING

Insufficient gear backlash is extremely destructive to the gear teeth. If a test ride, following reassembly, indicates these symptoms, stop riding immediately to minimize gear damage.

c. A slight "thunk" evident at low speed operation. This noise must be distinguished from normal vehicle operation.
   Diagnosis: Possible broken gear teeth.

EWA13790
⚠ WARNING

Stop riding immediately if broken gear teeth are suspected. This condition could result in the shaft drive assembly locking up, causing a loss of control and possible injury to the rider.

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2. Check:
   • Drained oil
   Drained oil shows large amounts of metal particles → Check the bearing for seizure.

TIP

A small amount of metal particles in the oil is normal.

3. Check:
   • Oil leakage

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a. Clean the entire vehicle thoroughly, then dry it.
b. Apply a leak-localizing compound or dry powder spray to the shaft drive.
c. Road test the vehicle for the distance necessary to locate the leak.
   Leakage → Check the component housing, gasket, and/or seal for damage.
   Damage → Replace the component.

TIP

• An apparent oil leak on a new or nearly new vehicle may be the result of a rust-preventative coating or excessive seal lubrication.

• Always clean the vehicle and recheck the suspected location of an apparent leakage.

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EAS29910

TROUBLESHOOTING CHART

When basic conditions (a) and (b) exist, check the following points:

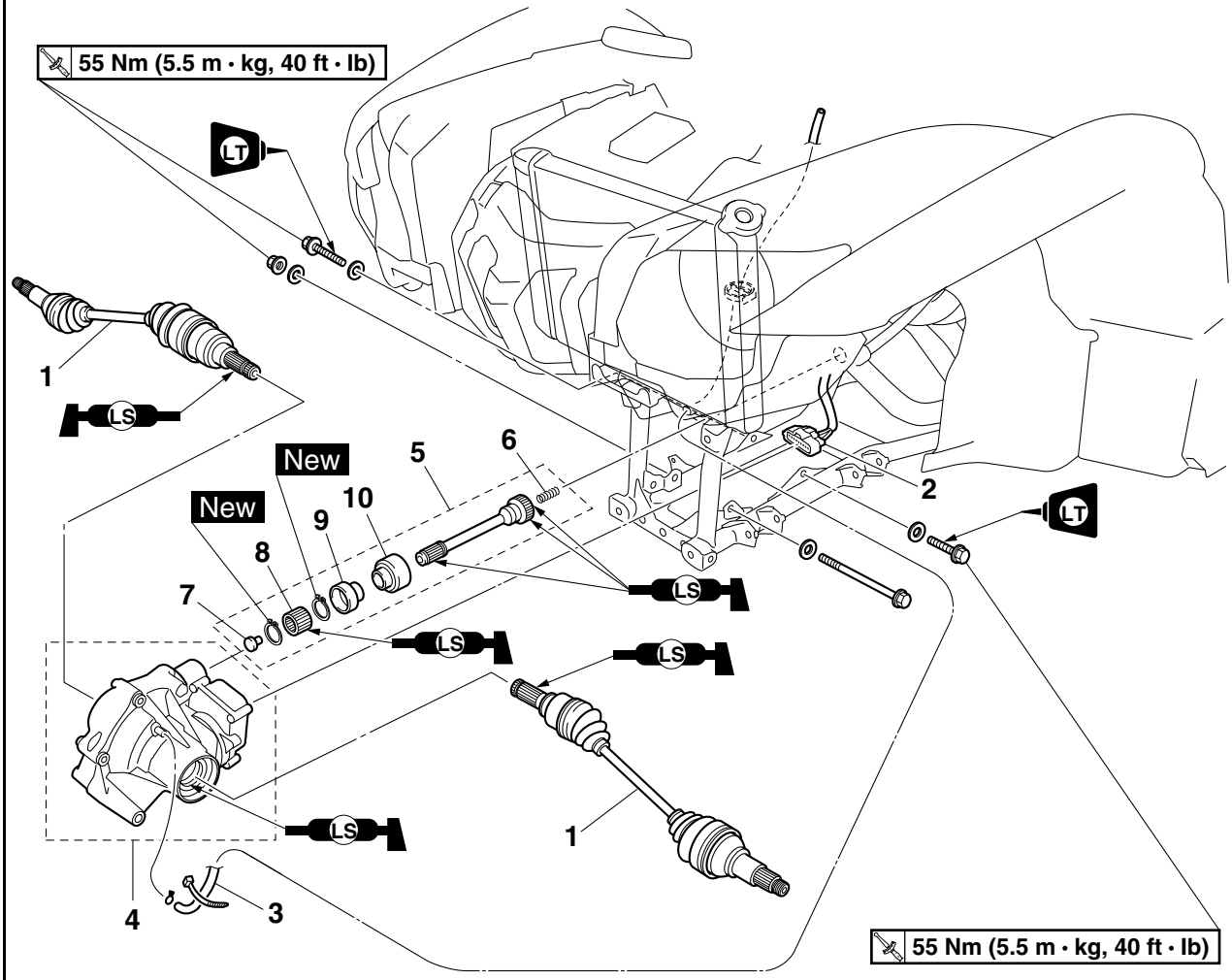
1. Elevate and spin both wheels. Feel for wheel bearing damage.
   - YES → Replace the wheel bearing. (Refer to "TIE-RODS AND STEERING KNUCKLES" on page 4-55 and "REAR KNUCKLES AND STABILIZER" on page 4-64.)
   - NO ↓
2. Check the wheel nuts and axle nuts for tightness.
   - NO → Torque to specification. (Refer to "FRONT WHEELS" on page 4-14 and "REAR WHEELS" on page 4-18.)
   - YES ↓
3. Check the front constant velocity shaft assemblies. Feel for bearing damage.
   - NO → Constant velocity shaft bearings and differential bearings are probably not damaged. Repeat the test or remove the individual components.
   - YES ↓
4. Check the rear brake adjustment.
   - NO → Adjust per instructions. (Refer to "ADJUSTING THE REAR DISC BRAKE" on page 3-20.)
   - YES ↓
5. Check the rear constant velocity shaft assemblies. Feel for bearing damage.
   - NO → Constant velocity shaft bearings and final gear bearings are probably not damaged. Repeat the test or remove the individual components.
   - YES ↓

Remove the shaft drive components.

EAS29920

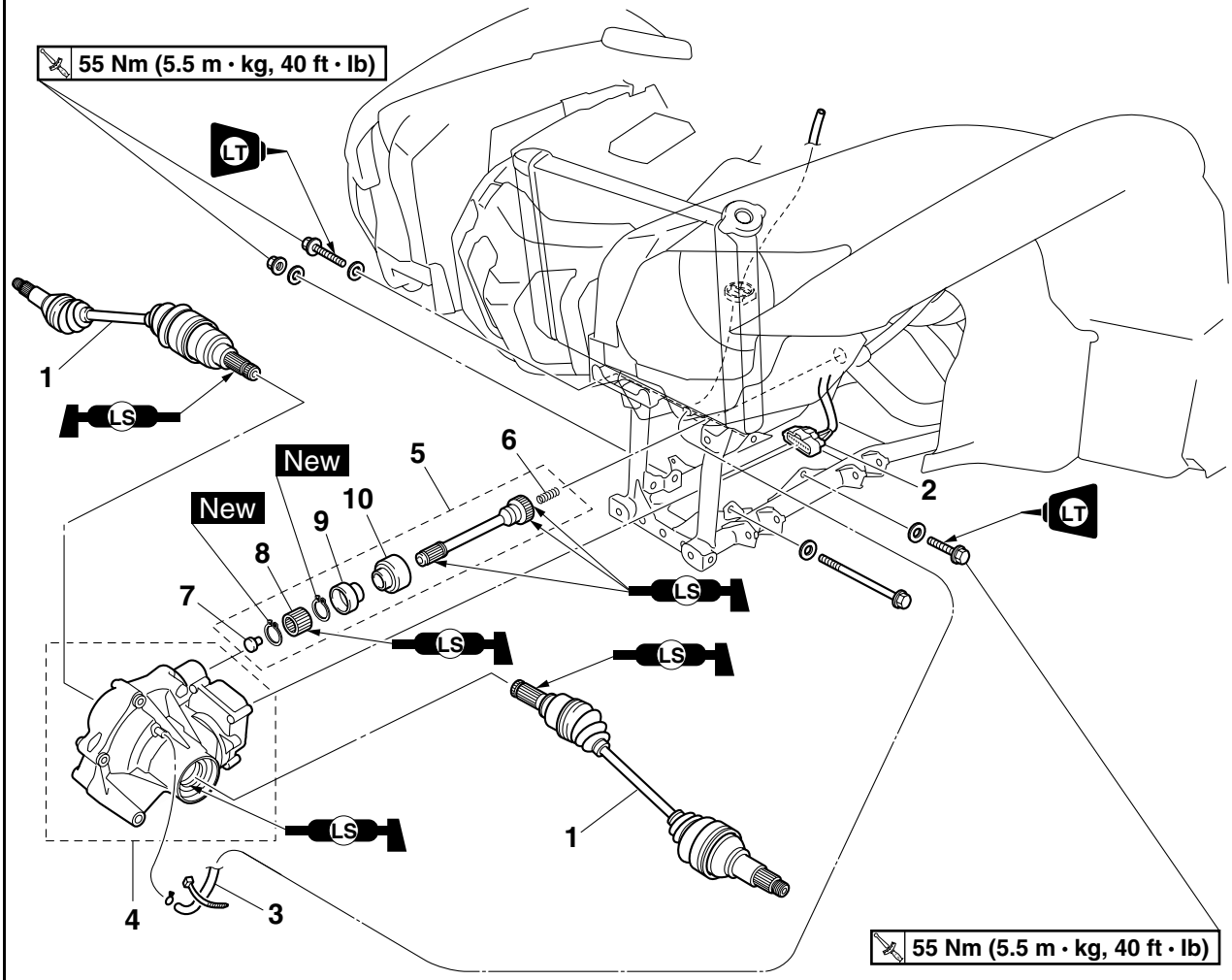
FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES, DIFFERENTIAL ASSEMBLY AND FRONT DRIVE SHAFT

Removing the front constant velocity shaft assemblies, differential assembly and front drive shaft



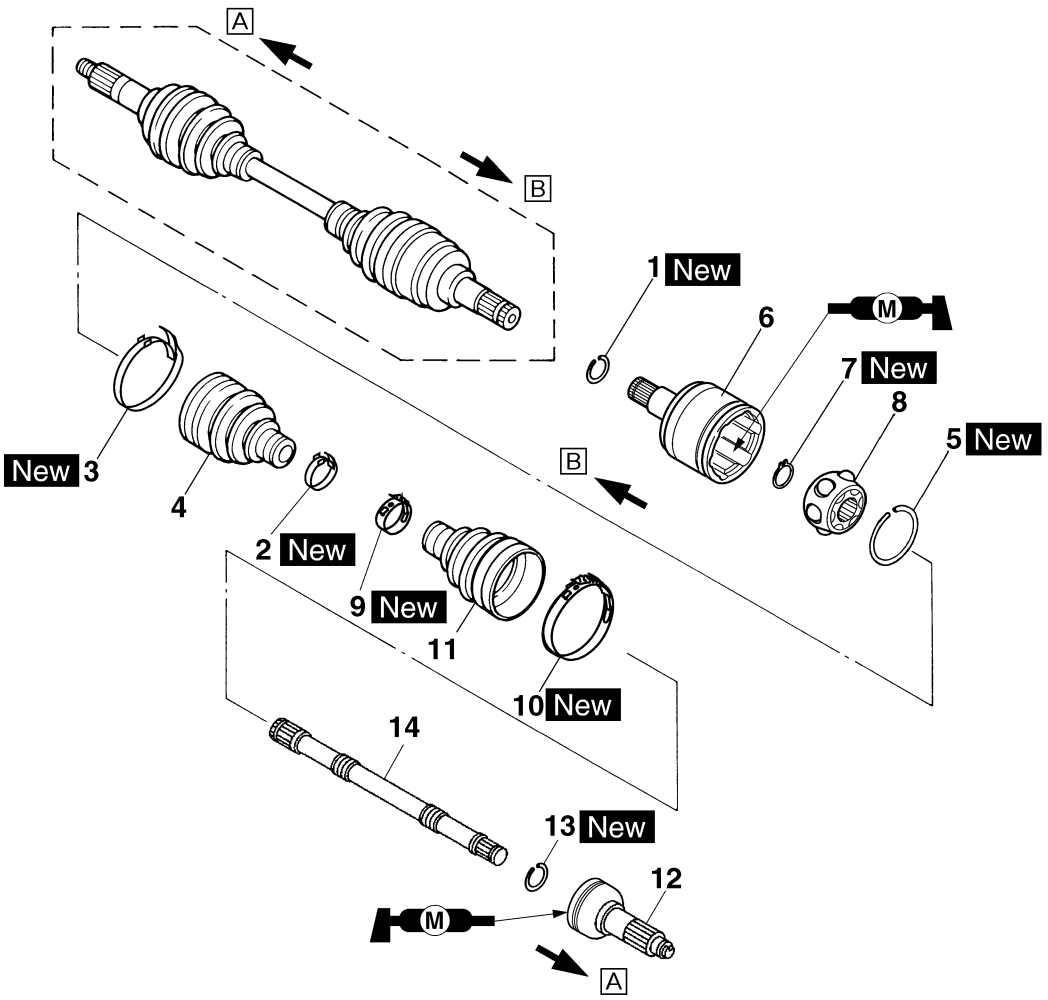
Order	Job/Parts to remove	Q'ty	Remarks
	Front engine skid plate		Refer to "GENERAL CHASSIS" on page 4-1.
	Steering knuckles		Refer to "TIE-RODS AND STEERING KNUCKLES" on page 4-55.
	Front arms		Refer to "FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES" on page 4-59.
	Differential gear oil		Drain. Refer to "CHANGING THE DIFFERENTIAL GEAR OIL" on page 3-27.
1	Front constant velocity shaft assembly	2	
2	Differential motor coupler	1	Disconnect.
3	Differential case breather hose	1	Disconnect.
4	Differential assembly	1	
5	Front drive shaft	1	
6	Spring	1	
7	Damper	1	

Removing the front constant velocity shaft assemblies, differential assembly and front drive shaft



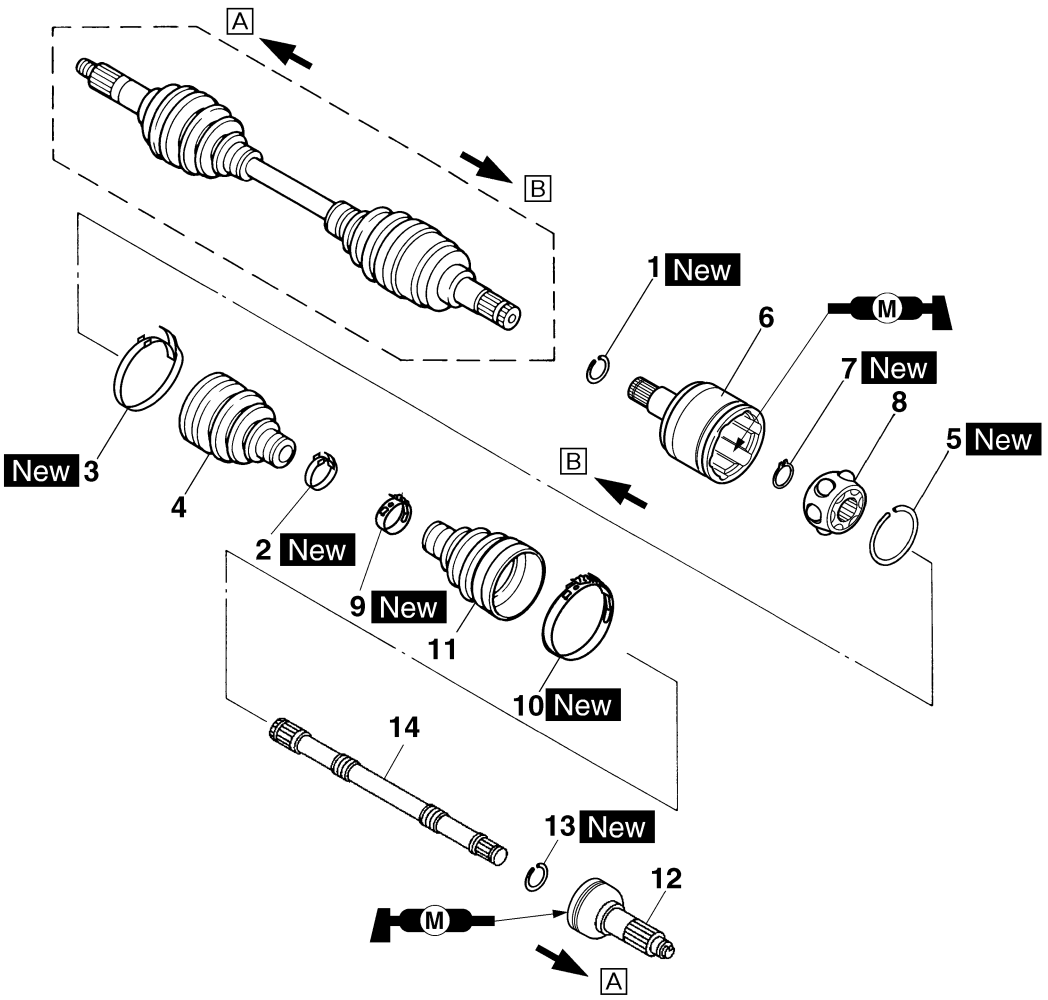
Order	Job/Parts to remove	Q'ty	Remarks
8	Front drive shaft coupling sleeve	1	
9	Dust seal	1	
10	Dust seal	1	
			For installation, reverse the removal procedure.

Disassembling the front constant velocity shaft assemblies



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front constant velocity shaft assemblies.
1	Clip	1	
2	Boot band	1	
3	Boot band	1	
4	Dust boot	1	
5	Clip	1	
6	Double offset joint	1	
7	Circlip	1	
8	Ball bearing	1	
9	Boot band	1	
10	Boot band	1	
11	Dust boot	1	
12	Constant velocity joint	1	
13	Clip	1	

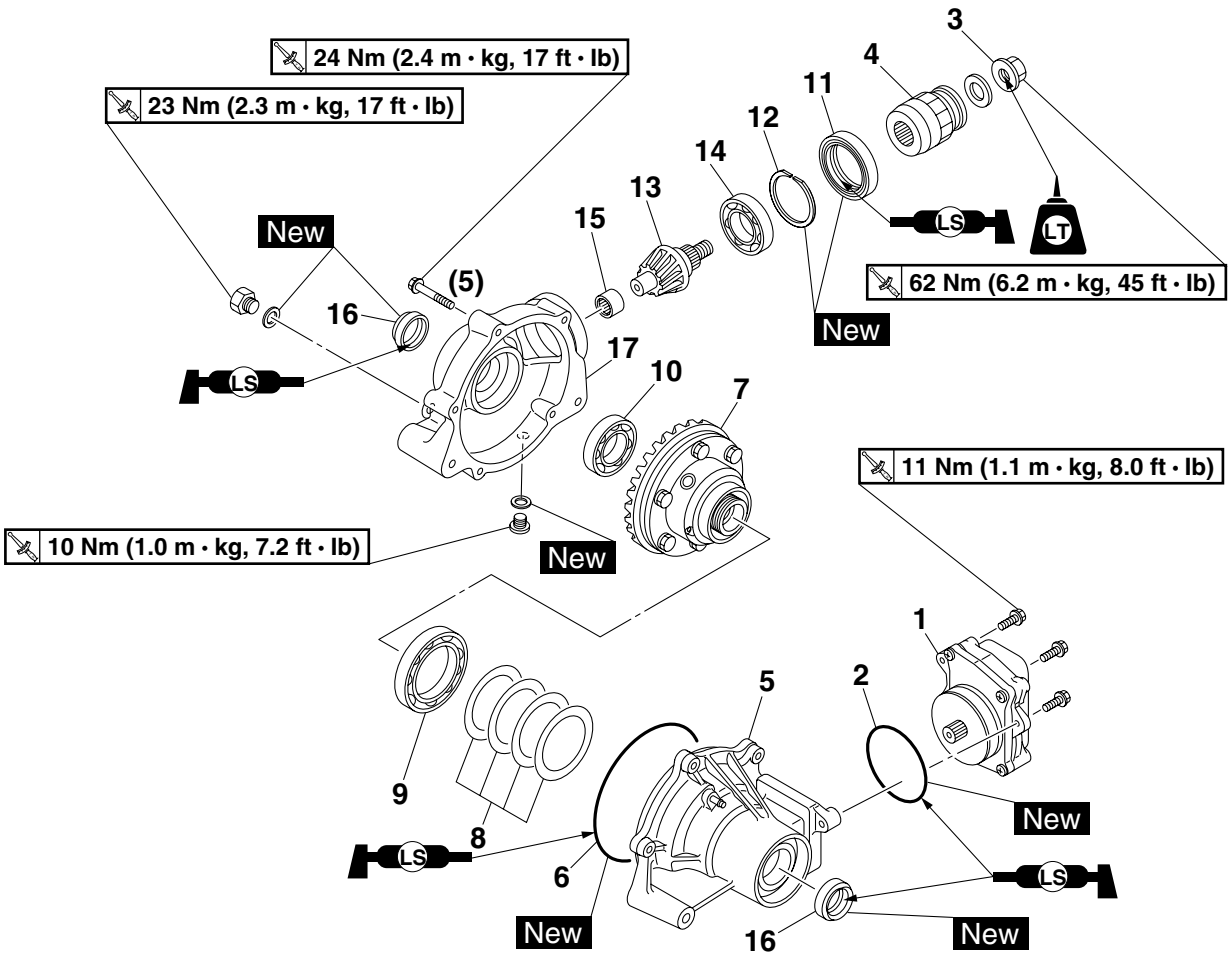
Disassembling the front constant velocity shaft assemblies



Order	Job/Parts to remove	Q'ty	Remarks
14	Constant velocity shaft	1	
			For assembly, reverse the disassembly procedure.

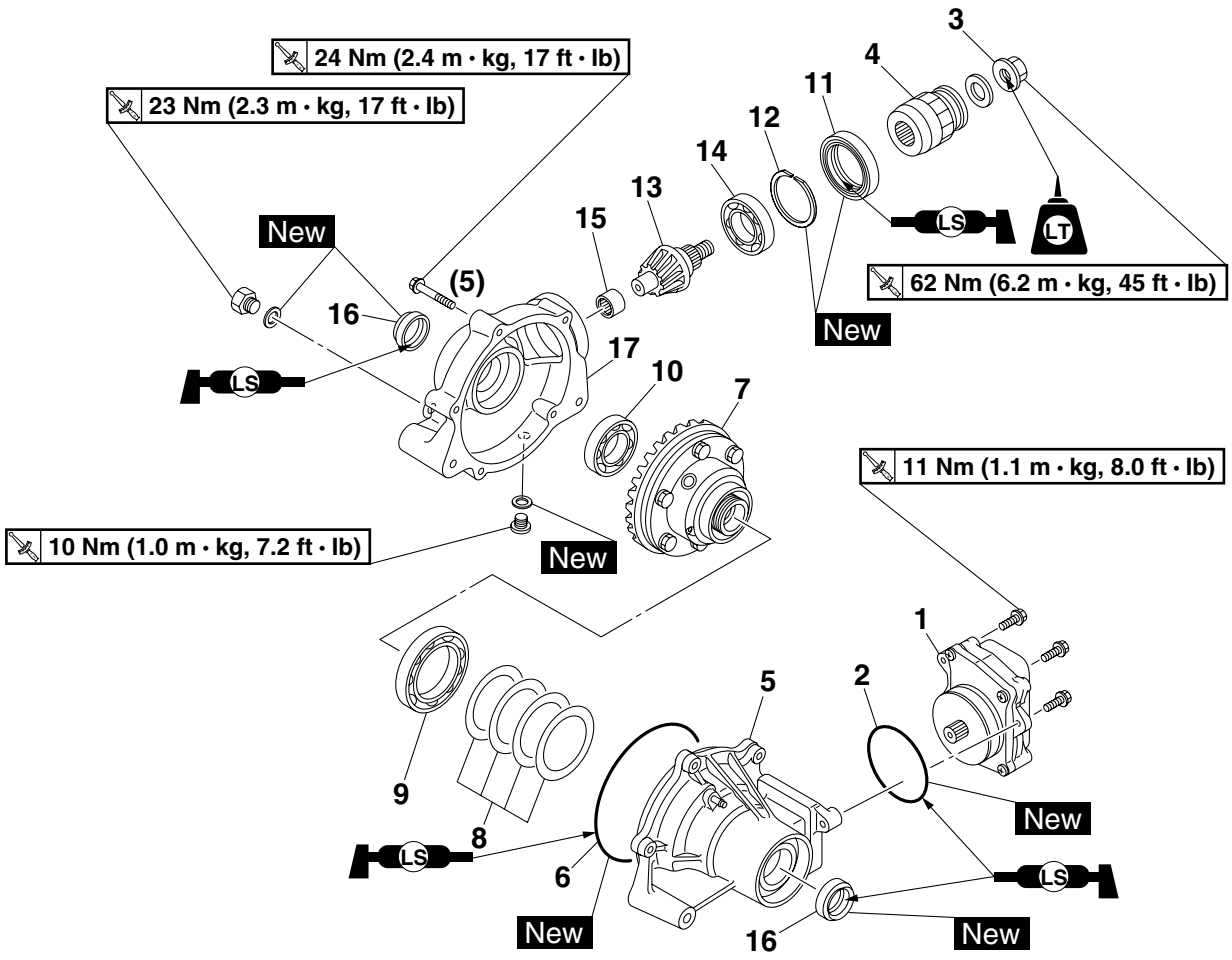
A: Wheel side
B: Differential side

Disassembling the differential assembly



Order	Job/Parts to remove	Q'ty	Remarks
			TIP Do not disassemble the differential motor or remove the differential motor pinion gear.
1	Differential motor	1	
2	O-ring	1	
3	Front drive shaft yoke nut (differential case side)	1	
4	Front drive shaft yoke (differential case side)	1	
5	Differential case cover	1	
6	O-ring	1	
7	Differential gear assembly	1	
8	Differential gear assembly shim		Refer to "ADJUSTING THE DIFFERENTIAL GEAR BACKLASH" on page 8-13.
9	Bearing	1	
10	Bearing	1	
11	Oil seal	1	
12	Clip	1	
13	Differential pinion gear	1	
14	Bearing	1	

Disassembling the differential assembly



Order	Job/Parts to remove	Q'ty	Remarks
15	Bearing	1	
16	Oil seal	2	
17	Differential case	1	
			For assembly, reverse the disassembly procedure.

EAS29930
DISASSEMBLING THE FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES

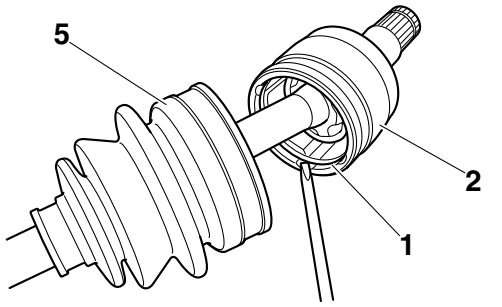
The following procedure applies to both of the front constant velocity shaft assemblies.

1. Remove:
   - Boot bands
   - Clip "1"
   - Double offset joint "2"
   - Circlip "3"
   - Ball bearing "4"
   - Dust boot "5"

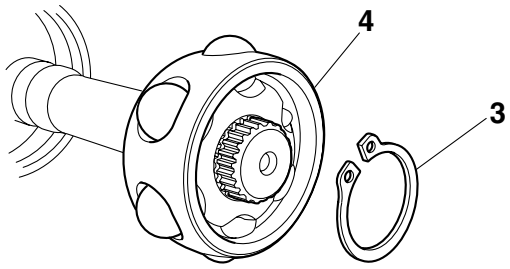
TIP

Before removing the clip, slide the dust boot away from the double offset joint.

A



A



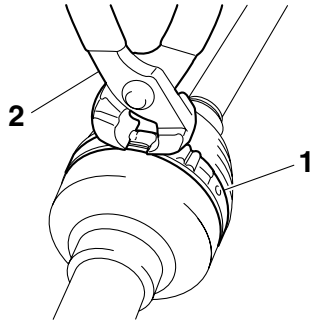
A. Differential side

2. Remove:
   - Boot band "1"

   Use the boot band installation tool "2".

	Boots band installation tool **90890-01526** **YM-01526**

B



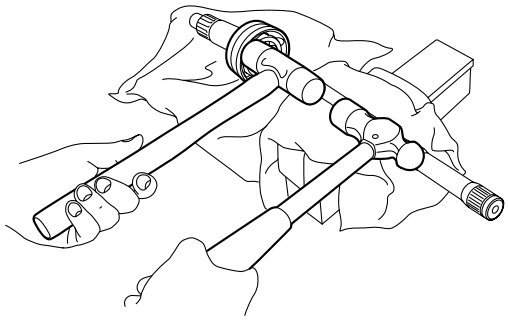
B. Wheel side

3. Remove:
   - Dust boot
   - Constant velocity joint
   - Clip

TIP

Secure the constant velocity shaft in a vise, and then remove the constant velocity joint using hammers.

B



B. Wheel side

EAS29960
CHECKING THE FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES

The following procedure applies to both of the front constant velocity shaft assemblies.

1. Check:
   - Double offset joint splines
   - Constant velocity joint splines
   - Constant velocity shaft splines

   Wear/damage → Replace.
2. Check:
   - Dust boots

   Cracks/damage → Replace.

ECA28P1042

NOTICE

Always use new boot bands.

3. Check:
   - Balls and ball races
   - Inner surface of double offset joint

   Pitting/wear/damage → Replace.

EAS29990
ASSEMBLING THE FRONT CONSTANT VELOCITY SHAFT ASSEMBLIES

The following procedure applies to both of the front constant velocity shaft assemblies.

1. Install:
   - Clip "1" New
   - Constant velocity joint "2"
   - Constant velocity shaft "3"
   - Dust boot

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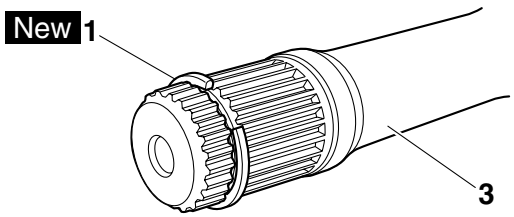
a. Install the clip.
b. Install the constant velocity joint.

TIP

- Install the clip into the groove in the constant velocity shaft as shown.
- Secure the constant velocity joint in a vise, and then fit the constant velocity shaft into the constant velocity joint using a hammer.

A



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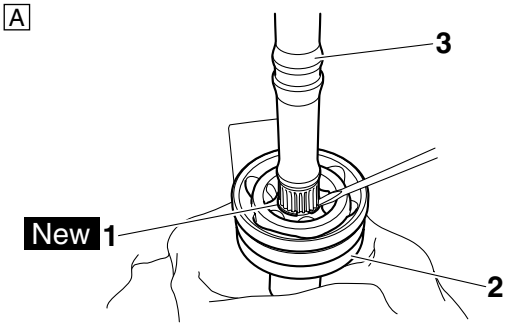

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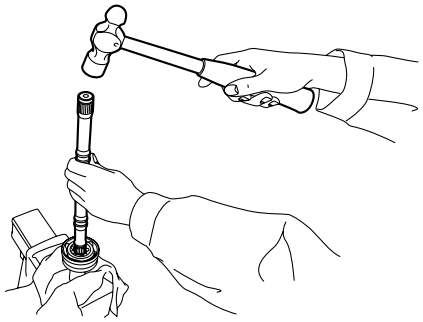

A. Wheel side

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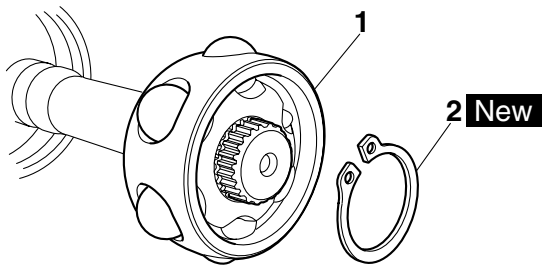
2. Install:
   - Dust boot
   - Ball bearing "1"
   - Circlip "2" New
   - Double offset joint "3"
   - Clip "4" New

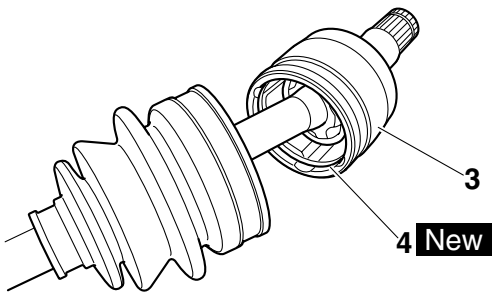
TIP

- Securely install the circlip into the groove in the constant velocity shaft.
- Securely install the clip into the groove in the double offset joint.

B



B



B. Differential side

3. Apply:
   - Molybdenum disulfide grease (into the double offset joint, constant velocity joint, and dust boots)

	Molybdenum disulfide grease **50 g (1.8 oz) per dust boot (wheel side)** **65 g (2.3 oz) per dust boot (differential side)**

TIP

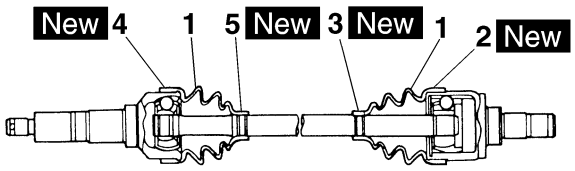
Molybdenum disulfide grease is included in the repair kit.

4. Install:
   - Dust boots "1"
   - Boot bands "2", "3", "4", "5" New

TIP

- The new boot bands may differ from the original ones.

• The dust boots should be fastened with the boot bands “3” and “5” at the grooves in the constant velocity shaft.



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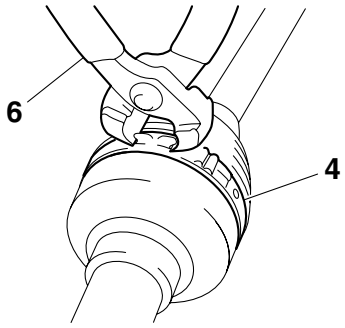
a. Install the dust boots.
b. Install the dust boot bands “4” and “5”.
Use the boot band installation tool “6”.

	Boots band installation tool **90890-01526** **YM-01526**



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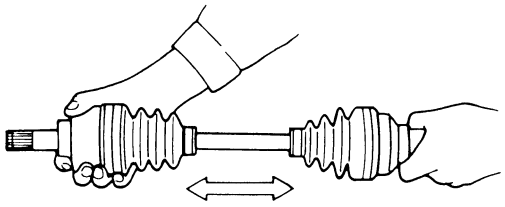
5. Check:
• Thrust movement free play
Excessive play → Replace the constant velocity shaft assembly.

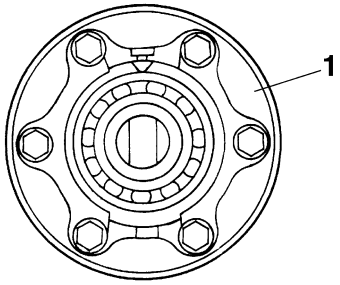


EAS29950
REMOVING THE DIFFERENTIAL GEAR ASSEMBLY

1. Remove:
• Differential gear assembly “1”

ECA16200
NOTICE

The ring gear and differential gear are assembled into a proper unit at the factory by means of specialized equipment. Do not attempt to disassemble this unit. Disassembly will result in the malfunction of the unit.



EAS29970
CHECKING THE DIFFERENTIAL ASSEMBLY

1. Check:
• Gear teeth
Pitting/galling/wear → Replace differential pinion gear and differential gear assembly as a set.
• Bearings
Pitting/damage → Replace.
• Oil seals
• O-rings
Damage → Replace.
2. Check:
• Drive shaft splines
• Pinion gear splines
Wear/damage → Replace.
• Spring
Fatigue → Replace.
3. Check:
• Front drive shaft
Bends → Replace.

EWA15060
⚠ WARNING

Do not attempt to straighten a bent shaft; this may dangerously weaken it.

EAS29980
CHECKING THE DIFFERENTIAL MOTOR

1. Check:
• Differential motor

ECA28P1017
NOTICE

Do not disassemble the differential motor or remove the differential motor pinion gear.

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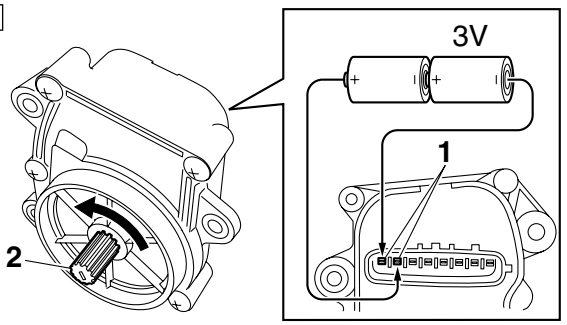
a. Connect two C-size batteries to the differential motor terminals "1" (as shown in the illustrations).

ECA28P1018

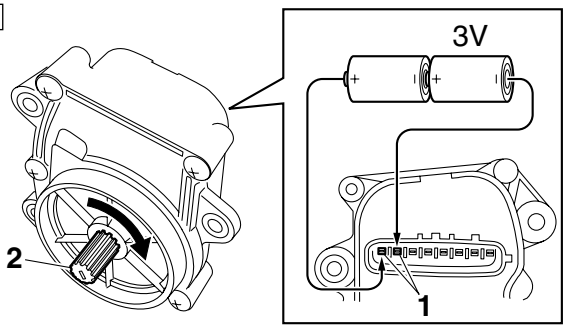
NOTICE

- **Do not use a 12 V battery to operate the differential motor pinion gear.**
- **Do not connect the batteries to the differential motor when it is installed in the differential case.**
- **The differential motor should be checked when it is removed from the differential case.**

A



B



A. Check that the differential motor pinion gear "2" turns counterclockwise.

B. Check that the differential motor pinion gear "2" turns clockwise.

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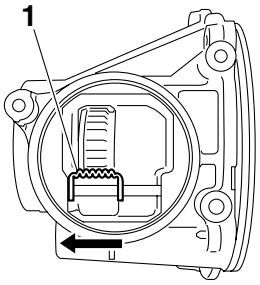
EAS30000

ASSEMBLING THE DIFFERENTIAL ASSEMBLY

1. Measure:
   - Gear backlash
   Refer to "MEASURING THE DIFFERENTIAL GEAR BACKLASH" on page 8-13.
2. Install:
   - Differential motor

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Slide the shift fork sliding gear "1", which is installed to the differential case cover, to the left as shown in the illustration to put it into the 2WD mode.

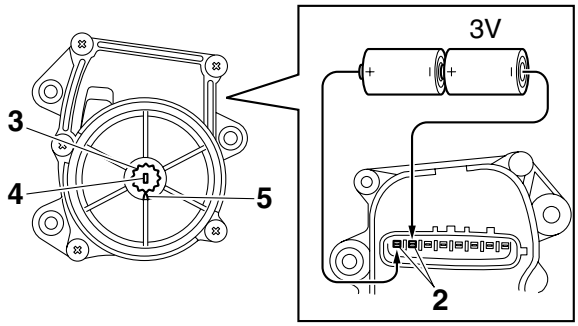


b. Connect two C-size batteries to the differential motor terminal "2" to operate the differential motor pinion gear "3". Operate the differential motor pinion gear until the mark "4" on the differential motor pinion gear is aligned with the mark "5" on the differential motor case.

ECA16230

NOTICE

Do not use a 12 V battery to operate the differential motor pinion gear.

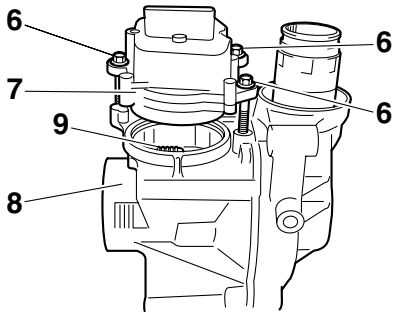


c. Insert 6 mm bolts "6" into the differential motor "7" and use them as a guide to set the motor on the differential case cover "8" so that the shift fork sliding gear "9" does not move.

ECA16240

NOTICE

If the position of the shift fork sliding gear is moved, the position of the differential gear assembly and the indicator light display may differ, and the 2WD or differential lock mode may not be activated.



d. Remove the 6 mm bolts, and then install the motor with the differential motor bolts.

	Differential motor bolt **11 Nm (1.1 m·kg, 8.0 ft·lb)**

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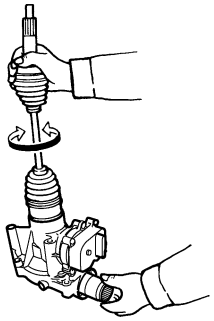
3. Check:
   - Differential assembly operation
     Unsmooth operation → Replace the differential assembly.
     Insert the double offset joint into the differential assembly, and turn the gears back and forth.



EAS30020
MEASURING THE DIFFERENTIAL GEAR BACKLASH

1. Secure the differential case in a vise or another supporting device.
2. Remove:
   - Drain plug
   - Gasket
3. Install:
   - Ring gear fix bolt (M10) “1”
     (into the drain plug hole)

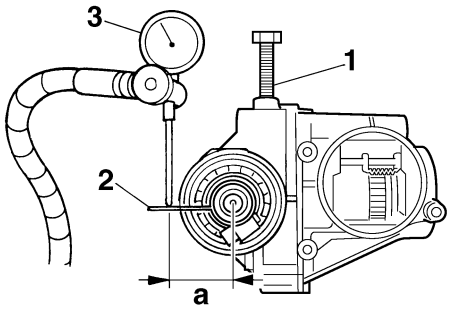
	Ring gear fix bolt (M10) **90890-01527** **YM-01527**

ECA16250
NOTICE

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

4. Attach:
   - Gear lash measurement tool “2”
   - Dial gauge “3”

	Gear lash measurement tool **90890-01475** **Middle drive gear lash tool** **YM-01475**



a. Measuring point is 22.5 mm (0.86 in)

5. Measure:
   - Gear backlash
     Gently rotate the differential pinion gear from engagement to engagement.

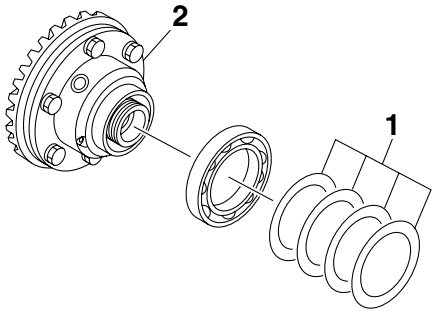
	Differential gear backlash **0.05–0.25 mm (0.002–0.010 in)**

TIP

Measure the gear backlash at four positions. Rotate the differential pinion gear 90° each time.

EAS30030
ADJUSTING THE DIFFERENTIAL GEAR BACKLASH

1. Remove:
   - Differential gear assembly shim(s) “1”
   - Differential gear assembly “2”



2. Adjust:
   - Gear backlash

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a. Select the suitable shims using the following chart.

Thinner shim	Differential gear backlash is increased.
Thicker shim	Differential gear backlash is decreased.

	Differential gear assembly shims **Thickness (mm)** **0.1 0.2 0.3 0.4**

b. Measure the differential gear backlash again.

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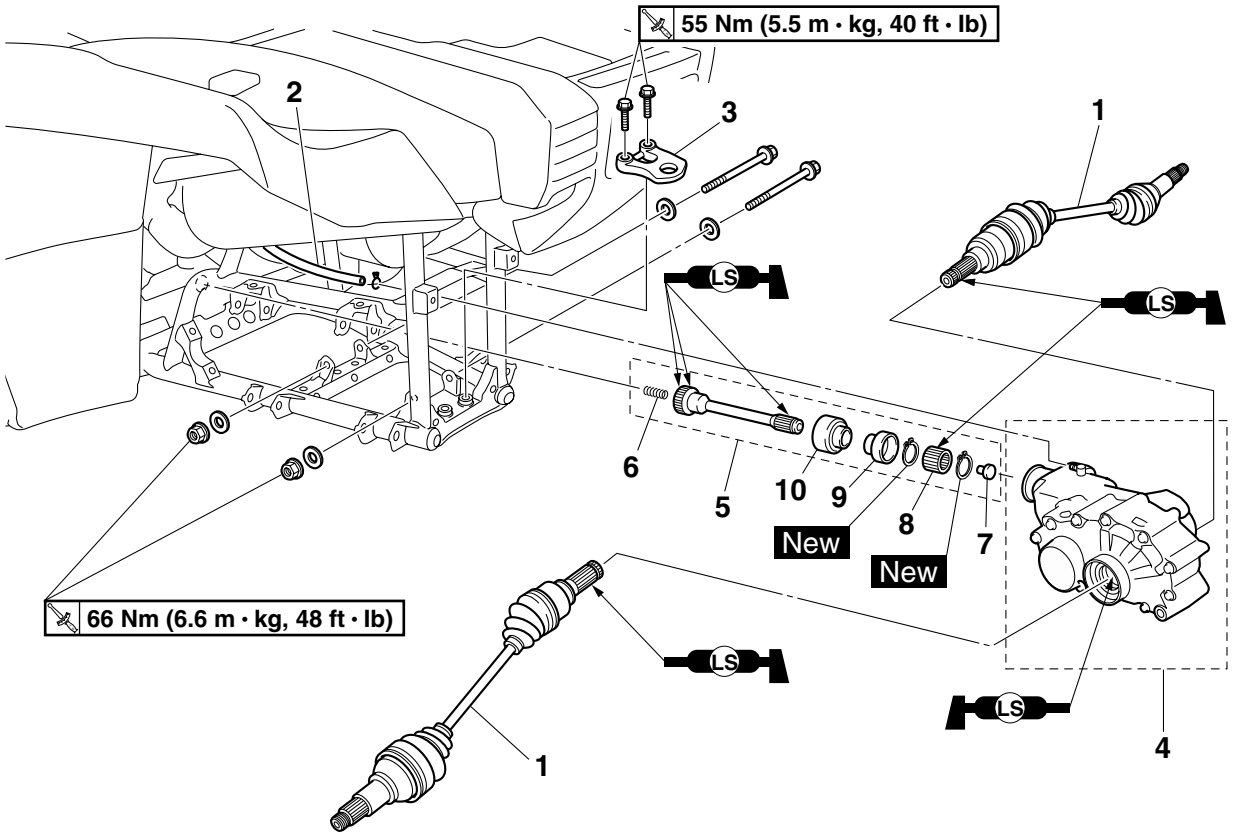
EAS30050

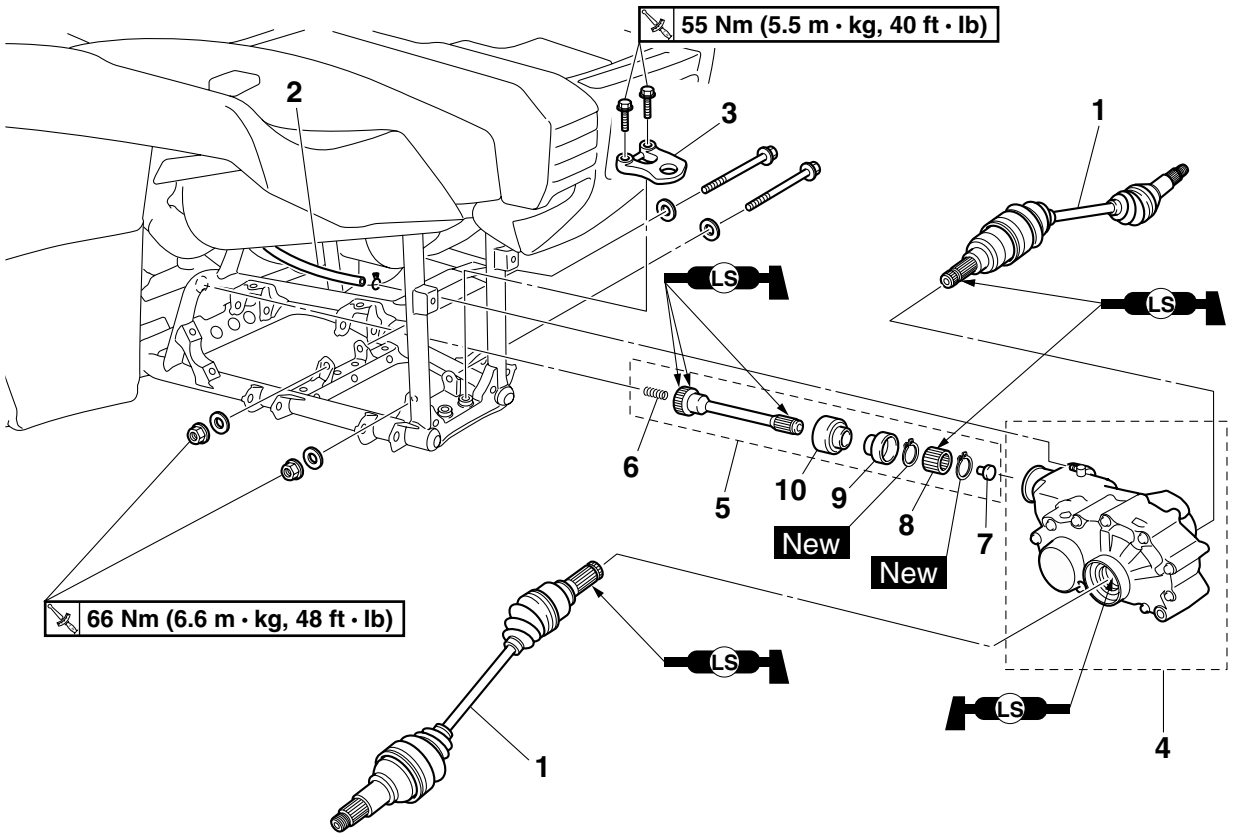
REAR CONSTANT VELOCITY SHAFT ASSEMBLIES, FINAL DRIVE ASSEMBLY AND REAR DRIVE SHAFT

Removing the rear constant velocity shaft assemblies, final drive assembly and rear drive shaft



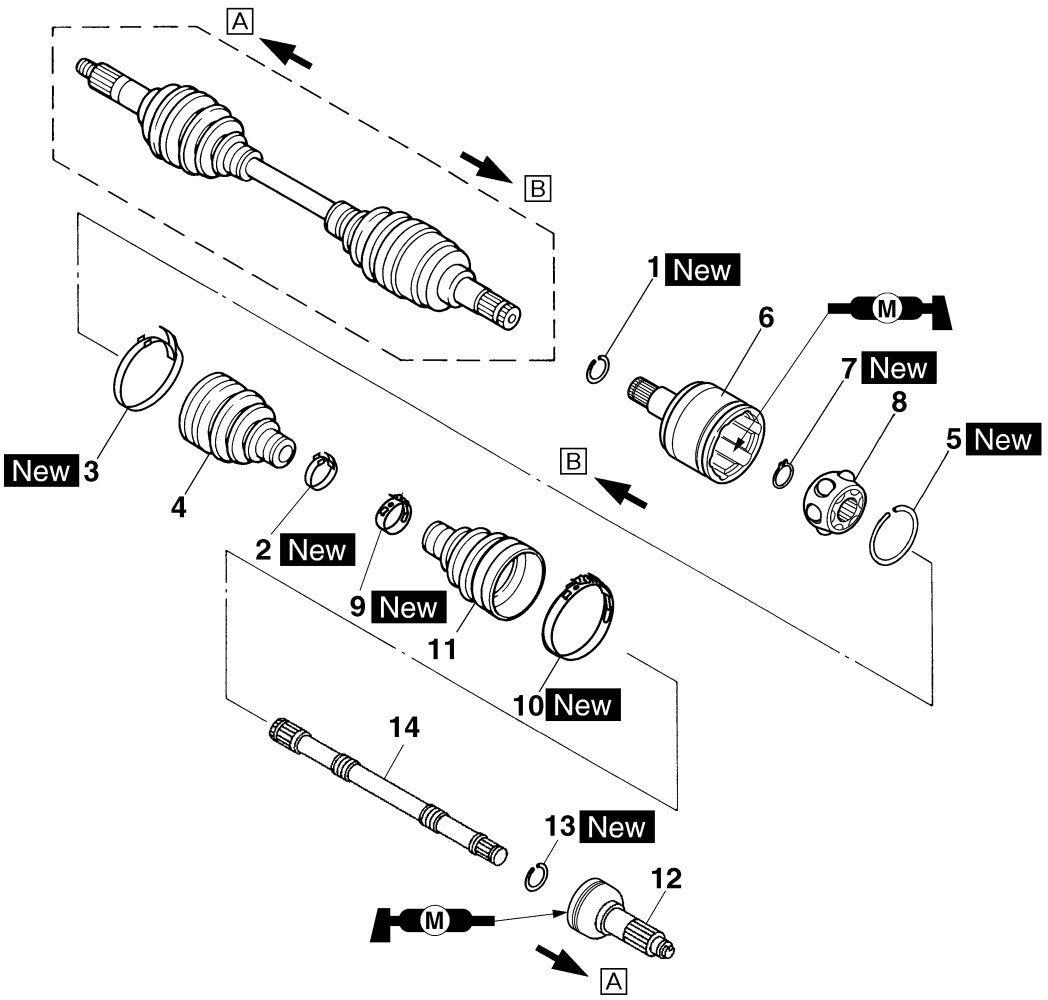
Order	Job/Parts to remove	Q'ty	Remarks
	Rear engine skid plate/Rear fender		Refer to "GENERAL CHASSIS" on page 4-1
	Rear arms		Refer to "REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES" on page 4-67
	Final gear oil		Drain. Refer to "CHANGING THE FINAL GEAR OIL" on page 3-26
1	Rear constant velocity shaft assembly	2	
2	Final drive case breather hose	1	Disconnect.
3	Trailer hitch	1	
4	Final drive assembly	1	
5	Rear drive shaft	1	
6	Spring	1	
7	Damper	1	
8	Rear drive shaft coupling sleeve	1	
9	Dust seal	1	

Removing the rear constant velocity shaft assemblies, final drive assembly and rear drive shaft



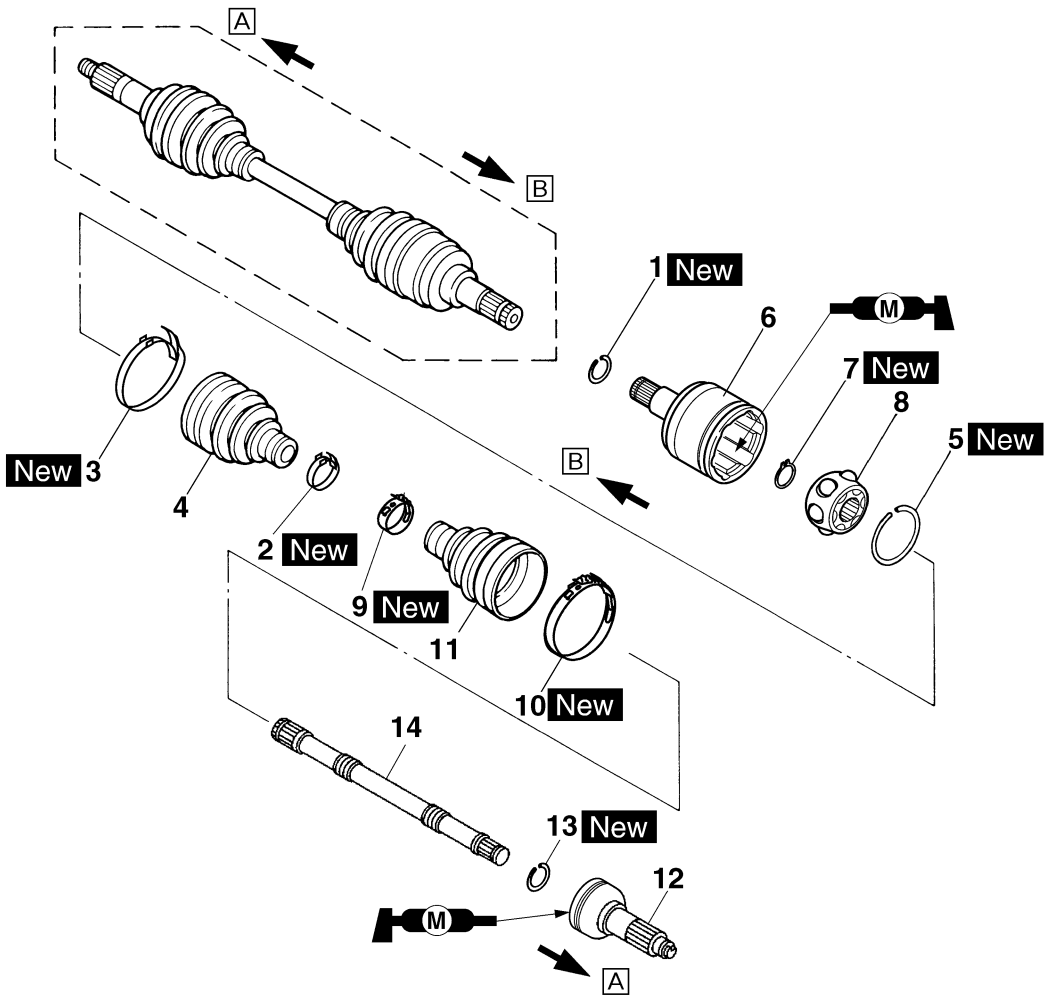
Order	Job/Parts to remove	Q'ty	Remarks
10	Dust seal	1	
			For installation, reverse the removal procedure.

Disassembling the rear constant velocity shaft assemblies



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the rear constant velocity shaft assemblies.
1	Clip	1	
2	Boot band	1	
3	Boot band	1	
4	Dust boot	1	
5	Clip	1	
6	Double offset joint	1	
7	Circlip	1	
8	Ball bearing	1	
9	Boot band	1	
10	Boot band	1	
11	Dust boot	1	
12	Constant velocity joint	1	
13	Clip	1	

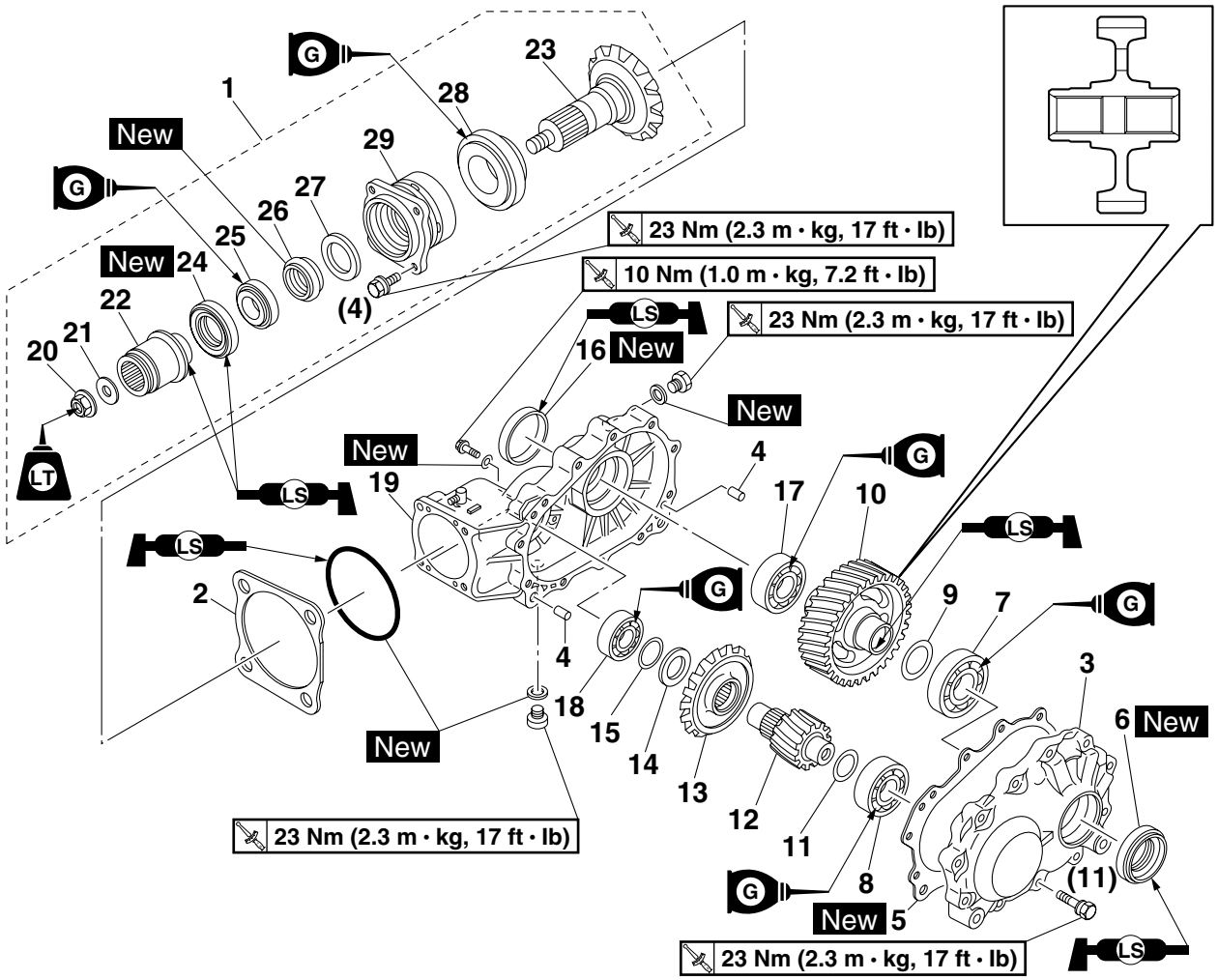
Disassembling the rear constant velocity shaft assemblies



Order	Job/Parts to remove	Q'ty	Remarks
14	Constant velocity shaft	1	
			For assembly, reverse the disassembly procedure.

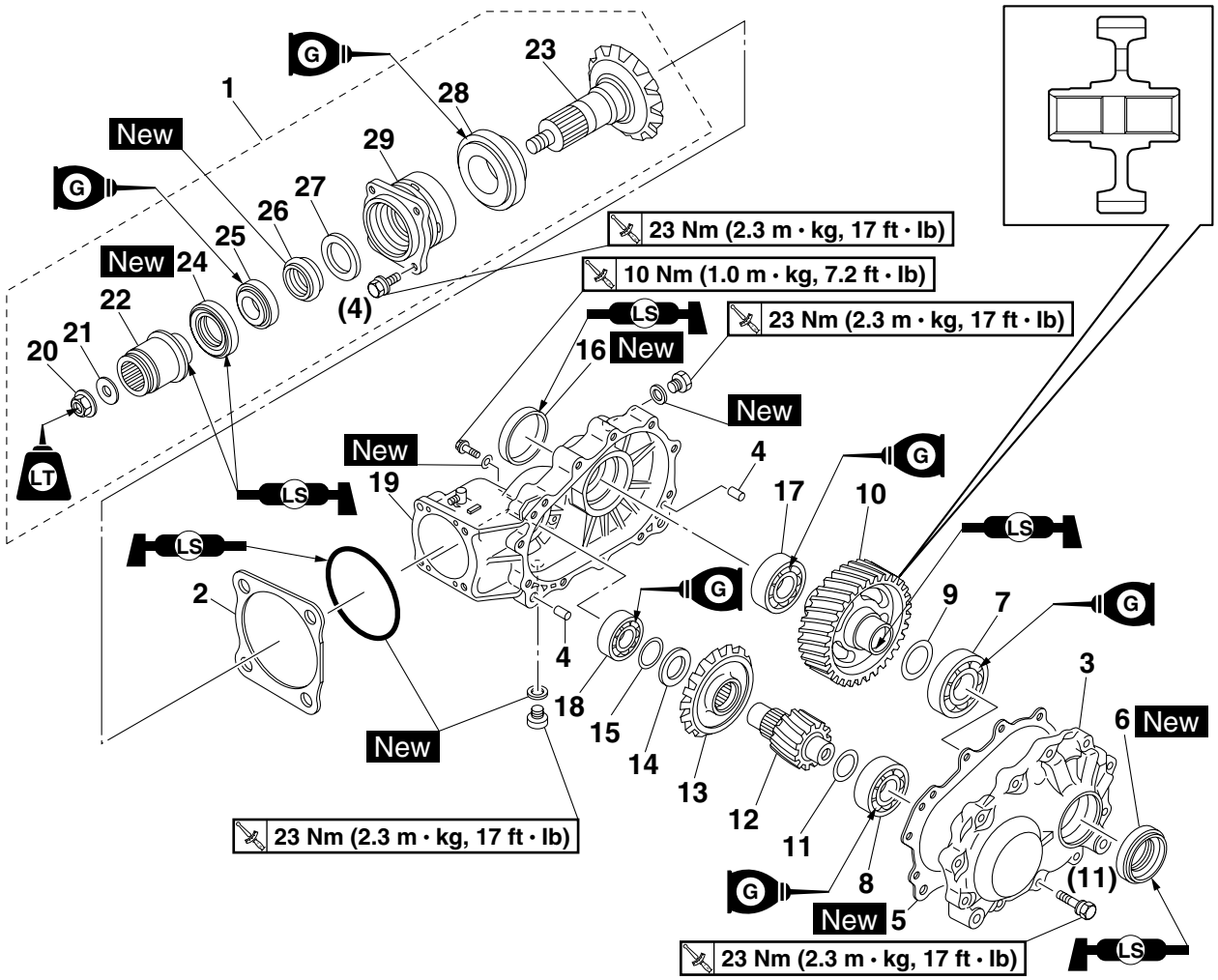
A: Wheel side
B: Final drive side

Disassembling the final drive assembly



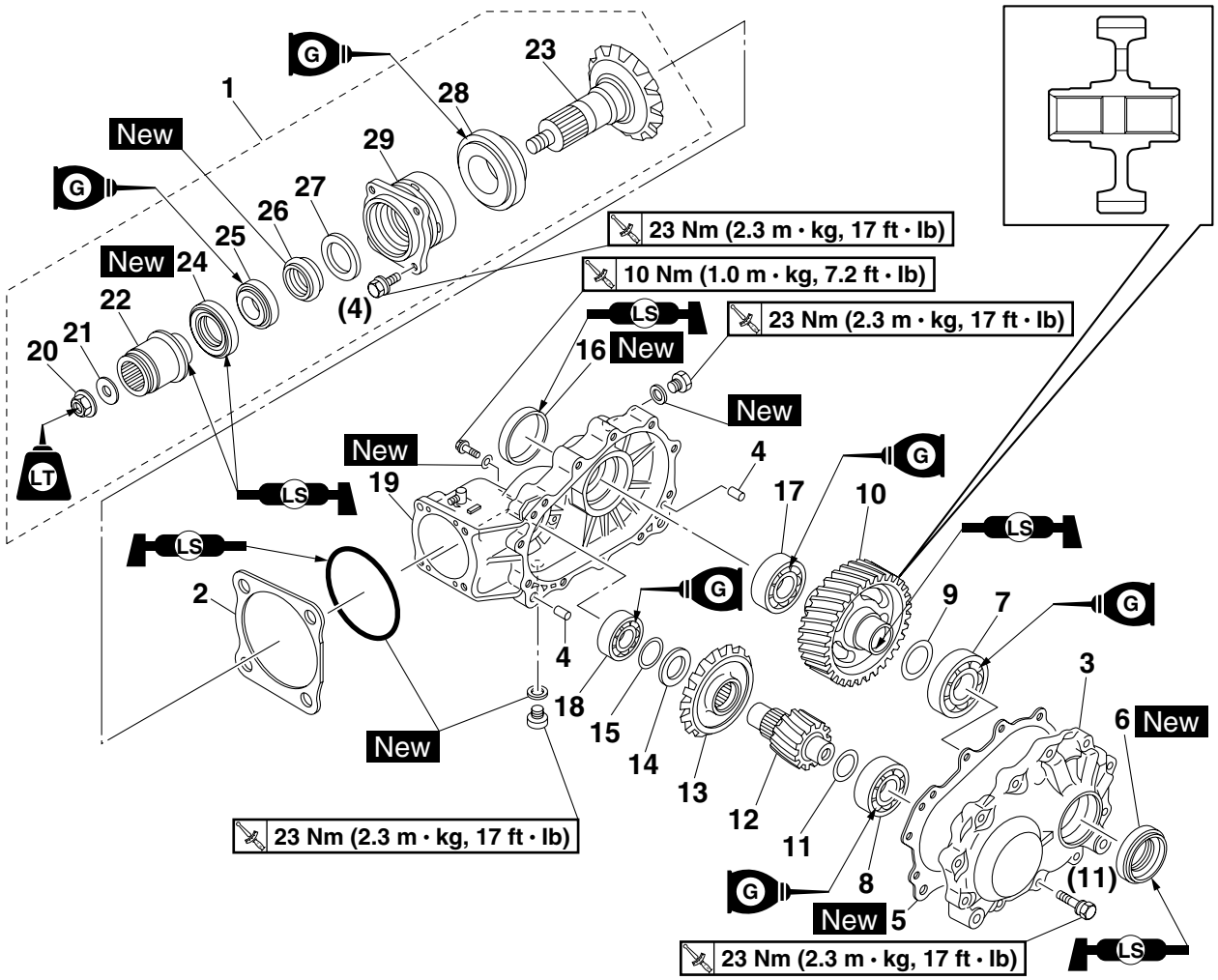
Order	Job/Parts to remove	Q'ty	Remarks
1	Final drive pinion gear assembly	1	
2	Final drive pinion gear shim		Refer to "SELECTING THE FINAL DRIVE PINION GEAR SHIM(S)" on page 8-25.
3	Final drive case cover	1	**TIP** Working in a crisscross pattern, loosen each bolt 1/4 of a turn. After all the bolts are loosened, remove them.
4	Dowel pin	2	
5	Gasket	1	
6	Oil seal	1	
7	Bearing	1	
8	Bearing	1	
9	Wheel gear shim		Refer to "SELECTING THE WHEEL GEAR SHIM(S)" on page 8-28.
10	Wheel gear	1	
11	Final driven pinion gear shim (final drive case cover side)		Refer to "SELECTING THE FINAL DRIVEN PINION GEAR SHIM (FINAL DRIVE CASE COVER SIDE)" on page 8-28.
12	Pinion gear	1	

Disassembling the final drive assembly



Order	Job/Parts to remove	Q'ty	Remarks
13	Final driven pinion gear	1	
14	Thrust washer		Refer to "SELECTING THE FINAL DRIVEN PINION GEAR SHIM (FINAL DRIVE CASE SIDE) AND THRUST WASHER" on page 8-26.
15	Final driven pinion gear shim (final drive case side)		Refer to "SELECTING THE FINAL DRIVEN PINION GEAR SHIM (FINAL DRIVE CASE SIDE) AND THRUST WASHER" on page 8-26.
16	Oil seal	1	
17	Bearing	1	
18	Bearing	1	
19	Final drive case	1	
20	Rear drive shaft yoke nut (final drive case side)	1	
21	Washer	1	
22	Rear drive shaft yoke (final drive case side)	1	
23	Final drive pinion gear	1	
24	Oil seal	1	
25	Bearing	1	

Disassembling the final drive assembly



Order	Job/Parts to remove	Q'ty	Remarks
26	Expander	1	
27	Washer	1	
28	Bearing	1	
29	Final drive pinion gear bearing housing	1	
			For assembly, reverse the disassembly procedure.

EAS30060
DISASSEMBLING THE REAR CONSTANT VELOCITY SHAFT ASSEMBLIES

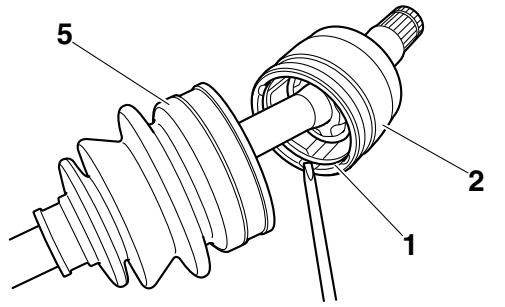
The following procedure applies to both of the rear constant velocity shaft assemblies.

1. Remove:
   - Boot bands
   - Clip "1"
   - Double offset joint "2"
   - Circlip "3"
   - Ball bearing "4"
   - Dust boot "5"

TIP

Before removing the clip, slide the dust boot away from the double offset joint.

A



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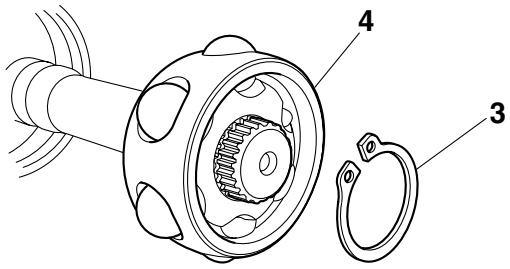


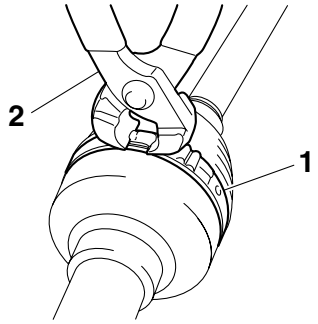
A. Final drive side

2. Remove:
   - Boot band "1"

   Use the boot band installation tool "2".

Boots band installation tool
90890-01526
YM-01526

B



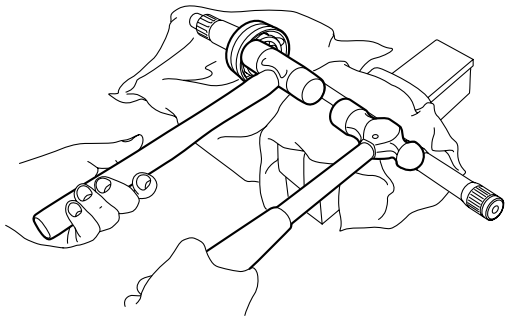
B. Wheel side

3. Remove:
   - Dust boot
   - Constant velocity joint
   - Clip

TIP

Secure the constant velocity shaft in a vise, and then remove the constant velocity joint using hammers.

B



B. Wheel side

EAS30330
CHECKING THE REAR CONSTANT VELOCITY SHAFT ASSEMBLIES

The following procedure applies to both of the rear constant velocity shaft assemblies.

1. Check:
   - Double offset joint splines
   - Constant velocity joint splines
   - Constant velocity shaft splines

   Wear/damage → Replace.
2. Check:
   - Dust boots

   Cracks/damage → Replace.

ECA16210

NOTICE

Always use a new boot band.

3. Check:
   - Balls and ball races
   - Inner surface of double offset joint

   Pitting/wear/damage → Replace.

EAS30070

ASSEMBLING THE REAR CONSTANT VELOCITY SHAFT ASSEMBLIES

The following procedure applies to both of the rear constant velocity shaft assemblies.

1. Install:
   - Clip "1" New
   - Constant velocity joint "2"
   - Constant velocity shaft "3"
   - Dust boot

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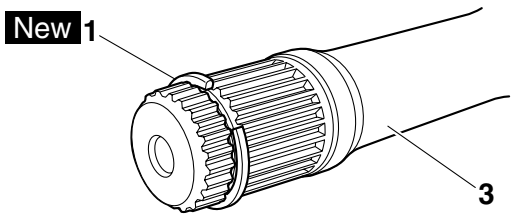
a. Install the clip.

b. Install the constant velocity joint.

TIP

- Install the clip into the groove in the constant velocity shaft as shown.
- Secure the constant velocity joint in a vise, and then fit the constant velocity shaft into the constant velocity joint using a hammer.

A



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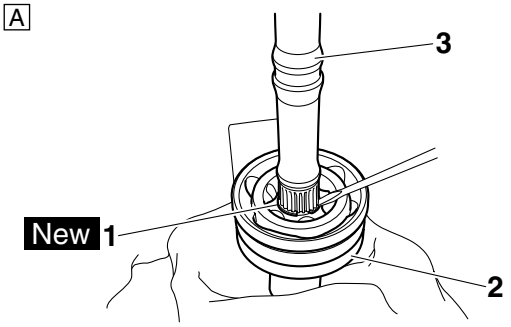
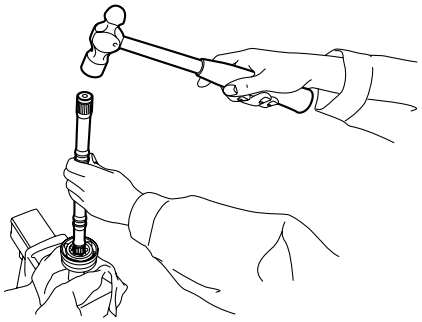


A



A. Wheel side

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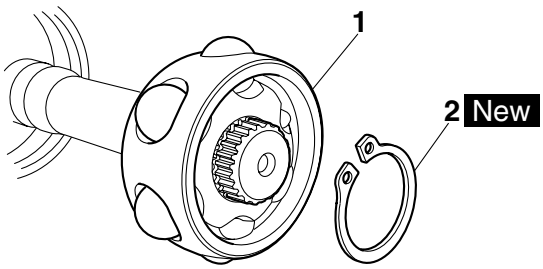
2. Install:
   - Dust boot
   - Ball bearing "1"
   - Circlip "2" New
   - Double offset joint "3"
   - Clip "4" New

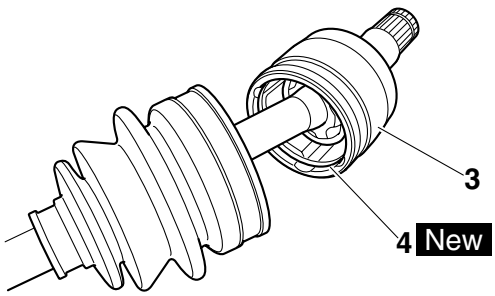
TIP

- Securely install the circlip into the groove in the constant velocity shaft.
- Securely install the clip into the groove in the double offset joint.

B



B



B. Final drive side

3. Apply:
   - Molybdenum disulfide grease (into the double offset joint, constant velocity joint, and dust boots)

	Molybdenum disulfide grease **50 g (1.8 oz) per dust boot (wheel side)** **70 g (2.5 oz) per dust boot (final drive side)**

TIP

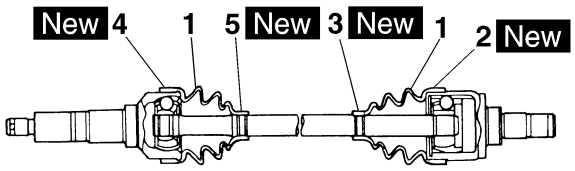
Molybdenum disulfide grease is included in the repair kit.

4. Install:
   - Dust boots "1"
   - Boot bands "2", "3", "4", "5" New

TIP

- The new boot bands may differ from the original ones.

• The dust boots should be fastened with the boot bands “3” and “5” at the grooves in the constant velocity shaft.



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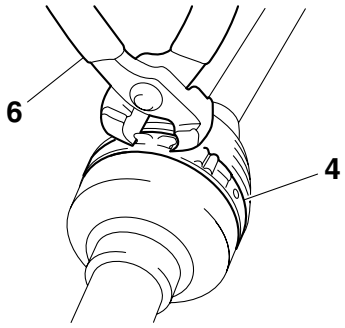
a. Install the dust boots.
b. Install the dust boot bands “4” and “5”.
Use the boot band installation tool “6”.

Boots band installation tool
90890-01526
YM-01526



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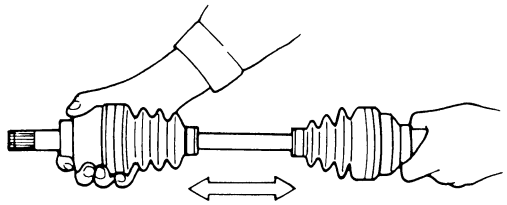
5. Check:
• Thrust movement free play
Excessive play → Replace the constant velocity shaft assembly.



EAS28P1017

DISASSEMBLING THE FINAL DRIVE PINION GEAR ASSEMBLY

1. Remove:
• Rear drive shaft yoke nut “1”

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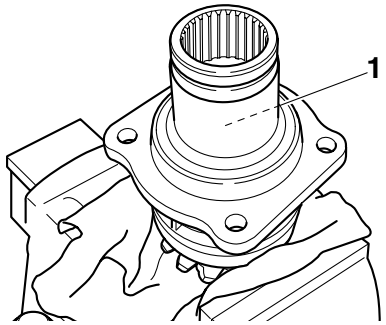
a. Place a folded rag as shown.
b. Secure the final drive pinion gear in the vise.



c. Remove the rear drive shaft yoke nut.

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EAS30150

CHECKING THE REAR DRIVE SHAFT

1. Check:
• Drive shaft splines
• Coupling sleeve splines
Wear/damage → Replace.

EAS30160

CHECKING THE FINAL DRIVE ASSEMBLY

1. Check:
• Final drive case
• Final drive case cover
Cracks/damage → Replace.

TIP

When the final drive case and/or the final drive case cover are replaced, be sure to adjust the shim of the final drive pinion gear and/or final driven pinion gear.

2. Check:
• Gear teeth
Pitting/galling/wear → Replace the final drive pinion gear and final driven pinion gear as a set.

TIP

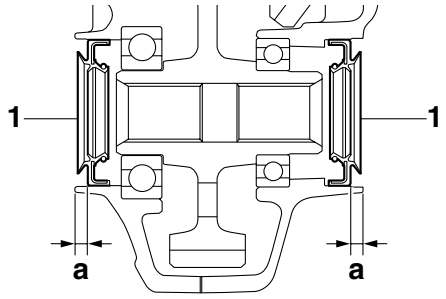
When the final drive pinion gear, final driven pinion gear and/or wheel gear are replaced, be sure to adjust the shim of the final drive pinion gear, final driven pinion gear and/or wheel gear.

• Oil seals
• O-ring
Damage → Replace.
3. Check:
• Bearings
Damage → Replace.

EAS28P1019
ASSEMBLING THE FINAL DRIVE CASE

1. Install:
   • Oil seals “1”

	Installed depth of oil seal “a” **5.5 mm (0.22 in)**



EAS28P1020
ASSEMBLING THE FINAL DRIVE PINION GEAR ASSEMBLY

1. Install:
   • Rear drive shaft yoke nut “1”

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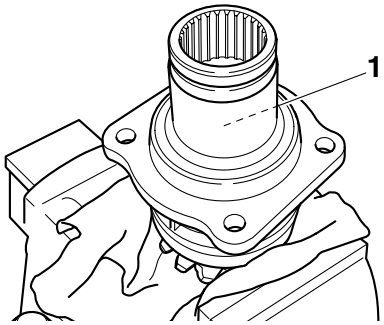
a. Place a folded rag as shown.
b. Secure the final drive pinion gear in the vise.



c. Tighten the rear drive shaft yoke nut. (temporarily)

	Rear drive shaft yoke nut (temporarily) **82 Nm (8.2 m·kg, 59 ft·lb)** **LOCTITE®**

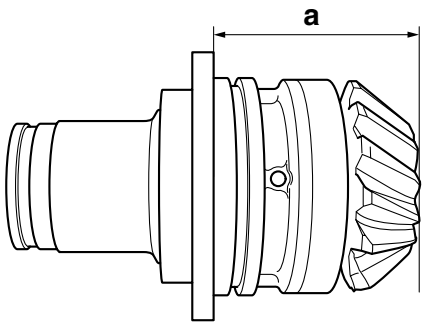
d. Secure the final drive pinion gear bearing housing in a vice, and then turn the nut with a torque wrench to check the starting torque.

	Final drive pinion gear starting torque (final drive pinion gear preload) **0.8–1.3 Nm (0.08–0.13 m·kg, 0.58–0.94 ft·lb)**

e. Out of specification → Tighten the nut further.
f. Repeat steps (d) and (e) until the starting torque is within specification.

TIP

- Be careful not to exceed the specified starting torque.
- If the specified starting torque is exceeded, replace the expander with a new one and reassemble the final drive pinion gear assembly.
- Make sure that the distance “a” is 67.5–68.1 mm (2.66–2.68 in) as shown.



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2. Check:
   • Final drive assembly operation
   Unsmooth operation → Replace the final drive assembly.
   Insert the double offset joint into the final drive assembly, and turn the gears back and forth.

EAS30110
SELECTING THE FINAL DRIVE PINION GEAR SHIM(S)

1. Select:
   • Final drive pinion gear shim(s) “1”

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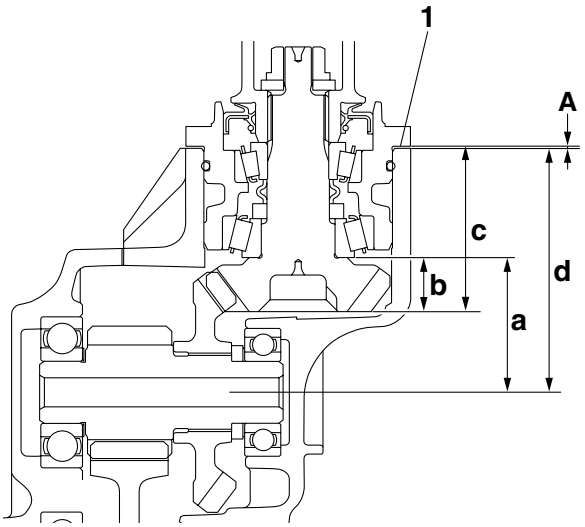
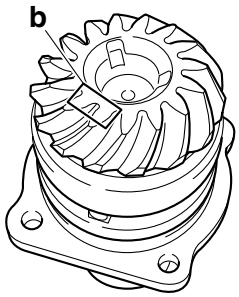
a. To find the final drive pinion gear shim thickness “A”, use the following formula.

Final drive pinion gear shim thickness “A” = “a” + (“c” - “b”) - “d”

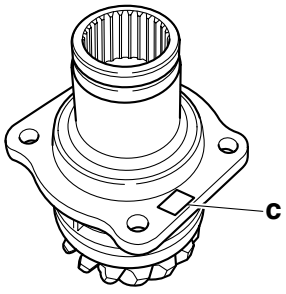
“a” = 55 mm
“b” = a numeral (usually a decimal number) on the final drive pinion gear either added to or subtracted from “22.2”
“c” = a numeral (usually a decimal number) on the final drive pinion gear bearing housing either added to or subtracted from “67.8”
“d” = a numeral (usually a decimal number) on the final drive case either added to or subtracted from “100”



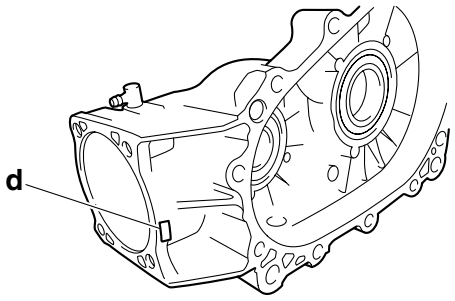
Example:
"a" = 55
If "-02" is stamped on the final drive pinion gear,
"b" = 22.2 - 0.02
= 22.18



If "-05" is stamped on the final drive pinion gear bearing housing,
"c" = 67.8 - 0.05
= 67.75



If "-01" is stamped on the final drive case,
"d" = 100 - 0.01
= 99.99



Therefore, "A" is 0.58.
"A" = 55 + (67.75 - 22.18) - 99.99
= 0.58
Round off the hundredth digit and select the appropriate shim(s).
In the example above, the calculated number is 0.58. The chart instructs you to round off 8 to 10 at the hundredth place. Thus, the shim thickness is 0.60 mm (0.024 in).

Hundredth	Rounded value
0, 1, 2	0
3, 4, 5, 6, 7	5
8, 9	10

Shims are supplied in the following thicknesses.

Final drive pinion gear shims
Thickness (mm)
0.25 0.30 0.35 0.40 0.45 0.50

EAS30120
SELECTING THE FINAL DRIVEN PINION GEAR SHIM (FINAL DRIVE CASE SIDE) AND THRUST WASHER

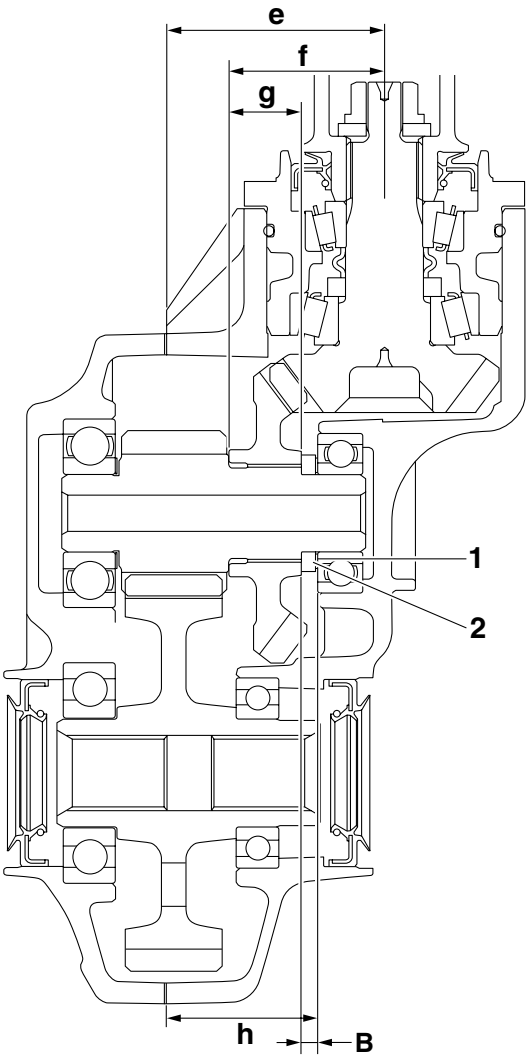
1. Select:
   - Final driven pinion gear shim (final drive case side) "1"
   - Thrust washer "2"

a. To find the final driven pinion gear shim (final drive case side) and thrust washer thickness "B", use the following formula.

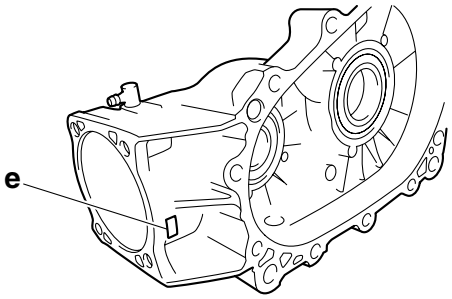
Final driven pinion gear shim (final drive case side) and thrust washer thickness
"B" = "h" - ("e" - "f" + "g")

"e" = a numeral (usually a decimal number) on the final drive case either added to or subtracted from "71.6"

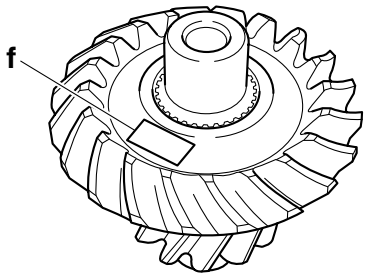
"f" = a numeral (usually a decimal number) on the final driven pinion gear either added to or subtracted from "51.0"
"g" = a numeral (usually a decimal number) on the final driven pinion gear either added to or subtracted from "24.0"
"h" = 49.8



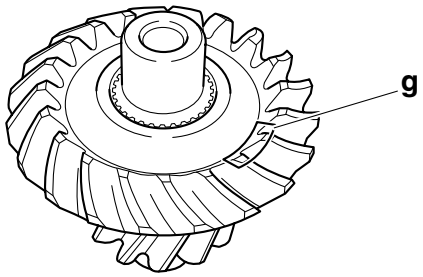
Example:
If "-03" is stamped on the final drive case,
"e" = 71.6 - 0.03
= 71.57



If "-12" is stamped on the outside of the final driven pinion gear,
"f" = 51.0 - 0.12
= 50.88



If "-05" is stamped on the outside of the final driven pinion gear,
"g" = 24.0 - 0.05
= 23.95



"h" = 49.8
Therefore, shim and thrust washer thickness "B" is 5.16.
"B" = 49.8 - (71.57 - 50.88 + 23.95)
= 5.16
Round off the hundredth digit and select the appropriate shim(s).
In the example above, the calculated number is 5.16. The chart instructs you to round off 6 to 5 at the hundredth place.
Thus, the shim and thrust washer thickness is 5.15 mm.

Hundredth	Rounded value
0, 1, 2	0
3, 4, 5, 6, 7	5
8, 9	10

Shim and thrust washer are supplied in the following thicknesses.

Final driven pinion gear shims (final drive case side) "1"
Thickness (mm)
0.25 0.30 0.35 0.40 0.45 0.50

Thrust washer "2"
Thickness (mm)
4.50 4.80 5.10 5.40

TIP

Be sure to use one of each of the final driven pinion gear shim (final drive case side) "1" and thrust washer "2" to obtain the shim and thrust washer thickness.

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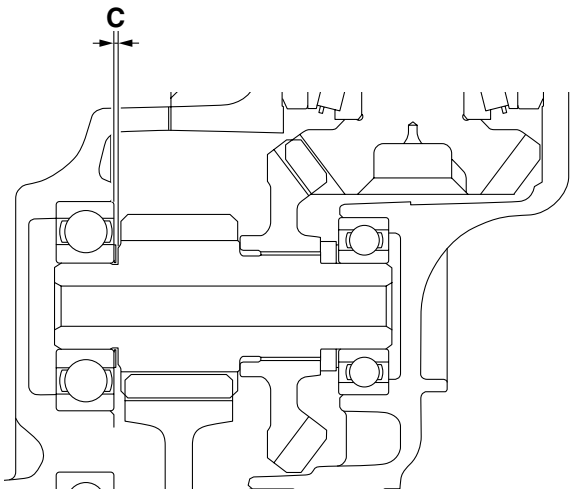
EAS30130

SELECTING THE FINAL DRIVEN PINION GEAR SHIM (FINAL DRIVE CASE COVER SIDE)

1. Measure:
   • Final driven pinion gear thrust clearance "C"



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a. Place four pieces of Plastigauge® between the originally fitted shim(s) and the final driven pinion gear assembly.
b. Install the final driven pinion gear assembly, final driven pinion gear shim (final drive case side) and thrust washer, and tighten the bolts to specification.

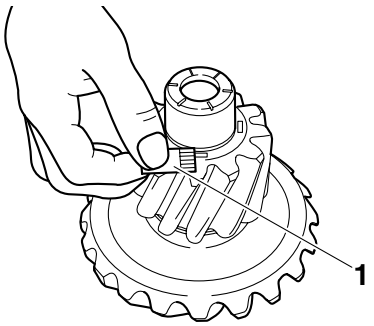
Final drive case cover bolt
23 Nm (2.3 m·kg, 17 ft·lb)

TIP

Do not turn the final drive pinion gear, wheel gear, and driven pinion gear when measuring the clearance with Plastigauge®.

c. Remove the final driven pinion gear assembly.
d. Measure the thrust clearance. Calculate the width of the flattened Plastigauge® "1".

Final driven pinion gear thrust clearance
0.08–0.12 mm (0.0031–0.0047 in)



e. If out of specification, remove the originally fitted shim(s), and then select the correct shim(s)

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2. Select:
   • Final driven pinion gear shim (final drive case cover side)

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a. Select suitable final driven pinion gear shims (final drive case cover side) using the following chart.

Final driven pinion gear shims (final drive case cover side)
Thickness (mm)
0.25 0.30 0.35 0.40 0.45 0.50

TIP

Measure the thickness of the originally fitted shim(s), and then calculate the required new shim thickness to bring the final driven pinion gear thrust clearance within the specified limits.

b. Repeat the measurement steps until the final driven pinion gear thrust clearance is within the specified limits.

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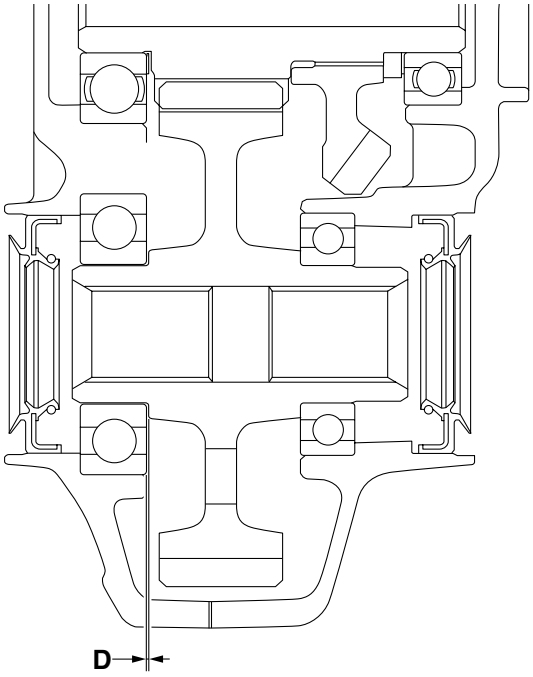
EAS28P1018

SELECTING THE WHEEL GEAR SHIM(S)

1. Measure:
   • Wheel gear thrust clearance "D"



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a. Place four pieces of Plastigauge® between the originally fitted wheel gear shim(s) and the wheel gear.
b. Install the wheel gear and tighten the bolts to specification.

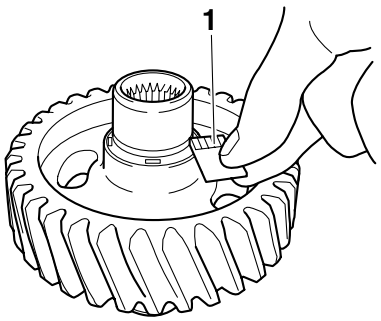
Final gear case cover bolt
23 Nm (2.3 m·kg, 17 ft·lb)

TIP

Do not turn the drive pinion gear, wheel gear, or driven pinion gear when measuring the clearance with Plastigauge®.

c. Remove the wheel gear.
d. Measure the thrust clearance. Calculate the width of the flattened Plastigauge® "1".

Wheel gear thrust clearance
0.03–0.07 mm (0.0012–0.0028 in)



e. If out of specification, remove the originally fitted shim(s), and then select the correct shim(s).

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2. Select:
   • Wheel gear shim(s)

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a. Select suitable wheel gear shims using the following chart.

Wheel gear shims
Thickness (mm)
0.25 0.30 0.35 0.40 0.45 0.50

TIP

Measure the thickness of the originally fitted shim(s), and then calculate the required new shim thickness to bring the wheel gear thrust clearance within the specified limits.

b. Repeat the measurement steps until the wheel gear thrust clearance is within the specified limits.

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EAS30170

MEASURING THE FINAL GEAR BACKLASH

1. Secure the final drive case in a vise or another supporting device.
2. Remove:
   • Drain plug
   • Gasket
3. Install:
   • Ring gear fix bolt (M14) "1" (into the drain plug hole)

Ring gear fix bolt (M14)
90890-01524
YM-01524

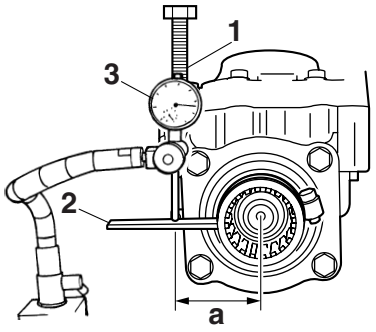
ECA16250

NOTICE

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

4. Attach:
   • Final gear backlash band "2"
   • Dial gauge "3"

Final gear backlash band
90890-01511
Middle drive gear lash tool
YM-01230



a. Measuring point is 31.5 mm (1.24 in)

5. Measure:
   • Gear backlash
   Gently rotate the final drive pinion gear from engagement to engagement.

Final gear backlash
0.10–0.20 mm (0.004–0.008 in)

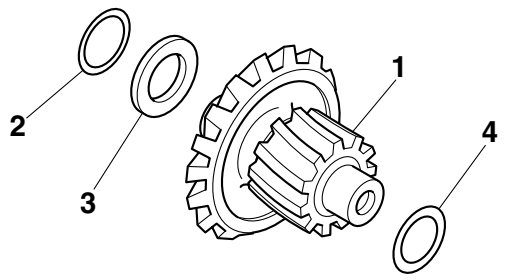
TIP

- When measuring the gear backlash, be sure the right side (gear oil level check bolt side) of the final drive case assembly is facing downward.
- Measure the gear backlash at four positions. Rotate the final drive pinion gear 90° each time.

EAS30180

ADJUSTING THE FINAL GEAR BACKLASH

1. Remove:
   • Final driven pinion gear assembly “1”
   • Final driven pinion gear shim (final drive case side) “2”
   • Thrust washer “3”
   • Final driven pinion gear shim (final drive case cover side) “4”



2. Adjust:
   • Gear backlash

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a. Select a suitable shim(s) and thrust washer(s) using the following chart.

Thinner shim	Final gear backlash is increased.
Thicker shim	Final gear backlash is decreased.

b. If increased by more than 0.2 mm (0.008 in): Reduce the final driven pinion gear shim (final drive case cover side) “4” thickness by 0.2 mm (0.008 in) for every 0.2 mm (0.008 in) that the final driven pinion gear shim (final drive case side) “2” and thrust washer “3” are increased.
c. If reduced by more than 0.2 mm (0.008 in): Increase the final driven pinion gear shim (final drive case cover side) “4” thickness by 0.2 mm (0.008 in) for every 0.2 mm (0.008 in) that the final driven pinion gear shim (final drive case side) “2” and thrust washer “3” are decreased.

Final driven pinion gear shims (final drive case side) “2”
Thickness (mm)
0.25 0.30 0.35 0.40 0.45 0.50

Thrust washers “3”
Thickness (mm)
4.50 4.80 5.10 5.40

TIP

Be sure to use one of each of the final driven pinion gear shim (final drive case side) “2” and thrust washer “3” to obtain the shim and thrust washer thickness.

Final driven pinion gear shims (final drive case cover side) “4”
Thickness (mm)
0.25 0.30 0.35 0.40 0.45 0.50

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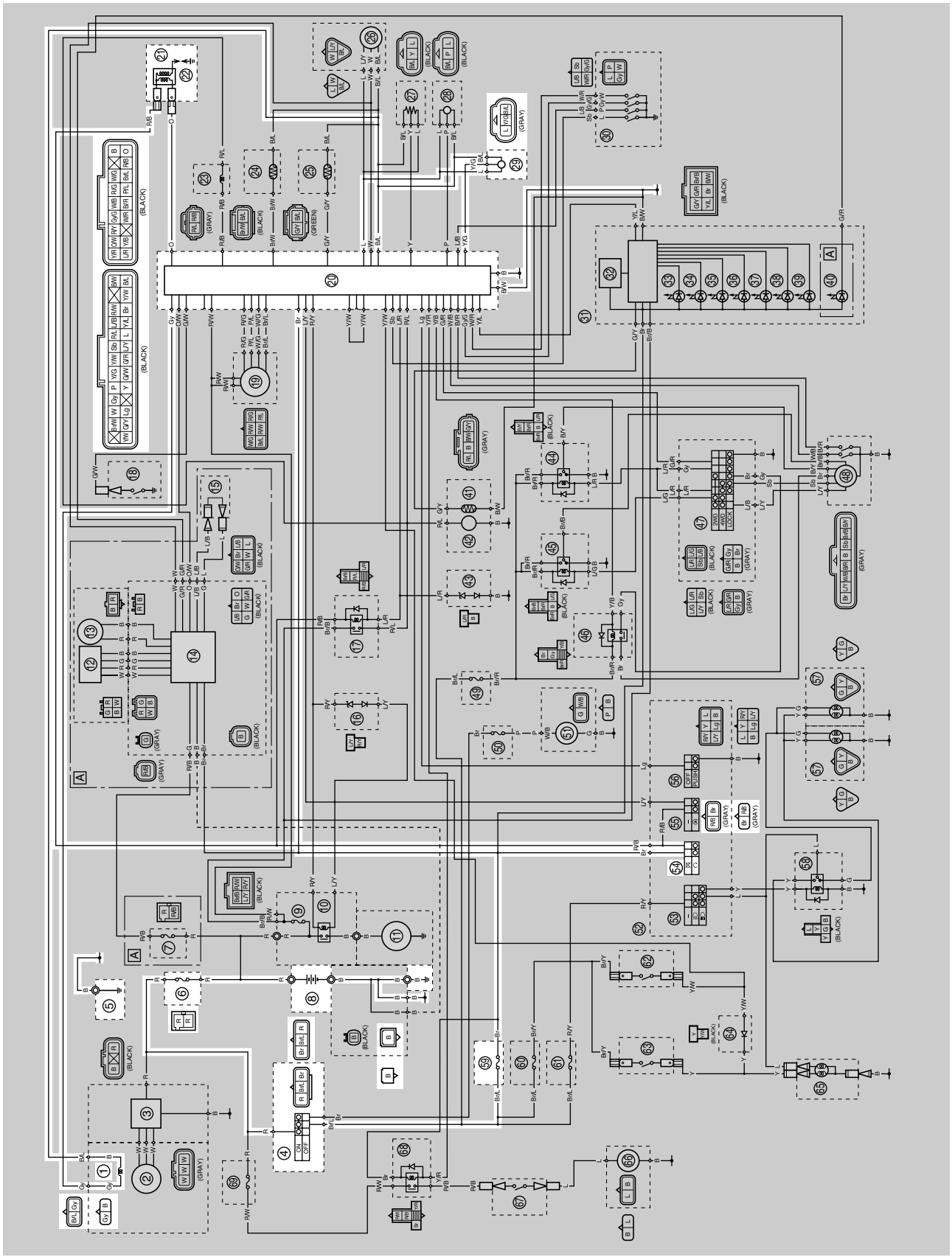
EAS27090
IGNITION SYSTEM

EAS27100
CIRCUIT DIAGRAM



1. Crankshaft position sensor
4. Main switch
5. Frame ground
6. Main fuse
8. Battery
20. ECU (engine control unit)
21. Ignition coil
22. Spark plug
29. Lean angle sensor
54. Engine stop switch
59. Ignition fuse

EAS27130
TROUBLESHOOTING

The ignition system fails to operate (no spark or intermittent spark).

TIP

• Before troubleshooting, remove the following part(s):
1. Seat
2. Battery cover
3. Right side panel
4. V-belt cooling exhaust duct

1. Check the fuses. (Main and ignition) Refer to "CHECKING THE FUSES" on page 9-83.	NG →	Replace the fuse(s).
OK ↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 9-84.	NG →	• Clean the battery terminals. • Recharge or replace the battery.
OK ↓		
3. Check the spark plug. Refer to "CHECKING THE SPARK PLUG" on page 3-7.	NG →	Re-gap, clean, or replace the spark plug.
OK ↓		
4. Check the ignition spark gap. Refer to "CHECKING THE IGNITION SPARK GAP" on page 9-91.	OK →	Ignition system is OK.
NG ↓		
5. Check the spark plug cap. Refer to "CHECKING THE SPARK PLUG CAP" on page 9-90.	NG →	Replace the spark plug cap.
OK ↓		
6. Check the ignition coil. Refer to "CHECKING THE IGNITION COIL" on page 9-90.	NG →	Replace the ignition coil.
OK ↓		
7. Check the crankshaft position sensor. Refer to "CHECKING THE CRANKSHAFT POSITION SENSOR" on page 9-91.	NG →	The crankshaft position sensor is faulty. Replace the crankshaft position sensor/stator assembly.
OK ↓		

8. Check the main switch.
   Refer to “CHECKING THE SWITCHES” on page 9-79.

NG → Replace the main switch.

OK ↓

9. Check the engine stop switch.
   Refer to “CHECKING THE SWITCHES” on page 9-79.

NG → The engine stop switch is faulty. Replace the left handlebar switch.

OK ↓

10. Check the lean angle sensor.
    Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 9-92.

NG → Replace the lean angle sensor.

OK ↓

11. Check the entire ignition system wiring.
    Refer to “CIRCUIT DIAGRAM” on page 9-1.

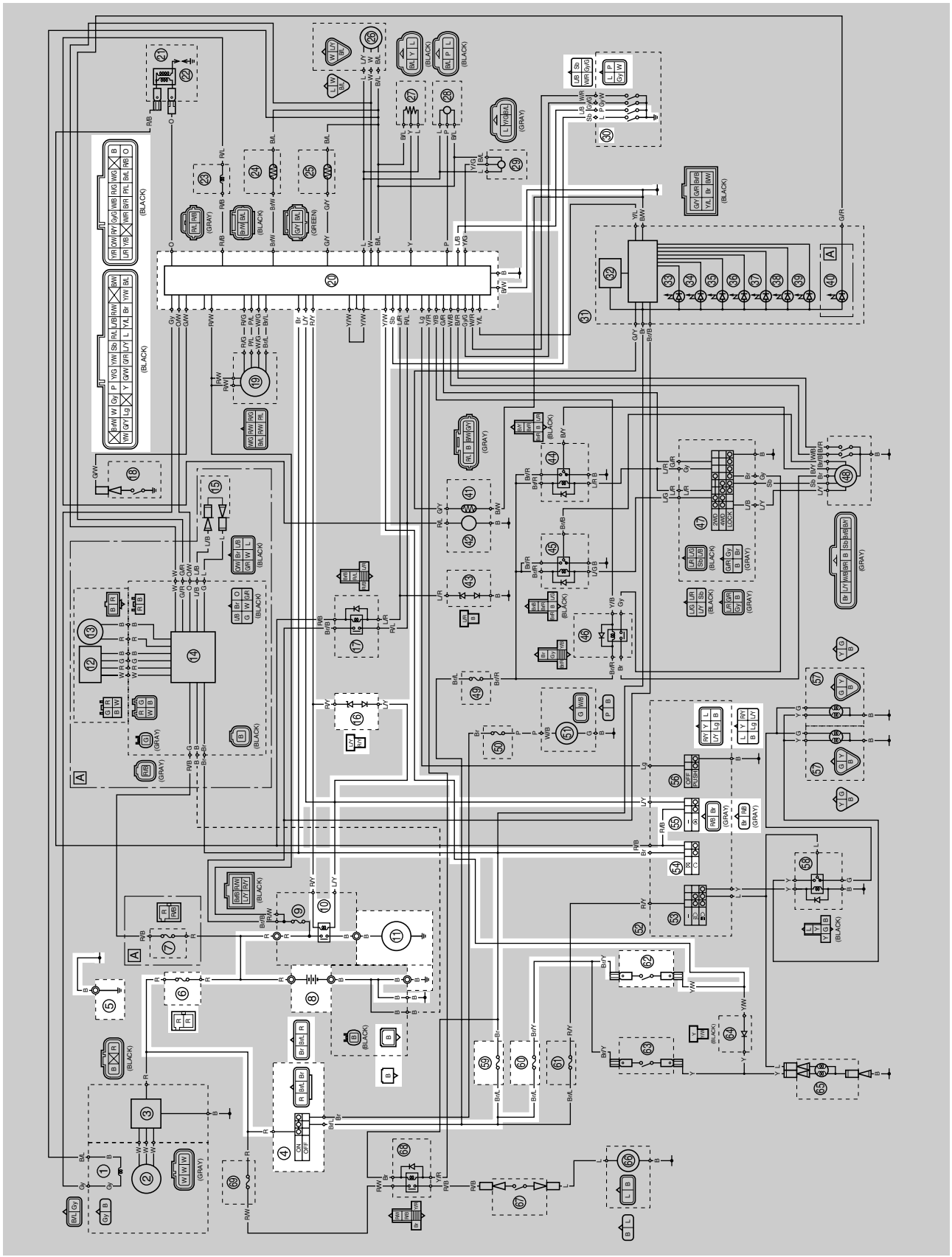
NG → Properly connect or repair the ignition system wiring.

OK ↓

Replace the ECU.

EAS27160
ELECTRIC STARTING SYSTEM

EAS27170
CIRCUIT DIAGRAM

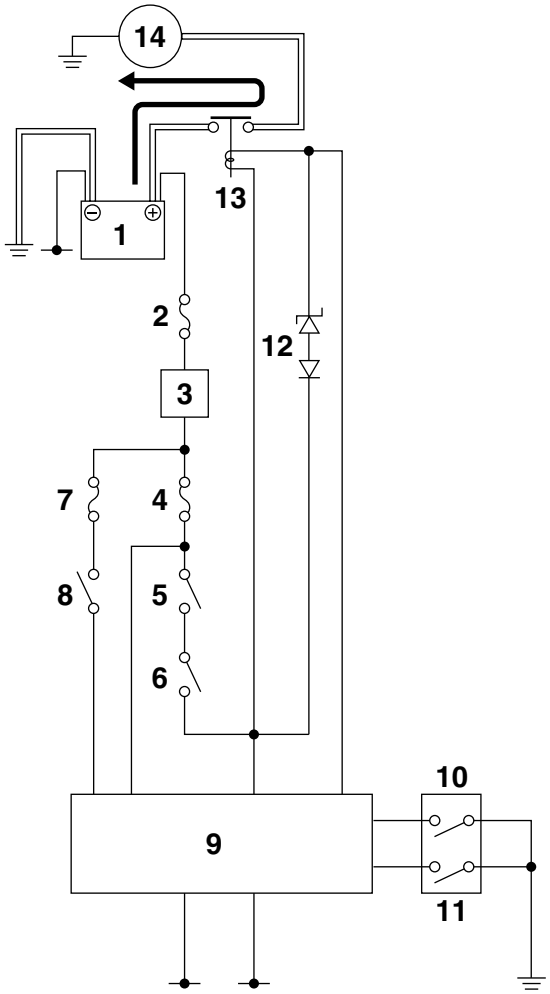


4. Main switch
5. Frame ground
6. Main fuse
8. Battery
10. Starter relay
11. Starter motor
16. Diode 1
20. ECU (engine control unit)
30. Gear position switch
54. Engine stop switch
55. Start switch
59. Ignition fuse
60. Signaling system fuse
62. Rear brake light switch

EAS27180
STARTING CIRCUIT CUT-OFF SYSTEM OPERATION

If the engine stop switch is set to "○" and the main switch is set to "ON" (both switch circuits are closed), the starter motor can only operate if at least one of the following conditions is met:

- The transmission is in neutral (the neutral switch circuit of the gear position switch is closed).
- The transmission is in park (the park switch circuit of the gear position switch is closed).
- The rear brake lever is pulled to the handlebar or the brake pedal is pushed down (the rear brake light switch circuit is closed).



1. Battery
2. Main fuse
3. Main switch
4. Ignition fuse
5. Engine stop switch
6. Start switch
7. Signaling system fuse
8. Rear brake light switch
9. ECU (engine control unit)
10. Park switch (gear position switch)
11. Neutral switch (gear position switch)
12. Diode 1
13. Starter relay
14. Starter motor

EAS27190
TROUBLESHOOTING

The starter motor fails to turn.

TIP

• Before troubleshooting, remove the following part(s):
1. Seat
2. Battery cover
3. Side covers

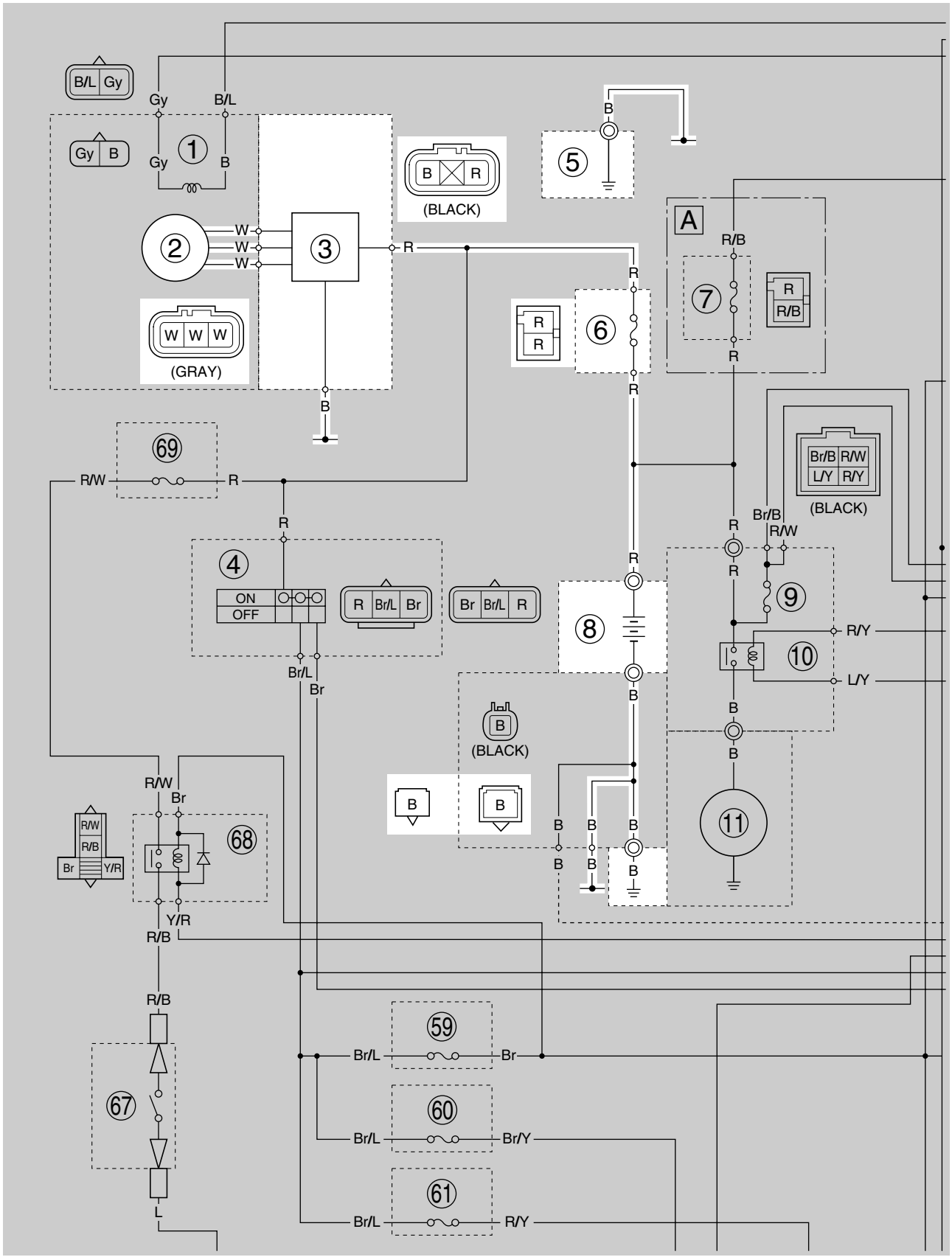
1. Check the fuses. (Main, ignition and signaling system) Refer to “CHECKING THE FUSES” on page 9-83.	NG →	Replace the fuse(s).
OK ↓		
2. Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-84.	NG →	• Clean the battery terminals. • Recharge or replace the battery.
OK ↓		
3. Check the starter motor operation. Refer to “CHECKING THE STARTER MOTOR OPERATION” on page 9-92.	OK →	Starter motor is OK. Perform the electric starting system troubleshooting, starting with step 5.
NG ↓		
4. Check the starter motor. Refer to “CHECKING THE STARTER MOTOR” on page 5-42.	NG →	Repair or replace the starter motor.
OK ↓		
5. Check the starter relay. Refer to “CHECKING THE RELAYS” on page 9-87.	NG →	Replace the starter relay.
OK ↓		
6. Check the main switch. Refer to “CHECKING THE SWITCHES” on page 9-79.	NG →	Replace the main switch.
OK ↓		
7. Check the engine stop switch. Refer to “CHECKING THE SWITCHES” on page 9-79.	NG →	The engine stop switch is faulty. Replace the left handlebar switch.
OK ↓		
8. Check the start switch. Refer to “CHECKING THE SWITCHES” on page 9-79.	NG →	The start switch is faulty. Replace the left handlebar switch.
OK ↓		

9. Check the rear brake light switch.
   Refer to “CHECKING THE SWITCHES” on page 9-79.
   NG → Replace the rear brake light switch.
   OK ↓
10. Check the gear position switch.
    Refer to “CHECKING THE SWITCHES” on page 9-79.
    NG → Replace the gear position switch.
    OK ↓
11. Check the entire starting system wiring.
    Refer to “CIRCUIT DIAGRAM” on page 9-5.
    NG → Properly connect or repair the starting system wiring.
    OK ↓

Replace the diode 1 or ECU.

EAS27200
CHARGING SYSTEM

EAS27210
CIRCUIT DIAGRAM



2. AC magneto
3. Rectifier/regulator
5. Frame ground
6. Main fuse
8. Battery

EAS27230
TROUBLESHOOTING

The battery is not being charged.

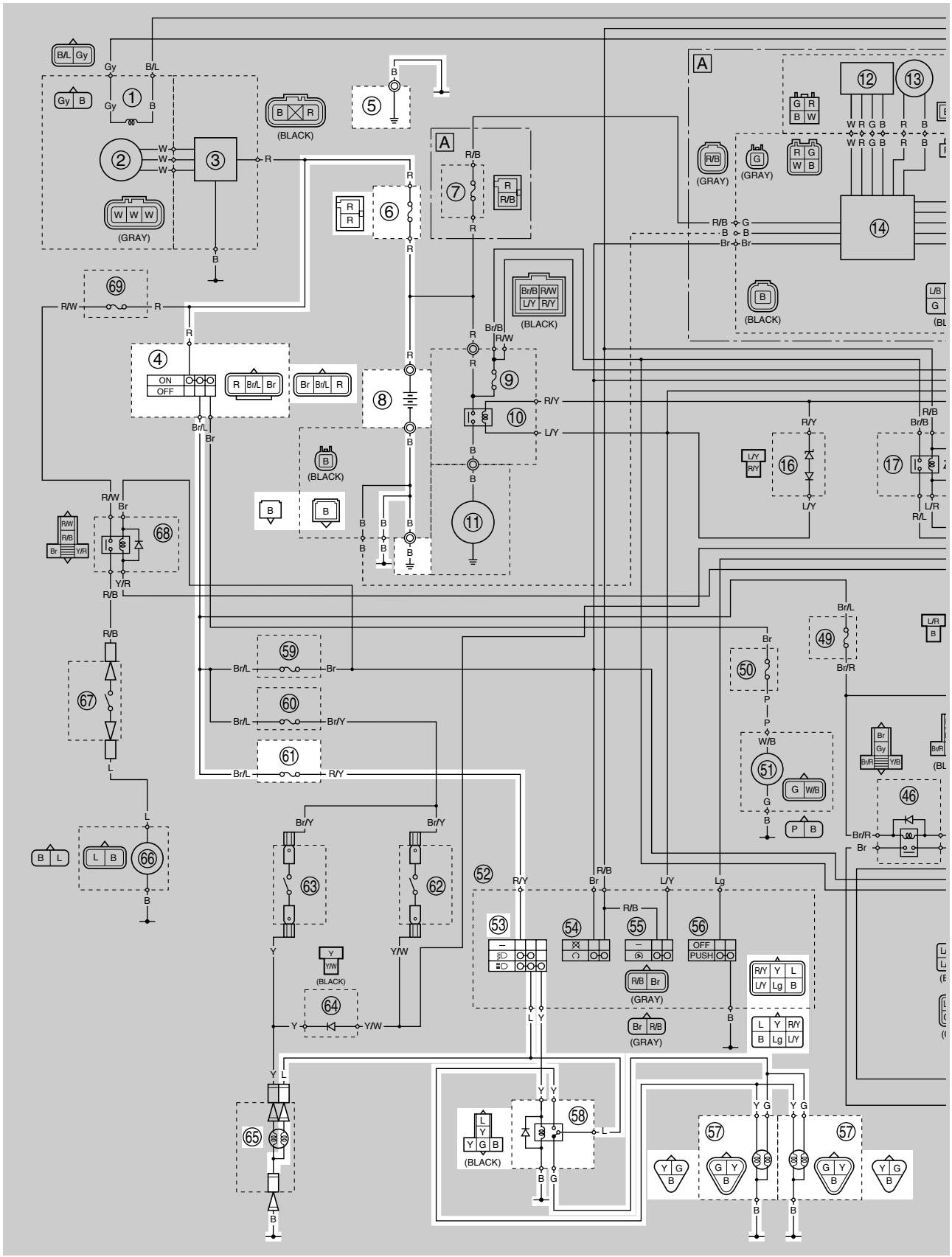
TIP

• Before troubleshooting, remove the following part(s):
1. Seat
2. Battery cover
3. Right side cover
4. V-belt cooling exhaust duct

1. Check the fuse. (Main) Refer to "CHECKING THE FUSES" on page 9-83.	NG →	Replace the fuse.
OK ↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 9-84.	NG →	• Clean the battery terminals. • Recharge or replace the battery.
OK ↓		
3. Check the stator coil. Refer to "CHECKING THE STATOR COIL" on page 9-92.	NG →	The stator coil is faulty. Replace the crankshaft position sensor/stator assembly.
OK ↓		
4. Check the rectifier/regulator. Refer to "CHECKING THE RECTIFIER/REGULATOR" on page 9-93.	NG →	Replace the rectifier/regulator.
OK ↓		
5. Check the entire charging system wiring. Refer to "CIRCUIT DIAGRAM" on page 9-11.	NG →	Properly connect or repair the charging system wiring.
OK ↓		
The charging system circuit is OK.		

EAS27240
LIGHTING SYSTEM

EAS27250
CIRCUIT DIAGRAM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Gy B
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R R
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R/W R
R/W Br
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4. Main switch
5. Frame ground
6. Main fuse
8. Battery
53. Light switch
57. Headlight
58. Headlight relay
61. Headlight fuse
65. Tail/brake light

EAS27260
TROUBLESHOOTING

Any of the following fail to light: headlight or taillight.

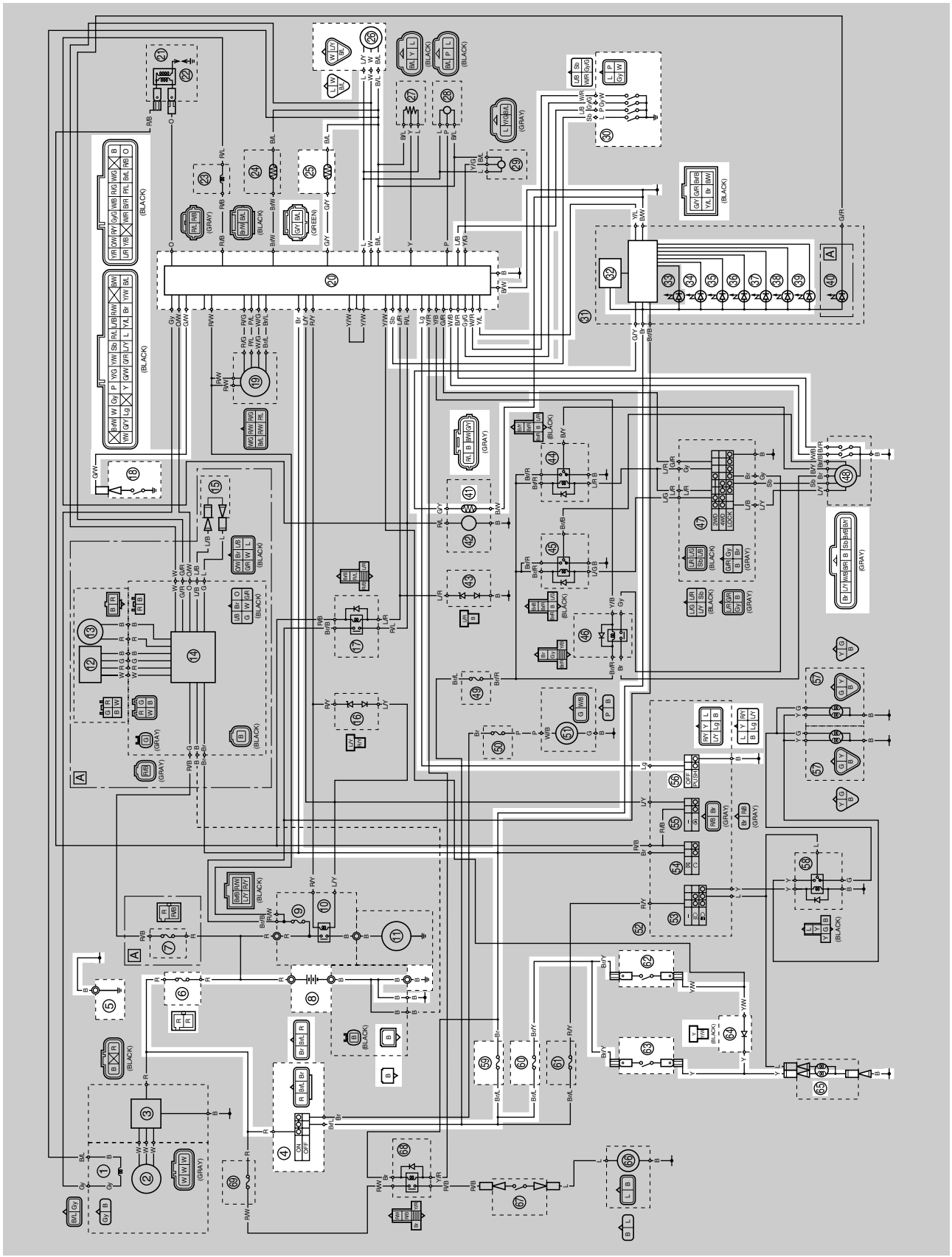
TIP

• Before troubleshooting, remove the following part(s):
1. Seat
2. Battery cover
3. Tail/brake light cover

1. Check the condition of each bulb and bulb socket. Refer to “CHECKING THE BULBS AND BULB SOCKETS” on page 9-82.	NG →	Replace the bulb(s) and bulb socket(s).
OK ↓		
2. Check the fuses. (Main and headlight) Refer to “CHECKING THE FUSES” on page 9-83.	NG →	Replace the fuse(s).
OK ↓		
3. Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-84.	NG →	• Clean the battery terminals. • Recharge or replace the battery.
OK ↓		
4. Check the main switch. Refer to “CHECKING THE SWITCHES” on page 9-79.	NG →	Replace the main switch.
OK ↓		
5. Check the light switch. Refer to “CHECKING THE SWITCHES” on page 9-79.	NG →	The light switch is faulty. Replace the left handlebar switch.
OK ↓		
6. Check the headlight relay. Refer to “CHECKING THE RELAYS” on page 9-87.	NG →	Replace the headlight relay.
OK ↓		
7. Check the entire lighting system wiring. Refer to “CIRCUIT DIAGRAM” on page 9-15.	NG →	Properly connect or repair the lighting system wiring.
OK ↓		
The lighting system circuit is OK.		

EAS27270
SIGNALING SYSTEM

EAS27280
CIRCUIT DIAGRAM



4. Main switch
5. Frame ground
6. Main fuse
8. Battery
18. Reverse switch
20. ECU (engine control unit)
25. Coolant temperature sensor
26. Speed sensor
30. Gear position switch
32. Multifunction meter
34. Coolant temperature warning light
35. Park indicator light
36. Reverse indicator light
37. Neutral indicator light
38. High-range indicator light
39. Low-range indicator light
41. Fuel sender
48. Differential motor
56. Override switch
59. Ignition fuse
60. Signaling system fuse
62. Rear brake light switch
63. Front brake light switch
64. Diode 3
65. Tail/brake light

EAS27290
TROUBLESHOOTING

• Any of the following fail to light: warning light, brake light or an indicator light.

TIP

• Before troubleshooting, remove the following part(s):
1. Seat
2. Battery cover
3. Side panels
4. V-belt cooling exhaust duct
5. Rear fender

1. Check the fuses. (Main, ignition and signaling system) Refer to "CHECKING THE FUSES" on page 9-83.	NG →	Replace the fuse(s).
OK ↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 9-84.	NG →	• Clean the battery terminals. • Recharge or replace the battery.
OK ↓		
3. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 9-79.	NG →	Replace the main switch.
OK ↓		
4. Check the entire signaling system wiring. Refer to "CIRCUIT DIAGRAM" on page 9-19.	NG →	Properly connect or repair the signaling system wiring.
OK ↓		
Check the condition of each of the signaling system circuits. Refer to "Checking the signaling system".		

Checking the signaling system

The tail/brake light fails to come on.

1. Check the tail/brake light bulb and socket. Refer to "CHECKING THE BULBS AND BULB SOCKETS" on page 9-82.	NG →	Replace the tail/brake light bulb, socket or both.
OK ↓		

2. Check the front brake light switch. Refer to “CHECKING THE SWITCHES” on page 9-79.	NG →	Replace the front brake light switch.
OK ↓		
3. Check the rear brake light switch. Refer to “CHECKING THE SWITCHES” on page 9-79.	NG →	Replace the rear brake light switch.
OK ↓		
4. Check the diode 3. Refer to “CHECKING THE DIODE” on page 9-89.	NG →	Replace the diode 3.
OK ↓		
5. Check the entire signaling system wiring. Refer to “CIRCUIT DIAGRAM” on page 9-19.	NG →	Properly connect or repair the signaling system wiring.
OK ↓		
This circuit is OK.		

The neutral, park, high-range, and/or low-range indicator light fails to come on.

1. Check the gear position switch. Refer to “CHECKING THE SWITCHES” on page 9-79.	NG →	Replace the gear position switch.
OK ↓		
2. Check the entire signaling system wiring. Refer to “CIRCUIT DIAGRAM” on page 9-19.	NG →	Properly connect or repair the signaling system wiring.
OK ↓		
Replace the meter assembly or ECU.		

The reverse indicator light fails to come on.

1. Check the reverse switch. Refer to “CHECKING THE SWITCHES” on page 9-79.	NG →	Replace the reverse switch.
OK ↓		

2. Check the entire signaling system wiring. Refer to “CIRCUIT DIAGRAM” on page 9-19.	NG →	Properly connect or repair the signaling system wiring.

OK ↓

Replace the meter assembly or ECU.

The differential gear lock indicator light and /or four-wheel-drive motor indicator light fails to come on.

1. Check the four-wheel-drive motor switch (differential motor). Refer to “CHECKING THE SWITCHES” on page 9-79.	NG →	Replace the differential motor.

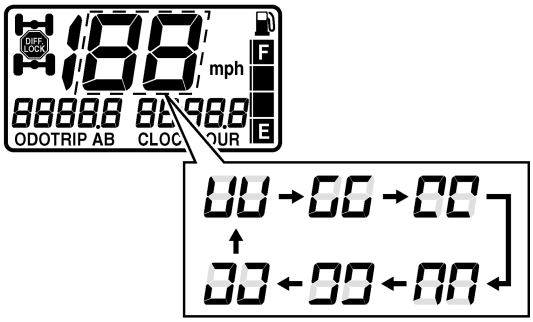
OK ↓

2. Check the entire signaling system wiring. Refer to “CIRCUIT DIAGRAM” on page 9-19.	NG →	Properly connect or repair the signaling system wiring.

OK ↓

Replace the meter assembly or ECU.

While the override switch is pushed, the segments of the speedometer digits will not appear as shown in the illustration.



1. Check the override switch. Refer to “CHECKING THE SWITCHES” on page 9-79.	NG →	The override switch is faulty. Replace the left handlebar switch.

OK ↓

2. Check the entire signaling system wiring.
   Refer to “CIRCUIT DIAGRAM” on page 9-19.
   NG → Properly connect or repair the signaling system wiring.
   OK ↓
Replace the meter assembly or ECU.

The coolant temperature warning light fails to come on.

1. Check the coolant temperature sensor.
   Refer to “CHECKING THE COOLANT TEMPERATURE SENSOR” on page 9-95.
   NG → Replace the coolant temperature sensor.
   OK ↓
2. Check the entire signaling system wiring.
   Refer to “CIRCUIT DIAGRAM” on page 9-19.
   NG → Properly connect or repair the signaling system wiring.
   OK ↓
Replace the meter assembly or ECU.

The fuel level indicator fails to come on.

1. Check the fuel sender.
   Refer to “CHECKING THE FUEL SENDER” on page 9-93.
   NG → Replace the fuel pump assembly.
   OK ↓
2. Check the entire signaling system wiring.
   Refer to “CIRCUIT DIAGRAM” on page 9-19.
   NG → Properly connect or repair the signaling system wiring.
   OK ↓
Replace the meter assembly.

The speedometer fails to operate.

1. Check the speed sensor.
   Refer to “CHECKING THE SPEED SENSOR” on page 9-94.
   NG → Replace the speed sensor.
   OK ↓

2. Check the entire signaling system wiring.
   Refer to “CIRCUIT DIAGRAM” on page 9-19.

NG →

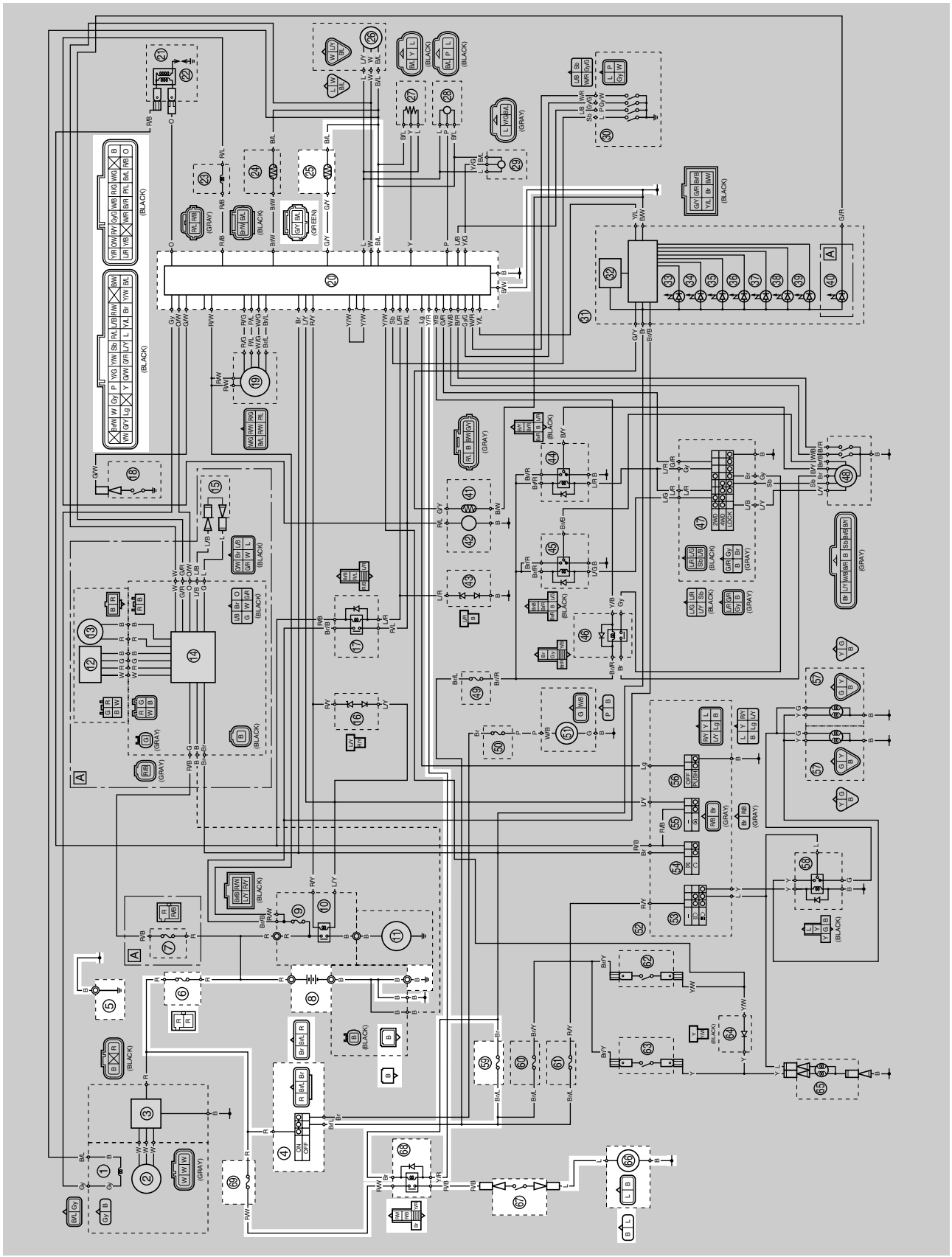
Properly connect or repair the signaling system wiring.

OK ↓

Replace the meter assembly or ECU.

EAS27300
COOLING SYSTEM

EAS27310
CIRCUIT DIAGRAM



4. Main switch
5. Frame ground
6. Main fuse
8. Battery
20. ECU (engine control unit)
25. Coolant temperature sensor
59. Ignition fuse
66. Radiator fan motor
67. Radiator fan motor circuit breaker
68. Radiator fan motor relay
69. Radiator fan motor fuse

EAS27320
TROUBLESHOOTING

The radiator fan motor fails to turn.

TIP

• Before troubleshooting, remove the following part(s):
1. Seat
2. Battery cover
3. Side panels
4. Front fenders

1. Check the fuses. (Main, ignition and radiator fan motor) Refer to “CHECKING THE FUSES” on page 9-83.	NG →	Replace the fuse(s).
OK ↓		
2. Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-84.	NG →	• Clean the battery terminals. • Recharge or replace the battery.
OK ↓		
3. Check the main switch. Refer to “CHECKING THE SWITCHES” on page 9-79.	NG →	Replace the main switch.
OK ↓		
4. Check the radiator fan motor. Refer to “CHECKING THE RADIATOR FAN MOTOR” on page 9-94.	NG →	The radiator fan motor is faulty and must be replaced.
OK ↓		
5. Check the radiator fan motor relay. Refer to “CHECKING THE RELAYS” on page 9-87.	NG →	Replace the radiator fan motor relay.
OK ↓		
6. Check the radiator fan motor circuit breaker. Refer to “CHECKING THE RADIATOR FAN MOTOR CIRCUIT BREAKER” on page 9-95.	NG →	Replace the radiator fan motor circuit breaker.
OK ↓		
7. Check the coolant temperature sensor. Refer to “CHECKING THE COOLANT TEMPERATURE SENSOR” on page 9-95.	NG →	Replace the coolant temperature sensor.
OK ↓		

8. Check the entire cooling system wiring.
   Refer to “CIRCUIT DIAGRAM” on page 9-27.

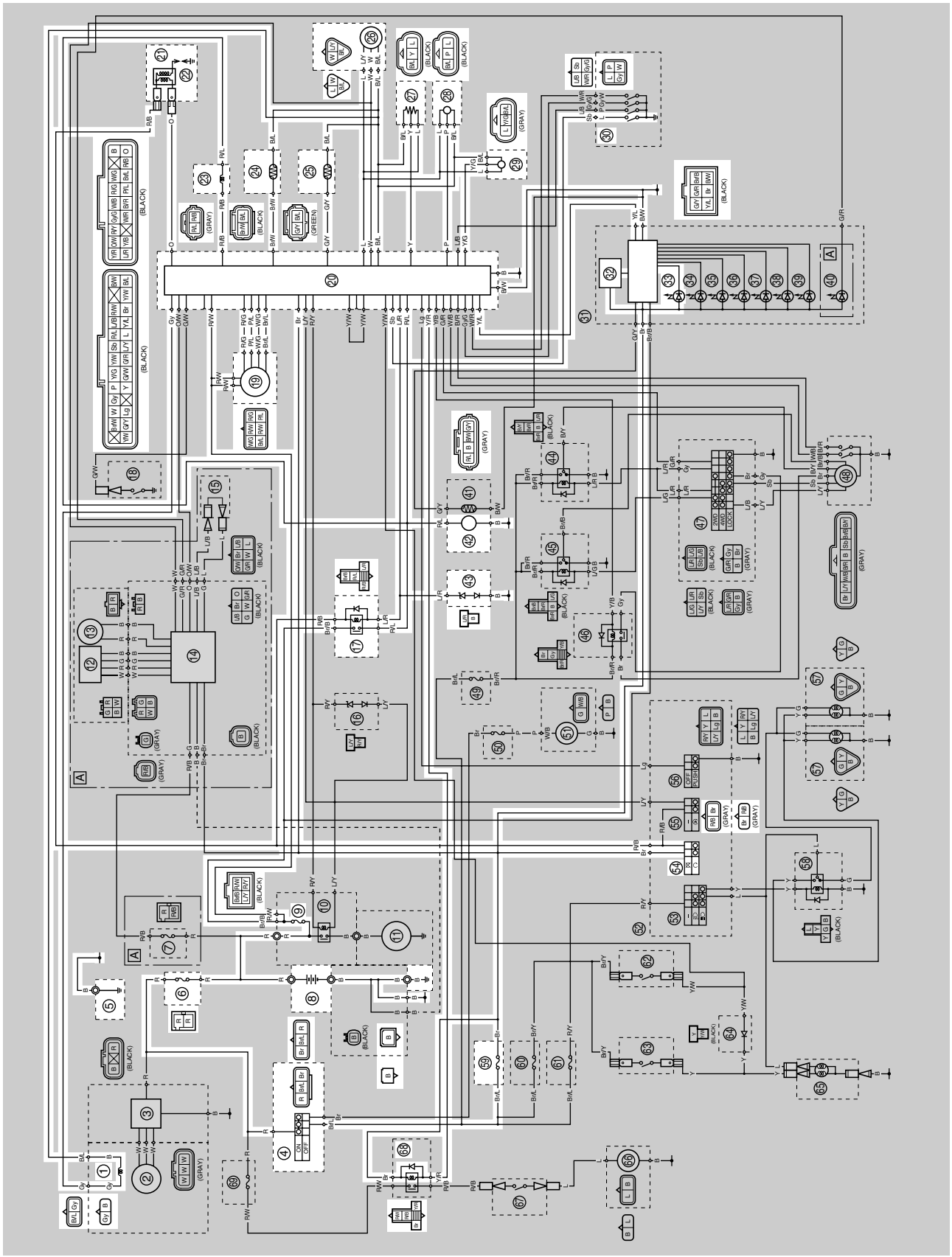
NG → Properly connect or repair the cooling system wiring.

OK ↓

Replace the ECU.

EAS27330
FUEL INJECTION SYSTEM

EAS27340
CIRCUIT DIAGRAM



1. Crankshaft position sensor
4. Main switch
5. Frame ground
6. Main fuse
8. Battery
9. Fuel injection system fuse
17. Fuel injection system relay
19. ISC (idle speed control) unit
20. ECU (engine control unit)
21. Ignition coil
22. Spark plug
23. Fuel injector
24. Intake air temperature sensor
25. Coolant temperature sensor
26. Speed sensor
27. TPS (throttle position sensor)
28. Intake air pressure sensor
29. Lean angle sensor
30. Gear position switch
32. Multifunction meter
33. Engine trouble warning light
42. Fuel pump
43. Diode 2
54. Engine stop switch
59. Ignition fuse
68. Radiator fan motor relay

EAS27350
ECU SELF-DIAGNOSTIC FUNCTION

The ECU is equipped with a self-diagnostic function in order to ensure that the fuel injection system is operating normally. If this function detects a malfunction in the system, it immediately operates the engine under substitute characteristics and illuminates the engine trouble warning light to alert the rider that a malfunction has occurred in the system. Once a malfunction has been detected, a fault code is stored in the memory of the ECU.

- To inform the rider that the fuel injection system is not functioning, the engine trouble warning light flashes when the start switch is being pushed to start the engine.
- If a malfunction is detected in the system by the self-diagnostic function, the ECU provides an appropriate substitute characteristic operation, and alerts the rider of the detected malfunction by illuminating the engine trouble warning light.
- After the engine has been stopped, the lowest fault code number appears on the clock LCD. Once a fault code has been displayed, it remains stored in the memory of the ECU until it is deleted.

1. Engine trouble warning light

Engine trouble warning light indication and FI system operation

Warning light indication	ECU operation	FI operation	Vehicle operation
Flashing*	Warning provided when unable to start engine	Operation stopped	Cannot be operated
Remains on	Malfunction detected	Operated with substitute characteristics in accordance with the description of the malfunction	Can or cannot be operated depending on the fault code

* The warning light flashes when any one of the conditions listed below is present and the start switch is pushed:

12:	Crankshaft position sensor	41:	Lean angle sensor (open or short-circuit)
30:	Lean angle sensor (latch up detected)	50:	ECU internal malfunction (faulty ECU memory)

EAS27380
SELF-DIAGNOSTIC FUNCTION TABLE

If the ECU detects an abnormal signal from a sensor while the vehicle is being driven, the ECU illuminates the engine trouble warning light and provides the engine with alternate operating instructions that are appropriate for the type of malfunction.
When an abnormal signal is received from a sensor, the ECU processes the specified values that are programmed for each sensor in order to provide the engine with alternate operating instructions that enable the engine to continue to operate or stop operating, depending on the conditions.

Self-diagnostic function table

Fault code No.	Item	Symptom	Able / unable to start	Able / unable to drive
12	Crankshaft position sensor	No normal signals are received from the crankshaft position sensor.	Unable	Unable
13	Intake air pressure sensor (open or short circuit)	Intake air pressure sensor–open or short circuit detected.	Able	Able
14	Intake air pressure sensor (hose line)	Intake air pressure sensor: hose line malfunction (clogged or detached hose).	Able	Able
15	Throttle position sensor (open or short circuit)	Throttle position sensor: open or short circuit detected.	Able	Able
16	Throttle position sensor (stuck)	Stuck throttle position sensor detected.	Able	Able
21	Coolant temperature sensor (open or short circuit)	Coolant temperature sensor: open or short circuit detected.	Able	Able
22	Intake air temperature sensor (open or short circuit)	Intake air temperature sensor: open or short circuit detected.	Able	Able
30	Lean angle sensor (latch up detected)	The vehicle has overturned.	Unable	Unable
33	Ignition coil (faulty ignition)	Malfunction detected in the primary wire of the ignition coil.	Unable	Unable
37	ISC valve (stuck fully open)	Engine speed is high when the engine is idling.	Able	Able
39	Fuel injector (open circuit)	Fuel injector: open circuit detected.	Unable	Unable
41	Lean angle sensor (open or short circuit)	Lean angle sensor: open or short circuit detected.	Unable	Unable
42	Speed sensor	No normal signals are received from the speed sensor.	Able	Able
43	Fuel system voltage (monitoring voltage)	The ECU is unable to monitor the battery voltage (an open or short circuit in the line to the ECU).	Able	Able
44	Error in writing the amount of CO adjustment on EEPROM	Error is detected while reading or writing on EEPROM (CO adjustment value).	Able	Able
46	Vehicle system power supply (Monitoring voltage)	Power supply to the fuel injection system is not normal.	Able	Able

Fault code No.	Item	Symptom	Able / unable to start	Able / unable to drive
50	ECU internal malfunction (memory check error)	Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.)	Unable	Unable

Communication error with the meter

Fault code No.	Item	Symptom	Able / unable to start	Able / unable to drive
Er-1	ECU internal malfunction (output signal error)	No signals are received from the ECU.	Unable	Unable
Er-2	ECU internal malfunction (output signal error)	No signals are received from the ECU within the specified duration.	Unable	Unable
Er-3	ECU internal malfunction (output signal error)	Data from the ECU cannot be received correctly.	Unable	Unable
Er-4	ECU internal malfunction (input signal error)	Non-registered data has been received from the meter.	Unable	Unable

EAS27400
TROUBLESHOOTING METHOD

The engine operation is not normal and the engine trouble warning light comes on.

1. Check:
   • Fault code number

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a. Check the fault code number displayed on the meter.
b. Identify the system with the malfunction. Refer to “Self-Diagnostic Function table”.
c. Identify the probable cause of malfunction. Refer to “Diagnostic code table”.

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2. Check and repair the probable cause of malfunction.

Fault code No.	Fault code No.
Check and repair. Refer to “TROUBLESHOOTING DETAILS” on page 9-41. Monitor the operation of the sensors and actuators in the diagnostic mode. Refer to “Sensor operation table” and “Actuator operation table”.	Check and repair. Refer to “Self-Diagnostic Function table”.

3. Perform ECU reinstatement action.
   Refer to “Reinstatement method” of table in “TROUBLESHOOTING DETAILS”.
4. Turn the main switch to “OFF” and back to “ON”, then check the fault code number is not displayed.

TIP

If fault codes are displayed, repeat steps (1) to (4) until no fault code number is displayed.

5. Erase the malfunction history in the diagnostic mode. Refer to “Sensor operation table (diagnostic code No.d62)”.

The engine operation is not normal but the engine trouble warning light does not come on.

1. Check the operation of following sensors and actuators in the Diagnostic mode. Refer to “Sensor operation table” and “Actuator operation table”.

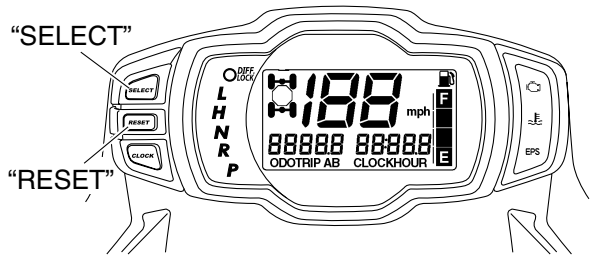
d01: Throttle position sensor (throttle angle) d30: Ignition coil d36: Injector

If a malfunction is detected in the sensors or actuators, repair or replace all faulty parts.
If no malfunction is detected in the sensors and actuators, check and repair inner parts of the engine.

EAS27441
DIAGNOSTIC MODE

It is possible to monitor the sensor output data or check the activation of actuators without connecting the measurement equipment by simply switching the meter indication from the normal mode to the diagnostic monitoring mode.
Setting the diagnostic mode

1. Set the main switch to “OFF” and set the engine stop switch to “OFF”.
2. Disconnect the wire harness coupler from the fuel pump.
3. Simultaneously press and hold the “SELECT” and “RESET” buttons, turn the main switch to “ON”, and continue to press the buttons for 8 seconds or more.



TIP

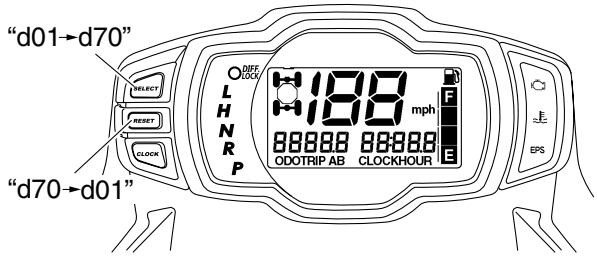
- All elements on the meter disappear.
- “dIAG” appears on the multifunction meter.

4. Simultaneously press the “SELECT” and “RESET” buttons for 2 seconds or more to execute the selection.
5. Select the diagnostic code number that applies to the item that was verified with the fault code number by pressing the “SELECT” or “RESET” buttons.

TIP

The diagnostic code number appears on the multifunction meter (d01–d70).

- To decrease the selected diagnostic code number, press the “RESET” button. Press the “RESET” button for 1 second or longer to automatically decrease the diagnostic code numbers.
- To increase the selected diagnostic code number, press the “SELECT” button. Press the “SELECT” button for 1 second or longer to automatically increase the diagnostic code numbers.



6. Verify the operation of the sensor or actuator.
   - Sensor operation
     The data representing the operating conditions of the sensor appears on the multifunction meter.
   - Actuator operation
     Set the engine stop switch to “ON” to operate the actuator.

TIP

If the engine stop switch is set to “ON”, set it to “OFF”, and then set it to “ON” again.

7. Turn the main switch to “OFF” to cancel the diagnostic mode.

TIP

To perform a reliable diagnosis, make sure to turn off the power supply before every check and then start right from the beginning.

Diagnostic code table

Fault code No.	Symptom	Probable cause of malfunction	Diagnostic code No.
12	No normal signals are received from the crankshaft position sensor.	• Open or short circuit in wire harness. • Defective crankshaft position sensor. • Malfunction in crankshaft position sensor rotor. • Malfunction in ECU. • Improperly installed sensor.	—
13	Intake air pressure sensor: open or short circuit detected.	• Open or short circuit in wire harness. • Defective intake air pressure sensor. • Malfunction in ECU.	d03
14	Intake air pressure sensor: hose line malfunction (clogged or detached hose).	• Intake air pressure sensor hose is detached, clogged, kinked, or pinched. • Malfunction in ECU.	d03
15	Throttle position sensor: open or short circuit detected.	• Open or short circuit in wire harness. • Defective throttle position sensor. • Malfunction in ECU. • Improperly installed throttle position sensor.	d01
16	Stuck throttle position sensor detected.	• Stuck throttle position sensor. • Malfunction in ECU.	d01
21	Coolant temperature sensor: open or short circuit detected.	• Open or short circuit in wire harness. • Defective coolant temperature sensor. • Malfunction in ECU. • Improperly installed coolant temperature sensor.	d06

Fault code No.	Symptom	Probable cause of malfunction	Diagnostic code No.
22	Intake air temperature sensor: open or short circuit detected.	• Open or short circuit in wire harness. • Defective intake temperature sensor. • Malfunction in ECU. • Improperly installed intake air temperature sensor.	d05
30	The vehicle has overturned.	• The vehicle has overturned. • Malfunction in ECU.	d08
33	Malfunction detected in the primary lead of the ignition coil.	• Open or short circuit in wire harness. • Malfunction in ignition coil. • Malfunction in ECU. • Malfunction in a component of ignition cut-off circuit system.	d30
37	Engine speed is high when the engine is idling.	• Open circuit in wire harness. • Malfunction in throttle body. • Malfunction in throttle cables. • ISC valve is stuck fully open due to disconnected ISC unit hose or coupler. (High engine idle speed is detected with the ISC valve stuck fully open even though signals for the valve to close are continuously being transmitted by the ECU.) • Malfunction in ECU. • Fuel injection system fuse is blown.	d54
39	Fuel injector: open or short circuit detected.	• Open or short circuit in wire harness. • Defective fuel injector. • Improperly installed fuel injector.	d36
41	Lean angle sensor: open or short circuit detected.	• Open or short circuit in wire harness. • Defective lean angle sensor. • Malfunction in ECU.	d08
42	No normal signals are received from the speed sensor.	• Open circuit in wiring harness. • Defective speed sensor. • Malfunction in vehicle speed sensor detected. • Malfunction in the engine side of the neutral switch. • Malfunction in ECU.	d07
43	Power supply to the fuel injector and fuel pump is not normal.	• Open or short circuit in wire harness. • Malfunction in ECU.	d09
44	Error is detected while reading or writing on EEPROM (CO adjustment value).	• Malfunction in ECU. (The CO adjustment value is not properly written on or read from the internal memory.)	d60
46	Power supply to the fuel injection system is not normal.	• Malfunction in charging system. Refer to “CHARGING SYSTEM” on page 9-11.	—

Fault code No.	Symptom	Probable cause of malfunction	Diagnostic code No.
50	Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the multi-function meter.)	• Malfunction in ECU. (The program and data are not properly written on or read from the internal memory.)	—

Sensor operation table

Diagnostic code No.	Item	Meter display	Checking method
d01	Throttle angle • Fully closed position • Fully opened position	 12–22 91–111	 Check with throttle fully closed. Check with throttle fully open.
d03	Pressure difference (atmospheric pressure and intake air pressure)	Displays the intake air pressure.	Set the engine stop switch to “RUN”, then operate the throttle while pushing the start switch. (If the display value changes, the performance is OK.)
d05	Intake air temperature	Displays the intake air temperature.	Compare the actually measured intake air temperature with the meter display value.
d06	Coolant temperature	Displays the coolant temperature.	Compare the actually measured coolant temperature with the meter display value.
d07	Vehicle speed pulse	0–999	Check that the number increases when the rear wheels are rotated. The number is cumulative and does not reset each time the wheel is stopped.
d08	Lean angle sensor • Upright • Overturned	 3.7–4.4 0.4–1.4	Remove the lean angle sensor and incline it more than 65 degrees.
d09	Fuel system voltage (battery voltage)	Approximately 12.0	Set the engine stop switch to “RUN”, and then compare with the actually measured battery voltage. (If the battery voltage is lower, perform recharging.)

Diagnostic code No.	Item	Meter display	Checking method
d21	Neutral switch • Neutral • In gear	 ON OFF	Shift the transmission.
d60	EEPROM fault code display • No history • History exists	 00 01	—
d61	Malfunction history code display • No history • History exists	 00 Fault codes 12–50 • (If more than one code number is detected, the display alternates every two seconds to show all the detected code numbers. When all code numbers are shown, the display repeats the same process.)	—
d62	Malfunction history code erasure • No history • History exists	 0 Up to 16 fault codes	 — To erase the history, set the engine stop switch to “OFF” and then to “RUN”.
d70	Control number	00–255	—

Actuator operation table

• Actuator operation
Set the engine stop switch to “OFF” and then to “RUN”.

Diagnostic code No.	Item	Actuation	Checking method
d30	Ignition coil	Actuates the ignition coil five times in one-second intervals. The engine trouble warning light also flashes five times.	Check the spark five times. • Connect an ignition checker.
d36	Injector	Actuates the injector five times in one-second intervals. The engine trouble warning light also flashes five times.	Check the operating sound of the injector five times.

Diagnostic code No.	Item	Actuation	Checking method
d50	Fuel injection system	Actuates the fuel injection system relay five times in one-second intervals. The engine trouble warning light also flashes five times. (The engine trouble warning light is OFF when the relay is ON, and the engine trouble warning light is ON when the relay is OFF).	Check the operating sound of the fuel injection system relay five times.
d51	Radiator fan motor relay	Actuates the radiator fan motor relay and illuminates the engine trouble warning light five cycles (5 seconds per cycle–2 seconds ON, 3 seconds OFF).	Check the operating sound of the radiator fan motor relay five times.
d54	ISC valve	Actuates and fully closes the ISC valve, then opens it to the standby opening position when the engine is started. This operation takes approximately 12 seconds until it is completed. Illuminates the engine trouble warning light.	The ISC unit vibrates when the ISC valve operates.

EAS27481
TROUBLESHOOTING DETAILS
This section describes the measures per fault code number displayed on the meter. Check and service the items or components that are the probable cause of the malfunction following the order given. After the check and service of the malfunctioning part have been completed, reset the meter display according to the reinstatement method.
Fault code No.:
Code number displayed on the meter when the engine failed to work normally. Refer to “Self-Diagnostic Function table”.
Diagnostic code No.:
Diagnostic code number to be used when the diagnostic mode is operated. Refer to “DIAGNOSTIC MODE” on page 9-36.

Fault code No.	12	Symptom	No normal signals are received from the crankshaft position sensor.
Diagnostic code No.		—	—

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Installed condition of crankshaft position sensor	Check for looseness or pinching.	Cranking the engine.
2	Connections • Crankshaft position sensor coupler • Main wire harness-ECU coupler	• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	
3	Open or short circuit in wire harness.	• Repair or replace if there is an open or short circuit. • Between the crankshaft position sensor coupler and ECU coupler. (gray–gray) (black/blue–black/blue)	
4	Defective crankshaft position sensor.	• Replace the crankshaft position sensor/stator assembly. Refer to “CHECKING THE CRANKSHAFT POSITION SENSOR” on page 9-91.	

Fault code No.	13	Symptom	Intake air pressure sensor: open or short circuit detected.
Diagnostic code No.		d03	Intake air pressure sensor

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Connections • Intake air pressure sensor coupler • Main wire harness-ECU coupler	• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	Setting the main switch to "ON".
2	Open or short circuit in wire harness.	• Repair or replace if there is an open or short circuit. • Between intake air pressure sensor coupler and ECU coupler (black/blue–black/blue) (pink–pink) (blue–blue)	
3	Defective intake air pressure sensor.	• Execute the diagnostic mode. (Code No. d03) • Replace if defective. Refer to "CHECKING THE INTAKE AIR PRESSURE SENSOR" on page 9-96.	

Fault code No.	14	Symptom	Intake air pressure sensor: hose line malfunction (clogged or detached hose).
Diagnostic code No.		d03	Intake air pressure sensor

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Intake air pressure sensor hose.	• Check the intake air pressure sensor hose condition. • Repair or replace the sensor hose.	Starting the engine and operating it at idle.
2	Intake air pressure sensor malfunction at intermediate electrical potential.	• Check and repair the connection. • Replace it if there is a malfunction.	
3	Connections • Intake air pressure sensor coupler • Main wire harness-ECU coupler	• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	
4	Defective intake air pressure sensor.	• Execute the diagnostic mode. (Code No. d03) • Replace if defective. Refer to “CHECKING THE INTAKE AIR PRESSURE SENSOR” on page 9-96.	

Fault code No.	15	Symptom	Throttle position sensor: open or short circuit detected.
Diagnostic code No.		d01	Throttle position sensor

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Installed condition of throttle position sensor.	• Check for looseness or pinching. • Check that the sensor is installed in the specified position.	Setting the main switch to "ON".
2	Connections • Throttle position sensor coupler • Main wire harness-ECU coupler	• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	
3	Open or short circuit in wire harness.	• Repair or replace if there is an open or short circuit. • Between throttle position sensor coupler and ECU coupler (black/blue–black/blue) (yellow–yellow) (blue–blue)	
4	Throttle position sensor lead wire open circuit output voltage check.	• Check for open circuit and replace the throttle position sensor. (Yellow–Black/Blue)	
5	Defective throttle position sensor.	• Execute the diagnostic mode. (Code No. d01) • Replace if defective. Refer to "CHECKING THE THROTTLE POSITION SENSOR" on page 9-96.	

Fault code No.	16	Symptom	Stuck throttle position sensor detected.
Diagnostic code No.		d01	Throttle position sensor

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Installed condition of throttle position sensor.	• Check the installed area for looseness or pinching. • Check that the throttle position sensor is installed in the specified position. Refer to “ADJUSTING THE THROTTLE POSITION SENSOR” on page 7-7.	Reinstated by starting the engine, operating it at idle, and then racing it.
2	Defective throttle position sensor.	• Execute the diagnostic mode. (Code No. d01) • Replace if defective. Refer to “CHECKING THE THROTTLE POSITION SENSOR” on page 9-96.	

Fault code No.	21	Symptom	Coolant temperature sensor: open or short circuit detected.
Diagnostic code No.		d06	Coolant temperature sensor

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Installed condition of coolant temperature sensor.	Check the installed area for looseness or pinching.	Setting the main switch to “ON”.
2	Connections • Coolant temperature sensor coupler • Main wire harness-ECU coupler	• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	
3	Open or short circuit in wire harness.	• Repair or replace if there is an open or short circuit. • Between coolant temperature sensor coupler and ECU coupler. (black/blue–black/blue) (green/yellow–green/yellow)	
4	Defective coolant temperature sensor.	• Execute the diagnostic mode. (Code No. d06) • Replace if defective. Refer to “CHECKING THE COOLANT TEMPERATURE SENSOR” on page 9-95.	

Fault code No.	22	Symptom	Intake air temperature sensor: open or short circuit detected.
Diagnostic code No.		d05	Intake air temperature sensor

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Installed condition of intake air temperature sensor.	Check for looseness or pinching.	Setting the main switch to "ON".
2	Connections • Intake air temperature sensor coupler • Main wire harness-ECU coupler	• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	
3	Open or short circuit in wire harness.	• Repair or replace if there is an open or short circuit. • Between intake air temperature sensor coupler and ECU coupler. (black/blue–black/blue) (brown/white–brown/white)	
4	Defective intake air temperature sensor.	• Execute the diagnostic mode. (Code No. d05) • Replace if defective. Refer to "CHECKING THE INTAKE AIR TEMPERATURE SENSOR" on page 9-96.	

Fault code No.	30	Symptom	The vehicle has overturned.
Diagnostic code No.		d08	Lean angle sensor

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	The vehicle has overturned.	Raise the vehicle upright.	Setting the main switch to "ON" (however, the engine cannot be restarted unless the main switch is first set to "OFF").
2	Installed condition of the lean angle sensor.	Check for looseness or pinching.	
3	Connections • Lean angle sensor coupler • Main wire harness-ECU coupler	• Check the coupler for any pins that may be pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	
4	Defective lean angle sensor.	• Execute the diagnostic mode. (Code No. d08) • Replace if defective. Refer to "CHECKING THE LEAN ANGLE SENSOR" on page 9-92.	

Fault code No.	33	Symptom	Malfunction detected in the primary lead of the ignition coil.
Diagnostic code No.		d30	Ignition coil

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Connections • Ignition coil connector (primary coil side) • Main wire harness-ECU coupler	• Check the connector and coupler for any pins that may have pulled out. • Check the locking condition of the connector and coupler. • If there is a malfunction, repair it and connect the connector or coupler securely.	Starting the engine and operating it at idle.
2	Open or short circuit in wire harness.	• Repair or replace if there is an open or short circuit. • Between ignition coil connector and ECU coupler. (orange–orange) • Between ignition coil connector and left handlebar switch coupler. (red/black–red/black)	
3	Defective ignition coil	• Execute the diagnostic mode. (Code No. d30) • Test the primary and secondary coils for continuity. • Replace if defective. Refer to “CHECKING THE IGNITION COIL” on page 9-90.	

Fault code No.	37	Symptom	Engine speed is high when the engine is idling.
Diagnostic code No.		d54	ISC valve

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Fuel injection system fuse is blown.	• Check the fuel injection system fuse. Refer to “CHECKING THE FUSES” on page 9-83.	ISC valve returns to its original position by setting the main switch to “ON” and back to “OFF”. Reinstated if the engine idle speed is within specification after starting the engine.
2	Throttle valve does not fully close.	• Check the throttle body. Refer to “THROTTLE BODY” on page 7-4. • Check the throttle cables. Refer to “ADJUSTING THE THROTTLE LEVER FREE PLAY” on page 3-6.	
3	ISC valve is stuck fully open due to disconnected ISC unit coupler. (High engine idle speed is detected with the ISC valve stuck fully open even though signals for the valve to close are continuously being transmitted by the ECU.)	• Check that the ISC unit coupler is not disconnected. • The ISC valve is stuck fully open if it does not operate when the main switch is turned “OFF”. (Touch the ISC unit with your hand and check if it is vibrating to confirm if the ISC valve is operating.)	
4	ISC valve is not moving correctly.	• Execute the diagnostic mode. (Code No. d54) • After the ISC valve is fully closed, it opens to the standby opening position when the engine is started. This operation takes approximately 12 seconds. Start the engine. If the error recurs, replace the throttle body assembly.	

Fault code No.	39	Symptom	Fuel injector: open or short circuit detected.
Diagnostic code No.		d36	Fuel injector

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Connections • Fuel injector coupler • Main wire harness-ECU coupler • Main wire harness fuel pump coupler	• Check the couplers for any pins that may have pulled out. • Check the locking condition of the couplers. • If there is a malfunction, repair it and connect the coupler securely.	Cranking the engine. (Connect the fuel injector coupler.)
2	Open or short circuit in wire harness.	• Repair or replace if there is an open or short circuit. • Between fuel injector coupler and ECU coupler. (red/black–red/black) (red/blue–red/blue)	
3	Defective fuel injector.	• Execute the diagnostic mode. (Code No. d36) • Replace if defective. Refer to “CHECKING THE INJECTOR” on page 7-6.	

Fault code No.	41	Symptom	Lean angle sensor: open or short circuit detected.
Diagnostic code No.		d08	Lean angle sensor

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Connections • Lean angle sensor coupler • Main wire harness-ECU coupler	• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	Setting the main switch to “ON”.
2	Open or short circuit in wire harness.	• Repair or replace if there is an open or short circuit. • Between lean angle sensor coupler and ECU coupler. (black/blue–black/blue) (yellow/green–yellow/green) (blue–blue)	
3	Defective lean angle sensor	• Execute the diagnostic mode. (Code No. d08) • Replace if defective. Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 9-92	

Fault code No.	42	Symptom	No normal signals are received from the speed sensor.
Diagnostic code No.		d07	Speed sensor

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Connections • Speed sensor coupler • Main wire harness-ECU coupler	• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	Starting the engine, and activating the vehicle speed sensor by operating the vehicle at 20 to 30 km/h.
2	Open or short circuit in speed sensor lead.	• Repair or replace if there is an open or short circuit. • Between speed sensor coupler and ECU coupler. (blue–blue) (white–white) (black/blue–black/blue)	
3	Gear for detecting vehicle speed has broken.	• Replace if defective. Refer to “TRANSMISSION” on page 5-73.	
4	Defective speed sensor	• Execute the diagnostic mode. (Code No. d07) • Replace if defective. Refer to “CHECKING THE SPEED SENSOR” on page 9-94.	

Fault code No.	43	Symptom	Power supply to the fuel injector and fuel pump is not normal.
Diagnostic code No.		d09	Fuel system voltage

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Connections • Fuel injection system relay • Main wire harness-ECU coupler	• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	Starting the engine and operating it at idle.
2	Open or short circuit in the wire harness.	• Repair or replace if there is an open or short circuit. • Between fuel injection system relay coupler and ECU coupler. (blue/red–blue/red) (red/blue–red/blue) • Between fuel injection system relay coupler and starter relay coupler. (brown/black–brown/black) • Between fuel injection system relay coupler and left handlebar switch coupler. (red/black–red/black)	
3	Malfunction or open circuit in fuel injection system relay	• Execute the diagnostic mode. (Code No. d09) • Replace if defective. • If there is no malfunction with the fuel injection system relay, replace the ECU.	

Fault code No.	44	Symptom	Error is detected while reading or writing on EEPROM (CO adjustment value).
Diagnostic code No.		d60	EEPROM improper cylinder indication

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Malfunction in ECU.	• Execute the diagnostic mode. (Code No. d60) • Replace the ECU if defective.	Setting the main switch to “ON”.

Fault code No.	46	Symptom	Power supply to the fuel injection system is not normal.
Diagnostic code No.		—	—

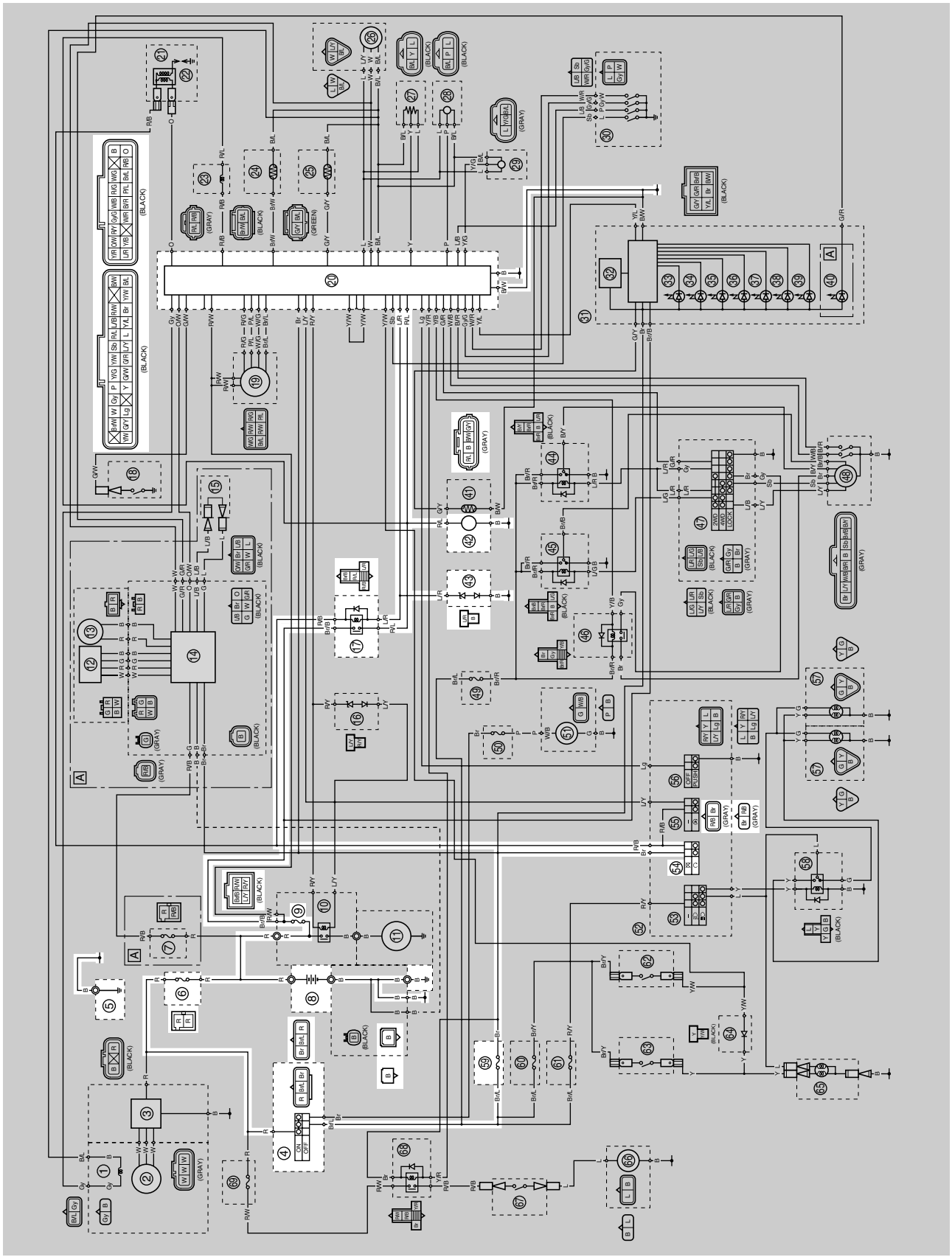
Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Connections • Main wire harness-ECU coupler	• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	Starting the engine and operating it at idle.
2	Faulty battery.	• Charge or replace the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-84.	
3	Malfunction in rectifier/regulator.	• Replace if defective. Refer to “CHARGING SYSTEM” on page 9-11.	
4	Open or short circuit in the wire harness.	• Repair or replace if there is an open or short circuit. • Between battery and main switch coupler (red–red) • Between main switch coupler and ignition fuse (brown/blue–brown/blue) • Between ignition fuse and ECU coupler (brown–brown)	

Fault code No.	50	Symptom	Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.)
Diagnostic code No.		—	—

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Malfunction in ECU	Replace the ECU. **TIP** Do not perform this procedure with the main switch turned to “ON”.	Setting the main switch to “ON”.

EAS27550
FUEL PUMP SYSTEM

EAS27560
CIRCUIT DIAGRAM



4. Main switch
5. Frame ground
6. Main fuse
8. Battery
9. Fuel injection system fuse
17. Fuel injection system relay
20. ECU (engine control unit)
42. Fuel pump
43. Diode 2
54. Engine stop switch
59. Ignition fuse

EAS27570
TROUBLESHOOTING

If the fuel pump fails to operate.

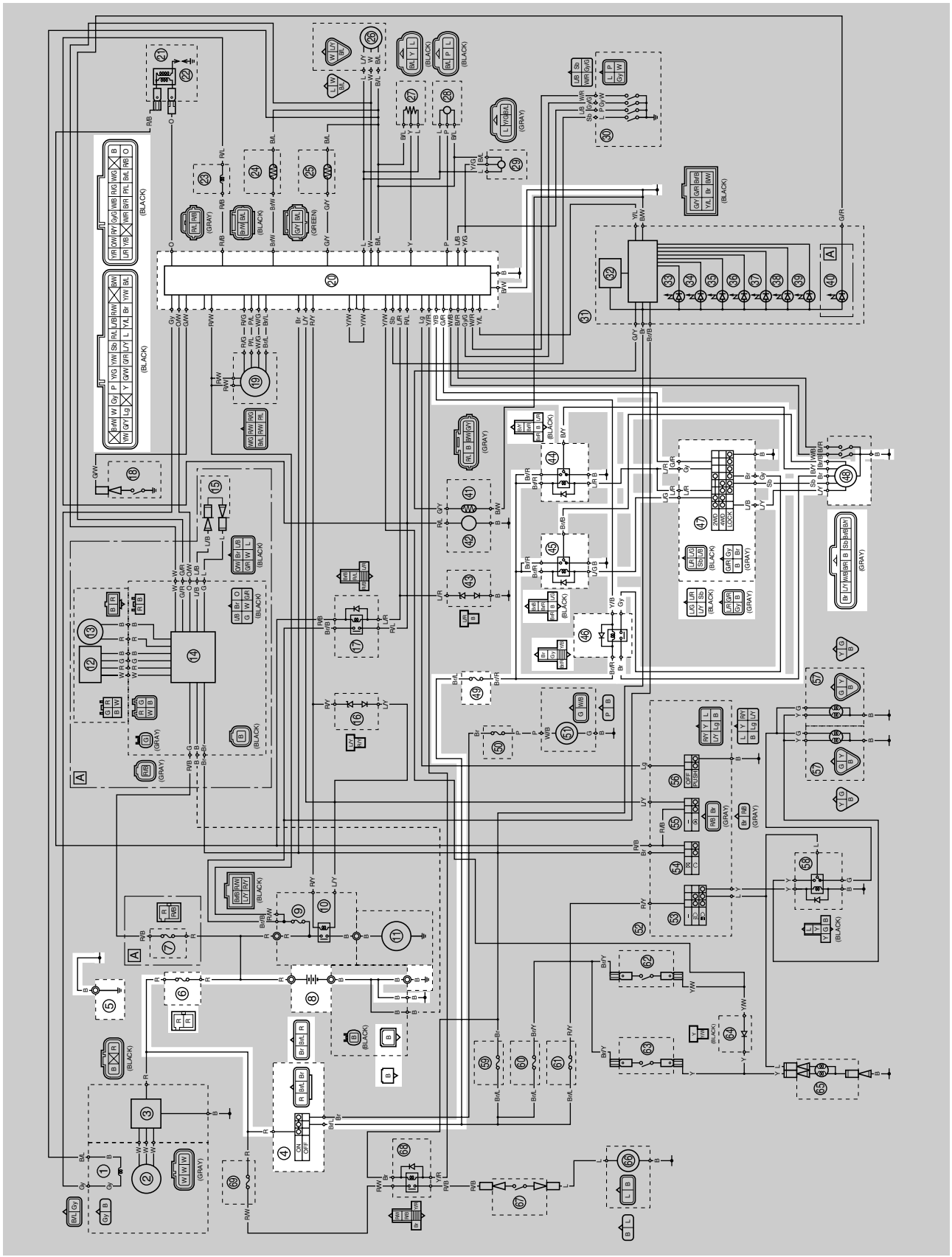
TIP

• Before troubleshooting, remove the following part(s):
1. Seat
2. Battery cover
3. Rear fender

1. Check the fuses. (Main, ignition and fuel injection system) Refer to “CHECKING THE FUSES” on page 9-83.	NG →	Replace the fuse(s).
OK ↓		
2. Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-84.	NG →	• Clean the battery terminals. • Recharge or replace the battery.
OK ↓		
3. Check the main switch. Refer to “CHECKING THE SWITCHES” on page 9-79.	NG →	Replace the main switch.
OK ↓		
4. Check the engine stop switch. Refer to “CHECKING THE SWITCHES” on page 9-79.	NG →	The engine stop switch is faulty. Replace the left handlebar switch.
OK ↓		
5. Check the fuel injection system relay. Refer to “CHECKING THE RELAYS” on page 9-87.	NG →	Replace the fuel injection system relay.
OK ↓		
6. Check the fuel pump. Refer to “CHECKING THE FUEL PUMP BODY” on page 7-2.	NG →	Replace the fuel pump.
OK ↓		
7. Check the entire fuel pump system wiring. Refer to “CIRCUIT DIAGRAM” on page 9-55.	NG →	Properly connect or repair the fuel pump system wiring.
OK ↓		
Replace the diode 2 or ECU.		

EAS30200
2WD/4WD SELECTING SYSTEM

EAS30210
CIRCUIT DIAGRAM



4. Main switch
5. Frame ground
6. Main fuse
8. Battery
20. ECU (engine control unit)
44. Four-wheel-drive motor relay 1
45. Four-wheel-drive motor relay 2
46. Four-wheel-drive motor relay 3
47. On-command four-wheel-drive motor switch and differential lock switch
48. Differential motor
49. Four-wheel-drive motor fuse

EAS30220
TROUBLESHOOTING

The four-wheel-drive motor indicator light fails to come on.

TIP

• Before troubleshooting, remove the following part(s):
1. Seat
2. Battery cover

1. Check the fuses. (Main and four-wheel-drive motor) Refer to “CHECKING THE FUSES” on page 9-83.	NG →	Replace the fuse(s).
OK ↓		
2. Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-84.	NG →	• Clean the battery terminals. • Recharge or replace the battery.
OK ↓		
3. Check the main switch. Refer to “CHECKING THE SWITCHES” on page 9-79.	NG →	Replace the main switch.
OK ↓		
4. Check the on-command four-wheel-drive motor switch and differential lock switch. Refer to “CHECKING THE SWITCHES” on page 9-79.	NG →	Replace the on-command four-wheel-drive motor switch and differential lock switch.
OK ↓		
5. Check the four-wheel-drive motor relay 1. Refer to “CHECKING THE RELAYS” on page 9-87.	NG →	Replace the four-wheel-drive motor relay 1.
OK ↓		
6. Check the four-wheel-drive motor relay 2. Refer to “CHECKING THE RELAYS” on page 9-87.	NG →	Replace the four-wheel-drive motor relay 2.
OK ↓		
7. Check the four-wheel-drive motor relay 3. Refer to “CHECKING THE RELAYS” on page 9-87.	NG →	Replace the four-wheel-drive motor relay 3.
OK ↓		

8. Check the differential motor.
   Refer to “CHECKING THE DIFFERENTIAL MOTOR” on page 8-11.

NG → Replace the differential motor.

OK ↓

9. Check the entire 2WD/4WD selecting system wiring.
   Refer to “CIRCUIT DIAGRAM” on page 9-59.

NG → Properly connect or repair the 2WD/4WD selecting system wiring.

OK ↓

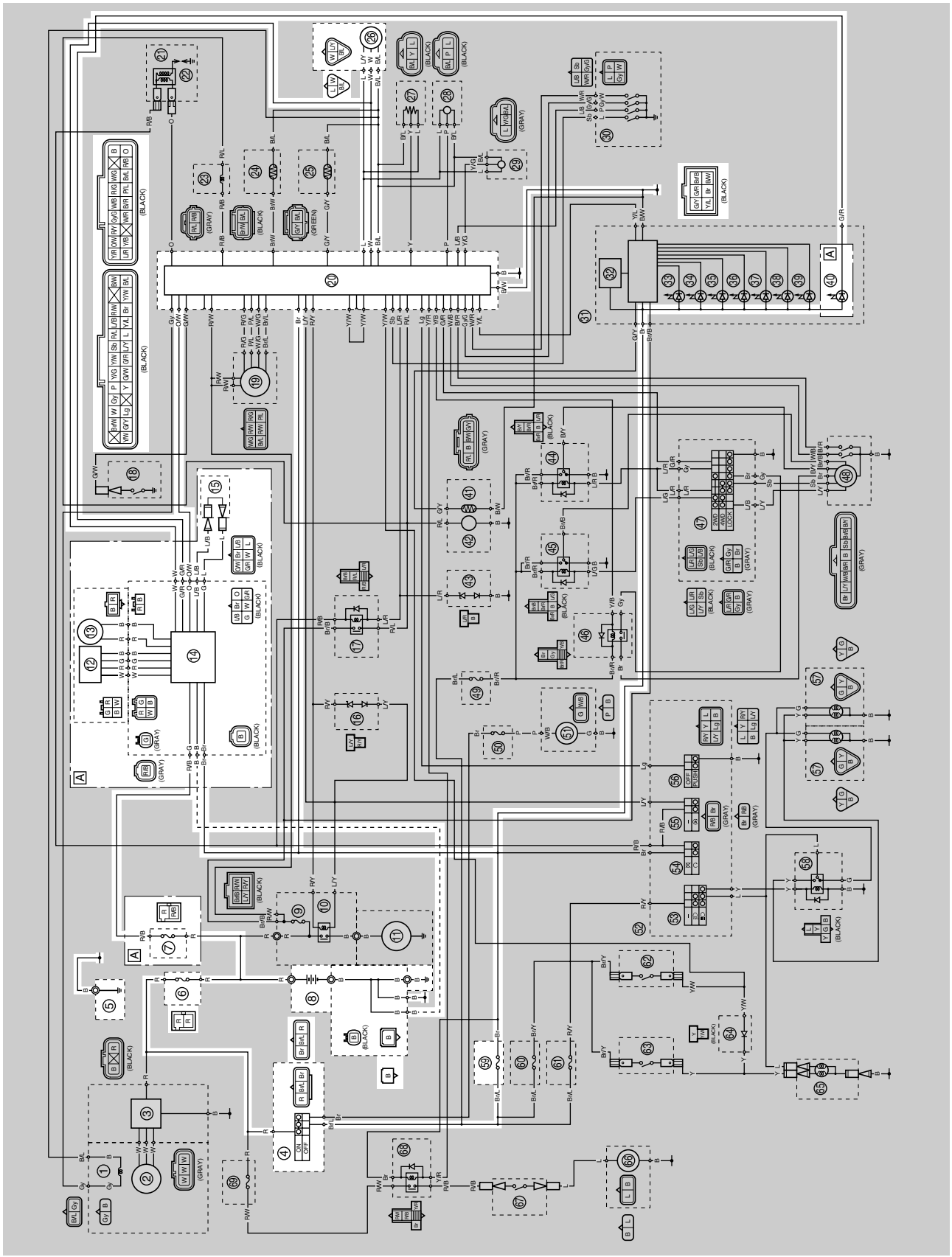
Replace the ECU.

EAS30230

EPS (ELECTRIC POWER STEERING) SYSTEM (for YFM5FGP/YFM7FGP)

EAS30240

CIRCUIT DIAGRAM



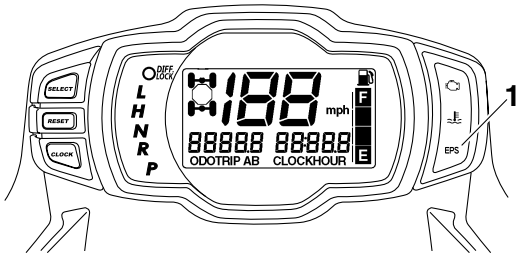
4. Main switch
5. Frame ground
6. Main fuse
7. EPS fuse
8. Battery
12. EPS torque sensor
13. EPS motor
14. EPS (electric power steering) control unit
15. EPS self-diagnosis signal connectors
20. ECU (engine control unit)
26. Speed sensor
40. EPS warning light
59. Ignition fuse

A. YFM5FGPY/YFM7FGPY only

EAS30250
EPS CONTROL UNIT'S SELF-DIAGNOSTIC FUNCTION

The EPS control unit is equipped with a self-diagnostic function. If this function detects a malfunction in the EPS system, it lights the EPS warning light to alert the rider that a malfunction has occurred in the system. Once a malfunction has been detected, it becomes stored in the EPS control unit memory in the form of a fault code.

- The EPS warning light comes on when the main switch is set to "ON", and then goes off once the engine is started. If the warning light remains on or comes on after the engine is started, the EPS system may be defective.
- The electrical circuit of the warning light can be checked by setting the main switch to "ON". If the warning light does not come on, the electrical circuit may be defective.



1. EPS warning light

TIP

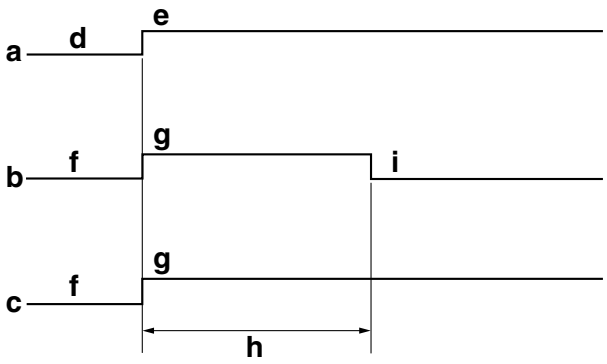
- If the engine is stopped using the engine stop switch and the main switch is in the "ON" position, the EPS warning light comes on to indicate that the power assistance for the steering is not functioning.
- If the steering usage is too heavy (i.e., excessive steering use when the vehicle is traveling at a slow speed), the power assist is reduced to protect the EPS motor from overheating.

EAS30260
EPS WARNING LIGHT DURING NORMAL OPERATION

The EPS warning light comes on initially for 2 seconds after the main switch is set to "ON". However, the warning light remains on until the engine is started.
In addition, if a malfunction is detected while the warning light comes on initially, the warning light remains on.
Furthermore, the warning light comes on whenever a malfunction has occurred.

TIP

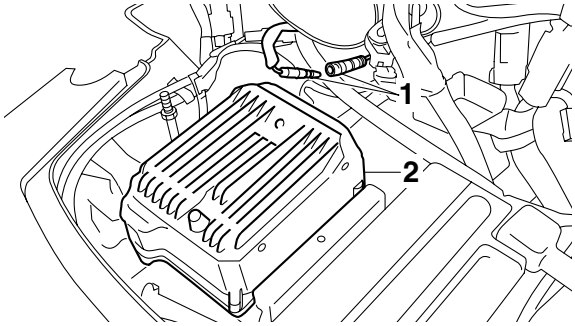
The EPS system does not operate while the EPS warning light is on.



a. Main switch
b. EPS warning light (no malfunction detected)
c. EPS warning light (malfunction detected)
d. OFF
e. ON
f. Off
g. Comes on.
h. Initial lighting: 2 seconds
i. Goes off.

EAS30270
DIAGNOSTIC MODE

Setting the diagnostic mode (present and past malfunctions)
1. Set the main switch to “ON”.
2. Disconnect the EPS self-diagnosis signal connector “1”.
3. Select the signaling mode by grounding the EPS self-diagnosis signal connector (male side) to the EPS control unit “2” or disconnecting it from the unit as follows.



- Present malfunction signaling mode
  Ground the EPS self-diagnosis signal connector within 5 seconds after setting the main switch to “ON”, and leave it grounded. The signaling mode is activated after 5 seconds.
- Past malfunction signaling mode
  While the present malfunction mode is activated, briefly disconnect the EPS self-diagnosis signal connector, ground it again, and leave it grounded. The signaling mode is activated after 5 seconds.

4. Set the main switch to “OFF” to cancel the diagnostic mode.

TIP
- The diagnostic mode can also be canceled by riding the vehicle at speeds above 2 km/h (1.2 mi/h).
- When the diagnostic mode is selected and during the initial lighting of the EPS warning light, the EPS control unit does not receive input from the EPS self-diagnosis signal connector.

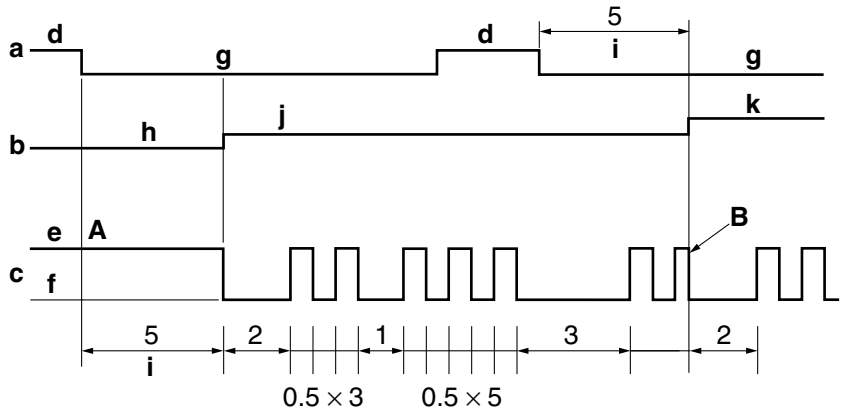
5. Connect the EPS self-diagnosis signal connector.

Identifying fault codes
When the diagnostic mode is activated, the fault codes determined by the fail-safe specifications are signaled by the EPS warning light as follows.

• Present malfunction signaling mode: Currently detected fault codes are signaled.
• Past malfunction signaling mode: Both previously detected fault codes and currently detected fault codes are signaled.

Signaling method

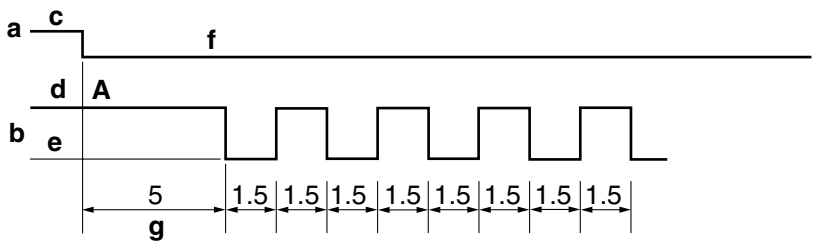
Example 1: Fault code No. 23



a. EPS self-diagnosis signal connector
b. Diagnostic mode
c. EPS warning light
d. Disconnected
e. On
f. Off
g. Grounded
h. Normal mode (diagnostic mode not activated)
i. Mode selection judgment
j. Present malfunction signaling mode
k. Past malfunction signaling mode
A. The EPS warning light comes on for 5 seconds during the diagnostic mode selection judgment.
B. Display of the present malfunctions stops when the past malfunction display mode is selected.

After the mode selection judgment is completed (present or past malfunction mode), the current fault code signaling stops immediately, and then the first code of the mode is signaled 2 seconds later. When a fault code is signaled, the EPS warning light goes off for 1 second between the units of 10 and the units of 1 for the code. After a fault code is signaled, the warning light goes off for 3 seconds, and then the next code is signaled.

Example 2: No malfunctions are detected

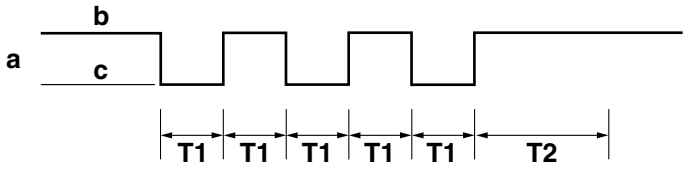


a. EPS self-diagnosis signal connector
b. EPS warning light
c. Disconnected
d. Comes on.
e. Goes off.
f. Grounded
g. Mode selection judgment
A. The EPS warning light comes on for 5 seconds during the diagnostic mode selection judgment.

After the mode selection judgment is completed (present display or past malfunction mode), the current fault code signaling stops immediately, and then the EPS warning light starts flashing at 1.5-second intervals.

Deleting fault codes

To delete fault codes, ground the EPS self-diagnosis signal connector 3 or more times within 5 seconds while the present or past malfunction mode is activated. The currently selected mode remains active after the fault codes of that mode are deleted.



a. EPS self-diagnosis signal connector
b. Disconnected
c. Grounded

T1: Connector grounded - - - - $0.1 \leq T1 \leq 1.6$ seconds
T2: Fault codes deleted - - - - - Maximum 1.5 seconds required

EAS30280
SELF-DIAGNOSTIC FUNCTION TABLE (EPS SYSTEM)

Fault code No.	Item	Symptom	Probable cause of malfunction
11 13 15 16	EPS torque sensor	No normal signals are received from the torque sensor.	• Open or short circuit in wire harness. • Malfunction in torque sensor. • Malfunction in EPS control unit.
21	Speed sensor	No normal signals are received from the speed sensor.	• Open or short circuit in wire harness. • Malfunction in speed sensor. • Malfunction in EPS control unit.
22	Engine speed signal	No normal signals are received from the ECU.	• Open or short circuit in wire harness. • Malfunction in ECU. • Malfunction in EPS control unit.
41 42 43 45	EPS motor	No normal signals are received from the EPS motor.	• Open or short circuit in wire harness. • Malfunction in EPS motor. • Malfunction in EPS control unit.
52	EPS control unit	Relay contacts in the EPS control unit are welded together.	Malfunction in EPS control unit.
53	EPS control unit	Battery voltage has dropped.	• Faulty battery. • Malfunction in the charging system. Refer to “CHARGING SYSTEM” on page 9-11. • Malfunction in EPS control unit.
54	EPS control unit	Relay contacts in the EPS control unit are welded together.	Malfunction in EPS control unit.
55	EPS control unit	Battery voltage has increased. Abnormality exists between the EPS and the ECU.	• Malfunction in the charging system. Refer to “CHARGING SYSTEM” on page 9-11. • Malfunction in EPS control unit.

EAS30290
TROUBLESHOOTING DETAILS (EPS SYSTEM)

TIP

The malfunction history is stored even if the main switch is turned to “OFF”, therefore, be sure to erase the history (present and past malfunction signaling modes) after repairing the cause of the EPS system malfunction. The malfunction history must be erased in the diagnostic mode. Refer to “DIAGNOSTIC MODE” on page 9-66.

Fault code No.	**11,13, 15,16**	**Symptom**	**EPS torque sensor: open or short circuit detected.**

Order	**Item/components and probable cause**	**Check or maintenance job**	**Reinstatement method**
1	Connections • EPS torque sensor coupler	• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	Setting the main switch to “OFF”.
2	Defective EPS torque sensor.	• Replace if defective. Refer to “CHECKING THE EPS TORQUE SENSOR (for YFM5FGP/YFM7FGP)” on page 9-97.	
3	Open or short circuit in EPS torque sensor lead.	• Repair or replace if there is an open or short circuit. • Between EPS torque sensor coupler and EPS control unit coupler. (white–white) (red–red) (green–green) (black–black)	

Fault code No.	21	Symptom	Speed sensor: open or short circuit detected.	
Order	**Item/components and probable cause**		**Check or maintenance job**	**Reinstatement method**
1	Connections • Speed sensor coupler • EPS control unit coupler at the wire harness		• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	Starting the engine and activating the vehicle speed sensor by operating the vehicle above 5 km/h (3 mi/h), or setting the main switch to “OFF”, then to “ON”, and then deleting the fault codes. Refer to “DIAGNOSTIC MODE” on page 9-66.
2	Open or short circuit in wire harness.		• Repair or replace if there is an open or short circuit. • Between speed sensor coupler and EPS control unit coupler. (white–white)	
3	Defective speed sensor.		• Execute the diagnostic mode. (Code No. 21) • Replace if defective. Refer to “CHECKING THE SPEED SENSOR” on page 9-94.	

Fault code No.	22	Symptom	No normal signals are received from the ECU.	
Order	**Item/components and probable cause**		**Check or maintenance job**	**Reinstatement method**
1	Connections • EPS control unit coupler at the wire harness • ECU coupler at the wire harness		• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	Setting the main switch to “OFF”.
2	Open or short circuit in wire harness.		• Repair or replace if there is an open or short circuit. • Between ECU coupler and EPS control unit coupler. (orange/white–orange/white)	
3	Malfunction in ECU.		Replace the ECU.	

Fault code No.	41,42, 43,45	Symptom	EPS motor: open or short circuit detected.

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Connections • EPS motor coupler	• Check the coupler for any pins that may have pulled out. • Check the locking condition of the coupler. • If there is a malfunction, repair it and connect the coupler securely.	Setting the main switch to “OFF”.
2	Open or short circuit in EPS motor lead.	• Repair or replace if there is an open or short circuit. • Between EPS motor and EPS control unit coupler. (red–red) (black–black)	
3	Defective EPS motor.	Replace if defective. Refer to “CHECKING THE EPS MOTOR (for YFM5FGP/YFM7FGP)” on page 9-97.	

Fault code No.	52	Symptom	Relay contacts in the EPS control unit are welded together.

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Malfunction in EPS control unit.	Replace the EPS control unit.	Setting the main switch to “OFF”.

Fault code No.	53	Symptom	Power supply to the EPS control unit is not normal (low battery voltage).

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Faulty battery.	Charge or replace the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-84.	Setting the main switch to “OFF”.
2	Malfunction in rectifier/regulator or charging system.	Replace if defective. Refer to “CHECKING THE RECTIFIER/REGULATOR” on page 9-93.	
3	Malfunction in EPS control unit.	Replace the EPS control unit.	

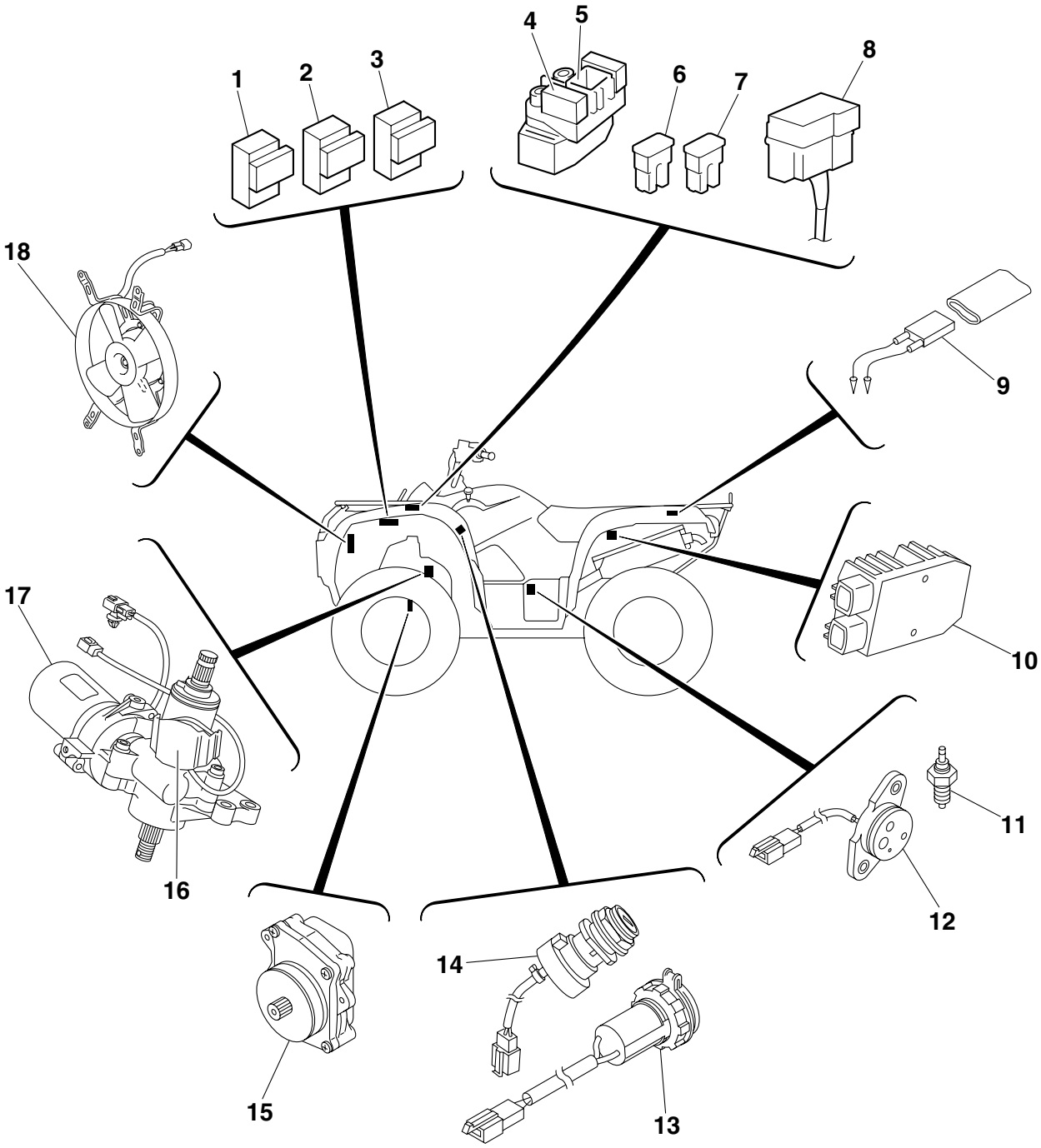
Fault code No.	54	Symptom	Relay contacts in the EPS control unit are welded together.

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Malfunction in EPS control unit.	Replace the EPS control unit.	Setting the main switch to “OFF”.

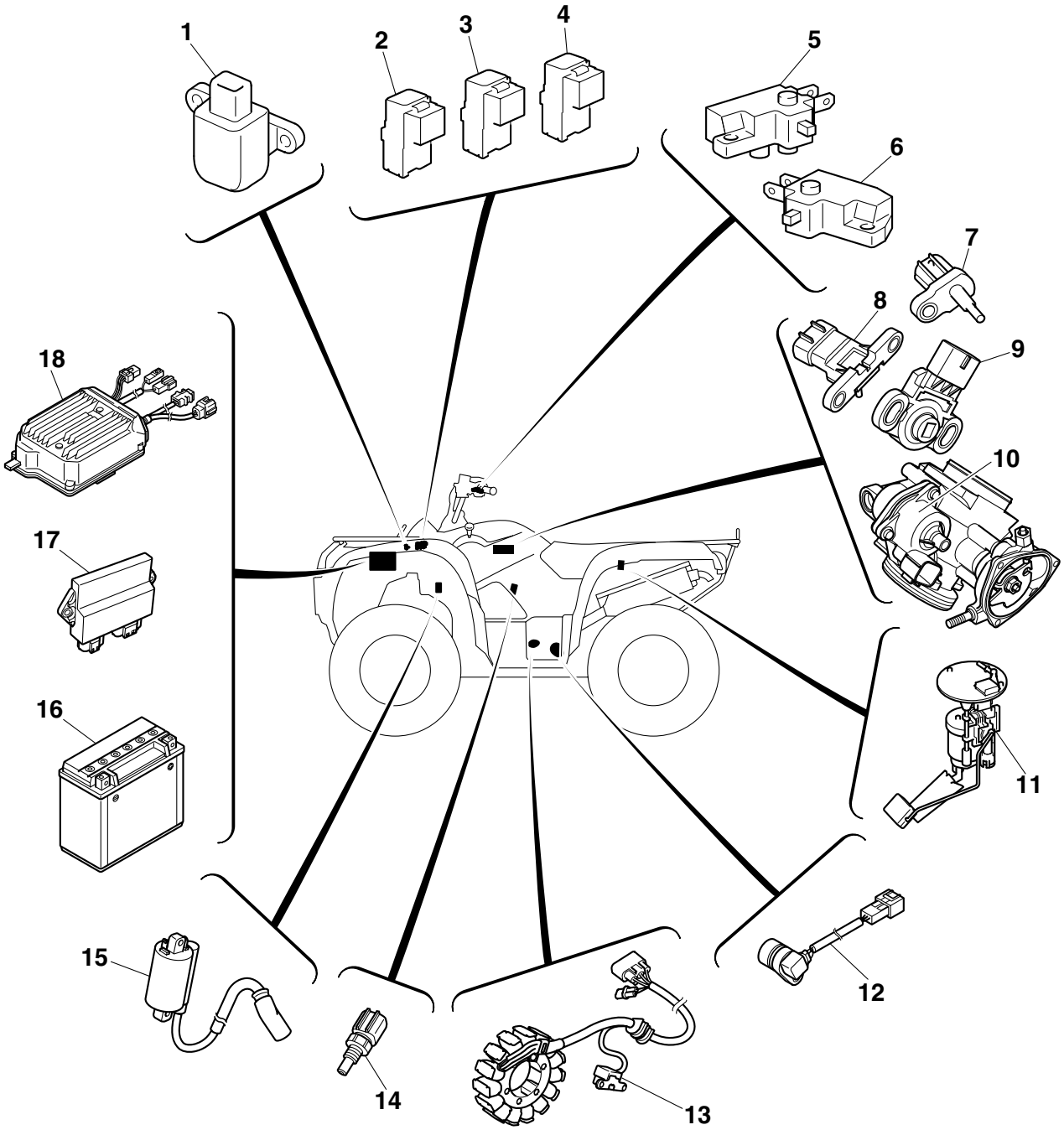
Fault code No.	55	Symptom	Power supply to the EPS control unit is not normal (high battery voltage). Malfunction in control unit.

Order	Item/components and probable cause	Check or maintenance job	Reinstatement method
1	Faulty battery.	Replace the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 9-84.	Setting the main switch to “OFF”.
2	Malfunction in rectifier/regulator.	Replace if defective. Refer to “CHECKING THE RECTIFIER/REGULATOR” on page 9-93.	
3	Malfunction in EPS control unit.	Replace the EPS control unit.	

EAS27972
ELECTRICAL COMPONENTS



1. Four-wheel-drive motor relay 1
2. Four-wheel-drive motor relay 2
3. Headlight relay
4. Fuel injection system fuse
5. Starter relay
6. EPS fuse (YFM5FGP/YFM7FGP only)
7. Main fuse
8. Fuse box (ignition, headlights, four-wheel-drive motor, radiator fan motor, signaling system, auxiliary DC jack)
9. Radiator fan motor circuit breaker
10. Rectifier/regulator
11. Reverse switch
12. Gear position switch
13. Auxiliary DC jack
14. Main switch
15. Differential motor
16. EPS torque sensor (YFM5FGP/YFM7FGP only)
17. EPS motor (YFM5FGP/YFM7FGP only)
18. Radiator fan motor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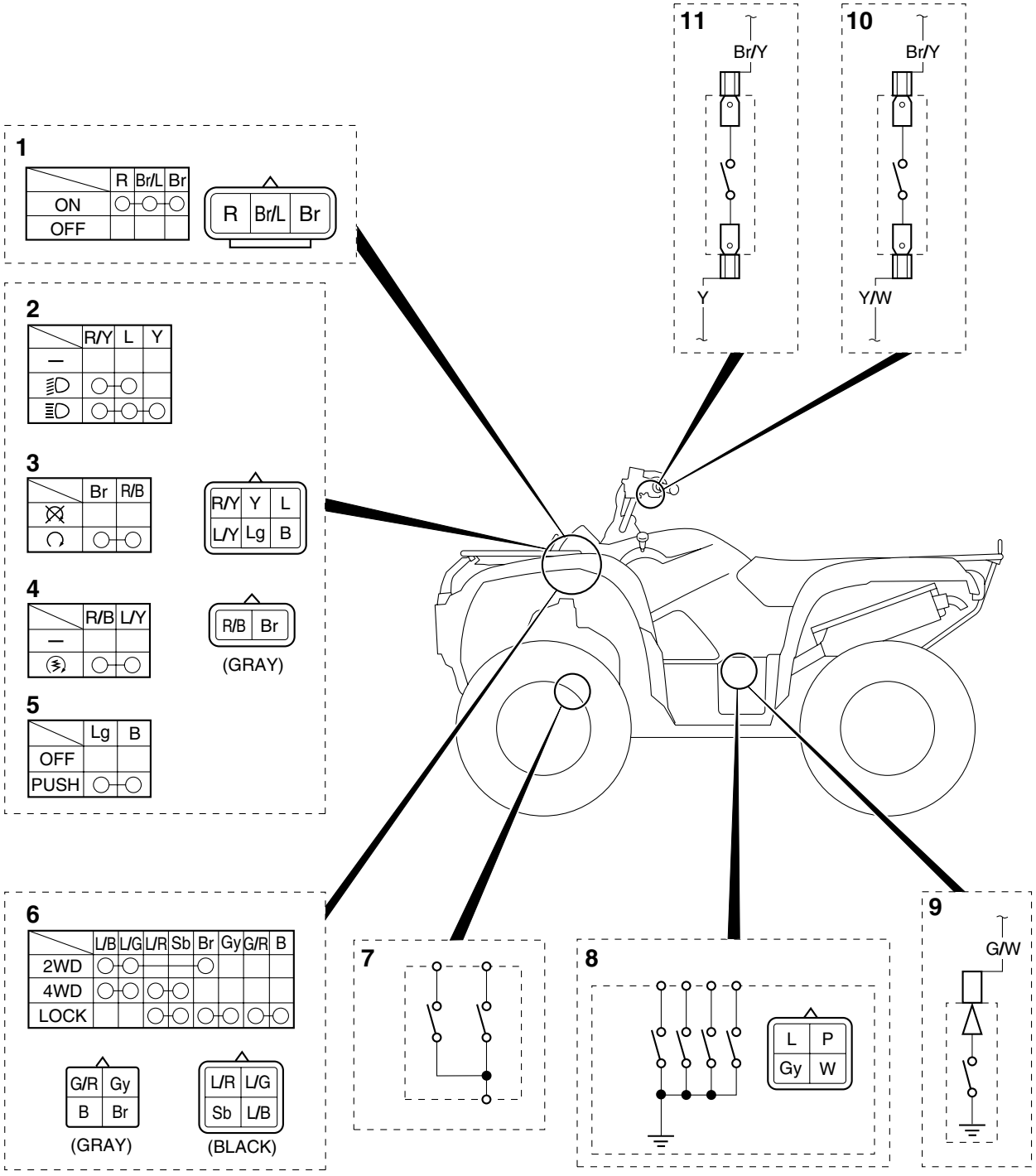
1. Lean angle sensor
2. Radiator fan motor relay
3. Fuel injection system relay
4. Four-wheel drive motor relay 3
5. Front brake light switch
6. Rear brake light switch
7. Intake air temperature sensor
8. Intake air pressure sensor
9. TPS (throttle position sensor)
10. ISC (idle speed control) unit
11. Fuel pump
12. Speed sensor
13. Crankshaft position sensor
14. Coolant temperature sensor
15. Ignition coil
16. Battery
17. ECU (engine control unit)
18. EPS (electric power steering) control unit (YFM5FGP/YFM7FGP only)

EAS27980
CHECKING THE SWITCHES



1. Main switch
2. Light switch
3. Engine stop switch
4. Start switch
5. Override switch
6. On-command four-wheel-drive motor switch and differential gear lock switch
7. Four-wheel-drive motor switch (differential motor)
8. Gear position switch
9. Reverse switch
10. Rear brake light switch
11. Front brake light switch

Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, check the wiring connections and if necessary, replace the switch.

ECA14370

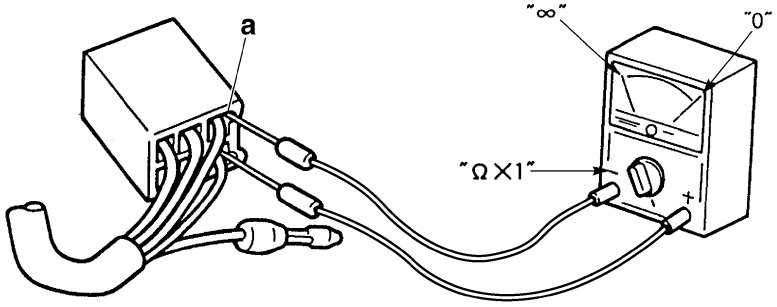
NOTICE

Never insert the tester probes into the coupler terminal slots "a". Always insert the probes from the opposite end of the coupler, taking care not to loosen or damage the leads.

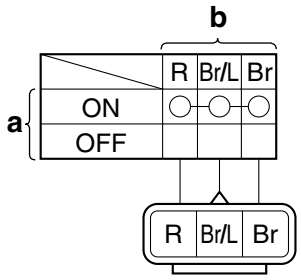
Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

TIP

- Before checking for continuity, set the pocket tester to "0" and to the "Ω × 1" range.
- When checking for continuity, switch back and forth between the switch positions a few times.



The switches and their terminal connections are illustrated as in the following example of the main switch.
The switch positions "a" are shown in the far left column and the switch lead colors "b" are shown in the top row.
The continuity (i. e., a closed circuit) between switch terminals at a given switch position is indicated by " ○——○ ". There is continuity between red, brown/blue, and brown when the switch is set to "ON".



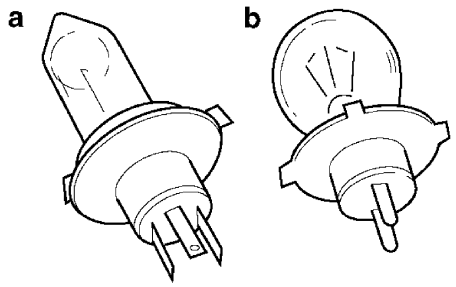
EAS27990
CHECKING THE BULBS AND BULB SOCKETS

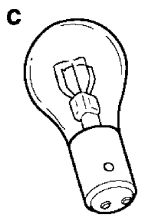
TIP

Do not check any of the lights that use LEDs.

Check each bulb and bulb socket for damage or wear, proper connections, and also for continuity between the terminals.
Damage/wear → Repair or replace the bulb, bulb socket or both.
Improperly connected → Properly connect.
No continuity → Repair or replace the bulb, bulb socket or both.

Types of bulbs
The bulbs used on this vehicle are shown in the illustration.
- Bulbs "a" and "b" are used for the headlights and usually use a bulb holder that must be detached before removing the bulb. The majority of these types of bulbs can be removed from their respective sockets by turning them counterclockwise.
- Bulbs "c" are used for tail/brake lights and can be removed from the socket by pushing and turning the bulb counterclockwise.





Checking the condition of the bulbs
The following procedure applies to all of the bulbs.
1. Remove:
   - Bulb

EWA28P1001
⚠ WARNING

Since headlight bulbs get extremely hot, keep flammable products and your hands away from them until they have cooled down.

ECA28P1001
NOTICE

- **Be sure to hold the socket firmly when removing the bulb. Never pull the lead, otherwise it may be pulled out of the terminal in the coupler.**
- **Avoid touching the glass part of a headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb, and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.**

2. Check:
   - Bulb (for continuity)
     (with the pocket tester)
     No continuity → Replace.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

TIP

Before checking for continuity, set the pocket tester to "0" and to the "Ω × 1" range.

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a. Connect the positive tester probe to terminal "1" and the negative tester probe to terminal "2", and check the continuity.
b. Connect the positive tester probe to terminal "1" and the negative tester probe to terminal "3", and check the continuity.
c. If either of the readings indicate no continuity, replace the bulb.

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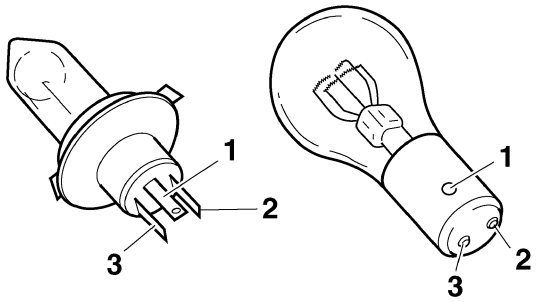

Checking the condition of the bulb sockets
The following procedure applies to all of the bulb sockets.
1. Check:
   • Bulb socket (for continuity)
   (with the pocket tester)
   No continuity → Replace.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

TIP
Check each bulb socket for continuity in the same manner as described in the bulb section; however, note the following.

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a. Install a good bulb into the bulb socket.
b. Connect the pocket tester probes to the respective leads of the bulb socket.
c. Check the bulb socket for continuity. If any of the readings indicate no continuity, replace the bulb socket.
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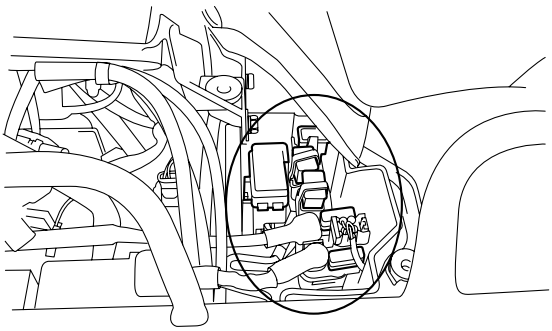
EAS28000
CHECKING THE FUSES
The following procedure applies to all of the fuses.
ECA13680
NOTICE
To avoid a short circuit, always set the main switch to "OFF" when checking or replacing a fuse.

1. Remove:
   • Battery cover
   Refer to "GENERAL CHASSIS" on page 4-1.
2. Check:
   • Fuse



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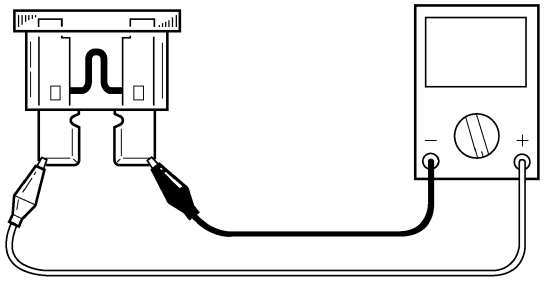
a. Connect the pocket tester to the fuse and check the continuity.

TIP
Set the pocket tester selector to "Ω × 1".

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C



b. If the pocket tester indicates "∞", replace the fuse.

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3. Replace:
   • Blown fuse

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a. Set the main switch to "OFF".
b. Install a new fuse of the correct amperage rating.
c. Set the switch(es) to on to verify if the electrical circuit is operational.
d. If the fuse immediately blows again, check the electrical circuit.

Fuses	Amperage rating	Q'ty
Main	40 A	1
EPS (YFM5FGP/YFM7FGP only)	40 A	1
Radiator fan motor	20 A	1
Headlight	15 A	1
Ignition	15 A	1
Fuel injection system	15 A	1
Four-wheel-drive motor	15 A	1
Auxiliary DC jack	15 A	1
Signaling system	5 A	1
Spare	40 A	1
Spare	20 A	1
Spare	15 A	1
Spare	5 A	1

EWA13310
⚠ WARNING

Never use a fuse with an amperage rating other than that specified. Improvising or using a fuse with the wrong amperage rating may cause extensive damage to the electrical system, cause the lighting and ignition systems to malfunction and could possibly cause a fire.

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4. Install:
   • Battery cover
   Refer to "GENERAL CHASSIS" on page 4-1.

EAS28030
CHECKING AND CHARGING THE BATTERY

EWA13290
⚠ WARNING

Batteries generate explosive hydrogen gas and contain electrolyte which is made of poisonous and highly caustic sulfuric acid. Therefore, always follow these preventive measures:
- **Wear protective eye gear when handling or working near batteries.**
- **Charge batteries in a well-ventilated area.**
- **Keep batteries away from fire, sparks or open flames (e.g., welding equipment, lighted cigarettes).**
- **DO NOT SMOKE when charging or handling batteries.**
- **KEEP BATTERIES AND ELECTROLYTE OUT OF REACH OF CHILDREN.**
- **Avoid bodily contact with electrolyte as it can cause severe burns or permanent eye injury.**

FIRST AID IN CASE OF BODILY CONTACT:
EXTERNAL
- **Skin — Wash with water.**
- **Eyes — Flush with water for 15 minutes and get immediate medical attention.**

INTERNAL
- **Drink large quantities of water or milk followed with milk of magnesia, beaten egg or vegetable oil. Get immediate medical attention.**

ECA28P1002
NOTICE

- **This is a VRLA (Valve Regulated Lead Acid) battery. Never remove the sealing caps because the balance between cells will not be maintained and battery performance will deteriorate.**
- **Charging time, charging amperage and charging voltage for a VRLA (Valve Regulated Lead Acid) battery are different from those of conventional batteries. The VRLA (Valve Regulated Lead Acid) battery should be charged as explained in the charging method. If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.**

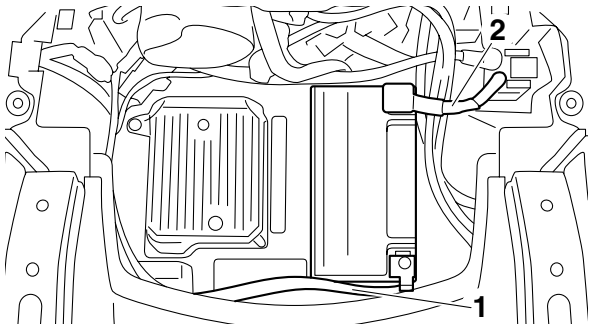
TIP

Since VRLA (Valve Regulated Lead Acid) batteries are sealed, it is not possible to check the charge state of the battery by measuring the specific gravity of the electrolyte. Therefore, the charge of the battery has to be checked by measuring the voltage at the battery terminals.

1. Remove:
   • Battery cover
   • Front carrier
   • Battery holding bracket
   Refer to "GENERAL CHASSIS" on page 4-1.
2. Disconnect:
   • Battery leads
   (from the battery terminals)

ECA13640
NOTICE

First, disconnect the negative battery lead "1", and then positive battery lead "2".



3. Remove:
   • Battery
4. Check:
   • Battery charge

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a. Connect a pocket tester to the battery terminals.

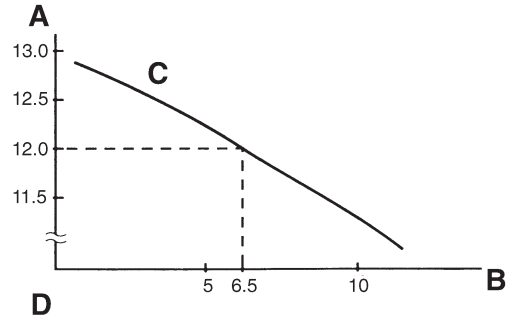
• Positive tester probe → positive battery terminal • Negative tester probe → negative battery terminal

TIP

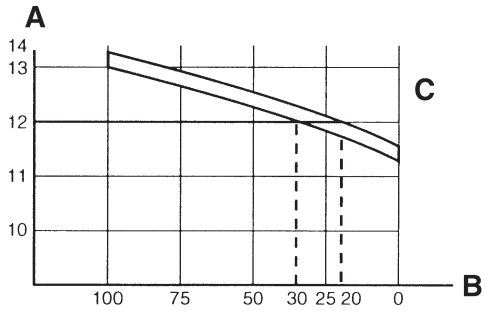
- The charge state of a VRLA (Valve Regulated Lead Acid) battery can be checked by measuring its open-circuit voltage (i.e., the voltage when the positive battery terminal is disconnected).
- No charging is necessary when the open-circuit voltage equals or exceeds 12.8 V.

b. Check the charge of the battery, as shown in the charts and the following example.

Example
Open-circuit voltage = 12.0 V
Charging time = 6.5 hours
Charge of the battery = 20–30%



A. Open-circuit voltage (V)
B. Charging time (hours)
C. Relationship between the open-circuit voltage and the charging time at 20 °C (68 °F)
D. These values vary with the temperature, the condition of the battery plates, and the electrolyte level.



A. Open-circuit voltage (V)
B. Charging condition of the battery (%)
C. Ambient temperature 20 °C (68 °F)

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5. Charge:
   - Battery
     (refer to the appropriate charging method)

EWA13300

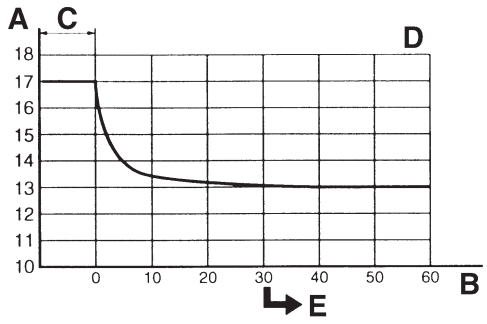
⚠ WARNING

Do not quick charge a battery.

ECA28P1003

NOTICE

- **Do not use a high-rate battery charger since it forces a high-amperage current into the battery quickly and can cause battery overheating and battery plate damage.**
- **If it is impossible to regulate the charging current on the battery charger, be careful not to overcharge the battery.**
- **When charging a battery, be sure to remove it from the vehicle. (If charging has to be done with the battery mounted on the vehicle, disconnect the negative battery lead from the battery terminal.)**
- **To reduce the chance of sparks, do not plug in the battery charger until the battery charger leads are connected to the battery.**
- **Before removing the battery charger lead clips from the battery terminals, be sure to turn off the battery charger.**
- **Make sure the battery charger lead clips are in full contact with the battery terminal and that they are not shorted. A corroded battery charger lead clip may generate heat in the contact area and a weak clip spring may cause sparks.**
- **If the battery becomes hot to the touch at any time during the charging process, disconnect the battery charger and let the battery cool before reconnecting it. Hot batteries can explode!**
- **As shown in the following illustration, the open-circuit voltage of a VRLA (Valve Regulated Lead Acid) battery stabilizes about 30 minutes after charging has been completed. Therefore, wait 30 minutes after charging is completed before measuring the open-circuit voltage.**



A. Open-circuit voltage (V)
B. Time (minutes)
C. Charging
D. Ambient temperature 20 °C (68 °F)
E. Check the open-circuit voltage.

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Charging method using a variable-current (voltage) charger

a. Measure the open-circuit voltage prior to charging.

TIP

Voltage should be measured 30 minutes after the engine is stopped.

b. Connect a charger and ammeter to the battery and start charging.

TIP

Set the charging voltage at 16–17 V. If the setting is lower, charging will be insufficient. If too high, the battery will be over-charged.

c. Make sure that the current is higher than the standard charging current written on the battery.

TIP

If the current is lower than the standard charging current written on the battery, set the charging voltage adjust dial at 20–24 V and monitor the amperage for 3–5 minutes to check the battery.

- Reaches the standard charging current → Battery is good.
- Does not reach the standard charging current → Replace the battery.

d. Adjust the voltage so that the current is at the standard charging level.
e. Set the time according to the charging time suitable for the open-circuit voltage.
f. If charging requires more than 5 hours, it is advisable to check the charging current after a lapse of 5 hours. If there is any change in the amperage, readjust the voltage to obtain the standard charging current.
g. Measure the battery open-circuit voltage after leaving the battery unused for more than 30 minutes.

12.8 V or more --- Charging is complete.
12.7 V or less --- Recharging is required.
Under 12.0 V --- Replace the battery.

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Charging method using a constant voltage charger

a. Measure the open-circuit voltage prior to charging.

TIP

Voltage should be measured 30 minutes after the engine is stopped.

b. Connect a charger and ammeter to the battery and start charging.
c. Make sure that the current is higher than the standard charging current written on the battery.

TIP

If the current is lower than the standard charging current written on the battery, this type of battery charger cannot charge the VRLA (Valve Regulated Lead Acid) battery. A variable voltage charger is recommended.

d. Charge the battery until its charging voltage is 15 V.

TIP

Set the charging time at 20 hours (maximum).

e. Measure the battery open-circuit voltage after leaving the battery unused for more than 30 minutes.

12.8 V or more --- Charging is complete.
12.7 V–12.0 V --- Recharging is required.
Under 12.0 V --- Replace the battery.

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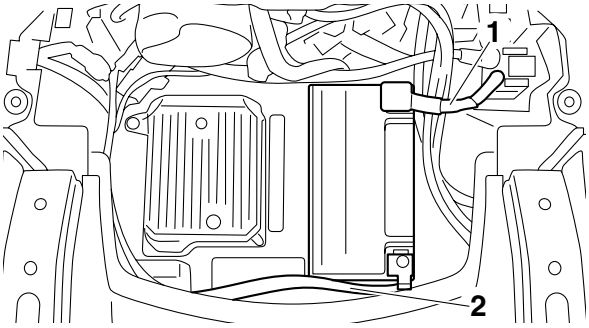
6. Install:
   - Battery
7. Connect:
   - Battery leads (to the battery terminals)

ECA13630

NOTICE

First, connect the positive battery lead "1", and then the negative battery lead "2".



8. Check:
   - Battery terminals
     Dirt → Clean with a wire brush.
     Loose connection → Connect properly.
9. Lubricate:
   - Battery terminals

	Recommended lubricant **Dielectric grease**

10. Install:
    - Battery holding bracket
    - Front carrier
    - Battery cover
      Refer to "GENERAL CHASSIS" on page 4-1.

EAS28040

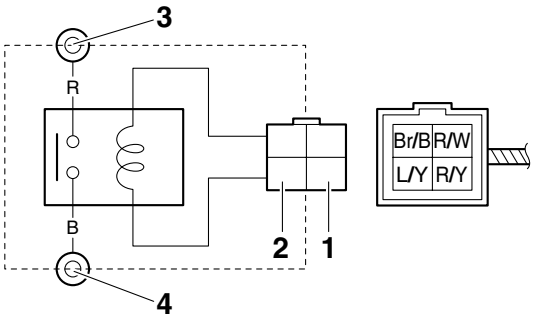
CHECKING THE RELAYS

Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, replace the relay.

	Pocket tester **90890-03112** **Analog pocket tester** **YU-03112-C**

1. Disconnect the relay from the wire harness.
2. Connect the pocket tester ($\Omega \times 1$) and battery (12 V) to the relay terminal as shown.
   Check the relay operation.
   Out of specification → Replace.

Starter relay

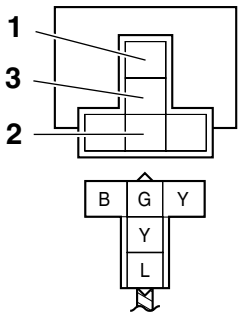


1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

	Result **Continuity** **(between "3" and "4")**

Headlight relay

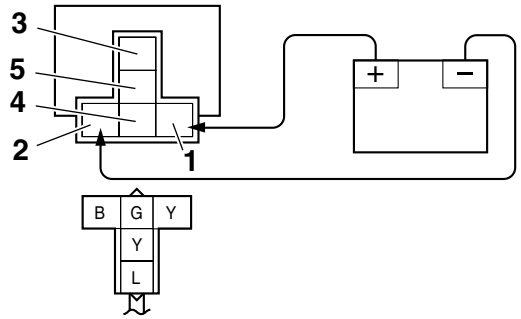
First step:



1. Positive tester probe
2. Negative tester probe
3. Negative tester probe

	Result **Continuity** **(between "1" and "2")** **No continuity** **(between "1" and "3")**

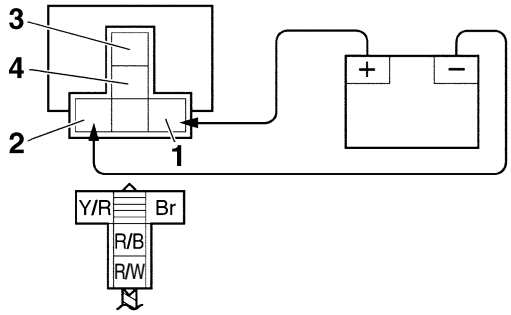
Second step:



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe
5. Negative tester probe

Result
No continuity
(between "3" and "4")
Continuity
(between "3" and "5")

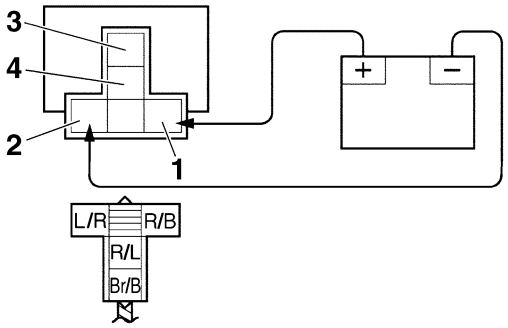
Radiator fan motor relay



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity
(between "3" and "4")

Fuel injection system relay

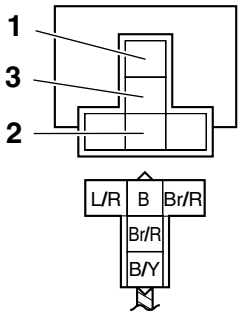


1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity
(between "3" and "4")

Four-wheel-drive motor relay 1

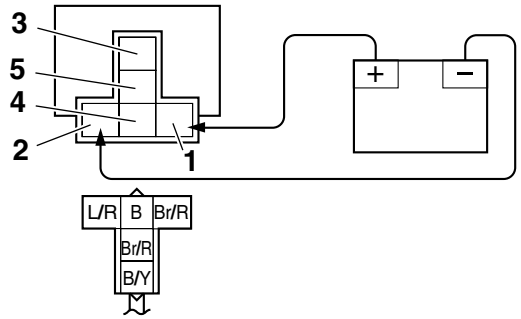
First step:



1. Positive tester probe
2. Negative tester probe
3. Negative tester probe

Result
Continuity
(between "1" and "2")
No continuity
(between "1" and "3")

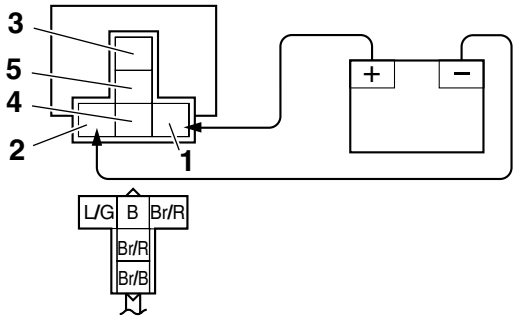
Second step:



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe
5. Negative tester probe

Result
No continuity
(between "3" and "4")
Continuity
(between "3" and "5")

Second step:

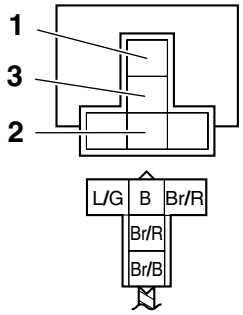


1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe
5. Negative tester probe

Result
No continuity
(between "3" and "4")
Continuity
(between "3" and "5")

Four-wheel-drive motor relay 2

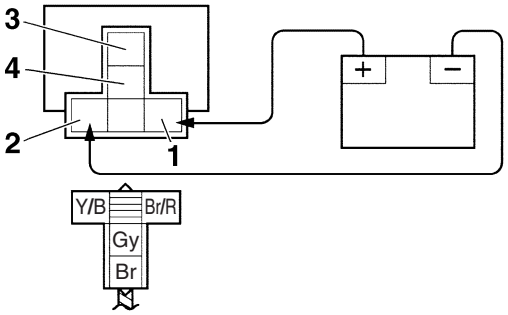
First step:



1. Positive tester probe
2. Negative tester probe
3. Negative tester probe

Result
Continuity
(between "1" and "2")
No continuity
(between "1" and "3")

Four-wheel-drive motor relay 3



1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

Result
Continuity
(between "3" and "4")

EAS28050
CHECKING THE DIODE

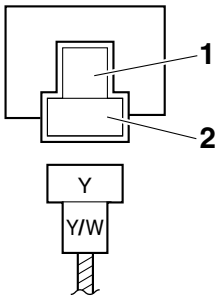
1. Check:
   • Diode 3
   Out of specification → Replace.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

TIP

The pocket tester or the analog pocket tester readings are shown in the following table.

	No continuity **Positive tester probe → yellow/white "1"** **Negative tester probe → yellow "2"** **Continuity** **Positive tester probe → yellow "2"** **Negative tester probe → yellow/white "1"**



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a. Disconnect the diode 3 from the wire harness.
b. Connect the pocket tester (Ω × 1) to the diode 3 coupler as shown.
c. Check the diode 3 for continuity.
d. Check the diode 3 for no continuity.

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EAS28060

CHECKING THE SPARK PLUG CAP

1. Check:
   • Spark plug cap resistance
   Out of specification → Replace.

	Resistance **10.0 kΩ**

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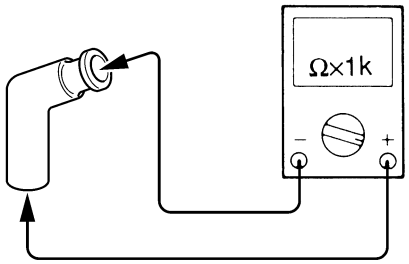
a. Remove the spark plug cap from the spark plug lead.
b. Connect the pocket tester (Ω × 1k) to the spark plug cap as shown.

	Pocket tester **90890-03112** **Analog pocket tester** **YU-03112-C**



c. Measure the spark plug cap resistance.

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EAS28090

CHECKING THE IGNITION COIL

1. Check:
   • Primary coil resistance
   Out of specification → Replace.

	Primary coil resistance **2.16–2.64 Ω at 20 °C (68 °F)**

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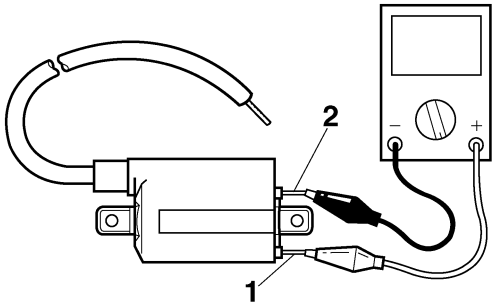
a. Disconnect the ignition coil connectors from the ignition coil terminals.
b. Connect the pocket tester (Ω × 1) to the ignition coil as shown.

	Pocket tester **90890-03112** **Analog pocket tester** **YU-03112-C**

• Positive tester probe red/black "1" • Negative tester probe orange "2"



c. Measure the primary coil resistance.

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2. Check:
   • Secondary coil resistance
   Out of specification → Replace.

Secondary coil resistance
8.64–12.96 kΩ at 20 °C (68 °F)

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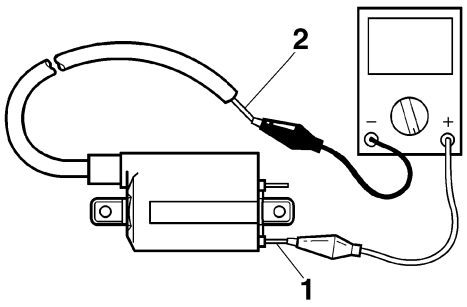
a. Disconnect the spark plug cap from the ignition coil.
b. Connect the pocket tester (Ω × 1k) to the ignition coil as shown.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

- Positive tester probe
  red/black "1"
- Negative tester probe
  Spark plug lead "2"



c. Measure the secondary coil resistance.

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EAS28930
CHECKING THE IGNITION SPARK GAP

1. Check:
   - Ignition spark gap
     Out of specification → Perform the ignition system troubleshooting, starting with step 5. Refer to "TROUBLESHOOTING" on page 9-3.

Minimum ignition spark gap
6.0 mm (0.24 in)

TIP

If the ignition spark gap is within specification, the ignition system circuit is operating normally.

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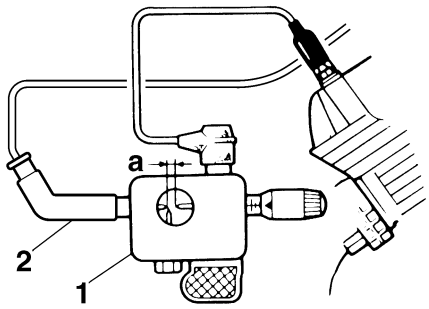
a. Disconnect the spark plug cap from the spark plug.
b. Connect the ignition checker "1" as shown.

Ignition checker
90890-06754
Opama pet-4000 spark checker
YM-34487



2. Spark plug cap

c. Set the main switch to "ON" and engine stop switch to "∩".
d. Measure the ignition spark gap "a".
e. Crank the engine by pushing the start switch "≋" and gradually increase the spark gap until a misfire occurs.

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EAS28120
CHECKING THE CRANKSHAFT POSITION SENSOR

1. Disconnect:
   - Crankshaft position sensor coupler (from the wire harness)
2. Check:
   - Crankshaft position sensor resistance
     Out of specification → Replace the crankshaft position sensor/stator assembly.

Crankshaft position sensor resistance
459–561 Ω at 20 °C (68 °F)

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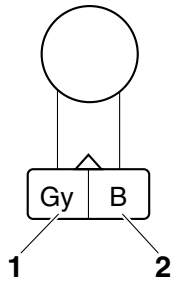
a. Connect the pocket tester (Ω × 100) to the crankshaft position sensor coupler as shown.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

- Positive tester probe
  gray "1"
- Negative tester probe
  black "2"



b. Measure the crankshaft position sensor resistance.

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EAS28130
CHECKING THE LEAN ANGLE SENSOR

1. Remove:
   • Lean angle sensor
2. Check:
   • Lean angle sensor output voltage
   Out of specification → Replace.

Lean angle sensor output voltage
Less than 65°: 3.55–4.45 V
More than 65°: 0.65–1.35 V

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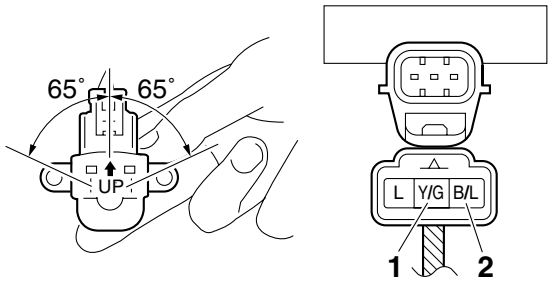
a. Connect the lean angle sensor coupler to the wire harness.
b. Connect the pocket tester (DC 20 V) to the lean angle sensor coupler as shown.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

• Positive tester probe
yellow/green "1"
• Negative tester probe
black/blue "2"



c. Set the main switch to "ON".
d. Tilt the lean angle sensor to 65°.
e. Measure the lean angle sensor output voltage.

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EAS28940
CHECKING THE STARTER MOTOR OPERATION

1. Check:
   • Starter motor operation
   Does not operate → Perform the electric starting system troubleshooting, starting with step 4.
   Refer to "TROUBLESHOOTING" on page 9-9.

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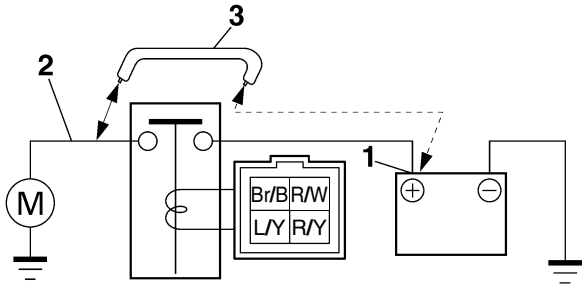
a. Connect the positive battery terminal "1" and starter motor lead "2" with a jumper lead "3".

EWA13810
⚠ WARNING

• A wire that is used as a jumper lead must have at least the same capacity of the battery lead, otherwise the jumper lead may burn.
• This check is likely to produce sparks, therefore, make sure no flammable gas or fluid is in the vicinity.



b. Check the starter motor operation.

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EAS28150
CHECKING THE STATOR COIL

1. Disconnect:
   • AC magneto coupler
   (from the wire harness)
2. Check:
   • Stator coil resistance
   Out of specification → Replace the crankshaft position sensor/stator assembly.

Stator coil resistance
0.108–0.132 Ω at 20 °C (68 °F)

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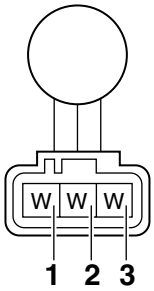
a. Connect the pocket tester (Ω × 1) to the AC magneto coupler as shown.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

- Positive tester probe
  white “1”
- Negative tester probe
  white “2”

- Positive tester probe
  white “1”
- Negative tester probe
  white “3”

- Positive tester probe
  white “2”
- Negative tester probe
  white “3”



b. Measure the stator coil resistance.

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EAS28170
CHECKING THE RECTIFIER/REGULATOR

1. Check:
   - Charging voltage
     Out of specification → Replace the rectifier/regulator.

Charging voltage
above 14 V at 5000 r/min

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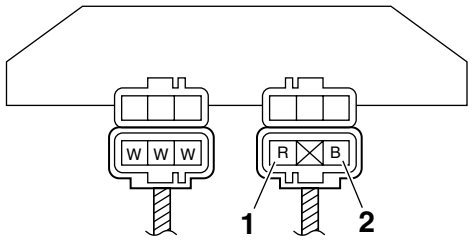
a. Connect the engine tachometer to the spark plug lead.
b. Connect the pocket tester (DC 20 V) to the rectifier/regulator coupler as shown.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

- Positive tester probe
  red “1”
- Negative tester probe
  black “2”



c. Start the engine and let it run at approximately 5000 r/min.
d. Measure the charging voltage.

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EAS28230
CHECKING THE FUEL SENDER

1. Disconnect:
   - Fuel pump coupler
     (from the wire harness)
2. Remove:
   - Fuel pump assembly
     (from the fuel tank)
3. Check:
   - Fuel sender resistance
     Out of specification → Replace the fuel pump assembly.

Sender unit resistance (full)
19.00–21.00 Ω
Sender unit resistance (empty)
139.00–141.00 Ω

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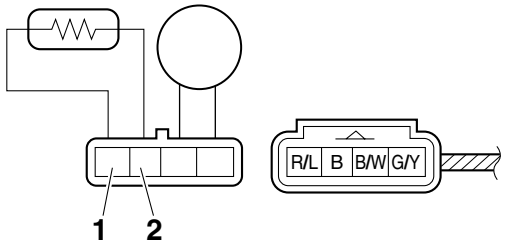
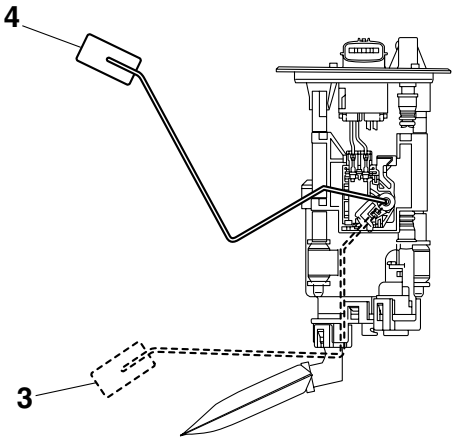
a. Connect the pocket tester (Ω × 10) to the fuel sender terminal as shown.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

- Positive tester probe
  green/yellow “1”
- Negative tester probe
  black/white “2”



b. Move the fuel sender float to the minimum "3" and maximum "4" level positions.



c. Measure the fuel sender resistance.

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EAS28240

CHECKING THE SPEED SENSOR

1. Check:
   - Speed sensor output voltage
     Out of specification → Replace.

	Output voltage reading cycle **0.6 V–4.8 V–0.6 V–4.8 V–0.6 V**

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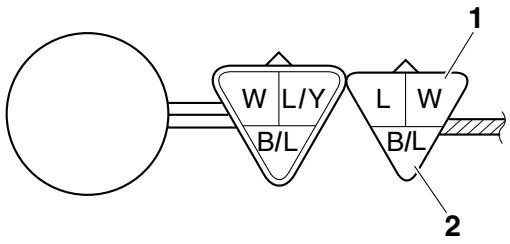
a. Connect the pocket tester (DC 20 V) to the speed sensor coupler as shown.

	Pocket tester **90890-03112** **Analog pocket tester** **YU-03112-C**

- Positive tester probe
  white "1"
- Negative tester probe
  black/blue "2"



b. Set the main switch to "ON".
c. Elevate the rear wheels and slowly rotate them.
d. Measure the voltage (DC 20 V) of white and black/blue. With each full rotation of the rear wheel, the voltage reading should cycle from 0.6 V to 4.8 V to 0.6 V to 4.8 V.

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EAS28250

CHECKING THE RADIATOR FAN MOTOR

1. Check:
   - Radiator fan motor
     Faulty/rough movement → Replace.

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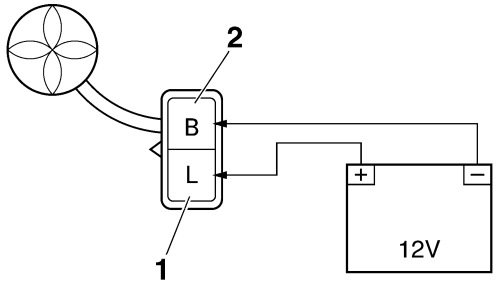
a. Disconnect the radiator fan motor coupler from the wire harness.
b. Connect the battery (DC 12 V) as shown.

- Positive battery terminal
  blue "1"
- Negative battery terminal
  black "2"



c. Measure the radiator fan motor movement.

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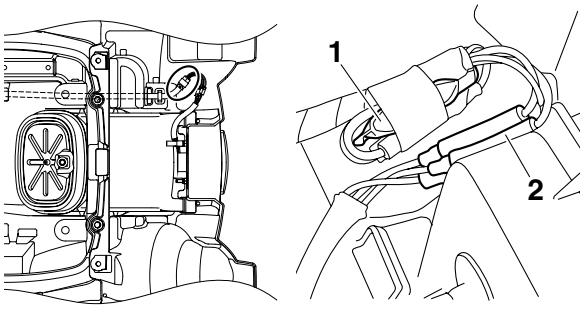
EAS28P1001
CHECKING THE RADIATOR FAN MOTOR CIRCUIT BREAKER

1. Remove:
   • Radiator fan motor circuit breaker (from the wire harness)

TIP

The radiator fan motor circuit breaker "1" is attached to the wire harness with black tape near the tail/brake light connectors "2".



2. Check:
   • Radiator fan motor circuit breaker resistance
   Out of specification → Replace the radiator fan motor circuit breaker.

Radiator fan motor circuit breaker resistance
Zero Ω at 20 °C (68 °F)

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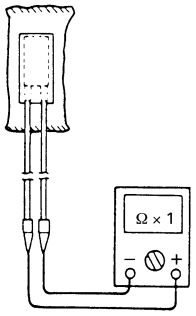
a. Connect the pocket tester (Ω × 1) to the radiator fan motor circuit breaker as shown.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C



b. Measure the radiator fan motor circuit breaker resistance.

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EAS28260
CHECKING THE COOLANT TEMPERATURE SENSOR

1. Remove:
   • Coolant temperature sensor

EWA14130

⚠ WARNING

- **Handle the coolant temperature sensor with special care.**
- **Never subject the coolant temperature sensor to strong shocks. If the coolant temperature sensor is dropped, replace it.**

2. Check:
   • Coolant temperature sensor resistance
   Out of specification → Replace.

Coolant temperature sensor resistance
2.45 kΩ at 20 °C (68 °F)
290–354 Ω at 80 °C (176 °F)

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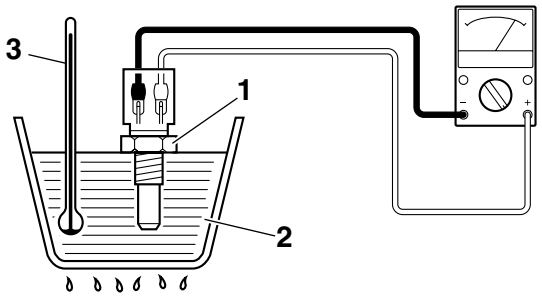
a. Connect the pocket tester (Ω × 100) to the coolant temperature sensor terminals as shown.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C



b. Immerse the coolant temperature sensor "1" in a container filled with coolant "2".

TIP

Make sure the coolant temperature sensor terminals do not get wet.

c. Place a thermometer "3" in the coolant.
d. Slowly heat the coolant, and then let it cool down to the specified temperature.
e. Measure the coolant temperature sensor resistance.

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EAS28300
CHECKING THE THROTTLE POSITION SENSOR

1. Remove:
   • Throttle position sensor (from the throttle body)
2. Check:
   • Throttle position sensor maximum resistance
   Out of specification → Replace the throttle position sensor.

Resistance
3.08–5.72 kΩ

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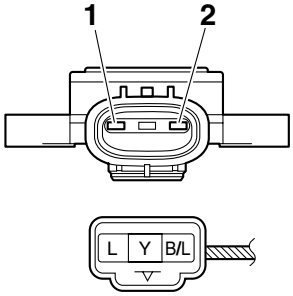
a. Connect the pocket tester (Ω × 1k) to the throttle position sensor terminal as shown.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

• Positive tester probe
blue "1"
• Negative tester probe
black/blue "2"



b. Measure the throttle position sensor resistance.

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3. Install:
   • Throttle position sensor

TIP

When installing the throttle position sensor, adjust its angle properly. Refer to "ADJUSTING THE THROTTLE POSITION SENSOR" on page 7-7.

EAS28410
CHECKING THE INTAKE AIR PRESSURE SENSOR

1. Check:
   • Intake air pressure sensor output voltage
   Out of specification → Replace.

Intake air pressure sensor output voltage
3.75–4.25 V

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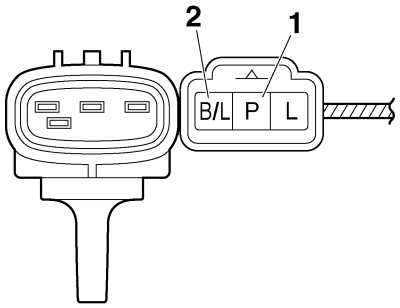
a. Connect the pocket tester (DC 20 V) to the intake air pressure sensor coupler as shown.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

• Positive tester probe
pink "1"
• Negative tester probe
black/blue "2"



b. Set the main switch to "ON".
c. Measure the intake air pressure sensor output voltage.

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EAS28420
CHECKING THE INTAKE AIR TEMPERATURE SENSOR

1. Remove:
   • Intake air temperature sensor (from the air filter case.)

EWA14110

⚠ WARNING

• Handle the intake air temperature sensor with special care.
• Never subject the intake air temperature sensor to strong shocks. If the intake air temperature sensor is dropped, replace it.

2. Check:
   • Intake air temperature sensor resistance
   Out of specification → Replace.

Intake air temperature sensor resistance
290–390 Ω at 80 °C (176 °F)

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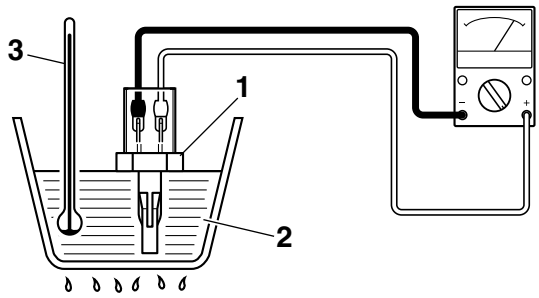
a. Connect the pocket tester (Ω × 100) to the intake air temperature sensor terminal as shown.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C



b. Immerse the intake air temperature sensor "1" in a container filled with water "2".

TIP

Make sure that the air temperature sensor terminals do not get wet.

c. Place a thermometer "3" in the water.
d. Slowly heat the water, then let it cool down to the specified temperature.
e. Measure the intake air temperature sensor resistance.

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EAS30300

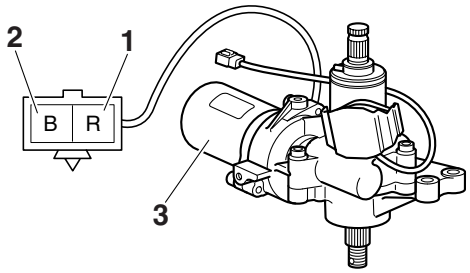
CHECKING THE EPS MOTOR (for YFM5FGP/YFM7FGP)

1. Remove:
   • EPS unit
2. Check:
   • EPS motor
   Out of specification → Replace the EPS unit.

TIP

The pocket tester and the analog pocket tester readings are shown in the following table.

Continuity
Positive tester probe → red "1"
Negative tester probe → black "2"
No continuity
Positive tester probe → red "1"
Negative tester probe → EPS motor body "3"
No continuity
Positive tester probe → black "2"
Negative tester probe → EPS motor body "3"



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a. Connect the pocket tester (Ω × 1) to the EPS motor coupler terminal and EPS motor body.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

b. Check the EPS motor for continuity.
c. Check the EPS motor for no continuity.

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EAS30310

CHECKING THE EPS TORQUE SENSOR (for YFM5FGP/YFM7FGP)

1. Remove:
   • EPS unit
2. Check:
   • EPS torque sensor resistance
   Out of specification → Replace the EPS unit.

EPS torque sensor resistance
1.00–1.50 kΩ

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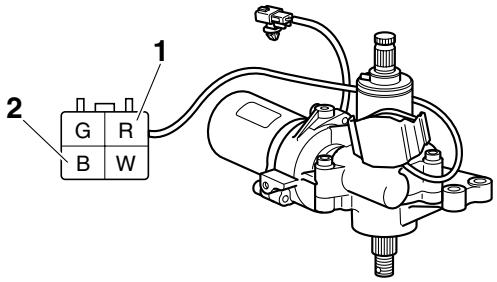
a. Connect the pocket tester (Ω × 1k) to the EPS torque sensor coupler terminal as shown.

Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

- Positive tester probe → red “1”
- Negative tester probe → black “2”



b. Measure the EPS torque sensor resistance.

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TROUBLESHOOTING

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EAS28451
TROUBLESHOOTING

EAS28460
GENERAL INFORMATION

TIP

The following guide for troubleshooting does not cover all the possible causes of trouble. It should be helpful, however, as a guide to basic troubleshooting. Refer to the relative procedure in this manual for checks, adjustments, and replacement of parts.

EAS28470
STARTING FAILURES

Engine

1. Cylinder and cylinder head
   - Loose spark plug
   - Loose cylinder head or cylinder
   - Damaged cylinder head gasket
   - Damaged cylinder gasket
   - Worn or damaged cylinder
   - Incorrect valve clearance
   - Improperly sealed valve
   - Incorrect valve-to-valve-seat contact
   - Incorrect valve timing
   - Faulty valve spring
   - Seized valve
2. Piston and piston ring(s)
   - Improperly installed piston ring
   - Damaged, worn or fatigued piston ring
   - Seized piston ring
   - Seized or damaged piston
3. Air filter
   - Improperly installed air filter
   - Clogged air filter element
4. Crankcase and crankshaft
   - Improperly assembled crankcase
   - Seized crankshaft

Fuel system

1. Fuel tank
   - Empty fuel tank
   - Clogged fuel tank drain hose
   - Clogged rollover valve
   - Clogged rollover valve hose
   - Deteriorated or contaminated fuel
2. Fuel pump
   - Faulty fuel pump
   - Faulty fuel injection system relay
   - Clogged or damaged fuel hose
3. Throttle body
   - Deteriorated or contaminated fuel
   - Sucked-in air

Electrical system

1. Battery
   - Discharged battery
   - Faulty battery
2. Fuse(s)
   - Blown, damaged or incorrect fuse
   - Improperly installed fuse
3. Spark plug
   - Incorrect spark plug gap
   - Incorrect spark plug heat range
   - Fouled spark plug
   - Worn or damaged electrode
   - Worn or damaged insulator
   - Faulty spark plug cap
4. Ignition coil
   - Cracked or broken ignition coil body
   - Broken or shorted primary or secondary coils
   - Faulty spark plug lead
5. Ignition system
   - Faulty ECU
   - Faulty crankshaft position sensor
   - Broken AC magneto rotor woodruff key
6. Switches and wiring
   - Faulty main switch
   - Faulty engine stop switch
   - Broken or shorted wiring
   - Faulty gear position switch
   - Faulty start switch
   - Faulty brake light switch
   - Improperly grounded circuit
   - Loose connections
7. Starting system
   - Faulty starter motor
   - Faulty starter relay
   - Faulty starter clutch

EAS28490
INCORRECT ENGINE IDLING SPEED

Engine

1. Cylinder and cylinder head
   - Incorrect valve clearance
   - Damaged valve train components
2. Air filter
   - Clogged air filter element

Fuel system

1. Throttle body
   - Damaged or loose throttle body joint
   - Improper throttle cable free play
   - Flooded throttle body

Electrical system
1. Battery
   • Discharged battery
   • Faulty battery
2. Spark plug
   • Incorrect spark plug gap
   • Incorrect spark plug heat range
   • Fouled spark plug
   • Worn or damaged electrode
   • Worn or damaged insulator
   • Faulty spark plug cap
3. Ignition coil
   • Broken or shorted primary or secondary coils
   • Faulty spark plug lead
   • Cracked or broken ignition coil
4. Ignition system
   • Faulty ECU
   • Faulty crankshaft position sensor
   • Broken AC magneto rotor woodruff key
5. Valve train
   • Improperly adjusted valve clearance
   • Improperly adjusted valve timing

EAS28510
POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE
Refer to “STARTING FAILURES” on page 10-1.

Engine
1. Air filter
   • Clogged air filter element

Fuel system
1. Fuel pump
   • Faulty fuel pump

EAS30320
FAULTY DRIVE TRAIN
The following conditions may indicate damaged shaft drive components:

Symptoms	Possible Causes
1. A pronounced hesitation or “jerky” movement during acceleration, deceleration, or sustained speed. (This must not be confused with engine surging or transmission characteristics.) 2. A “rolling rumble” noticeable at low speed; a high-pitched whine; a “clunk” from a shaft drive component or area. 3. A locked-up condition of the shaft drive mechanism, no power transmitted from the engine to the front and/or rear wheels.	A. Bearing damage. B. Improper gear backlash. C. Gear tooth damage. D. Broken drive shaft. E. Broken gear teeth. F. Seizure due to lack of lubrication. G. Small foreign objects lodged between the moving parts.

TIP

Areas A, B, and C above may be extremely difficult to diagnose. The symptoms are quite subtle and difficult to distinguish from normal vehicle operating noise. If there is reason to believe these components are damaged, remove the components and check them.

EAS28530
FAULTY GEAR SHIFTING

Shifting is difficult
Refer to “FAULTY CLUTCH” on page 10-3.

EAS3B41028
SHIFT LEVER DOES NOT MOVE

Shift drum and shift forks
• Foreign object in a shift drum groove
• Seized shift fork
• Bent shift fork guide bar

Transmission
• Seized transmission gear
• Foreign object between transmission gears
• Improperly assembled transmission

EAS28550
JUMPS OUT OF GEAR

Shift forks
• Worn shift fork

Shift drum
• Incorrect axial play
• Worn shift drum groove

Transmission
• Worn gear dog

EAS28580
FAULTY CLUTCH

Engine operates but vehicle will not move
1. V-belt
   • Damaged or worn V-belt
   • Slipping V-belt
2. Primary pulley cam and primary pulley slider
   • Damaged or worn primary pulley cam
   • Damaged or worn primary pulley slider
3. Clutch spring(s)
   • Damaged clutch spring
4. Transmission gear(s)
   • Damaged transmission gear

Clutch slips
1. Clutch spring
   • Damaged, loose or worn clutch spring
2. Clutch shoe
   • Damaged or worn clutch shoe
3. Primary sliding sheave
   • Seized primary sliding sheave

Poor starting performance
1. V-belt
   • V-belt slips
   • Oil or grease on the V-belt
2. Primary sliding sheave
   • Faulty operation
   • Worn pin groove
   • Worn pin
3. Clutch shoe
   • Bent, damaged or worn clutch shoe

Poor speed performance
1. V-belt
   • Oil or grease on the V-belt
2. Primary pulley weight(s)
   • Faulty operation
   • Worn primary pulley weight
3. Primary fixed sheave
   • Worn primary fixed sheave
4. Primary sliding sheave
   • Worn primary sliding sheave
5. Secondary fixed sheave
   • Worn secondary fixed sheave
6. Secondary sliding sheave
   • Worn secondary sliding sheave

EAS28600
OVERHEATING

Engine
1. Clogged coolant passages
2. Cylinder head and piston
   • Heavy carbon buildup
3. Engine oil
   • Incorrect oil level
   • Incorrect oil viscosity
   • Inferior oil quality

Cooling system
1. Coolant
   • Low coolant level
2. Radiator
   • Damaged or leaking radiator
   • Faulty radiator cap
   • Bent or damaged radiator fin
3. Water pump
   • Damaged or faulty water pump
4. Thermostat
   • Thermostat stays closed
5. Hose(s) and pipe(s)
   • Damaged hose
   • Improperly connected hose
   • Damaged pipe
   • Improperly connected pipe

Fuel system
1. Throttle body
   • Damaged or loose throttle body joint
2. Air filter
   • Clogged air filter element

Chassis
1. Brake(s)
   • Dragging brake

Electrical system
1. Spark plug
   • Incorrect spark plug gap
   • Incorrect spark plug heat range
2. Ignition system
   • Faulty ECU

EAS28610
OVERCOOLING

Cooling system
1. Thermostat
   • Thermostat stays open

EAS28620
POOR BRAKING PERFORMANCE
- Worn brake pad
- Worn brake disc
- Air in hydraulic brake system
- Leaking brake fluid
- Faulty brake caliper kit
- Faulty brake caliper piston seal
- Loose union bolt
- Damaged brake hose
- Oil or grease on the brake disc
- Oil or grease on the brake pad
- Incorrect brake fluid level

EAS3B41029
FAULTY SHOCK ABSORBER ASSEMBLY

Leaking oil
- Bent, damaged or rusty damper rod
- Cracked or damaged shock absorber
- Damaged oil seal lip

Malfunction
- Fatigued or damaged shock absorber spring
- Bent or damaged damper rod

EAS28670
UNSTABLE HANDLING
1. Handlebar
   - Bent or improperly installed handlebar
2. Steering
   - Incorrect toe-in
   - Bent steering stem
   - Improperly installed steering stem
   - Damaged bearing or bearing race
   - Bent tie-rods
   - Deformed steering knuckles
3. Shock absorber
   - Faulty shock absorber spring
   - Leaking oil
4. Tire(s)
   - Uneven tire pressures (left and right)
   - Incorrect tire pressure
   - Uneven tire wear
5. Wheel(s)
   - Incorrect wheel balance
   - Deformed wheel
   - Damaged or loose wheel bearing
   - Bent or loose wheel axle
   - Excessive wheel runout
6. Frame
   - Bent frame
   - Damaged frame

EAS28710
FAULTY LIGHTING OR SIGNALING SYSTEM

Headlight does not come on
- Wrong headlight bulb
- Too many electrical accessories
- Hard charging
- Incorrect connection
- Improperly grounded circuit
- Poor contacts (main or light switch)
- Burnt-out headlight bulb

Headlight bulb burnt out
- Wrong headlight bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded circuit
- Faulty main switch
- Faulty light switch
- Headlight bulb life expired

Tail/brake light does not come on
- Wrong tail/brake light bulb
- Too many electrical accessories
- Incorrect connection
- Burnt-out tail/brake light bulb

Tail/brake light bulb burnt out
- Wrong tail/brake light bulb
- Faulty battery
- Incorrectly adjusted rear brake light switch
- Tail/brake light bulb life expired

EAS28740

WIRING DIAGRAM

YFM5FGY/YFM5FGPY/ YFM7FGY/YFM7FGPY 2009

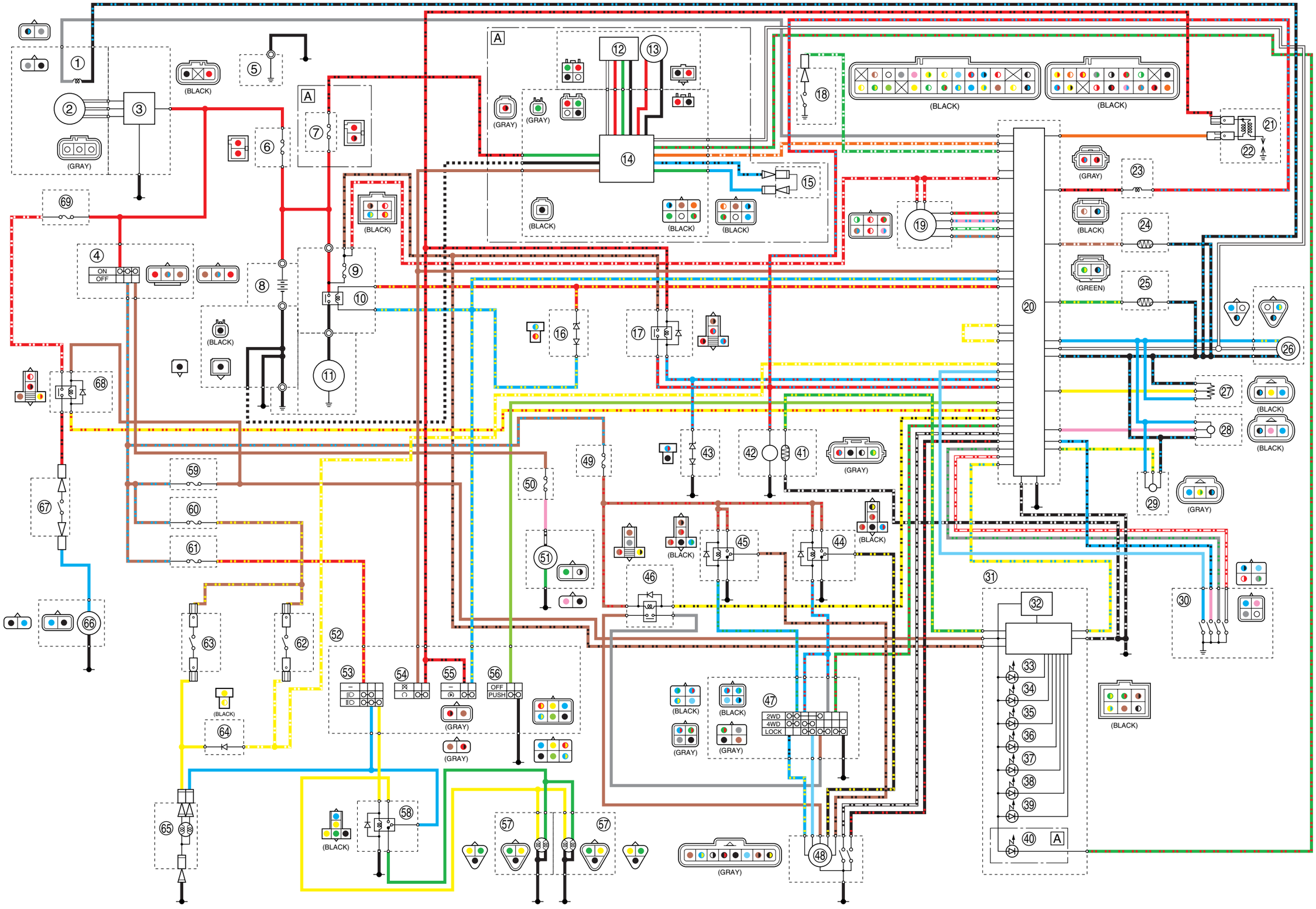
1. Crankshaft position sensor
2. AC magneto
3. Rectifier/regulator
4. Main switch
5. Frame ground
6. Main fuse
7. EPS fuse
8. Battery
9. Fuel injection system fuse
10. Starter relay
11. Starter motor
12. EPS torque sensor
13. EPS motor
14. EPS (electric power steering) control unit
15. EPS self-diagnosis signal connectors
16. Diode 1
17. Fuel injection system relay
18. Reverse switch
19. ISC (idle speed control) unit
20. ECU (engine control unit)
21. Ignition coil
22. Spark plug
23. Fuel injector
24. Intake air temperature sensor
25. Coolant temperature sensor
26. Speed sensor
27. TPS (throttle position sensor)
28. Intake air pressure sensor
29. Lean angle sensor
30. Gear position switch
31. Meter assembly
32. Multifunction meter
33. Engine trouble warning light
34. Coolant temperature warning light
35. Park indicator light
36. Reverse indicator light
37. Neutral indicator light
38. High-range indicator light
39. Low-range indicator light
40. EPS warning light
41. Fuel sender
42. Fuel pump
43. Diode 2
44. Four-wheel-drive motor relay 1
45. Four-wheel-drive motor relay 2
46. Four-wheel-drive motor relay 3
47. On-command four-wheel-drive motor switch and differential lock switch
48. Differential motor
49. Four-wheel-drive motor fuse
50. Auxiliary DC jack fuse
51. Auxiliary DC jack
52. Left handlebar switch
53. Light switch
54. Engine stop switch
55. Start switch
56. Override switch
57. Headlight
58. Headlight relay
59. Ignition fuse
60. Signaling system fuse
61. Headlight fuse
62. Rear brake light switch
63. Front brake light switch
64. Diode 3
65. Tail/brake light
66. Radiator fan motor
67. Radiator fan motor circuit breaker
68. Radiator fan motor relay
69. Radiator fan motor fuse

A. YFM5FGPY/YFM7FGPY only

EAS28750

COLOR CODE

B	Black
Br	Brown
G	Green
Gy	Gray
L	Blue
Lg	Light green
O	Orange
P	Pink
R	Red
Sb	Sky blue
W	White
Y	Yellow
B/L	Black/Blue
B/R	Black/Red
B/W	Black/White
B/Y	Black/Yellow
Br/B	Brown/Black
Br/L	Brown/Blue
Br/R	Brown/Red
Br/W	Brown/White
Br/Y	Brown/Yellow
G/R	Green/Red
G/W	Green/White
G/Y	Green/Yellow
Gy/G	Gray/Green
L/B	Blue/Black
L/G	Blue/Green
L/R	Blue/Red
L/Y	Blue/Yellow
O/W	Orange/White
P/L	Pink/Blue
R/B	Red/Black
R/G	Red/Green
R/L	Red/Blue
R/W	Red/White
R/Y	Red/Yellow
W/B	White/Black
W/G	White/Green
W/R	White/Red
Y/B	Yellow/Black
Y/G	Yellow/Green
Y/L	Yellow/Blue
Y/R	Yellow/Red
Y/W	Yellow/White

YAMAHA MOTOR CO., LTD.
2500 SHINGAI IWATA SHIZUOKA JAPAN

YFM5FGY/YFM5FGPY/YFM7FGY/YFM7FGPY 2009 WIRING DIAGRAM