ETON America

2011 VIPER SILVER SERIES

SERVICE MANUAL

Covers:

2011 Viper 90R Silver

VIPER 90R
SERVICE MANUAL

IMPORTANT

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

E-TON POWER TECH CO., Ltd. is continually striving to improve all its models. Modifications and significant changes in specifications or procedures will be forwarded to all authorized E-TON dealers and will appear in future editions of this manual where applicable.

TIP

Designs and specifications are subject to change without notice.

IMPORTANT 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.

* Product and specifications are subject to change without notice.

HOW TO USE THIS MANUAL

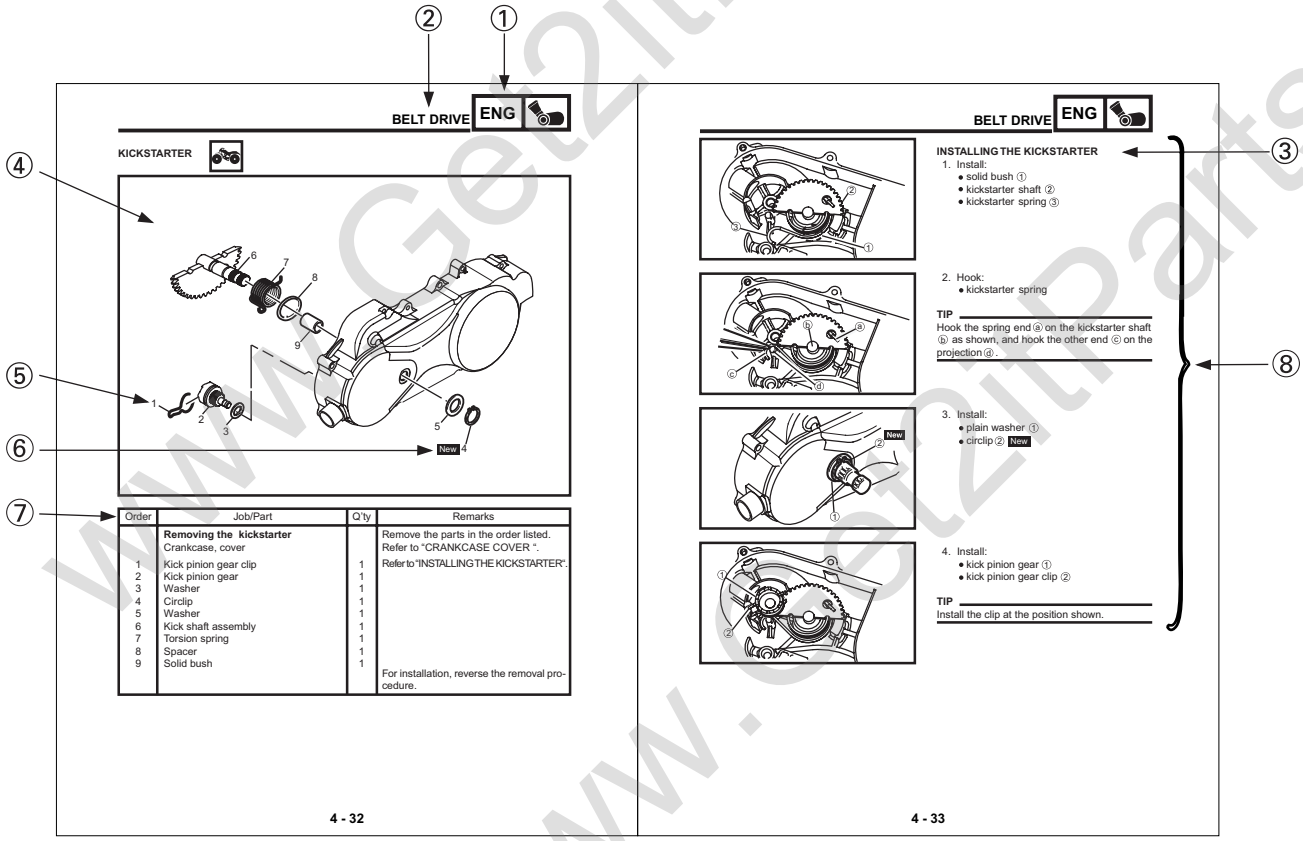
MANUAL ORGANIZATION

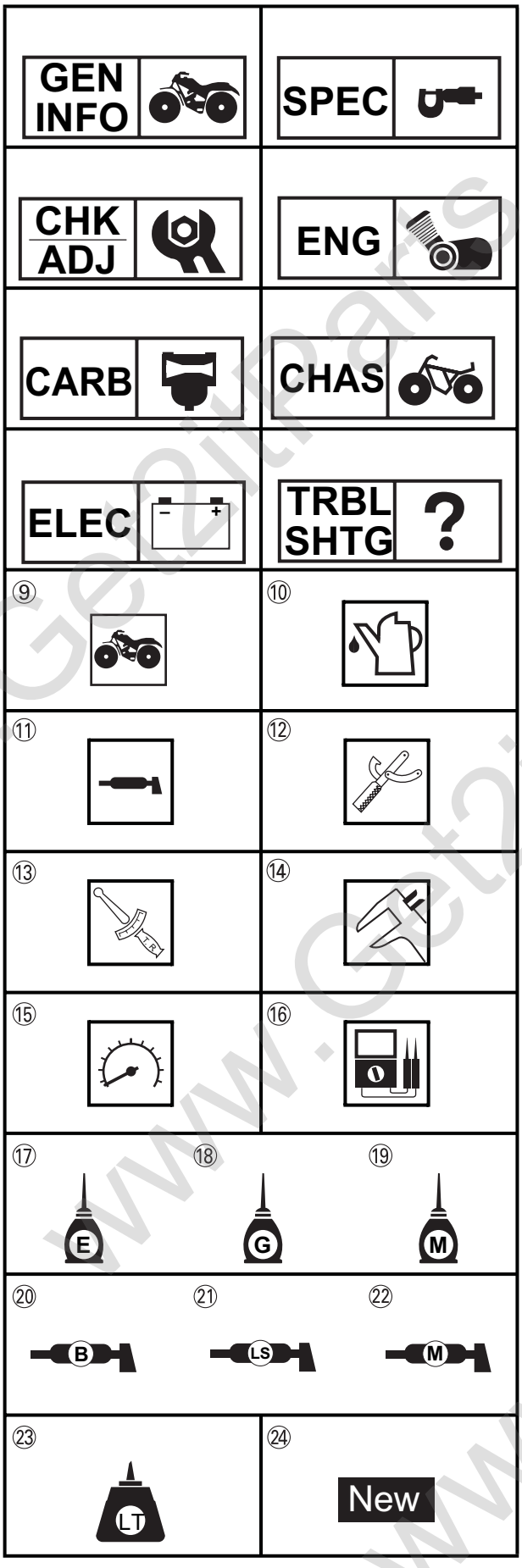
This manual consists of chapters for the main categories of subjects. (See “symbols”)
1st title ①: This is the title of the chapter with its symbol in the upper right corner of each page.
2nd title ②: This title indicates the section of the chapter and only appears on the first page of each section. It is located in the upper left corner of the page.
3rd title ③: This title indicates a sub-section that is followed by step-by-step procedures accompanied by corresponding illustrations.

EXPLODED DIAGRAMS

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

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





SYMBOLS

The following symbols are not relevant to every machine.

Symbols to indicate the subject of each chapter.

General information
Specifications
Periodic checks and adjustments
Engine
Carburetor
Chassis
Electrical
Troubleshooting

Symbols ⑨ to ⑯ indicate the following.

⑨ Serviceable with engine mounted
⑩ Filling fluid
⑪ Lubricant
⑫ Special tool
⑬ Torque
⑭ Wear limit, clearance
⑮ Engine speed
⑯ Electrical data (Ω, V, A)

Symbols ⑰ to ㉒ in the exploded diagrams indicate the types of lubricants and lubrication points.

⑰ Apply engine oil
⑱ Apply gear oil
⑲ Apply molybdenum disulfide oil
⑳ Apply wheel bearing grease
㉑ Apply lithium-soap-based grease
㉒ Apply molybdenum disulfide grease

Symbols ㉓ to ㉔ in the exploded diagrams indicate where to apply a locking agent ㉓ and when to install a new part ㉔.

㉓ Apply the locking agent (LOCTITE®)
㉔ Replace

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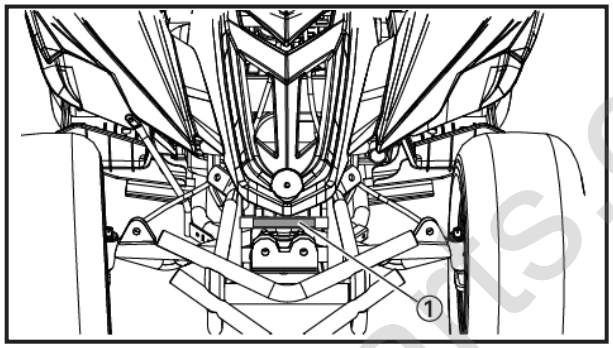
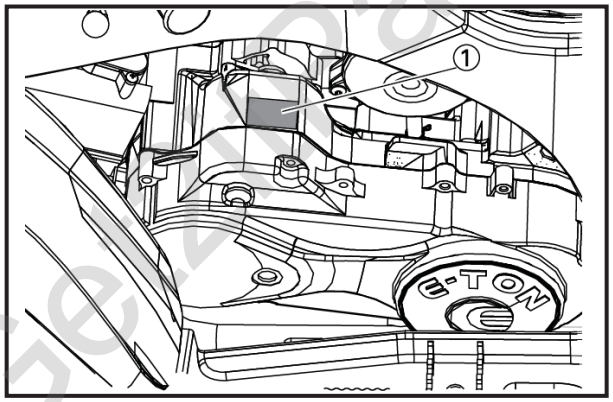


GENERAL INFORMATION

MACHINE IDENTIFICATION

VEHICLE IDENTIFICATION NUMBER

The vehicle identification number ① is stamped into the left side of the frame.

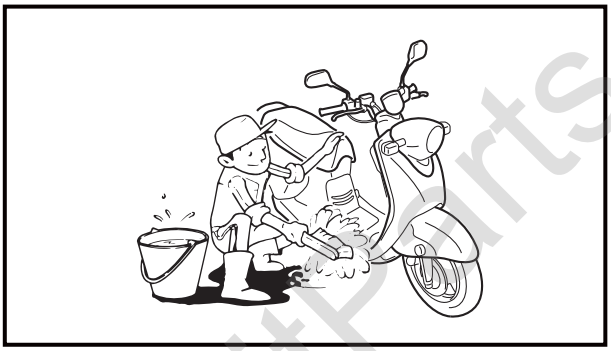


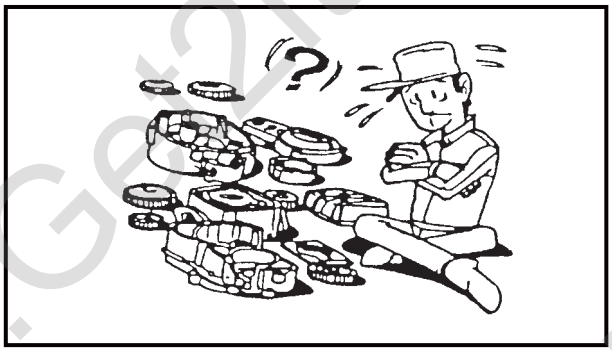
ENGINE SERIAL NUMBER

The engine serial number ① is stamped on the engine.

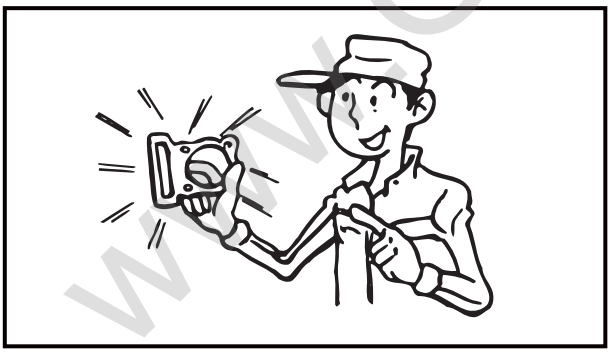
IMPORTANT INFORMATION

PREPARATION FOR REMOVAL AND DISASSEMBLY





1. Before removal and disassembly , remove all dirt, mud, dust and foreign material.
2. Use only the proper tools and cleaning equipment.
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.

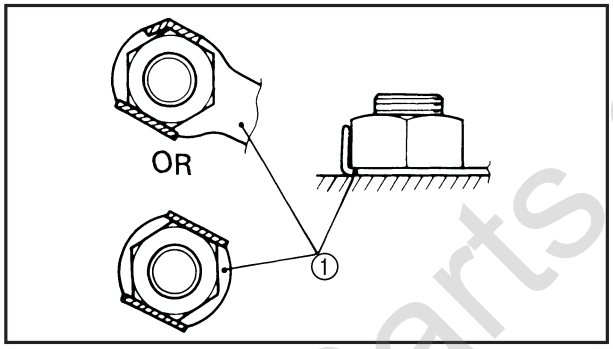


REPLACEMENT PARTS

1. Use only genuine E-TON parts for all replacements.

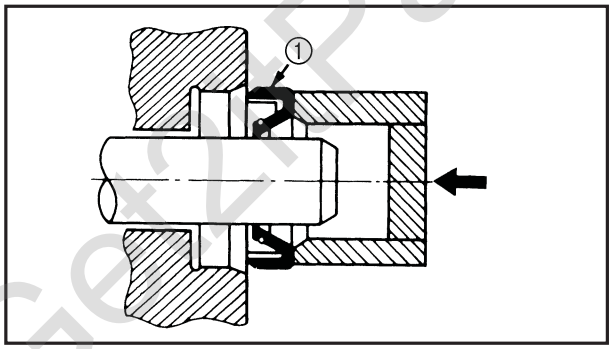
GASKETS, OIL SEALS AND O-RINGS

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.



LOCK WASHERS/PLATES AND COTTER PINS

After removal, replace all lock washers/plates 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.



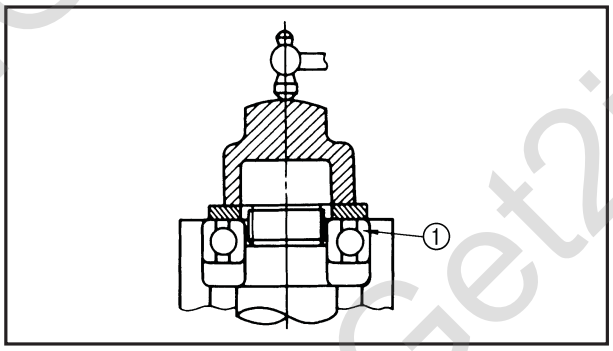
BEARINGS AND OIL SEALS

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

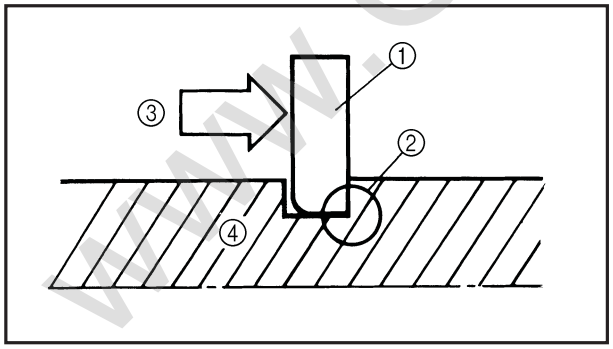
① Oil seal

NOTICE

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



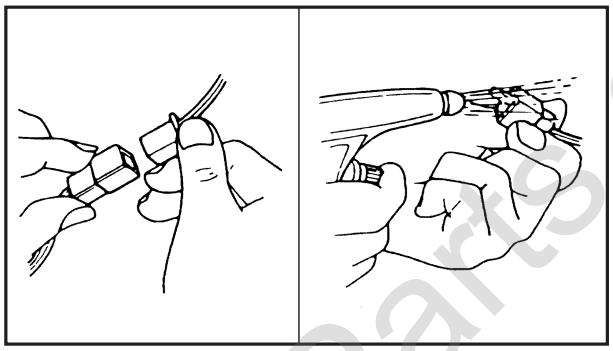
① Bearing



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.

④ Shaft

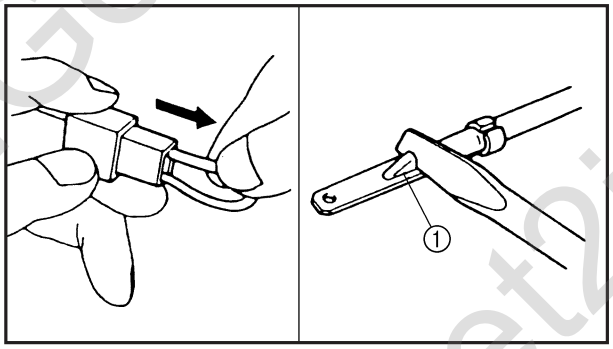


CHECKING THE CONNECTIONS

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.

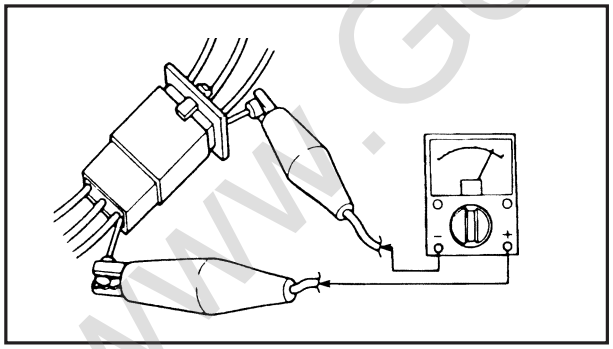
TIP

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

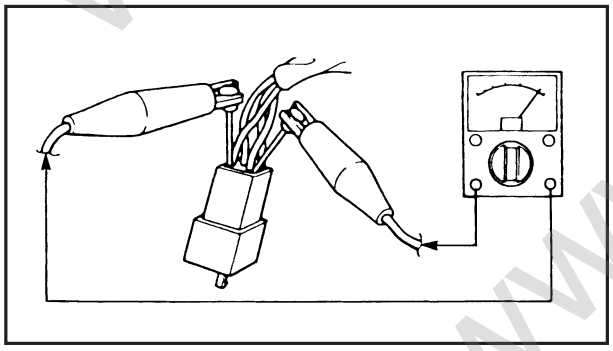
4. Connect:
   - lead
   - coupler
   - connector

TIP

Make sure all connections are tight.



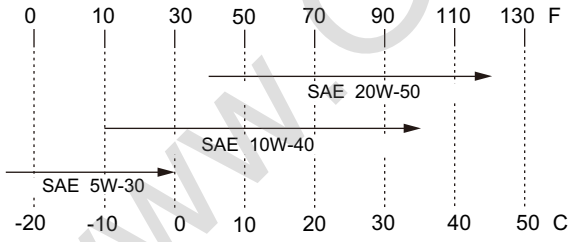
5. Check:
   - continuity (with the pocket tester)



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.

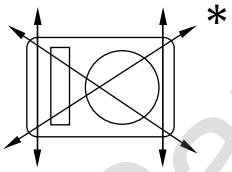
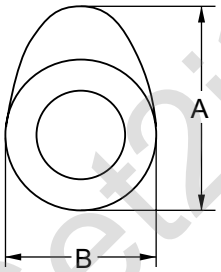
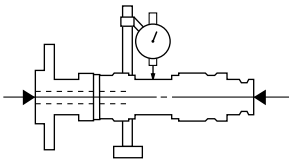
GENERAL SPECIFICATIONS

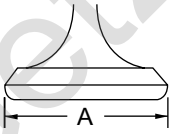
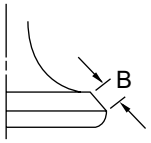
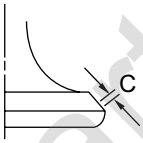
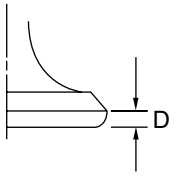
Item	Standard
Model code	Virper 90
Dimensions	
Overall length	1,500 mm (59.1 in)
Overall width	850 mm (33.5 in)
Overall height	900 mm (35.4 in)
Seat height	680 mm (26.8 in)
Wheelbase	930 mm (36.6 in)
Minimum ground clearance	120 mm (4.7 in)
Minimum turning radius	3,000 mm (118.1in)
Basic weight	
With oil and full fuel tank	113 kg (249.12 lb)
Engine	
Engine type	Air cooled 4-stroke, SOHC
Cylinder arrangement	Single cylinder
Displacement	88 cm^3 (5.37 cu.in)
Bore x stroke	47.0 x 51.0 mm (1.85 x 2.01 in)
Compression ratio	10.2 : 1
Standard compression pressure (at sea level)	1250 kPa (12.5 kg/cm^2, 181.3 psi) at 1,000r/min
Starting system	Electric starter & kick starter
Lubrication system	Wet sump
Oil type or grade	
Engine oil	SAE5W-30 or SAE10W-40 or SAE20W-50 
Final transmission oil	SAE 80API “GL-4” Hypoid gear oil
Oil capacity	
Engine oil	
Periodic oil change	0.75 L (0.66 Imp qt, 0.80 US qt)
Total amount	0.80 L (0.70 Imp qt, 0.85 US qt)
Final transmission oil	
Total amount	0.30 L (0.27 Imp qt, 0.32 US qt)
Air filter	Wet type element

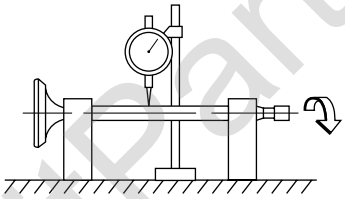
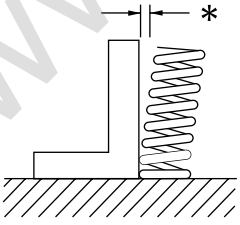
Item		Standard
Fuel		
Type		Unleaded gasoline 92 octane
Fuel tank capacity	plastic	4.5 L (0.99 Imp gal, 1.19 US gal)
	Iron	3.6 L (0.79 Imp gal, 0.95 US gal)
Fuel reserve amount	plastic	1.0 L (0.22 Imp gal, 0.26 US gal)
	Iron	0.5 L (0.11 Imp gal, 0.13 US gal)
Carburetor		
Type/quantity		SVR 22-1D x 1
Manufacturer		TK
Spark plug		
Type/manufacturer		NGK/CR7HSA
Spark plug gap		0.6 ~ 0.7 mm (0.024 ~ 0.028 in)
Clutch type		Dry, centrifugal automatic
Transmission		
Primary reduction system		V-belt
Primary reduction ratio		2.47-0.61:1
Secondary reduction system		Spur
Secondary reduction ratio		41/15 × 45/13 (9.46)
Third reduction system		Chain drive
Third reduction ratio		28/13(2.154)
Transmission type		V-belt automatic
Chassis		
Frame type		Steel tube frame
Caster angle		8°00’
Camber angle		1°00’
Kingpin angle		10.3°00’
Trail		28.6 mm (1.13 in)
Tread (STD)	front	702 mm (27.64 in)
	rear	688 mm (27.10 in)
Toe-in (with tires touching the ground)		10 mm (0.40 in)
Tire		
Type		Tubeless
Size	front	AT18 x 7-8
	rear	AT18 x 9-8
Manufacturer	front	MAXXIS
	rear	MAXXIS
Type	front	M939
	rear	M940
Tire pressure (cold tire)		
Maximum load*		70.0 kg (154.32 lb)
Off-road riding	front	23 ~ 28 kPa (0.23 ~ 0.28 kgf/cm^2, 3.3 ~ 4.1 psi)
	rear	23 ~ 28 kPa (0.23 ~ 0.28 kgf/cm^2, 3.3 ~ 4.1 psi)
*Load in total weight of rider and accessories		

Item		Standard
Brake		
Front brake	type	Drum brake
	operation	Right hand operation
Rear brake	type	Single disc brake
	operation	Left hand operation
Suspension		
Front suspension		Single A-arm / Independent
Rear suspension		Swing arm
Shock absorber		
Front shock absorber		Coil spring/oil damper
Rear shock absorber		Coil spring/oil damper
Wheel travel		
Front wheel travel		50 mm (1.97 in)
Rear wheel travel		100 mm (3.93 in)
Electrical		
Ignition system		AC-CDI
Generator system		AC magneto
Battery type		Lead-Acid
Battery capacity		12 V 4.0 Ah

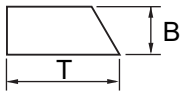
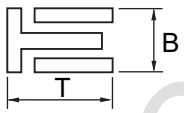
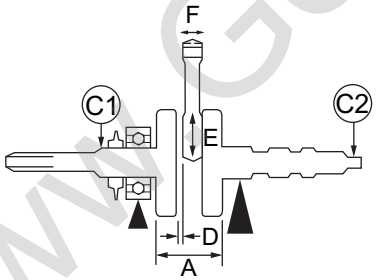
ENGINE SPECIFICATIONS

Item	Standard	Limit
Cylinder head		
Warp limit ∗ 	7.00 ~ 7.40 cm^3 (0.43 ~ 0.45 cu.in)	0.05 mm (0.002 in)
Cylinder		
Bore size	47.000 mm (1.8504 in)	47.10 mm (1.8543 in)
Taper limit	----	0.05 mm (0.002 in)
Maximum out-of-round	----	0.01 mm (0.0004 in)
Camshaft		
Drive method	Chain drive (Left)	----
Cam dimensions 		
Intake “A”	25.683 ~ 25.843 mm (1.0111 ~ 1.0174 in)	25.583 mm (1.0072 in)
“B”	20.985 ~ 21.015 mm (0.8262 ~ 0.8274 in)	20.886 mm (0.8223 in)
Exhaust “A”	25.525 ~ 25.685 mm (1.0049 ~ 1.0112 in)	25.425 mm (1.0010 in)
“B”	20.985 ~ 21.015 mm (0.8262 ~ 0.8274 in)	20.886 mm (0.8223 in)
Camshaft runout limit 	----	0.03 mm (0.0012 in)
Timing chain		
Timing chain type/No. of links	KMC 92 RH 2005 / 86	----
Timing chain adjustment method	Automatic	----

Item		Standard	Limit
Rocker arm/rocker arm shaft			
Rocker arm inside diameter		10.000 ~ 10.015 mm (0.3937 ~ 0.3943 in)	10.100 mm (0.3976 in)
Rocker arm shaft outside diameter		9.972 ~ 9.987 mm (0.3926 ~ 0.3932 in)	9.910 mm (0.3902 in)
Rocker-arm-to-rocker-arm-shaft clearance		0.013 ~ 0.043 mm (0.0005 ~ 0.0017 in)	----
Valve, valve seat, valve guide			
Valve clearance (cold)	IN	0.07 ~ 0.10 mm (0.003 ~ 0.004 in)	----
	EX	0.07 ~ 0.10 mm (0.003 ~ 0.004 in)	----
Valve dimensions			
 Head Diameter	 Face Width	 Seat Width	 Margin Thickness
"A" head diameter	IN	20.9 ~ 21.1 mm (0.8228~ 0.8307 in)	----
	EX	18.9 ~ 19.1 mm (0.7441~ 0.7520 in)	----
"B" face width	IN	1.50 ~ 1.80 mm (0.0591~ 0.0709 in)	----
	EX	1.50 ~ 1.80 mm (0.0591~ 0.0709 in)	----
"C" seat width	IN	0.8 ~ 1.1 mm (0.0315 ~ 0.0433 in)	1.6 mm (0.0630 in)
	EX	0.8 ~ 1.1 mm (0.0315 ~ 0.0433 in)	1.6 mm (0.0630 in)
"D" margin thickness	IN	0.5 ~ 0.9 mm (0.0197 ~ 0.0354 in)	----
	EX	0.6 ~ 1.0 mm (0.0236 ~ 0.0394 in)	----
Stem outside diameter	IN	4.975 ~ 4.990 mm (0.1959 ~ 0.1965 in)	4.900 mm (0.1930 in)
	EX	4.955 ~ 4.970 mm (0.1951~ 0.1957 in)	4.900 mm (0.1930 in)
Guide inside diameter	IN	5.000 ~ 5.012 mm (0.1969 ~ 0.1973 in)	5.030 mm (0.1980 in)
	EX	5.000 ~ 5.012 mm (0.1969 ~ 0.1973 in)	5.030 mm (0.1980 in)

Item		Standard	Limit
Stem-to-guide clearance	IN	0.010 ~ 0.037 mm (0.0004 ~ 0.0015 in)	0.08 mm (0.0031 in)
	EX	0.025 ~ 0.052 mm (0.0010 ~ 0.0020 in)	0.10 mm (0.0039 in)
Stem runout limit		----	0.02 mm (0.0008 in)
			
Valve seat width	IN	0.8 ~ 1.1 mm (0.0315 ~ 0.0433 in)	1.6 mm (0.0630 in)
	EX	0.8 ~ 1.1 mm (0.0315 ~ 0.0433 in)	1.6 mm (0.0630 in)
Valve spring			
Inner spring			
Free length	IN	30.00 mm (1.18 in)	27.00 mm (1.06 in)
	EX	30.00 mm (1.18 in)	27.00 mm (1.06 in)
Compressed pressure (installed)	IN	39.14 ~ 47.77 N at 22.45 mm (3.99 ~ 4.87 kg, 8.80 ~ 10.74 lb at 0.884 in)	----
	EX	39.14 ~ 47.77 N at 22.45 mm (3.99 ~ 4.87 kg, 8.80 ~ 10.74 lb at 0.884 in)	----
Tilt limit *	IN		2.0°/1.1 mm (2.0°/0.04 in)
	EX		2.0°/1.1 mm (2.0°/0.04 in)
			
Direction of winding (top view)	IN	Counterclockwise	----
	EX	Counterclockwise	----
Outer spring			
Free length	IN	33.50 mm (1.32 in)	30.50 mm (1.20 in)
	EX	33.50 mm (1.32in)	30.50 mm (1.20 in)

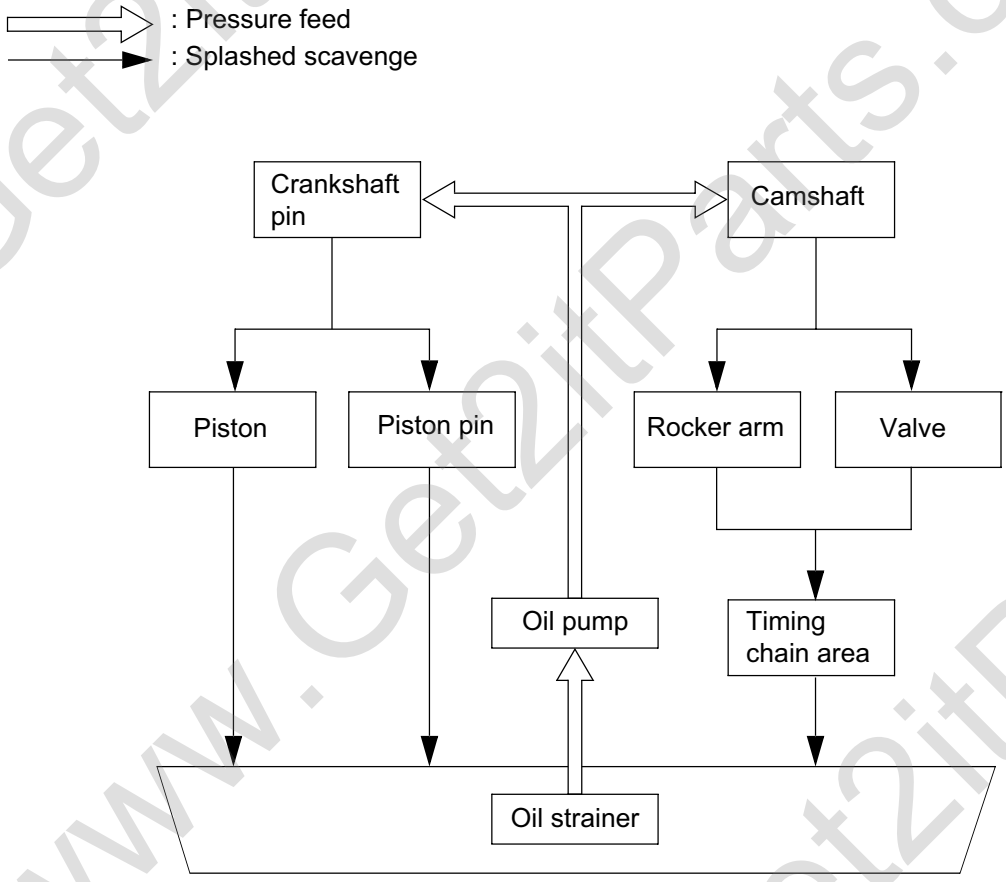
Item		Standard	Limit
Compressed pressure installed)	IN	73.75 ~ 90.03 N at 25.45 mm (7.52 ~ 9.18 kg, 16.57 ~ 20.23 lb at 1.00 in)	----
	EX	73.75 ~ 90.03 N at 25.45 mm (7.52 ~ 9.18 kg, 16.57 ~ 20.23 lb at 1.00 in)	----
Tilt limit *	IN		2.0 °/1.2 mm (2.0 °/0.05 in)
	EX		2.0°/1.2 mm (2.0°/0.05 in)
Direction of winding (top view)	IN	Counterclockwise	----
	EX	Counterclockwise	----
Piston			
Piston to cylinder clearance		0.010 ~ 0.040 mm (0.0004 ~ 0.0016 in)	0.10 mm (0.0039 in)
Piston size "D"		46.970 ~ 46.990 mm (1.8492 ~ 1.8500 in)	
Measuring point "H"		5.0 mm (0.20 in)	
Piston off-set		0.5 mm (0.02 in)	----
Piston off-set direction		Intake side	----
Piston pin bore inside diameter		13.002 ~ 13.008 mm (0.5119 ~ 0.5121 in)	13.040 mm (0.5134 in)
Piston pin outside diameter		12.996 ~ 13.000 mm (0.5117 ~ 0.5118 in)	12.960 mm (0.5102 in)

Item	Standard	Limit
Piston rings		
Top ring		
		
Type	Barrel	----
Dimensions (B × T)	1.0 × 2.1 mm (0.0394 × 0.0827in)	----
End gap (installed)	0.10 ~ 0.25 mm (0.0039~0.0098in)	0.45 mm (0.0177in)
Side clearance (installed)	0.015 ~0.055 mm (0.0006~0.0022in)	0.09 mm (0.0035in)
2nd ring		
		
Type	Taper	----
Dimensions (B × T)	1.0 × 2.0 mm (0.0394 × 0.0787in)	----
End gap (installed)	0.25 ~ 0.40 mm (0.0098~0.0157in)	0.55mm (0.0217in)
Side clearance	0.015 ~ 0.055 mm (0.0006~0.0022in)	0.09mm (0.0035in)
Oil ring		
		
Dimensions (B × T)	2.0 × 1.9 mm (0.0787 × 0.0748 in)	----
End gap (installed)	0.20 ~ 0.70 mm (0.0079~0.0276in)	----
Crankshaft		
		
Crank width “A”	44.10 ~ 44.15mm (1.7362~1.7382in)	----
Runout limit C1	----	0.04 mm (0.0016in)
C2	----	0.04 mm (0.0016in)
Big end side clearance “D”	0.10~0.30mm (0.0039~0.0118in)	0.50 mm (0.0197in)
Big end radial clearance “E”	0.007~0.015mm (0.0003~0.0006in)	----
Small end free play"F"	0.80~1.00mm (0.0315~0.0394in)	1.50 mm (0.0591in)

Item		Standard	Limit
Clutch			
Clutch type		Automatic centrifugal	----
Clutch shoe thickness		4.0 mm (0.1575 in)	2.0 mm (0.078 in)
Clutch shoe spring free length		30.5 mm	----
Clutch housing inside diameter		107.0 ~107.2 mm (4.21 ~4.22 in)	107.5 mm (4.23in)
Compression spring free length		87.9 mm (3.46 in)	----
Weight outside diameter		14.9 ~ 15.1 mm (0.587 ~0.594 in)	
Clutch-in revolution		2110±140r/min	
Clutch-stall revolution		2350±150 r/min	
V-belt			
V-belt width		18.0 mm (0.709 in)	17.0 mm (0.669in)
Transmission			
Transmission type			
Primary reduction system		V-belt automatic	
Primary reduction ratio		2.47~0.61:1	
Secondary reduction system		Spur gear	
Secondary reduction ratio		41/15 × 45/13(9.462)	
Max. main axle runout			0.08 mm (0.0031in)
Max. drive axle runout			0.08 mm (0.0031in)
Carburetors			
I. D. mark		A26-00	----
Main jet	(M.J)	#100	----
Air jet	(A.J)	1.0	----
Jet needle	(J.N)	#4T12 1/1	----
Needle jet	(N.J)	2.090 H5.5	----
Pilot jet	(P.J)	#32	----
Valve seat size	(V.S)	1.6	----
Fuel level	(F.L)	5.0 ~ 6.0 mm (0.20 ~ 0.24 in) Below the float chamber mating Surface	----
Engine idle speed		1,600 ~ 1,800 r/min	----

Item	Standard	Limit
Oil pump		
Oil pump type	Trochoid	----
Inner-rotor-to-outer-rotor-tip clearance	0.04 ~ 0.12mm (0.0016 ~ 0.0047 in)	0.15 mm (0.006 in)
Outer-rotor-to-oil-pump-housing clearance	0.14 ~ 0.21 mm (0.0055 ~ 0.0083 in)	0.28 mm (0.0110 in)
Oil-pump-housing-to-inner-rotor-and-outer-rotor clearance	0.06 ~ 0.11 mm (0.0024 ~ 0.0043 in)	0.20 mm (0.0079 in)

Lubrication chart



CHASSIS SPECIFICATIONS

Item		Standard	Limit
Front suspension			
Shock absorber travel		35 mm (1.38 in)	----
Optional spring		No	----
Rear suspension			
Shock absorber travel		40 mm (1.57 in)	----
Optional spring		No	----
Front wheel			
Type		Panel wheel	----
Rim size		8 x 5.5 AT	----
Rim material		Steel	----
Rim runout limit	radial	----	2.0 mm (0.08 in)
	lateral	----	2.0 mm (0.08 in)
Rear wheel			
Type		Panel wheel	----
Rim size		8 x 7 AT	----
Rim material		Steel	----
Rim runout limit	radial	----	2.0 mm (0.08 in)
	lateral	----	2.0 mm (0.08 in)
Drive chain			
Type/ manufacturer		#520/ KMC	
Link quantity		66	
Drive chain slack		10 mm~25 mm (0.39 in~0.98 in)	
Front drum brake			
Type		Leading, trailing	----
Brake drum inside diameter		85.0 mm (3.35 in)	86.0 mm (3.39 in)
Lining thickness		3.0 mm (0.12 in)	1.5 mm (0.06 in)
Shoe spring free length		46.3 mm (1.82 in)	----

Item		Standard	Limit
Rear disc brake			
Type		Single	----
Disc outside diameter × thickness		190.0 × 3.5 mm (7.48 × 0.11 in)	----
Brake disk maximum deflection			0.15 mm (0.006 in)
Pad thickness inner		3.7 mm (0.15 in)	----
Pad thickness outer		3.7 mm (0.15 in)	----
Master cylinder inside diameter		12.7 mm (0.50 in)	----
Caliper cylinder inside diameter		30.23 mm (1.19 in)	----
Brake fluid type		DOT 4	----
Brake lever			
Brake lever free play (pivot)	front	4.0 ~ 6.0 mm (0.16 ~ 0.24 in)	----
	rear	0 ~ 1.5 mm (0 ~ 0.06 in)	----
Throttle lever free play		1.0 ~ 3.0 mm (0.04 ~ 0.12 in)	----
Parking brake cable end length		53.0 ~ 57.0 mm (2.09 ~ 2.24 in)	----

ELECTRICAL SPECIFICATIONS

Item	Standard	Limit
Voltage	12 V	----
Ignition system		
Ignition timing (B.T.D.C.)	13.0 ° ± 1 ° /1,700 r/min	----
Advanced timing (B.T.D.C.)	28.5 ° ± 1 ° /4,000 r/min	----
Advancer type	Electrical (digital)	----
C.D.I.		
Magneto model/manufacturer	C1120-A26-0000/SY	----
Pickup coil resistance/color	120 ~ 180 Ω at 20 °C (68 °F)/ White/Red—Black	----
Source coil resistance/color	480 ~ 640 Ω at 20 °C (68 °F)/ Black/Red—Black	----
C.D.I. unit model/manufacturer	C0410-A26-2000/EYE	----
Ignition coil		
Model/manufacturer	C0510-A26-3000/SHIHLIN	----
Minimum spark gap	6 mm (0.24 in)	----
Primary winding resistance	0.19 ~ 0.23 Ω at 20 °C (68 °F)	----
Secondary winding resistance	2.79 ~ 3.41 kΩ at 20 °C (68 °F)	----
Spark plug cap		
Type	Resin	----
Resistance	5 k Ω	----
Charging system		
Type	A.C. magneto	----
Model/manufacturer	C1120-A26-0000/SY	----
Nominal output	14 V 23.8 W at 6,000 r/min	----
Charging coil resistance/color	0.547 ~ 0.716 Ω at 20 °C (68 °F)/ White—Black	----
Rectifier/regulator		
Regulator type	Semi conductor-short circuit	----
No-load regulated voltage (DC)	14.0 ~ 15.0 V	----
Model/manufacturer	C1600-B00-0000/SY	----
Capacity (DC)	10 A	----
Withstand voltage	500 V	----

Item	Standard	Limit
Electric starter system		
Type	Constant mesh	----
Starter motor		
Model/manufacturer	C1200-A26-9000/SY	----
Output	0.35 kW	----
Armature coil resistance	0.014 ~ 0.019 Ω at 20 °C (68 °F)	----
Brush overall length	7.0 mm (0.28 in)	3.5 mm (0.14 in)
Spring force	1.0 ~ 3.0 N (102~ 306gf, 3.60 ~ 10.80 oz)	----
Commutator diameter	22.0 mm (0.87 in)	19.5 mm (0.77in)
Mica undercut	1.6 mm (0.06 in)	----
Starter relay		
Model/manufacturer	C585A-LRA0-0000/SY	----
Model/manufacturer	150 A	----
Coil winding resistance	4.23 ~ 5.12 Ω at 20 °C (68 °F)	----
Circuit breakers		
Type	Fuse	----
Amperage for individual circuit		
Main fuse	7.0 A × 1	----

TIGHTENING TORQUES

ENGINE TIGHTENING TORQUES

Part to be tightened	Part name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m · kg	ft · lb	
Cover head cylinder	Bolt	M6	4	12	1.2	8.7	
Holder cam shaft	Nut	M7	4	15	1.5	11	
Spark plug	—	M10	1	11	1.1	8.0	
Cylinder head (Pipe assy, inlet)	Stud bolt	M6	2	9	0.9	6.5	
Cylinder head (Muffler pipe)	Stud bolt	M6	2	9	0.9	6.5	
Valve adjuster nut hex	Nut	M5	2	9	0.9	6.5	
Cylinder head(timing chain side)	Bolt	M6	2	12	1.2	8.7	
Timing chain tensioner(body)	Bolt	M6	2	12	1.2	8.7	
Timing chain tensioner(plug)	Bolt	M6	1	6	0.6	4.3	
Duct inlet and cover R side	Bolt	M6	2	12	1.2	8.7	
Duct inlet and shroud assy A and B	Screw	M5	2	2	0.2	1.4	
Shroud assy A and crank case, L	Bolt	M6	1	12	1.2	8.7	
Shroud assy A and B	Bolt	M6	1	2	0.2	1.4	
Shroud assy B and box tensioned lifter	Screw	M3	2	1	0.1	0.7	
Cylinder	Bolt	M6	1	12	1.2	8.7	
Stud bolt A	Stud bolt	M7	2	9	0.9	6.5	
Stud bolt B	Stud bolt	M7	2	9	0.9	6.5	
Cover L side	Bolt	M6	8	12	1.2	8.7	
Face assy, movable drive	Nut	M12	1	55	5.5	40	
Outer clutch nut	Nut	M10	1	40	4.0	30	
Motor start comp	Bolt	M6	2	12	1.2	8.7	
Fan comp cooling	Bolt	M6	4	12	1.2	8.7	
Flywheel comp	Nut	M12	1	55	5.5	40	
Stator comp	Bolt	M6	2	12	1.2	8.7	
Pulse	Bolt	M5	2	5	0.5	3.6	
Cover R side	Bolt	M6	8	12	1.2	8.7	
Gear oil pump driven	Nut	M6	1	12	1.2	8.7	
Pump assy oil	Bolt	M6	3	12	1.2	8.7	
Sprocket drive	Bolt	M6	2	10	1.0	7.2	
Gear oil drain bolt	Bolt	M8	1	15	1.5	11	
Cover mission	Bolt	M6	7	12	1.2	8.7	
Hole cap tap adjusting	Bolt	M30	1	8	0.8	5.8	
Crankcase R and L	Bolt	M6	1	12	1.2	8.7	
Air cleaner holder	Bolt	M6	3	12	1.2	8.7	
Pivot cam chain set	Bolt	M6	1	10	1.0	7.2	
Air filter	Bolt	M6	1	12	1.2	8.7	
Carburetor overflow drain screw	Screw	M6	1	1	0.1	0.7	
Carburetor pipe assy, inlet	Nut	M6	2	12	1.2	8.7	
Exhaust pipe	Nut	M6	2	13	1.3	9.4	
Muffler	Bolt	M8	1	25	2.5	18	
Spark arrester	Screw	M5	1	5	0.5	3.6	

CHASSIS TIGHTENING TORQUES

Part to be tightened	Thread size	Tightening torque			Remarks
		Nm	m · kg	ft · lb	
Engine lower stay and engine	M10	35	3.5	25.3	
Engine and frame	M10	35	3.5	25.3	
Engine lower stay and frame	M10	35	3.5	25.3	
Swingarm pivot shaft and frame	M14	75	7.5	54.2	
Rear shock absorber and frame	M10	35	3.5	25.3	
Rear shock absorber and swingarm	M10	35	3.5	25.3	
Front shock absorber and frame	M10	35	3.5	25.3	
Front shock absorber front arm	M10	35	3.5	25.3	
Steering stem and frame	M14	55	5.5	39.8	
Steering stem and tie-rod ball joint	M10	35	3.5	25.3	
Tie-rod locknut	M10	35	3.5	25.3	
Steering stem bushing and frame	M8	25	2.5	18.1	
Steering knuckle and tie-rod ball joint	M10	35	3.5	23.5	
Steering knuckle and front arm	M10	35	3.5	25.3	
Steering knuckle and front brake drum	M12	50	5.0	36.2	
Front wheel and front brake drum	M10	45	4.5	32.5	
Front brake camshaft and camshaft lever	M6	14	1.4	10.1	
Rear axle and rear axle nut	M28				See TIP.
Rear brake disc and disc bracket	M10	35	3.5	25.3	
Rear brake lever and handlebar holder	M6	14	1.4	10.1	
Parking brake adjusting bolt and locknut	M8	16	1.6	11.6	
Rear brake caliper and brake caliper bracket	M8	28	2.8	20.3	
Rear axle and wheel hub	M14	90	9.0	65.1	
Rear wheel and wheel hub	M10	45	4.5	32.5	
Handlebar holder and steering stem	M6	14	1.4	10.1	
Throttle lever and housing	M6	12	1.2	8.7	
Fuel tank and frame	M6	12	1.2	8.7	
Front fender and frame	M6	9	0.9	6.5	
Rear fender and frame	M6	9	0.9	6.5	
Rear carrier and frame	M8	25	2.5	18.1	
Parking brake case and caliper	M8	25	2.5	18.1	
Front bumper and frame	M8	25	2.5	18.1	
Footrest board and footrest bracket	M6	9	0.9	6.5	
Footrest bracket and frame	M8	22	2.2	15.9	
Driven sprocket and sprocket bracket	M10	35	3.5	25.3	
Parking brake lever and parking brake lever bracket	M6	14	1.4	10.1	

TIP

1. Before tightening the nuts, apply locking agent (LOCTITE®) to rear axle threads.
2. Tighten the inside nut to 60 Nm (6.0 m · kg, 43.4 ft · lb).
3. Tighten the outside nut to 170 Nm (17.0 m · kg, 123 ft · lb) while holding the inside nut.

HOW TO USE THE CONVERSION TABLE

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

Ex.

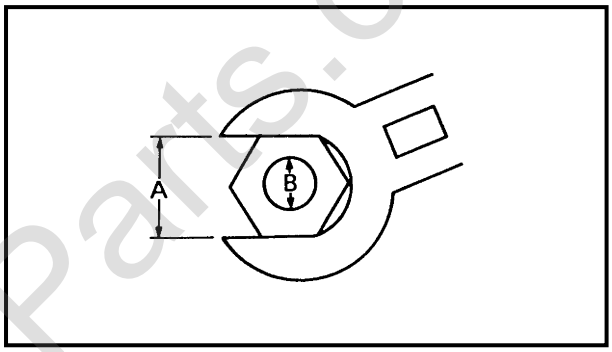
METRIC		MULTIPLIER		IMPERIAL
** mm	x	0.03937	=	** in
2 mm	x	0.03937	=	0.08 in

CONVERSION TABLE

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

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

LUBRICATION POINTS AND LUBRICANT TYPES

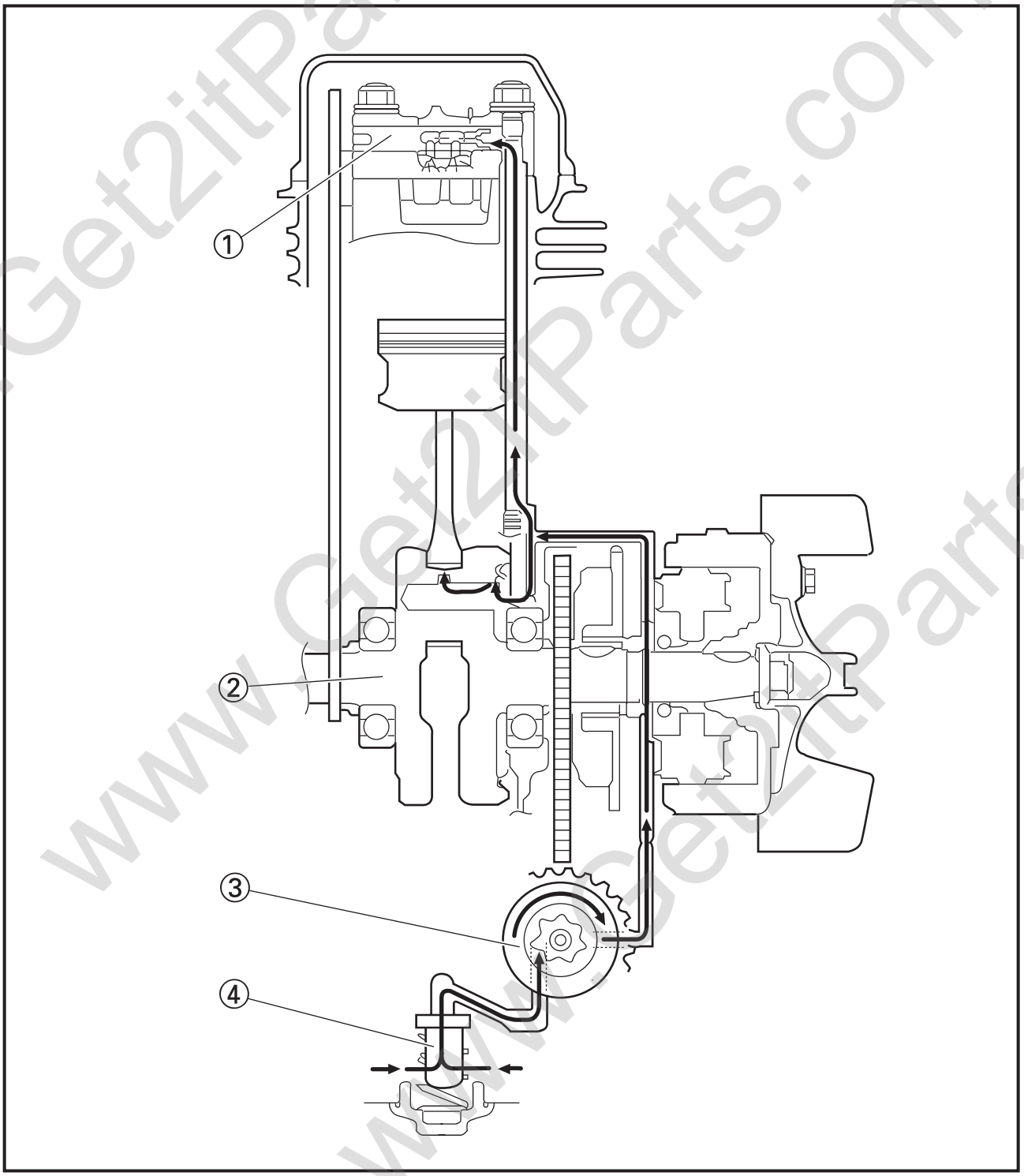
ENGINE

Lubrication Point	Lubricant
Oil seal lips	LS
O-ring (Except V-belt drive unit)	LS
Cylinder head tightening nut mounting surface	E
Cylinder head stud bolt thread	E
Cylinder head gasket dowel pin	E
Crankshaft pin outside surface	E
Connecting rod	E
Piston outside and ring groove	E
Piston pin outside surface	E
Crankshaft journal	E
Camshaft profile journal	M
Valve stem (IN, EX)	M
Valve stem seal	M
Valve stem end (IN, EX)	M
Valve lifter	E
Oil pump assembly inside	E
Oil pipe union bolt thread and surface	E
Gasket (Oil pump assembly)	LS
Idle gear 1 thrust surfaces	E
Idle gear 2	E
Drive shaft serration (Sprocket)	LS
Drive shaft taper roller bearing	LS
Transmission bearing	G
Secondary shaft bearing (right)	LS
Primary sheave oil seal	LS

Lubrication Point	Lubricant
Primary sheave inside, Collar, Solid bush,	
Secondary fixed inner surface	BEL-RAY asembly lube
Secondary sheave torque cam ditch	BEL-RAY asembly lube
Gasket (Cylinder head cover)	Sealant
Stopper guide (Cylinder head cover)	Sealant
Crankcase mating surfaces	Sealant
Oil pipe	Sealant
C.D.I. magneto lead grommet	Sealant

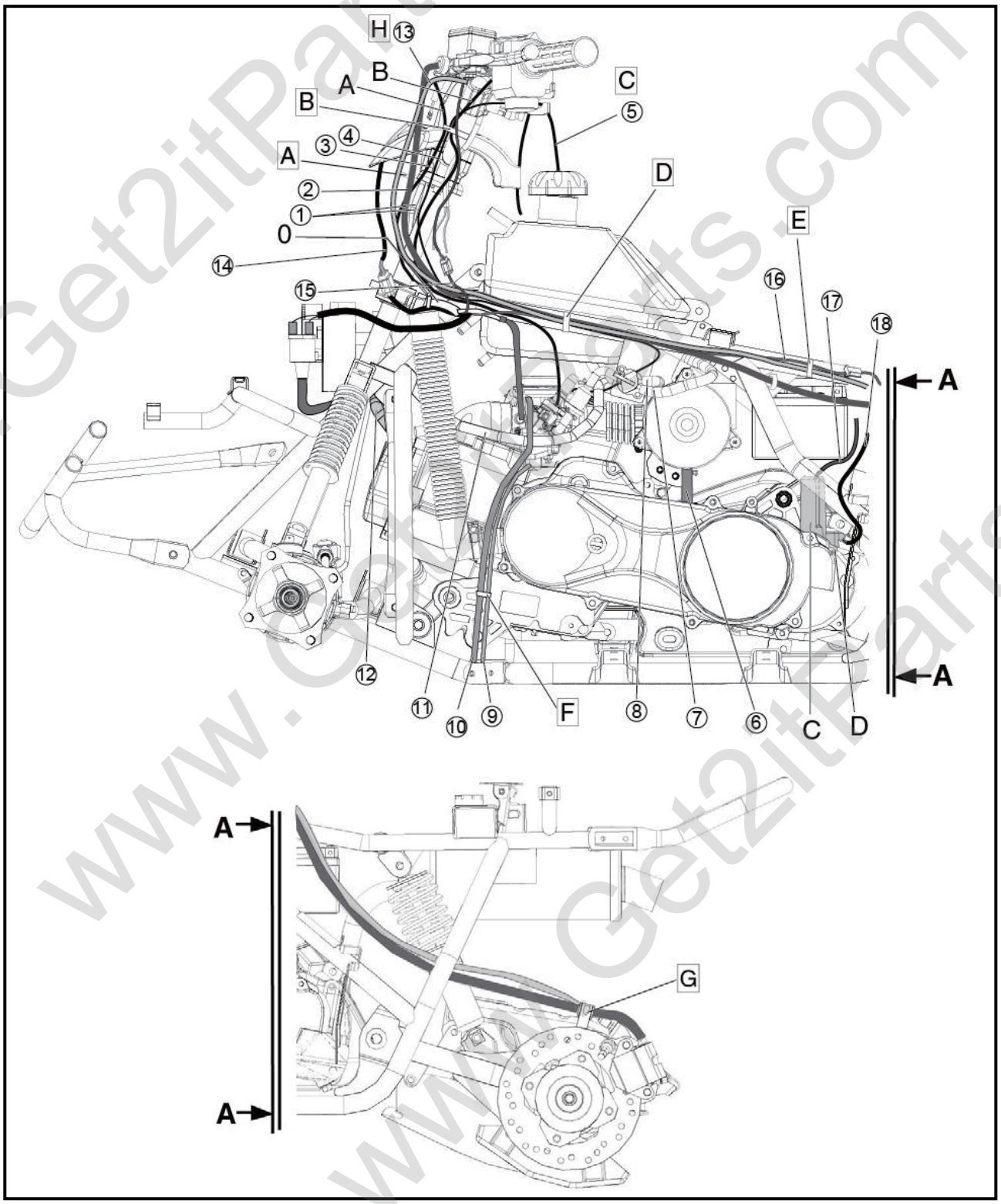
OIL FLOW DIAGRAMS

① Camshaft
② Crankshaft
③ Oil pump
④ Oil filter



CABLE ROUTING

① Front brake cables
② Rear brake hose
③ Throttle cable
④ Choke cable
⑤ Fuel tank breather hose
⑥ Air filter case check hose
⑦ Fuel hose
⑧ Fuel overflow
⑨ Throttle valve hose
⑩ Carburetor air vent hose
⑪ Oil catch hose
⑫ Crankcase breather hose
⑬ Parking brake cable
⑭ Fuel meter cable
⑮ Shift switch lead
⑯ Buzzer cable
⑰ Shift motor line
⑱ Shift sensor line
0 Wire harness
A Rear brake switch lead
B Handlebar switch lead



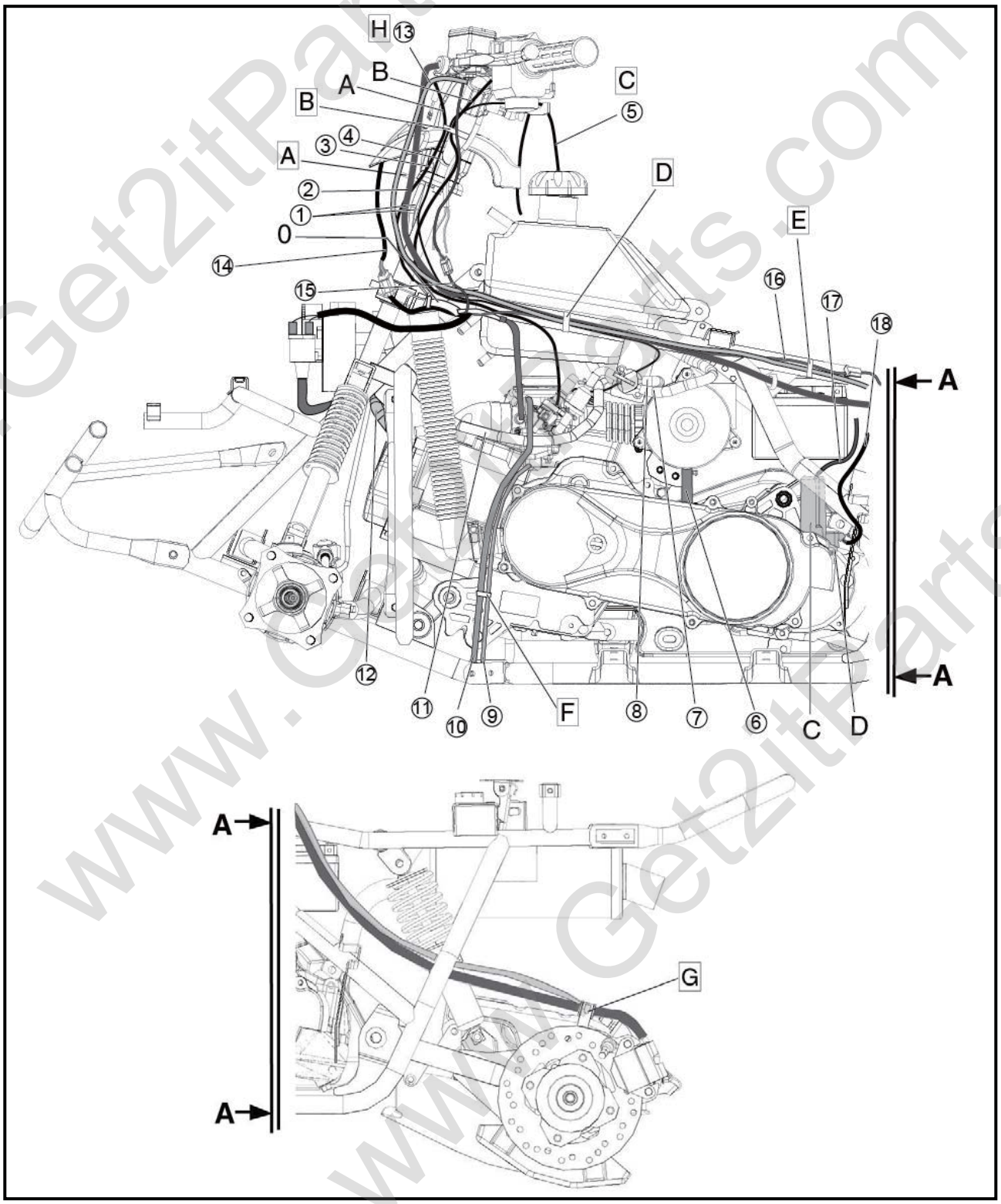
C Shift motor
D F-N-R shift switch

A Pass the front brake cables, throttle cable and choke cable through the hose guide.

B Fasten the choke cable, handlebar switch lead and rear brake switch lead with a plastic band.

C Insert the fuel tank breather hose into the hole in the handlebar cover.

D Fasten rear brake hose and throttle cable with a plastic band.

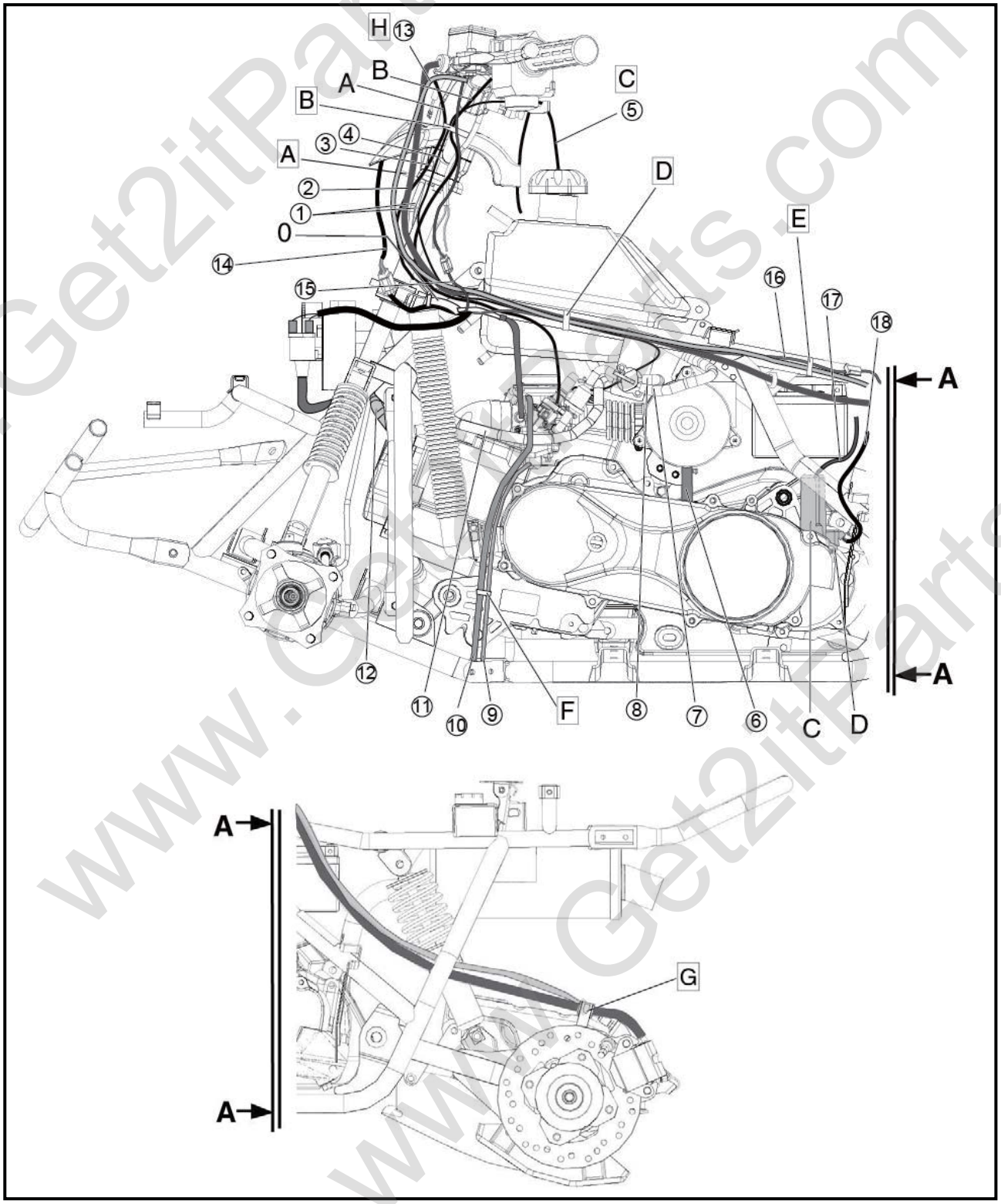


E Fasten rear brake hose with a plastic band.

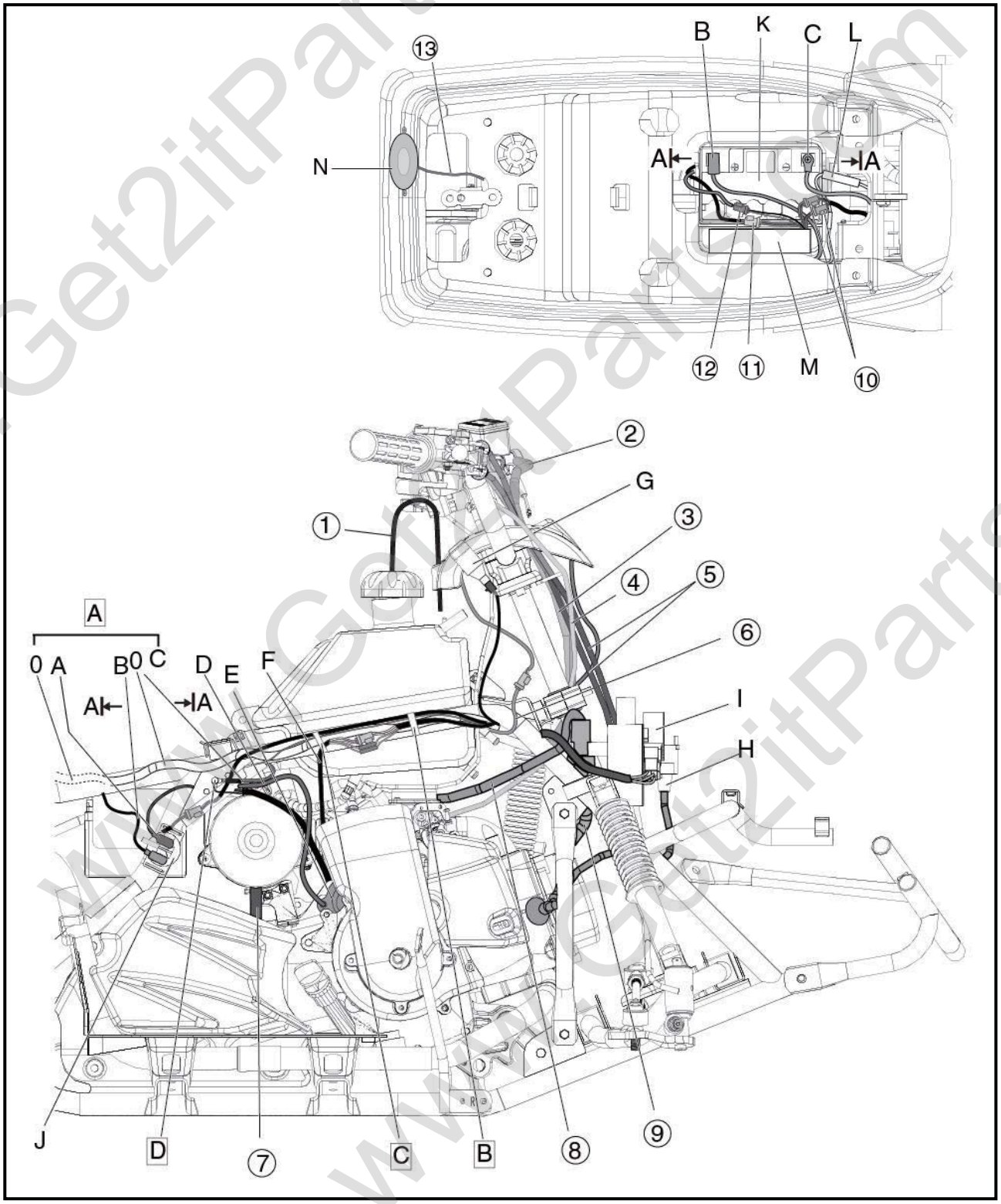
F Fasten the fuel overflow hose and carburetor air vent hose with a metal band. Be sure to not pinch the hose.

G Brake fuel tube with a clip.

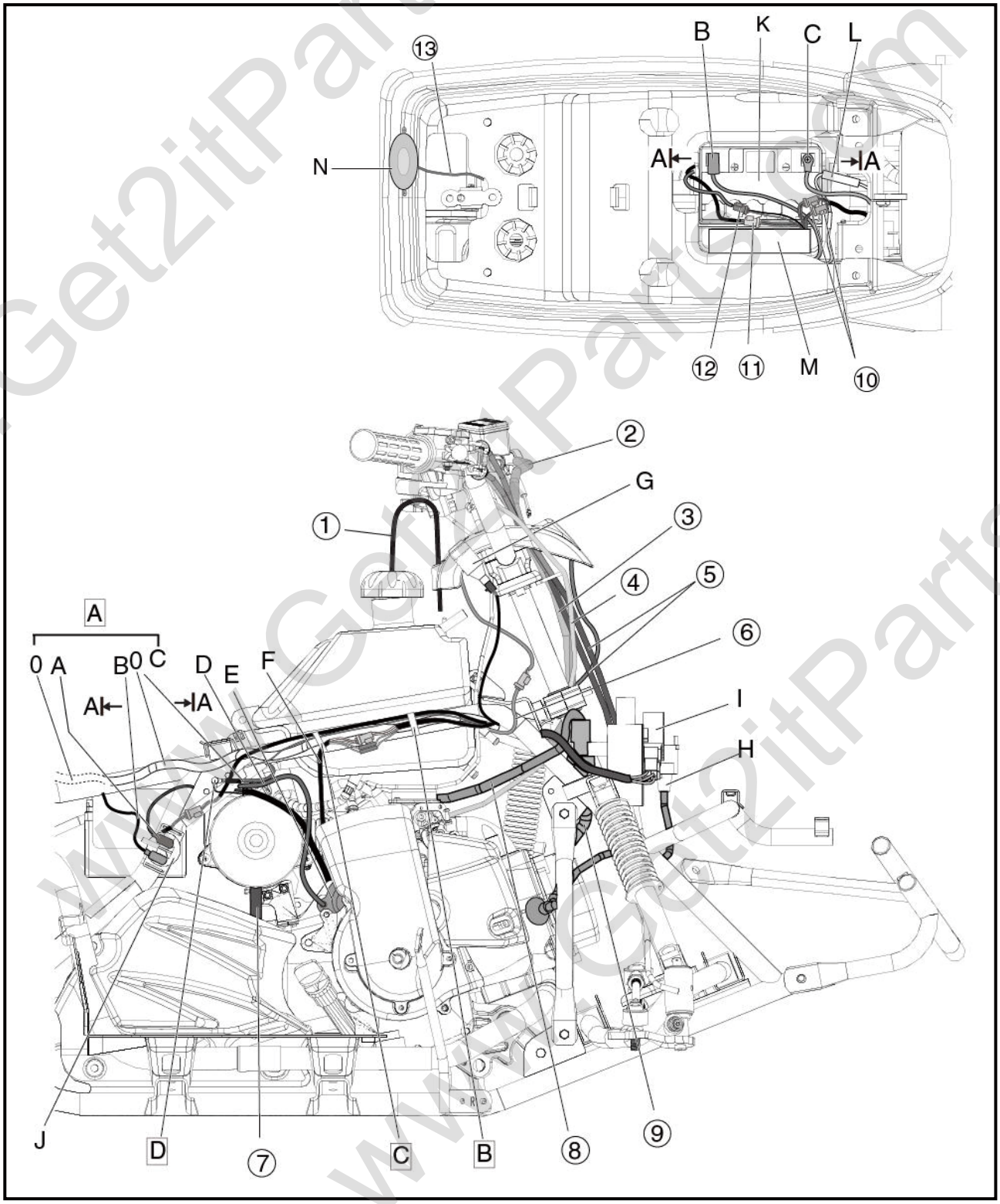
H Route the parking brake cable under the cross pipe and left of the steering column as shown in the illustration.



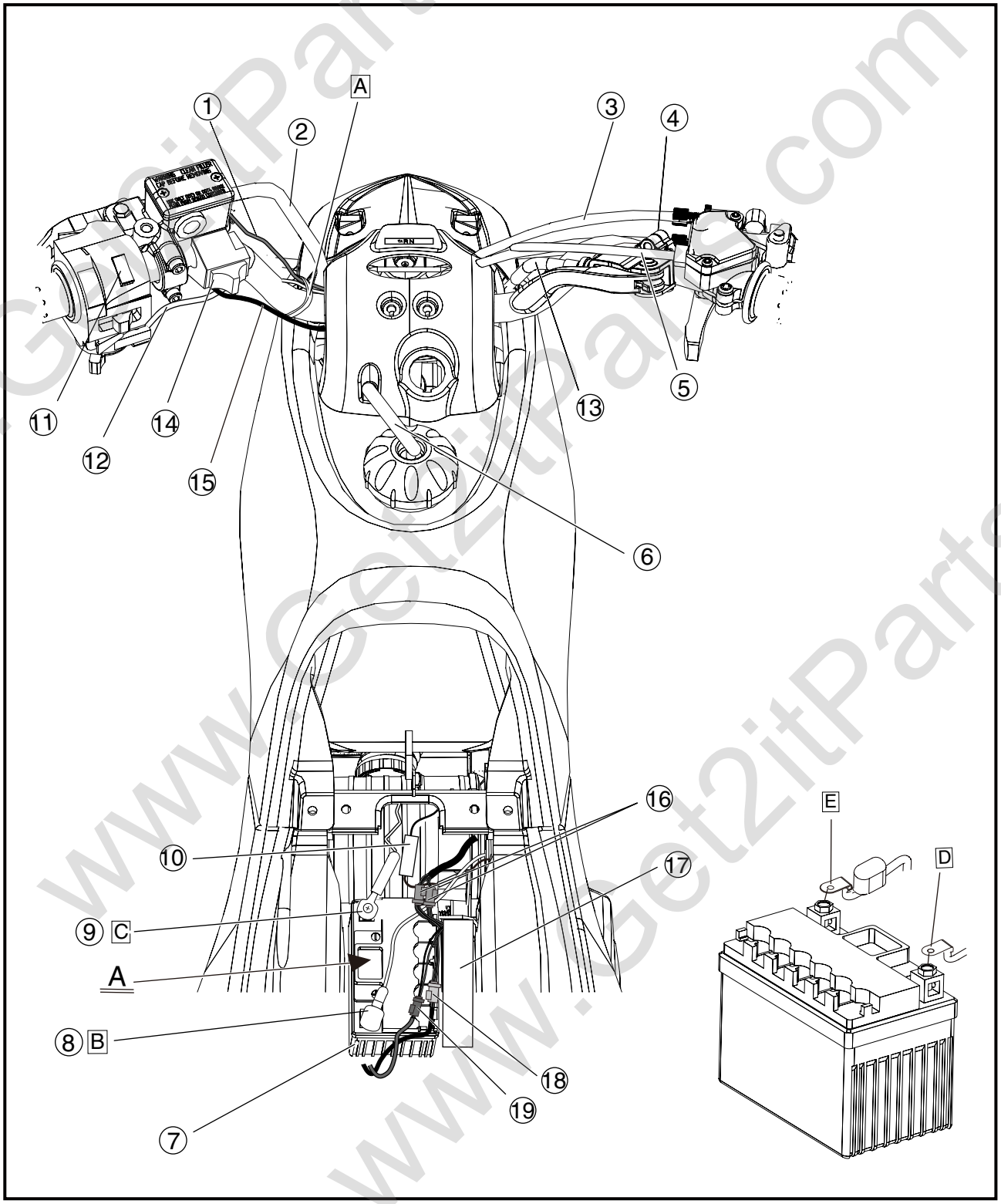
① Fuel drain hose
② Rear brake hose
③ Throttle cable
④ Parking brake cable
⑤ Front brake cables
⑥ Start relay cable
⑦ Air filter case check hose
⑧ Oil catch hose
⑨ Crankcase breather hose
⑩ C.D.I cable
⑪ Shift sensor cable
⑫ Shift motor cable
⑬ Buzzer cable
0 Wire harness
A Positive starter motor lead
B Positive battery lead
C Negative battery lead
D Negative starter motor lead
E Starter motor
F Generator lead
G Main switch lead
H Ignition coil
I Rectifier/regulator
J Starter relay



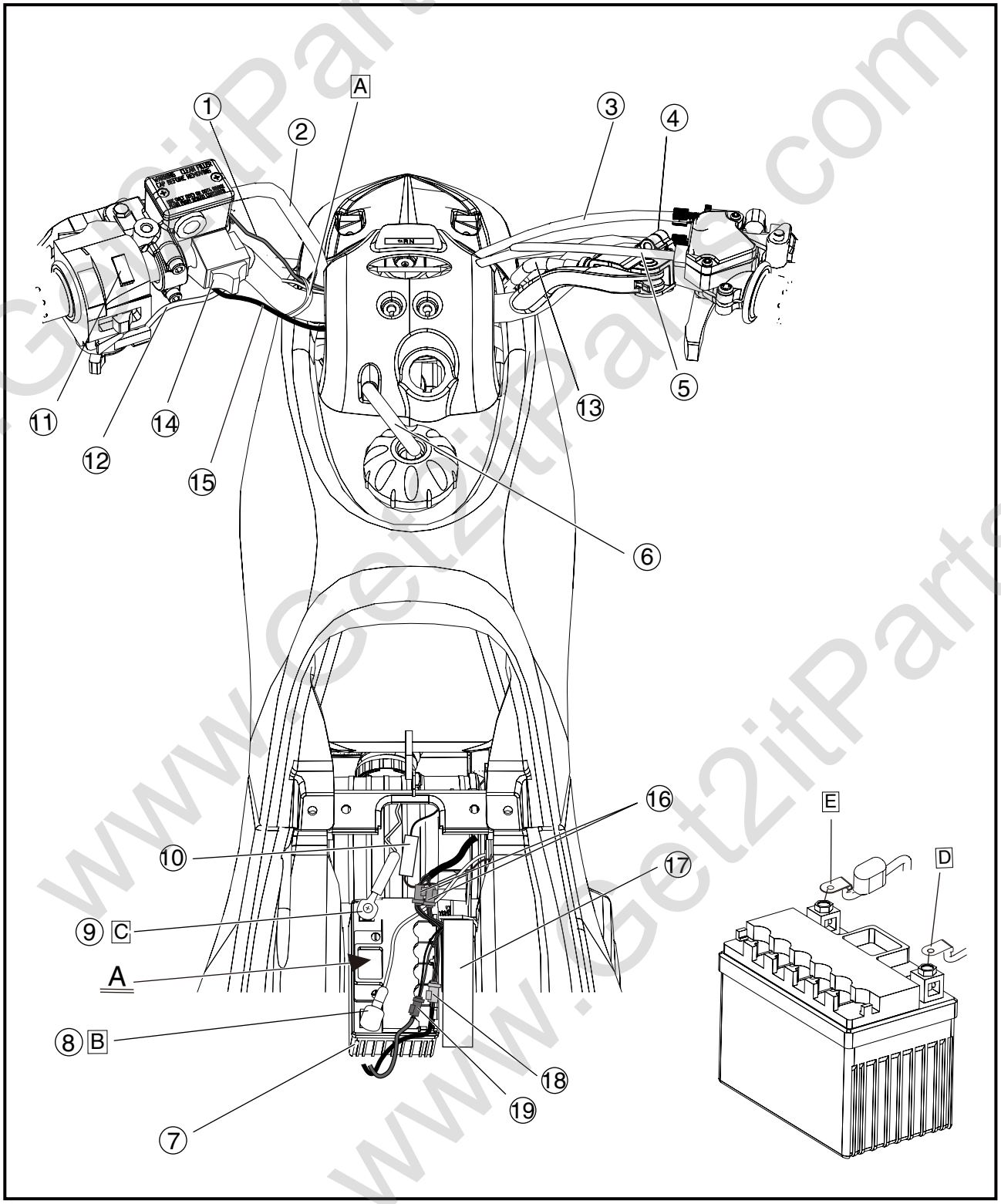
K Battery
L Main fuse
M C.D.I. unit
N Buzzer
A Pass these leads through rear fender.
B Fasten the wire harness, main switch lead, heater control switch lead and with a plastic band.
C Fasten the wire harness, negative battery lead and starter motor lead with a plastic band.
D Fixed the negative battery lead and negative starter motor lead by a bolt.



① Rear brake switch lead
② Rear brake hose
③ Front brake cable (right)
④ Front brake cable (left)
⑤ Throttle cable
⑥ Fuel tank breather hose
⑦ Battery
⑧ Positive battery lead
⑨ Negative battery lead
⑩ Main fuse
⑪ Handlebar switch
⑫ Choke cable
⑬ Parking brake cable
⑭ Shift switch
⑮ Shift switch lead
⑯ C.D.I cable
⑰ C.D.I unit
⑱ Shift sensor cable
⑲ Shift motor cable

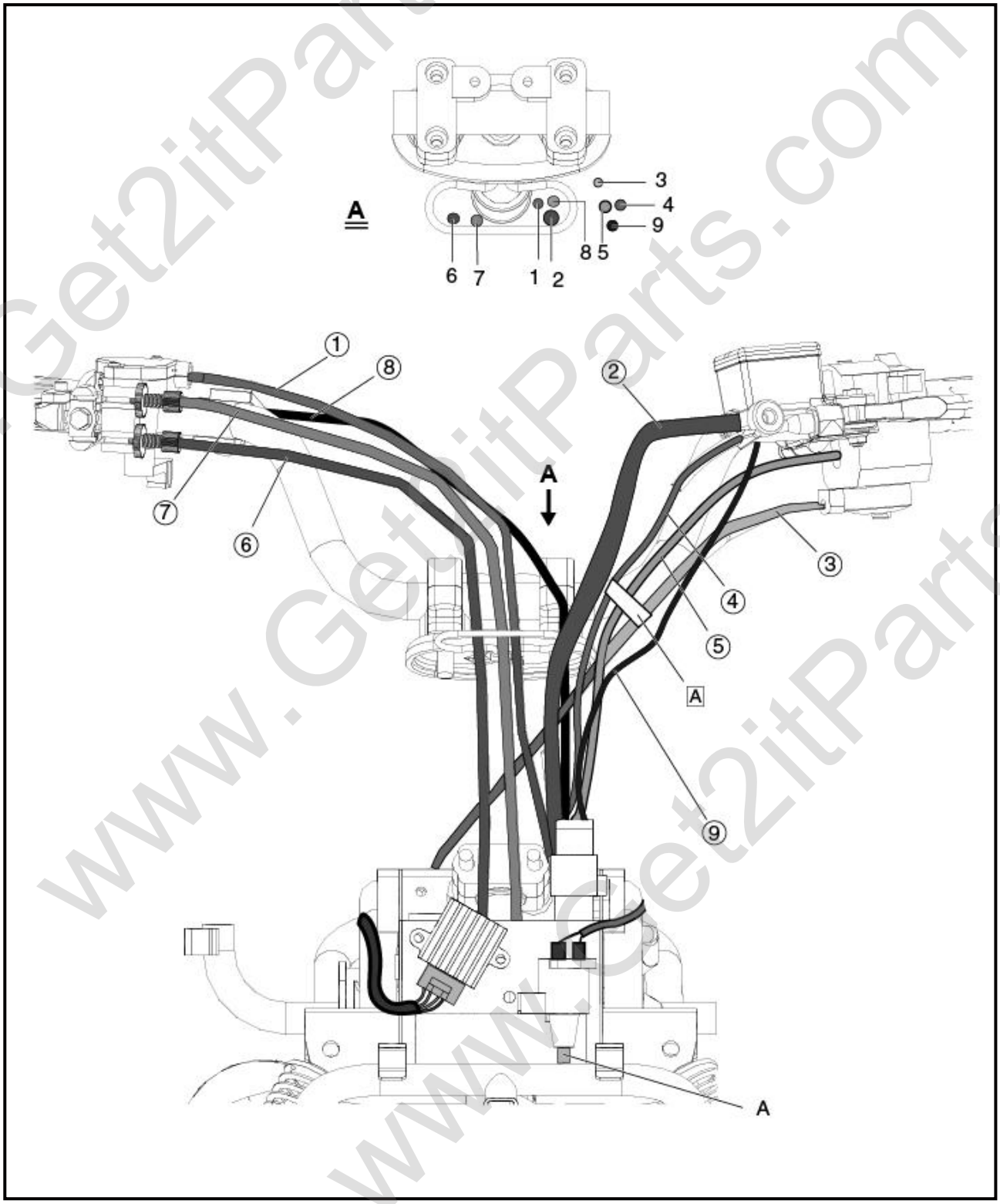


[A] Fasten the handlebar switch lead , rear brake switch lead and choke cable with a plastic band.
[B] To starter relay.
[C] To the frame.
[D] Connect the negative battery lead to the battery so that the lead is routed to the side of the battery.
[E] Connect the positive battery lead to the battery so that the lead contacts the battery case.



① Throttle cable
② Rear brake hose
③ Choke cable
④ Rear brake switch lead
⑤ Handlebar switch lead
⑥ Front brake cable (left)
⑦ Front brake cable (right)
⑧ Parking brake cable
⑨ Shift switch lead
A Ignition coil

A Fasten the handlebar switch lead , rear brake switch lead and choke cable with a plastic band.



PERIODIC CHECKS AND ADJUSTMENTS

INTRODUCTION

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

PERIODIC MAINTENANCE CHART FOR THE EMISSION CONTROL SYSTEM

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	*	Carburetor	• Check choke operation and correct if necessary. • Check engine idling speed and adjust if necessary.				√	√	√	√
5	*	Crankcase breather system	• Check breather hose for cracks or other damage, and replace if necessary.					√	√	√
6	*	Exhaust system	• Check for leakage and replace gasket(s) if necessary. • Check for looseness and tighten all screw clamps and joints if necessary.					√	√	√
7		Spark arrester	• Clean.					√	√	√

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	*	Clutch	• Check operation.			√		√	√	√
3	*	Front brake	• Check operation and correct if necessary. • Check brake lever free play and adjust if necessary.			√	√	√	√	√
			• Replace brake shoes.			Whenever worn to the limit				
4	*	Rear 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				
5	*	Brake hoses	• Check for cracks or other damage, and replace if necessary.				√	√	√	√
			• Replace.			Every 4years				
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.			√		√	√	√

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
8	*	Wheel hub bearings	• Check for looseness or damage, and replace if necessary.		√		√	√	√
9	*	Chassis fasteners	• Make sure that all nuts, bolts, and screws are properly tightened.		√	√	√	√	√
10	*	Shock absorber assemblies	• Check operation and correct if necessary. • Check for oil leakage and replace if necessary.				√	√	√
11	*	Front knuckle pivots	• Lubricate with lithium-soap-based grease.				√	√	√
12	*	Steering shaft	• Lubricate with lithium-soap-based grease.				√	√	√
13	*	Steering system	• Check operation and repair or replace if damaged. • Check toe-in and adjust if necessary.				√	√	√
14		Engine oil	• Change. • Check ATV for oil leakage, and correct if necessary.		√		√	√	√
15		Engine oil strainer	• Clean.		√		√		√
16		Final transmission oil	• Change. • Check ATV for oil leakage, and correct if necessary.		√				√
17	*	Moving parts and cables	• Lubricate.			√	√	√	√
18	*	Drive select lever safety system cable	• Check operation and adjust or replace if necessary.				√	√	√
19	*	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.		√	√	√	√	√
20	*	Front and rear brake switches	• Check operation and correct if necessary.		√	√	√	√	√
21	*	Lights and switches	• Check operation and correct if necessary. • Adjust headlight beams.		√	√	√	√	√
22		V-belt	• Check operation • Check for wear, cracks or other damage, and replace if necessary.		√		√	√	√
23		Drive chain	• Check chain slack and adjust if necessary. • Check rear wheel alignment and correct if necessary. • Clean and lubricate.		√	√	√	√	√
24	*	Drive chain rollers	• Check for wear and replace if necessary.				√	√	√
25	*	Parking brake	• Check operation and adjust if necessary.		√	√	√	√	√

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 brake master cylinder and caliper, and change the brake fluid.
- Replace the brake hoses every four years and if cracked or damaged.

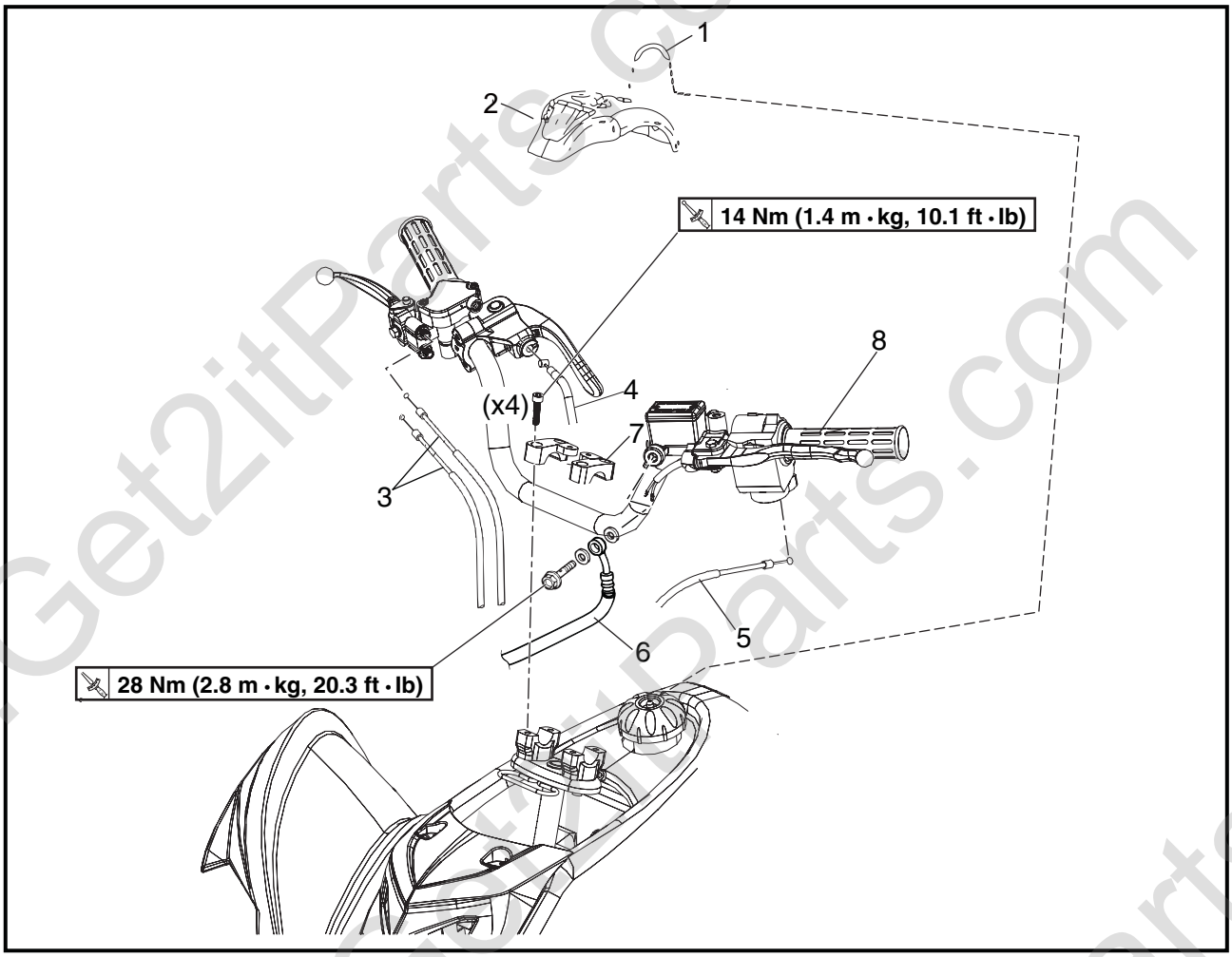
* Since these items require special tools, data and technical skills, have an E-TON dealer perform the service.

⚠ WARNING

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

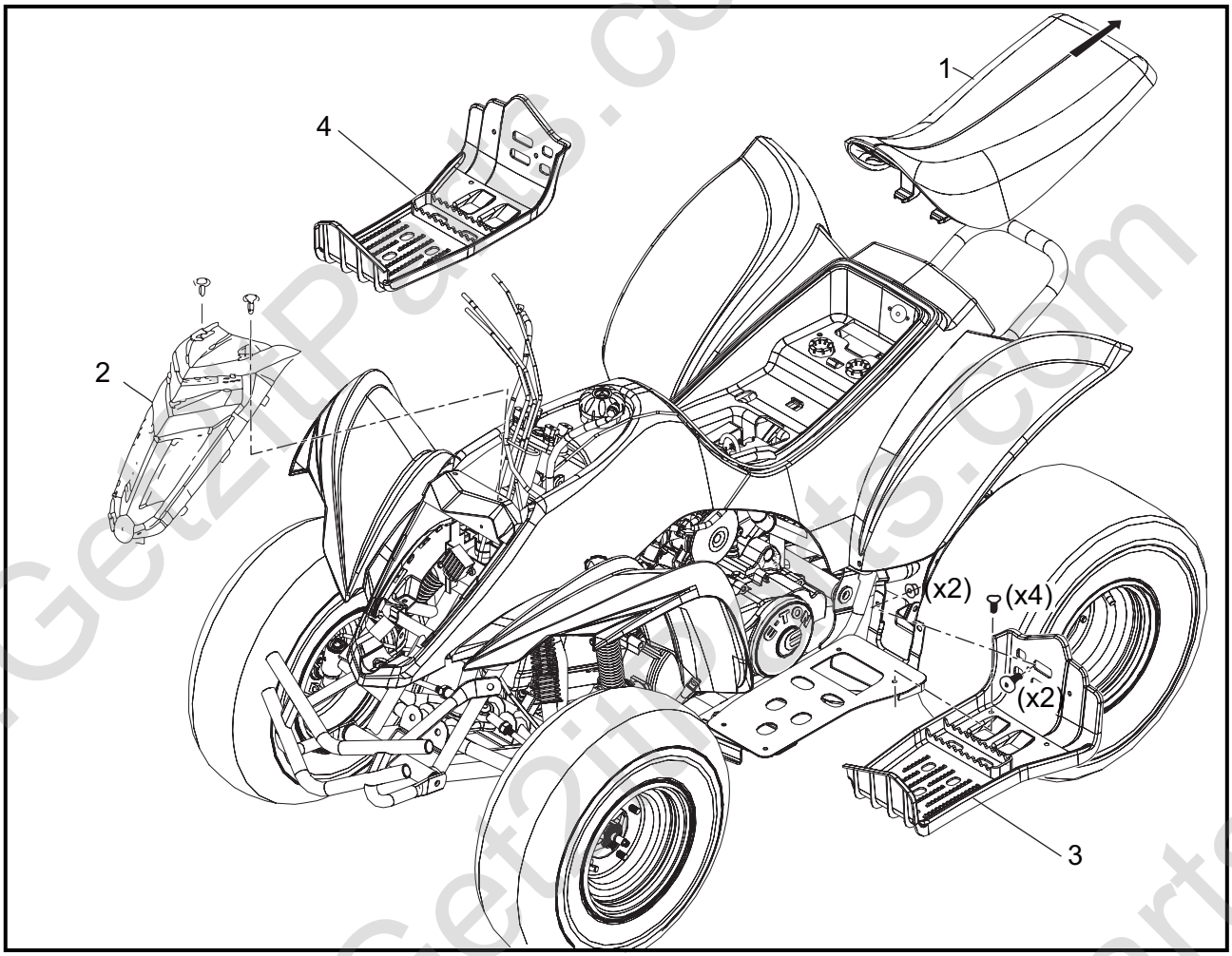
HANDLEBAR, SEAT, FENDERS AND FUEL TANK

HANDLEBAR



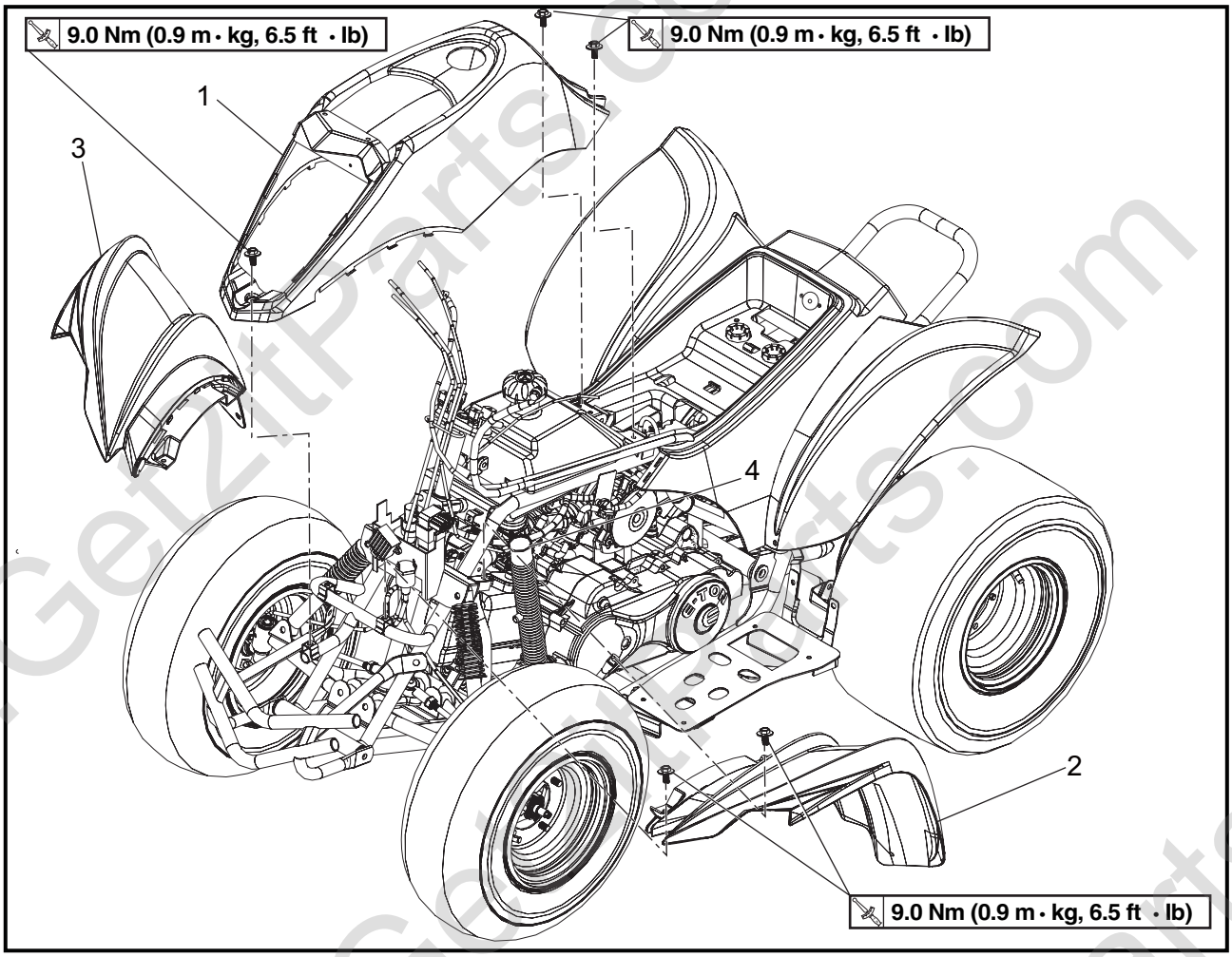
Order	Job/Part	Q'ty	Remarks
	Removing the handlebar		Remove the parts in the order listed.
1	Fuel tank breather hose	1	
2	Handlebar cover	1	**TIP** When installing the handlebar cover, pass the fuel tank breather hose through the hole in the handlebar cover.
3	Front brake cable	2	
4	Parking brake cable	1	Refer to "INSTALLING THE PARKING BRAKE LEVER".
5	Choke cable	1	
6	Rear brake hose	1	Refer to "INSTALLING THE REAR BRAKE MASTER CYLINDER".
7	Upper handlebar holder	1	
8	Handlebar	1	
			For installation, reverse the removal procedure.

SEAT, FRONT PANEL AND FOOTREST BOARDS



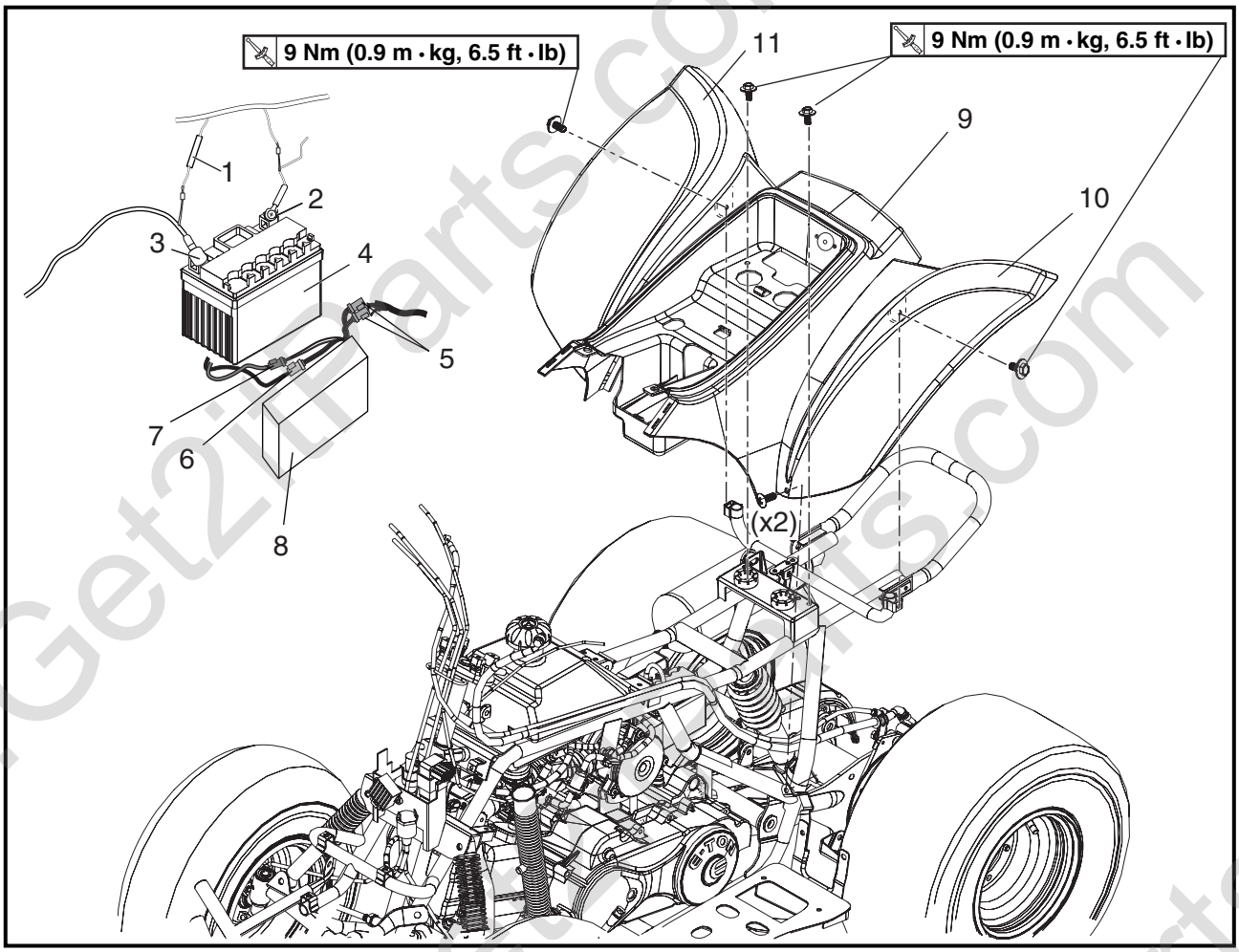
Order	Job/Part	Q'ty	Remarks
	Removing the seat, front panel and footrest boards		Remove the parts in the order listed.
	Handlebar		Refer to "HANDLEBAR".
1	Seat	1	**TIP** Pull back the seat lock lever, than pull up on the rear of the seat.
2	Front panel	1	
3	Footrest board (L)	1	
4	Footrest board (R)	1	
			For installation, reverse the removal procedure.

FRONT FENDER



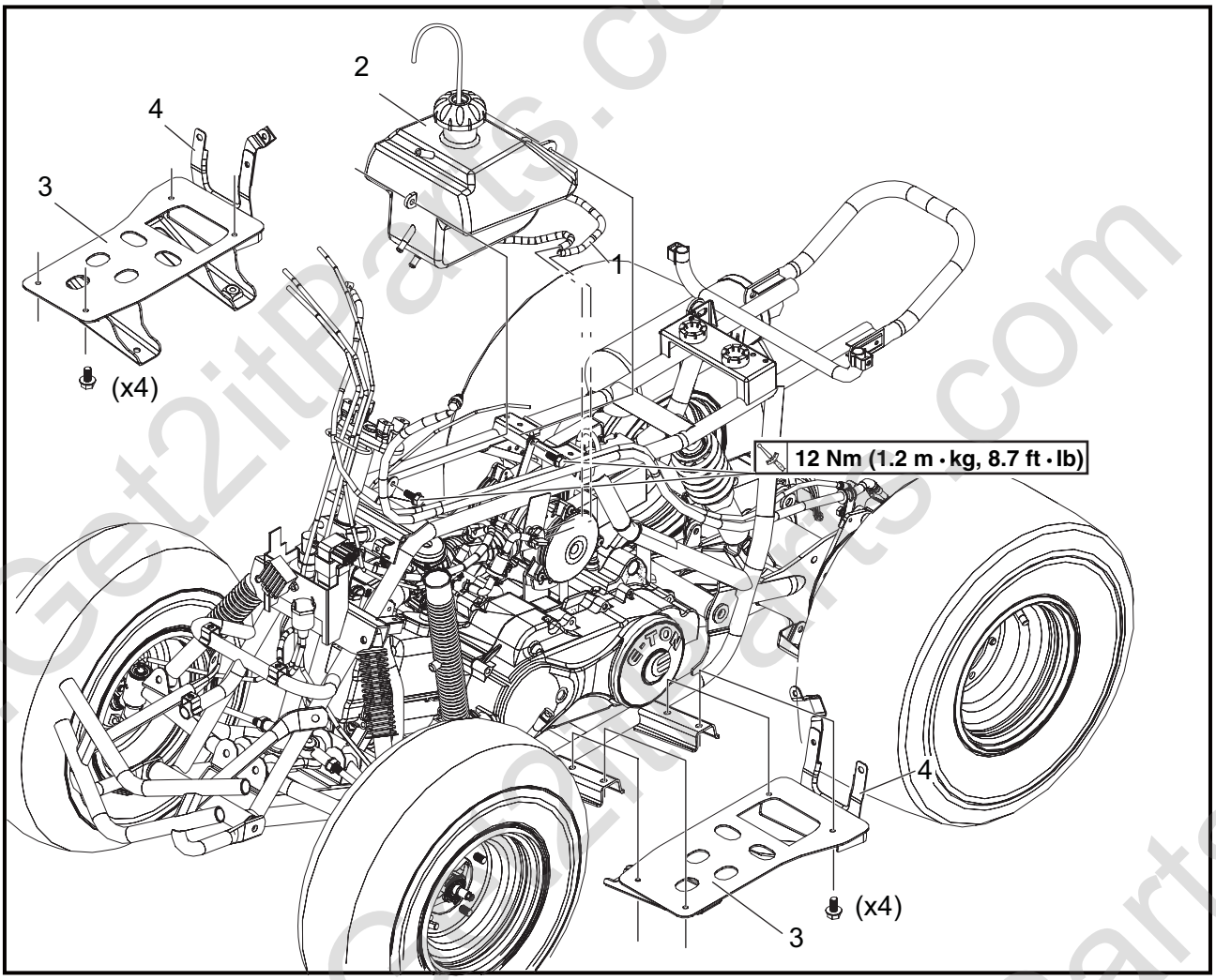
Order	Job/Part	Q'ty	Remarks
	Removing the front fender		Remove the parts in the order listed.
	Handlebar		Refer to "HANDLEBAR".
	Seat and front panel		Refer to "SEAT AND FRONT PANEL".
1	Front body cover	1	
2	Front fender (L)	1	
3	Front fender (R)	1	
4	Air cleaner joint clamp screw	1	Loosen.
			For installation, reverse the removal procedure.

REAR FENDER, BATTERY AND C.D.I UNIT



Order	Job/Part	Q'ty	Remarks
	Removing the rear fender, battery and C.D.I unit		Remove the parts in the order listed.
	Handlebar		Refer to "HANDLEBAR".
	Seat and front panel		Refer to "SEAT AND FRONT PANEL".
	Front fender		Refer to "FRONT FENDER".
1	Wire harness and main fuse	1	
2	Negative battery lead	1	Disconnect.
3	Positive battery lead	1	Disconnect.
			NOTICE **First disconnect the negative lead, then disconnect the positive lead.**
4	Battery	1	
5	C.D.I cable	2	
6	Shift sensor cable	1	
7	Shift motor cable	1	
8	C.D.I unit	1	
9	Rear body cover	1	
10	Rear fender (L)	1	
11	Rear fender (R)	1	For installation, reverse the removal procedure.

FUEL TANK AND FOOTREST BARS



Order	Job/Part	Q'ty	Remarks
	Removing the fuel tank and footrest bars		Remove the parts in the order listed.
	Seat and front panel		Refer to "SEAT AND FRONT PANEL".
	Front fender		Refer to "FRONT FENDER".
1	Fuel hose	2	Disconnect. **TIP** Before disconnecting the fuel hose, turn the fuel cock to "OFF".
2	Fuel tank	1	For installation, reverse the removal procedure.
3	Footrest bar	2	
4	Footrest bear bar	2	

ENGINE

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:
   - C.D.I. magneto cover
   - Cylinder head cover

   Refer to "CYLINDER HEAD" in chapter 4.

2. Measure:
   - valve clearance

   Out of specification → Adjust.

Valve clearance (cold)
Intake valve
0.07 ~ 0.10 mm (0.003~ 0.004 in)
Exhaust valve
0.07 ~ 0.10 mm (0.003~ 0.004 in)

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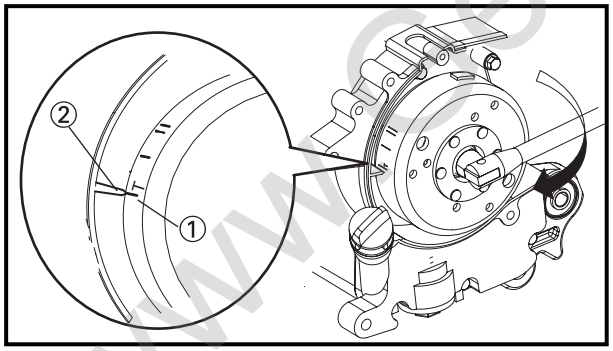
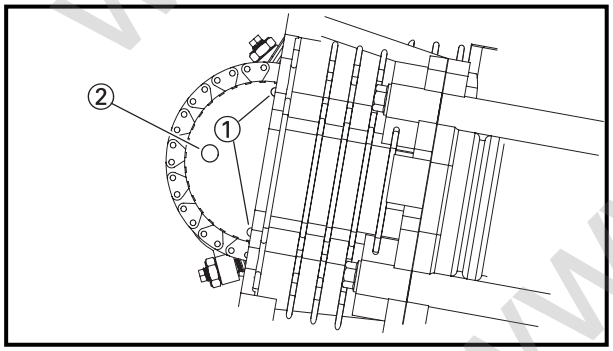
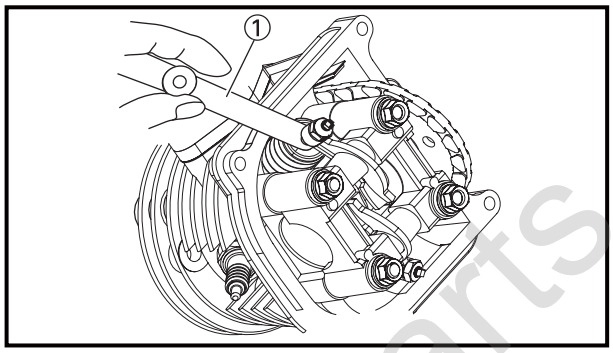
a. Turn the crankshaft clockwise with a wrench.
b. Align the "T" mark ① on the rotor with the stationary pointer ② on the crankcase. When the "T" mark is aligned with the stationary pointer, the piston is at the Top Dead Center (TDC).





TIP

- When the piston is at the Top Dead Center (TDC) on the compression stroke, there should be clearance between the valve stem tips and their respective adjusting screws.
- Be sure to align the alignment mark ① on the camshaft sprocket with hole mark ② is forward to up.



c. Measure the valve clearance using a thickness gauge ①.
Out of specification → Adjust

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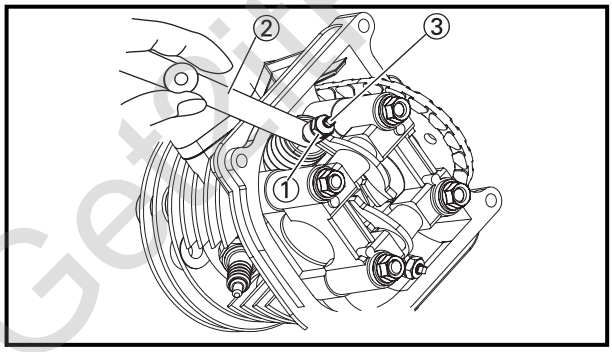

3. Adjust:
• valve clearance

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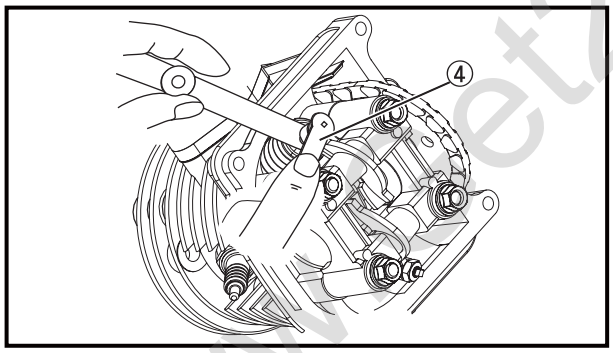
a. Loosen the locknut ①.
b. Insert a thickness gauge ② between the adjuster end and the valve end.
c. Turn the adjuster ③ clockwise or counterclockwise with the tappet adjusting tool ④ until the proper clearance is obtained.



d. Hold the adjuster to prevent it from moving and then tighten the locknut.

	**Locknut** **9 Nm (0.9 m · kg, 6.5 ft · lb)**

e. Measure the valve clearance.
f. If the clearance is incorrect, repeat the above steps until the proper clearance is obtained.

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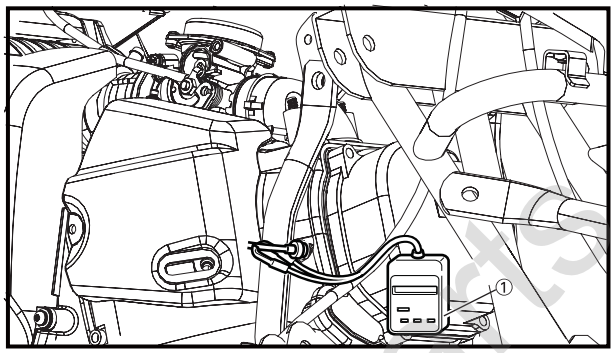
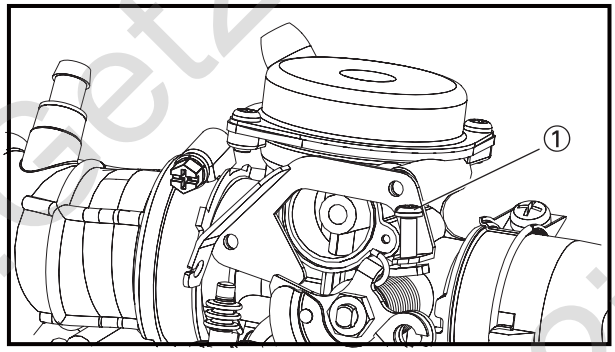
4. Install:
• C.D.I. magneto cover
• Cylinder head cover
Refer to “CYLINDER HEAD” in chapter 4.



ADJUSTING THE ENGINE IDLING SPEED

1. Start the engine and let it warm up for several minutes.
2. Attach:
   - engine tachometer ①
     (to the spark plug lead)
3. Measure:
   - engine idling speed
     Out of specification → Adjust.

	Engine idling speed **1,600 ~ 1,800 r/min**



4. Adjust:
   - engine idling speed

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a. Turn the throttle stop screw ① in or out until the specified idling speed is obtained.

Turning right	**Idling speed becomes higher.**
Turning left	**Idling speed becomes lower.**

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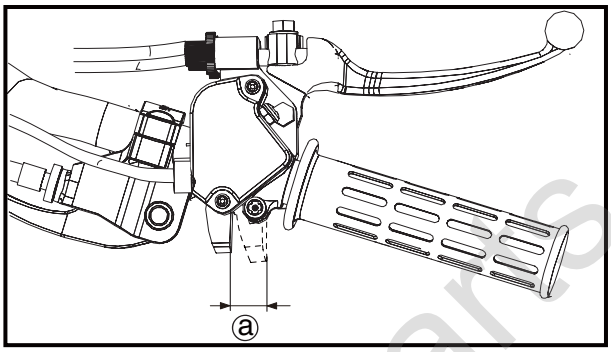
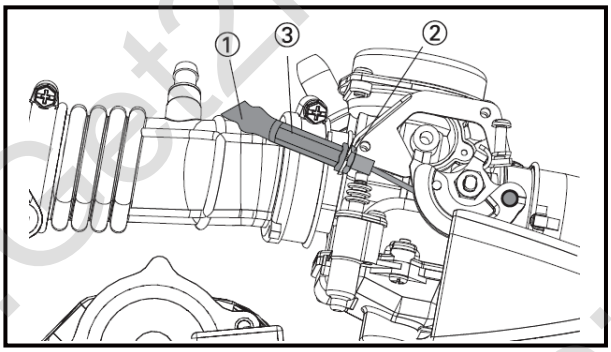
5. Detach:
   - engine tachometer

6. Adjust:
   - throttle lever free play
     Refer to “ADJUSTING THE THROTTLE LEVER FREE PLAY”.

	Throttle lever free play **1.0 ~ 3.0 mm (0.04 ~ 0.12 in)**





ADJUSTING THE THROTTLE LEVER FREE PLAY

TIP

Engine idling speed should be adjusted properly before adjusting the throttle lever free play.

1. Measure:
   - throttle lever free play ⓐ
     Out of specification → Adjust.

	Throttle lever free play **1.0 ~ 3.0 mm (0.04 ~ 0.12 in)**

2. Adjust:
   - throttle lever free play

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a. Pull back the adjuster cover ①.
b. Loosen the locknut ② on the carburetor side.
c. Turn the adjuster ③ in or out until the correct free play is obtained.

Turning in	**Free play is increased.**
Turning out	**Free play is decreased.**

d. Tighten the locknut ②.
e. Push in the adjuster cover①.

⚠ 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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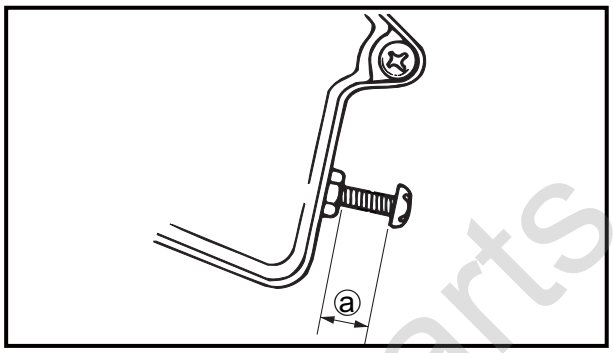

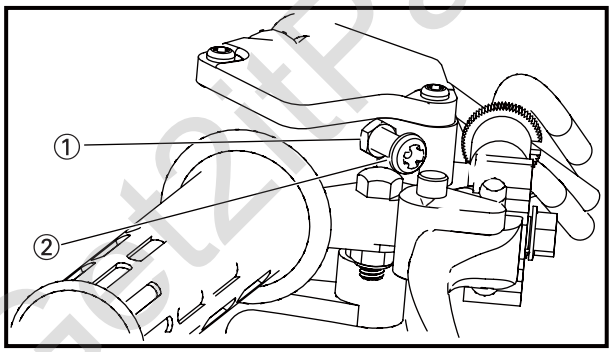

ADJUSTING THE SPEED LIMITER

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

1. Measure:
   - speed limiter length ⓐ
     Out of specification → Adjust.

	Speed limiter length **Less than 11.0mm (0.43 in)**

2. Adjust:
   - speed limiter length

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a. Loosen the locknut ①.
b. Turn the adjuster ② in or out until the specified speed limiter length is obtained.

Turning in	**Speed limiter length is decreased.**
Turning out	**Speed limiter length is increased.**

c. Tighten the locknut.

⚠ 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 11.0 mm (0.43 in). Also, always adjust the throttle lever free play to 1.0 ~ 3.0 mm (0.04 ~ 0.12 in).**

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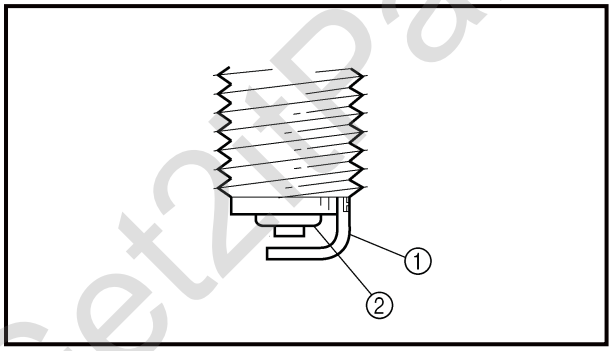
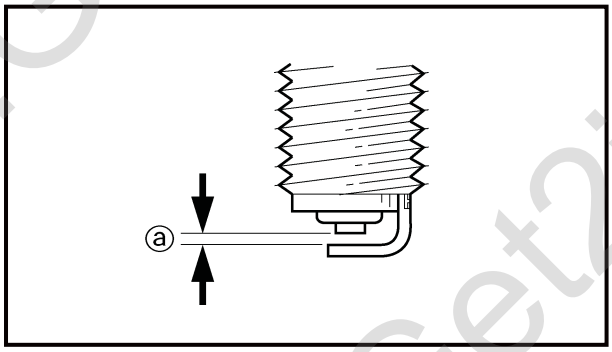




CHECKING THE SPARK PLUG

1. Remove:
   • spark plug
2. Check:
   • spark plug type
   Incorrect → Change.

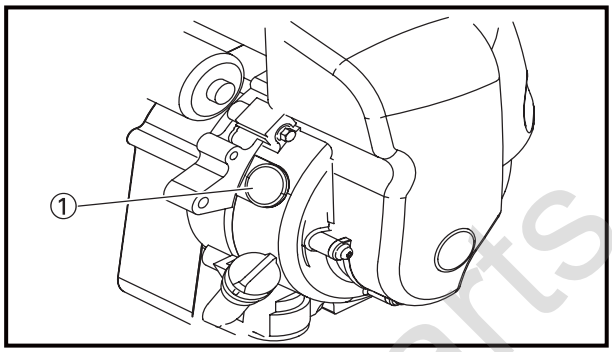
Standard spark plug
CR7HSA/NGK

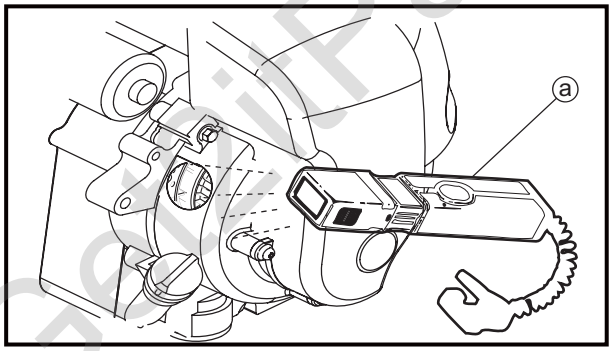
3. Check:
   • electrode ①
   Wear/damage → Replace.
   • insulator ②
   Abnormal color → Replace.
   Normal color is a medium-to-light tan color.
4. Clean:
   • spark plug
   (with a spark plug cleaner or wire brush)
5. Measure:
   • spark plug gap ⓐ
   Use a wire gauge or thickness gauge.
   Out of specification → Regap.

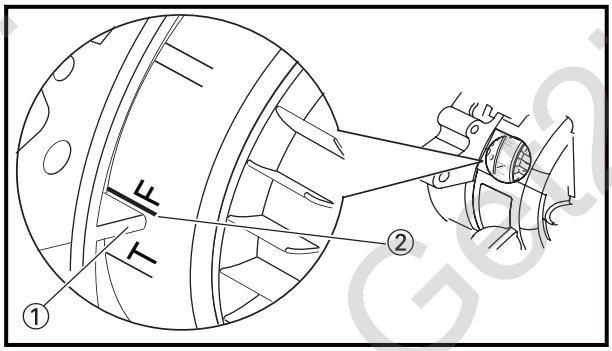
Spark plug gap
0.6 ~ 0.7 mm (0.024 ~ 0.028 in)

6. Tighten:
   • spark plug

11 Nm (1.1 m · kg, 8.0 ft · lb)







CHECKING THE IGNITION TIMING

TIP

Engine idling speed and throttle cable free play should be adjusted properly before checking the ignition timing.

1. Remove:
   - Shroud cap ①

2. Attach:
   - engine tachometer
   - timing light ⓐ
     (to spark plug lead)

3. Check:
   - ignition timing

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a. Warm up the engine and keep it at the specified speed.

	Engine speed **1,600 ~ 1,800 r/min**

b. Visually check the stationary pointer ① to verify it is within the required firing range ② indicated on the rotor.
   Incorrect firing range → Check the pickup coil.

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4. Detach:
   - timing light
   - engine tachometer
5. Install:
   - Shroud cap

TIP

The ignition timing is not adjustable.

MEASURING THE COMPRESSION PRESSURE

TIP

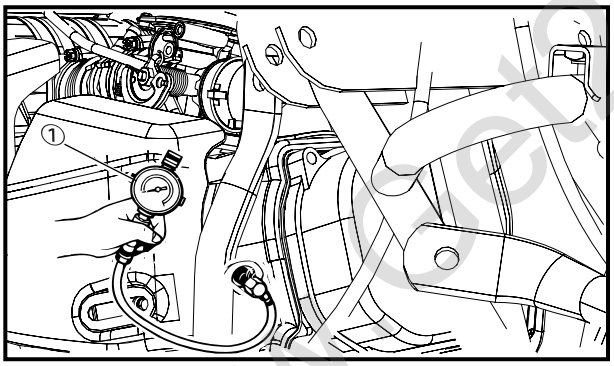
Insufficient compression pressure will result in a loss of performance.

1. Measure:
   - valve clearance
     Out of specification → Adjust.
     Refer to "ADJUSTING THE VALVE CLEARANCE".

2. Start the engine, warm it up for several minutes, and then turn it off.
3. Disconnect:
   - spark plug cap
4. Remove:
   - spark plug

NOTICE

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



5. Attach:
   - compression gauge ①

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

Compression pressure (at sea level)
Minimum
1,050 kPa/1,000 r/min
(10.5kg/cm², 152.3 psi)
Standard
1,250 kPa/1,000 r/min
(12.5kg/cm², 181.3 psi)
Maximum
1,350 kPa/1,000 r/min
(13.5kg/cm², 195.8 psi)

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

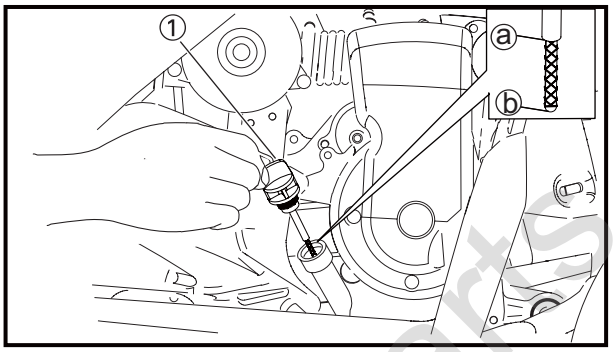
WARNING

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, squirt a few drops of oil into the cylinder 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 possibly defective → Repair.**

7. Install:
   • spark plug — **11 Nm (1.1 m · kg, 8.0 ft · lb)**
8. Connect:
   • spark plug cap



CHECKING THE ENGINE OIL LEVEL

1. Place the machine on a level surface.
2. Check:
   • engine oil level
   Oil level should be between the maximum ⓐ mark and minimum ⓑ mark.
   Oil level low → Add oil to the proper level.

TIP

Do not screw the dipstick ① in when checking the oil level.

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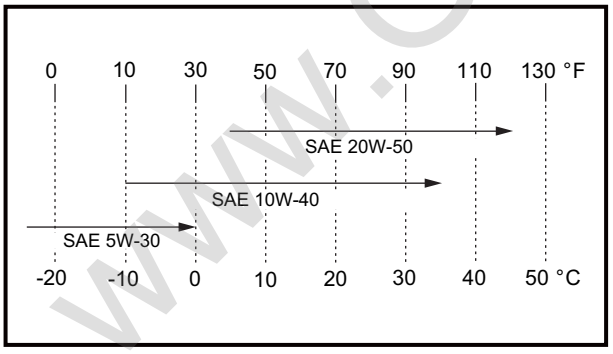
a. Warm up the engine for several minutes, and stop it, then wait at least several minutes for the oil to drain back into the crankcase.

⚠ WARNING

Never remove the dipstick just after high speed operation because the heated oil could spurt out. Wait until the oil cools down before removing the dipstick.

b. Screw the dipstick ① completely out, and wipe the dipstick clean, then just rest the dipstick in the hole.
c. Pull up the dipstick, and check the oil level whether or not it is between maximum ⓐ and minimum level ⓑ.
d. If the level is lower, add the oil up to the proper level.



Recommended oil
Follow the chart on the left.

TIP

Recommended oil classification:
API service SG type or higher, JASO standard MA.

NOTICE

- **Do not add any chemical additives. Engine oil also lubricates the clutch and additives could cause clutch slippage.**
- **Do not allow foreign material to enter the crankcase.**

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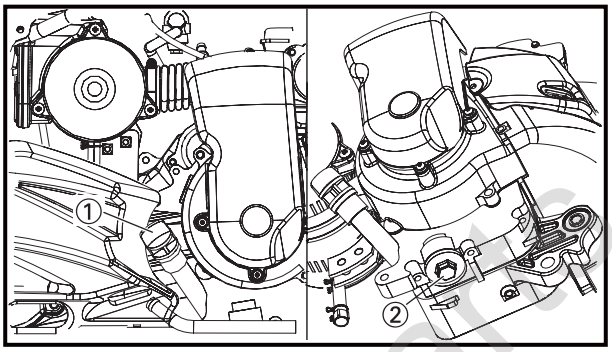
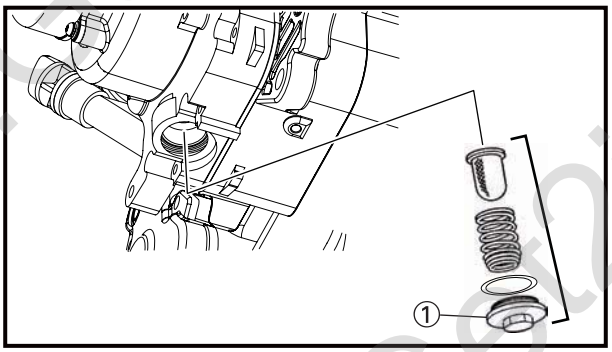


CHANGING THE ENGINE OIL

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 ①
   - engine oil drain bolt ②
   (along with the O-ring, spring and oil filter screen)
4. Drain:
   - engine oil
   (completely from the crankcase)
5. Check:
   - engine oil drain bolt gasket
   Damage → Replace.



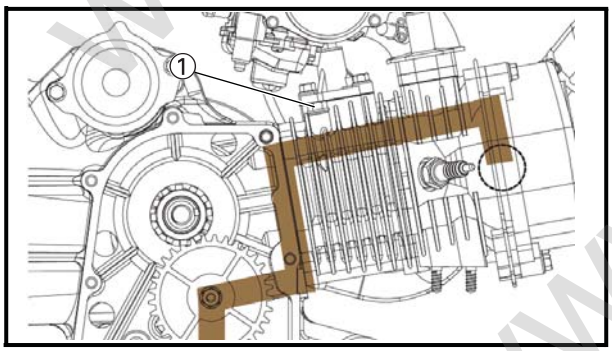
6. Install:
   - engine oil drain bolt ①
   (along with the O-ring, spring and oil filter screen)

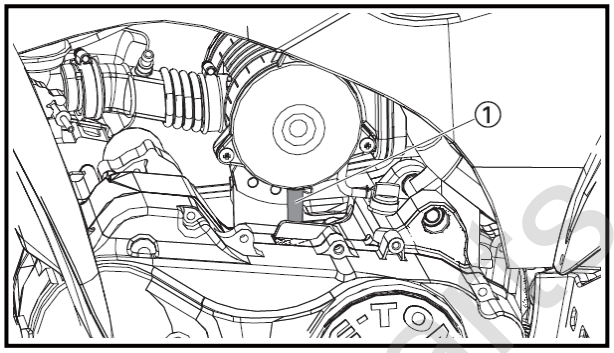
8 Nm (0.8 m · kg, 5.8 ft · lb)

7. Fill:
   - crankcase
   (with the specified amount of the recommended engine oil)

Quantity
Total amount
0.80 L (0.70 Imp qt, 0.85 US qt)
Periodic oil change
0.75 L (0.66 Imp qt, 0.80 US qt)

8. Install:
   - dipstick
9. Start the engine, warm it up for several minutes, and then turn it off.
10. Check:
    - engine
    (for engine oil leaks)
11. Check:
    - engine oil level
    Refer to “CHECKING THE ENGINE OIL LEVEL”.
12. Check:
    - oil lubrication by oil check bolt ①

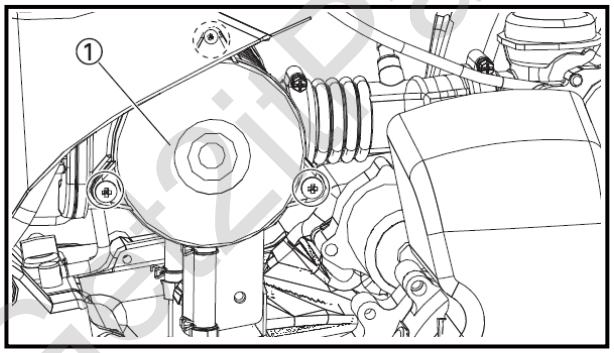




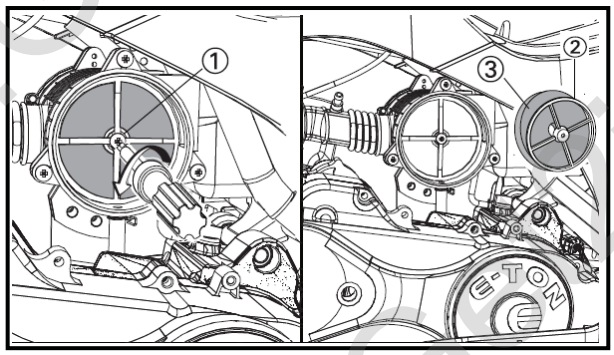
CLEANING THE AIR FILTER ELEMENTS

TIP

There is a check hose ① at the bottom of the air filter case. If dust and/or water collects in this hose, clean the air filter elements and air filter case.



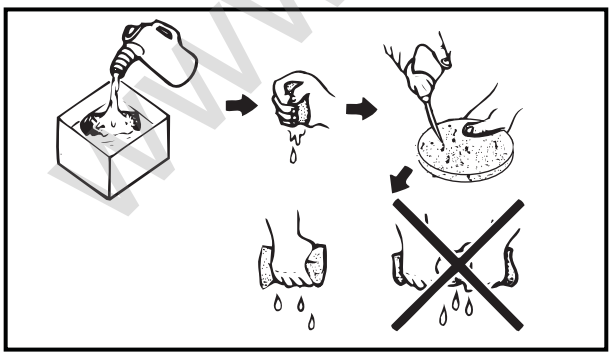
1. Remove:
   - air filter case covers ①



2. Loosen:
   - bolt ①
3. Remove:
   - air filter element holders ②
   - sponge materials ③

NOTICE

- **The engine should never be run without the air filter; excessive piston and/or cylinder wear may result.**
- **This model is equipped with two air filter elements: one located on the left side and one located on the right side of the air box.**



4. Check:
   - sponge materials
     Damaged → Replace.
5. Clean:
   - sponge materials

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a. Wash the sponge materials gently, but thoroughly in solvent.

WARNING

Use a cleaning solvent which is designed to clean parts only. Never use gasoline or low flash point solvents as they may cause a fire or explosion.

b. Squeeze the excess solvent out of the sponge materials and let it dry.

NOTICE

Do not twist or wring out the sponge materials. could damage the sponge materials.

c. Apply Yamaha foam air filter oil or other quality foam air filter oil to the sponge materials.

d. Squeeze out the excess oil.

TIP

The sponge materials should be wet but not dripping.

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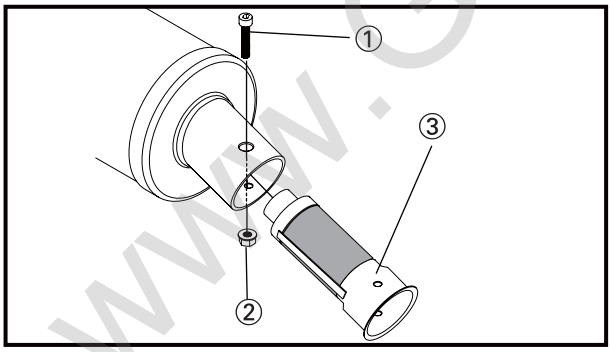
6. Install:
   - Sponge materials
   - Air filter element holders
7. Tighten:
   - bolt
8. Install:
   - Air filter case covers

TIP

Make sure its sealing surface matches the sealing surface of the case so there is no air leak.



CLEANING THE SPARK ARRESTER

1. Clean:
   - spark arrester

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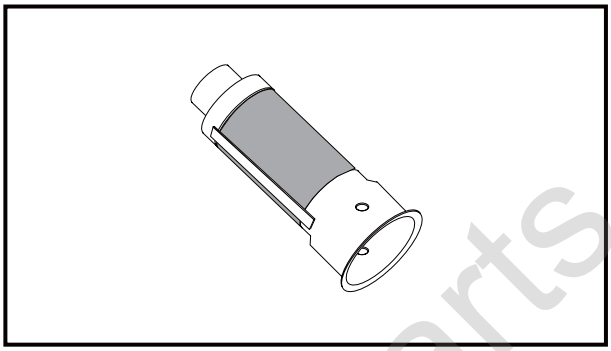
WARNING

- **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 muffler.**

a. Remove the bolt ① and nut ②
b. Remove the spark arrester ③ by pulling it out of the muffler.



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. Insert the spark arrester into the muffler and align the screw holes.
e. Insert the bolt, nut and tighten it.

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

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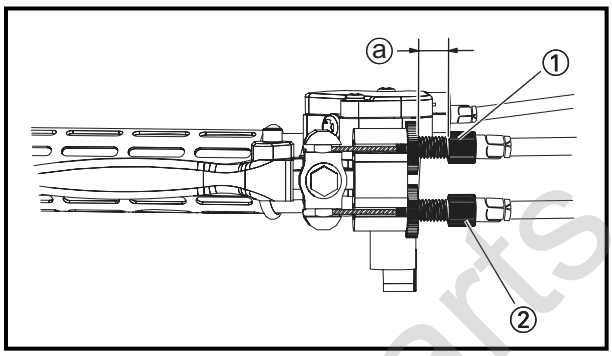

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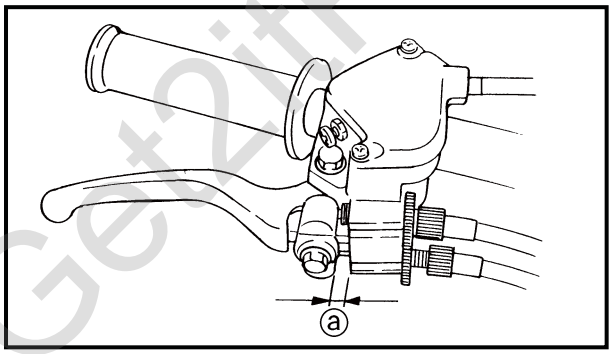
CHECKING THE FRONT BRAKE SHOES

1. Check:
   - Upper adjusting bolt ①
   - Lower adjusting bolt ②

   As ⓐ more than 12 mm (0.47 in) → Replace the brake shoes as a set.
   Refer to "FRONT BRAKES" in chapter 6.



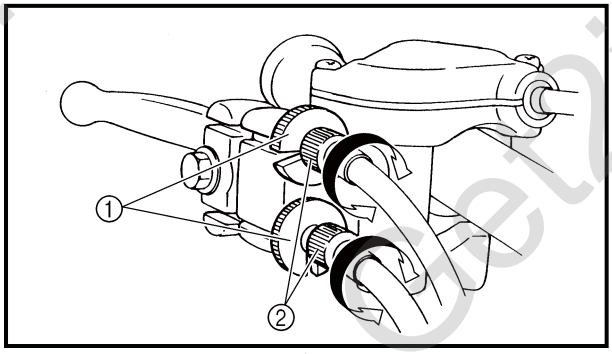
ADJUSTING THE FRONT BRAKE

TIP

Before adjusting the front brake, the front brake linings should be checked.

NOTICE

Proper lever free play is essential to avoid excessive brake drag.



1. Measure:
   - front brake lever free play ⓐ
     Out of specification → Adjust.

Front brake lever free play
4 ~ 6 mm (0.16 ~ 0.24 in)

2. Adjust:
   - front brake lever free play

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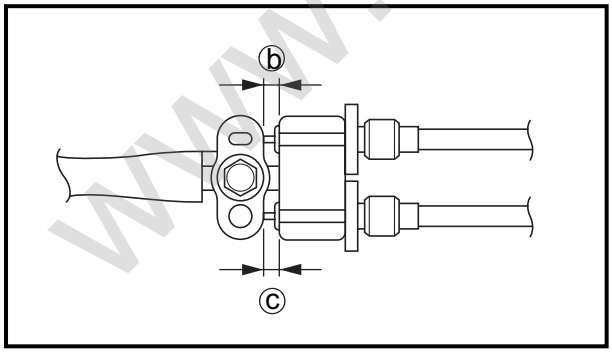
a. Loosen the locknuts ①.
b. Turn the adjusters ② in or out until the specified front brake lever free play is obtained.



TIP

Make sure that the difference between clearances ⓑ and ⓒ is less than 2 mm when the front brake lever is squeezed.

c. Tighten the locknuts.

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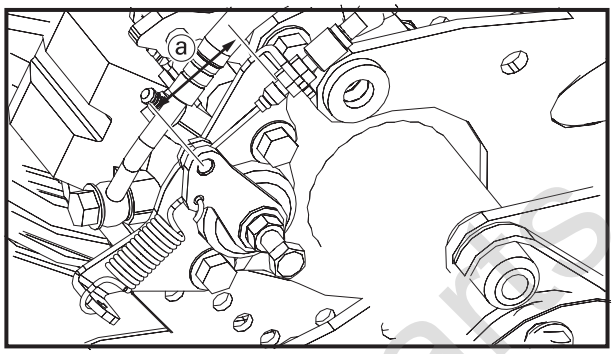
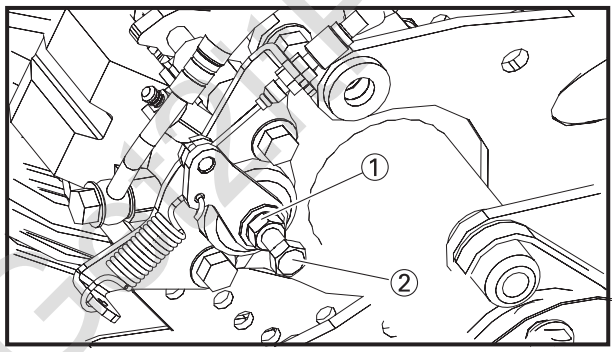
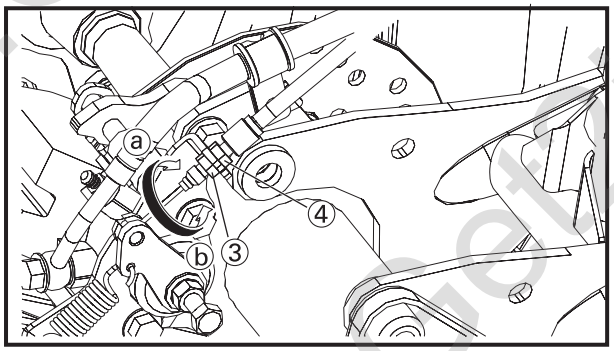


ADJUSTING THE PARKING BRAKE

1. Check:
   • parking brake cable end length ⓐ
   Out of specification → Adjust.

	Parking brake cable end length **53.0 ~ 57.0 mm (2.09 ~ 2.24 in)**





2. Adjust:
   • parking brake cable end length

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a. Loosen the locknut ① and adjusting bolt ②.
b. Loosen the locknut ④.
c. Turn the adjusting nut ③ in direction ⓐ or ⓑ until the specified brake cable end length is obtained.
d. Tighten the locknut ④.
e. Slowly turn the adjusting bolt clockwise until resistance is felt.
f. Turn it 1/8 counterclockwise.
g. Tighten the locknut ①.

	16 Nm (1.6 m•kg, 11 ft•lb)

⚠ WARNING

After this adjustment is performed, lift the 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.

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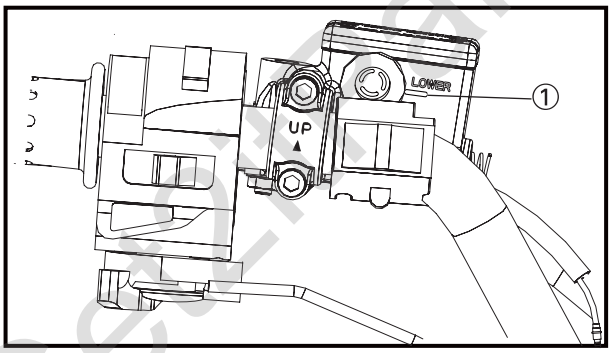
CHECKING THE REAR BRAKE FLUID LEVEL

1. Place the machine on a level surface.

TIP

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



2. Check:
   - brake fluid level
     Below the minimum level mark ① → Add the recommended brake fluid to the proper level.

	Recommended brake fluid **DOT #4**

WARNING

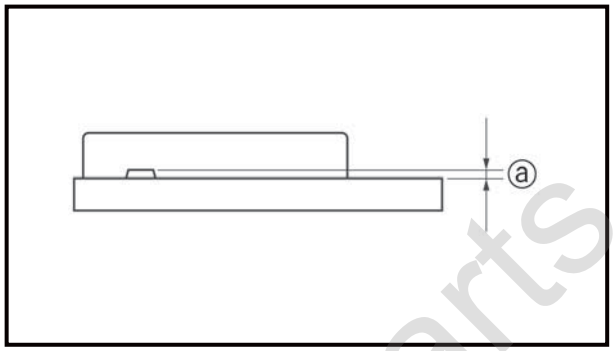
- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor 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.**

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 that the top of the brake master cylinder reservoir or brake fluid reservoir is horizontal.

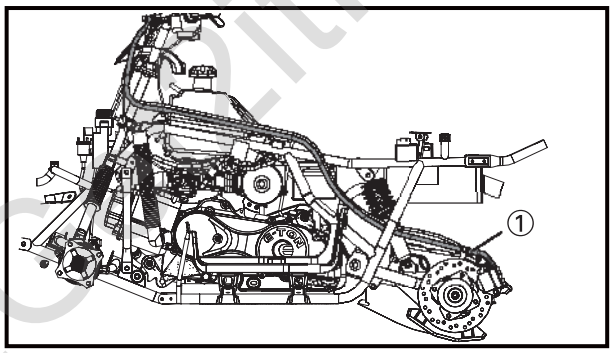


CHECKING THE REAR BRAKE PADS

1. Check:
   • brake pads
   Wear indicators almost touch the brake disc ⓐ → Replace the brake pads as a set.
   Refer to “REAR BRAKE” in chapter 6.

	Brake pad wear limit ⓐ **1.0 mm (0.04 in)**

2. Operate the rear brake lever.



CHECKING THE BRAKE HOSE

1. Remove:
   • seat
   • front fender
   Refer to “SEAT, FENDERS AND FUEL TANK”.
2. Check:
   • rear brake hose ①
   Cracks/wear/damage → Replace.
3. Check:
   • brake hose clamps
   Loosen → Tighten.
4. Hold the machine in an upright position and apply the rear brake.
5. Check:
   • brake hose
   Apply the brake lever times.
   Fluid leakage → Replace the hose or pipe.
   Refer to “REAR BRAKE” in chapter 6.
6. Install:
   • front fender
   • seat
   Refer to “SEAT, FENDERS AND FUEL TANK”.

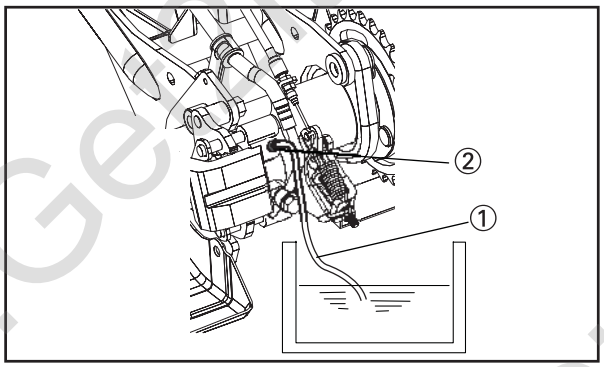
BLEEDING THE HYDRAULIC BRAKE SYSTEM

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. 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 or brake fluid reservoir).
c. Connect a clear plastic hose ① tightly to the bleed screw ②.
d. Place the other end of the hose into a container.
e. Slowly apply the brake lever or brake pedal several times.
f. Fully squeeze the brake lever or fully depress 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 contact the 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.

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 REAR BRAKE FLUID LEVEL”.

WARNING

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

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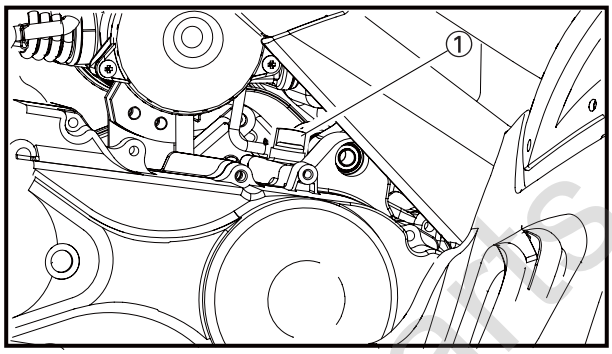
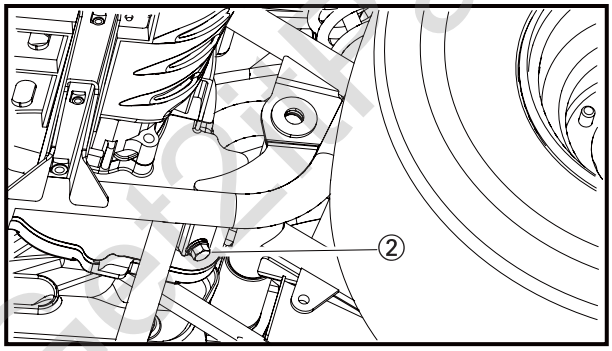




CHANGING THE FINAL TRANSMISSION OIL

1. Place the machine on a level surface.
2. Place a receptacle under the final transmission case.
3. Remove:
   - dipstick ①
   - final transmission oil drain plug ②
4. Drain:
   - final transmission oil
5. Install:
   - final transmission oil drain plug

15 Nm (1.5 m · kg, 10.8 ft · lb)

TIP

Check the gasket(drain plug). If it is damaged, replace it with a new one.

6. Fill:
   - final transmission case

Total amount
0.30 L (0.27 Imp qt, 0.32 US qt)
Recommended oil
SAE80 API"GL-4" Hypoid gear oil

NOTICE

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

7. Install:
   - dipstick

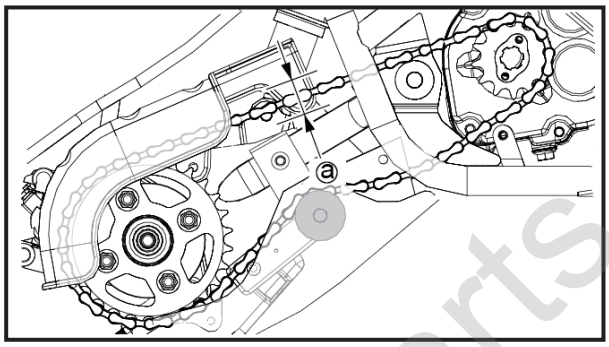
ADJUSTING THE DRIVE CHAIN SLACK

TIP

- Measure the drive chain slack halfway between the drive axle and the rear axle.
- When checking and adjusting the drive chain slack, there should be no weight on the vehicle and all tires must be touching the ground.

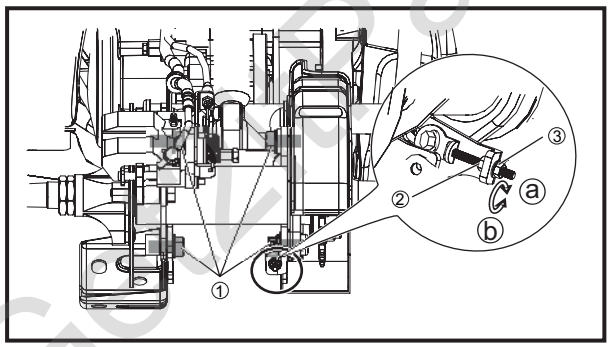
NOTICE

A drive chain that is too tight will overload the engine and other vital parts, and one that is too loose can skip and damage the swingarm or cause an accident. Therefore, keep the drive chain slack within the specified limits.



1. Measure:
   • drive chain slack ⓐ
   Out of specification → Adjust.

Drive chain slack
10 ~ 25 mm (0.39 ~ 0.98 in)



2. Adjust:
   • drive chain slack

TIP

The drive chain slack is adjusted by the rotation of the rear axle hub.

a. Loosen the rear axle pinch bolts ①.
b. Loosen the locknut ② .
c. To tighten the drive chain, turn the drive chain adjusting nut ③ in direction ⓐ . To loosen the drive chain, turn the drive chain adjusting nut ③ in direction ⓑ .

NOTICE

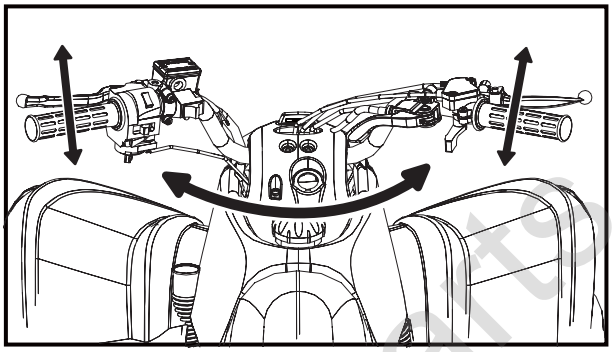
Excessive chain slack will overload the engine and other vital parts; keep the slack within the specified limits.

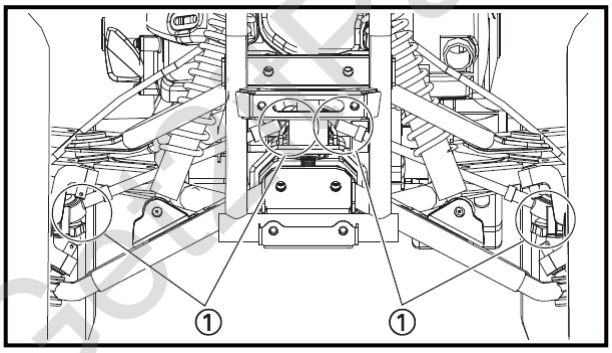
d. Tighten the locknut.
e. Tighten the rear wheel axle pinch bolts.

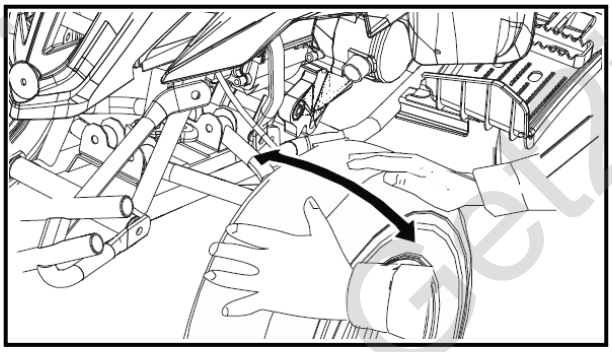
55 Nm (5.5 m · kg, 39.8 ft · lb)

TIP

The chain should be cleaned and lubricated after every use of the vehicle.

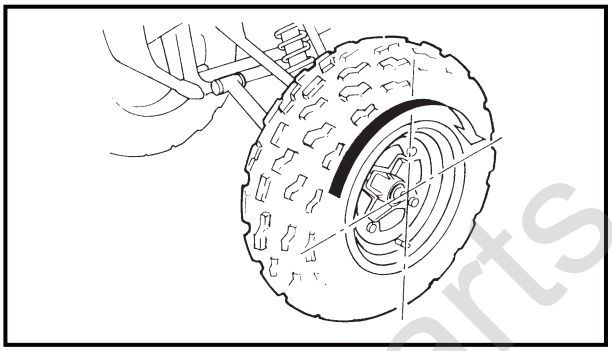


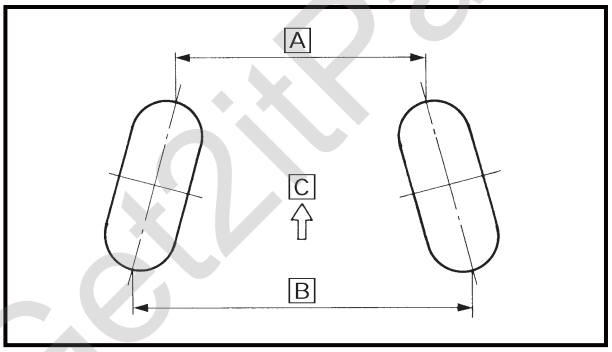




CHECKING THE STEERING SYSTEM

1. Place the machine on a level surface.
2. Check:
   - steering shaft bushings and bearings
     Move the handlebar up and down, and/or back and forth.
     Excessive play → Replace the steering shaft bushings and or bearings.
     Refer to “STEERING SYSTEM” in chapter 6.
3. Check:
   - tie-rod ends
     Turn the handlebar to the left and/or right until it stops completely, then slightly move the handlebar slightly in the opposite direction.
     Tie-rod end(s) ① have vertical play → Replace the tie-rod end(s).
     Refer to “STEERING SYSTEM” in chapter 6.
4. Raise the front end of the machine so that there is no weight on the front wheels.
5. Check:
   - ball joints and/or wheel bearings
     Move the wheels laterally back and forth.
     Excessive free play →Replace the front arms (upper and lower) and/or wheel bearings.





ADJUSTING THE TOE-IN

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

Toe-in
10 mm (0.40 in)

TIP

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

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

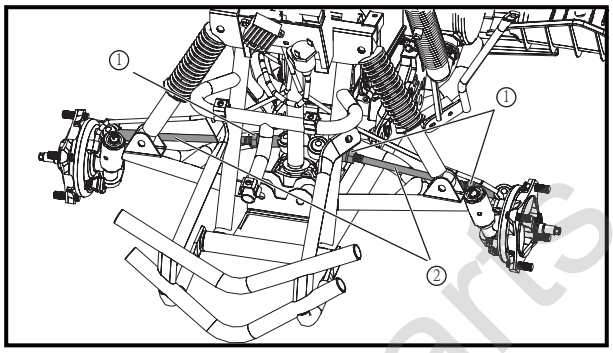
g. If the toe-in is incorrect, adjust it.

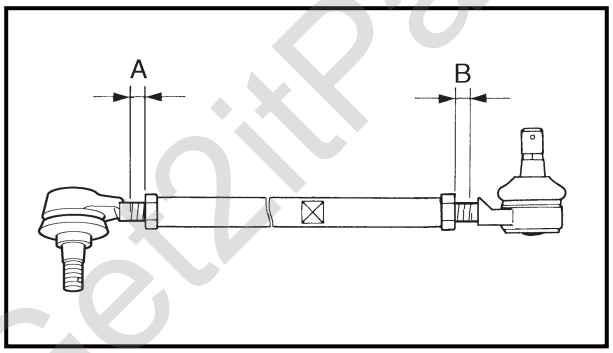
C Forward

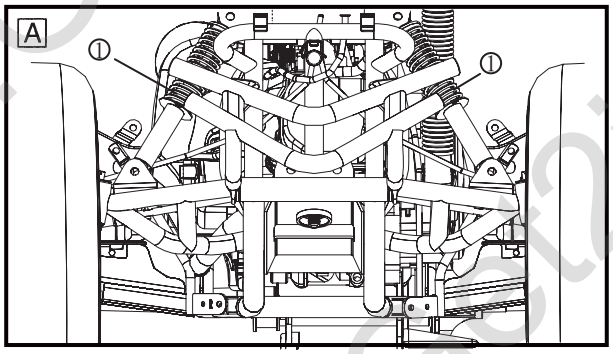
3. Adjust:
   • toe-in

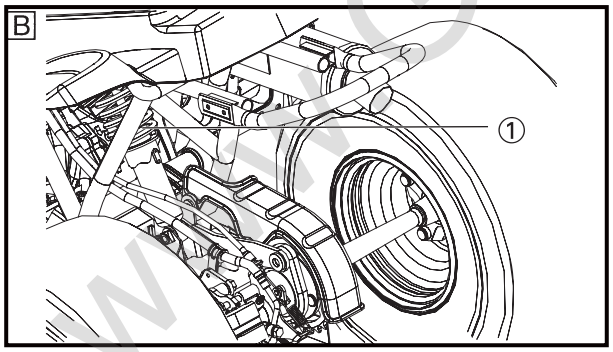
WARNING

- **Be sure that both tie-rods are turned the same amount. If not, the machine 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 machine 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.**









a. Mark both tie-rods 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 rods the same.
d. Tighten the rod end locknuts of both tie-rods. **35 Nm (3.5 m · kg, 25.3 ft · lb)**

TIP

Adjust the rod ends so that A and B are equal.

CHECKING THE FRONT AND REAR SHOCK ABSORBERS

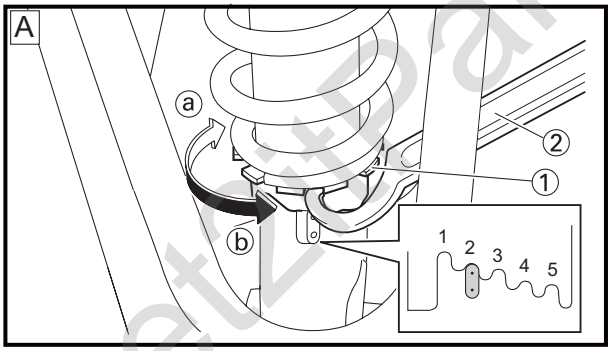
1. Place the machine on a level surface.
2. Check:
   - damper rod ①
     Bends/damage → Replace the front/rear shock absorber assembly.
   - oil leakage
     Excessive oil leakage → Replace the front/rear shock absorber assembly.
   - cylinder
     Damage → the front/rear shock absorber assembly.
   - spring
     Fatigue → the front/rear shock absorber assembly.
     Refer to "FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES" and "REAR SHOCK ABSORBER, SWINGARM AND DRIVE CHAIN" in chapter 6.
3. Check:
   - operation
     Pump the shock absorbers up and down for several times.
     Unsmooth operation → Replace the front/rear shock absorber assembly.
     Refer to "ADJUSTING THE SHOCK ABSORBERS".

A Front shock absorber
B Rear shock absorber

ADJUSTING THE SHOCK ABSORBERS

WARNING

Always adjust the spring preload of both front shock absorbers to the same setting. Uneven adjustment can result in poor handling and loss of stability.

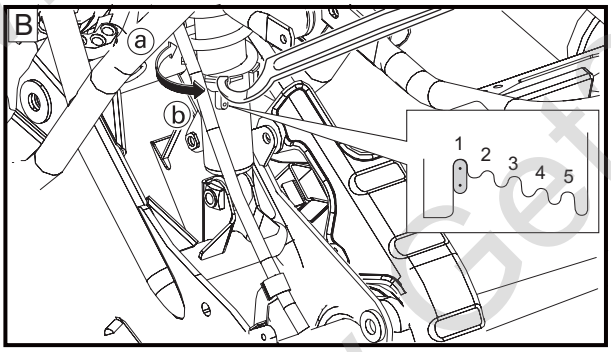


1. Adjust:
   • spring preload

a. Turn the adjusting ring ① in direction ⓐ or ⓑ with the spanner wrench ②.

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

Standard position: Front-2, Rear-1
Minimum position: 1
Maximum position: 5



A Front shock absorbers
B Rear shock absorbers

CHECKING THE TIRES

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

1) Tire characteristics influence the handling of ATVs. The tires listed below have been approved by E-TON POWER TECH Co., Ltd. for this model. If other tire combinations are used, they can adversely affect your machine's handling characteristics and are therefore not recommended.

	Manufacturer	Size	Type
Front	MAXXIS	AT18 x 7-8	M939
Rear	MAXXIS	AT18 x 9-8	M940

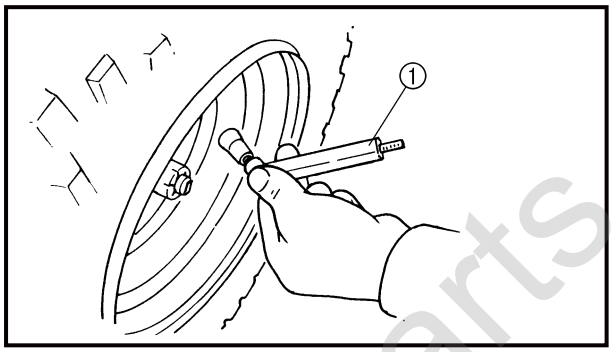
• TIRE PRESSURE

1) Recommended tire pressure
Front 25 kPa (0.25 kgf/cm^2, 3.6 psi)
Rear 25 kPa (0.25 kgf/cm^2, 3.6 psi)

2) Tire pressure below the minimum specification could cause the tire to dislodge from the rim under severe riding conditions.
The following are minimums:
Front 22 kPa (0.22 kgf/cm^2, 3.2 psi)
Rear 22 kPa (0.22 kgf/cm^2, 3.2 psi)

3) Use no more than
Front 250 kPa (2.5 kgf/cm^2, 36 psi)
Rear 250 kPa (2.5 kgf/cm^2, 36 psi)
when seating the tire beads. Higher pressures may cause the tire to burst.
Inflate the tires slowly and carefully.
Fast inflation could cause the tire to burst.

• MAXIMUM LOADING LIMIT
Vehicle load limits: 70.0 kg (154 lb)
***Total weight of the cargo, trailer hitch vertical load, rider, and accessories.**



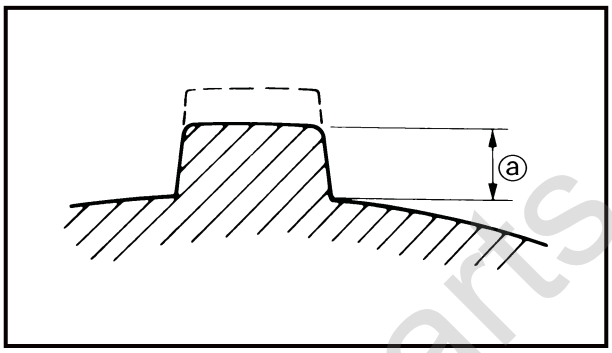
1. Measure:
• tire pressure
Out of specification → Adjust.

TIP
- The low-pressure tire gauge ① is included as standard equipment.
- If dust or the like is stuck to this gauge, it will not provide the correct readings. Therefore, take two measurements of the tire's pressure and use the second reading.

Cold tire pressure	Front	Rear
Standard	25 kPa (0.25 kgf/cm², 3.6 psi)	25 kPa (0.25 kgf/cm², 3.6 psi)
Minimum	23 kPa (0.23 kgf/cm², 3.3 psi)	23 kPa (0.23 kgf/cm², 3.3 psi)
Maximum	28 kPa (0.28 kgf/cm², 4.1psi)	28 kPa (0.2 8 kgf/cm², 4.1psi)

WARNING

Uneven or improper tire pressure may adversely affect the handling of this machine 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.**

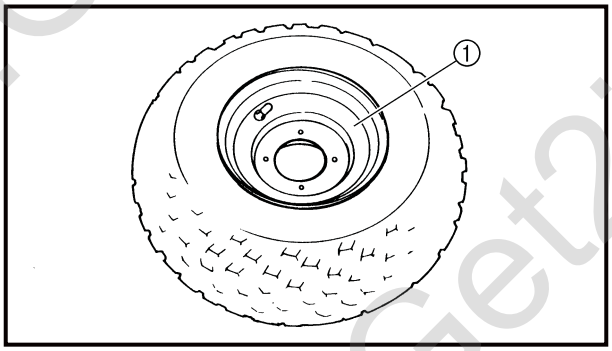


2. Check:
• tire surfaces
Wear/damage → Replace.

Tire wear limit ⓐ
Front and rear: 3 mm (0.12 in)

WARNING

It is dangerous to ride with a worn-out tire. When tire wear is out of specification, replace the tire immediately.



CHECKING THE WHEELS

1. Check:
• wheel ①
Damage/bends → Replace.

TIP

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

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.**

CHECKING AND LUBRICATING THE CABLES

WARNING

A damaged cable sheath may cause corrosion and interfere with the cable movement. An unsafe condition may result so replace a damaged cable as soon as possible.

1. Check:
   - cable sheath
     Damage → Replace.
2. Check:
   - cable operation
     Unsmooth operation → Lubricate or replace.

	Recommended lubricant **Lithium-soap-base grease**

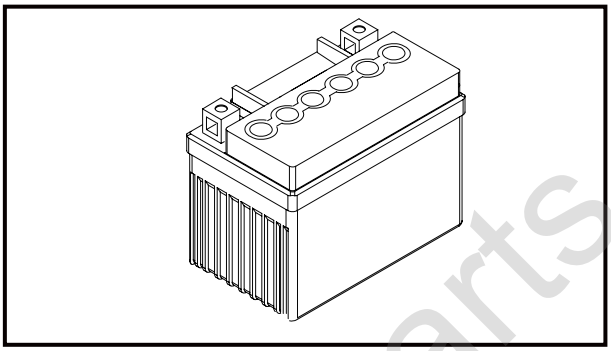
TIP

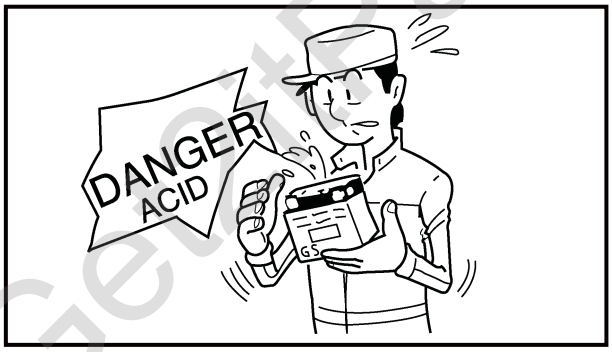
Hold the cable end up and apply several drops of lubricant to the cable.

LUBRICATING THE LEVERS, STEERING SHAFT AND STEERING KNUCKLES

Lubricate the pivoting point and metal-to-metal moving parts of the levers, steering shaft and steering knuckles.

	Recommended lubricant **Lithium-soap-base grease**





ELECTRICAL SYSTEM

CHECKING AND CHARGING THE BATTERY

⚠ 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.**

NOTICE

- **This is a sealed 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 an 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 illustrations. If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.**

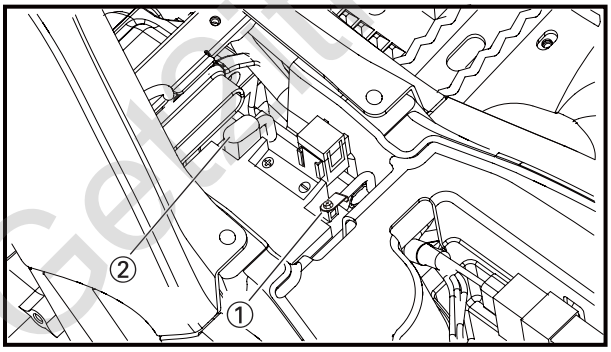
TIP

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:
   - seat
   - battery band

   Refer to "SEAT, FENDERS AND FUEL TANK".
2. Disconnect:
   - battery leads

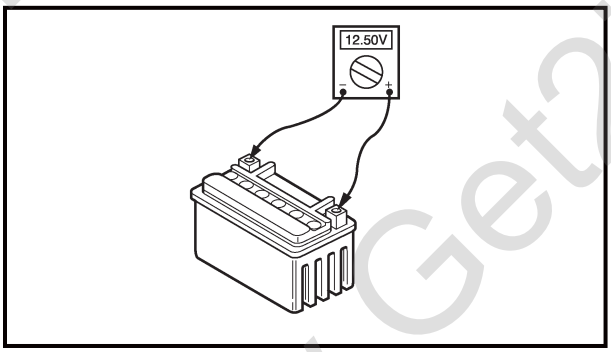
   (from the battery terminals)



NOTICE

First, disconnect the negative battery lead ①, and then the positive battery lead ②.

3. Remove:
   - battery
4. Check:
   - battery charge

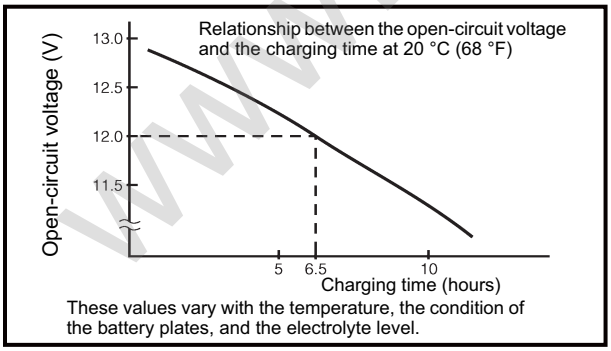


a. Connect a pocket tester to the battery terminals.

Positive tester probe →
positive battery terminal
Negative tester probe →
negative battery terminal

TIP

- The charge state of an VRLA (Valve Regulated Lead Acid) battery can be checked by measuring its open-circuit voltage (i.e., the voltage when the positive 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

c. Open-circuit voltage = 12.0 V
d. Charging time = 6.5 hours
e. Charge of the battery = 20 ~ 30%

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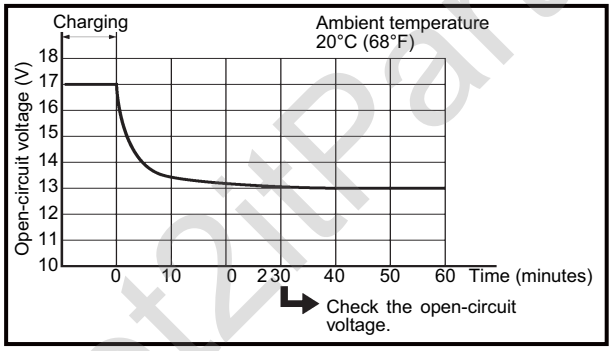
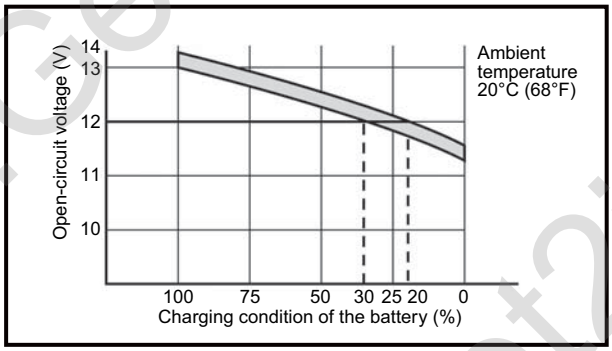




5. Charge:
   • battery
   (refer to the appropriate charging method illustration)

⚠ WARNING

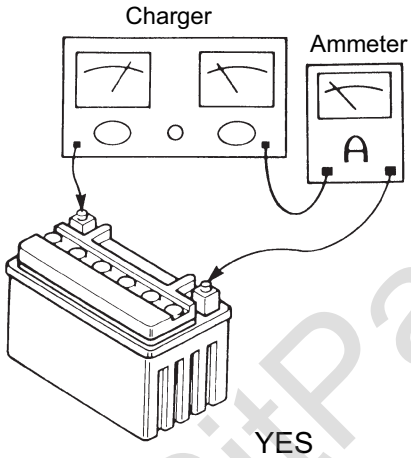
Do not quick charge a battery.

NOTICE

- **Never remove the VRLA (Valve Regulated Lead Acid) battery sealing caps.**
- **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 machine. (If charging has to be done with the battery mounted on the machine, 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 an 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.**

Charging method using a variable-current (voltage) charger



Measure the open-circuit voltage prior to charging.

TIP
Leave the battery unused for more than 30 minutes before measuring its open-circuit voltage.

Connect a charger and ammeter to the battery and start charging.

TIP
Set the charging voltage to 16~ 17V. (If the charging voltage is lower, charging will be insufficient, if it is higher, the battery will be over-charged.)

Is the amperage higher than the standard charging amperage written on the battery?

YES

NO

Adjust the charging voltage to 20 ~ 25 V.

Monitor the amperage for 3 ~ 5 minutes. Is the standard charging amperage exceeded?

YES

NO

Adjust the voltage to obtain the standard charging amperage.

If the amperage does not exceed the standard charging amperage after 5 minutes, replace the battery.

Set the timer to the charging time determined by the open-circuit voltage.
Refer to “CHECKING AND CHARGING THE BATTERY”.

If the required charging time exceeds 5 hours, it is advisable to check the charging amperage after 5 hours. If there is any change in the amperage, readjust the voltage to obtain the standard charging amperage.

Leave the battery unused for more than 30 minutes before measuring its open-circuit voltage.
12.8 V → Charging is complete.
12.0 ~ 12.7 V → Recharging is required.
Under 12.0 V → Replace the battery.

Charging method using a constant voltage charger

Measure the open-circuit voltage prior to charging.

TIP
Leave the battery unused for more than 30 minutes before measuring its open-circuit voltage.

Connect a charger and ammeter to the battery and start charging.

Is the amperage higher than the standard charging amperage written on the battery?

YES

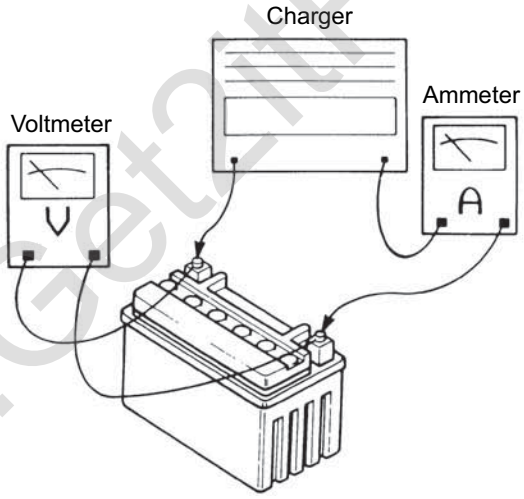
Charge the battery until the charging voltage reaches 15 V.

TIP
Set the charging time to a maximum of 20 hours.

Leave the battery unused for more than 30 minutes before measuring its open-circuit voltage.
12.8 V → Charging is complete.
12.0 ~ 12.7 V → Recharging is required.
Under 12.0 V → Replace the battery.

NO

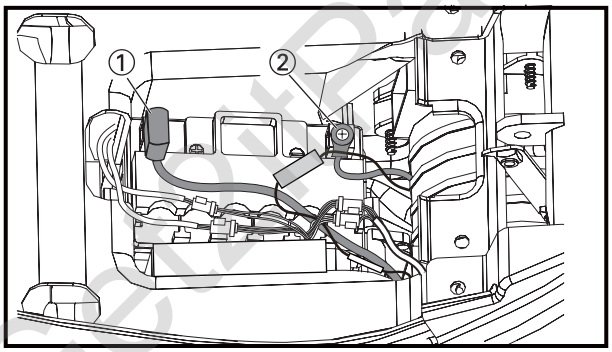
This type of battery charger cannot charge an VRLA battery. A variable-voltage charger is recommended.



NOTICE

Constant amperage chargers are not suitable for charging VRLA batteries.

6. Install:
   • battery



7. Connect:
   • battery leads
   (to the battery terminals)

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 band
    • seat
    Refer to “SEAT, FENDERS AND FUEL TANK”.

CHECKING THE FUSES

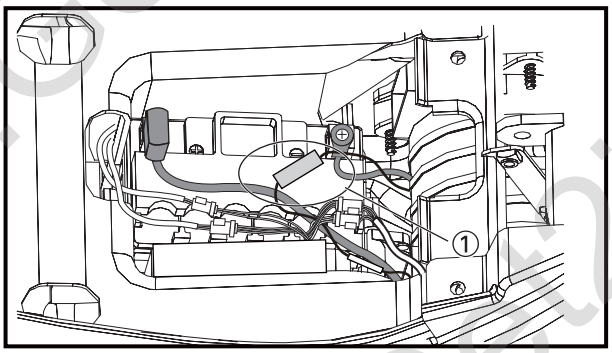
The following procedure applies to all of the fuses.

NOTICE

To avoid a short circuit, always set the main switch to "OFF" when checking or replacing a fuse.

1.Remove:
- seat

  Refer to "SEAT, FENDERS AND FUEL TANK".



2.Check:
- fuse ①

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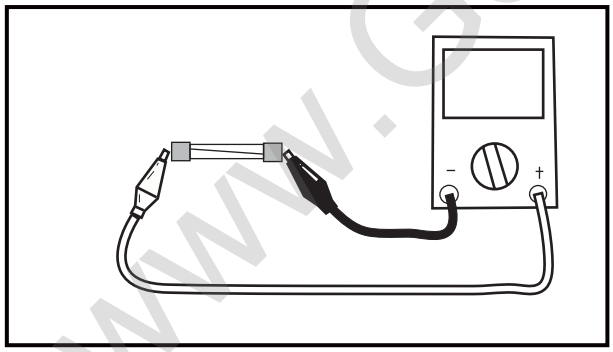
a. Connect the pocket tester to the fuse and check the continuity.

TIP

Set the pocket tester selector to "Ω x 1".



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.
c.Set on the switches to verify if the electrical circuit is operational.
d.If the fuse immediately blows again, check the electrical circuit.

Items	Amperage rating	Q'ty
Main	7A	1
Reserve	7A	1

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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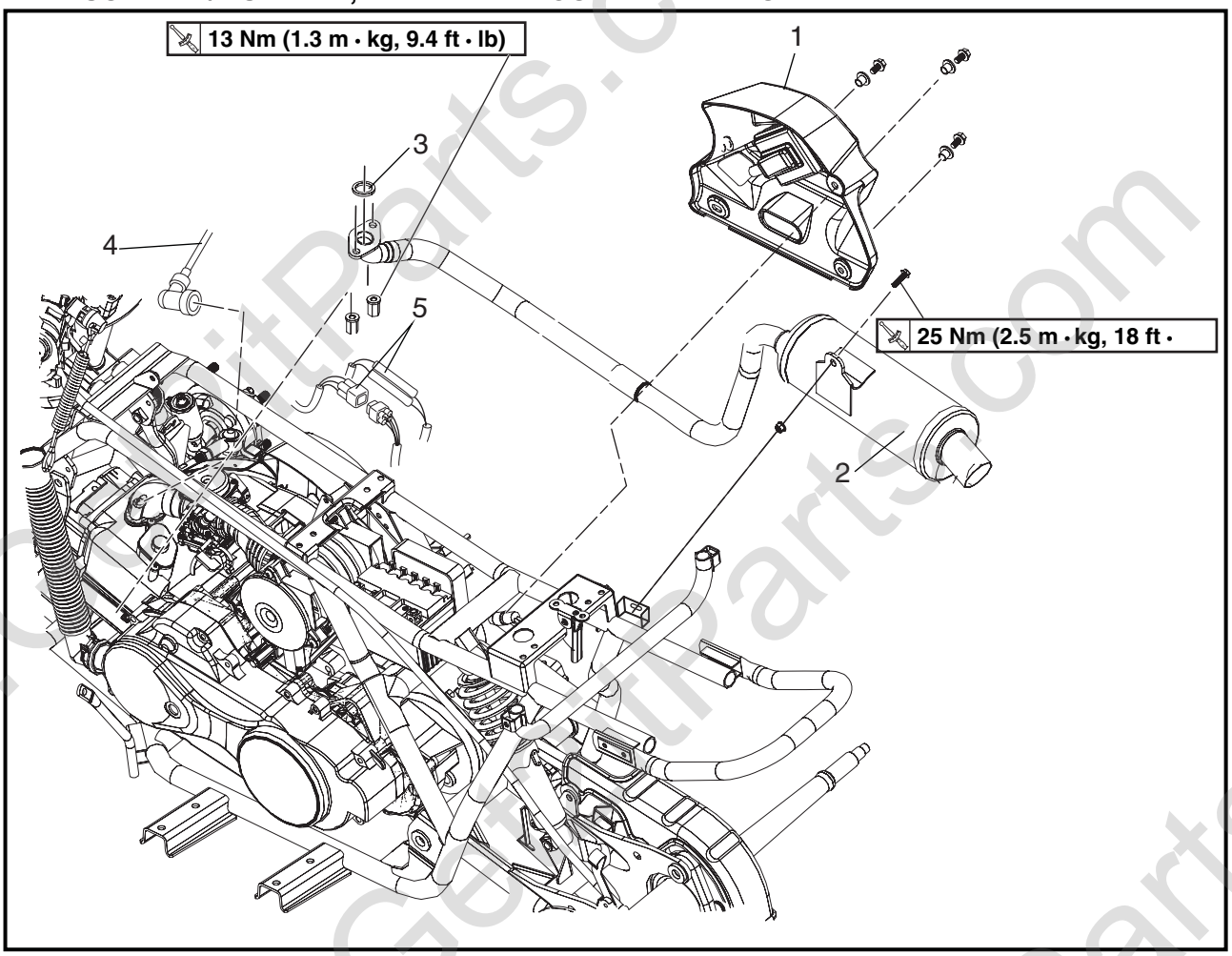
4. Install:
   • seat
   Refer to "SEAT, FENDERS AND FUEL TANK".

ENGINE

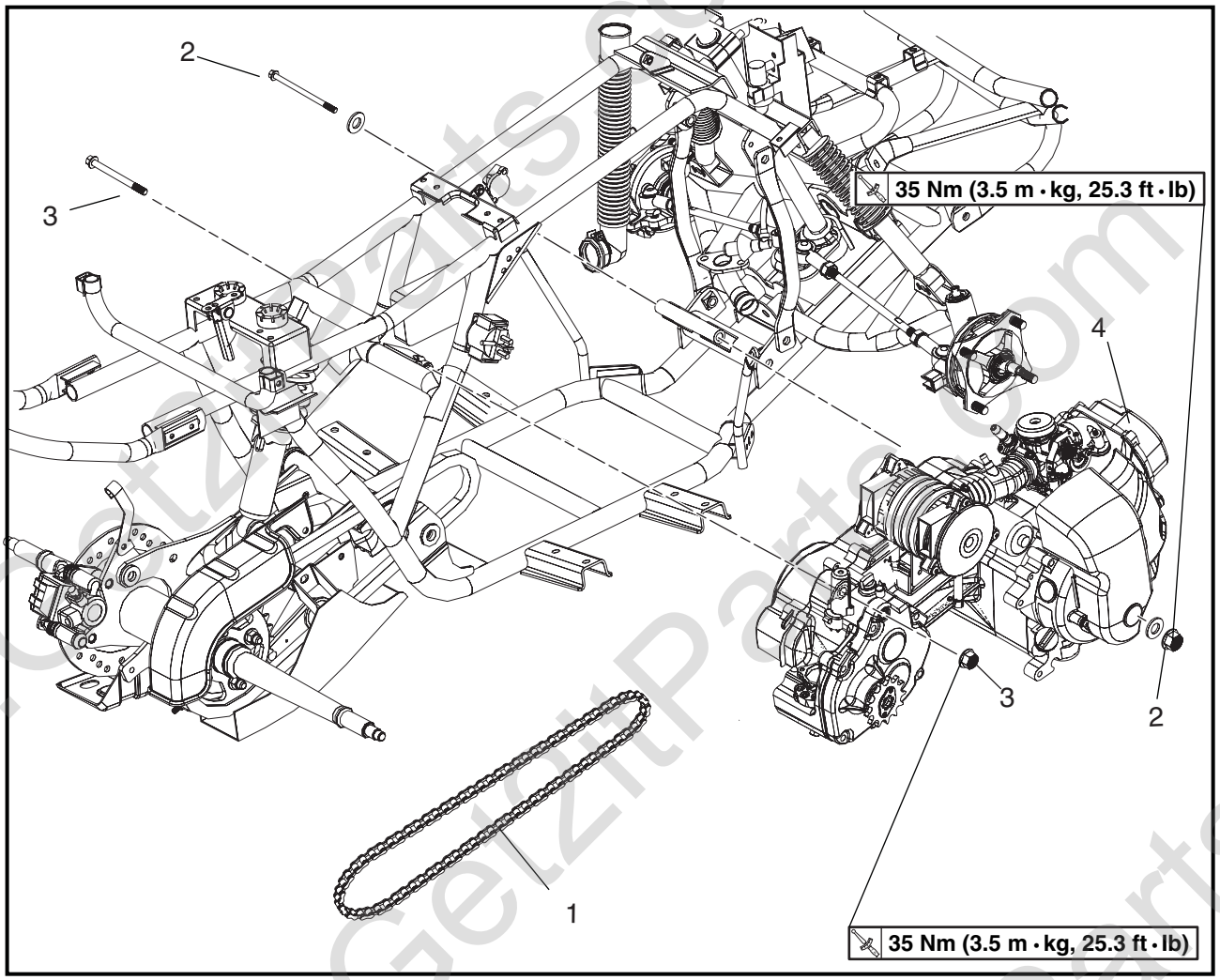
ENGINE

EXHAUST PIPE/MUFFLER, BREATHER HOSE AND LEADS

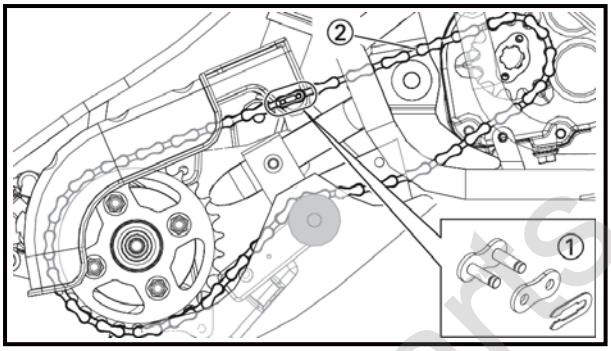


Order	Job/Part	Q'ty	Remarks
	Removing the exhaust pipe/muffler, breather hose and leads		Remove the parts in the order listed.
	Rear fender		Refer to "SEAT, FENDERS AND FUEL TANK" in chapter 3.
1	Cover,chain case 1	1	
2	Exhaust pipe/muffler	1	
3	Exhaust pipe gasket	1	
4	Spark plug lead	1	
5	Generator lead	2	
			For installation, reverse the removal procedure.

ENGINE MOUNTING BOLTS

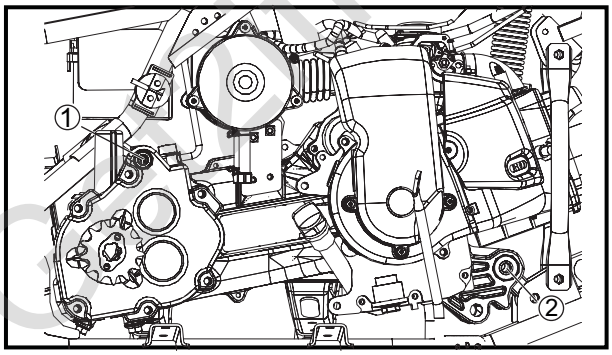


Order	Job/Part	Q'ty	Remarks
	Removing the engine mounting bolts		Remove the parts in the order listed.
	Carburetor		Refer to "CARBURETOR" in chapter 5.
1	Drive chain	1	Refer to "REMOVING THE ENGINE".
2	Lower engine mounting nut/bolt	1/1	Refer to "INSTALLING THE ENGINE".
3	Upper engine mounting nut/bolt	1/1	
4	Engine assembly	1	
			NOTICE **Install all of the bolts/nuts and then tighten them to full torque specifications.**
			For installation, reverse the removal procedure.



REMOVING THE ENGINE

1. Remove:
   - master link ①
   - drive chain ②



INSTALLING THE ENGINE

1. Install:
   - upper engine mounting bolt/nut ①
   - lower engine mounting bolt/nut ②

TIP

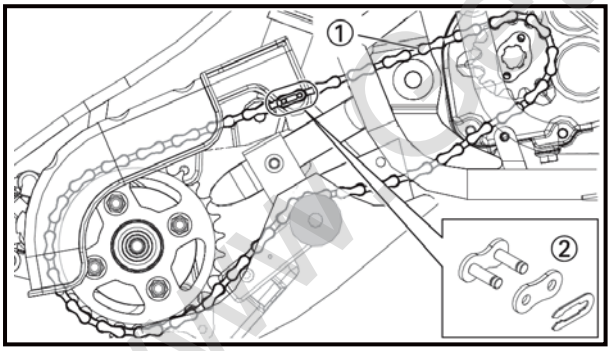
Do not fully tighten the bolts and nuts.

2. Tighten:
   - upper engine mounting nut ①

35 Nm (3.5 m · kg, 25.3 ft · lb)

   - lower engine mounting nut ②

35 Nm (3.5 m · kg, 25.3 ft · lb)

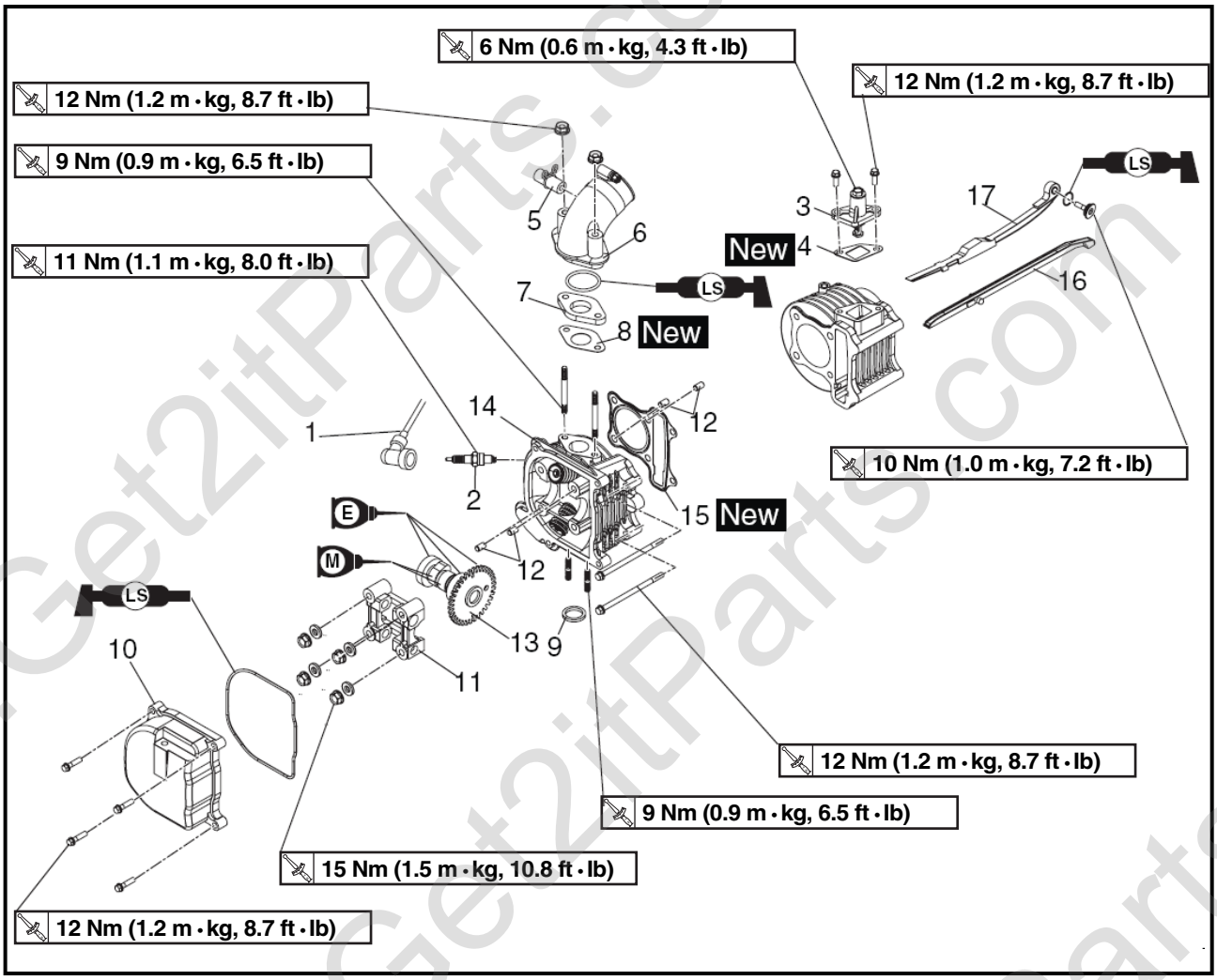


3. Install:
   - drive chain ①
   - master link ②

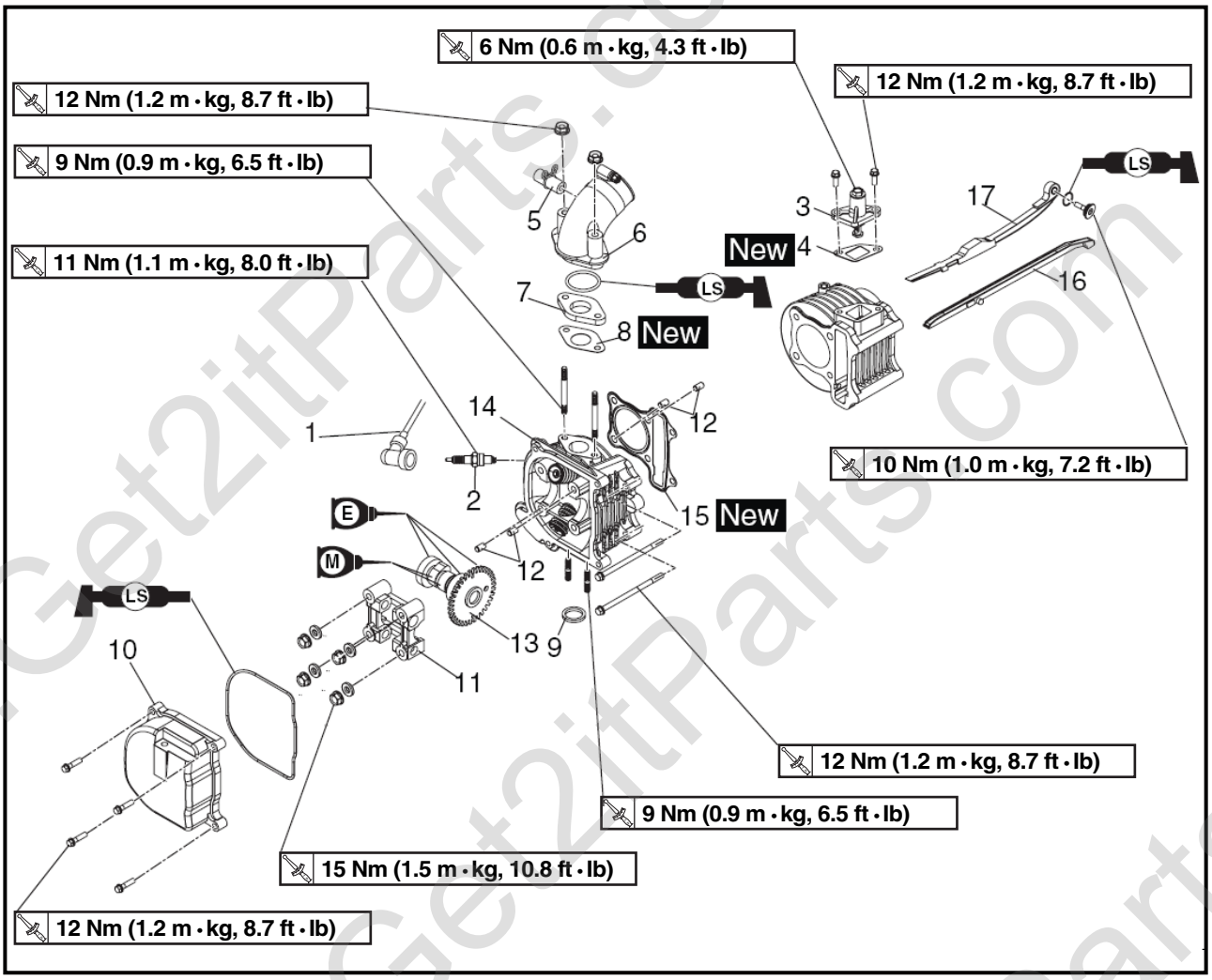
TIP

The master link clip must be installed with the rounded end facing the direction of travel.

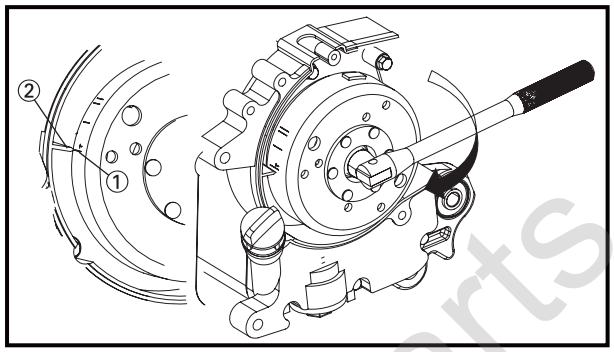
CYLINDER HEAD

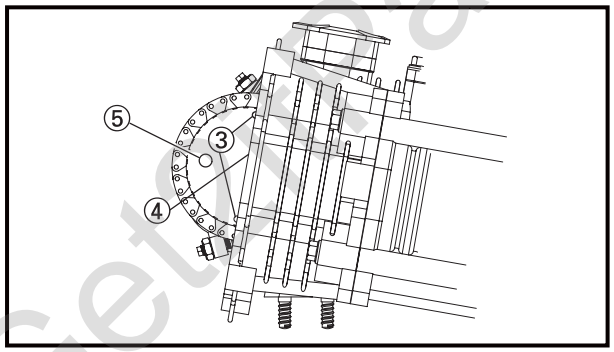


Order	Job/Part	Q'ty	Remarks
	Removing the cylinder head		Remove the parts in the order listed.
	Carburetor assembly		Refer to "CARBURETOR" in chapter 5.
	Exhaust pipe/muffler		Refer to "ENGINE".
1	Spark plug lead	1	
2	Spark plug	1	
3	Lifter comp tensioned	1	
4	Gasket, lifter tensioned	1	
5	Carb. rubber cap	1	
6	Pipe assy, inlet	1	
7	Insulator carburetor	1	
8	Gasket, carb. insulator	1	
9	Gasket exhaust pipe	1	



Order	Job/Part	Q'ty	Remarks
10	Cover assy head cylinder	1	Refer to "REMOVING THE CYLINDER HEAD" and "INSTALLING THE CYLINDER HEAD".
11	Holder cam shaft	1	
12	Pin, dowel	4	
13	Cam shaft comp.	1	
14	Head comp cylinder	1	
15	Gasket cylinder head	1	
16	Guide cam chain	1	
17	Guide tension cam chain	1	
			For installation, reverse the removal procedure.





REMOVING THE CYLINDER HEAD

1. Align:
   - "T" mark on the rotor
     (with the stationary pointer on the crankcase)

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a. Turn the crankshaft clockwise with a wrench.
b. Align the "T" mark ① on the rotor with the stationary pointer ② on the crankcase.
   When the "T" mark is aligned with the stationary pointer, the piston is at Top Dead Center (TDC).

TIP

TDC on compression stroke check:

- Both rocker arms must have a valve clearance when the camshaft sprocket alignment mark ③ is aligned with the cylinder head alignment mark ④ , and the round hole ⑤ in camshaft sprocket away from the cylinder head.
- If not, give the crankshaft one counterclockwise turn to meet the above condition.

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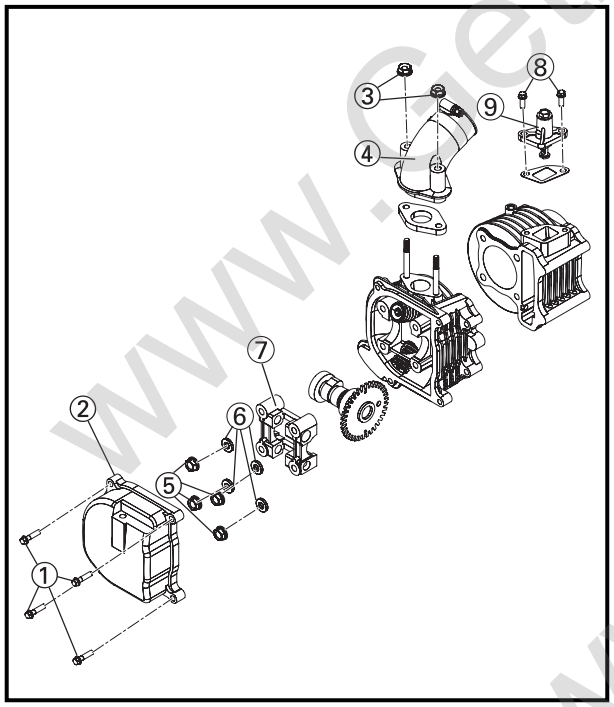


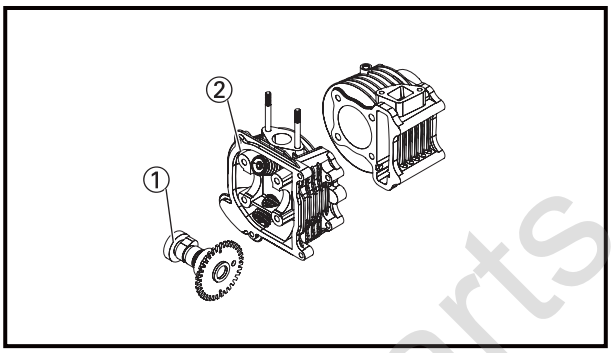
2.Remove:

- bolt, flg. (small head) ①
- cover assy head cylinder ②
- nut flange ③
- pipe assy, inlet ④
- nut flange ⑤
- washer ⑥
- holder cam shaft ⑦

TIP

- Working in a crisscross pattern, loosen each nut 1/4 of a turn.

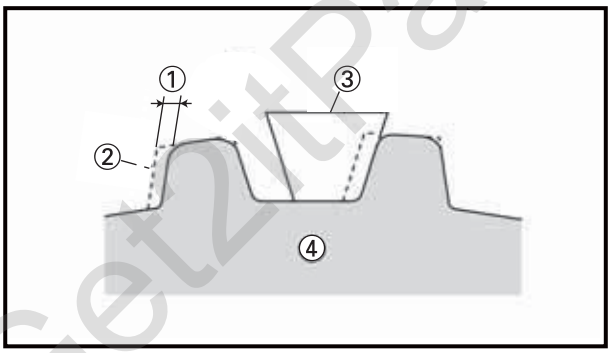
- bolt, flg. (small head) ⑧
- lifter comp tensioned ⑨



3. Remove:
   • cam shaft comp. ①
   • cyl. head assy. ②

TIP

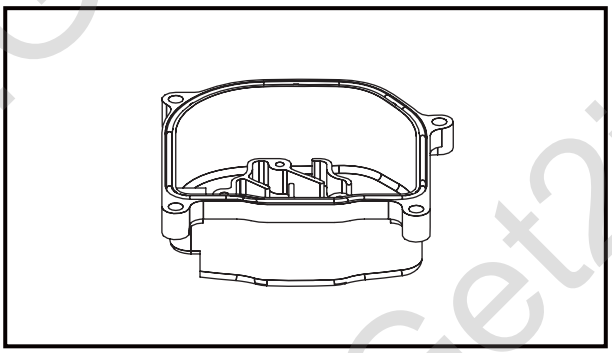
Fasten a safety wire to the timing chain to prevent it from falling into crankcase.



CHECKING THE CAMSHAFT SPROCKET

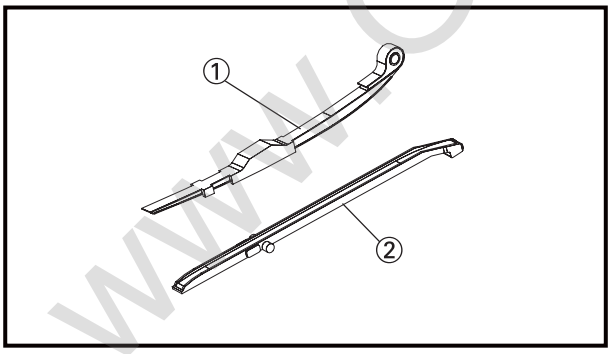
1. Check:
   • camshaft sprocket
   More than 1/4 tooth wear ① → Replace the cam shaft comp. and timing chain as a set.

① 1/4 of a tooth
② correct
③ roller
④ sprocket



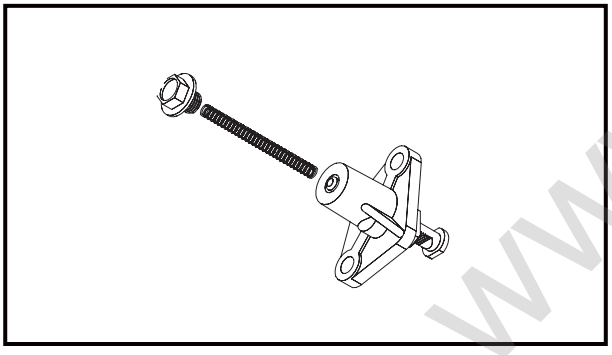
CHECKING THE CYL. HEAD COVER ASSY.

1. Check:
   • cover assy head cylinder
   • gasket cover head cylinder
   Cracks/damage → Replace.



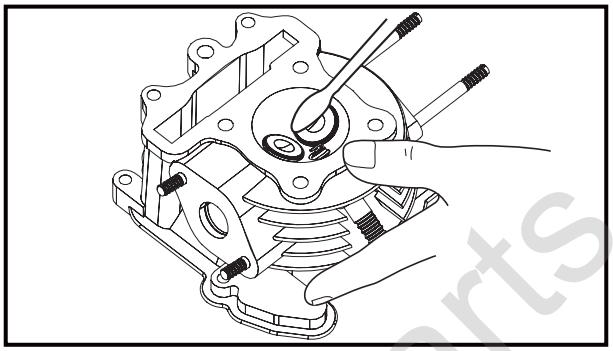
CHECKING THE TIMING CHAIN GUIDES

1. Check:
   • guide tension cam chain ①
   • guide cam chain ②
   Wear/damage → Replace.



CHECKING THE TIMING CHAIN TENSIONER ASSEMBLY

1. Check:
   • lifter comp tensioned
   Wear/damage → Replace.



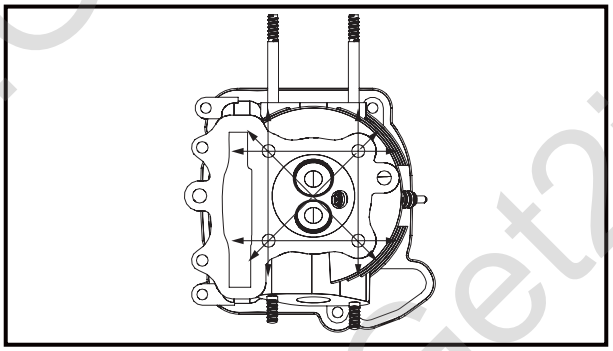
CHECKING THE CYLINDER HEAD

1. Eliminate:
   • combustion chamber carbon deposits (with a rounded scraper)

TIP

Do not use a sharp instrument to avoid damaging or scratching:
• spark plug bore threads
• valve seats

2. Check:
   • cylinder head
     Damage/scratches → Replace.



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

Maximum cylinder head warpage
0.05 mm (0.002 in)

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a. Place a straightedge and a thickness gauge 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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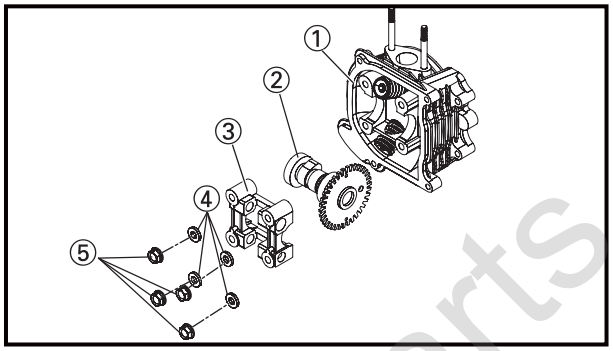

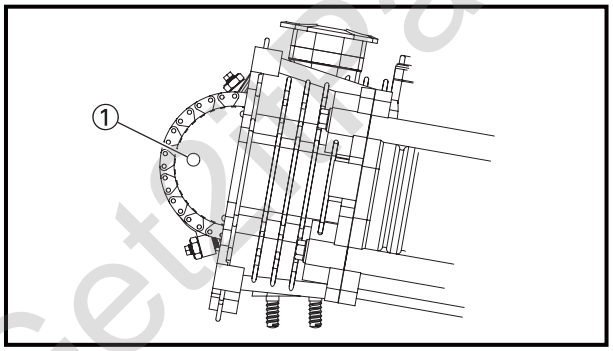

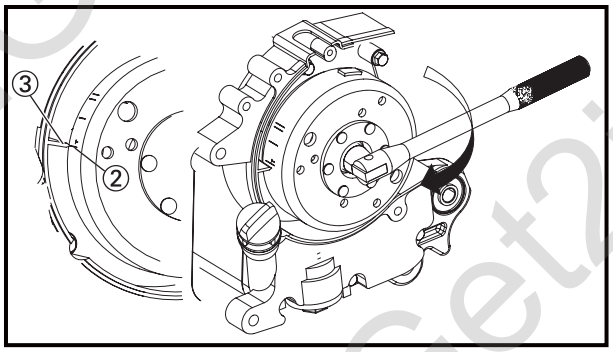

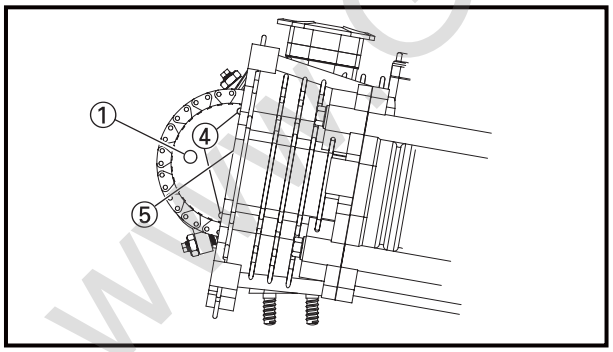

INSTALLING THE CYLINDER HEAD

1. Install:
   - cyl. head assy. 1 ①
   - cam shaft comp. ②
   - cap, camshaft ③
   - washer ④
   - nut ⑤

TIP

Tighten the nuts in two stages and a crisscross pattern.

2. Install:
   - cam shaft comp.

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a. Rotate the camshaft to align the round hole ① in camshaft sprocket away from the cylinder head.
b. Turn the crankshaft clockwise with a wrench.
c. Align the "T" mark ② on the rotor with the stationary pointer ③ on the crankcase. When the "T" mark is aligned with the stationary pointer, the piston is at the Top Dead Center (TDC).

NOTICE

Do not turn the crankshaft during the camshaft comp. installation.

d. Place the timing chain onto the camshaft sprocket.
e. Install the camshaft cap onto the camshaft comp. and finger tighten the nut with washer.

TIP

When the camshaft sprocket alignment mark ④ is aligned with the cylinder head alignment mark ⑤ , be sure to align the round hole ① in camshaft sprocket away from the cylinder head.

f. Force the camshaft clockwise and counterclockwise to remove timing chain slack.
g. Insert a screwdriver into the timing chain tensioner hole and push the timing chain guide inward.
h. While pushing the timing chain guide and the camshaft sprocket alignment mark ④ is aligned with the cylinder head alignment mark ⑤ ,be sure to align the round hole ① in camshsft sprocket away from the cylinder head.

i. If the marks are aligned, temporarily tighten the camshaft sprocket bolt. If the marks are not aligned, change the meshing position of the camshaft sprocket and timing chain.

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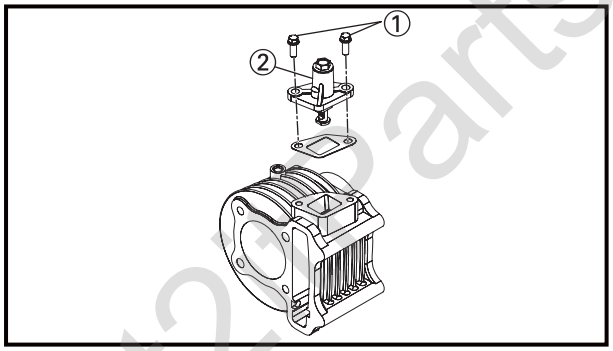


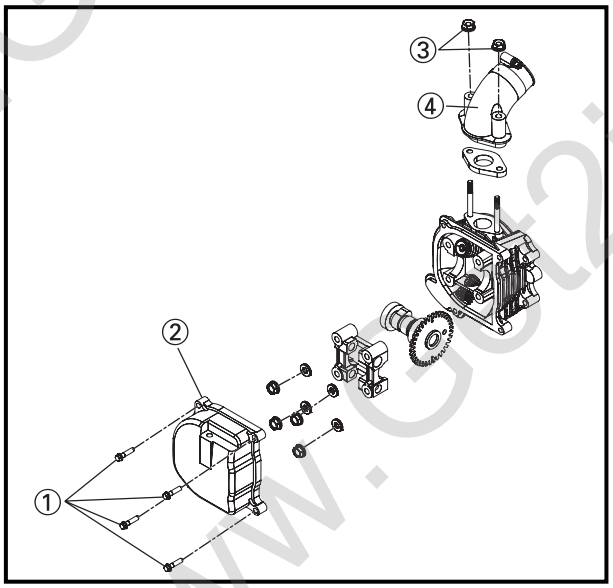
3. Install:
   - bolt, flg. (small head) ①
   - tensioner assy. ②

⚠ WARNING

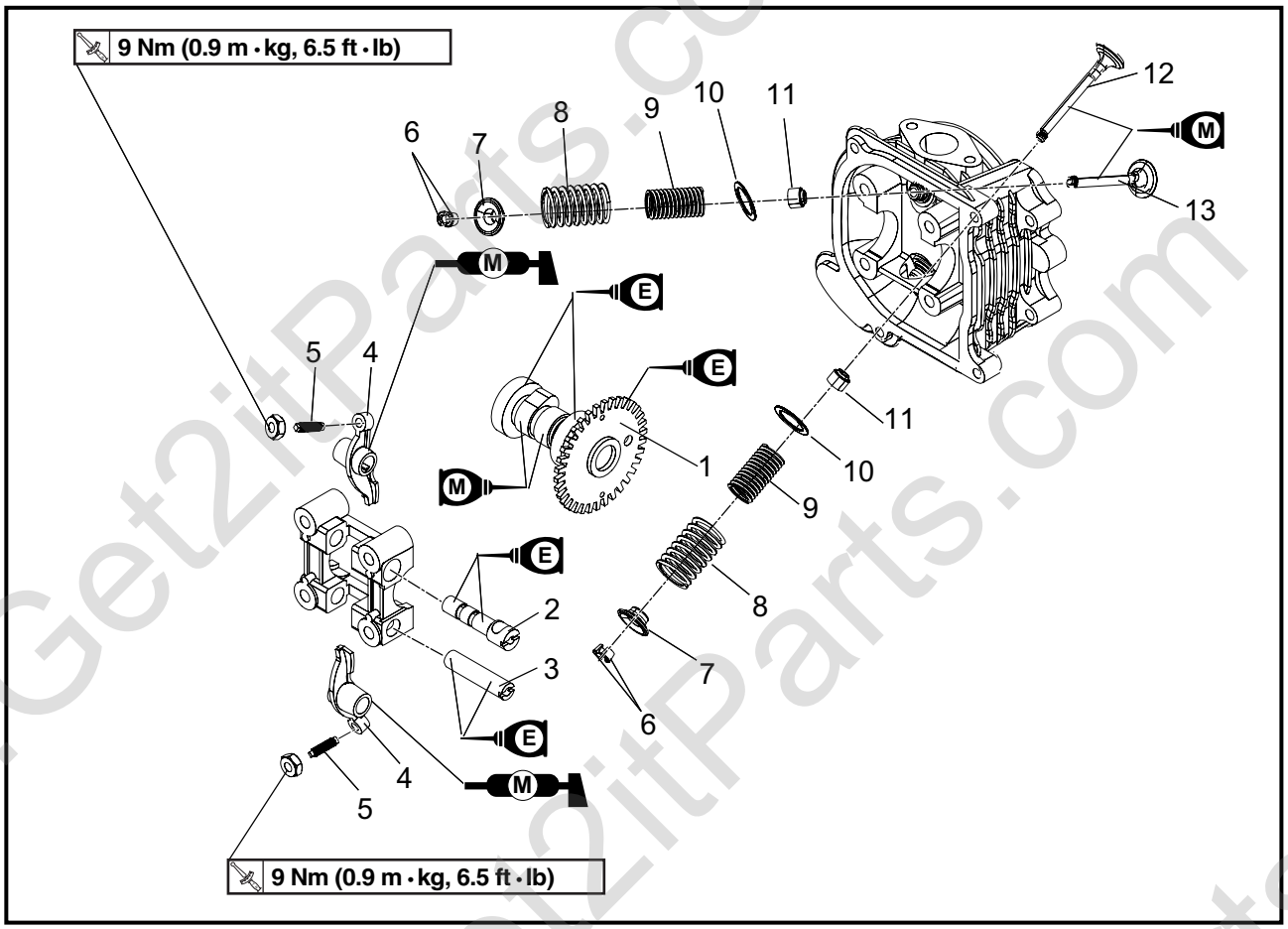
Always use a new gasket.

4. Adjust:
   - timing chain tensioner
5. Check:
   - camshaft sprocket alignment mark
   - rotor "T" mark

   Out of alignment → Adjust.
6. Install:
   - bolt, flg. (small head) ①
   - cyl. head cover assy. ②
   - nut ③
   - carb. joint assy. ④



CAMSHAFT, ROCKER ARMS AND VALVES



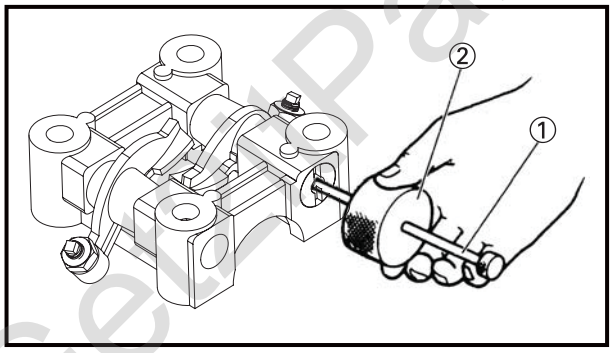
Order	Job/Part	Q'ty	Remarks
	Removing the camshaft, rocker arms and valves		Remove the parts in the order listed.
	Cylinder head		Refer to "CYLINDER HEAD".
1	Cam shaft comp.	1	Refer to "REMOVING THE ROCKER ARMS AND CAMSHAFT" and "INSTALLING THE CAMSHAFT AND ROCKER ARMS".
2	Shaft in rocker arm	1	
3	Shaft ex rocker arm	1	
4	Arm valve rocker	2	
5	Screw tappet adjusting	2	
6	Cotter valve	4	Refer to "REMOVING THE VALVES AND VALVE SPRINGS" and "INSTALLING THE VALVES AND VALVE SPRINGS".
7	Retainer valve spring	2	
8	Spring valve outer	2	
9	Spring valve inner	2	
10	Seat valve spring outer	2	
11	Seal valve stem	2	
12	Valve exhaust	1	
13	Valve inlet	1	
			For installation, reverse the removal procedure.

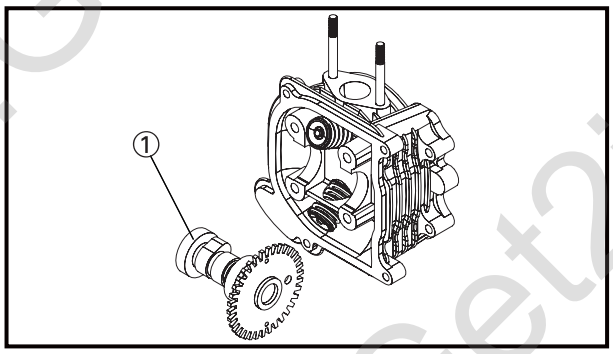
REMOVING THE ROCKER ARMS AND CAMSHAFT

1. Loosen:
   - locknuts
   - screw, valve adjusting
2. Remove:
   - shaft in rocker arm
   - shaft ex rocker arm
   - intake rocker arm
   - exhaust rocker arm

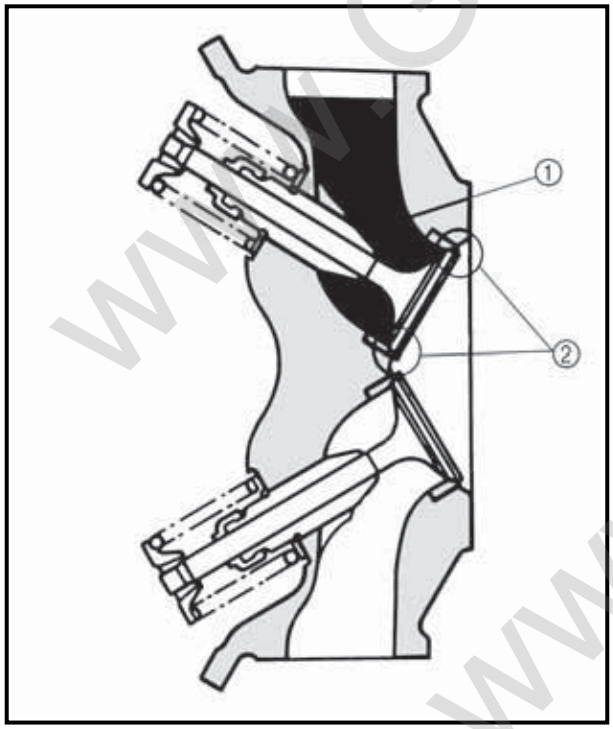
TIP

Remove the rocker arm shafts with the slide hammer bolt ① and weight ②.





3. Remove:
   - camshaft comp. ①



REMOVING THE VALVES AND VALVE SPRINGS

1. Check:
   - valve sealing

     Leakage at the valve seat → Check the valve face, valve seat and valve seat width. Refer to “CHECKING THE VALVES AND VALVE SPRINGS”.

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a. Pour a clean solvent ① into the intake and exhaust ports.
b. Check that the valve seals properly.

   There should be no leakage at the valve seat ②.

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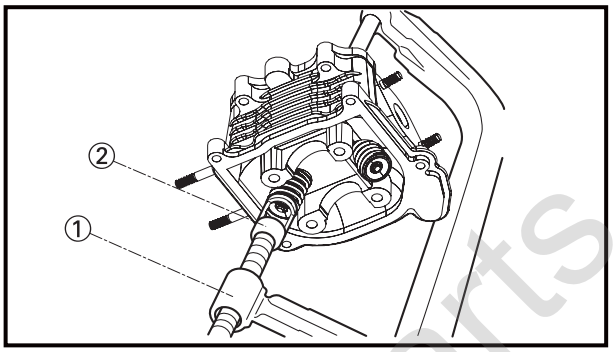
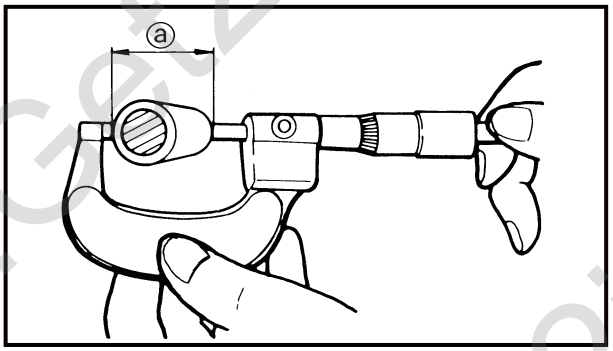
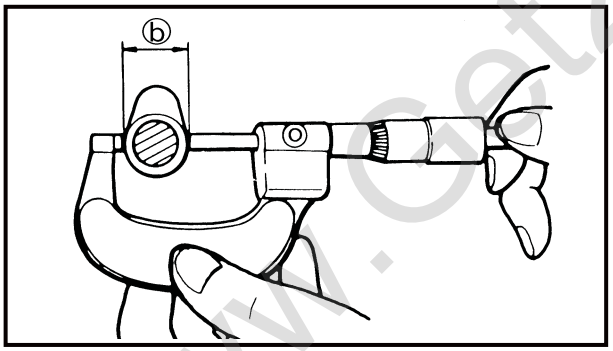


2. Remove:
• valve cotters

TIP

Attach a valve spring compressor ① and attachment ② between the valve spring retainer and the cylinder head to remove the valve cotters.





CHECKING THE CAMSHAFT

1. Check:
• cam lobes
Pitting/scratches/blue discoloration → Replace.
2. Measure:
• cam lobe dimensions ⓐ and ⓑ
Out of specification → Replace.

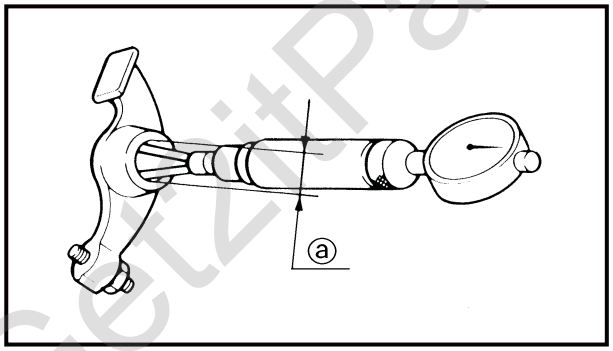
Camshaft lobe limit
Intake
ⓐ 25.583 mm (1.0072 in)
ⓑ 20.886 mm (0.8223 in)
Exhaust
ⓐ 25.425 mm (1.0010 in)
ⓑ 20.886 mm (0.8223 in)

CHECKING THE ROCKER ARMS AND ROCKER ARM SHAFTS

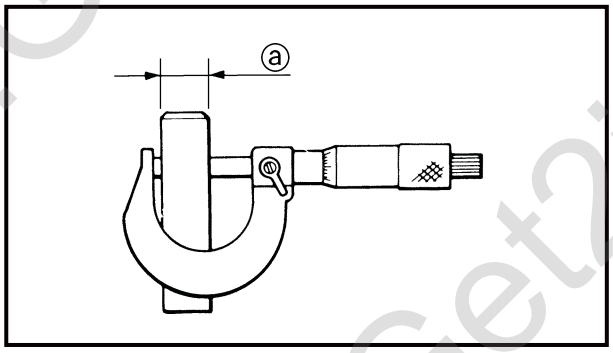
The following procedure applies to all of the rocker arms and rocker arm shafts.

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. Check:
   • camshaft lobe
   Excessive wear → Replace the camshaft.
4. Measure:
   • rocker arm inside diameter ⓐ
   Out of specification → Replace.



Rocker arm inside diameter
10.1 mm (0.3976 in)



5. Measure:
   • rocker arm shaft outside diameter ⓐ
   Out of specification → Replace.

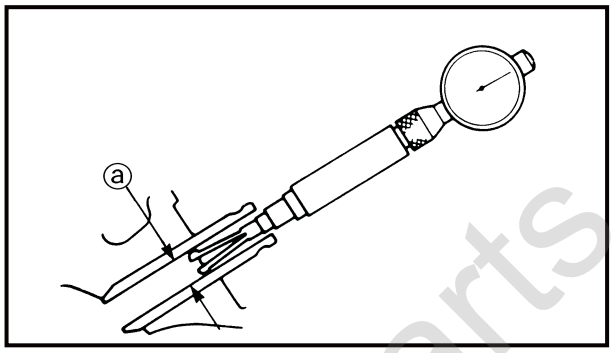
Rocker arm shaft outside diameter
9.91 mm (0.3902 in)

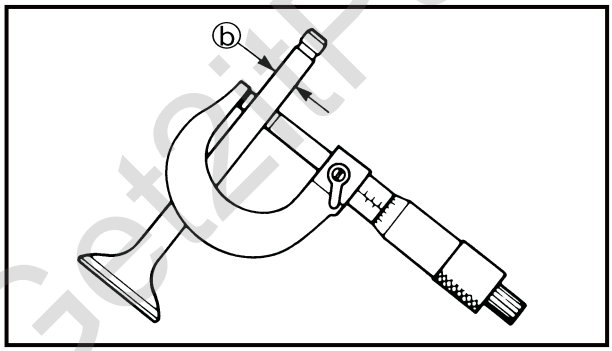
6. Calculate:
   • rocker-arm-to-rocker-arm-shaft clearance

TIP
Calculate the clearance by subtracting the rocker arm shaft outside diameter from the rocker arm inside diameter.

Out of specification → Replace the defective part(s).

Rocker-arm-to-rocker-arm-shaft clearance
0.013 ~ 0.043 mm
(0.0005 ~ 0.0017 in)





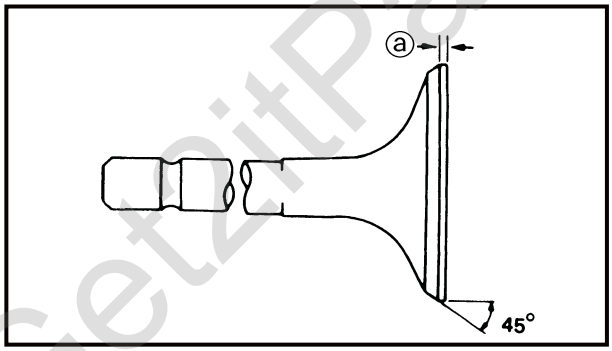
CHECKING THE VALVES AND VALVE SPRINGS

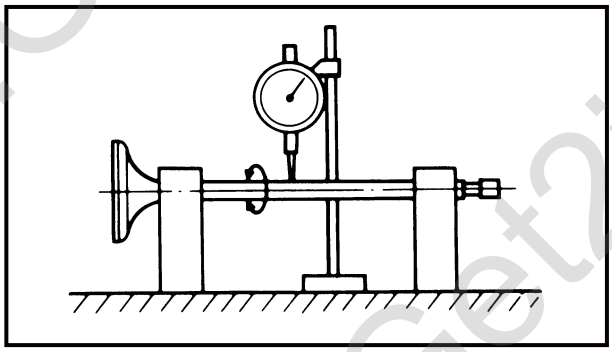
1. Measure:
   • Stem-to-guide clearance

Stem-to-guide clearance =
valve guide inside diameter ⓐ –
valve stem diameter ⓑ

• Out of specification → Replace the cylinder head ass'y.

Stem-to-guide clearance
Intake
0.010 ~ 0.037 mm
(0.0004 ~ 0.0015 in)
<Limit>: 0.08 mm (0.0031 in)
Exhaust
0.025 ~ 0.052 mm
(0.0010 ~ 0.0020 in)
<Limit>: 0.10 mm (0.0039 in)





2. Check:
   - valve face
     Pitting/wear → Grind the face.
   - valve stem end
     Mushroom shape or diameter larger than the body of the stem → Replace.
3. Measure:
   - margin thickness ⓐ
     Out of specification → Replace.

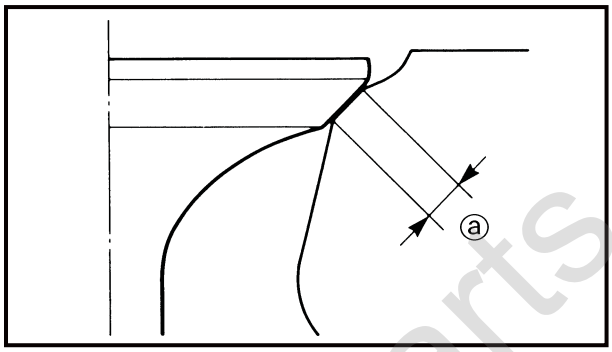
Margin thickness
Intake
0.5 ~ 0.9 mm
(0.0197 ~ 0.0354 in)
Exhaust
0.6 ~ 1.0 mm
(0.0236 ~ 0.0394 in)

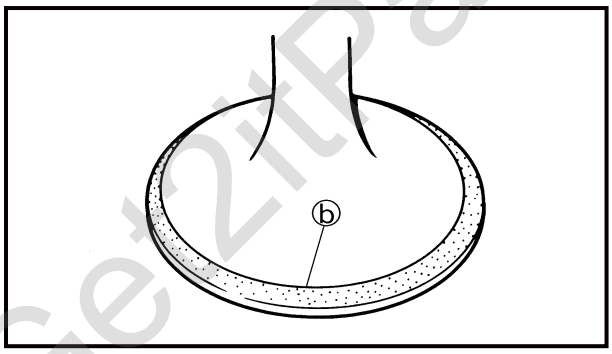
4. Measure:
   - runout (valve stem)
     Out of specification → Replace.

Runout limit
0.02 mm (0.0008 in)

TIP
- When installing a new valve always replace the guide.
- If the valve is removed or replaced always replace the oil seal.

5. Eliminate:
   - carbon deposits
     (from the valve face and valve seat)
6. Check:
   - valve seats
     Pitting/wear → Reface the valve seat.





7. Measure:
   • valve seat width ⓐ
   Out of specification → Reface the valve seat.

Valve seat width
Intake
0.8 ~ 1.1 mm
(0.0315 ~ 0.0433 in)
<Limit>: 1.6 mm (0.063 in)
Exhaust
0.8 ~ 1.1 mm
(0.0315 ~ 0.0433 in)
<Limit>: 1.6 mm (0.063 in)

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a. Apply Mechanic's blueing dye (Dykem) ⓑ to 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 pattern.
d. Measure the valve seat width. Where the valve seat and valve face made contact, blueing will have been removed.
e. If the valve seat is too wide, too narrow, or the seat is not centered, the valve seat must be refaced.

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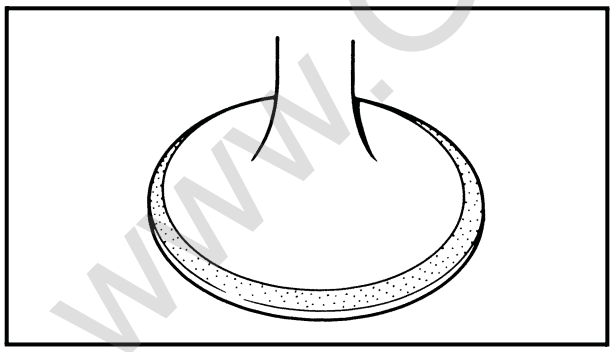

8. Lap:
   • valve face
   • valve seat

TIP

After refacing the valve seat or replacing the valve and valve guide, the valve seat and valve face should be lapped.

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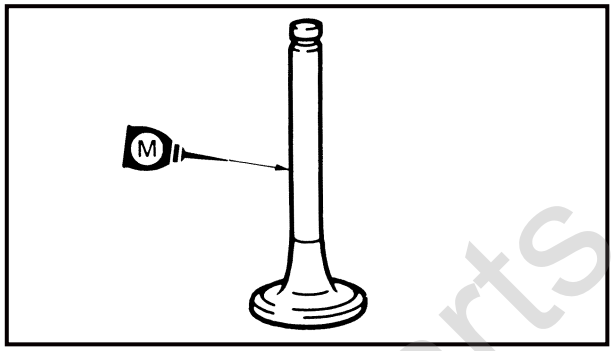
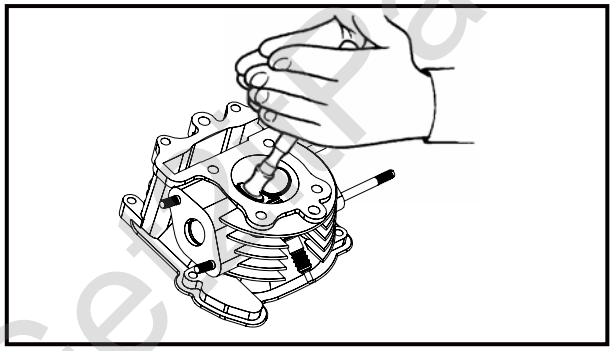
a. Apply a coarse lapping compound to the valve face.

NOTICE

Do not let the compound enter the gap between the valve stem and the guide.





b. Apply molybdenum disulfide oil to 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 compound.

TIP

For 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.

TIP

After every lapping operation be sure to clean off all of the compound from the valve face and valve seat.

f. Apply Mechanic's blueing dye (Dykem) to the valve face.
g. Install the valve into the cylinder head.
h. Press the valve through the valve guide and onto the valve seat to make a clear pattern.
i. Measure the valve seat width again. If the valve seat width is out of specification, reface and relap the valve seat.

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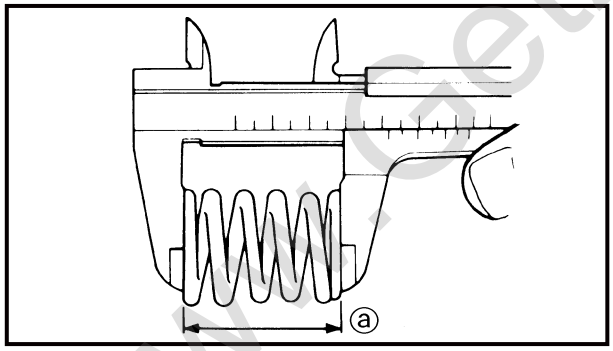
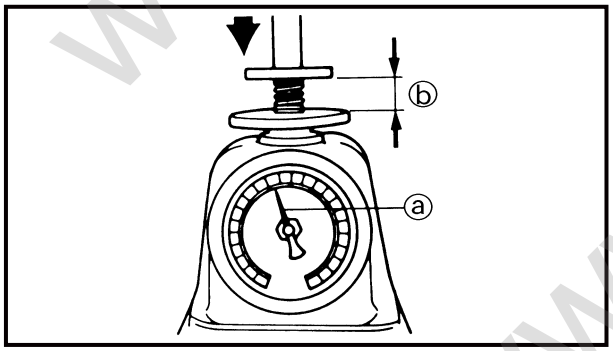


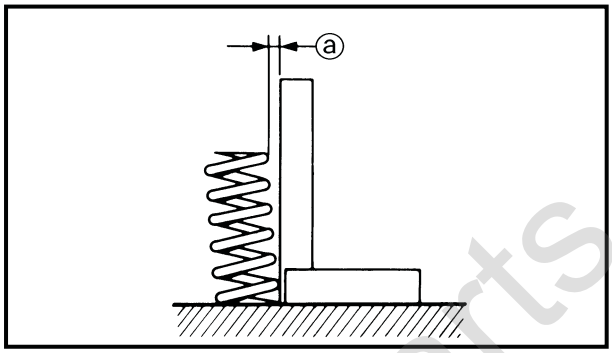
9.Measure:
- valve spring free length ⓐ
  Out of specification → Replace.

Valve spring free length
Inner spring
30.00 mm (1.18 in)
<Limit>: 27.00 mm (1.06 in)
Outer spring
33.50 mm (1.32 in)
<Limit>: 30.50 mm (1.20 in)



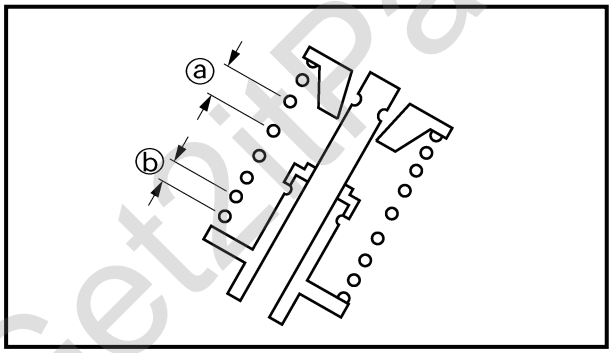
10.Measure:
- compressed spring force ⓐ
  Out of specification → Replace.
  ⓑ Installed length

Compressed spring force
Inner spring
39.14 ~ 47.77 N at 22.45 mm
(3.99 ~ 4.87 kg,
8.80 ~ 10.74 lb at 0.884 in)
Outer spring
73.75 ~ 90.03 N at 25.45 mm
(7.52 ~ 9.18 kg,
16.57 ~ 20.23 lb at 1.00 in)



11.Measure:
- spring tilt ⓐ
  Out of specification → Replace.

Spring tilt limit
Inner
2.0°/1.1 mm(2.0°/0.04 in)



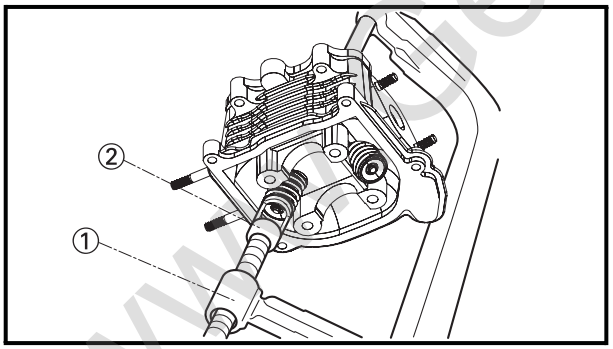
INSTALLING THE VALVES AND VALVE SPRINGS

1. Apply:
   - molybdenum disulfide oil
     (onto the valve stem and valve stem seal)
2. Install:
   - valve spring seats
   - valve stem seals New
   - valves
   - valve springs
   - valve spring retainers

TIP

Install the valve springs with the larger pitch ⓐ facing upwards.

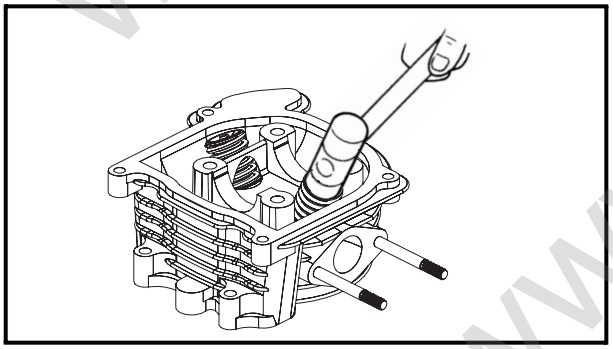
ⓑ Smaller pitch



3. Install:
   - valve cotters

TIP

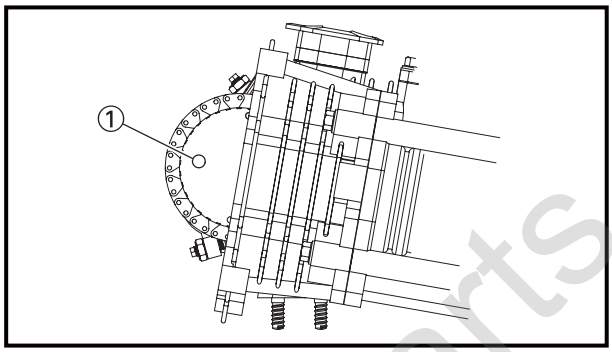
Install the valve cotters while compressing the valve spring with the valve spring compressor ① and attachment ②.

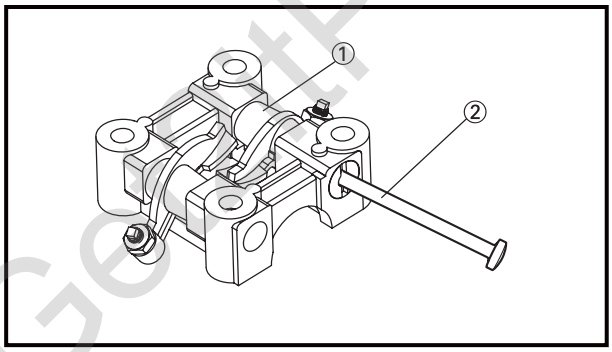


4. To secure the valve cotters onto the valve stem, lightly tap the valve tip with a piece of wood.

NOTICE

Hitting the valve tip with excessive force could damage the valve.





INSTALLING THE CAMSHAFT AND ROCKER ARMS

1. Install:
   - camshaft comp.

TIP

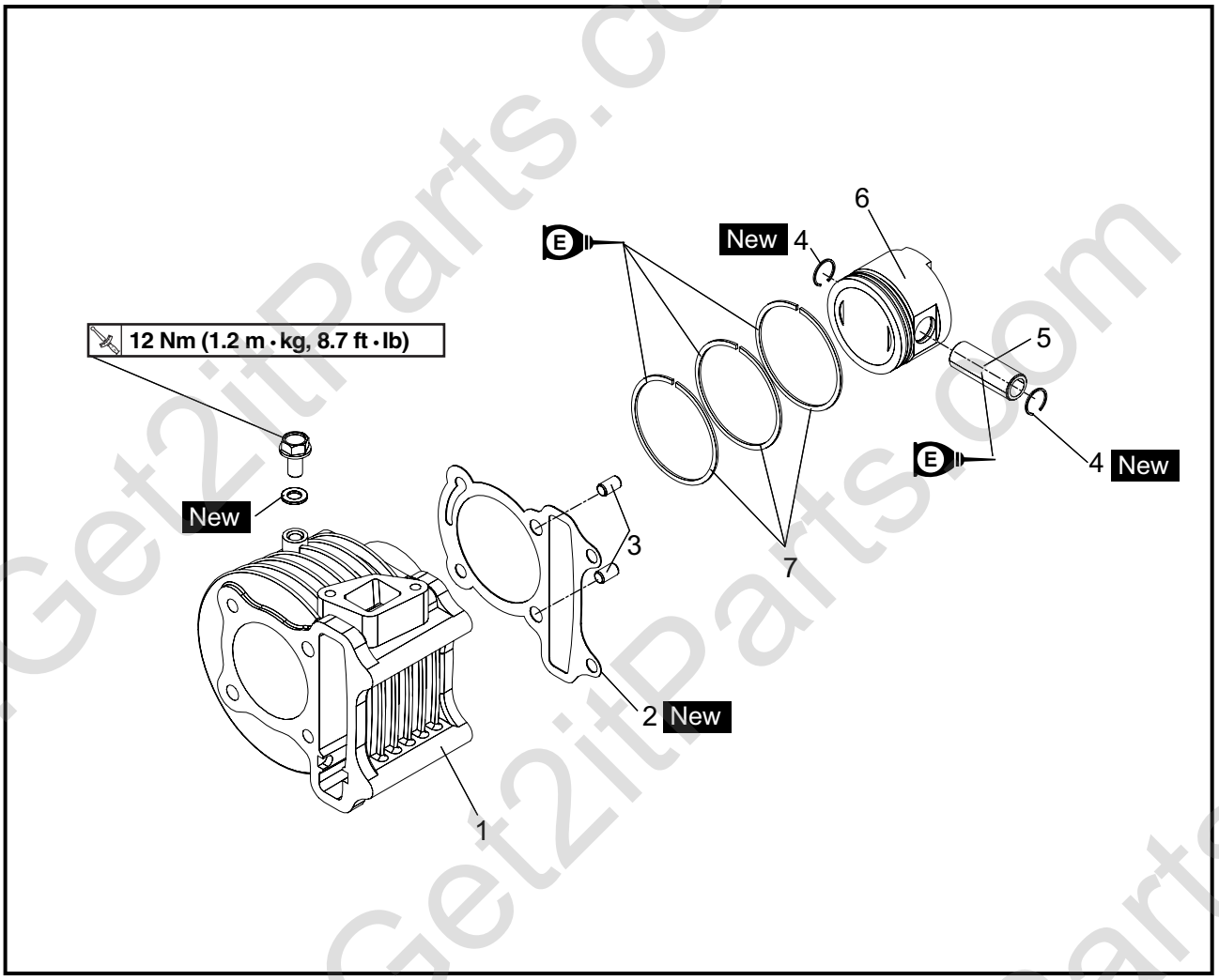
Be sure to align the round hole ① in camshaft sprocket away from the cylinder head.

2. Apply:
   - engine oil
     (onto the rocker arm shafts)
3. Install:
   - rocker arms ①
   - rocker arm shafts

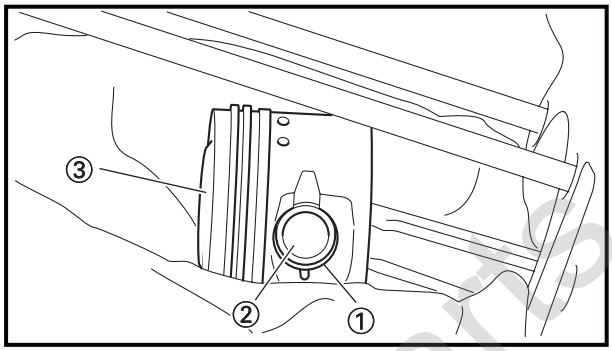
TIP

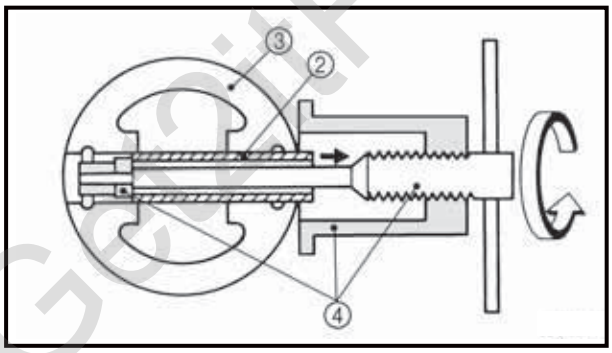
Use a slide hammer bolt ② to install the rocker arm shaft.

CYLINDER AND PISTON



Order	Job/Part	Q'ty	Remarks
	Removing the cylinder and piston		Remove the parts in the order listed.
	Cylinder head		Refer to "CYLINDER HEAD".
1	Cylinder	1	Refer to "INSTALLING THE CYLINDER".
2	Cylinder gasket	1	
3	Dowel pin	2	
4	Piston pin clip	2	
5	Piston pin	1	Refer to "REMOVING THE PISTON" and "INSTALLING THE PISTON".
6	Piston	1	
7	Piston ring set	1	
			For installation, reverse the removal procedure.





REMOVING THE PISTON

1. Remove:
   - piston pin clips ①
   - piston pin ②
   - piston ③

TIP

- Before removing the piston pin clip, cover the crankcase opening with a clean rag to prevent the piston pin clip from falling into the crankcase.
- Before removing each piston pin, deburr the clip groove and pin hole area. If the piston pin groove is deburred and the piston pin is still difficult to remove, use the piston pin puller ④.

NOTICE

Do not use a hammer to drive the piston pin out.

2. Remove:
   - piston rings

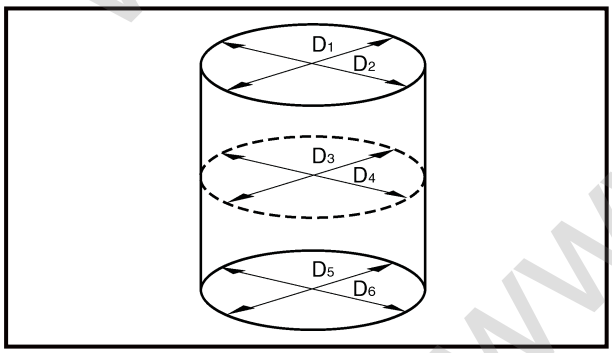
TIP

Spread the end gaps apart while at the same time lifting the piston ring over the top of the piston crown.

CHECKING THE CYLINDER AND PISTON

1. Check:
   - piston wall
   - cylinder wall

   Vertical scratches → Rebore or replace the cylinder, and replace the piston and piston rings as a set.
2. Measure:
   - piston-to-cylinder clearance



a. Measure cylinder bore “C” with the cylinder bore gauge.

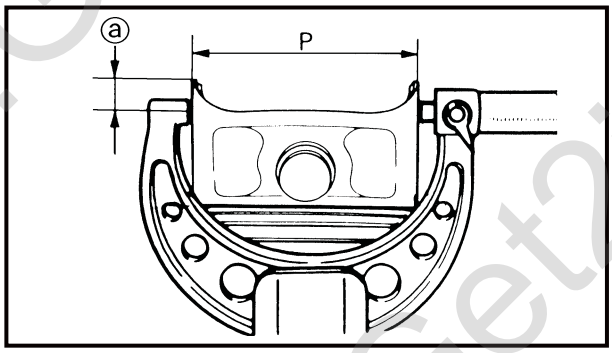
TIP

Measure cylinder bore “C” by taking side-to-side and front-to-back measurements of the cylinder. Then, find the average of the measurements.

Cylinder bore "C"	**47.00 ~ 47.01 mm (1.8504 ~ 1.8508 in)**
Taper limit "T"	**0.05 mm (0.002 in)**
Out-of-round "R"	**0.01 mm (0.0004 in)**

"C" = maximum of D_1 ~ D_2
"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, rebore or replace the cylinder, and replace the piston and piston rings as a set.
c. Measure piston skirt diameter "P" with the micrometer.



ⓐ 5 mm (0.20 in) from the bottom edge of the piston

	Piston size "P"
Standard	**46.97 ~ 46.99 mm (1.8492 ~ 1.8500 in)**

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 "P"

Piston-to-cylinder clearance
0.010 ~ 0.040 mm
(0.0004 ~ 0.0016 in)
<Limit>: 0.10 mm (0.0039 in)

f. If out of specification, rebore or replace the cylinder, and replace the piston and piston rings as a set.

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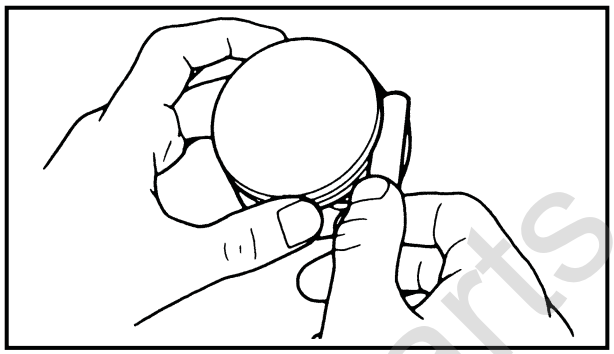


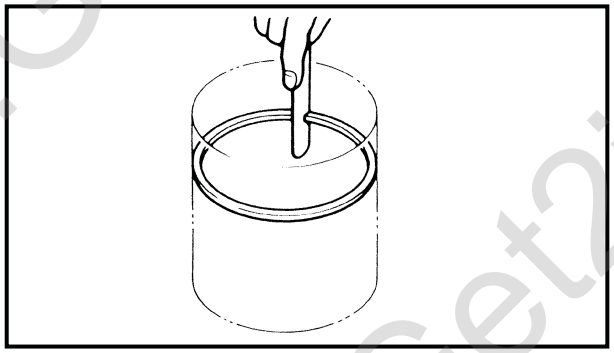
CHECKING THE PISTON RINGS

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.

Piston ring side clearance
Top ring
0.015 ~ 0.055 mm
(0.0006 ~ 0.0022 in)
<Limit>: 0.09 mm (0.0035 in)
2nd ring
0.015 ~ 0.055 mm
(0.0006 ~ 0.0022 in)
<Limit>: 0.09 mm (0.0035 in)



2. Install:
   • piston ring
   (into the cylinder)

TIP

Level the piston ring into the cylinder with the piston crown.

3. Measure:
   • piston ring end gap
   Out of specification → Replace the piston ring.

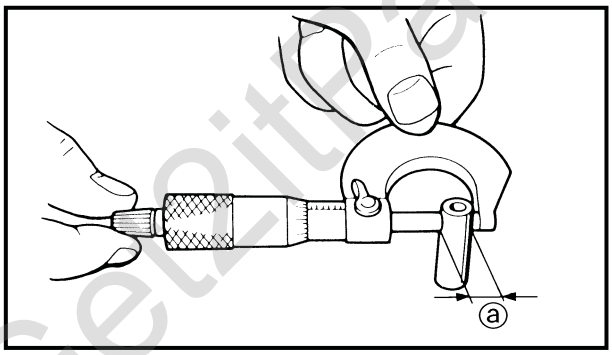
TIP

The oil ring expander spacer's end gap cannot be measured. If the oil ring rail's gap is excessive, replace all three piston rings.

Piston ring end gap
Top ring
0.10 ~ 0.25 mm
(0.0039 ~ 0.0098 in)
<Limit>: 0.45 mm (0.0177 in)
2nd ring
0.25 ~ 0.40 mm
(0.0098 ~ 0.0157 in)
<Limit>: 0.55 mm (0.0217 in)
Oil ring
0.20 ~ 0.70 mm
(0.0079 ~ 0.0276 in)

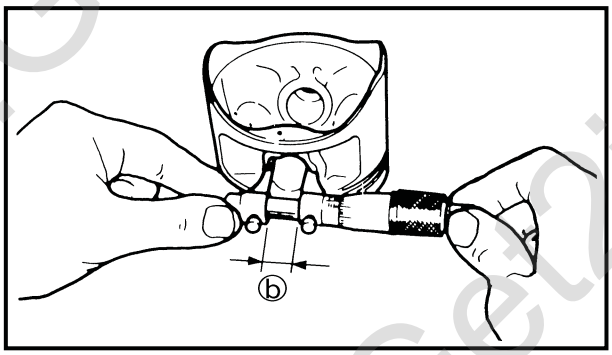
CHECKING THE PISTON PIN

1. Check:
   - piston pin
     Blue discoloration/grooves → Replace the piston pin and then check the lubrication system.



2. Measure:
   - piston pin outside diameter ⓐ
     Out of specification → Replace the piston pin.

Piston pin outside diameter
12.996 ~ 13.000 mm
(0.5117 ~ 0.5118 in)
<Limit>: 12.960 mm (0.5102 in)



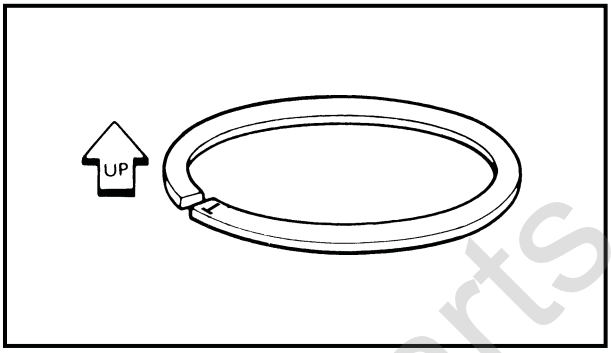
3. Measure:
   - piston pin bore diameter ⓑ
     Out of specification → Replace the piston.

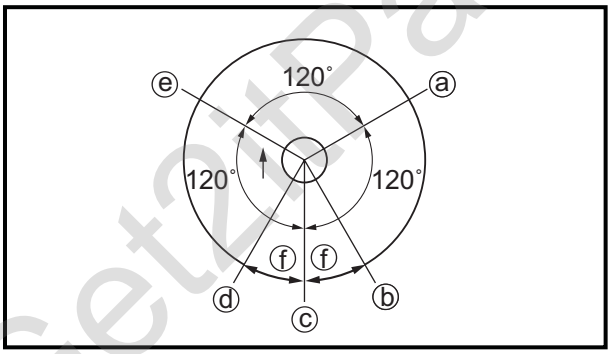
Piston pin bore diameter
13.002 ~ 13.008 mm
(0.5119 ~ 0.5121 in)
<Limit>: 13.040 mm (0.5134 in)

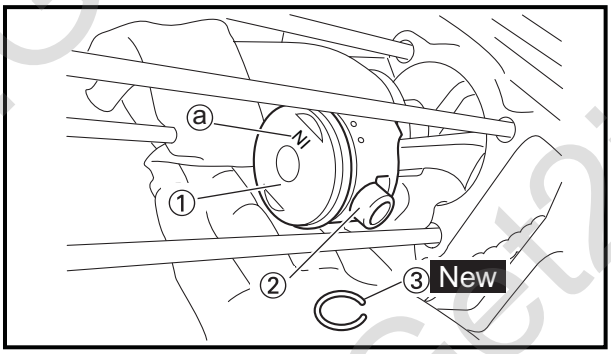
4. Calculate:
   - piston-pin-to-piston-pin-bore clearance
     Out of specification → Replace the piston pin and piston as a set.

Piston-pin-to-piston-pin-bore clearance =
Piston pin bore diameter ⓑ –
Piston pin outside diameter ⓐ

Piston-pin-to-piston clearance
0.002 ~ 0.012 mm
(0.0001 ~ 0.00047 in)







INSTALLING THE PISTON

1. Install:
   • piston rings
   (onto the piston)

TIP

- Be sure to install the piston rings so that the manufacturer's marks or numbers are located on the upper side of the rings.
- Lubricate the piston and piston rings liberally with engine oil.

2. Position:
   • top ring
   • 2nd ring
   • oil ring
   Offset the piston ring end gaps as shown.

ⓐ top ring end
ⓑ upper oil ring rail end
ⓒ expander end
ⓓ lower oil ring rail end
ⓔ 2nd ring end
ⓕ 20 mm (0.79 in)

3. Install:
   • piston ①
   • piston pin ②
   • piston pin clips ③ New

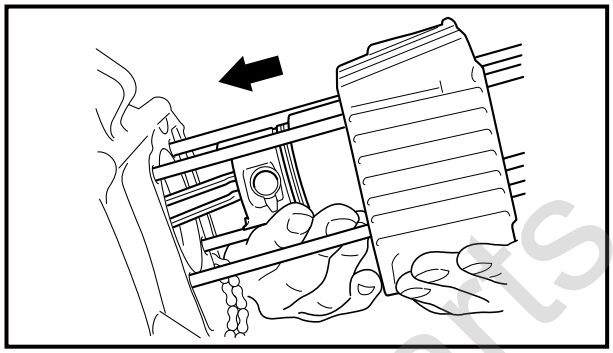
TIP

- Apply engine oil onto the piston pin, piston rings and piston.
- Be sure that the " IN " mark ⓐ on the piston points to the intake side of the engine.
- Before installing the piston pin clips, cover the crankcase with a clean rag to prevent the piston pin clips from falling into the crankcase.

4. Lubricate:
   • piston
   • piston rings
   • cylinder

TIP

Apply a liberal coating of engine oil.



INSTALLING THE CYLINDER

1. Install:
   • cylinder

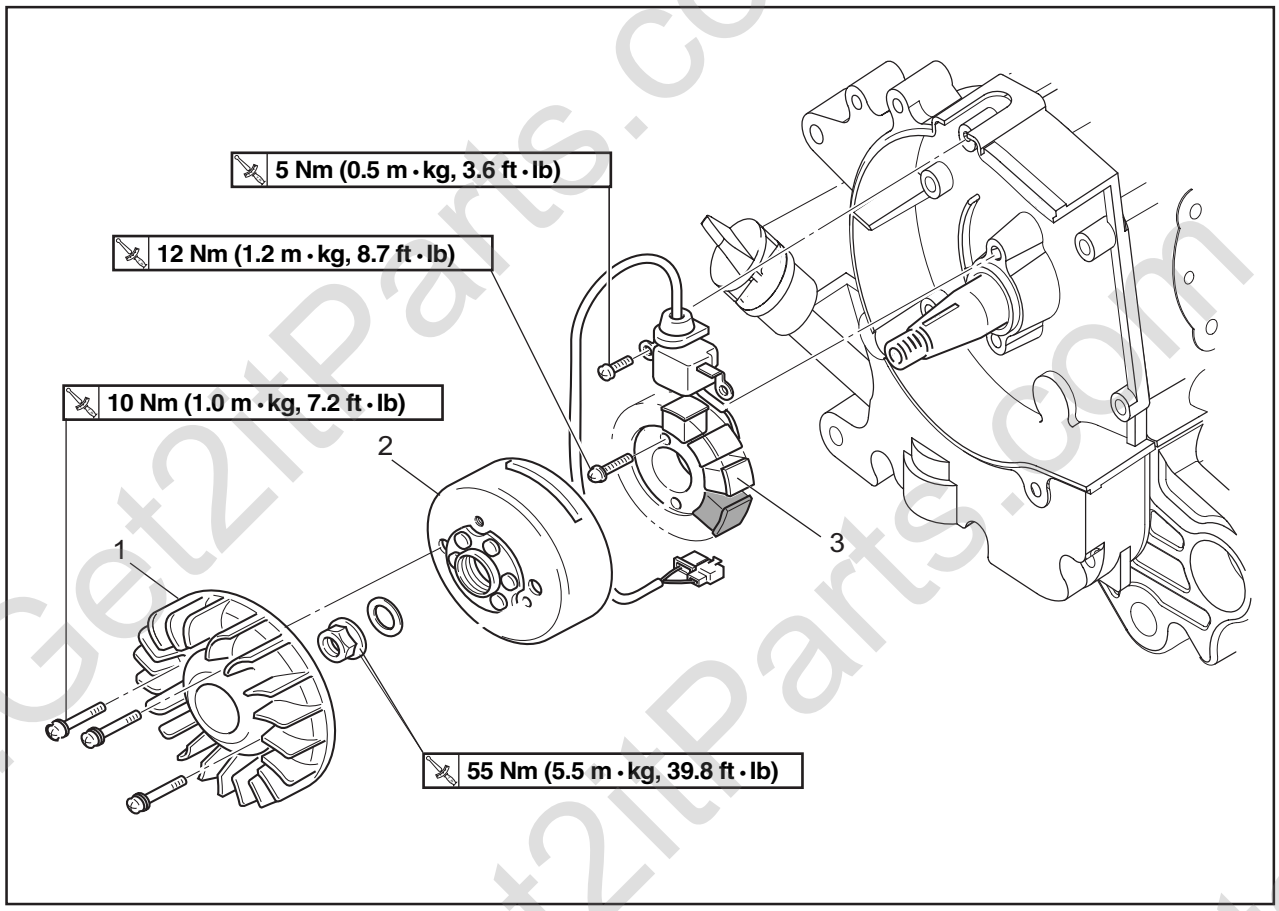
TIP

Install the cylinder with one hand while compressing the piston rings with the other hand.

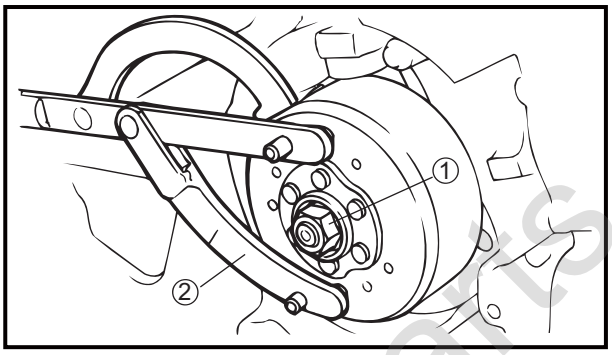
NOTICE

- **Be careful not to damage the timing chain damper during installation.**
- **Pass the timing chain through the timing chain cavity.**

C.D.I. MAGNETO



Order	Job/Part	Q'ty	Remarks
	Removing the C.D.I. magneto		Disassemble the parts in the order listed. Refer to "CYLINDER HEAD".
	Duct inlet assy.		
1	Fan	1	
2	C.D.I. magneto rotor	1	***NOTICE***
3	Stator coil assembly	1	**Disconnect the C.D.I. magneto lead coupler.**
		1	
			For installation, reverse the removal procedure.

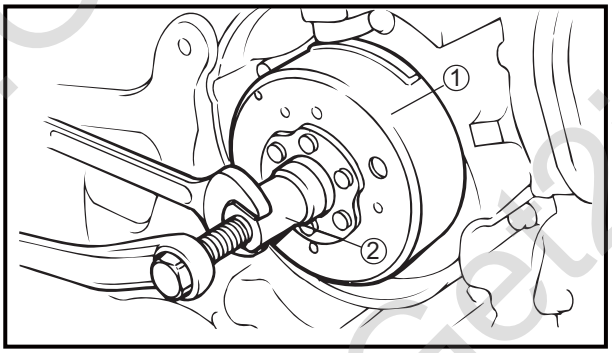


REMOVING THE C.D.I. MAGNETO ROTOR

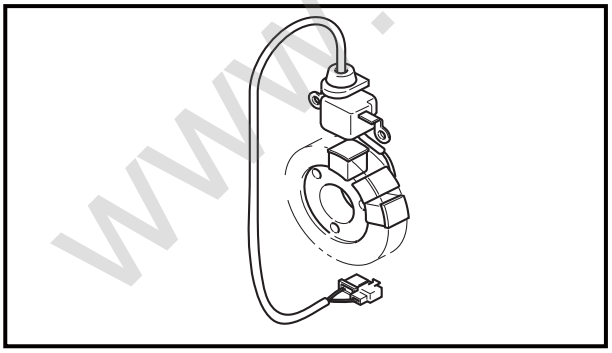
1. Remove:
   - nut ①
   - plate washer

TIP

- While holding the C.D.I. magneto rotor with the holding tool ② , loosen the C.D.I. magneto nut ①.
- Do not allow the sheave holder to touch the projection on the C.D.I. magneto rotor.

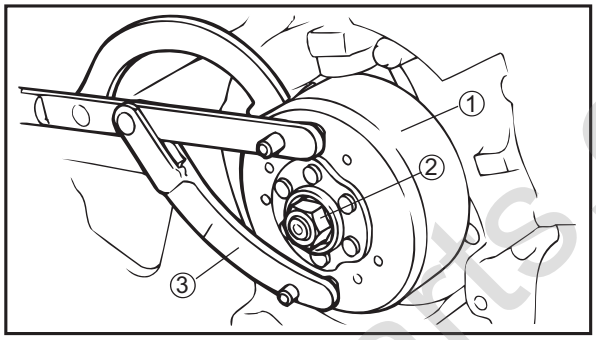


2. Remove:
   - C.D.I. magneto rotor ①
   - (with flywheel puller ②)



CHECKING THE PICKUP COIL/STATOR ASSEMBLY

1. Check:
   - pickup coil/stator assembly
     Damage → Replace.



INSTALLING THE C.D.I. MAGNETO ROTOR

1. Install:
   - C.D.I. magneto rotor ①

TIP

- Clean the tapered portion of the crankshaft and the magneto rotor hub.
- When installing the magneto rotor, make sure the woodruff key is properly seated in the keyway of the crankshaft.

2. Tighten:
   - nut ②

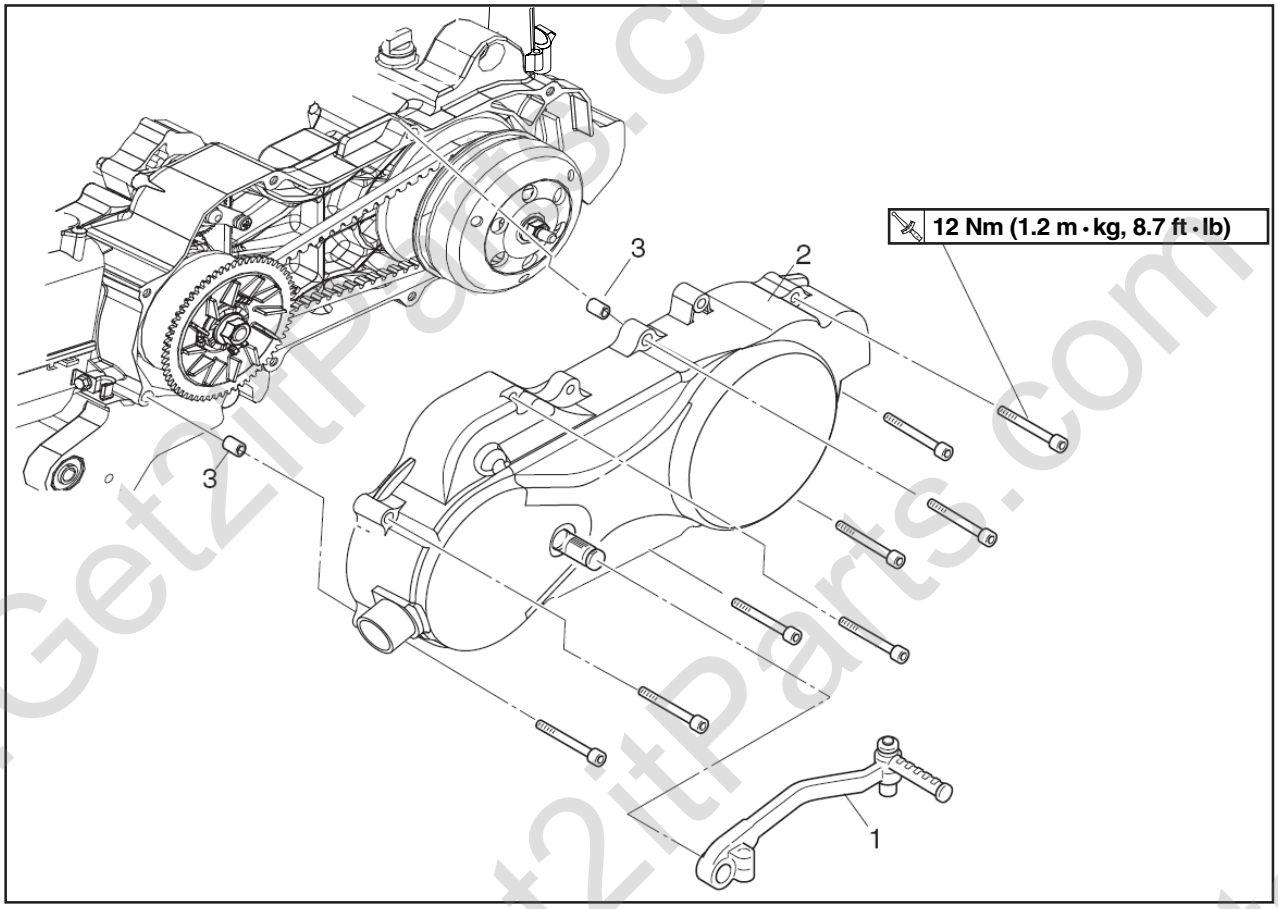
55 Nm (5.5 m · kg, 39.8 ft · lb)

TIP

- While holding the C.D.I. magneto with the holding tool ③, tighten the C.D.I. magneto rotor nut ② .
- Do not allow the sheave holder to touch the projection on the C.D.I. magneto rotor.

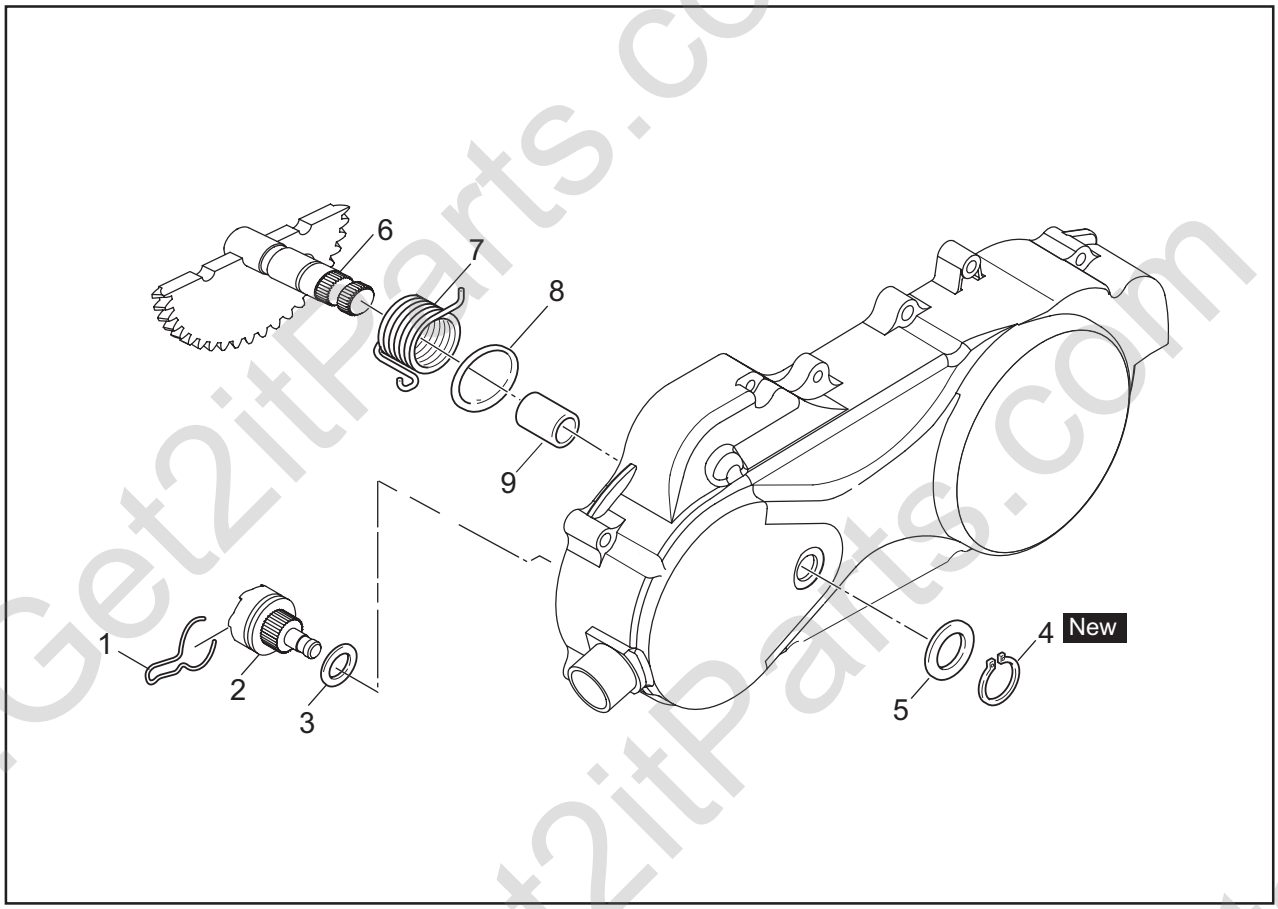
BELT DRIVE

CRANKCASE COVER

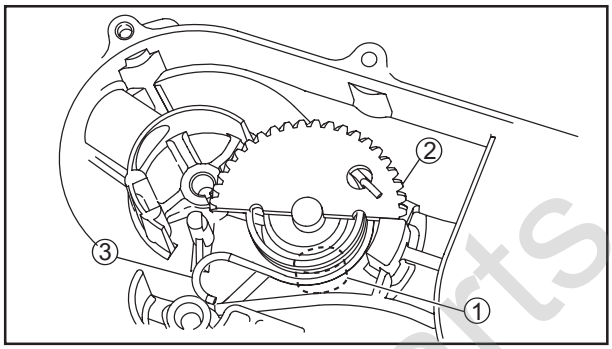


Order	Job/Part	Q'ty	Remarks
	Removing the belt drive		Remove the parts in the order listed.
1	Arm comp kick starter	1	
2	Cover L side	1	
3	Dowel pin	2	
			For installation, reverse the removal procedure.

KICKSTARTER

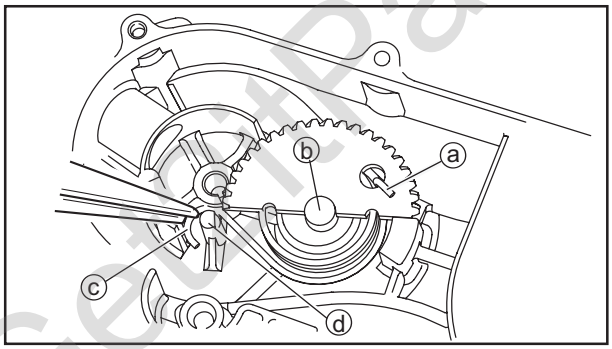


Order	Job/Part	Q'ty	Remarks
	Removing the kickstarter Crankcase, cover		Remove the parts in the order listed. Refer to "CRANKCASE COVER ".
1	Spring friction start gear	1	Refer to "INSTALLING THE KICKSTARTER".
2	Gear comp starter idle	1	
3	Washer	1	
4	Circlip	1	
5	Washer	1	
6	Spindle comp kick start	1	
7	Spring kick starter	1	
8	Boss distance	1	
9	Boss kick spindle	1	
			For installation, reverse the removal procedure.



INSTALLING THE KICKSTARTER

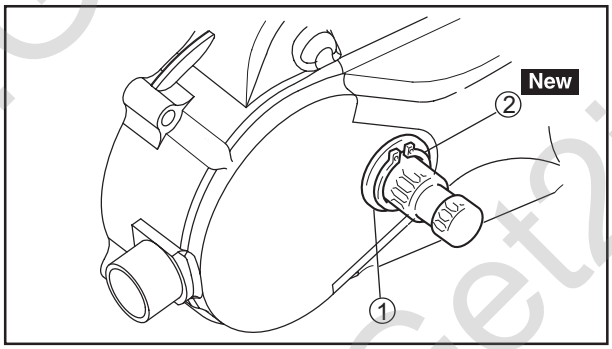
1. Install:
   - boss kick spindle ①
   - spindle comp kick start ②
   - spring kick starter ③



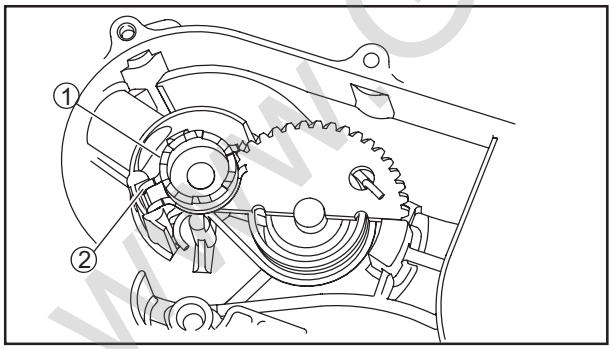
2. Hook:
   - spring kick starter

TIP

Hook the spring end ⓐ on the spindle comp kick start ⓑ as shown, and hook the other end ⓒ on the projection ⓓ.



3. Install:
   - plain washer ①
   - circlip ② New

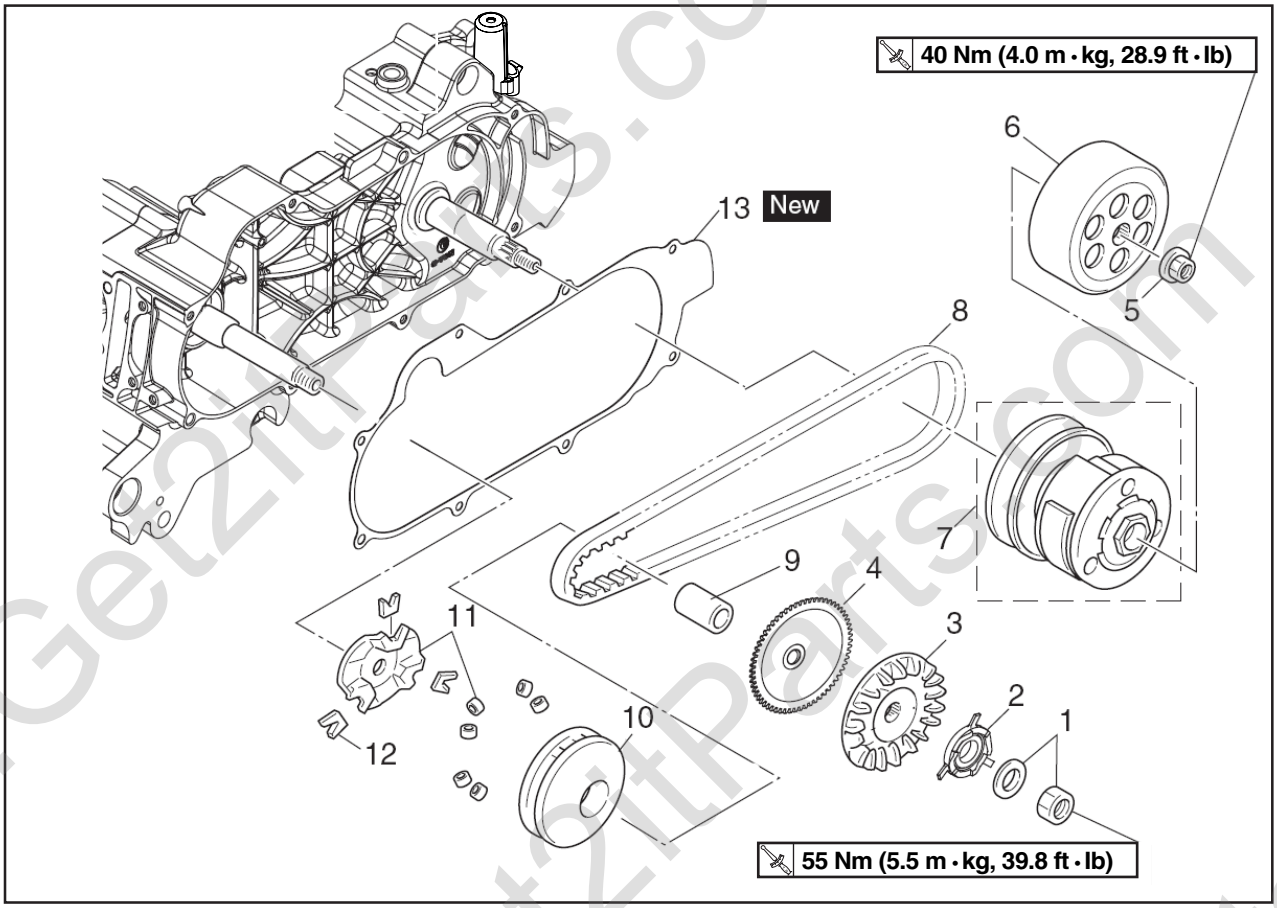


4. Install:
   - kgear comp starter idle ①
   - spring friction start gear ②

TIP

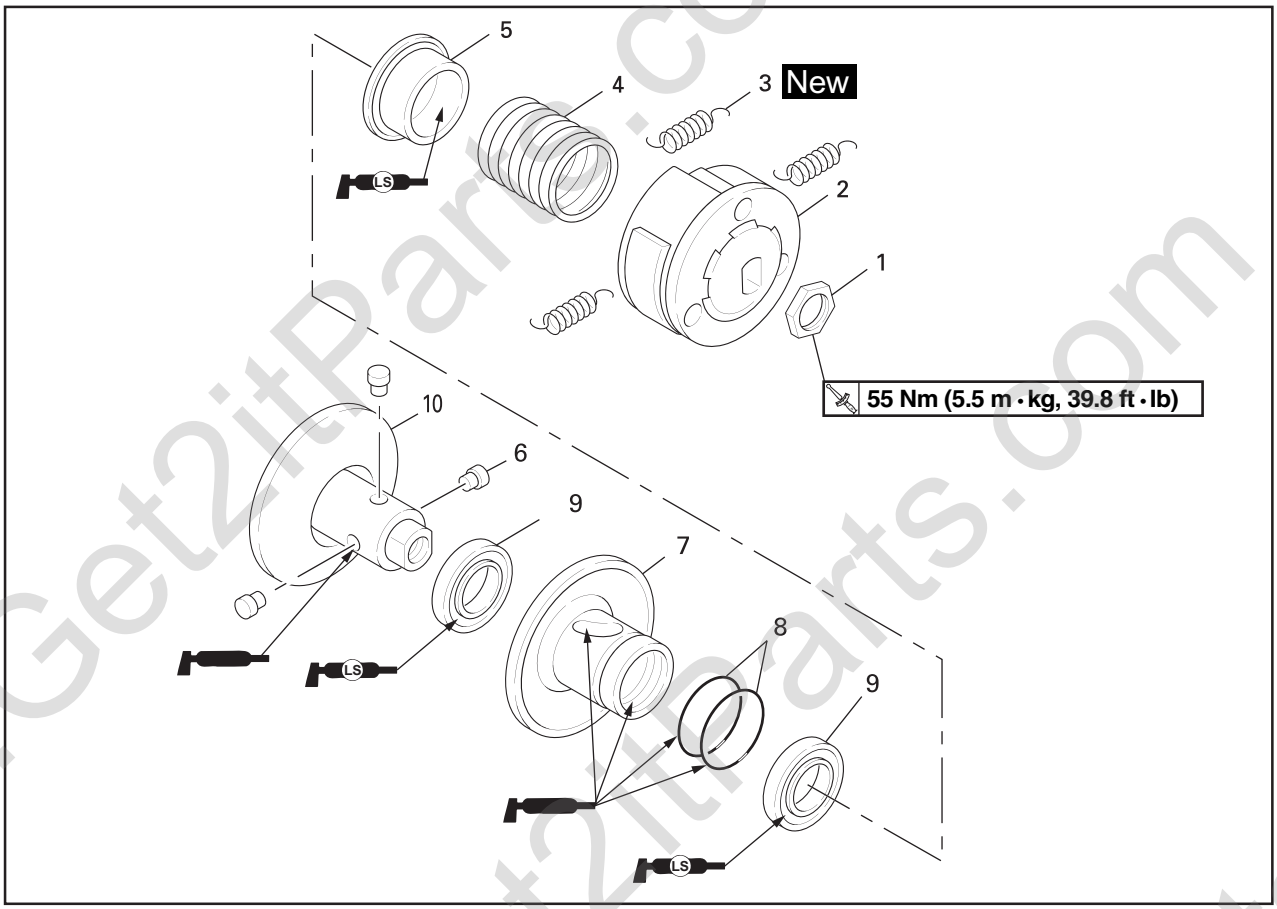
Install the clip at the position shown.

V-BELT, CLUTCH, DRIVE AND DRIVEN PULLEY

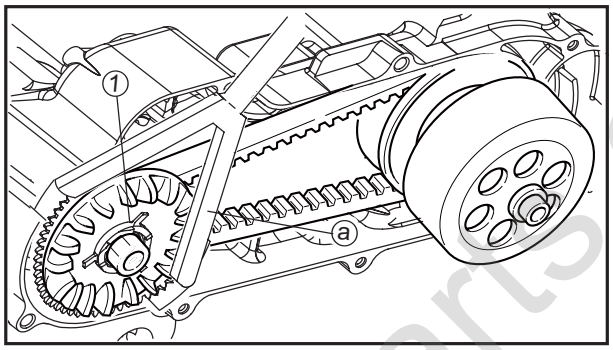


Order	Job/Part	Q'ty	Remarks
	Removing the V-belt, clutch, primary and secondary sheave		Remove the parts in the order listed.
1	Nut flange / Washer	1/1	
2	Ratchet kick starter	1	Refer to " REMOVING THE FACE ASSY, MOVABLE DRIVE ".
3	Face drive	1	
4	Face driver	1	
5	Nut flange	1	
6	Outer clutch	1	
7	Plate sub assy drive	1	Refer to " REMOVING THE PLATE SUB ASSY DRIVEN AND V-BELT ".
8	V-belt	1	
9	Boss drive face	1	
10	Face movable drive	1	
11	Plate ramp / Roller weight	1/6	
12	piece slide	3	
13	Gasket	1	
			For installation, reverse the removal procedure.

DISASSEMBLING THE SECONDARY SHEAVE

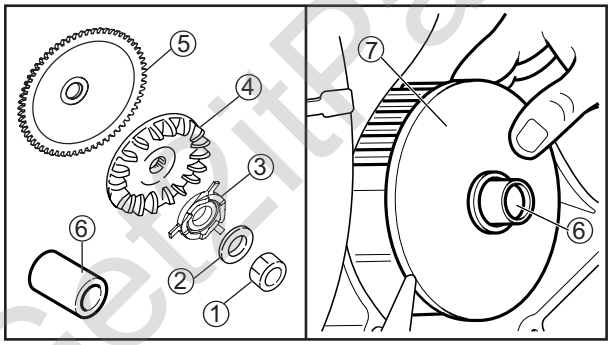


Order	Job/Part	Q'ty	Remarks
	Disassembling the plate sub assy drive		Disassemble the parts in the order listed.
1	Nut hex	1	
2	Clutch comp	1	
3	Spring clutch	3	
4	Spring driven face	1	
5	Collar spring	1	Refer to " PLATE SUB ASSY DRIVEN AND V-BELT ".
6	Pin guide	3	
7	Face comp, movable driven	1	
8	O-ring	2	
9	Oil seal	2	
10	Face comp, driven	1	
			For assembly, reverse the disassembly procedure.



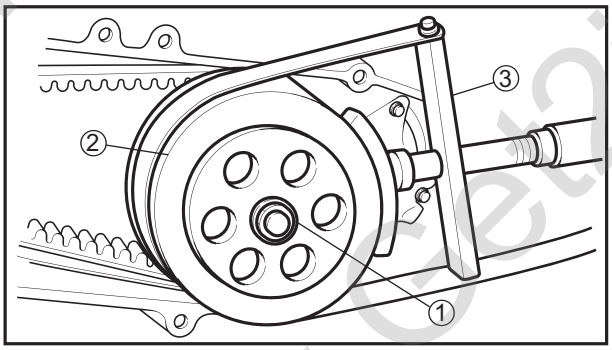
REMOVING THE PRIMARY SHEAVE

1. Remove:
   - primary sheave nut ①
   - plate washer ②
   - oneway clutch ③
   - primary fixed sheave - 1 ④
   - primary fixed sheave - 2 ⑤
   - collar ⑥
   - primary sliding sheave ⑦



TIP

While holding the primary fixed sheave with the rotor holding tool ⓐ, loosen the primary fixed sheave nut.

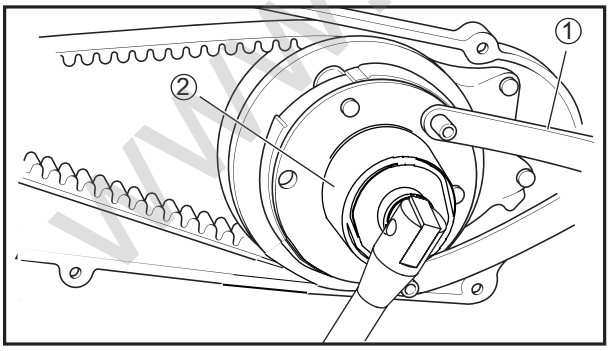


REMOVING THE SECONDARY SHEAVE AND V-BELT

1. Remove:
   - secondary sheave nut ①
   - clutch housing ②

TIP

While holding the clutch housing with the sheave holder ③, loosen the secondary sheave nut.



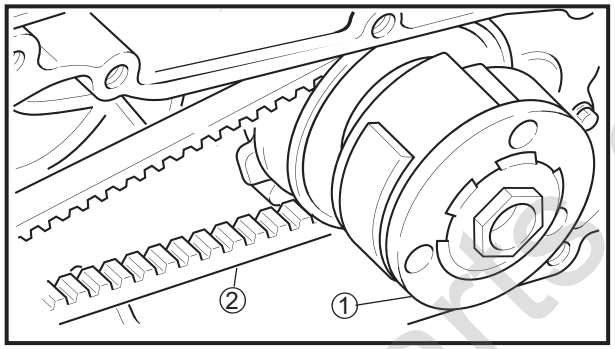
2. Loosen:
   - clutch carrier nut

NOTICE

Do not remove the clutch carrier nut at this stage.

TIP

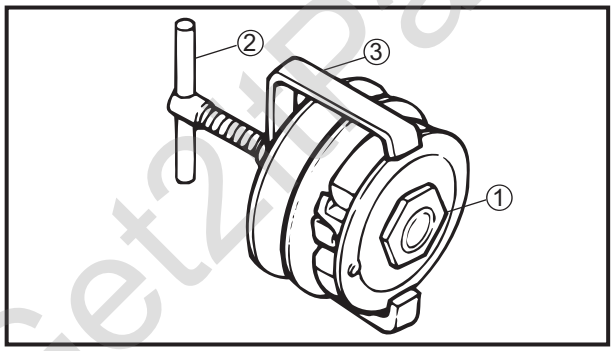
While holding the clutch carrier with the rotor holding tool ①, loosen the clutch carrier nut one full turn with the socket wrench (39 mm) ②.



3. Remove:
   - secondary sheave assembly ①
   - V-belt ②

TIP

Remove the V-belt and clutch assembly from the primary sheave side.

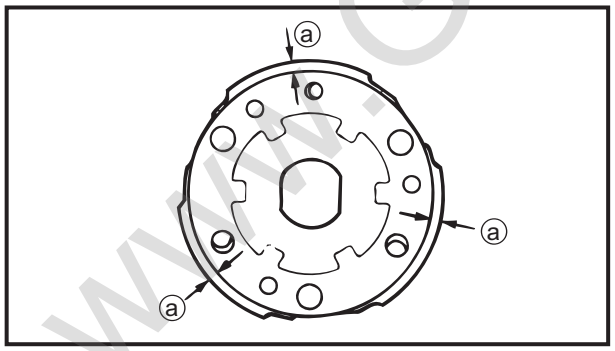


DISASSEMBLING THE SECONDARY SHEAVE

1. Remove:
   - clutch carrier nut ①

TIP

Install the clutch spring holder ② and clutch spring holder arm ③ onto the secondary sheave as shown. Then, compress the spring, and remove the clutch carrier nut ①.



CHECKING THE CLUTCH SHOE

1. Measure:
   - Clutch shoe
     Scratches → Glaze using coarse sandpaper.
     Damage/wear → Replace

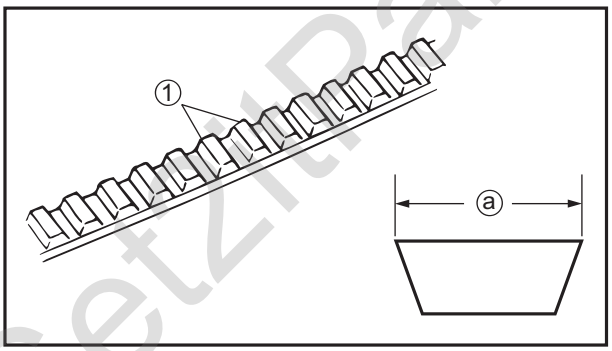
Clutch shoe thickness
4.0 mm (0.1575 in)
<Limit>: 2.0 mm (0.079 in)

TIP

- Inspect clutch shoes ⓐ.
- After removing the clutch weight spring, do not use them again.
- Replace the all three as a set.

CHECKING THE V-BELT

1. Check:
   - V-belt ①
     Cracks/damage/wear → Replace.
     Grease/oil → Clean the primary and secondary sheave.

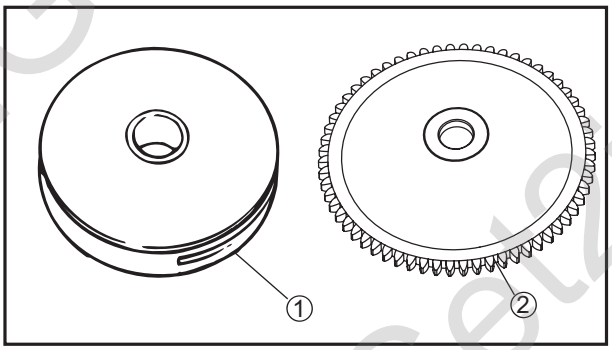


2. Measure:
   - V-belt width ⓐ
     Out of specification → Replace.

V-belt width
18.0 mm (0.709 in)
<Limit>: 17.0 mm (0.669 in)

CHECKING THE DRIVE PULLEY

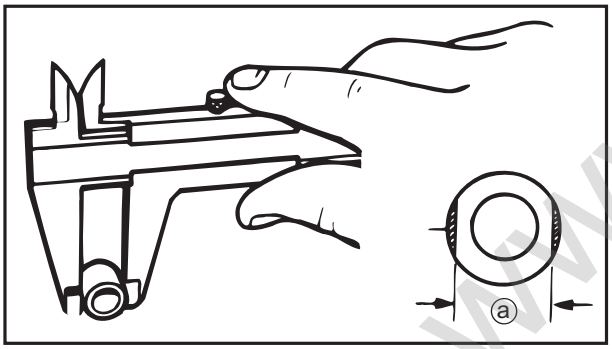
1. Check:
   - Face movable drive ①
   - Face driver ②
     Cracks/damage/wear → Replace the face movable drive, face driver and V-belt.



CHECKING THE PRIMARY ROLLER WEIGHTS

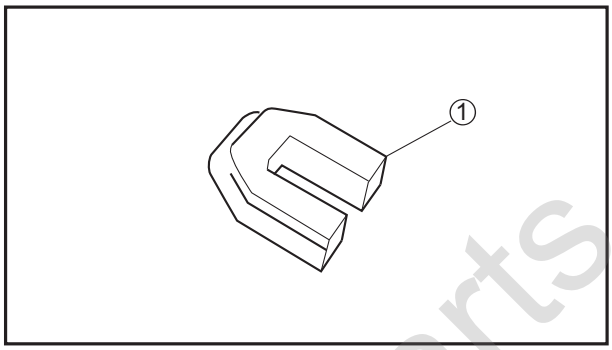
The following procedure applies to all of the roller weights.

1. Check:
   - roller weight
     Cracks/damage/wear → Replace.



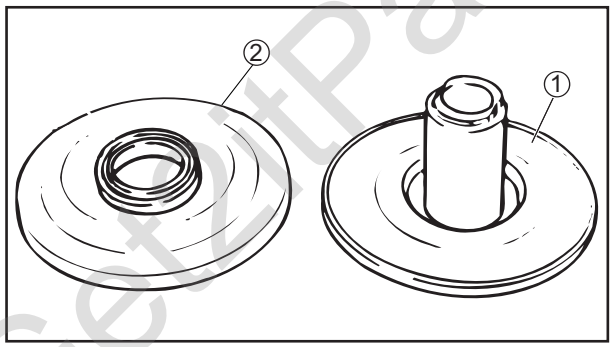
2. Measure:
   - roller weight outside diameter ⓐ
     Out of specification → Replace.

roller weight outside diameter
14.9~15.1 mm (0.587~0.594 in)



CHECKING THE PIECE SLIDER

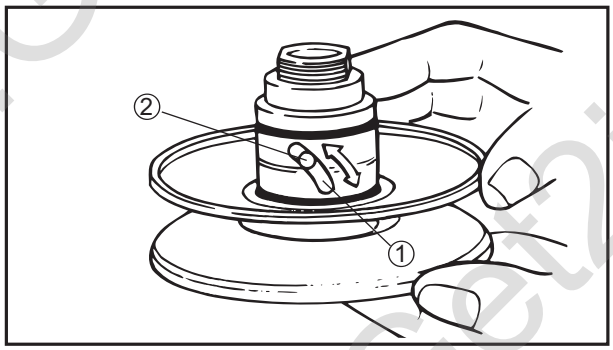
1. Check:
   piece slide ①
   Damage/wear→ Replace



CHECKING THE DRIVEN PULLEY

1. Check:
   - face comp, driven ①
   - face comp, movable driven ②

   Cracks/damage/wear → Replace the face comp, driven and face comp, movable driven as a set.

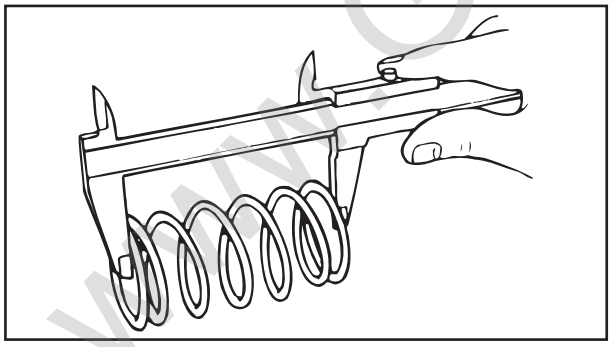


2. Check:
   - torque cam groove ①

   Damage/wear → Replace the face comp, driven and face comp, movable driven as a set.

3. Check:
   - guide pin ②

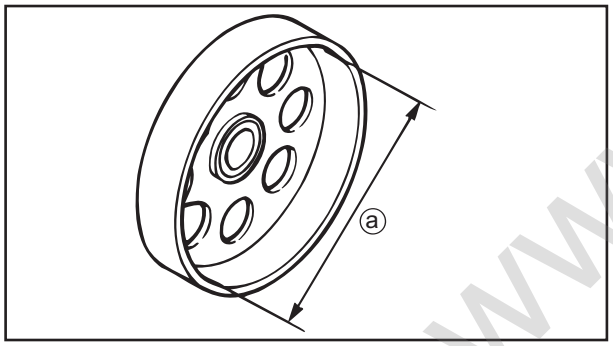
   Damage/wear → Replace the face comp, driven and face comp, movable driven as a set.



4. Measure:
   - spring driven face

   Out of specification → Replace.

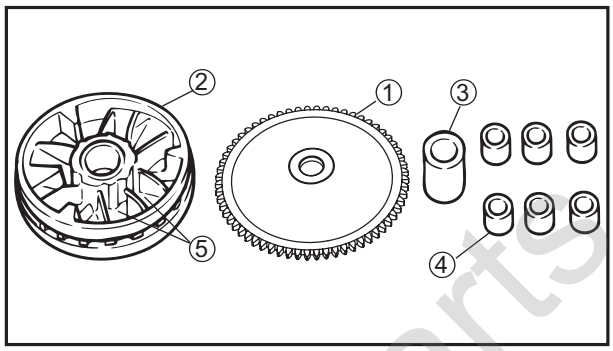
Spring driven face free length
87.9 mm (3.46 in)
<Limit>: 82.6 mm (3.25 in)

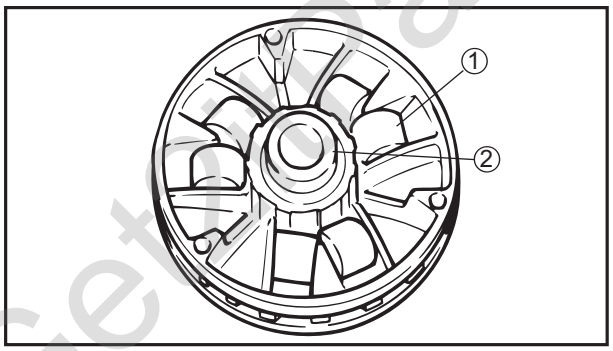


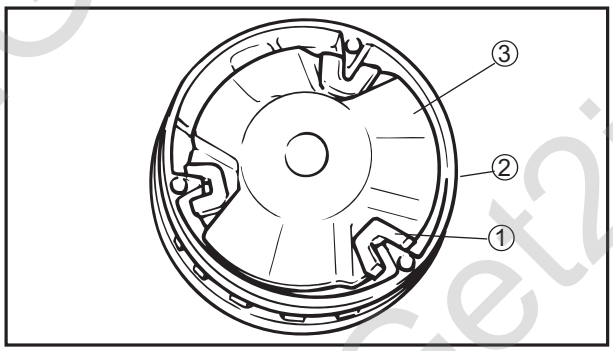
5. Measure:
   - outer clutch internal diameter ⓐ

   Out of specification → Replace.

Outer clutch internal diameter
107.0 ~ 107.2 mm (4.21 ~ 4.22 in)
<Limit>: 107.5 mm (4.23 in)







ASSEMBLING THE PRIMARY SHEAVE

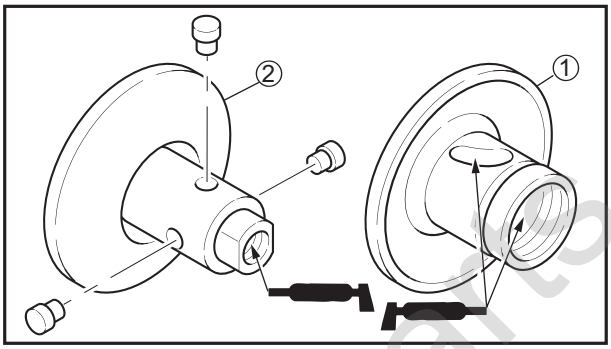
1. Clean:
   - face driver ①
   - face movable drive ②
   - boss drive face ③
   - roller weights ④

TIP

Use thinner to clean up grease, dirt on the primary sliding sheave cam side ⑤ .

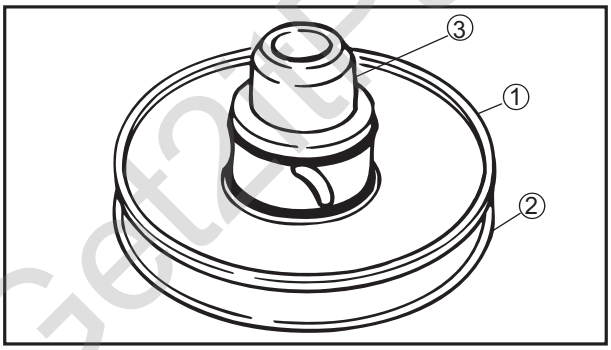
2. Install:
   - roller weights ①
   - boss drive face ②

3. Install:
   - piece slide ①
   - face movable drive ②
   - plate ramp ③



ASSEMBLING THE SECONDARY SHEAVE

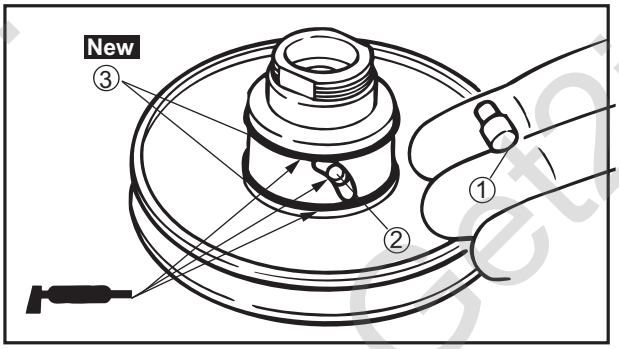
1. Lubricate:
   - face comp, movable driven's inner surface ①
   - face comp, driven's inner surface ②
   - torque cam groove
   - oil seals
   - bearings
   (with the recommended lubricant)



2. Install:
   - face comp, movable driven ①

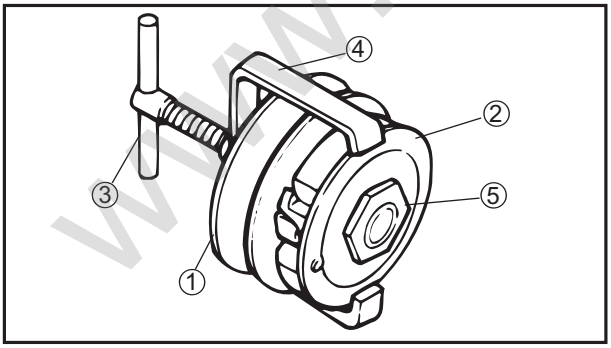
TIP

Install the face comp, movable driven onto the face comp, driven ② with the oil seal guide ③ .



3. Install:
   - guide pin ①
4. Lubricate:
   - guide pin groove ②
   - o-ring New ③
   (with the recommended lubricant)

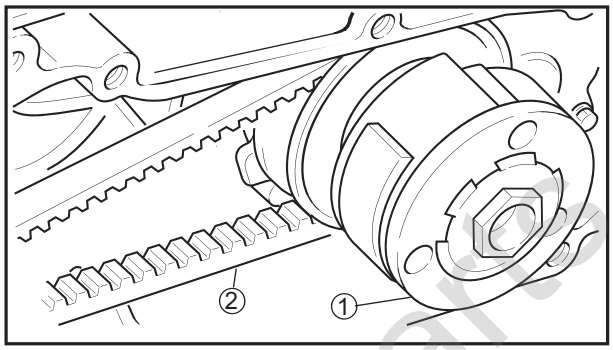
	Recommended lubricant **BEL-RAY assembly lube**



5. Install:
   - face comp, driven ①
   - spring
   - clutch comp ②

TIP

Attach the clutch spring holder ③ and clutch spring holder arm ④ onto the secondary sheave as shown. Then, compress the spring, and tighten the clutch nut hex ⑤.



INSTALLING THE BELT DRIVE

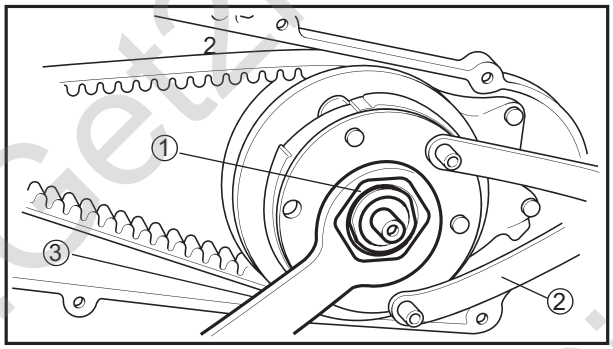
1. Install:
   - V-belt ①
   - plate sub assy drive ②

NOTICE

Do not allow grease to contact the V-belt, secondary sheave assembly.

TIP

Install the V-belt onto the face comp, driven.

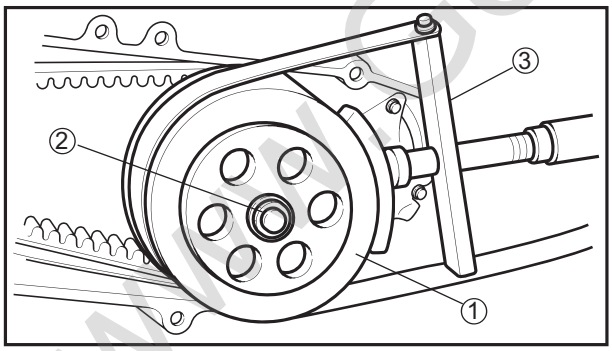


2. Install:
   - clutch nut hex ①

55 Nm (5.5 m · kg, 39.8 ft · lb)

TIP

While holding the clutch carrier with the rotor holding tool ②, tighten the clutch carrier nut with the locknut wrench ③.

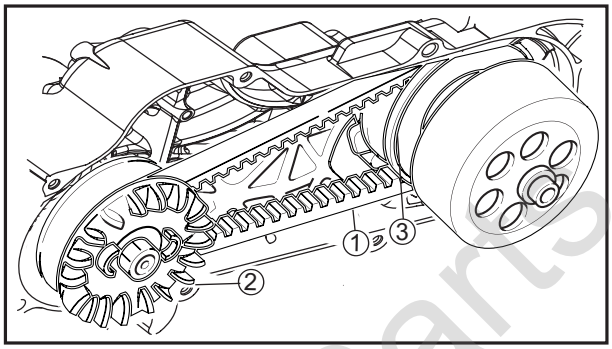


3. Install:
   - outer clutch ①
   - nut ②

40 Nm (4.0 m · kg, 28.9 ft · lb)

TIP

Tighten the secondary sheave nut with the sheave holder ③.

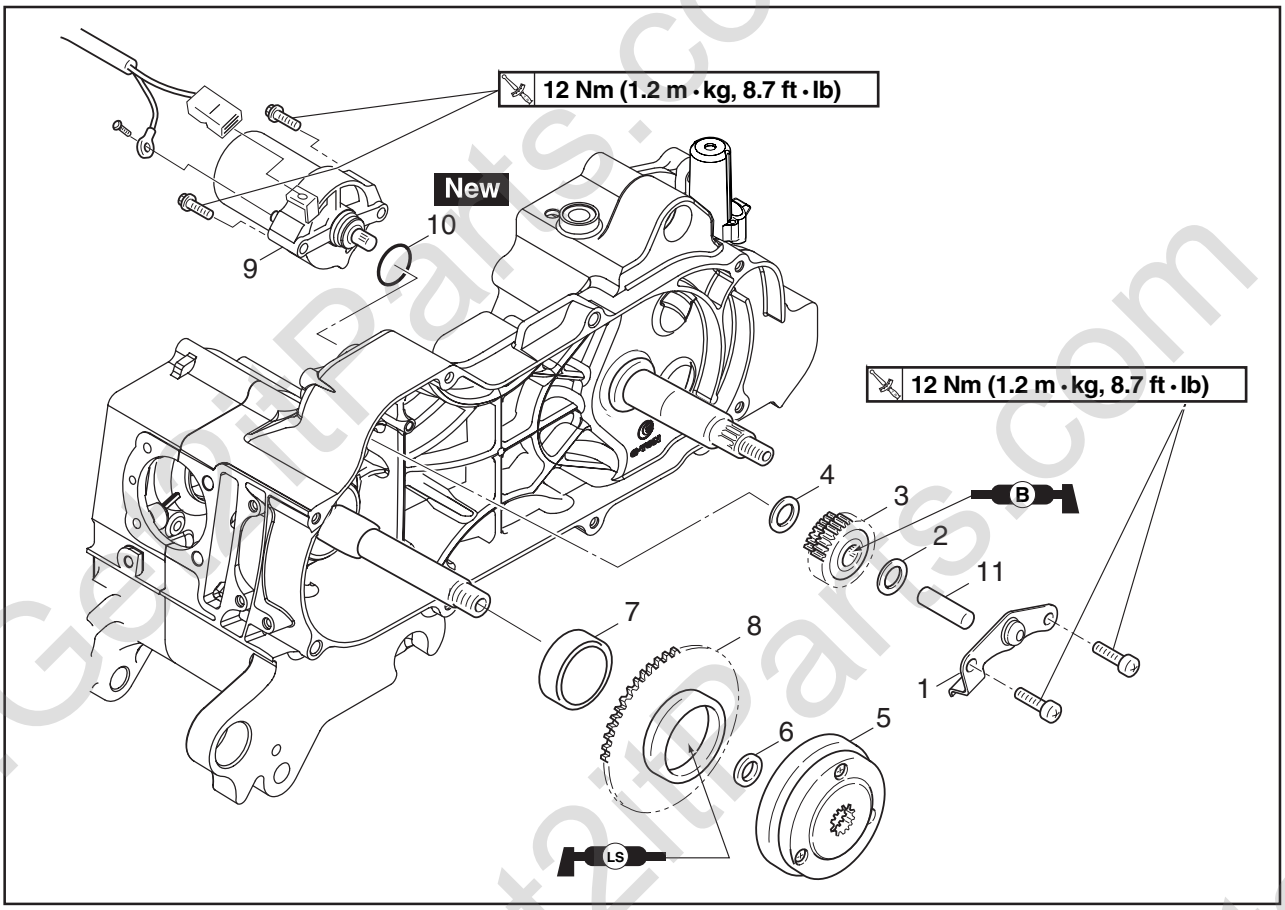


4. Position:
   • V-belt ①

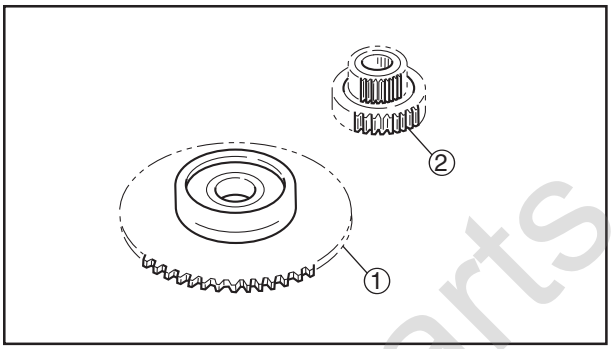
TIP

Position the V-belt in the face movable drive ② (when the pulley is at its widest position) and in the face movable drive ③ (when the pulley is at its narrowest position), and make sure the V-belt is tight.

STARTER CLUTCH AND STARTER MOTOR

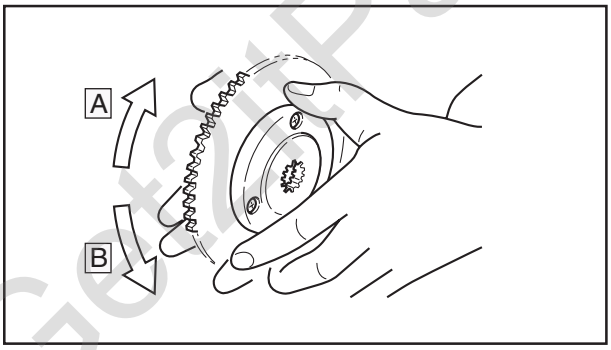


Order	Job/Part	Q'ty	Remarks
	Removing the starter clutch and starter motor		Disassemble the parts in the order listed.
	Primary sheave		Refer to " REMOVING THE PRIMARY SHEAVE "
1	Idle gear plate	1	
2	Plate washer	1	
3	Idle gear	1	
4	Washer	1	
5	Starter clutch	1	
6	Washer	1	
7	Bearing	1	
8	Starter wheel gear	1	
9	Starter motor	1	
10	O-ring	1	
11	Shaft	1	
			For installation, reverse the removal procedure.



CHECKING THE STARTER WHEEL GEAR

1. Check:
   - starter wheel gear ①
   - idle gear ②
   - Burrs/chips/roughness/wear → Replace



2. Check:
   - starter clutch operation

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a. Install the starter wheel gear ① onto the idle gear ② and hold the starter clutch.
b. When turning the starter wheel gear clockwise [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 counterclockwise [B], it should turn freely. otherwise the starter clutch is faulty and must be replaced.

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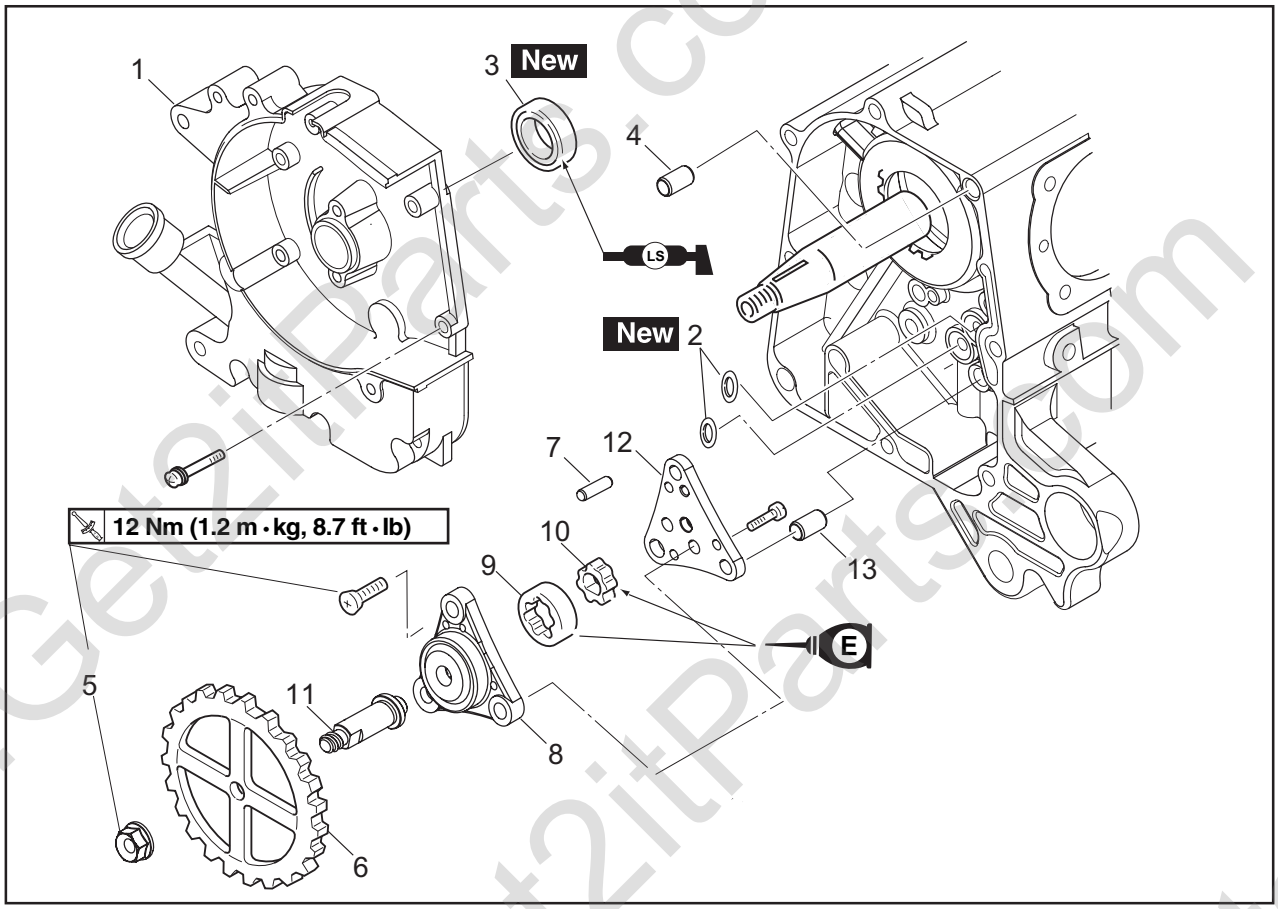
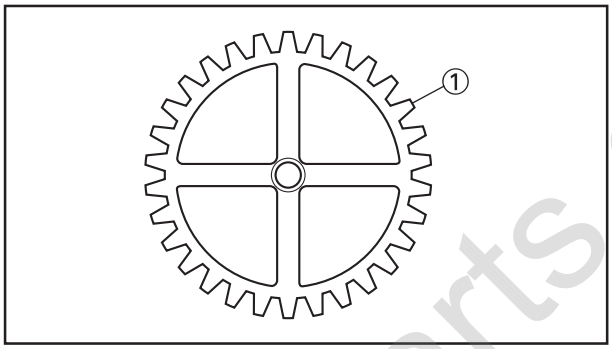
OIL PUMP

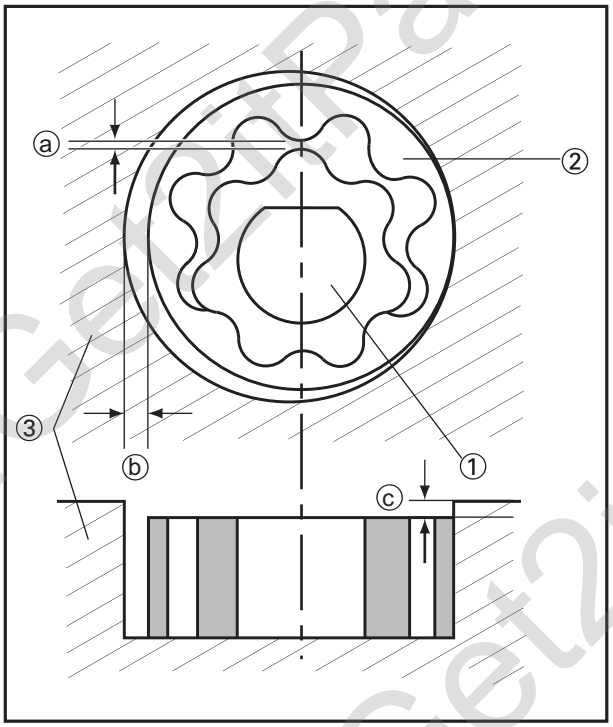


Order	Job/Part	Q'ty	Remarks
	Disassembling the oil pump		Remove the parts in the order listed.
	C.D.I. magneto		Refer to " C.D.I. MAGNETO "
1	Cover	1	
2	O-ring	2	
3	Oil seal	1	
4	Dowel pin	2	
5	Nut	1	
6	Oil pump driven gear	1	
7	Dowel pin	1	
8	Oil pump body	1	
9	Outer rotor	1	
10	Inner rotor	1	
11	Oil pump shaft	1	
12	Oil pump housing cover	1	
13	Dowel pin	1	For assembly, reverse the disassembly procedure.



CHECKING THE OIL PUMP

1. Check:
   - oil pump driven gear ①
     Cracks/damage/wear → Replace the defective part(s).

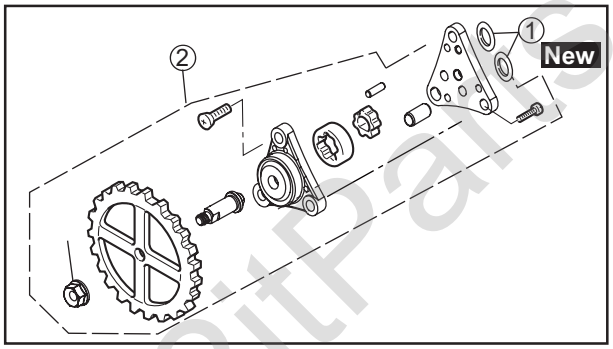


2. Measure:
   - inner-rotor-to-outer-rotor-tip clearance ⓐ
   - outer-rotor-to-oil-pump-housing clearance ⓑ
   - oil-pump-housing-to-inner-rotor-and-outer-rotor clearance ⓒ
     Out of specification → Replace the oil pump.

① Inner rotor
② Outer rotor
③ Oil pump housing

Inner-rotor-to-outer-rotor-tip clearance
0.04 ~ 0.12 mm
(0.0016~0.0047in)
<Limit>: 0.15mm (0.006 in)
Outer-rotor-to-oil-pump-housing clearance
0.14 ~ 0.21 mm
(0.0055~0.0083in)
<Limit>: 0.28 mm (0.0110 in)
Oil-pump-housing-to-inner-rotor-and-outer-rotor clearance
0.06 ~ 0.11mm
(0.0024~0.0043 in)
<Limit>: 0.20 mm (0.0079 in)

3. Check:
   - oil pump operation
     Rough movement → Repeat steps (1) and (2) or replace the defective part(s).



INSTALLING THE OIL PUMP

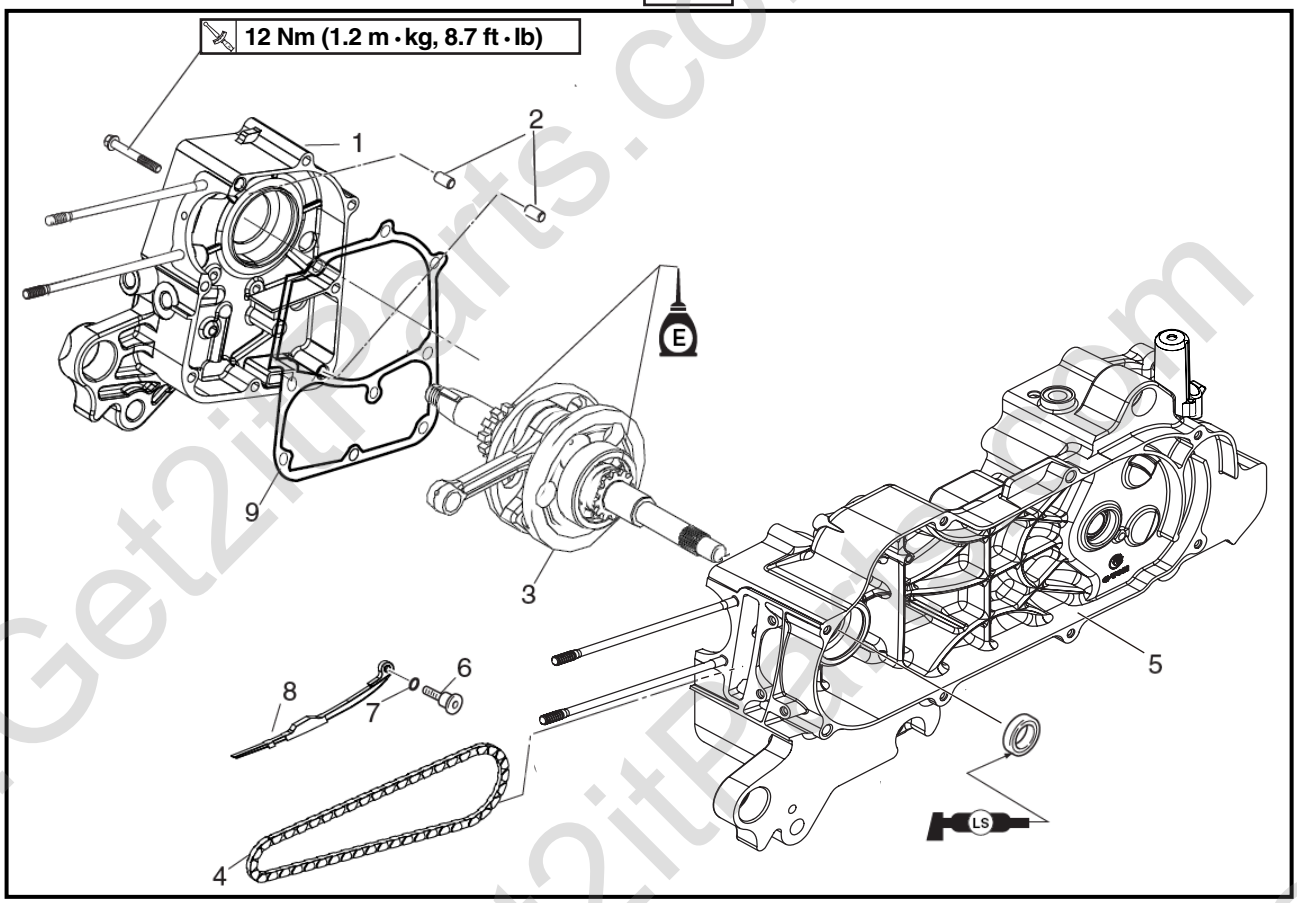
1. Install:
   - o-ring ① **New**
   - oil pump assembly ②
   - oil pump bolt

12 Nm (1.2 m · kg, 8.7 ft · lb)

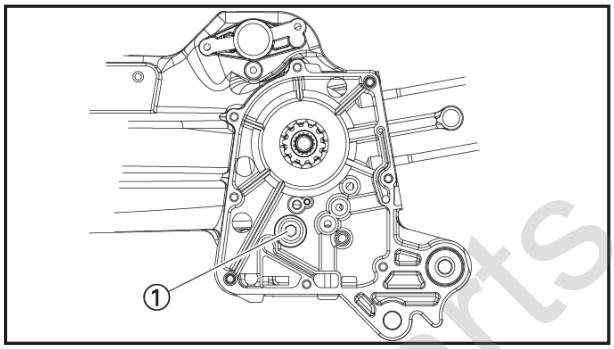
NOTICE

After tightening the bolts, make sure the oil pump turns smoothly.

CRANKCASE AND CRANKSHAFT

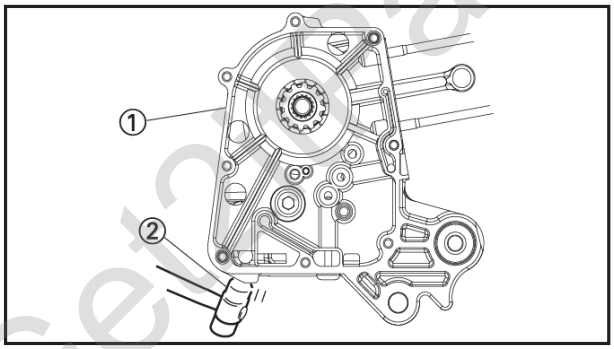


Order	Job/Part	Q'ty	Remarks
	Removing the crankshaft assembly		Remove the parts in the order listed.
	Engine		Refer to " ENGINE ".
	Cylinder head		Refer to "CYLINDER HEAD ".
	Cylinder piston		Refer to "CYLINDER AND PISTON ".
	V-belt, clutch, drive / driven pulley		Refer to "V-BELT, CLUTCH, DRIVE AND DRIVEN PULLEY ".
	Starter clutch		Refer to "STARTER CLUTCH AND STARTER MOTOR".
	C.D.I. magneto		Refer to "C.D.I. MAGNETO ".
	Oil pump		Refer to "OIL PUMP ".
1	Right crankcase	1	
2	Dowel pin	2	
3	Crankshaft	1	Refer to "SEPARATING THE CRANK-CASE ".
4	Timing chain	1	
5	Left crankcase	1	Refer to "INSTALLING THE CRANK-SHAFT ".
6	Bolt	1	
7	O-ring	1	
8	Timing chain guide	1	
9	Crankcase gasket	1	
			For installation, reverse the removal pro-cedure.



SEPARATING THE CRANKCASE

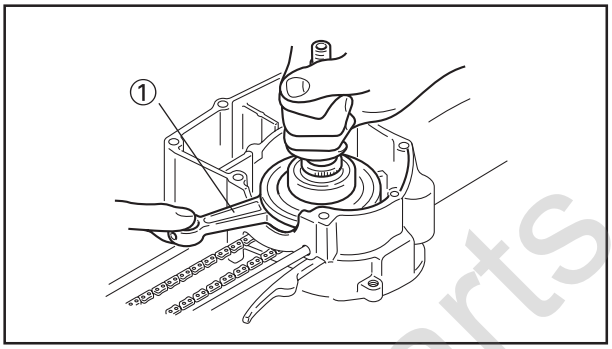
1. Remove:
   • crankcase bolt ①

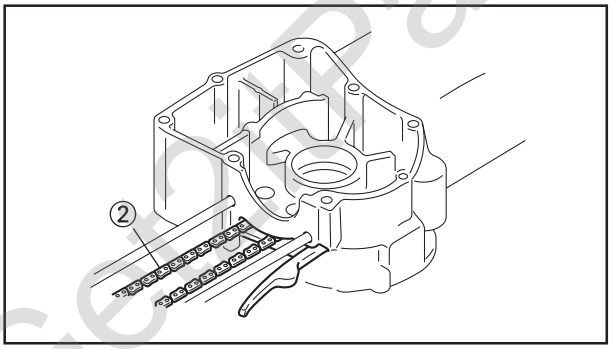


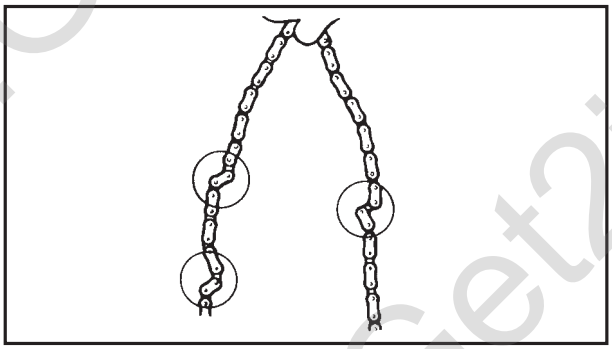
2. Remove:
   • right crankcase ①

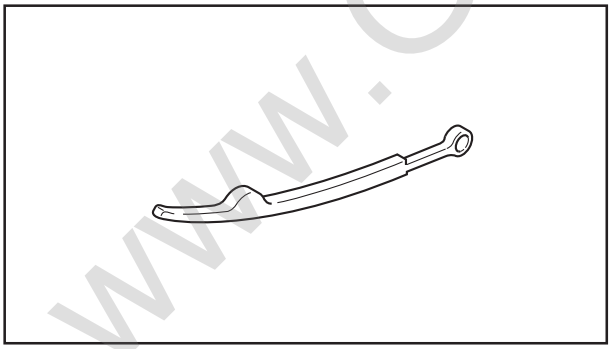
TIP

Tap on one side of the crankcase with a soft-face hammer②. 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.









REMOVING THE CRANKSHAFT ASSEMBLY

1. Remove:
   - crankshaft assembly ①
   - timing chain ②

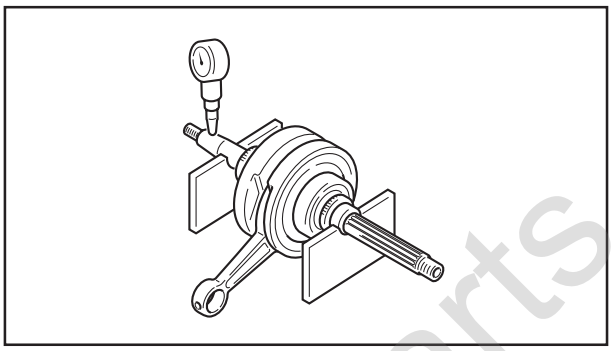
TIP

- Before removing the crankshaft assembly, remove the timing chain from the crankshaft sprocket.
- The crankshaft assembly cannot be removed if the timing chain is attached onto the crankshaft sprocket.

CHECKING THE TIMING CHAIN AND TIMING CHAIN GUIDES

1. Check:
   - timing chain
     Damage/stiffness → Replace the timing chain.

2. Check:
   - timing chain guide
     Damage/wear → Replace the timing chain guide.



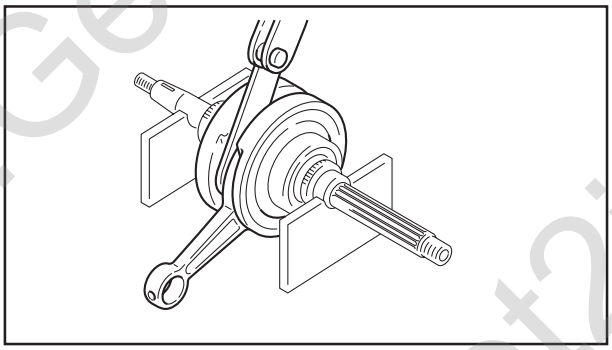
CHECKING THE CRANKSHAFT AND CONNECTING ROD

1. Measure:
   • crankshaft runout
   Out of specification → Replace the crankshaft, bearing or both.

TIP

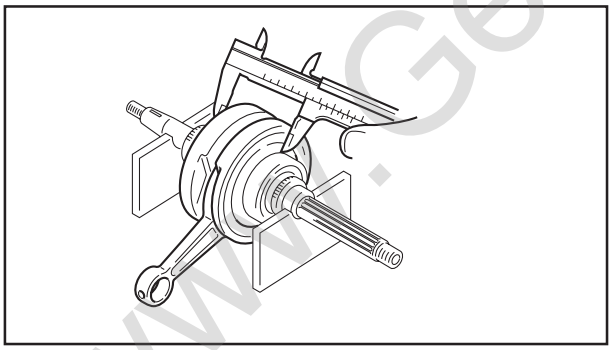
Turn the crankshaft slowly.

Maximum crankshaft runout
0.04 mm (0.0016 in)



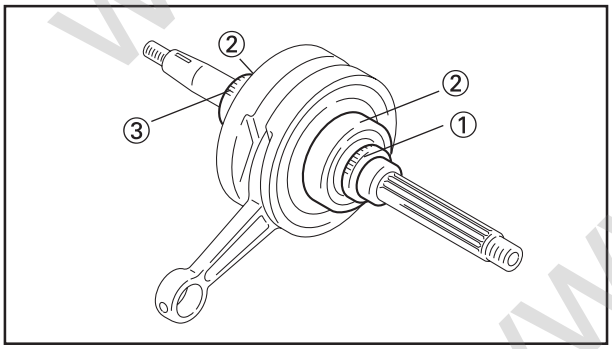
2. Measure:
   • big end side clearance
   Out of specification → Replace the big end bearing, crankshaft pin, or connecting rod.

Big end side clearance
0.10~0.30 mm (0.0039~0.0118 in)

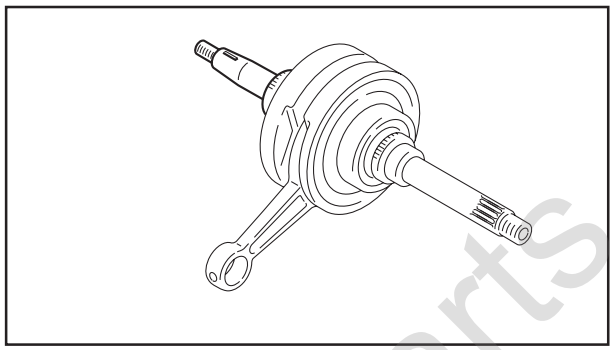


3. Measure:
   • crankshaft width
   Out of specification → Replace the crankshaft.

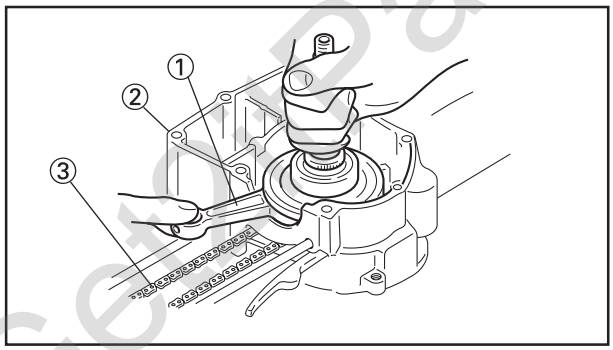
Crankshaft width
44.10~44.15 mm (1.7362~1.7382 in)



4. Check:
   • crankshaft sprocket ①
   Damage/wear → Replace the crankshaft.
   • bearing ②
   Cracks/damage/wear → Replace the crankshaft.
   • oil pump drive gear ③
   Damage/wear → Replace the crankshaft.



5. Check:
   • crankshaft journal
   Scratches/wear → Replace the crankshaft.



INSTALLING THE CRANKSHAFT

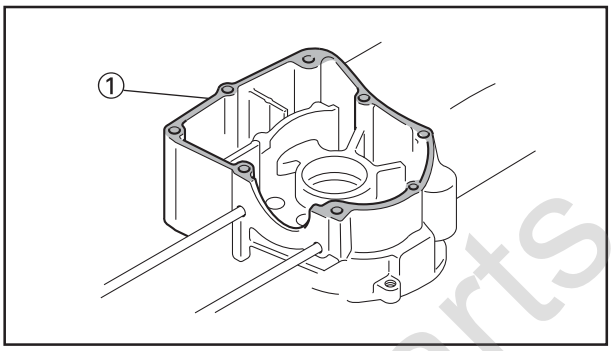
1. Install:
   • crankshaft assembly ①
   • crankcase ②
   • timing chain ③

NOTICE

To avoid scratching the crankshaft and to ease the installation procedure, lubricate the oil seal lips with lithium-soap-based grease and each bearing with engine oil.

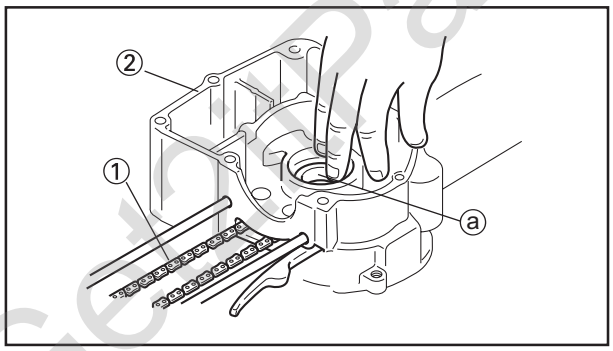
TIP

Put the timing chain in parallel into the crank case, then use hands to place the crank shaft Ass'y into the crank case. Manually rotate the crank shaft to check whether it is tightly engaged with the timing chain. (if not, install again)



ASSEMBLING THE CRANKCASE

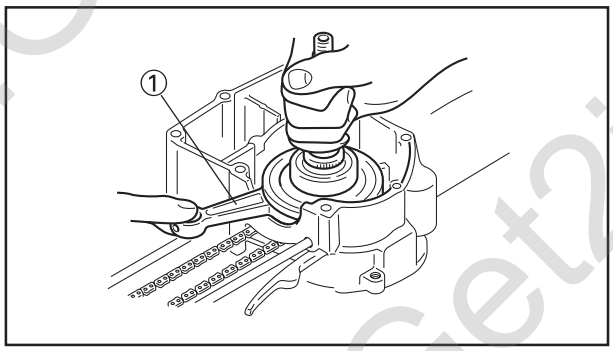
1. Thoroughly clean all the gasket mating surfaces and crankcase mating surfaces.
2. Install:
   - crankcase gasket ①
     (onto the crankcase mating surfaces)



3. Install:
   - dowel pins
   - timing chain ①

TIP

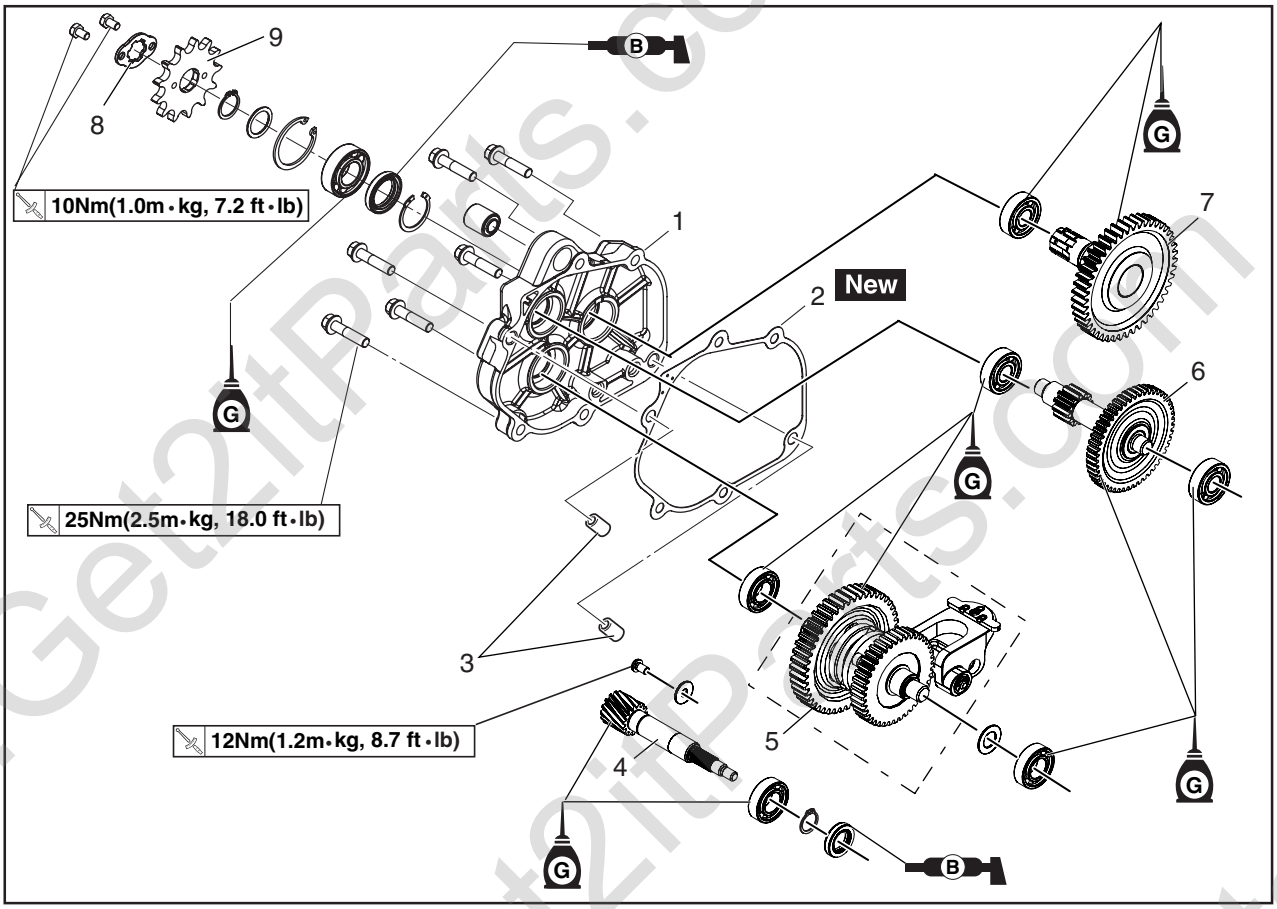
Install the timing chain so it is not visible through the opening ⓐ in the left crankcase ②.



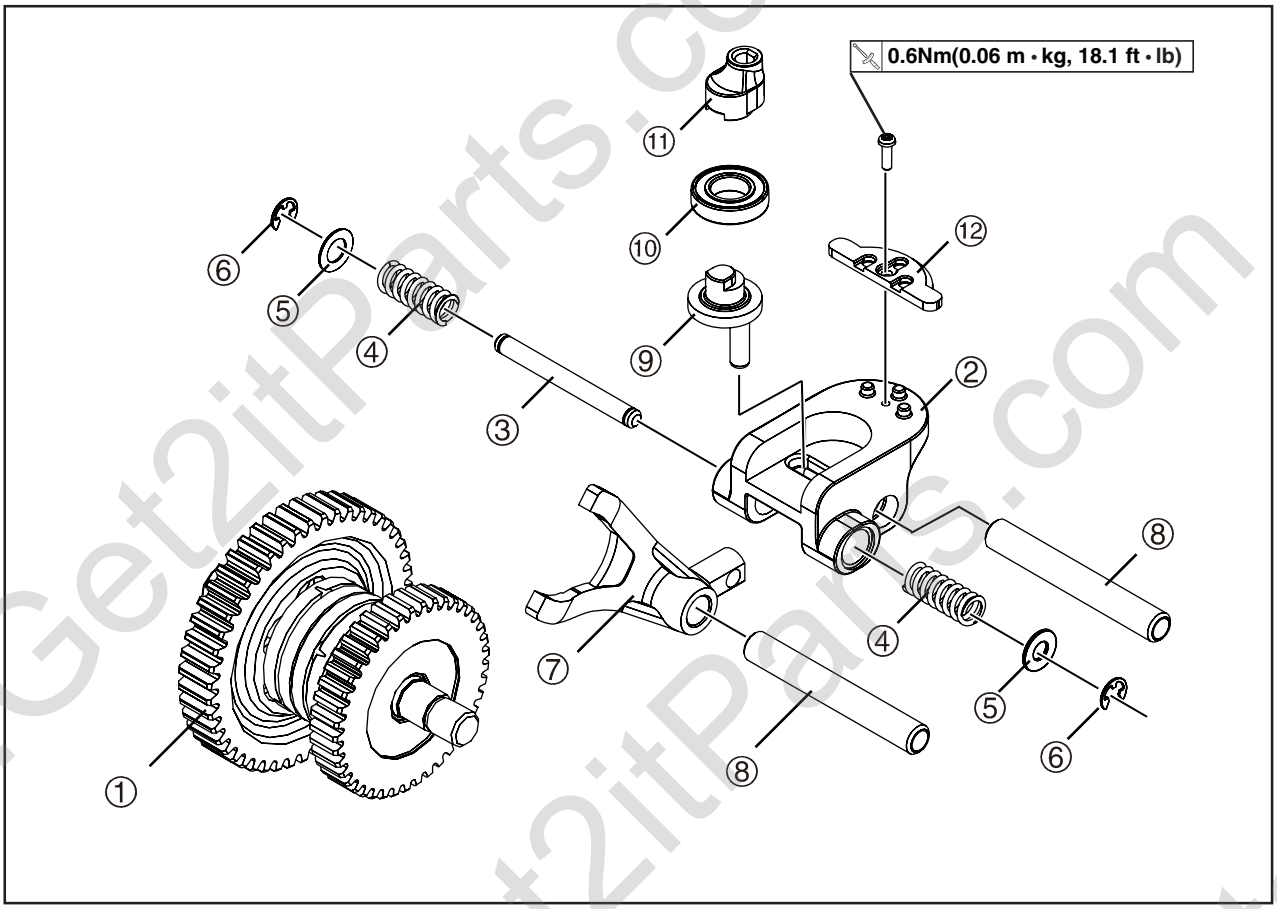
4. Install:
   - crankshaft ①
   - crankcase (right)
5. Tighten:
   - crankcase

12 Nm (1.2 m · kg, 8.7 ft · lb)

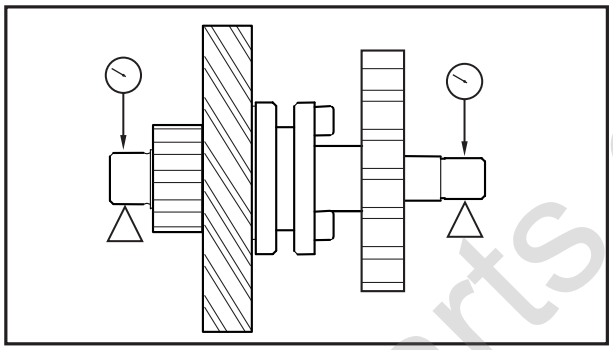
TRANSMISSION

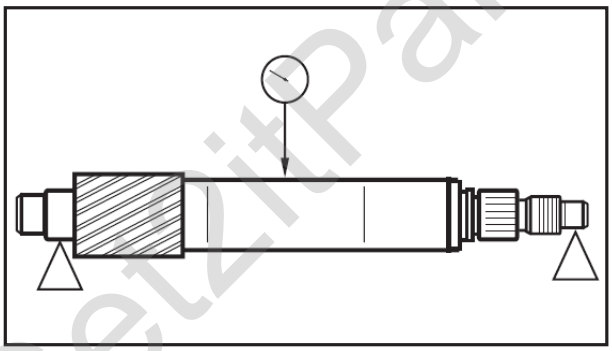


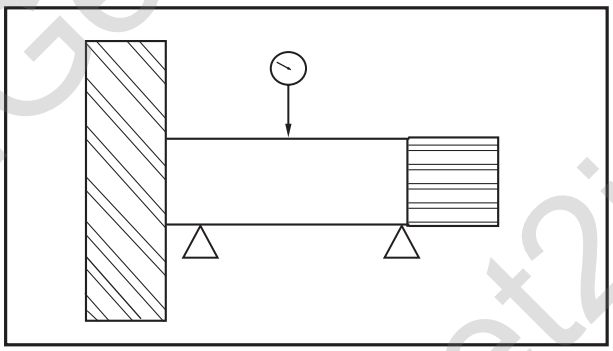
Order	Job/Part	Q'ty	Remarks
	Removing the lock washer, drive sprocket, and circlip		Remove the parts in the order listed.
	Transmission oil		Drain.
	Crankcase cover		Refer to "BELT DRIVE ".
	Belt drive		Refer to "V-BELT, DRIVE PULLEY AND DRIVEN PULLEY ".
	Driven pulley		
1	Cover mission	1	
2	Gasket, mission cover	1	
3	Dowel pin	2	
4	Shaft drive	1	
5	Counter shaft comp	1	
6	Reverse gear comp	1	
7	Final shaft comp	1	
8	Plate fixing	1	
9	Sprocket drive	1	
			For installation, reverse the removal procedure.

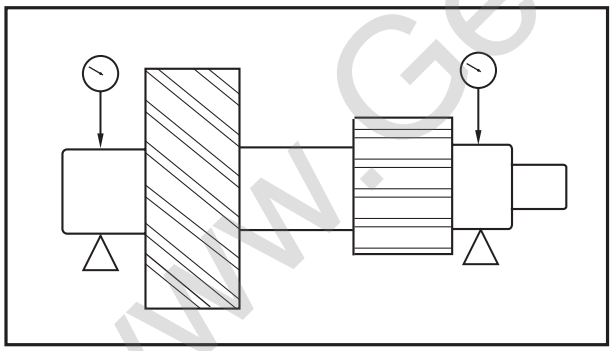


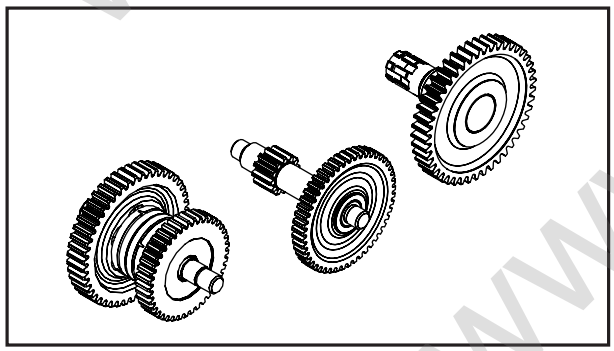
Order	Job/Part	Q'ty	Remarks
	Disassembling the counter shaft comp		Remove the parts in the order listed.
①	Counter shaft comp	1	
②	Shift push	1	
③	Shaft fixed	1	
④	Shift fixed spring	2	
⑤	Washer	2	
⑥	Circlip	2	
⑦	Fork	1	
⑧	Shaft gear shift	2	
⑨	Cam shift	1	
⑩	Bearing	1	
⑪	Knock black	1	
⑫	Insulator shim	1	
			For installation, reverse the removal procedure.











CHECKING THE TRANSMISSION

1. Measure:
   • counter shaft runout
   (with a centering device and dial gauge)
   Out of specification → Replace the counter shaft.

Counter shaft runout limit
0.08 mm (0.0031 in)

2. Measure:
   • drive shaft runout
   (with a centering device and dial gauge)
   Out of specification → Replace the drive shaft.

Dirve shaft runout limit
0.08 mm (0.0031 in)

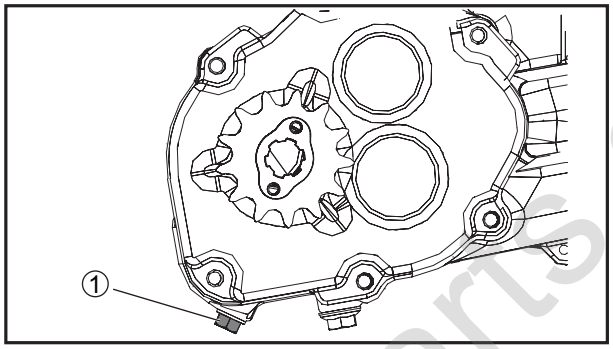
3. Measure:
   • final shaft runout
   (with a centering device and dial gauge)
   Out of specification → Replace the final shaft.

Final shaft runout limit
0.08 mm (0.0031 in)

4. Measure:
   • reverse gear runout
   (with a centering device and dial gauge)
   Out of specification → Replacethe reverse gear.

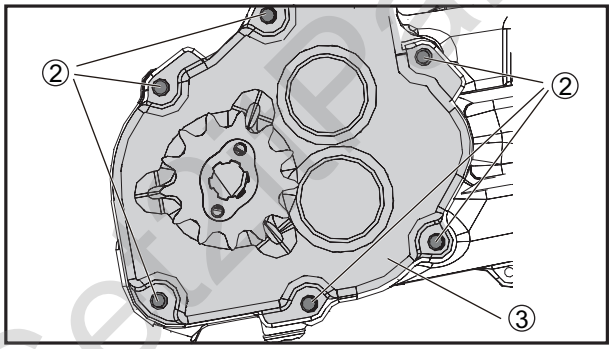
Final shaft runout limit
0.08 mm (0.0031 in)

5. Check:
   • transmission gears
   Blue discoloration/pitting/wear → Replace the defective gear(s).
6. Check:
   • transmission gear engagement
   (each pinion gear to its respective wheel gear)
   Incorrect → Reassemble the transmission shaft assemblies.
7. Check:
   • transmission gear movement
   Rough movement → Replace the defective part(s).

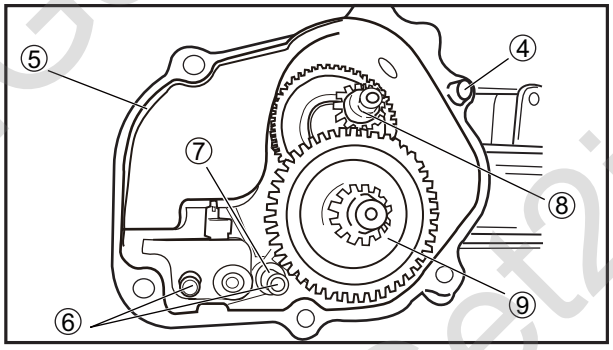


REMOVING THE GEAR SET

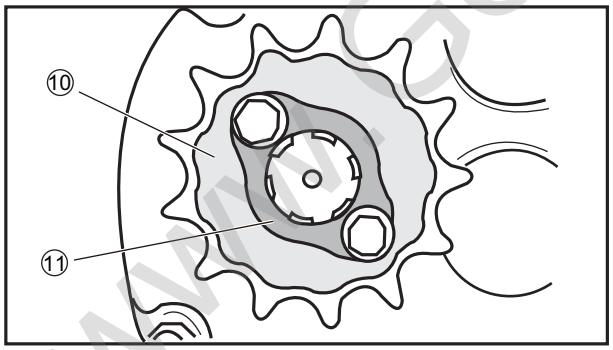
1. Remove:
   - drain bolt ① and drain the oil



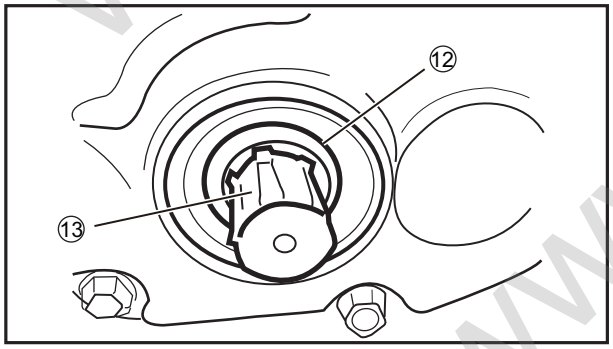
- relax the bolts and② remove the mission cover ③



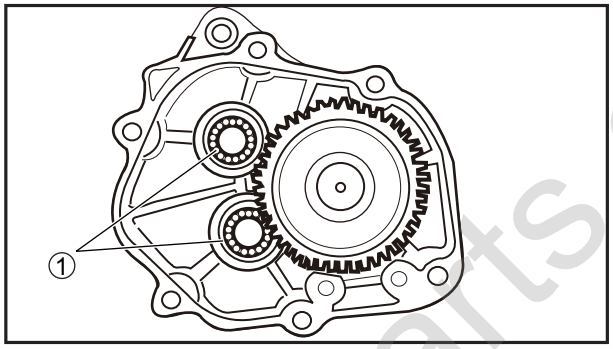
- remove the dowel pins ④ and gasket ⑤
- pull the shaft gear shifts out ⑥ and remove the fork shift ⑦
- remove the reverse shaft comp ⑧ , and counter shaft comp ⑨

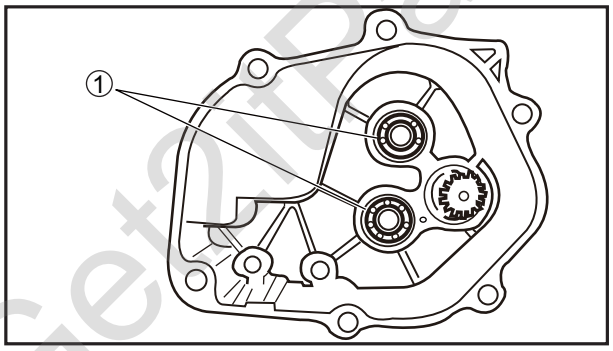


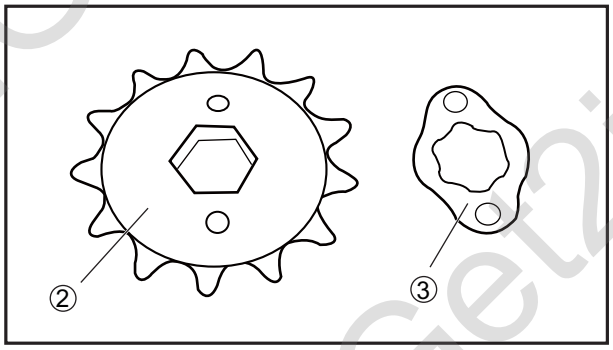
- remove the sprocket drive ⑩ and plate fixing ⑪ from the final shaft comp



- remove the circlip ⑫ and final shaft comp ⑬



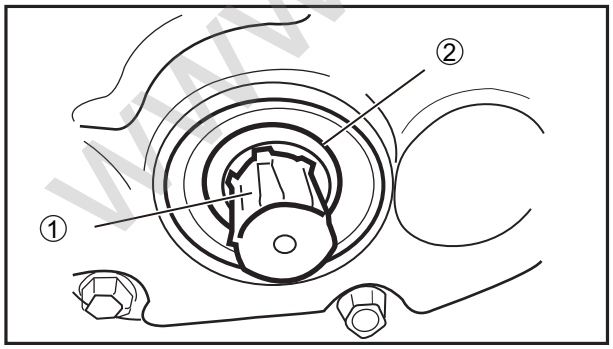




CHECKING THE GEAR SET

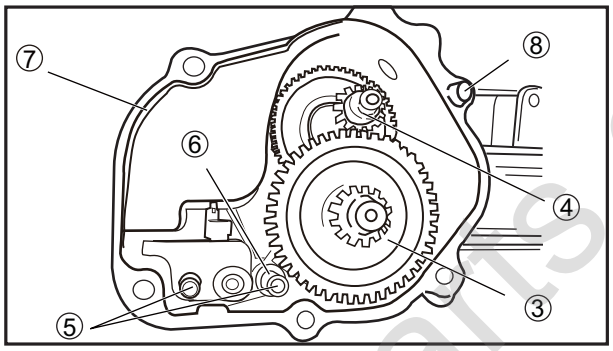
Turn the inner race of the bearing with your finger.

1. Check:
   - the bearings ① should turn smoothly and quietly
   - also check that the outer races of the bearings fit tightly in the left crankcase
   - replace the bearings if they are abnormal
   - check the sprocket drive ② and plate fixing ③ for wear or damage
   - replace the sprocket drive and plate fixing if necessary

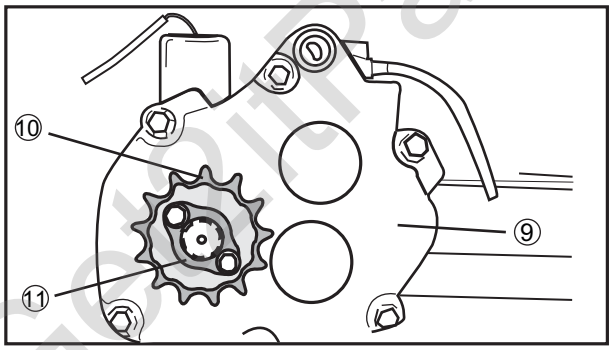


INSTALLING THE GEAR SET

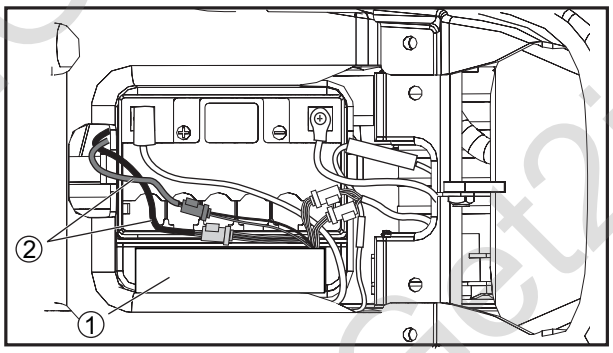
- Install the mission cover and final shaft ① comp together with circlip ②



- install the counter shaft comp ③ and reverse shaft comp ④ in the left crankcase
- install the shaft gear shifts ⑤ and the fork shift ⑥
- install a new gasket ⑦ and the dowel pins ⑧



- assemble the mission cover ⑨ ,sprocket drive⑩, plate fixing ⑪and fill the recommend oil about 0.3 liter

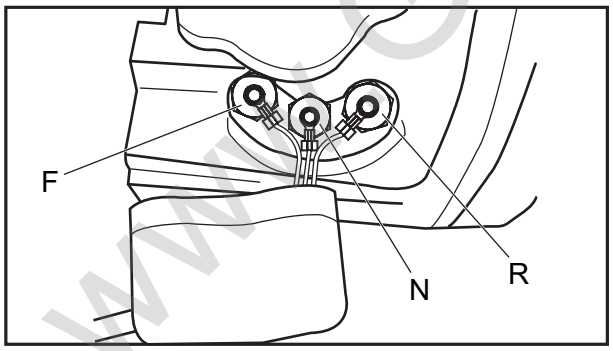


SHIFT MECHANISM

C.D.I

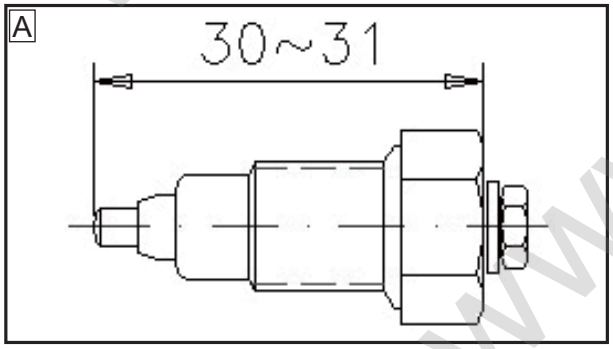
We can find C.D.I. ①, please refer to pictures. It include shift control system. Replace it if control system invalid.

Then this wire ② connected, the engine speed is limited to 4800 r/min.Then this wire cutted, top engine speed (8000 r/min) is available.



Sensor

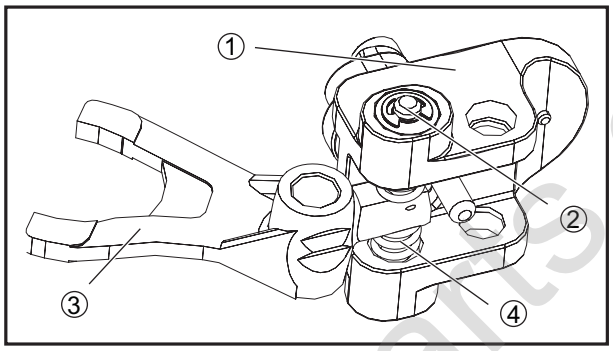
Inspect wire for break or damage and check contact. Measure sensor dimension as A after unscrew sensor.



If length is below 30mm, it must be replaced. Smear with loctite 5699 and screw with torque 250N.m in assembly.

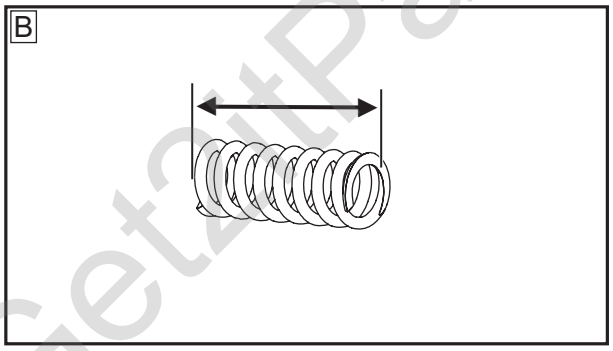
25 Nm (2.5 m · kg, 18.1 ft · lb)

Service limits
30 mm (1.1811 in)



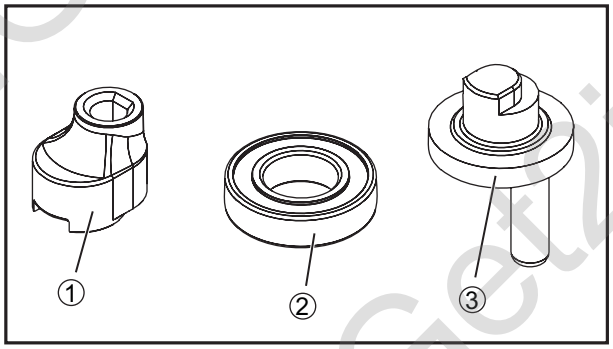
Shift fixed spring, shift push, shaft fixed and fork

1. Remove:
   • mission cover and other parts
2. Check:
   • shift push ① , shaft fixed ② , fork ③



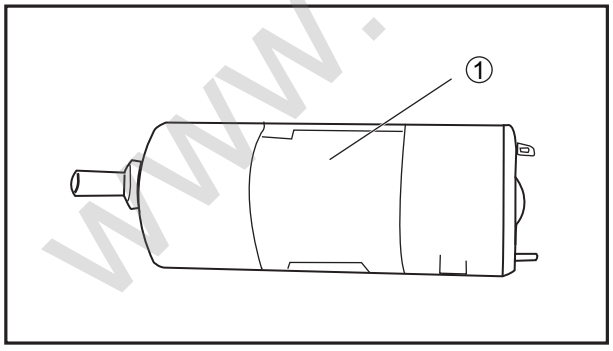
3. Measure:
   • shift fixed spring ④ lengthas B .
   If it is less than 24 mm, it must be replaced.

Service limits
24 mm (0.9449 in)



Knock block, bearing and cam shift

1. Check:
   • knock block ①, bearing ② and cam shift ③ for wear or damage. Replace it if necessary.



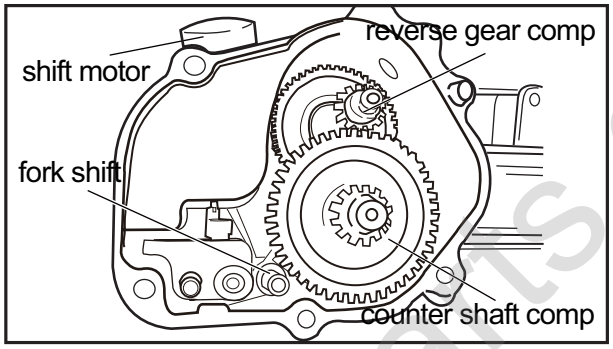
Shift motor

1. Check:
   • shift motor ① whether the action is normal as follow

data:

	Voltage(v)	Current(mA)	Torque (kg-cm)	rpm
loaded	12	≤ 800	6.0	54
No load	12	≤ 390	---	60

TIP
Replace the shift motor if necessary.



REMOVING GEAR BOX

1. Remove:
   - mission cover, parts of shift mechanism
2. Check:
   - gears for wear, scoring, chipping or break

TIP

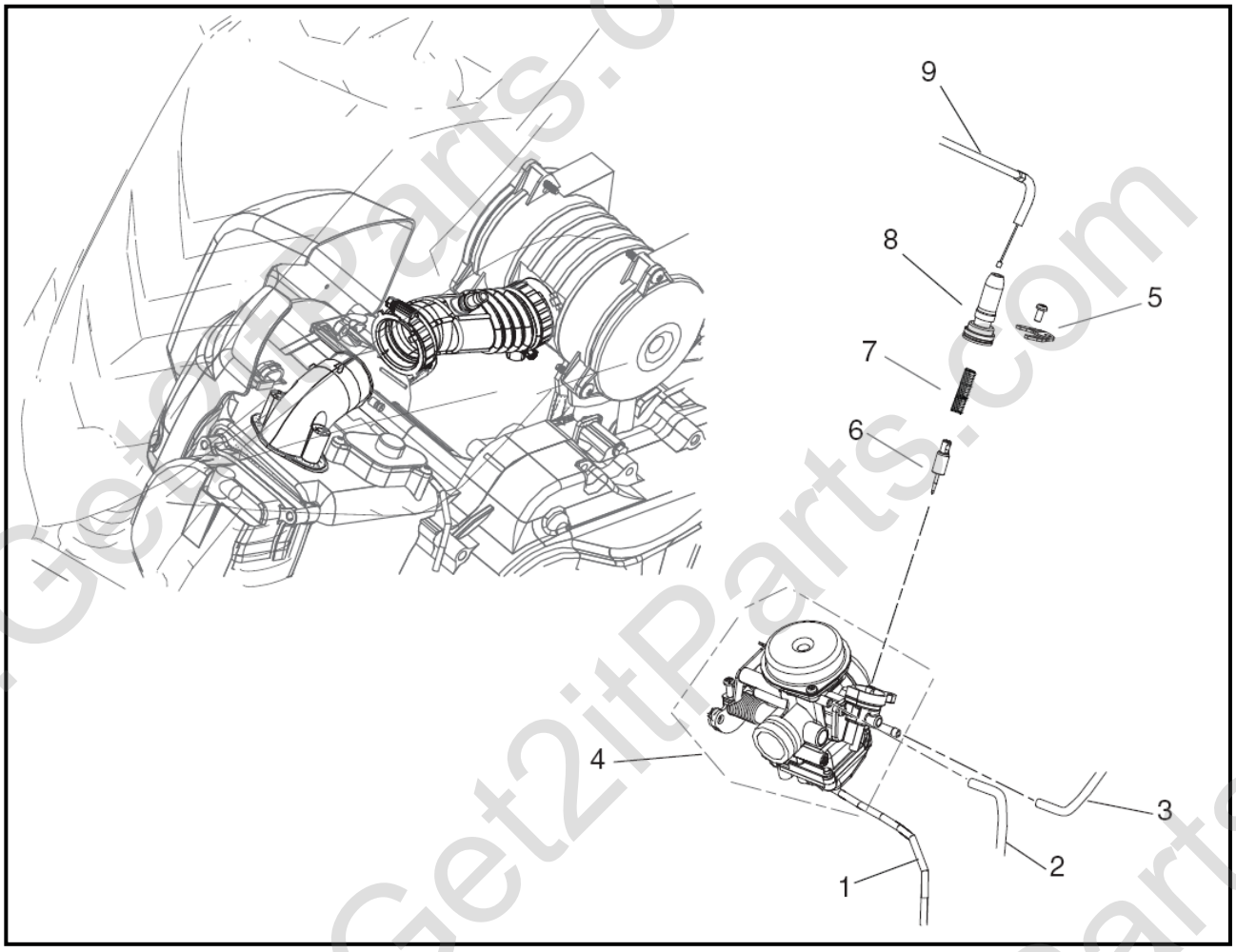
Replace it if necessary.

The gear ratio of forward gear composition is about $\frac{41}{15} \times \frac{45}{13}$.

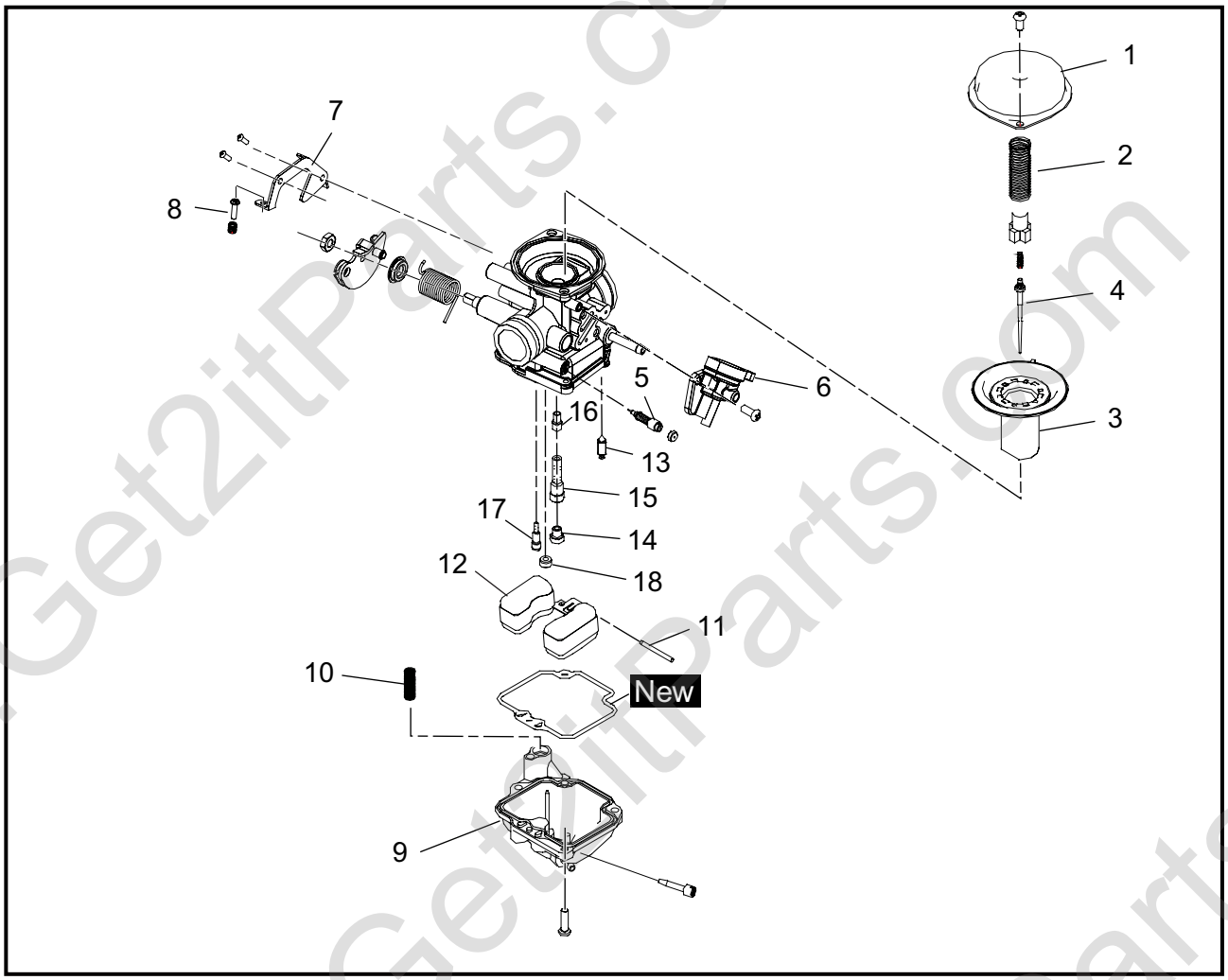
The gear ratio of reverse gear composition is about $\frac{49}{15} \times \frac{47}{12} \times \frac{45}{13}$.

CARBURETOR

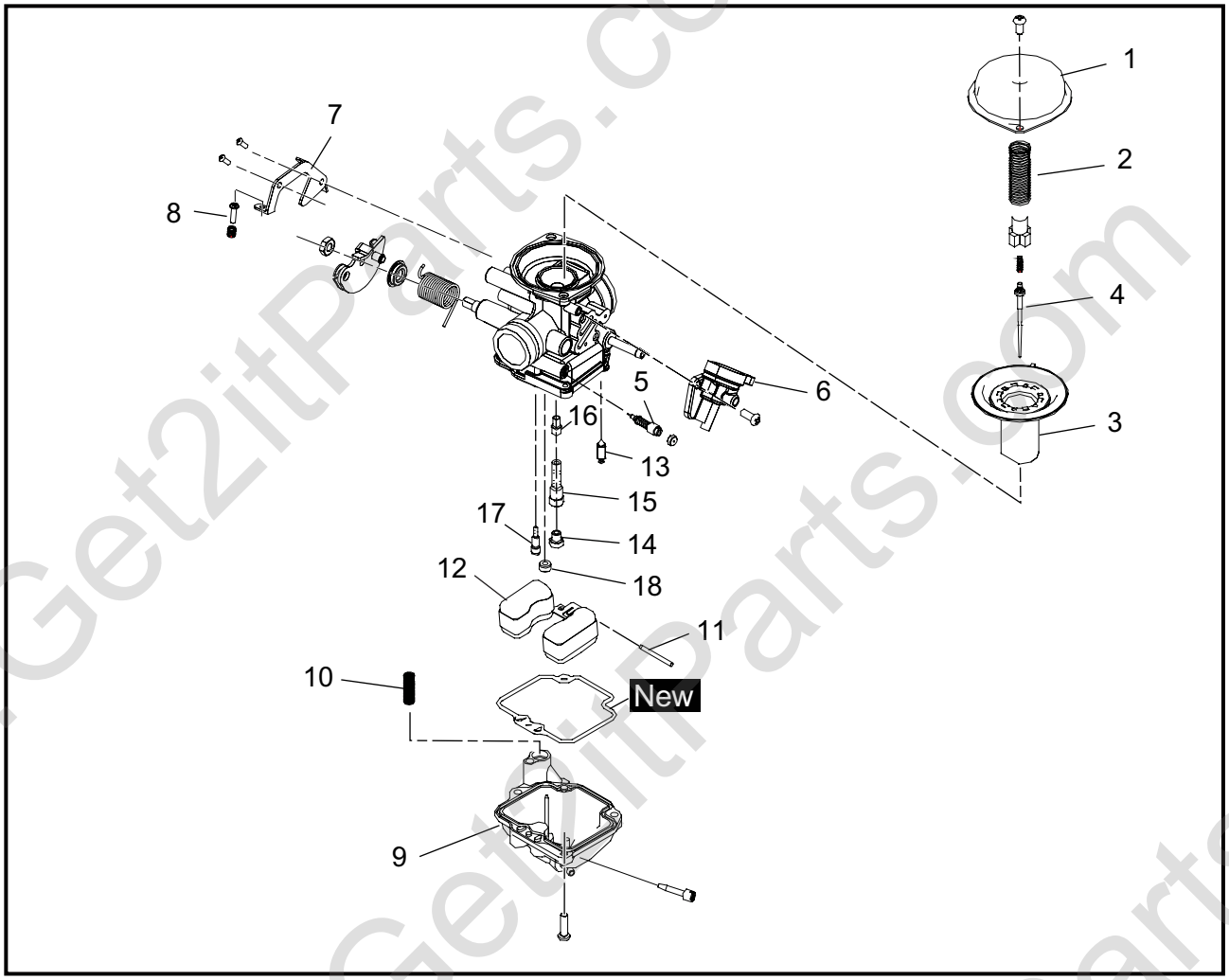
CARBURETOR



Order	Job/Part	Q'ty	Remarks
	Removing the carburetor		Remove the parts in the order listed.
1	Fuel overflow hose	1	
2	Air vent hose	1	
3	Fuel hose	1	
4	Carburetor assembly	1	
5	Plate	1	
6	Plunger assay, starter	1	
7	Spring	1	
8	Manual starter comp	1	
9	Wire, starter	1	
			For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	Disassembling the carburetor		Remove the parts in the order listed. **TIP** Before disassembling the carburetor, make sure to note the number of times the pilot screw is turned out from the seated position to its set position.
1	Cover	1	
2	Spring	1	
3	Piston valve	1	
4	Jet needle	1	
5	Pilot screw	1	
6	Starter assy	1	
7	Bracket wire assy	1	
8	Throttle stop screw	1	
9	Float chamber	1	



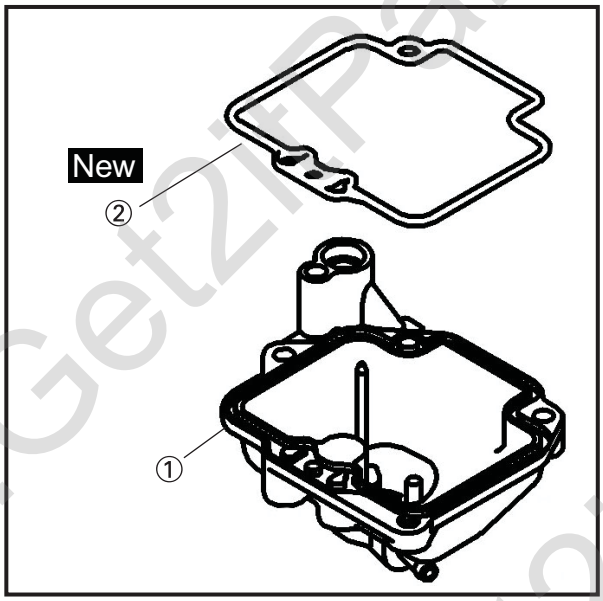
Order	Job/Part	Q'ty	Remarks
	Disassembling the carburetor		Remove the parts in the order listed.
10	Spring	1	
11	Float pin	1	
12	Float	1	
13	Needle valve	1	
14	Main jet	1	
15	Needle jet holder	1	
16	Needle jet	1	
17	Pilot jet	1	
18	Plug	1	
			For assembly, reverse the disassembly procedure.

DISASSEMBLING THE CARBURETOR

TIP

Before disassembling the carburetor, make sure to note the number of times the pilot screw is turned out from the seated position to its set position.

CHECKING THE CARBURETOR

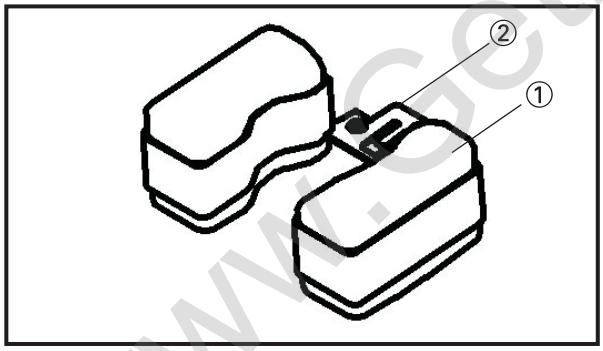


1. Check:
   - carburetor body
   - float chamber
     Cracks/damage → Replace.
   - fuel passages
     Obstruction → Clean.
   - float chamber body ①
     Dirt → Clean.
   - float chamber rubber gasket ② New
     Cracks/damage/wear → Replace.

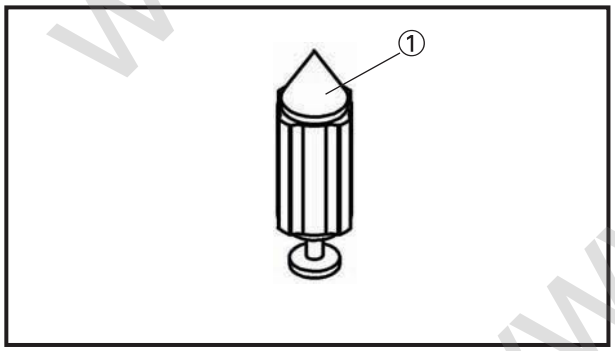
****

a. Wash the carburetor in a petroleum-based solvent. Do not use any caustic carburetor cleaning solution.
b. Blow out all of the passages and jets with compressed air.

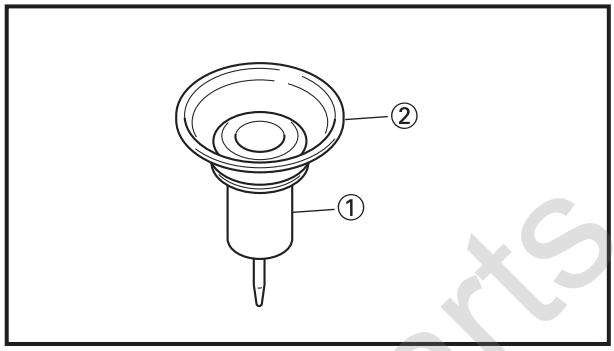
****



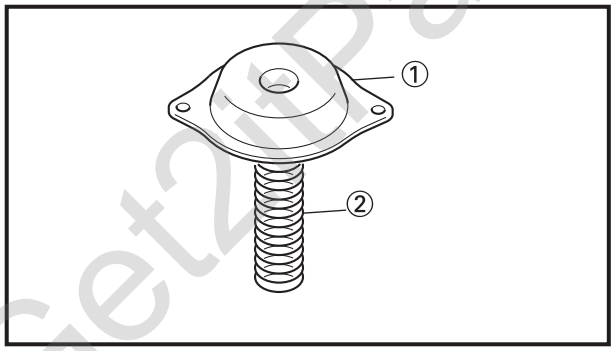
2. Check:
   - float ①
   - float tang ②
     Damage → Replace.



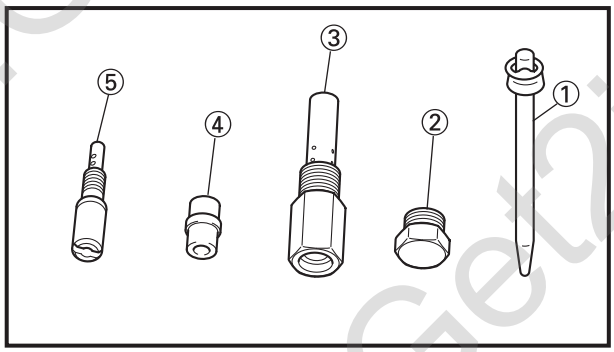
3. Check:
   - needle valve ①
     Damage/obstruction/wear → Replace the needle valve.



4. Check:
   • piston valve ①
   Damage/scratches/wear→ Replace.
   • piston valve diaphragm ②
   Cracks/tears → Replace.

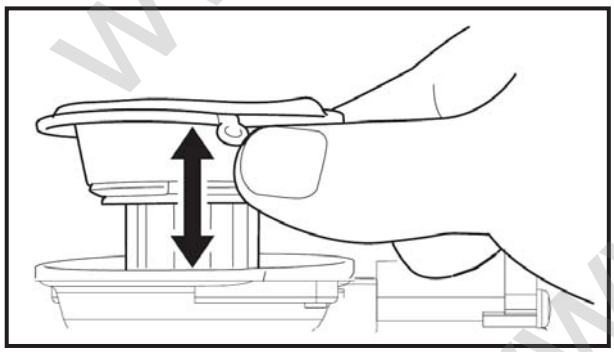


5. Check:
   • vacuum chamber cover ①
   • piston valve spring ②
   Cracks/damage → Replace.

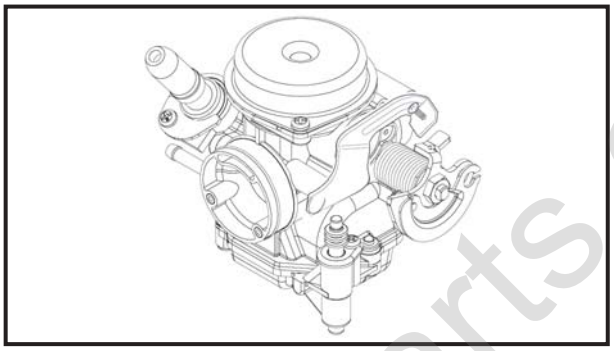


6. Check:
   • jet needle ①
   • main jet ②
   • Needle jet holder ③
   • Needle jet ④
   • pilot jet ⑤
   Bends/damage/wear → Replace.
   Obstruction → Clean.
   Blow out the jets with compressed air.

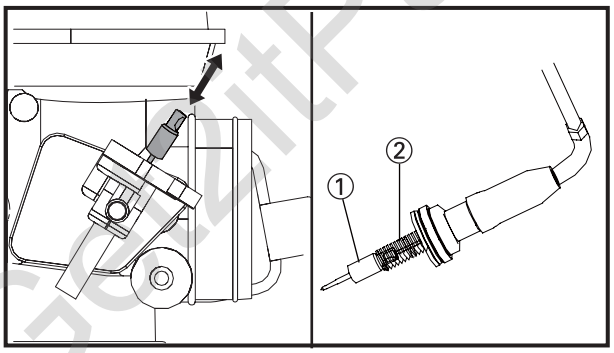
7. Check:
   • fuel hoses
   Cracks/damage/wear → Replace.
   Obstruction → Clean.
   Blow out the hoses with compressed air.



8. Check:
   • piston valve movement
   Insert the piston valve into the carburetor body and move it up and down.
   Tightness → Replace the piston valve.



9. Check:
   • throttle valve movement
     Sticks → Replace.



10. Check:
    • choke valve movement
      Sticks → Replace.

11. Check:
    • starter plunger ①
    • starter plunger spring ②
      Bends/cracks/damage → Replace.

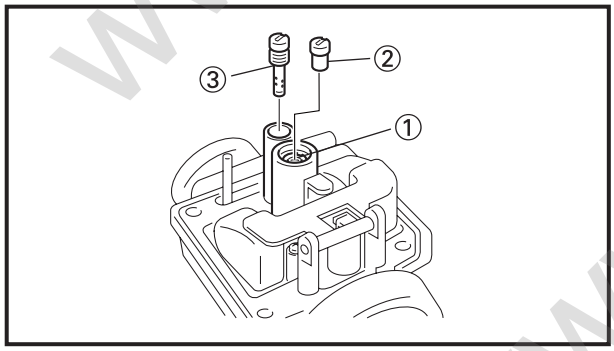
ASSEMBLING THE CARBURETOR

TIP

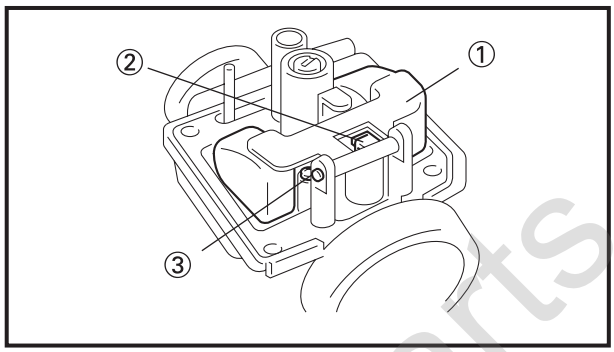
Before assembling the carburetor, make sure to turn out the pilot air screw the same number of times, as noted before disassembly, from the seated position to the set position.

NOTICE

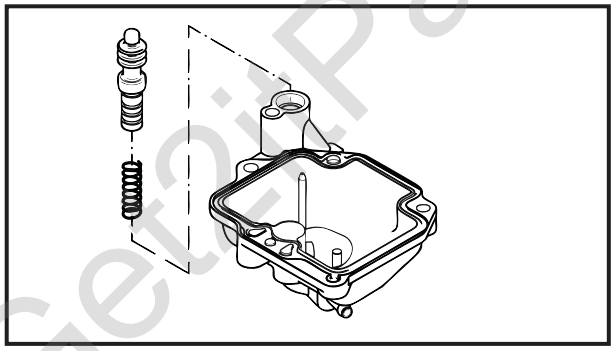
- **Before assembling the carburetor, wash all of the parts in a petroleum-based solvent.**
- **Always use a new gasket.**



1. Install:
   • needle jet holder ①
   • main jet ②
   • pilot jet ③



2. Install:
   • float ①
   • needle valve ②
   • float pin ③



3. Install:
   • accelerator pump assembly

4. Install:
   • piston valve
   • jet needle
   • piston valve spring
   • vacuum chamber cover

INSTALLING THE CARBURETOR

1. Adjust:
   • engine idling speed

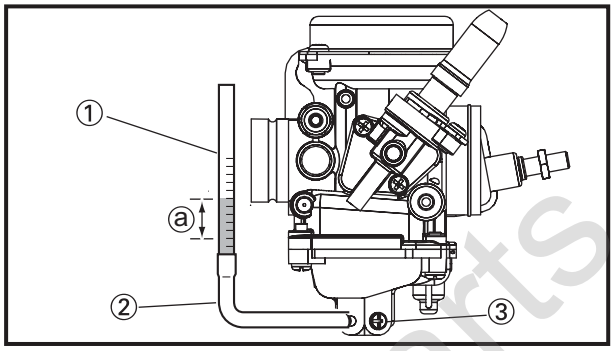
Engine idling speed
1,600 ~ 1,800r/min

Refer to "ADJUSTING THE ENGINE IDLING SPEED" in chapter 3.

2. Adjust:
   • throttle cable free play

Throttle cable free play (at the flange of the throttle grip)
1 ~ 3 mm (0.04 ~ 0.12 in)

Refer to "ADJUSTING THE THROTTLE CABLE FREE PLAY" in chapter 3.



MEASURING AND ADJUSTING THE FUEL LEVEL

1. Measure:
   • fuel level ⓐ
   Out of specification → Adjust.

Fuel level
(above the float chamber mating surface)
5.0 ~ 6.0 mm (0.20 ~ 0.24 in)

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a. Stand the machine on a level surface.
b. Install the fuel level gauge ① onto the fuel drain pipe ②.
c. Loosen the fuel drain screw ③.
d. Hold the fuel level gauge vertically next to the line on the float chamber.
e. Measure the fuel level ⓐ.

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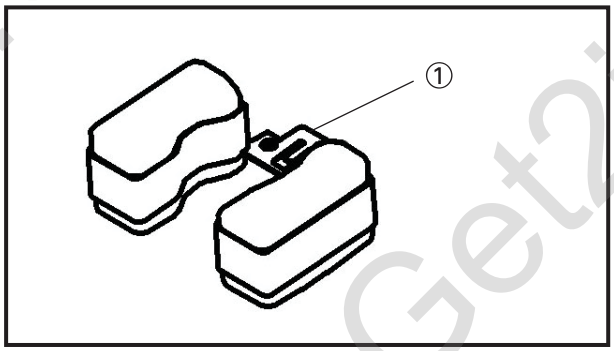

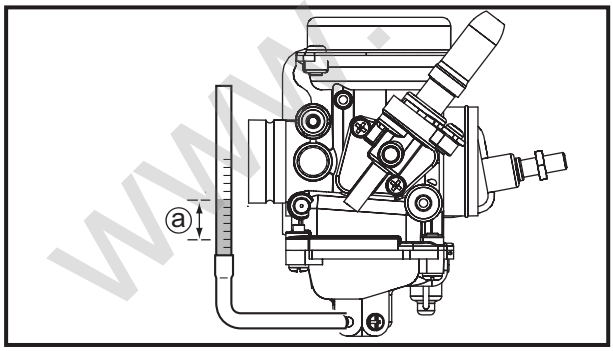

2. Adjust:
   • fuel level

▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼

a. Remove the carburetor assembly.
b. Check the needle valve seat and needle valve.
c. If either is worn, replace them as a set.
d. If both are fine, adjust the float level by slightly bending the float tang ①.
e. Install the carburetor assembly.
f. Measure the fuel level again ⓐ.
g. Repeat steps (a) to (f) until the fuel level is within specification.

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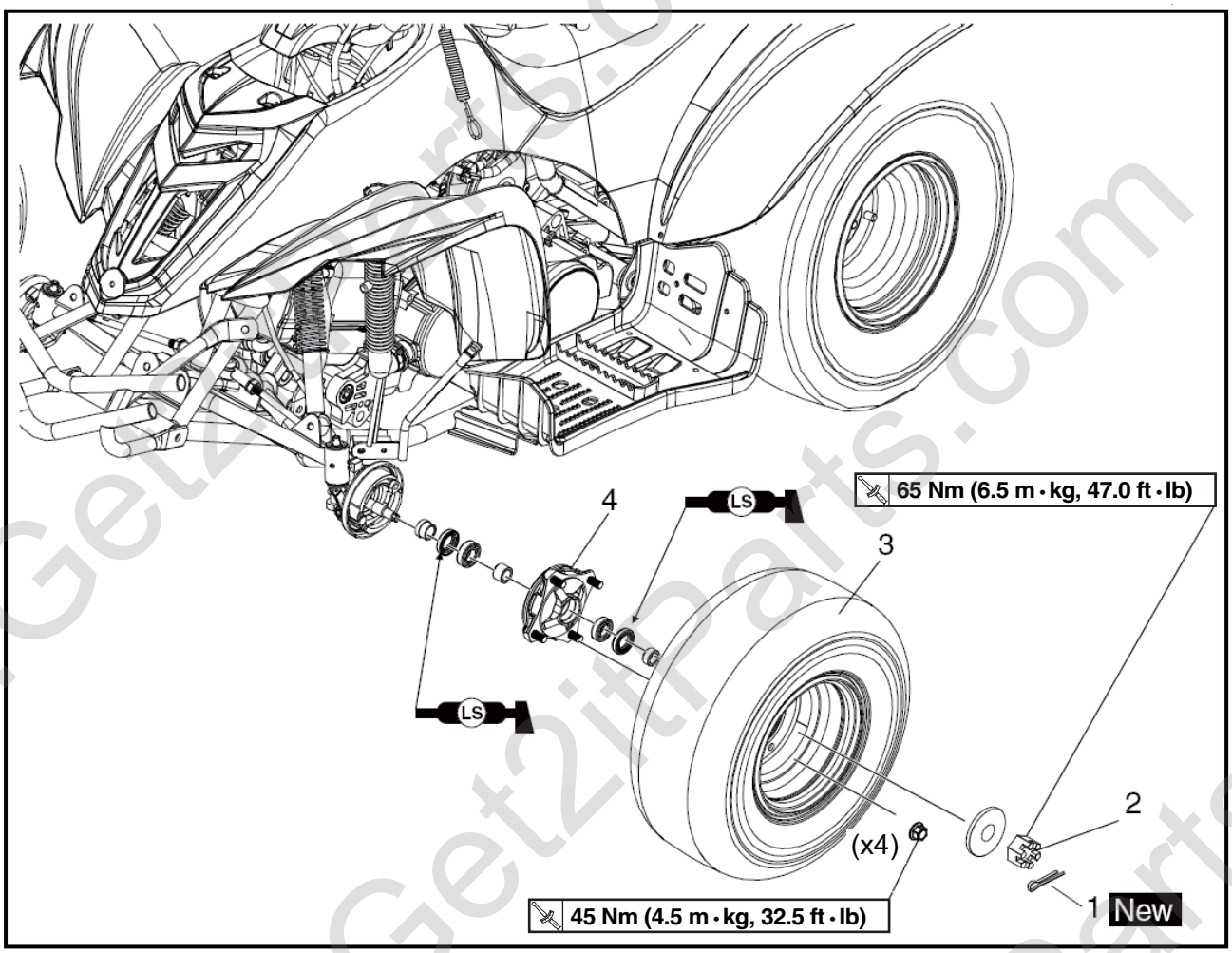
CHASSIS

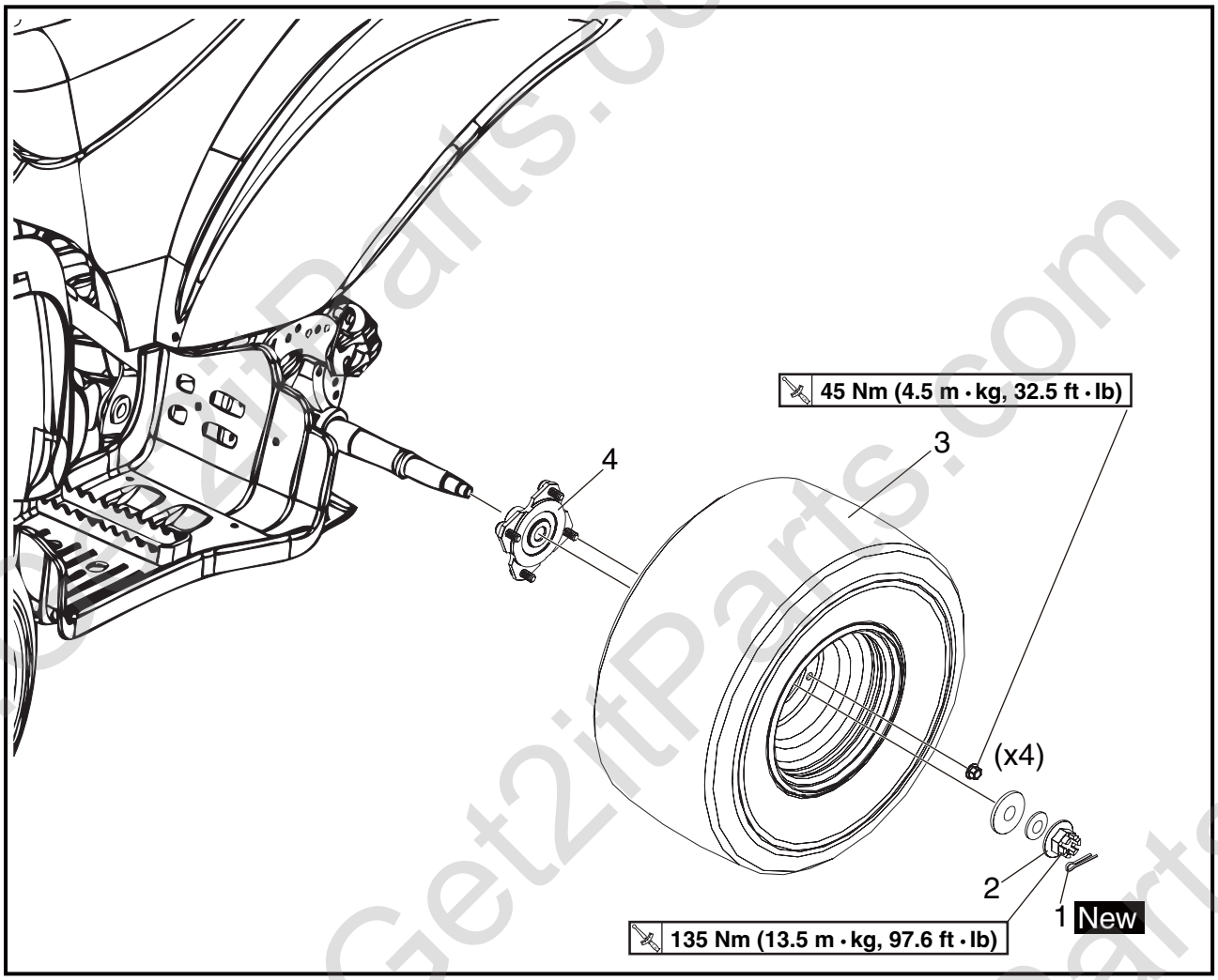
FRONT AND REAR WHEELS

FRONT WHEELS

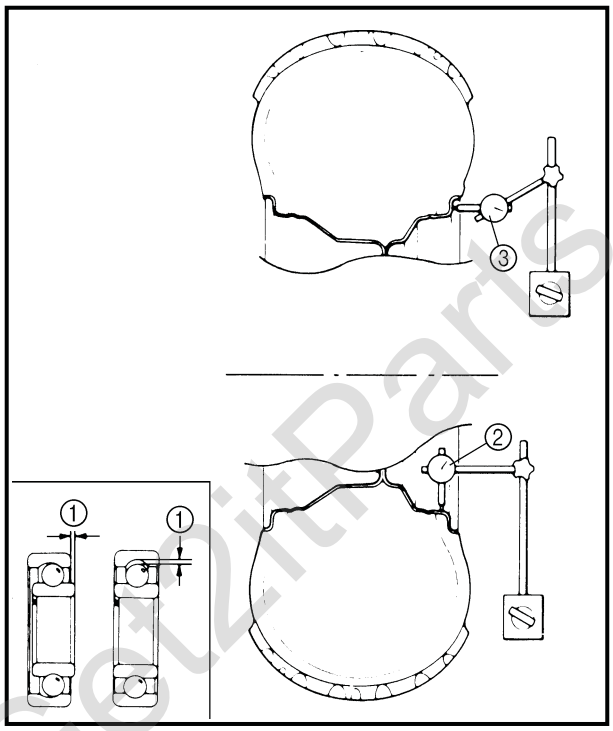


Order	Job/Part	Q'ty	Remarks
	Removing the front wheels		Remove the parts in the order listed. Place the machine on a level surface. **WARNING** **Securely support the machine so there is no danger of it falling over.** The following procedure applies to both of the front wheels.
1	Cotter pin	1	Refer to "INSTALLING THE WHEEL HUBS".
2	Axle nut	1	
3	Front wheel	1	Refer to "INSTALLING THE FRONT WHEELS".
4	Front brake drum	1	For installation, reverse the removal procedure.

REAR WHEELS



Order	Job/Part	Q'ty	Remarks
	Removing the rear wheels		Remove the parts in the order listed. Place the machine on a level surface. **WARNING** **Securely support the machine so there is no danger of it falling over.** The following procedure applies to both of the rear wheels.
1	Cotter pin	1	Refer to "INSTALLING THE WHEEL HUBS".
2	Axle nut	1	
3	Rear wheel	1	Refer to "INSTALLING THE REAR WHEELS".
4	Rear wheel hub	1	For installation, reverse the removal procedure.



CHECKING THE WHEELS

The following procedure applies to both of the front and rear wheels.

1. Check:
   - wheel
2. Measure:
   - wheel runout

   Over the specified limit → Replace the wheel or check the wheel bearing play ①.

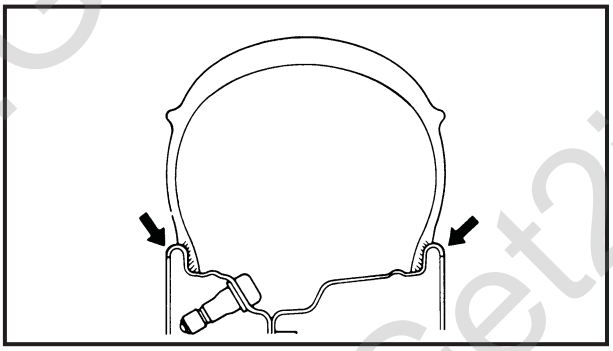
Wheel runout limit
Radial ②: 2.0 mm (0.08 in)
Lateral ③: 2.0 mm (0.08 in)

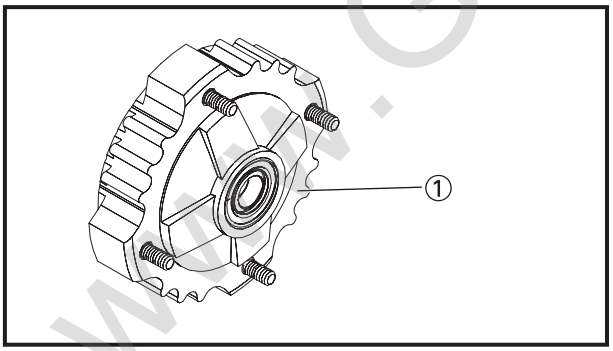
3. Check:
   - wheel balance

   Out of balance → Adjust.

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 machine damage and possible operator injury.





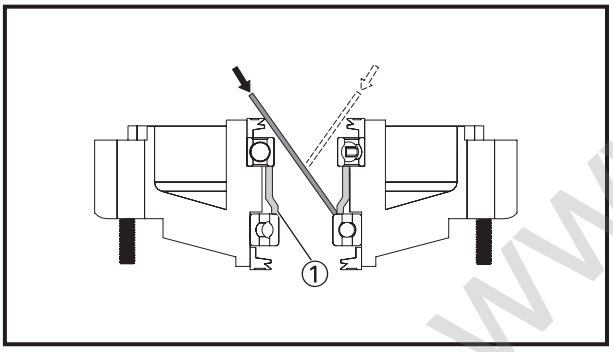
CHECKING THE FRONT WHEEL HUBS

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

1. Check:
   - front wheel hub ①

   Cracks/damage → Replace.
2. Check:
   - wheel bearings

   Wheel hub play/wheel turns roughly → Replace.



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a. Clean wheel hub exterior.
b. Drive bearing out by pushing spacer aside and tapping around perimeter of bearing inner race. Use soft metal drift punch and hammer. The spacer ① "floats" between bearings. Remove both bearings as described.

WARNING

Eye protection is recommended when using striking tools.

c. To install the wheel bearings, reverse the above sequence. Use a socket that matches outside diameter of bearing outer race to drive in bearing.

NOTICE

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

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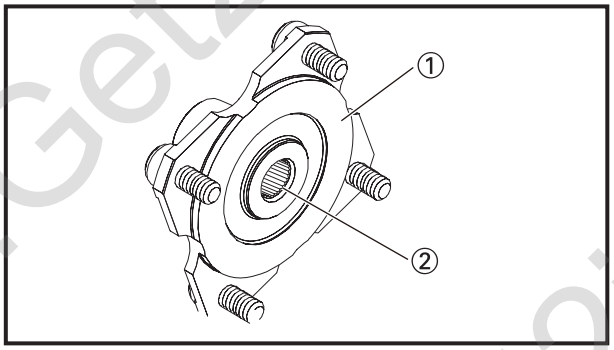
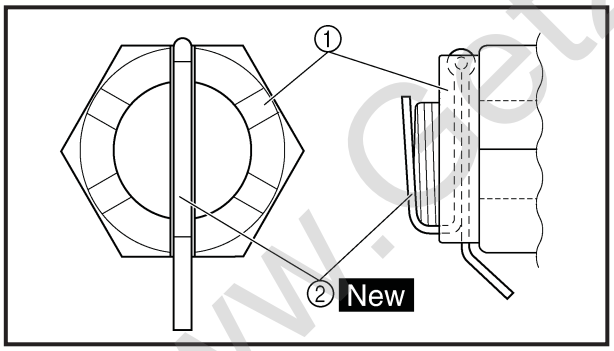


CHECKING THE REAR WHEEL HUBS

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

1. Check:
   - rear wheel hub ①
     Cracks/damage → Replace.
   - wheel hub splines ②
     Wear/damage → Replace.



INSTALLING THE WHEEL HUBS

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

1. Install:
   - axle nut ①

     Front wheel hub:

     65 Nm (6.5 m · kg, 47.0 ft · lb)

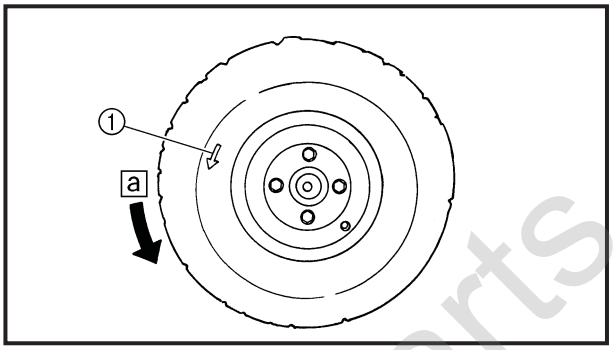
     Rear wheel hub:

     135 Nm (13.5 m · kg, 97.6 ft · lb)

   - cotter pin ② New

TIP

Do not loosen the axle nut after torquing it. If the axle nut groove is not aligned with the cotter pin hole, align the groove with the hole by tightening the axle nut.



INSTALLING THE FRONT WHEELS

The following procedure applies to both of the front wheels.

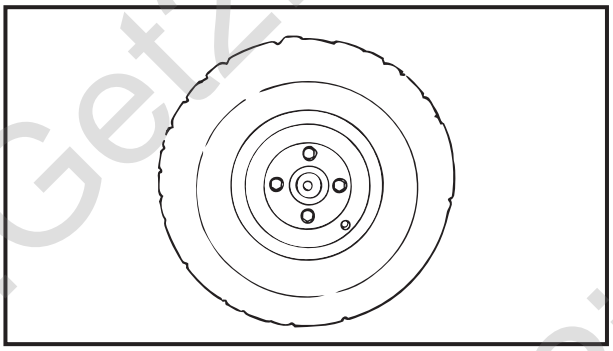
1. Install:
   - wheel

TIP

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

2. Tighten:
   - nuts

45 Nm (4.5 m · kg, 32.5 ft · lb)



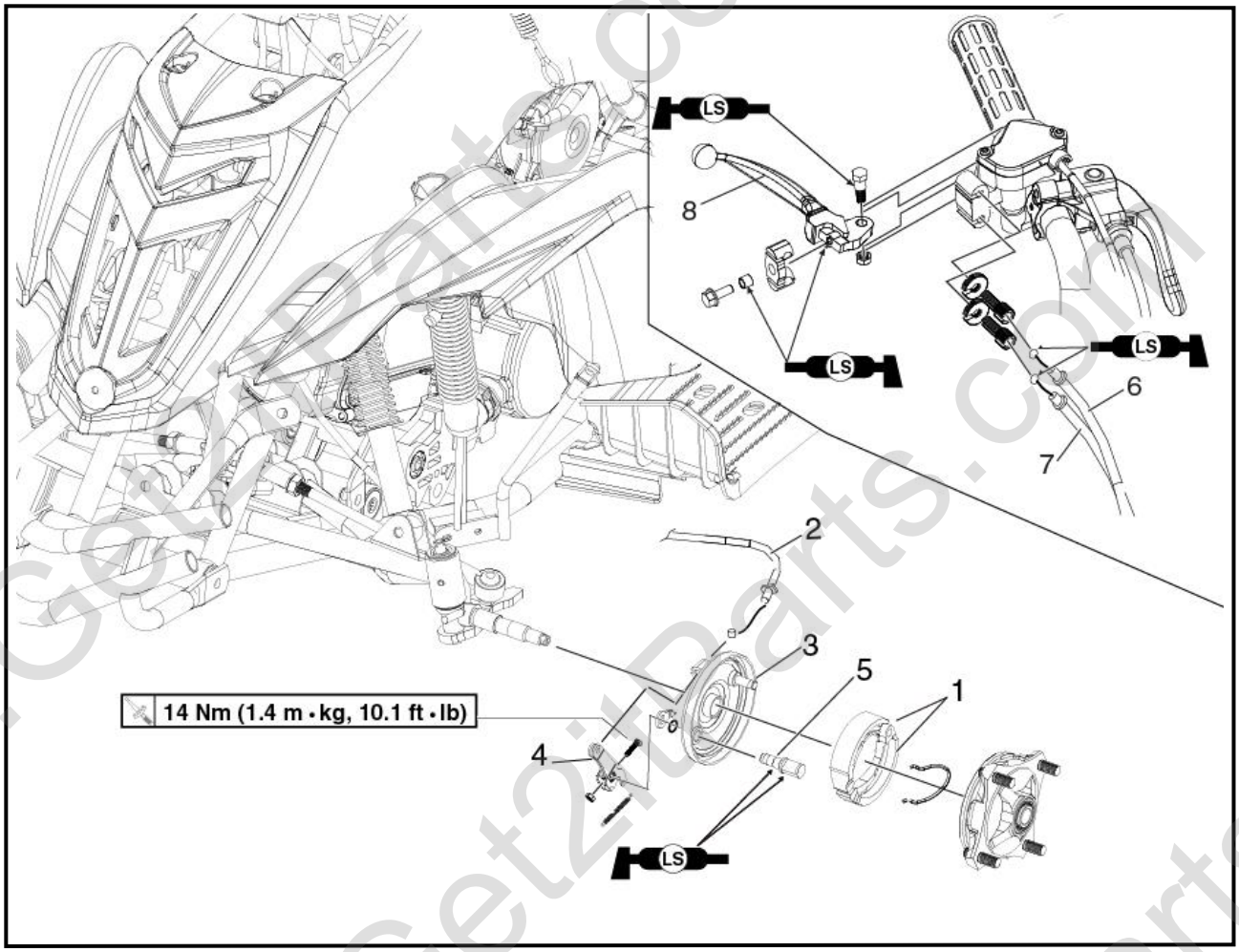
INSTALLING THE REAR WHEELS

The following procedure applies to both of the rear wheels.

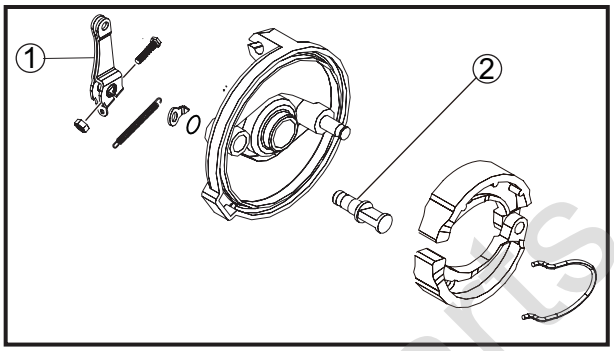
1. Install:
   - wheel
2. Tighten:
   - nuts

45 Nm (4.5 m · kg, 32.5 ft · lb)

FRONT BRAKES



Order	Job/Part	Q'ty	Remarks
	Removing the front brakes		Remove the parts in the order listed. Refer to "FRONT AND REAR WHEELS". The following procedure applies to both of the front brakes.
1	Brake shoe	2	Refer to "INSTALLING THE FRONT BRAKES".
2	Front brake cable (drum side)	1	
3	Brake shoe plate	1	
4	Brake camshaft lever	1	Refer to "REMOVING THE FRONT BRAKES" and "INSTALLING THE FRONT BRAKES".
5	Brake camshaft	1	
6	Right front brake cable (lever side)	1	
7	Left front brake cable (lever side)	1	
8	Front brake lever	1	
			For installation, reverse the removal procedure.



REMOVING THE FRONT BRAKES

The following procedure applies to each brake.

1. Remove:
   - brake camshaft lever ①
   - brake camshaft ②

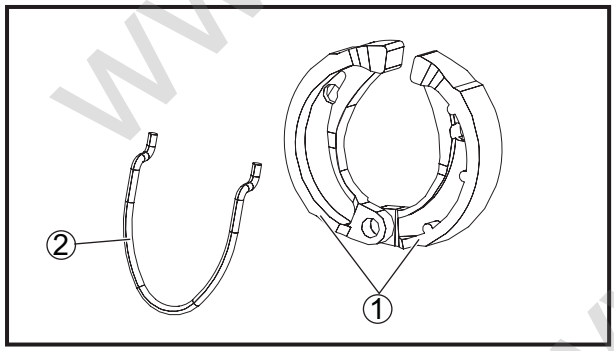
TIP

When removing the brake camshaft lever, mark the position on the brake camshaft lever where it is aligned with the punch mark in the brake camshaft.

CHECKING THE FRONT BRAKE SHOE PLATES

The following procedure applies to each brake.

1. Check:
   - brake shoe plate
   - pivot pin
   - brake camshaft
     Bends/cracks/damage → Replace.
   - dust seal
     Wear/damage → Replace.



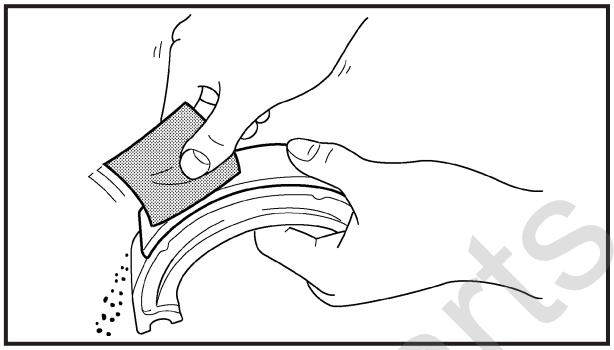
CHECKING THE FRONT BRAKE SHOES

The following procedure applies to each brake.

1. Check:
   - brake shoes ①
   - brake shoe spring ②
     Cracks/damage → Replace as a set.

TIP

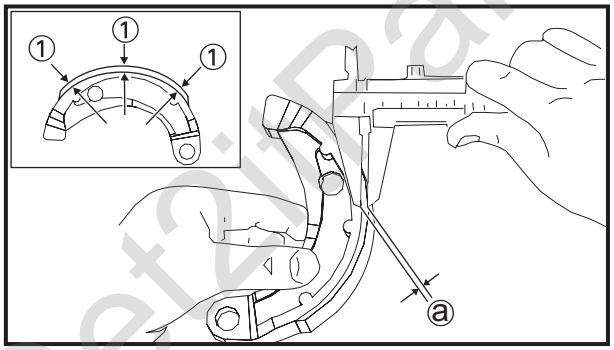
When replacing the brake shoes, replace the brake shoe springs at the same time.



2. Check:
• brake shoe lining surface
Glazed areas → Remove.
Use coarse sandpaper.

TIP

After using sandpaper, wipe off the polished particles with a cloth.



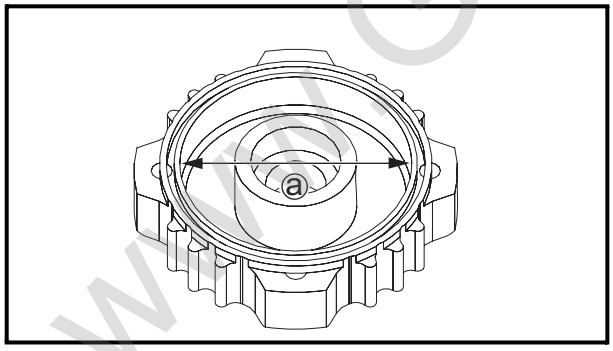
3. Measure:
• brake shoe lining thickness ⓐ
Out of specification → Replace.

① Measuring points

TIP

Replace the brake shoes as a set if either is found to be worn to the wear limit.

Brake lining thickness
3.0 mm (0.12 in)
<Limit>: 1.5 mm (0.06 in)

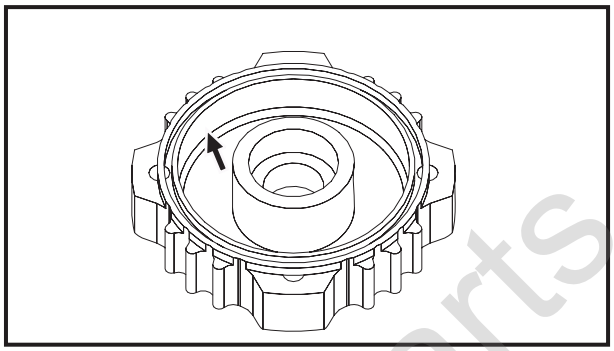


CHECKING THE FRONT BRAKE DRUMS

The following procedure applies to each brake.

1. Measure:
• brake drum inside diameter ⓐ
Out of specification → Replace.

Front brake drum inside diameter
Front: 85.0 mm (3.35 in)
<Limit>: 86.0 mm (3.39 in)



2. Check:
   • brake drum inner surface
   Oil/scratches → Remove.

Oil	**Use a rag soaked in lacquer thinner or solvent.**
Scratches	**Use an emery cloth (light and even polishing).**

INSTALLING THE FRONT BRAKES

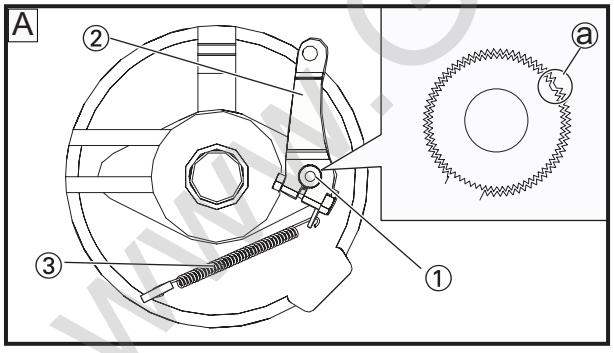
The following procedure applies to both of the front brakes.
Reverse the "Removal" procedure.
Note the following points.

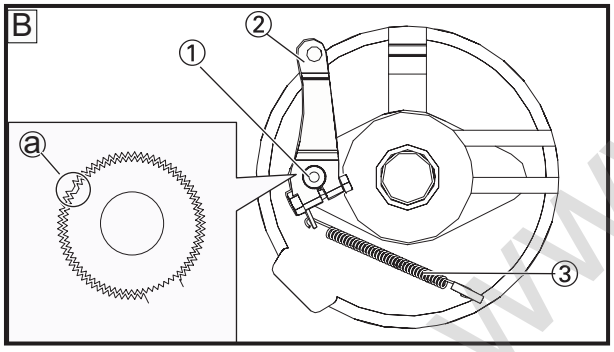
1. Lubricate:
   • brake camshaft
   • pivot pin

	Lithium-soap-based grease

NOTICE

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





2. Install:
   • brake camshaft ①
   • brake camshaft lever ②

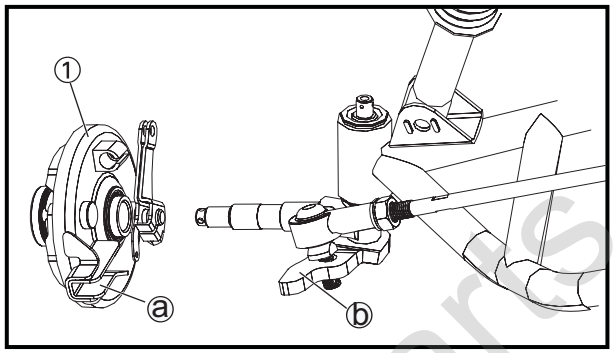
14 Nm (1.4 m · kg, 10.1 ft · lb)

   • brake camshaft spring ③

TIP

• Install the brake camshaft so its punch mark ⓐ is positioned as shown.
• Align the punch mark in the brake camshaft with the mark on the brake camshaft lever.

A Left side
B Right side



3. Install:
   • brake shoe plate ①

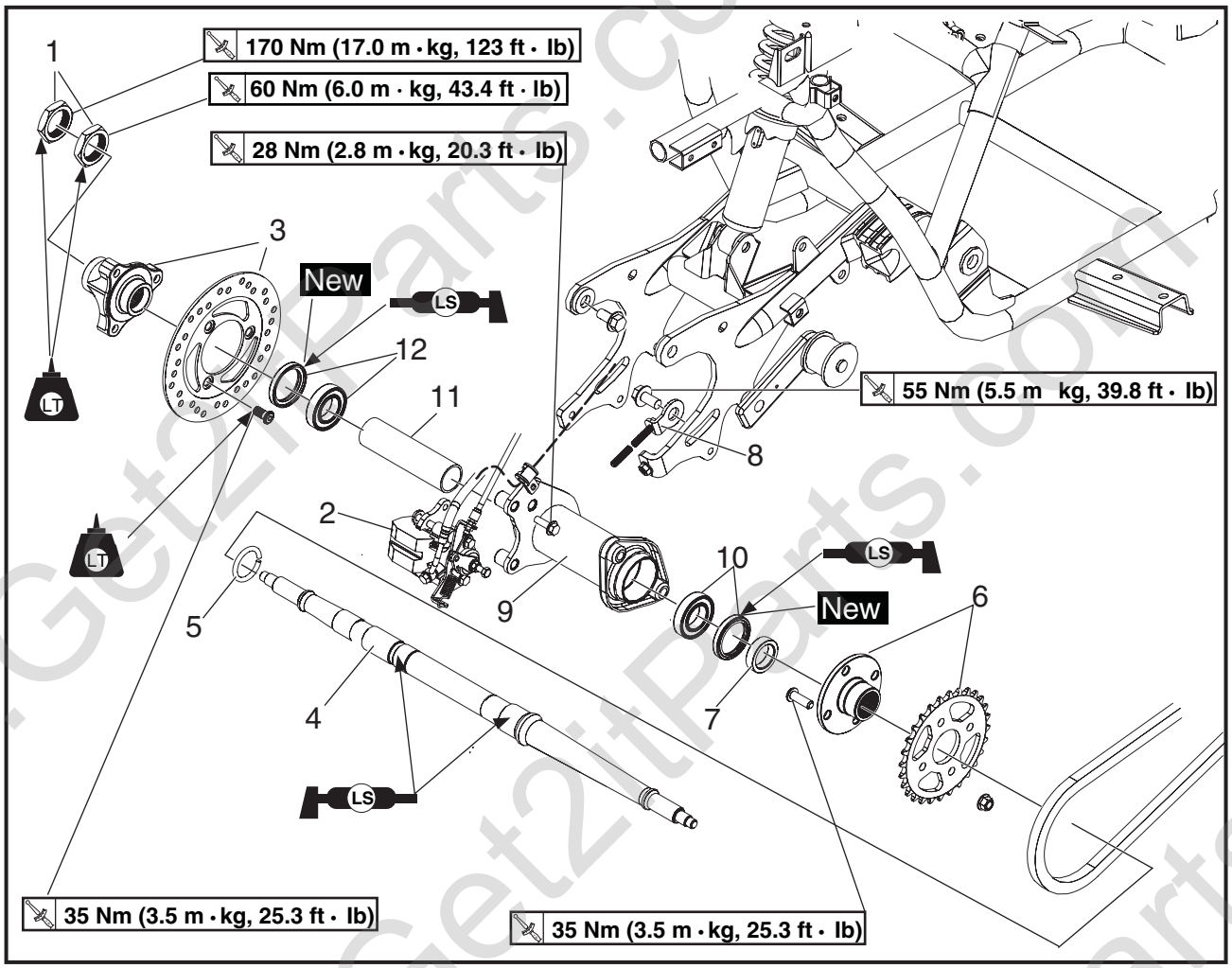
TIP
When installing the brake shoe plate, align the groove ⓐ of the brake shoe plate with the projection ⓑ of the steering knuckle.

4. Install:
   • front brake cable (drum side)
   • brake shoes

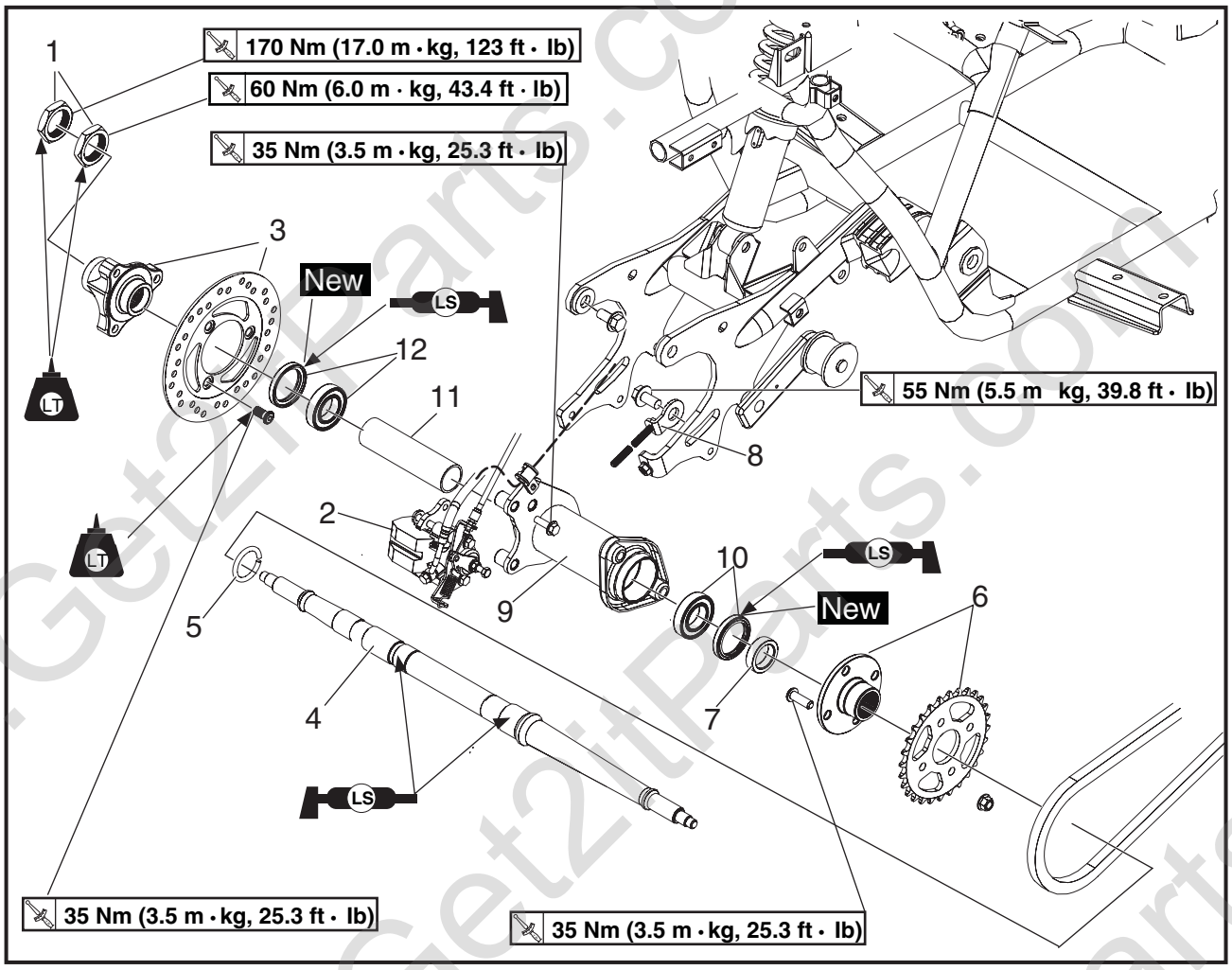
TIP
Check that the brake shoes are properly positioned.

5. Check:
   • brake camshaft operation
     Unsmooth operation → Repair.
6. Adjust:
   • front brake
     Refer to “ADJUSTING THE FRONT BRAKE” in chapter 3.

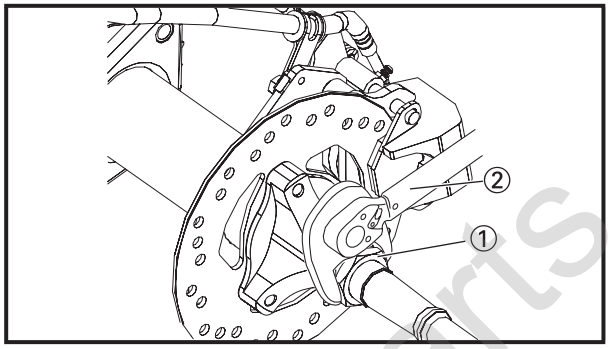
REAR AXLE AND REAR AXLE HUB



Order	Job/Part	Q'ty	Remarks
	Removing the rear axle and rear axle hub		Remove the parts in the order listed.
	Rear wheels/rear wheel hubs		Refer to "FRONT AND REAR WHEELS".
1	Nut	2	Refer to "REMOVING THE REAR AXLE" and "INSTALLING THE REAR AXLE".
2	Brake caliper	1	**TIP** Do not apply the brake lever and do not use the parking brake when the brake caliper is off of the brake disc as the brake pad will be force shut.
3	Brake disc/brake disc bracket	1/1	



Order	Job/Part	Q'ty	Remarks
4	Rear axle	1	Refer to "REMOVING THE REAR AXLE".
5	Axle clip	1	
6	Driven sprocket/sprocket bracket	1/1	Refer to "INSTALLING THE DRIVEN SPROCKET".
7	Spacer	1	
8	Chain puller	1	
9	Rear axle hub	1	
10	Bearing/oil seal	1/1	
11	Bearing spacer	1	
12	Bearing/oil seal	1/1	
			For installation, reverse the removal procedure.



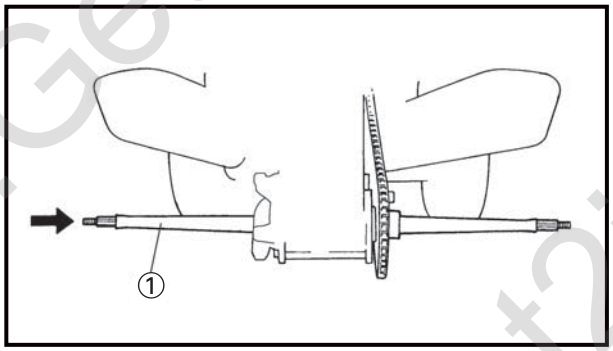
REMOVING THE REAR AXLE

1. Place the machine on a level surface.
2. Remove:
   • nuts ①

TIP

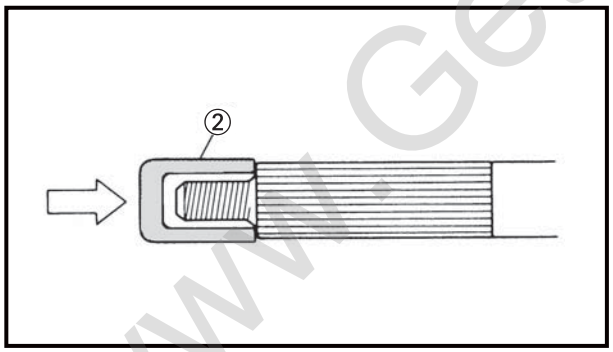
- Apply the brake lever so that the rear axle does not turn, when loosening the nut.
- Use the axle nut wrench (36 mm) ② .

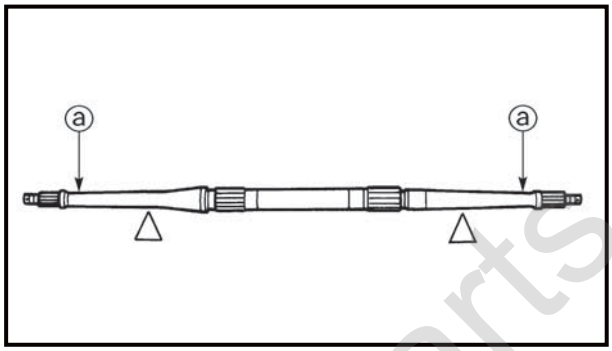
3. Elevate the rear wheels by placing the suitable stand under the frame.
4. Remove:
   • rear wheels
   • wheel hubs
   • nuts
   • washers
5. Remove:
   • rear axle ①



NOTICE

- **Never directly tap the axle end with a hammer, since this will result in damage to the axle thread and spline.**
- **Attach a suitable socket ② on the axle end and tap it with a soft hammer, then pull out the rear axle to the right.**





CHECKING THE REAR AXLE

1. Check:
   • rear axle runout ⓐ
   Out of specification → Replace.

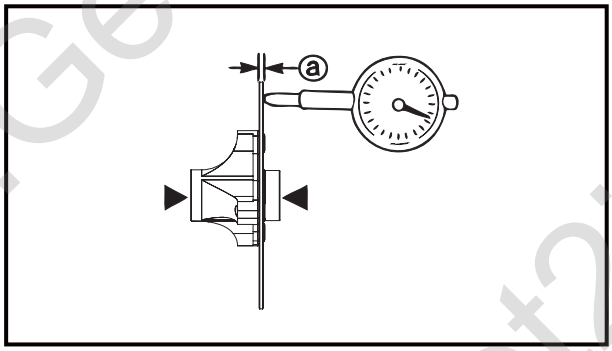
WARNING

Do not attempt to straighten a bent axle.

Rear axle runout limit
1.5 mm (0.06 in)

CHECKING THE DRIVEN SPROCKET

1. Check:
   • driven sprocket
   Refer to "REAR SHOCK ABSORBER, SWINGARM AND DRIVE CHAIN".



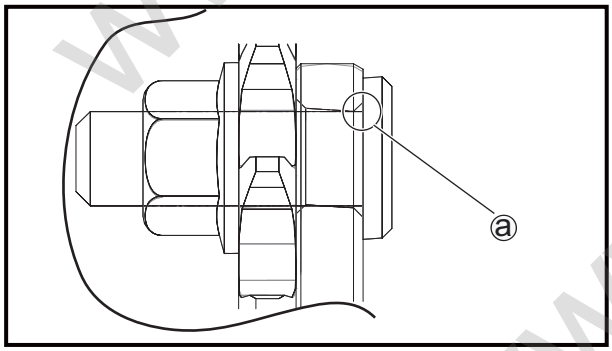
CHECKING THE BRAKE DISC

1. Check:
   • brake disc
   Galling/damage → Replace.
2. Measure:
   • brake disc deflection
   Out of specification → Replace.

Brake disc maximum deflection
0.15 mm (0.006 in)

   • brake disc thickness ⓐ
   Out of specification → Replace.

Brake disc minimum thickness
3 mm (0.12 in)

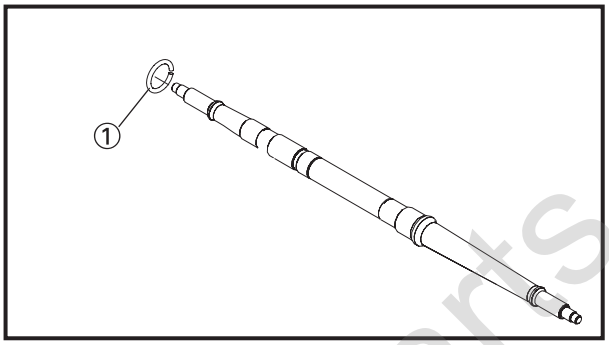


INSTALLING THE DRIVEN SPROCKET

1. Install:
   • driven sprocket

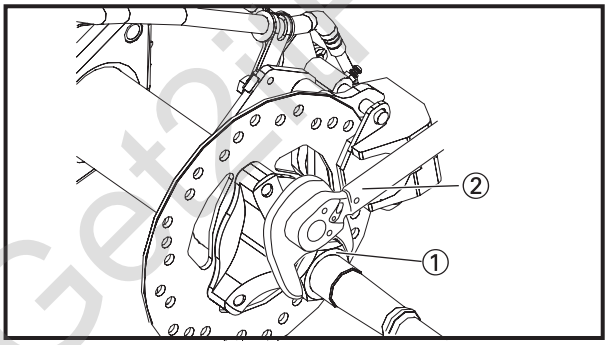
TIP

Make sure that the blunt-edged corner ⓐ of the driven sprocket is facing outward.



INSTALLING THE REAR AXLE

1. Install:
   • axle clip ①

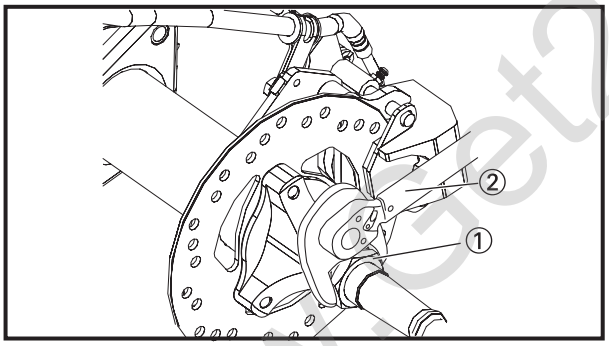


2. Tighten:
   • nut ①

60 Nm (6.0 m · kg, 43.4 ft · lb)

TIP

Tighten the nut with rear axle nut wrench ② to specification while holding the rear axle.



3. Tighten:
   • nut ①

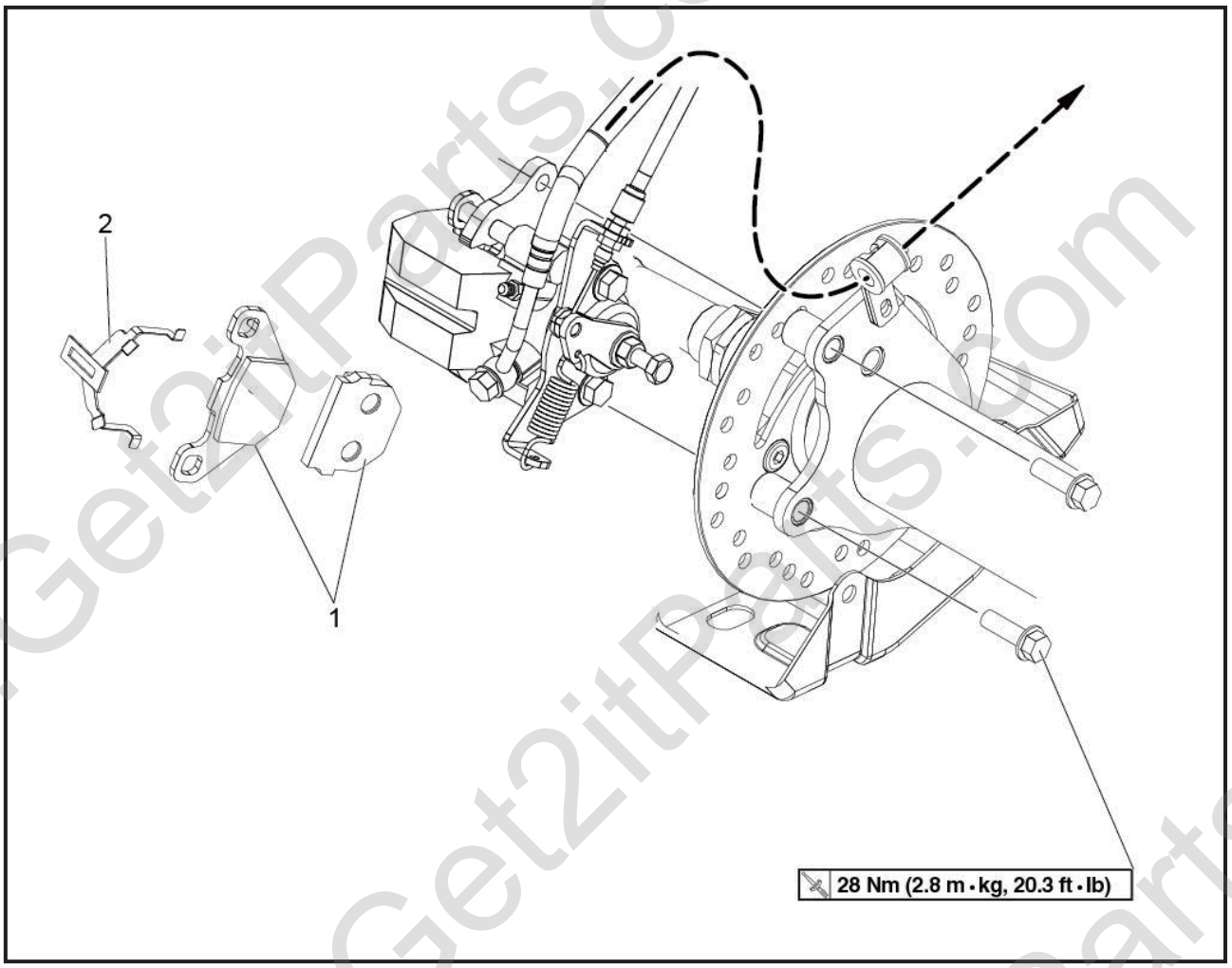
170 Nm (17.0 m · kg, 123 ft · lb)

TIP

Tighten the nut with rear axle nut wrench ② to specification while holding the rear axle.

REAR BRAKE

REAR BRAKE PADS



Order	Job/Part	Q'ty	Remarks
	Removing the rear brake pads		Remove the parts in the order listed. The following procedure applies to both of the rear brake calipers.
	Rear wheel		Refer to "FRONT AND REAR WHEELS".
1	Brake pad	2	Refer to "REPLACING THE REAR BRAKE PADS".
2	Brake pad spring	1	
			For installation, reverse the removal procedure.

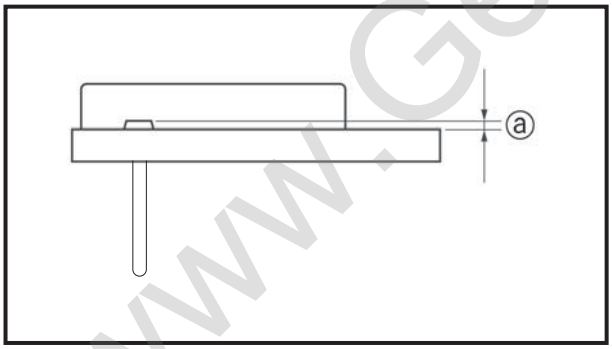
NOTICE

Disc brake components rarely require disassembly.
DO NOT:
- **disassemble components unless absolutely necessary;**
- **use solvents on internal brake components;**
- **use spent brake fluid for cleaning; (use only clean brake fluid)**
- **allow brake fluid to come in contact with the eyes, as this may cause eye injury;**
- **splash brake fluid onto painted surfaces or plastic parts, as this may cause damage;**
- **disconnect any hydraulic connection, as this would require the entire brake system to be disassembled, drained, cleaned, properly filled and bled after reassembly.**

REPLACING THE REAR BRAKE PADS

TIP

It is not necessary to disassemble the brake caliper and brake hose to replace the brake pads.



1. Remove:
   • brake pads
ⓐ wear limit

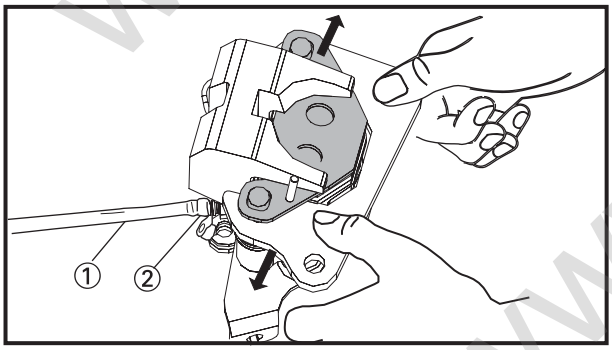
TIP

Replace the brake pads as a set if either is found to be worn to the wear limit.

2. Install:
   • brake pads
   • brake pad spring

TIP

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



a. Connect a suitable hose ① tightly to the brake caliper bleed screw ②. Put the other end of this hose into an open container.
b. Loosen the brake caliper bleed screw and, using a finger, push the caliper piston into the brake caliper.

c. Tighten the brake caliper bleed screw.

8 Nm (0.8 m · kg, 5.8 ft · lb)

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

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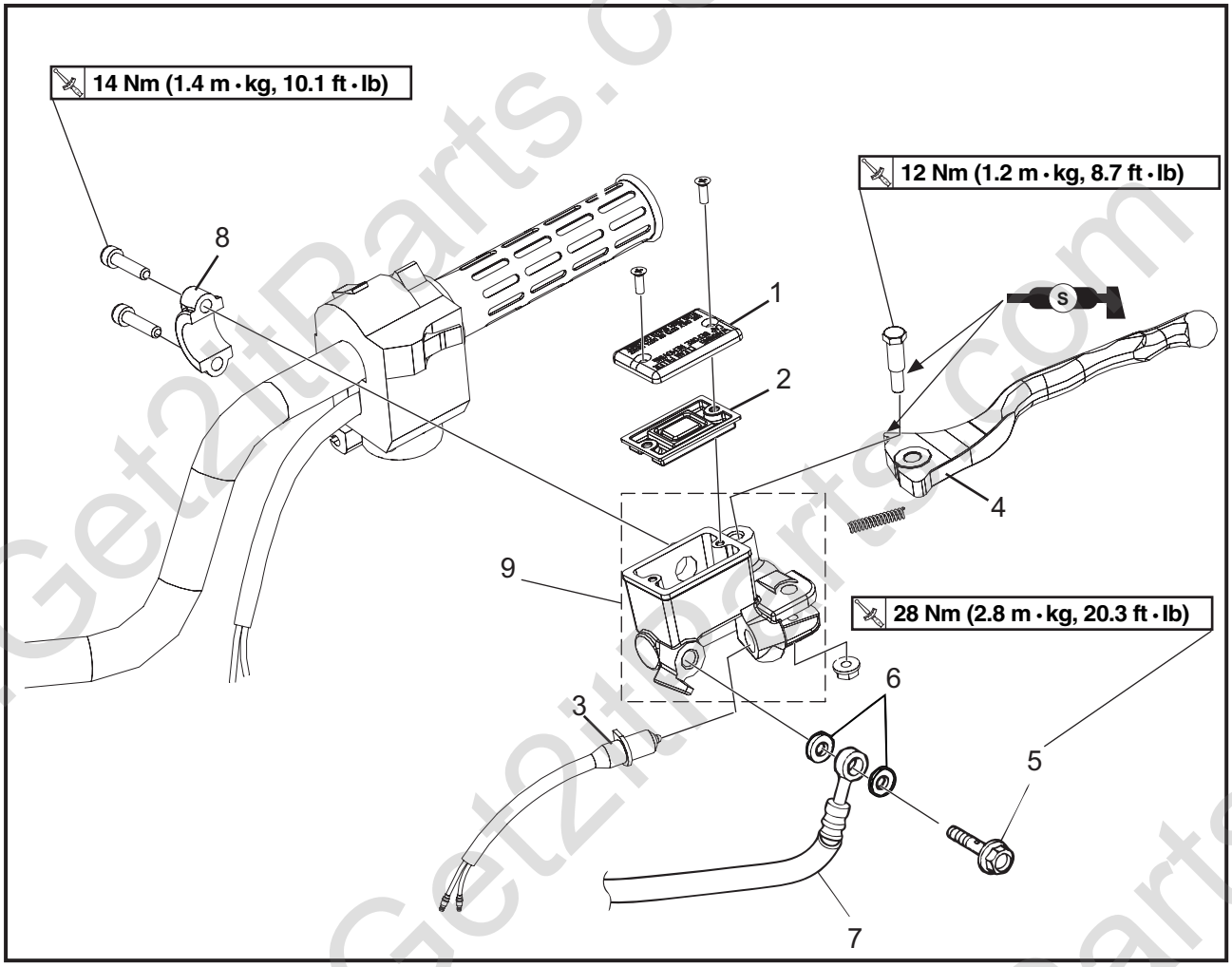
3. Install:
   • brake caliper
   • brake caliper mounting bolts

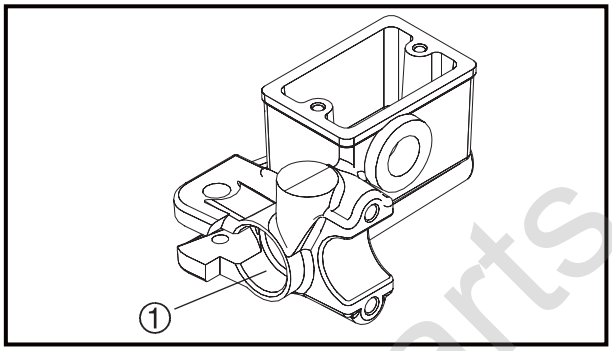
Brake caliper mounting bolt
28 Nm (2.8 m•kg, 20.3 ft•lb)

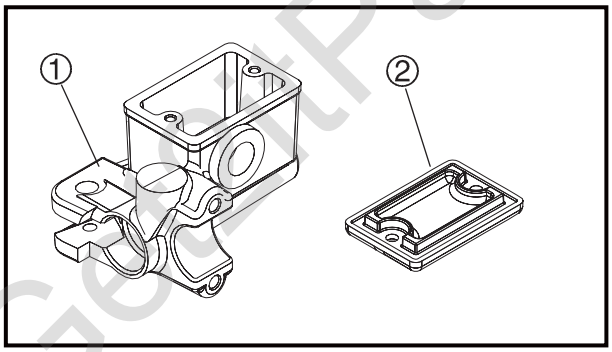
4. Check:
   • brake fluid level
   Refer to “CHECKING THE REAR BRAKE FLUID LEVEL” in chapter 3.
5. Check:
   • brake lever or brake pedal operation
   Soft or spongy feeling → Bleed the brake system.
   Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.

REAR BRAKE MASTER CYLINDER



Order	Job/Part	Q'ty	Remarks
	Removing the rear brake master cylinder		Remove the parts in the order listed.
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.
1	Brake fluid reservoir cap	1	
2	Brake fluid reservoir diaphragm	1	
3	Front brake light switch	1	
4	Brake lever	1	
5	Union bolt	1	
6	Copper washer	2	Refer to "INSTALLING THE REAR BRAKE MASTER CYLINDER".
7	Brake hose	1	Disconnect.
8	Brake master cylinder bracket	1	
9	Brake master cylinder	1	
			For installation, reverse the removal procedure.





CHECKING THE MASTER CYLINDER

1. Check:
   - brake master cylinder ①
     Wear/scratches → Replace the brake master cylinder assembly.
   - brake master cylinder body
     Cracks/damage → Replace.
   - brake fluid delivery passage
     (brake master cylinder body)
     Blockage → Blow out with compressed air.

2. Check:
   - rear brake master cylinder reservoir ①
   - rear brake master cylinder reservoir diaphragm ②
     Cracks/damage → Replace.

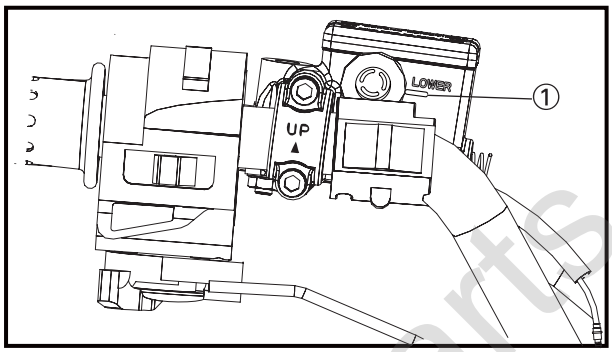
ASSEMBLING THE REAR BRAKE MASTER CYLINDER

WARNING

- **All internal brake components should be cleaned and lubricated with new brake fluid only before installation.**

	Recommended brake fluid **DOT 4**

- **Whenever a master cylinder is disassembled, replace the piston seals and dust seals.**



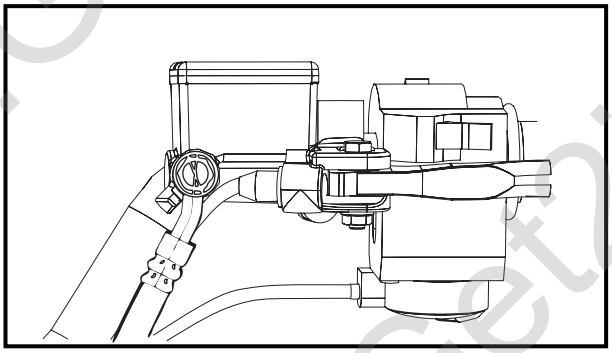
INSTALLING THE REAR BRAKE MASTER CYLINDER

1. Install:
   • brake master cylinder ①

	Brake master cylinder holder bolt 14 Nm (1.4 m•kg, 10.1 ft•lb)

TIP

- The "UP" mark on the brake master cylinder bracket should face up.
- Install the brake master cylinder so that the gaps between the brake master cylinder and the brake master cylinder bracket are equal.



2. Install:
   • copper washers New
   • brake hose
   • union bolt

	Union bolt 28 Nm (2.8 m•kg, 20.3 ft•lb)

TIP

- Tighten the union bolt while holding the brake hose as shown.
- Turn the handlebar to the left and to the right to check that the brake hose does not touch other parts (throttle cable, wire harness, leads, etc.). Correct if necessary.

WARNING

Proper brake hose routing is essential to insure safe machine operation. Refer to "CABLE ROUTING" in chapter 2.

3. Fill:
   • brake fluid reservoir

	**Recommended brake fluid** **DOT 4**

NOTICE

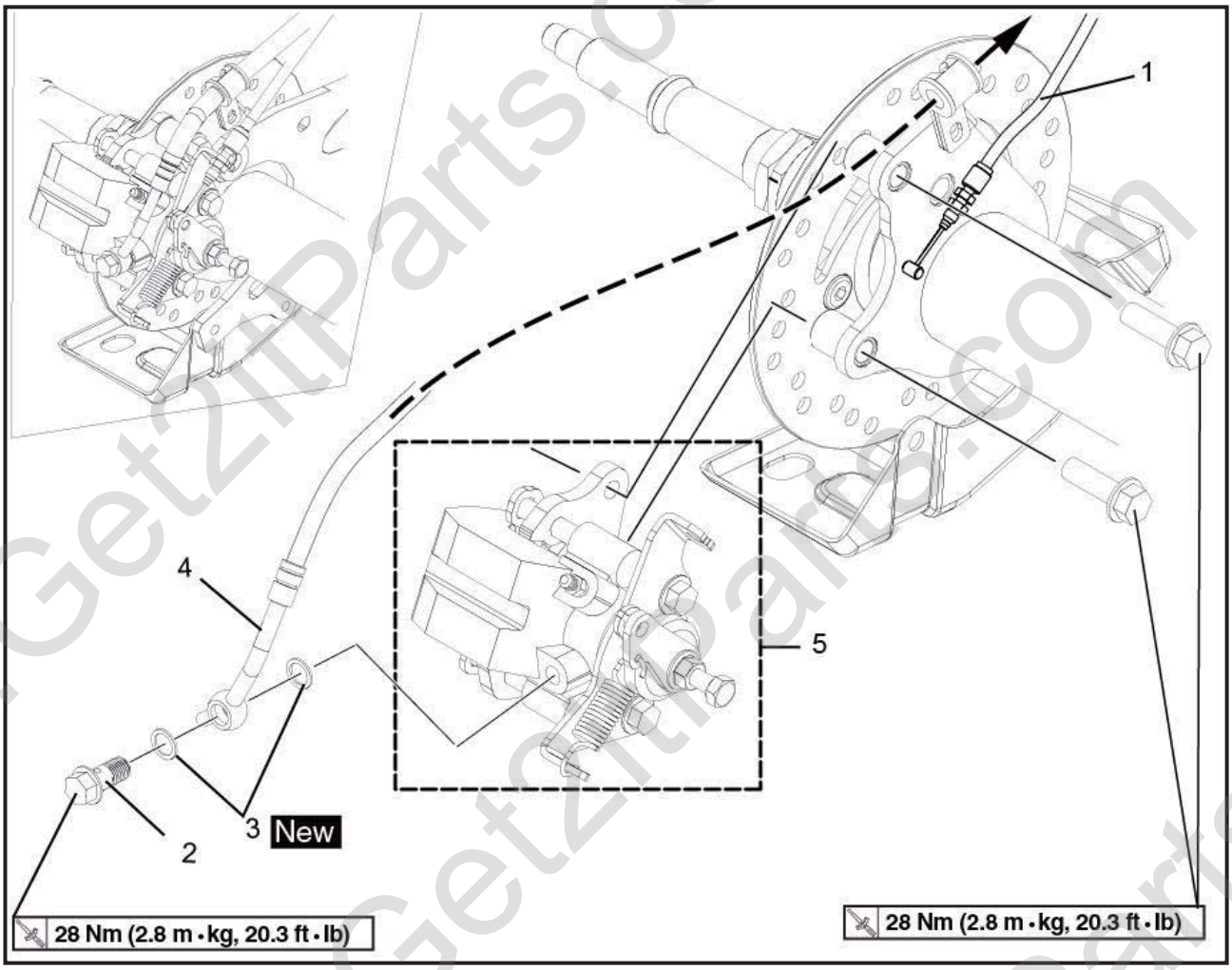
Brake fluid may damage painted surfaces or plastic parts. Always clean up spilled brake fluid immediately.

WARNING

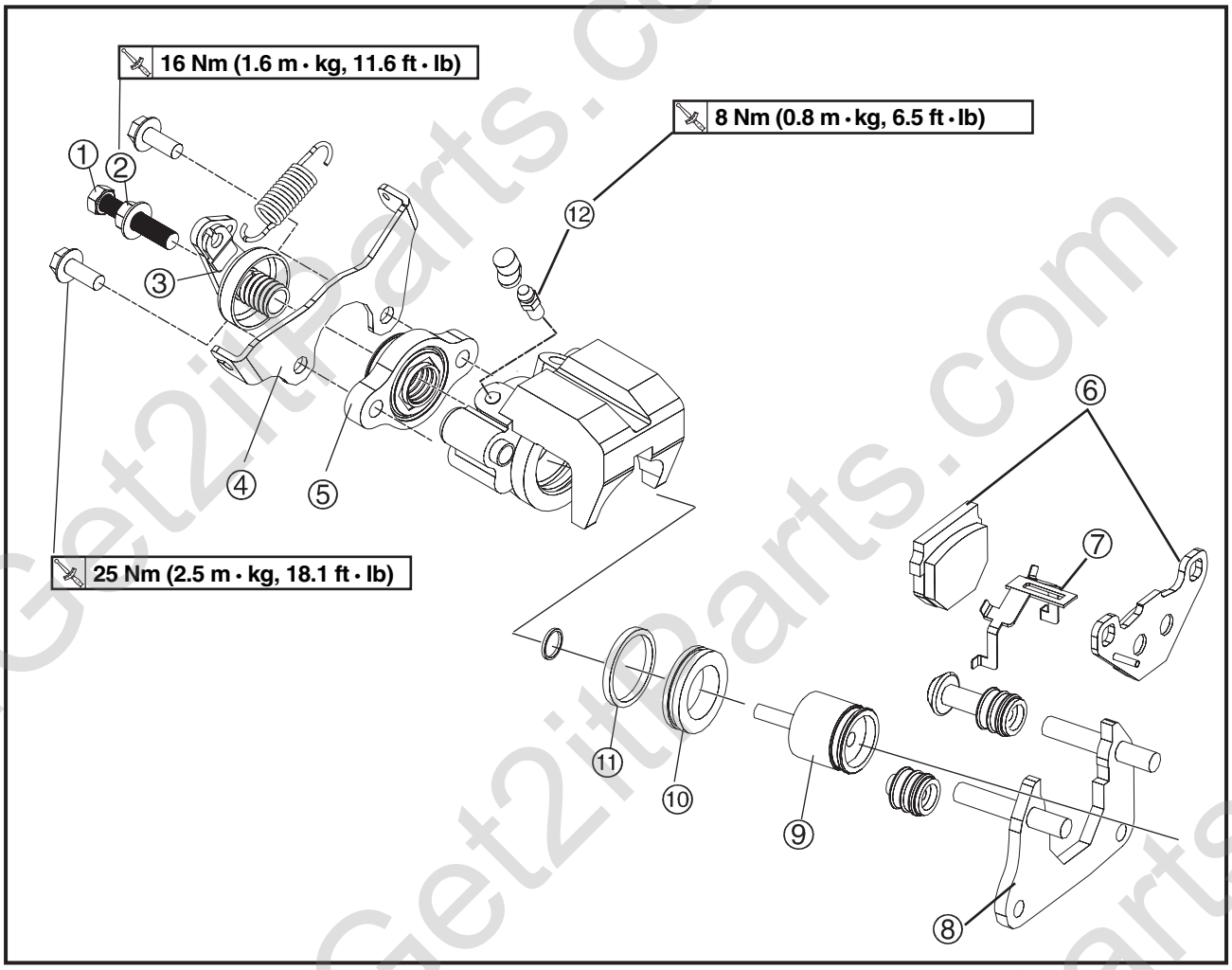
- **Use only the designated quality brake fluid: other brake fluids may deteriorate the rubber seals, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid: mixing brake fluids may result in a harmful reaction and lead to poor brake performance.**
- **Be careful that water does not enter the brake master cylinder when refilling. Water will significantly lower the boiling point of the brake fluid and may result in vapor lock.**

4. Air bleed:
   • brake system
   Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.
5. Check:
   • brake fluid level
   Brake fluid level is under the “LOWER” level line → Add the recommended brake fluid to the proper level.
   Refer to “CHECKING THE REAR BRAKE FLUID LEVEL” in chapter 3.

REAR BRAKE CALIPER



Order	Job/Part	Q'ty	Remarks
	Removing the rear brake caliper		Remove the parts in the order listed.
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.
1	Parking brake cable		Disconnect. Refer to "REMOVING THE PARKING BRAKE CABLE".
2	Union bolt	1	Refer to "INSTALLING THE REAR BRAKE CALIPER".
3	Copper washer	2	
4	Brake hose	1	Disconnect.
5	Brake caliper assembly	1	
			For installation, reverse the removal procedure.



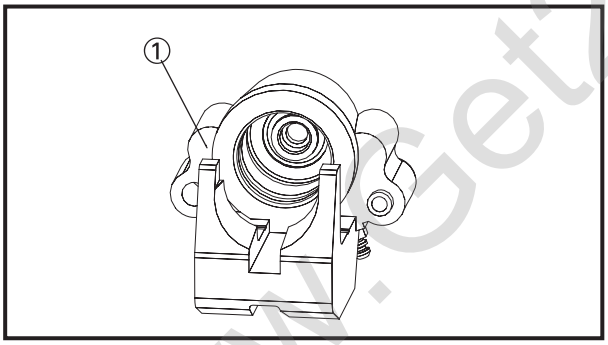
Order	Job/Part	Q'ty	Remarks
	Disassembling the rear brake caliper		Remove the parts in the order listed.
①	Adjusting bolt	1	
②	Locknut	1	
③	Parking brake arm	1	
④	Bracket brake bracket	1	
⑤	Parking brake case	1	
⑥	Brake pad	2	
⑦	Brake pad spring	1	
⑧	Caliper bracket	1	
⑨	Brake caliper piston	1	Refer to "DISASSEMBLING THE FRONT AND REAR BRAKE CALIPERS" and "ASSEMBLING THE REAR BRAKE CALIPER".
⑩	Dust seal	1	
⑪	Caliper piston seal	1	
⑫	Bleed screw	1	
			For assembly, reverse the disassembly procedure.

REMOVING THE PARKING BRAKE CABLE

1. Loosen:
   • nut
   • adjusting bolt
2. Disconnect:
   • parking brake cable
   (from parking brake lever)
3. Disconnect:
   • parking brake cable
   (from rear brake)

CHECKING THE REAR BRAKE CALIPER

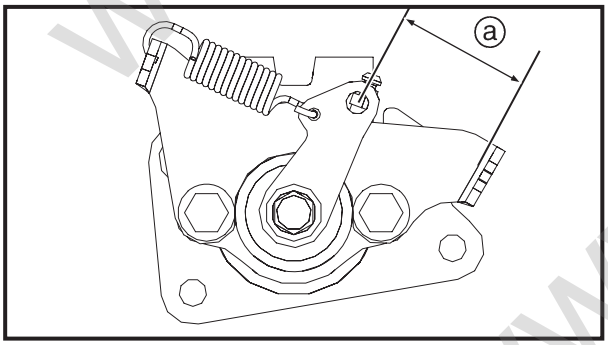
Recommended brake component replacement schedule	
Brake pads	**As required**
Caliper ass'y	**Every two years**
Brake hoses	**Every four years**
Brake fluid	**Replace when brakes are disassembled.**



1. Check:
   • brake caliper body ①
   Cracks/damage → Replace.
   • brake fluid delivery passage
   (brake caliper body)
   Blockage → Blow out with compressed air.

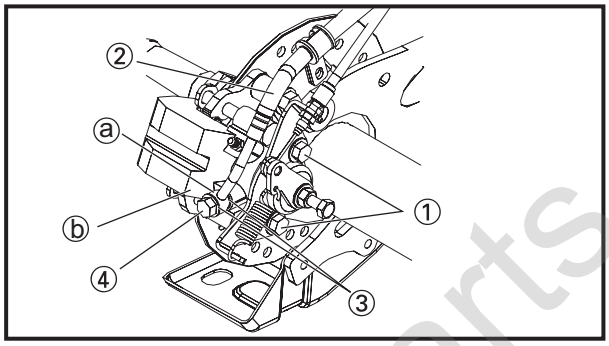
⚠ WARNING

Replace the caliper piston seal and dust seal whenever the brake caliper is disassembled.



2. Check:
   • parking brake arm to parking brake bracket distance ⓐ
   Out of specification → Adjust.

Parking brake arm to parking brake bracket distance
63.0 mm (2.48 in)



INSTALLING THE REAR BRAKE CALIPER

1. Install:
   - brake caliper assembly
   - brake caliper mounting bolts ①

	Brake caliper mounting bolt **28 Nm (2.8 m•kg, 20.3 ft•lb)**

   - brake hose ②
   - copper washers ③ New
   - union bolt ④

	Union bolt **28 Nm (2.8 m•kg, 20.3 ft•lb)**

NOTICE

When installing the brake hose on the brake caliper, make sure that the brake pipe ⓐ touches the projection ⓑ on the brake caliper.

WARNING

Proper brake hose routing is essential to insure safe machine operation. Refer to "CABLE ROUTING" in chapter 2.

2. Fill:
   - brake reservoir

	Recommended brake fluid **DOT 4**

NOTICE

Brake fluid may damage painted surfaces or plastic parts. Always clean up spilled brake fluid immediately.

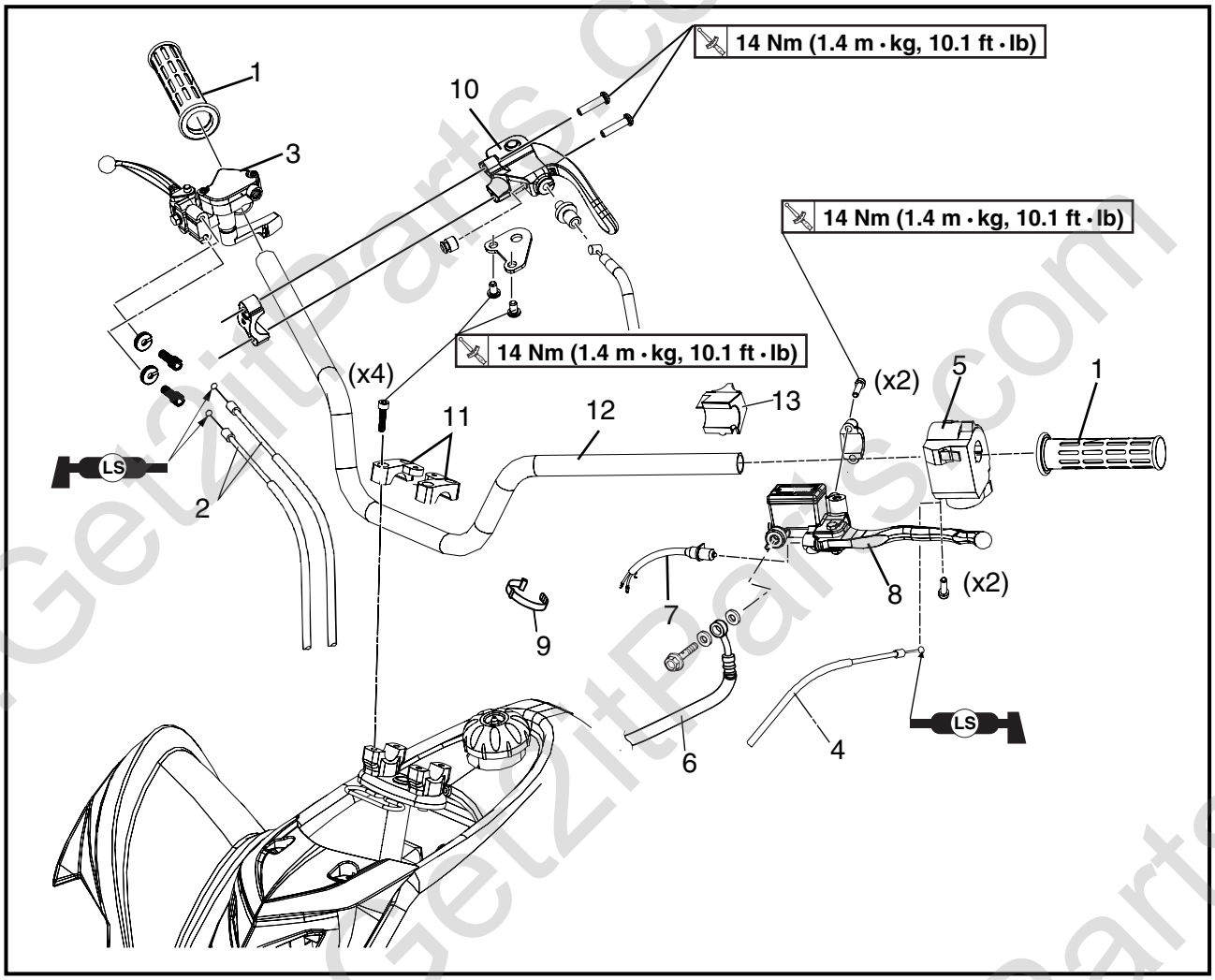
WARNING

- **Use only the designated quality brake fluid: other brake fluids may deteriorate the rubber seals, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid: mixing brake fluids may result in a harmful chemical reaction and lead to poor brake performance.**
- **Be careful that water does not enter the master cylinder when refilling. Water will significantly lower the boiling point of the brake fluid and may result in vapor lock.**

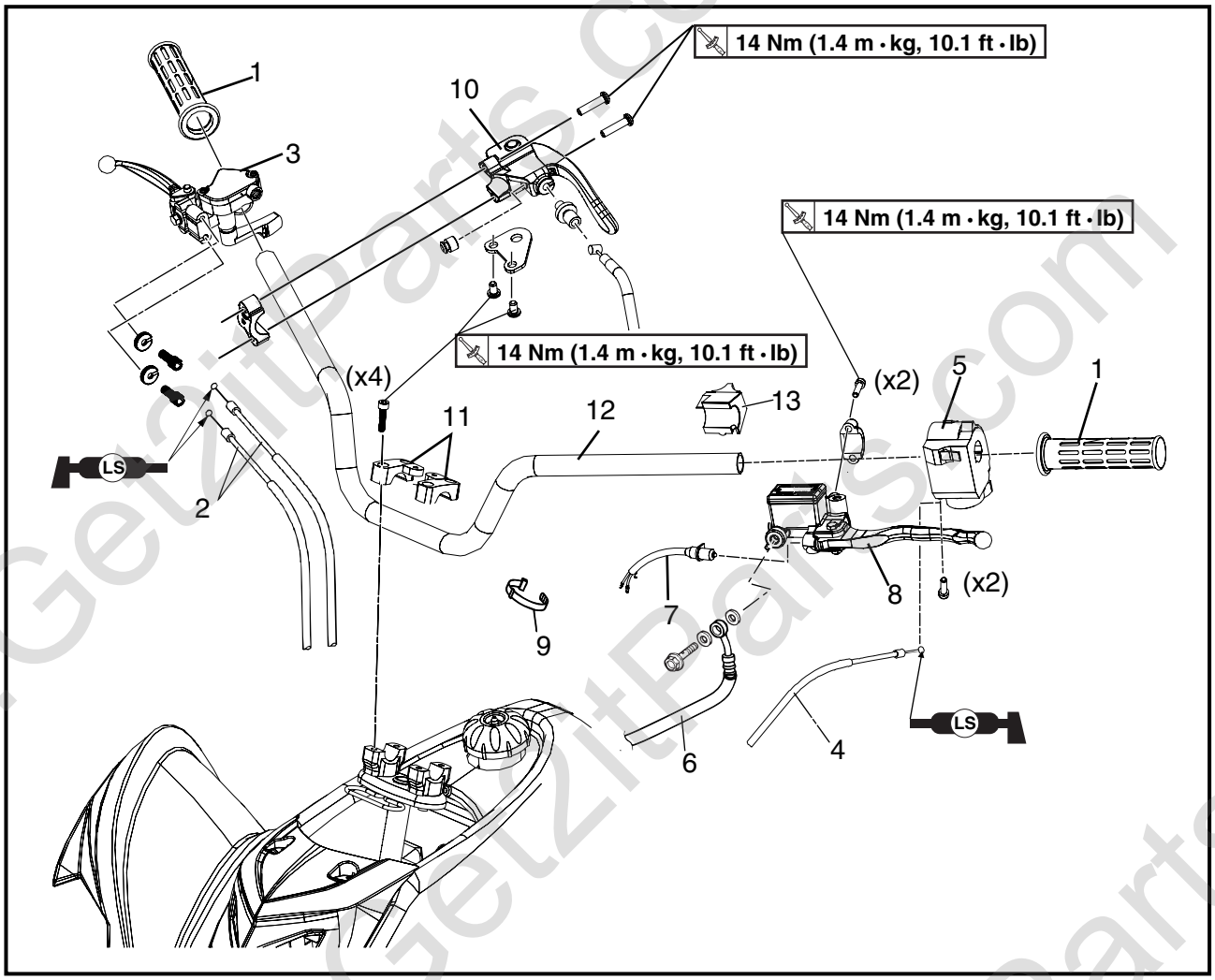
3. Air bleed:
   • brake system
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" in chapter 3.
4. Check:
   • brake fluid level
   Brake fluid level is below the "LOWER" level line → Add the recommended brake fluid to the proper level.
   Refer to "CHECKING THE BRAKE FLUID LEVEL" in chapter 3.
5. Adjust:
   • parking brake cable end length
   Refer to "ADJUSTING THE PARKING BRAKE" in chapter 3.

STEERING SYSTEM

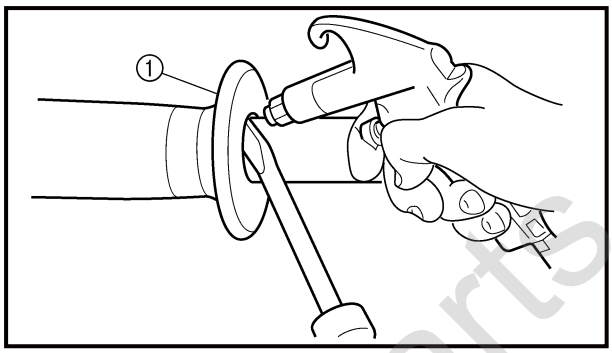
HANDLEBAR



Order	Job/Part	Q'ty	Remarks
	Removing the handlebar		Remove the parts in the order listed.
	Handlebar cover		Refer to "SEAT, FENDERS AND FUEL TANK" in chapter 3.
1	Handlebar grip	2	Refer to "REMOVING THE HANDLEBAR GRIPS" and "INSTALLING THE HANDLEBAR GRIPS".
2	Front brake cable	2	
3	Front brake lever assembly	1	Refer to "INSTALLING THE FRONT BRAKE LEVER ASSEMBLY".
4	Choke cable	1	
5	Handlebar switch	1	
6	Rear brake hose	1	Refer to "INSTALLING THE REAR BRAKE MASTER CYLINDER".
7	Rear brake switch	1	
8	Rear brake lever	1	
9	Plastic band	1	
10	Parking brake lever	1	



Order	Job/Part	Q'ty	Remarks
11	Upper handlebar holder	2	Refer to "INSTALLING THE HANDLE-BAR".
12	Handlebar	1	
13	Shift switch	1	
			For installation, reverse the removal procedure.

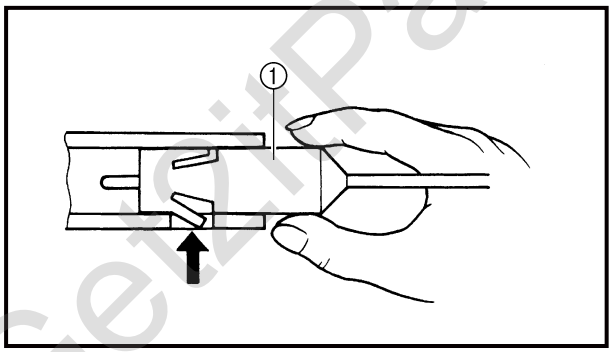


REMOVING THE HANDLEBAR GRIPS

1. Remove:
   • handlebar grips

TIP

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

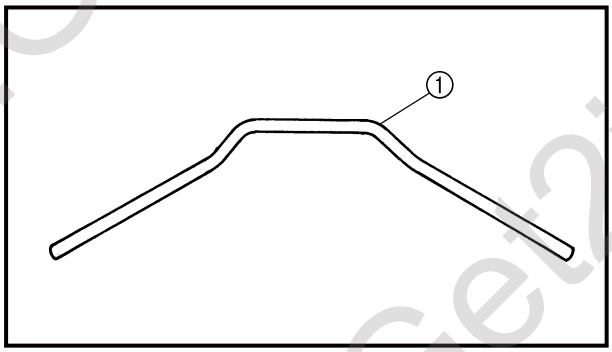


REMOVING THE REAR BRAKE SWITCH

1. Remove:
   • rear brake switch

TIP

Push the fastener when removing the rear brake switch out of the rear brake lever holder.

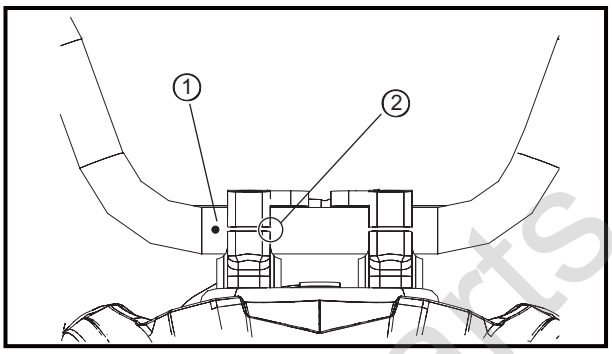


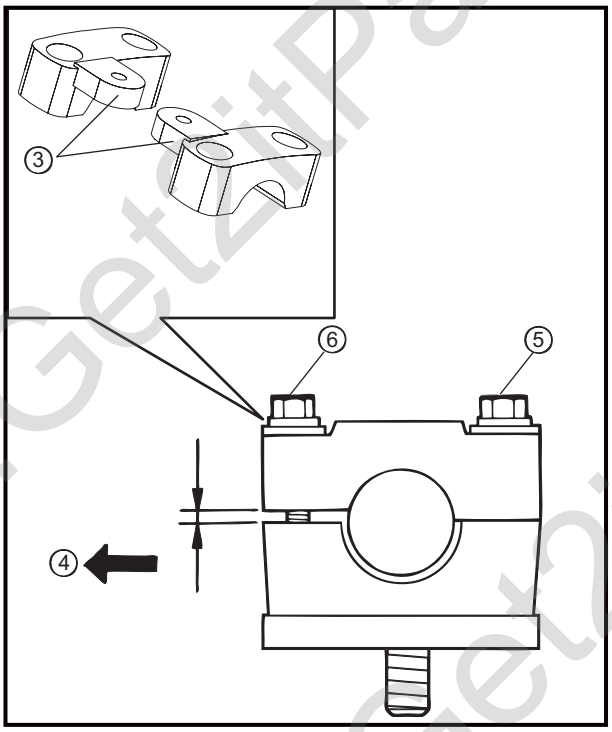
CHECKING THE HANDLEBAR

1. Check:
   • handlebar
   Bends/cracks/damage → Replace.

WARNING

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





INSTALLING THE HANDLEBAR

1. Install:
   - handlebar
   - upper handlebar holders

14 Nm (1.4 m · kg, 10.1 ft · lb)

TIP

- Install the handlebar, please align the punch mark ① and the gap at handlebar holder ②.
- The upper handlebar holders should be installed with the flange ③ forward ④.

NOTICE

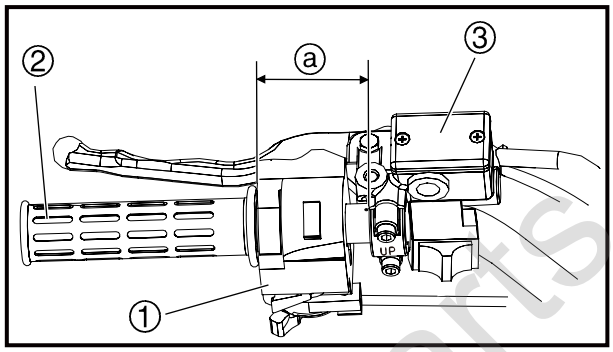
First tighten the bolt ⑤ on the rear side of the handlebar holder, and then tighten the bolt ⑥ on the front side.

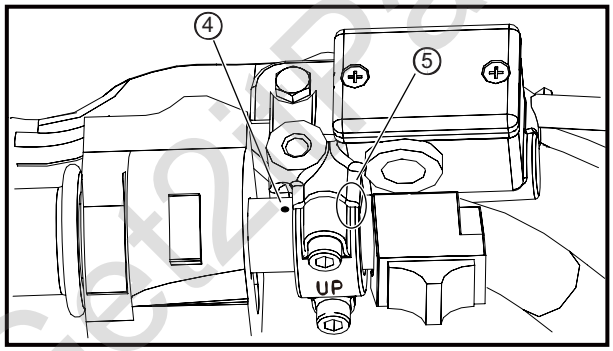
INSTALLING THE HANDLEBAR GRIPS

1. Install:
   - handlebar grips

TIP

- Before installing the handlebar grips, temporarily install the rear brake lever and front brake lever assembly on the handlebar.
- Before applying the adhesive, wipe off grease or oil on the handlebar surface with a lacquer thinner.





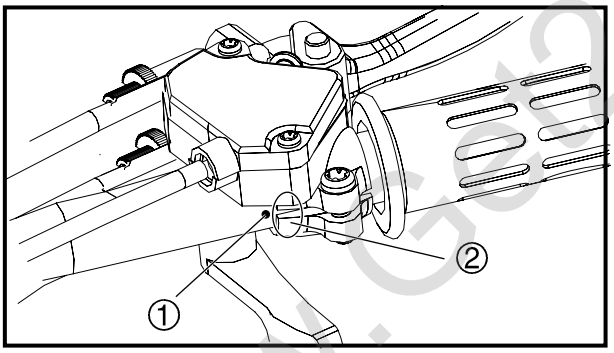
INSTALLING THE REAR BRAKE MASTER CYLINDER

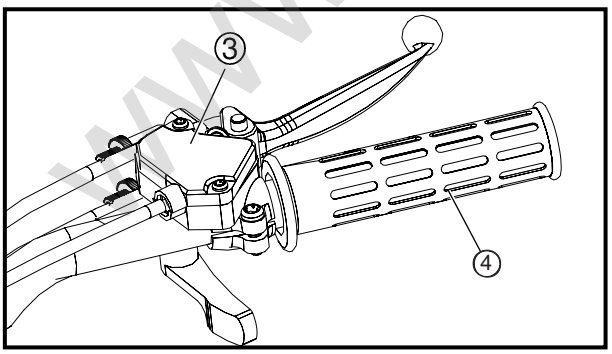
1. Install:
   - handlebar switch
   - handlebar grip
   - brake master cylinder

TIP

- Installing the rear brake master cylinder, make sure the handlebar switch ①, handlebar grip ②, and brake master cylinder ③ are in the positions shown in the illustration.
- Install the brake master cylinder, please align the punch mark ④ and the gap at brake master cylinder holder ⑤.
- The "UP" mark on the brake master cylinder bracket should face up.
- ⓐ 65 ~ 66 mm (2.56 ~ 2.60 in)

	Brake master cylinder bracket 14 Nm (1.4 m•kg, 10.1 ft•lb)





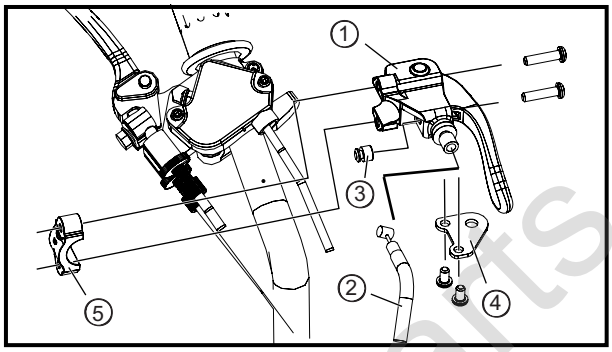
INSTALLING THE FRONT BRAKE LEVER ASSEMBLY

1. Install:
   - front brake lever assembly
   - handlebar grip

TIP

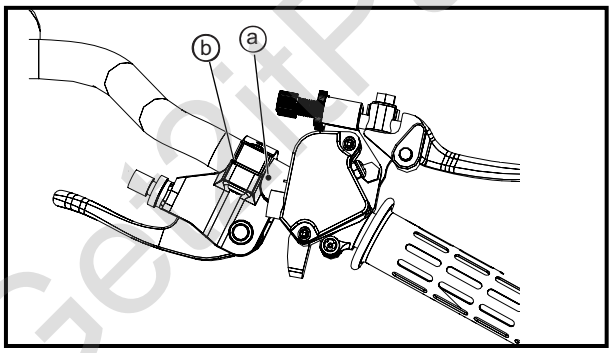
- Install the front brake lever assembly, please align the punch mark ① and the gap at front brake lever assembly ②.
- Installing the front brake lever assembly, make sure the clearance the front brake lever assembly ③ and handlebar grip ④.

2. Adjust:
   - front brake
     Refer to " ADJUSTING THE FRONT BRAKE" in chapter 3.



INSTALLING THE PARKING BRAKE LEVER

1. Install:
   - parking brake lever ①
   - parking brake cable ②
   - damper ③
   - parking brake lever plate ④
   - parking brake lever bracket ⑤

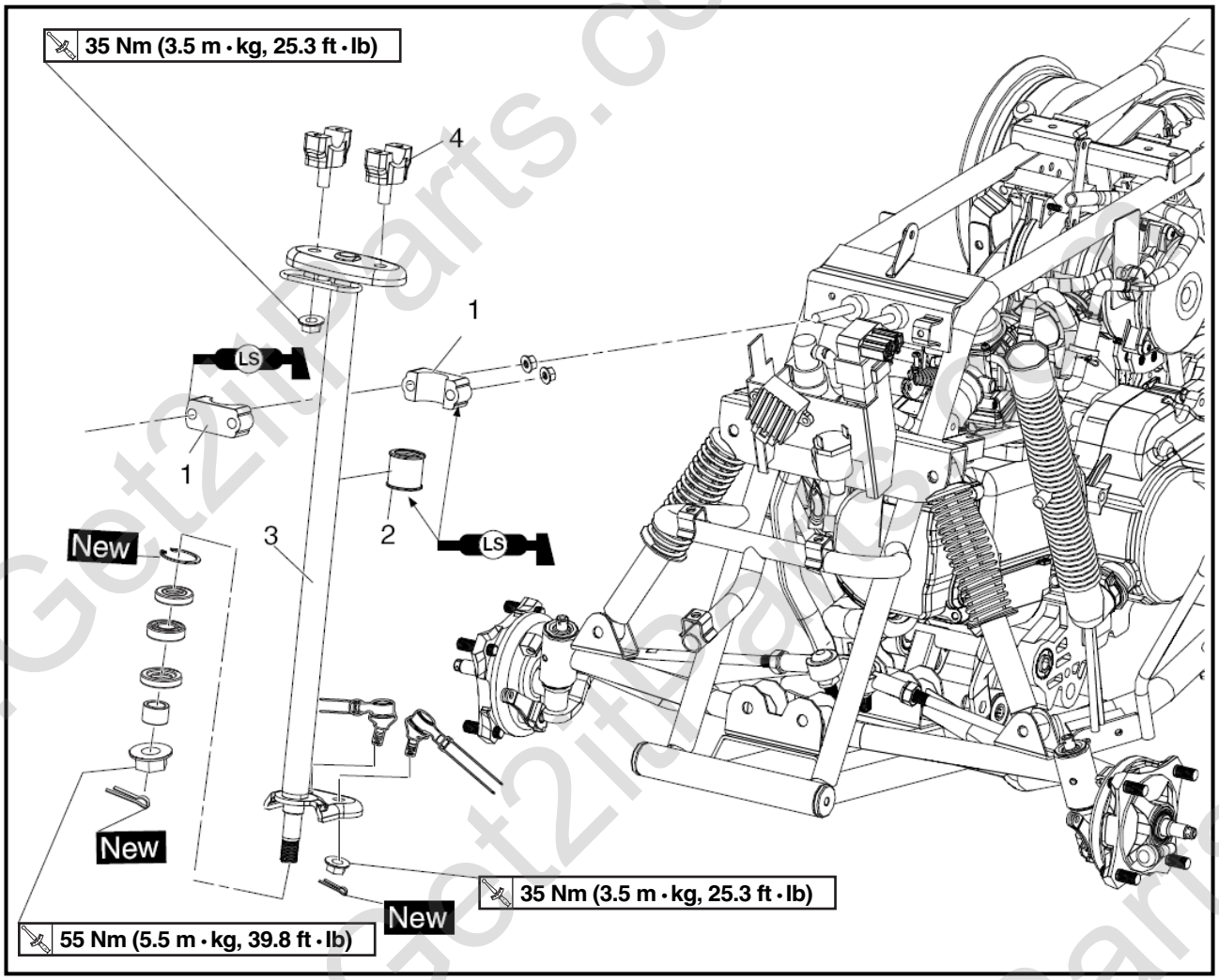


TIP

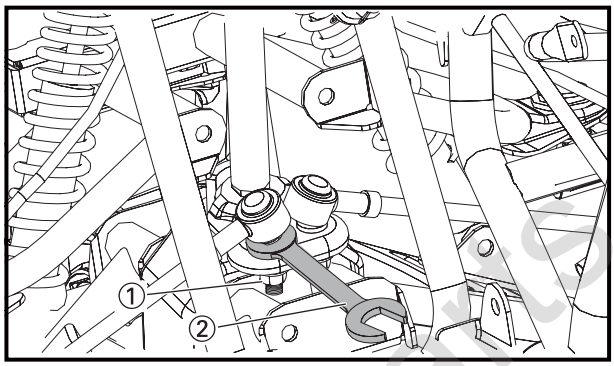
Install the parking brake cable lever, please align the punch mark ⓐ and the gap at parking brake lever ⓑ.

2. Adjust:
   - parking brake
     Refer to " ADJUSTING THE PARKING BRAKE" in chapter 3.

STEERING STEM



Order	Job/Part	Q'ty	Remarks
	Removing the steering stem		Remove the parts in the order listed.
	Front fender		Refer to "SEAT, FENDERS AND FUEL TANK" in chapter 3.
	Handlebar		Refer to "HANDLEBAR".
1	Steering stem bushing	2	
2	BRG.,steering	1	
3	Steering stem	1	
4	Lower handlebar holder	1	Refer to "REMOVING THE STEERING STEM" and "INSTALLING THE STEERING STEM".
			For installation, reverse the removal procedure.

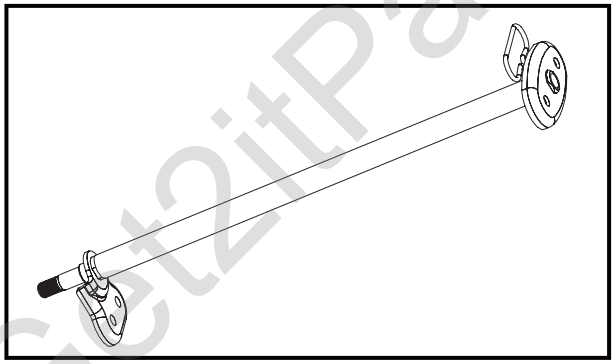


REMOVING THE STEERING STEM

1. Remove:
   • steering stem

TIP

When loosening each tie-rod end nut ①, hold the tie-rod ball joint with a 14-mm wrench ②.

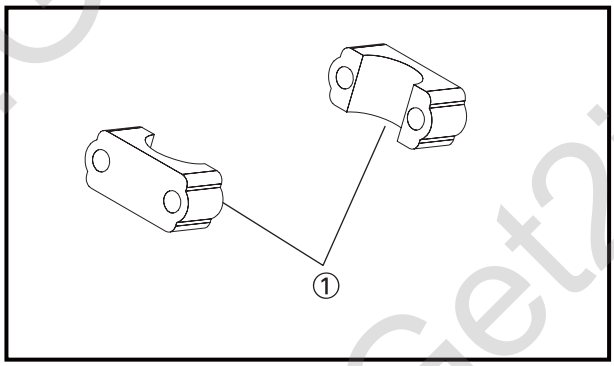


CHECKING THE STEERING STEM

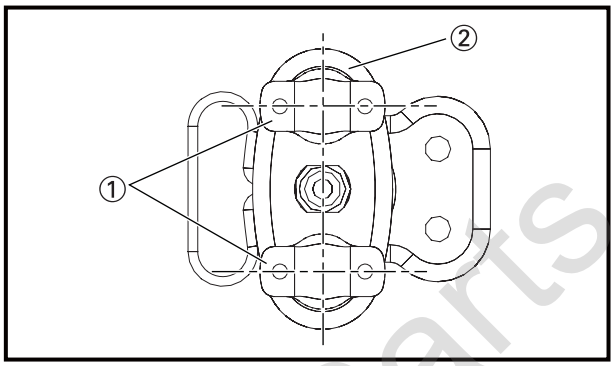
1. Check:
   • steering stem
   Bends → Replace.

WARNING

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



2. Check:
   • steering stem bushings ①
   Wear/damage → Replace.



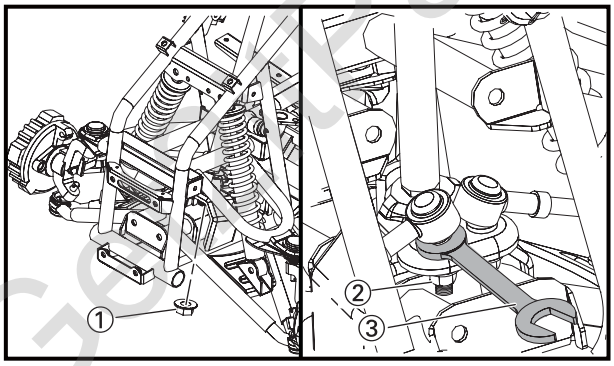
INSTALLING THE LOWER HANDLEBAR HOLDER

1. Install:
   • lower handlebar holder ①
   • nuts

35 Nm (3.5 m · kg, 25.3 ft · lb)

TIP

The lower handlebar holder ① and steering stem ② should be set a right angle when assembling.



INSTALLING THE STEERING STEM

1. Tighten:
   • steering stem nut ①

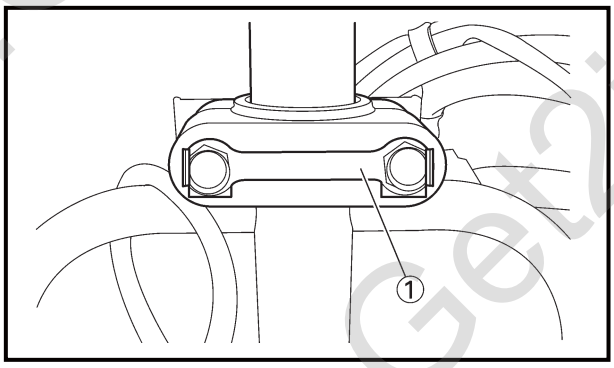
55 Nm (5.5 m · kg, 39.8 ft · lb)

   • tie-rod end nut ②

35 Nm (3.5 m · kg, 25.3 ft · lb)

TIP

When tightening each tie-rod end nut ②, hold the tie-rod ball joint with a 14-mm wrench ③.



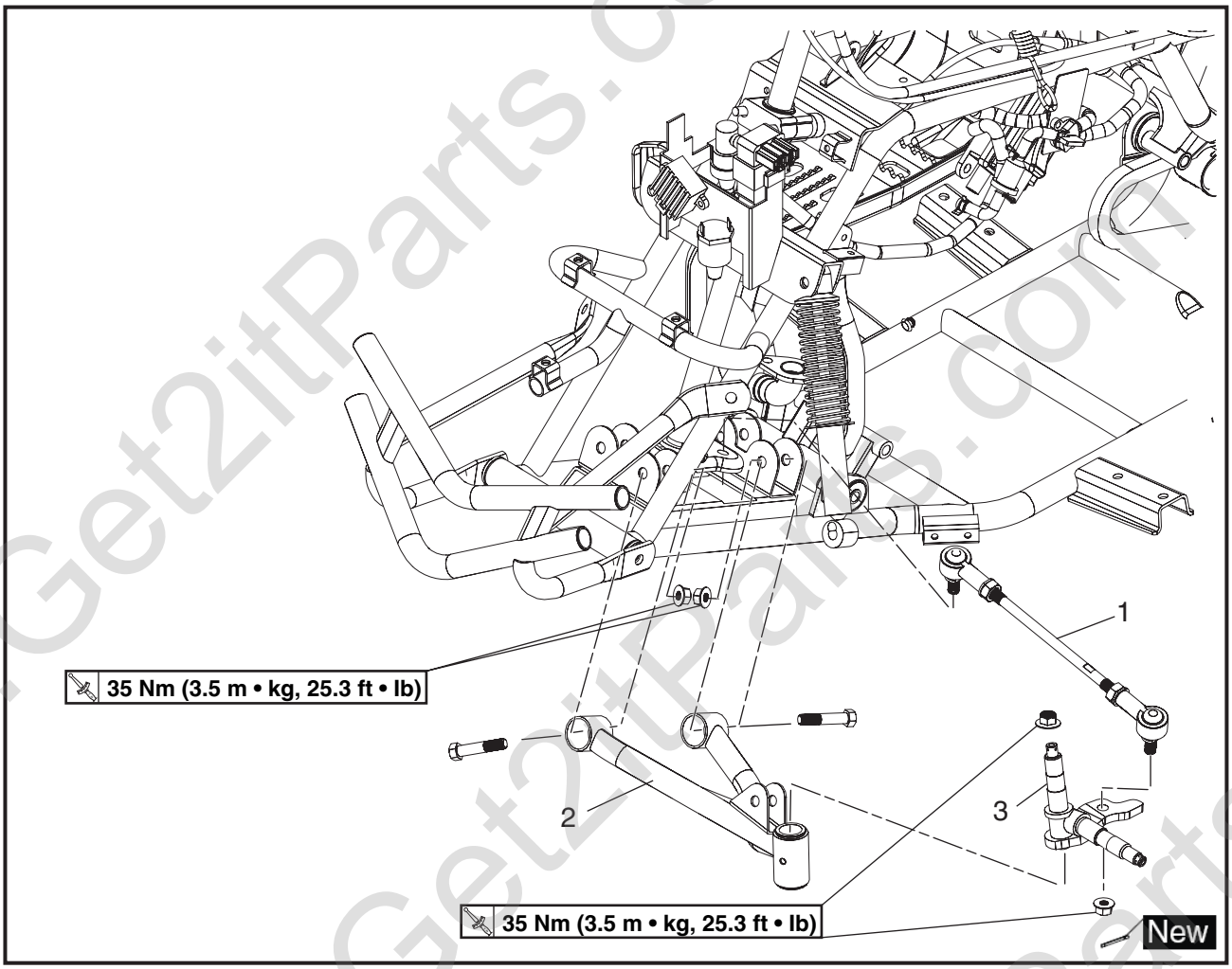
INSTALLING THE LOCK WASHER

1. Install:
   • lock washer ① New
   • bolts

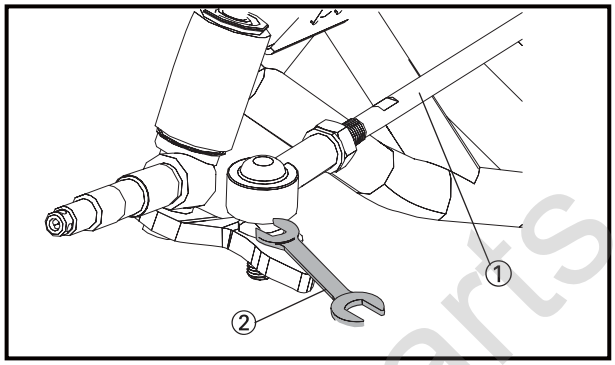
25 Nm (2.5 m · kg, 18.1 ft · lb)

2. Bend the lock washer tab along a flat side of the bolt.

TIE-RODS AND STEERING KNUCKLES



Order	Job/Part	Q'ty	Remarks
	Removing the tie-rods and steering knuckles		Remove the parts in the order listed. The following procedure applies to both of the tie-rods and steering knuckles.
	Front brakes		Refer to "FRONT BRAKES".
1	Tie-rod	1	Refer to "INSTALLING THE TIE-RODS".
2	Suspension of arm	1	
3	Steering knuckle	1	Refer to "REMOVING THE STEERING KNUCKLES".
			For installation, reverse the removal procedure.



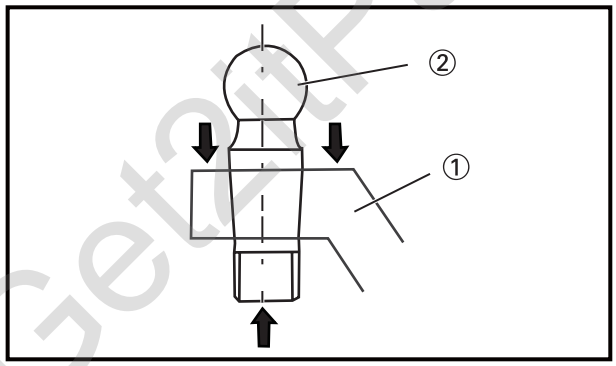
REMOVING THE TIE-RODS

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

1. Remove:
   • tie-rod ①

TIP

When removing the tie-rod, hold each tie-rod ball joint with a 14-mm wrench ② and then loosen the tie-rod end nut.



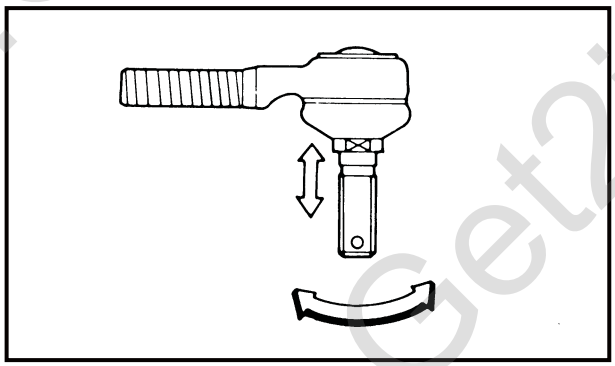
REMOVING THE STEERING KNUCKLES

The following procedure applies to both of the steering knuckles.

1. Remove:
   • steering knuckles ①

TIP

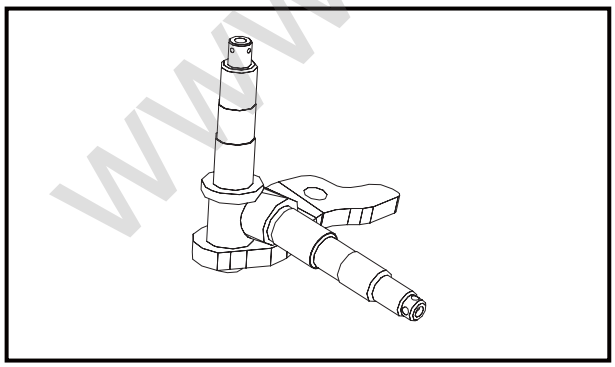
Use a general puller to separate the ball joint ② and steering knuckle.



CHECKING THE TIE-RODS

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

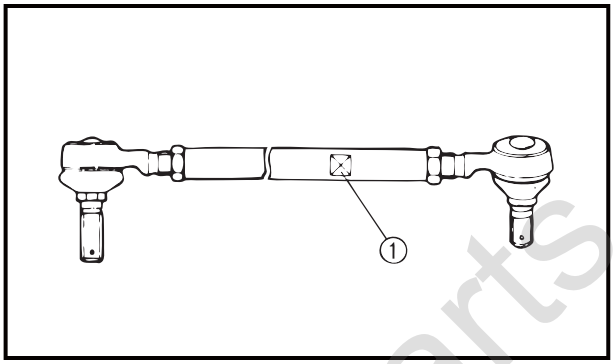
1. Check:
   • tie-rod free play and movement
     Free play → Replace the tie-rod end.
     Turns roughly → Replace the tie-rod end.
2. Check:
   • tie-rod
     Bends/damage → Replace.

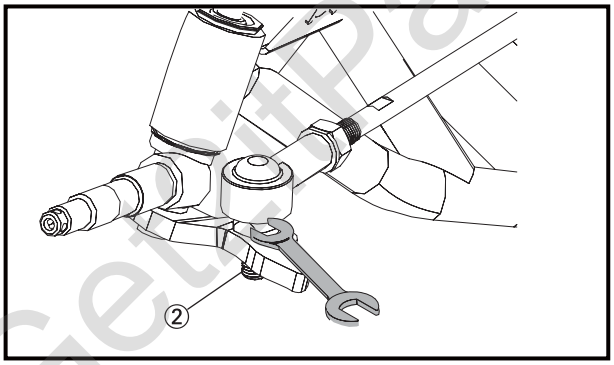


CHECKING THE STEERING KNUCKLES

The following procedure applies to both of the steering knuckles.

1. Check:
   • steering knuckle
     Damage/pitting → Replace.





INSTALLING THE TIE-RODS

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

1. Install:
   - tie-rod — **35 Nm (3.5 m · kg, 25.3 ft · lb)**

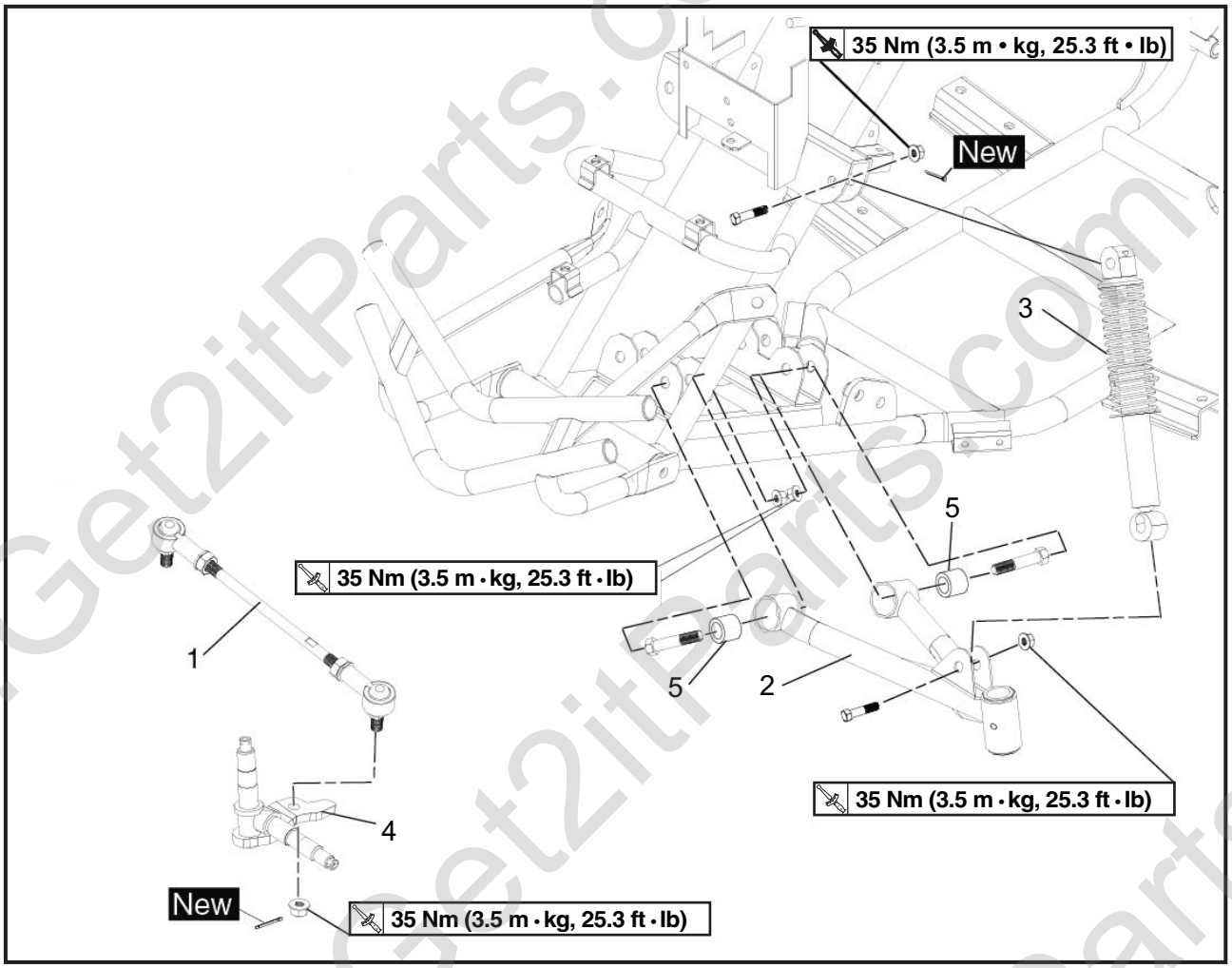
TIP

- The tie-rod side which must be installed on the outside has grooves ①.
- When installing the tie-rod, hold each tie-rod ball joint with a 14-mm wrench ② and then tighten the tie-rod end nut.

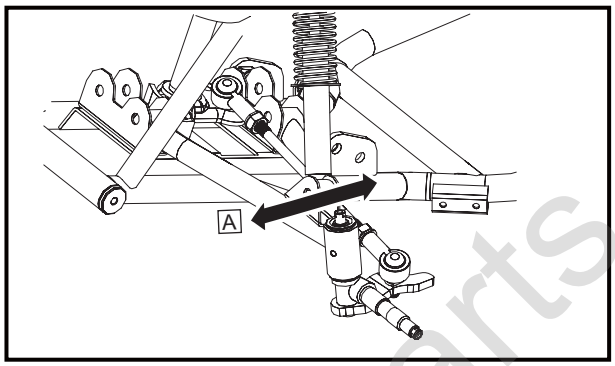
2. Adjust:
   - toe-in

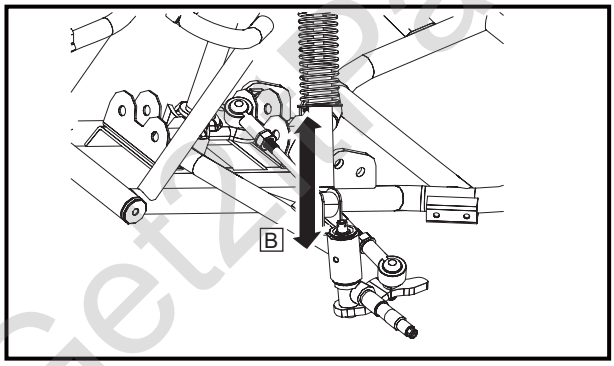
   Refer to "ADJUSTING THE TOE-IN" in chapter 3.

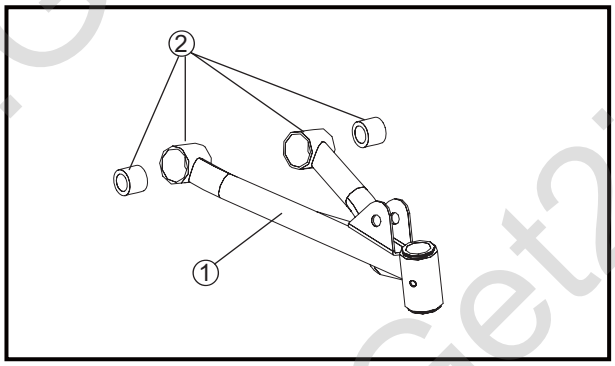
FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES

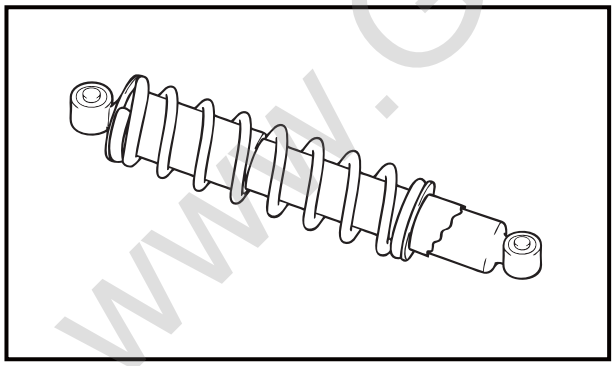


Order	Job/Part	Q'ty	Remarks
	Removing the tie-rods and steering knuckles		Remove the parts in the order listed. The following procedure applies to both of the tie-rods and steering knuckles.
	Front brakes		Refer to "FRONT BRAKES".
1	Tie-rod	1	Disconnect.
2	Suspension of arm	1	Refer to "REMOVING THE FRONT ARMS" and "INSTALLING THE FRONT ARMS".
3	Front suspension	1	
4	Steering knuckle	1	
5	Bush	2	
			For installation, reverse the removal procedure.









REMOVING THE FRONT 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. Remove:
   • front arm

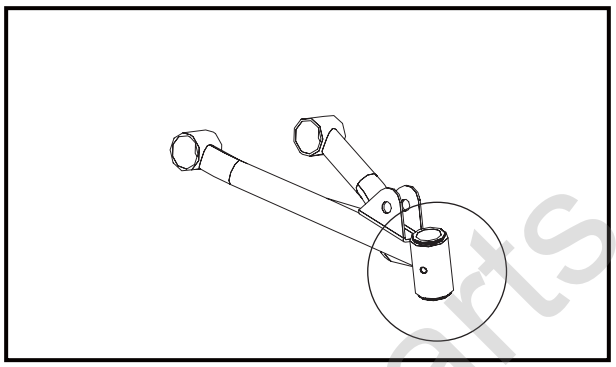
CHECKING THE FRONT ARMS

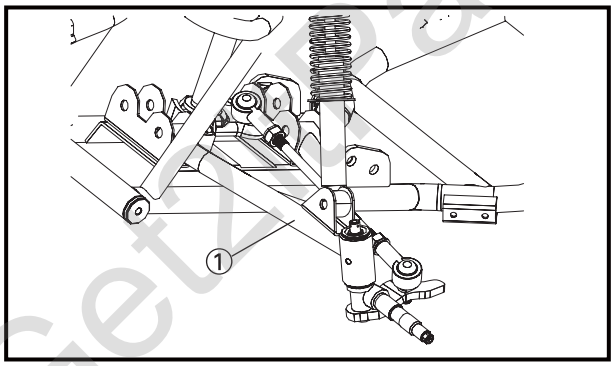
1. Check:
   • front arms ①
   Bends/damage → Replace.
2. Check:
   • bushes ②
   Wear/damage → Replace.

CHECKING THE FRONT SHOCK ABSORBERS

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

1. Check:
   • shock absorber
   Oil leaks → Replace the front shock absorber assembly.
   • shock absorber rod
   Bends/damage → Replace the front shock absorber assembly.
   • spring
   Fatigue → Replace the front shock absorber assembly.
   Move the spring up and down.





CHECKING THE BALL JOINTS

The following procedure applies to both of the front arm ball joints.

1. Check:
   - ball joint
     Damage/pitting → Replace the front arm.
     Free play → Replace the front arm.
     Turns roughly → Replace the front arm.

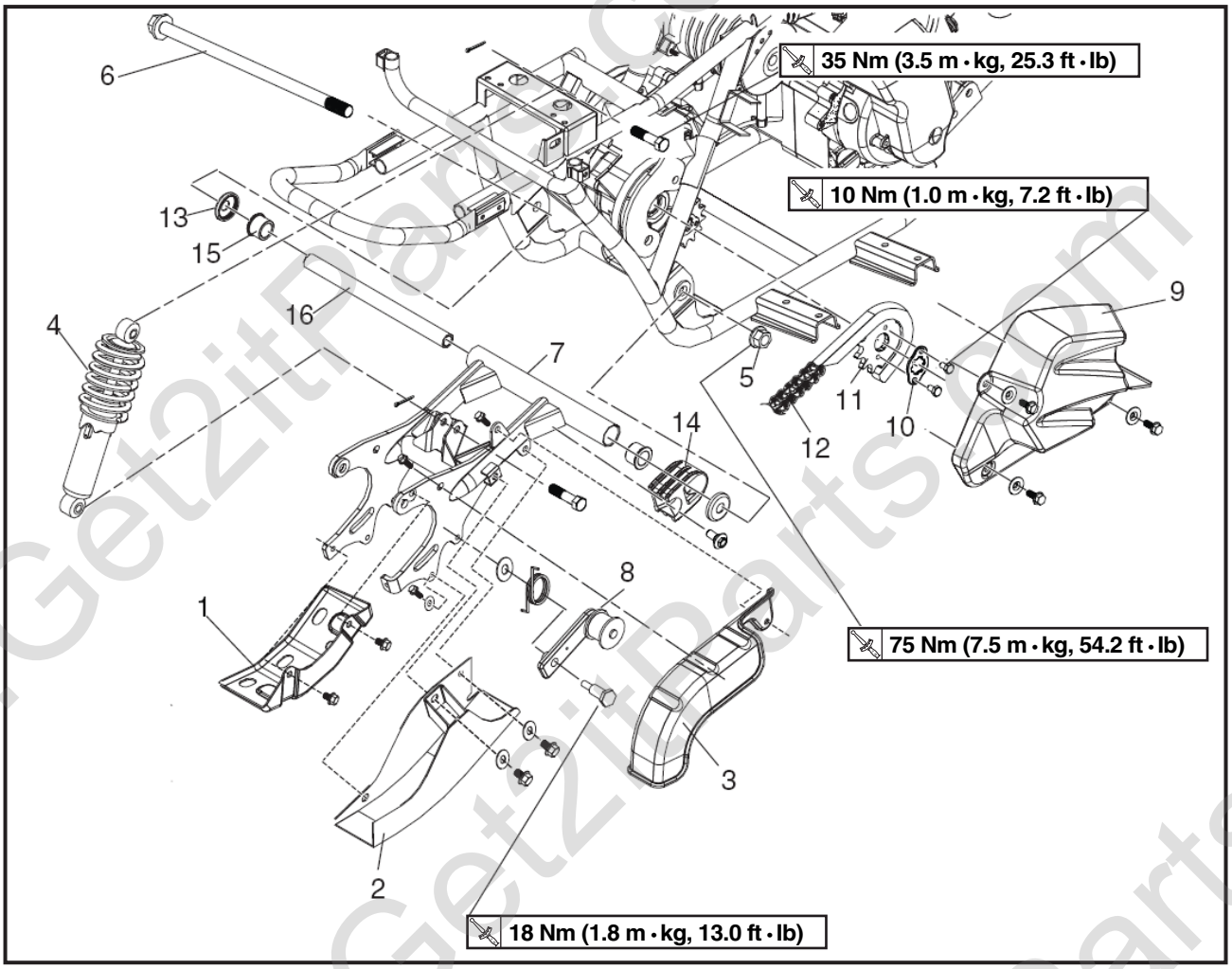
INSTALLING THE FRONT ARMS

The following procedure applies to both of the front arms.

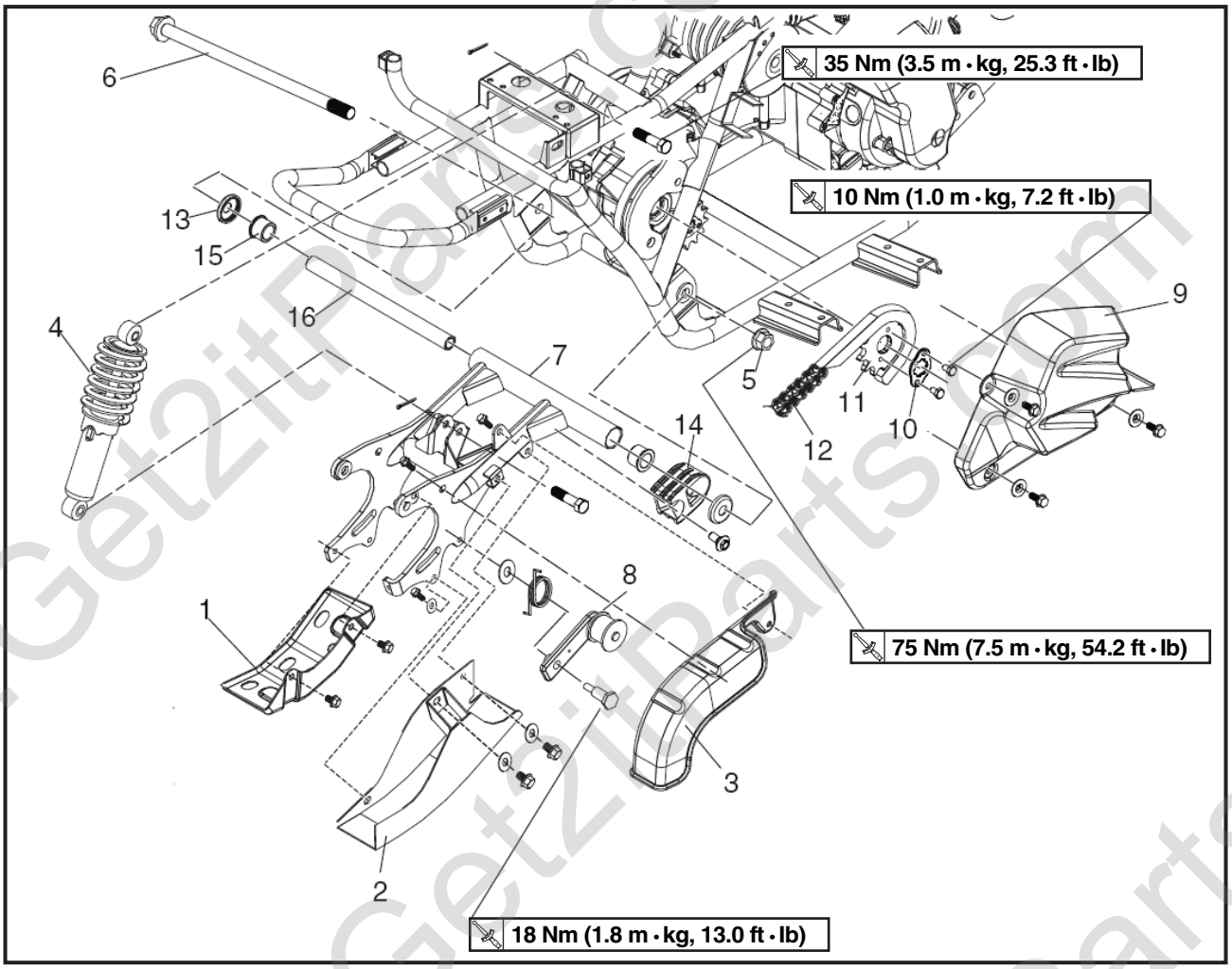
1. Install:
   - suspension of arm ①

	Front arm **25 Nm (2.5 m•kg, 18.1 ft•lb)**

REAR SHOCK ABSORBER, SWINGARM AND DRIVE CHAIN



Order	Job/Part	Q'ty	Remarks
	Removing the rear shock absorber, swingarm and drive chain		Remove the parts in the order listed.
	Seat/rear fender/air filter case		Refer to "SEAT, FENDERS AND FUEL TANK" in chapter 3.
	Rear axle hub		Refer to "REAR AXLE AND REAR AXLE HUB".
1	Guard 1	1	
2	Guard 2	1	
3	Drive chain case 2	1	
4	Rear shock absorber	1	
5	Pivot nut	1	
6	Pivot shaft	1	
7	Swingarm	1	
8	Chain tensioner assy	1	



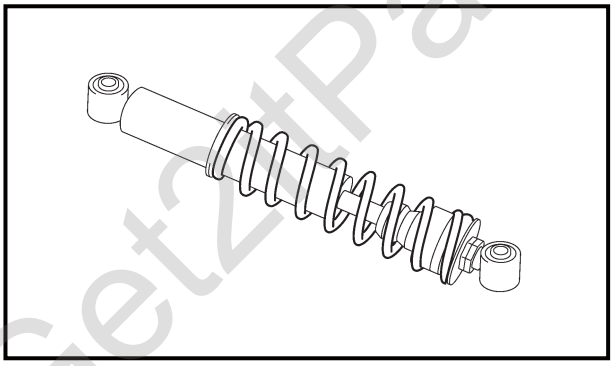
Order	Job/Part	Q'ty	Remarks
9	Drive chain case 1	1	
10	Lock washer	1	Refer to "INSTALLING THE DRIVE SPROCKET".
11	Drive sprocket	1	
12	Drive chain	1	
13	Dust cover	2	
14	Drive chain guide	2	
15	Bushing	1	
16	Spacer	2	
			For installation, reverse the removal procedure.

REMOVING THE REAR SHOCK ABSORBER

1. Remove:
   • rear shock absorber lower bolt
   • rear shock absorber upper bolt

TIP

While removing the rear shock absorber lower bolt, hold the swingarm so that it does not drop down.

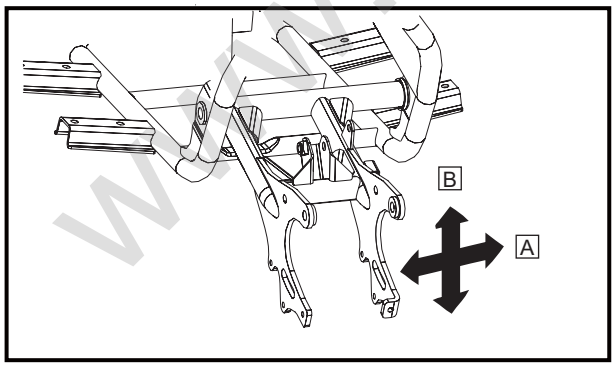


CHECKING THE REAR SHOCK ABSORBER

1. Check:
   • shock absorber
     Oil leaks → Replace the rear shock absorber assembly.
   • shock absorber rod
     Bends/damage → Replace the rear shock absorber assembly.
   • spring
     Fatigue → Replace the rear shock absorber assembly.
     Move the spring up and down.

TIP

Before removing the drive chain and the sprockets, measure the drive chain slack and a 15-link section of the drive chain.



REMOVING THE SWINGARM

1. Check:
   • swingarm free play

a. Check the tightening torque of the pivot shaft nut. **75 Nm (7.5 m · kg, 54.2 ft · lb)**

Swingarm free play limit (at the end of the swingarm)
1.0 mm (0.04 in)

b. Check the swingarm side play [A] by moving it from side to side.
   If side play is noticeable, check the spacer, bearings and frame pivot.

c. Check the swingarm vertical movement [B] by moving it up and down.
If vertical movement is tight or rough, or if there is binding, check the spacer, bearings and frame pivot.

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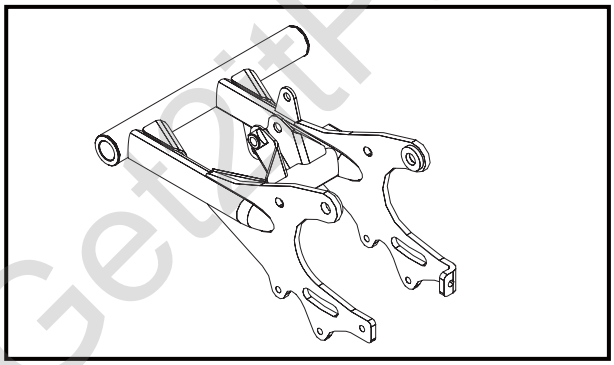
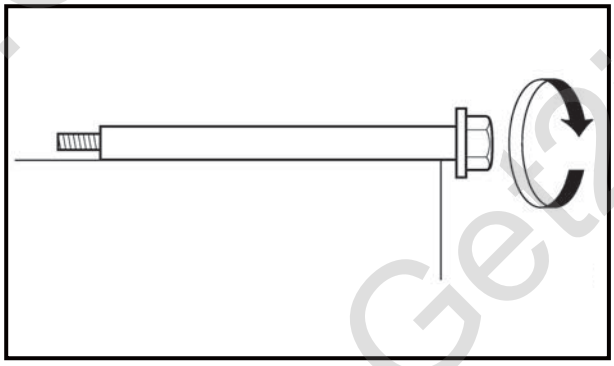
2. Remove:
   • pivot shaft nut
   • pivot shaft
   • swingarm



CHECKING THE SWINGARM

1. Check:
   • swingarm
   Bends/cracks/damage → Replace.



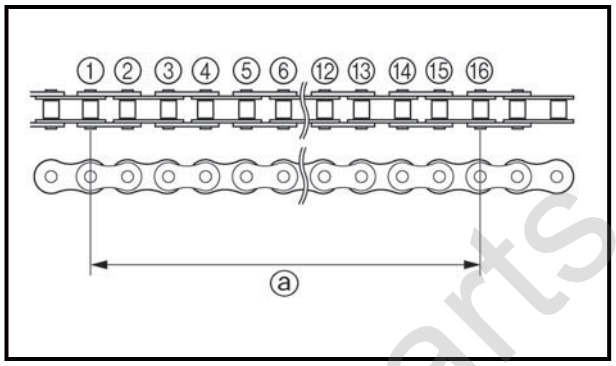
2. Check:
   • pivot shaft
   Roll the axle on a flat surface.
   Bends → Replace.

WARNING

Do not attempt to straighten a bent pivot shaft.

3. Clean:
   • pivot shaft
   • spacer

	Recommended cleaning solvent **Kerosene**



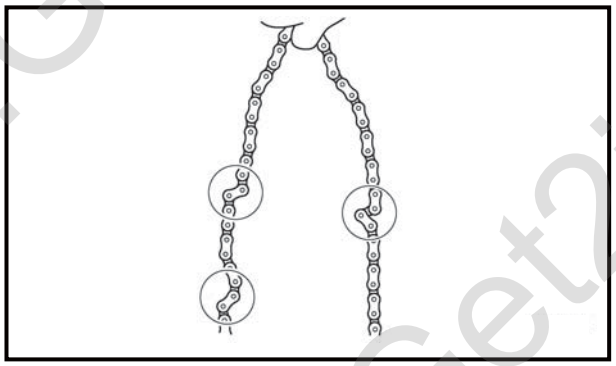
CHECKING THE DRIVE CHAIN

1. Measure:
   • 15-link section ⓐ of the drive chain
   Out of specification → Replace the drive chain.

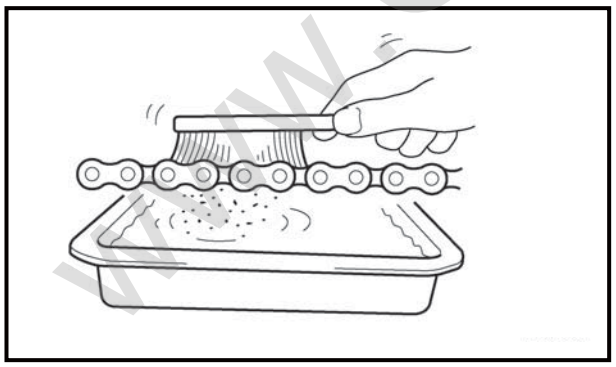
15-link drive chain section limit (maximum)
239.3 mm (9.42 in)

TIP

- While measuring the 15-link section, push down on the drive chain to increase its tension.
- Measure the length between drive chain roller ① and ⑯ as shown.
- Perform this measurement at two or three different places.



2. Check:
   • drive chain
   Stiffness → Clean and lubricate or replace.



3. Clean:
   • drive chain

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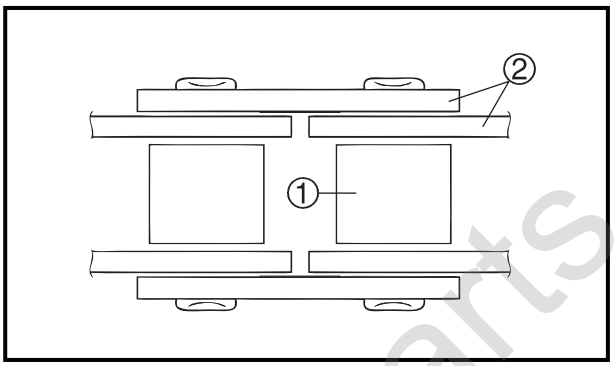
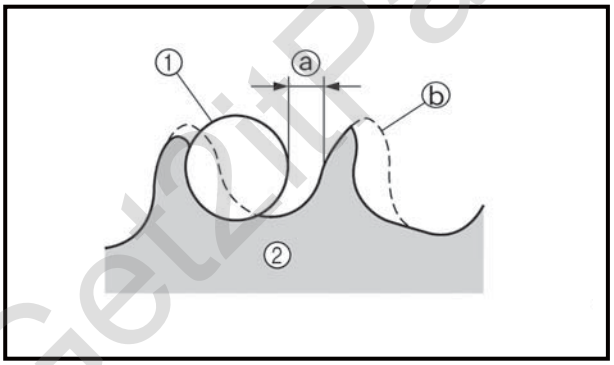
a. Wipe the drive chain with a clean cloth.
b. Put the drive chain in kerosene and remove any remaining dirt.
c. Remove the drive chain from the kerosene and completely dry it.

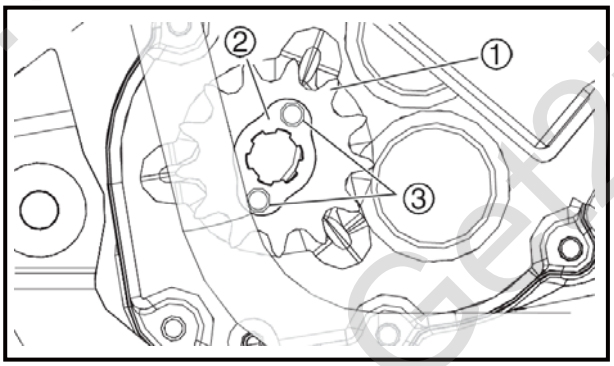


4. Check:
   • drive chain rollers ①
   Damage/wear → Replace the drive chain.
   • drive chain side plates ②
   Cracks/damage/wear → Replace the drive chain.
5. Lubricate:
   • drive chain



6. Check:
   • drive sprocket
   • driven sprocket
   More than 1/4 tooth ⓐ wear → Replace the drive chain sprockets as a set.
   Bent teeth → Replace the drive chain sprockets as a set.

ⓑ Correct
① Drive chain roller
② Drive chain sprocket

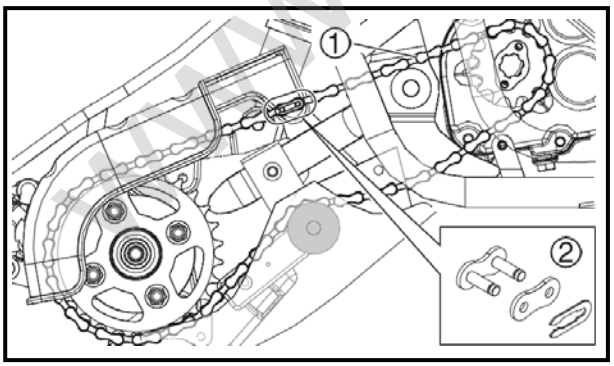


INSTALLING THE DRIVE SPROCKET

1. Install:
   • drive sprocket ①
   • lock washer ②
   • bolts ③

	Drive sprocket nut **10 Nm (1.0 m•kg, 7.2 ft•lb)**

2. Bend the lock washer tab along a flat side of the nut.

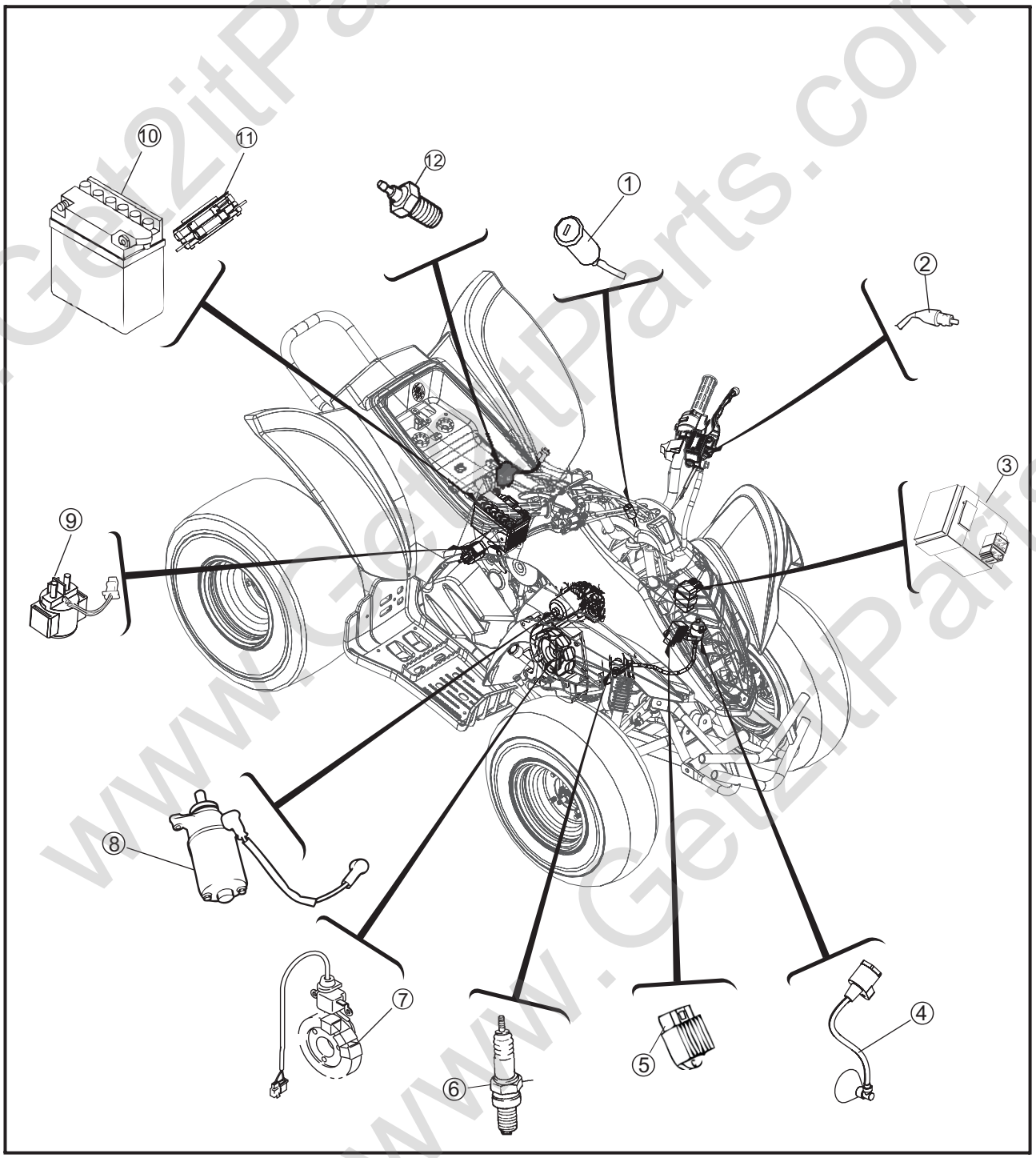


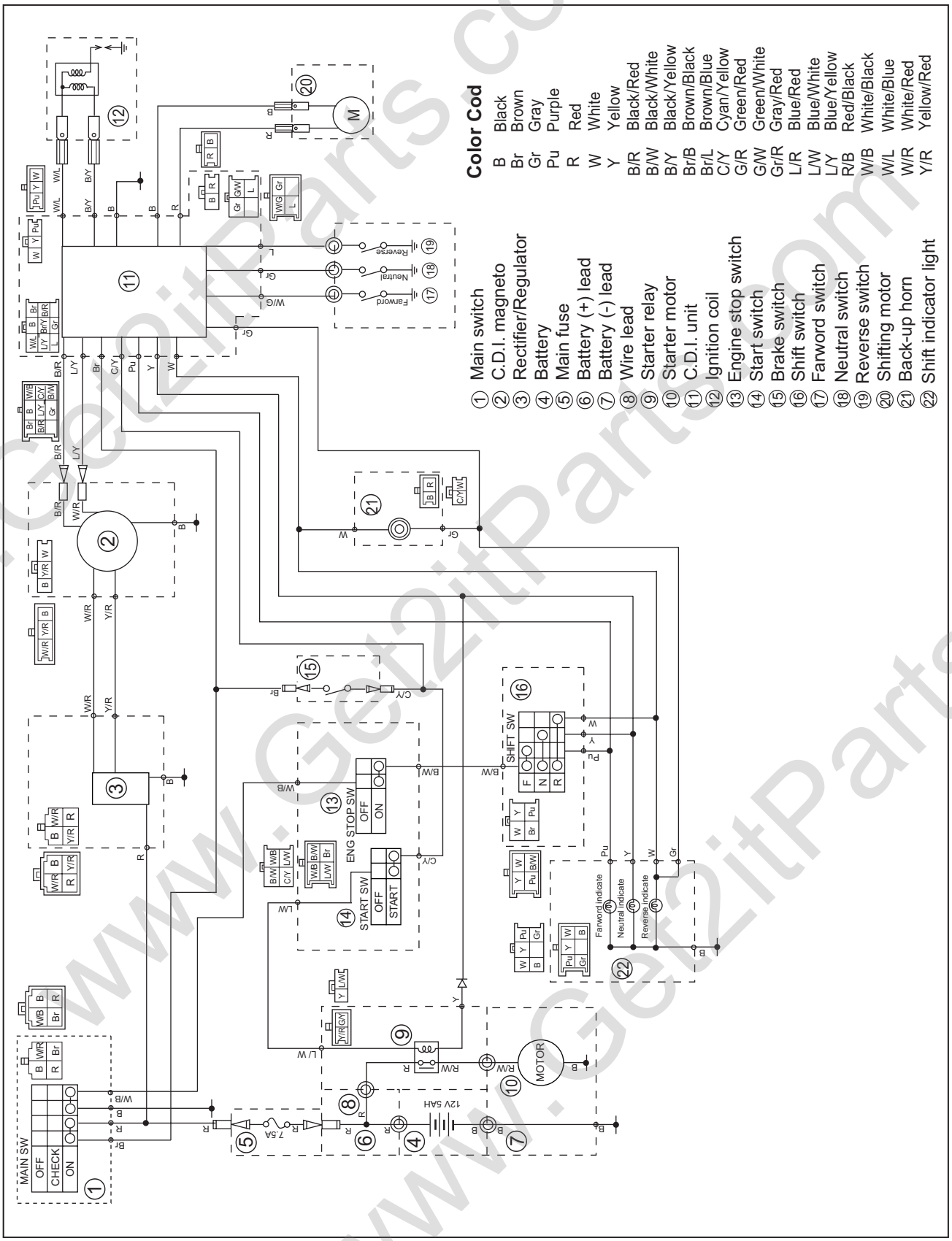
INSTALLING THE DRIVE CHAIN

1. Install:
   • drive chain ①
   • masterlink ②

ELECTRICAL COMPONENTS

① Main switch
② Brake switch
③ CDI unit
④ Ignition coil
⑤ Rectifier/regulator
⑥ Spark plug
⑦ C.D.I. magneto
⑧ Starter motor
⑨ Starter relay
⑩ Battery
⑪ Fuse
⑫ F-N-R shift switch

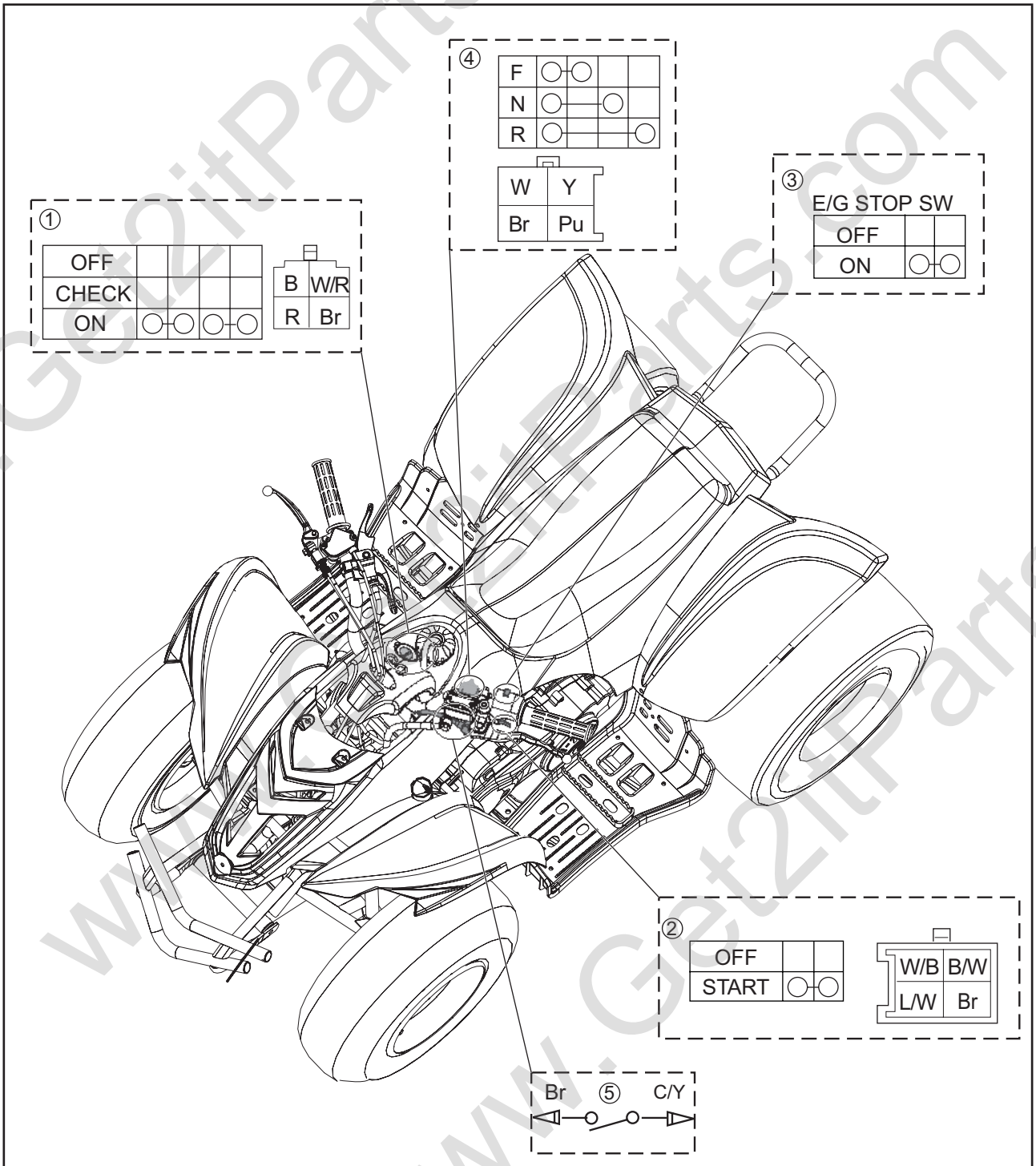




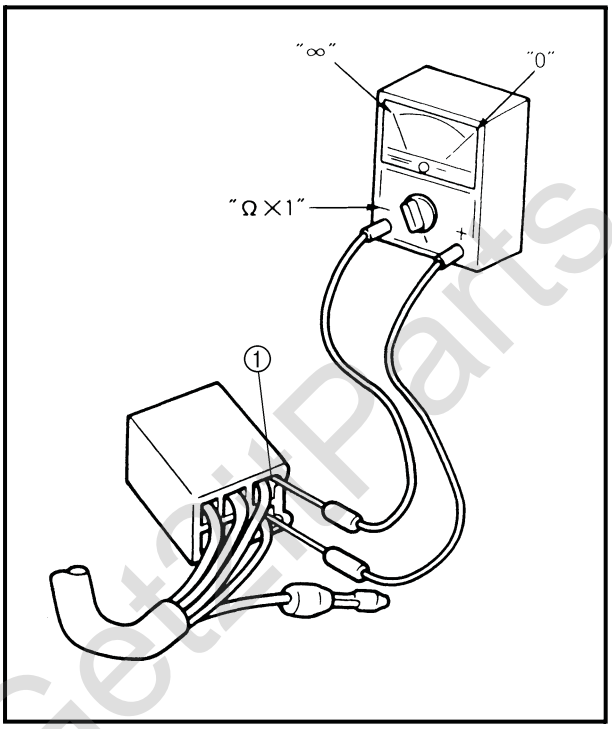
CHECKING THE SWITCHES

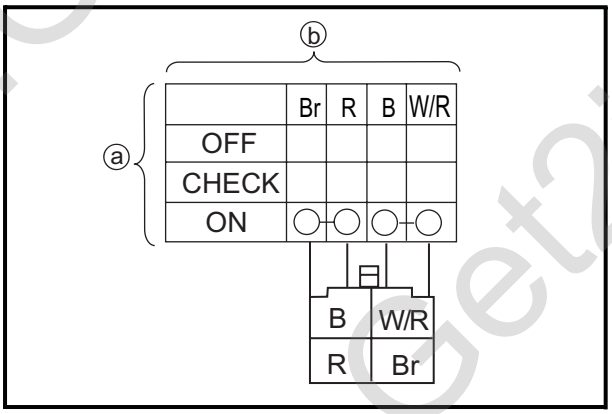
Check each switch for damage or wear, proper connections, and also for continuity between the terminals. Refer to "CHECKING SWITCH CONTINUITY".

Damage/wear → Repair or replace.
Improperly connected → Properly connect.
Incorrect continuity reading → Replace the switch.



① Main switch
② Star switch
③ E/G stop switch
④ Shift switch
⑤ Brake switch





CHECKING SWITCH CONTINUITY

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.

NOTICE

Never insert the tester probes into the coupler terminal slots ①. Always insert the probes from the opposite end of the coupler, taking care not to loosen or damage the leads.

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 terminal connections for switches (e.g., main switch, engine stop switch) are shown in an illustration similar to the one on the left.
The switch positions ⓐ are shown in the far left column and the switch lead colors ⓑ are shown in the top row in the switch illustration.

TIP

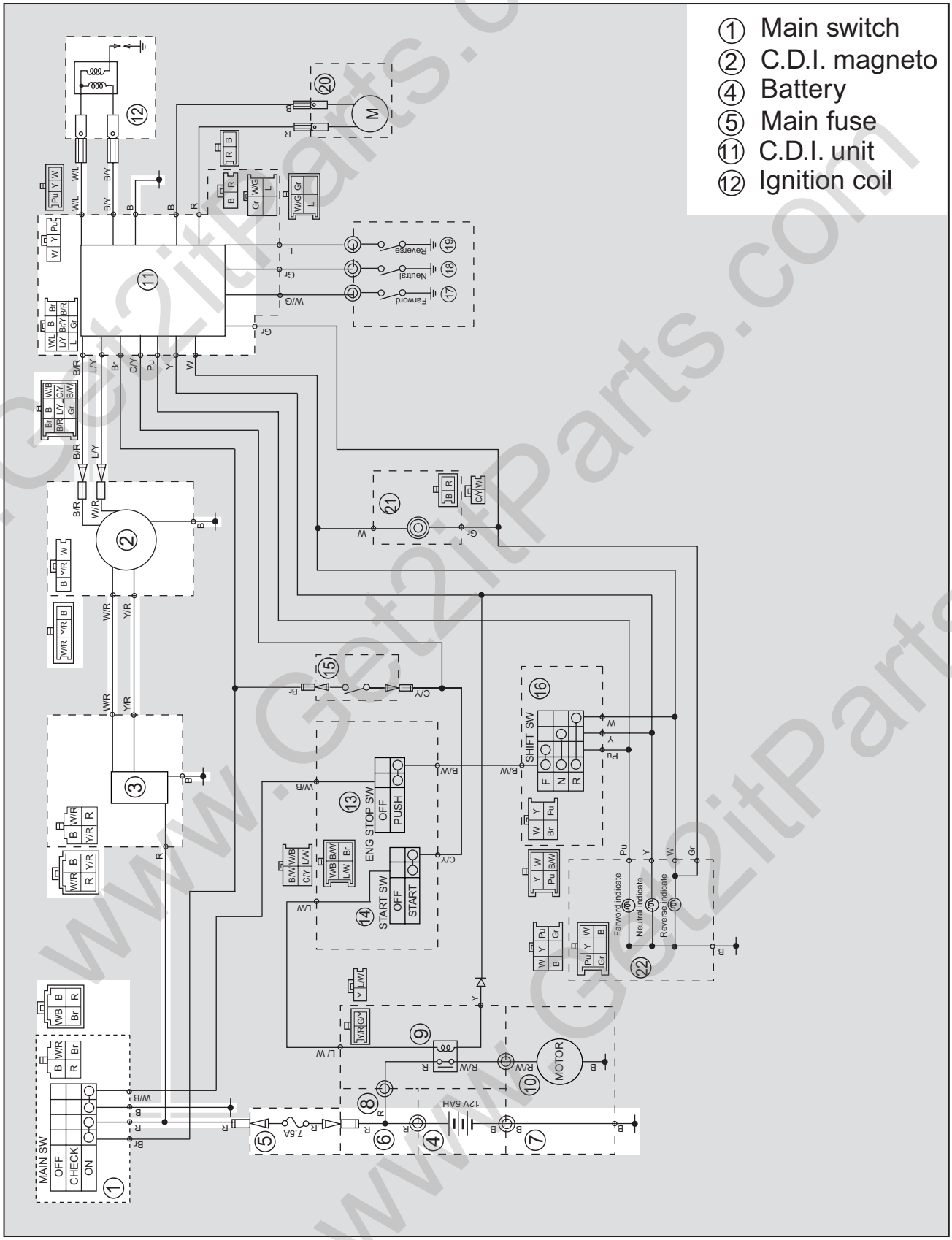
"○——○" indicates a continuity of electricity between switch terminals (i.e., a closed circuit at the respective switch position).

The example illustration on the left shows that:

There is continuity between black and yellow /red when the switch is set to "OFF".
There is continuity between red and brown when the switch is set to "ON".

IGNITION SYSTEM

CIRCUIT DIAGRAM



TROUBLESHOOTING

The ignition system fails to operate (no spark or intermittent spark).

Check:
1. spark plug
2. ignition spark gap
3. spark plug cap resistance
4. ignition coil resistance
5. main switch

7. wiring connections (of the entire ignition system)

TIP

- Before troubleshooting, remove the following part(s):

1. seat
2. front fender
3. fuel tank

- Troubleshoot with the following special tool(s).

1. Spark plug

- Check the condition of the spark plug.
- Check the spark plug type.
- Measure the spark plug gap.
  Refer to “CHECKING THE SPARK PLUG” in chapter 3.

Standard spark plug
CR7HSA (NGK)
Spark plug gap
0.6 ~ 0.7 mm (0.024 ~ 0.028 in)

- Is the spark plug in good condition, is it of the correct type, and is its gap within specification?

YES

NO

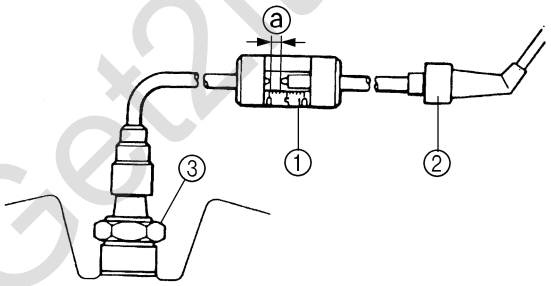
Re-gap or replace the spark plug.

2. Ignition spark gap

- Disconnect the spark plug cap from the spark plug.
- Connect the ignition dynamic spark tester ① as shown.

②Spark plug cap
③Spark plug

- Set the main switch to "ON".
- Measure the ignition spark gap ⓐ.
- Crank the engine by pushing the starter switch and gradually increase the spark gap until a misfire occurs.



Minimum ignition spark gap
6 mm (0.24 in)

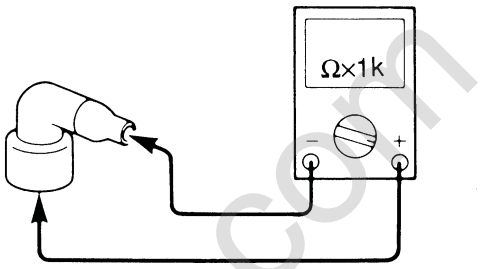
- Is there a spark and is the spark gap within specification?

NO → The ignition system is OK.

YES

3. Spark plug cap resistance

- Remove the spark plug cap from the spark plug lead.
- Connect the pocket tester ("**Ω ×** 1k" range) to the spark plug cap as shown.



- Measure the spark plug cap resistance.

Spark plug cap resistance
5 kΩ at 20 °C (68 °F)

- Is the spark plug cap OK?

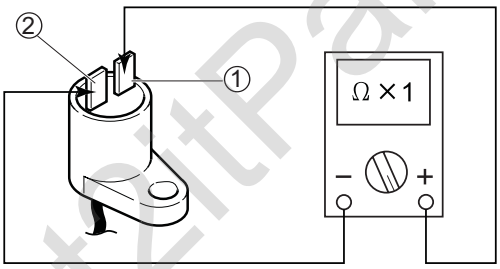
YES

NO → Replace the spark plug cap.

4. Ignition coil resistance

- Disconnect the ignition coil connectors from the ignition coil terminals.
- Connect the pocket tester (**Ω × 1**) to the ignition coil as shown.

Positive tester probe → black terminal ①
Negative tester probe → green terminal ②

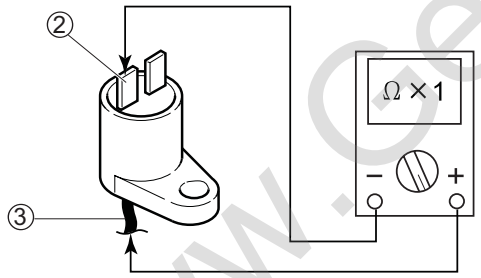


- Measure the primary coil resistance.

Primary coil resistance
0.19 ~ 0.25 Ω at 20 °C (68 °F)

- Connect the pocket tester (**Ω × 1k**) to the ignition coil as shown.

Positive tester probe → spark plug lead ③
Negative tester probe → green terminal ②



- Measure the secondary coil resistance.

Secondary coil resistance
2.55 ~ 3.45 kΩ at 20 °C (68 °F)

- Is the ignition coil OK?

YES → NO

Replace the ignition coil.

5. Main switch

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

YES → NO

Replace the main switch.

6. Engine stop switches

- Check the engine stop switches for continuity.
  Refer to “CHECKING THE SWITCHES”.
- Are the engine stop switches OK?

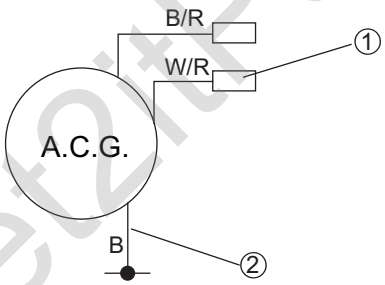
YES → NO

Replace the handlebar switch or engine stop switch (frame).

7. Pickup coil resistance

- Disconnect the C.D.I. magneto coupler from the wire harness.
- Connect the pocket tester (**Ω ×** 100) to the pickup coil terminal as shown.

Positive tester probe →
white/red terminal ①
Negative tester probe →
black terminal ②



- Measure the pickup coil resistance.

Pickup coil resistance
120 ~ 180 Ω at 20 °C (68 °F)
(between white/red and white/blue)

- Is the pickup coil OK?

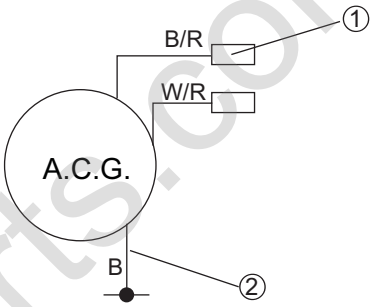
YES → NO

Replace the pickup coil/stator assembly.

8. Source coil resistance

- Disconnect the C.D.I. magneto coupler from the wire harness.
- Connect the pocket tester (**Ω ×** 100) to the source coil terminal.

Positive tester probe →
black/red terminal ①
Negative tester probe →
black terminal ②



- Measure the source coil resistance.

Source coil resistance
480 ~ 640 Ω at 20 °C (68 °F)
(black/red and green/white)

YES → NO

Replace the pickup coil/stator assembly.

9. Wiring

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

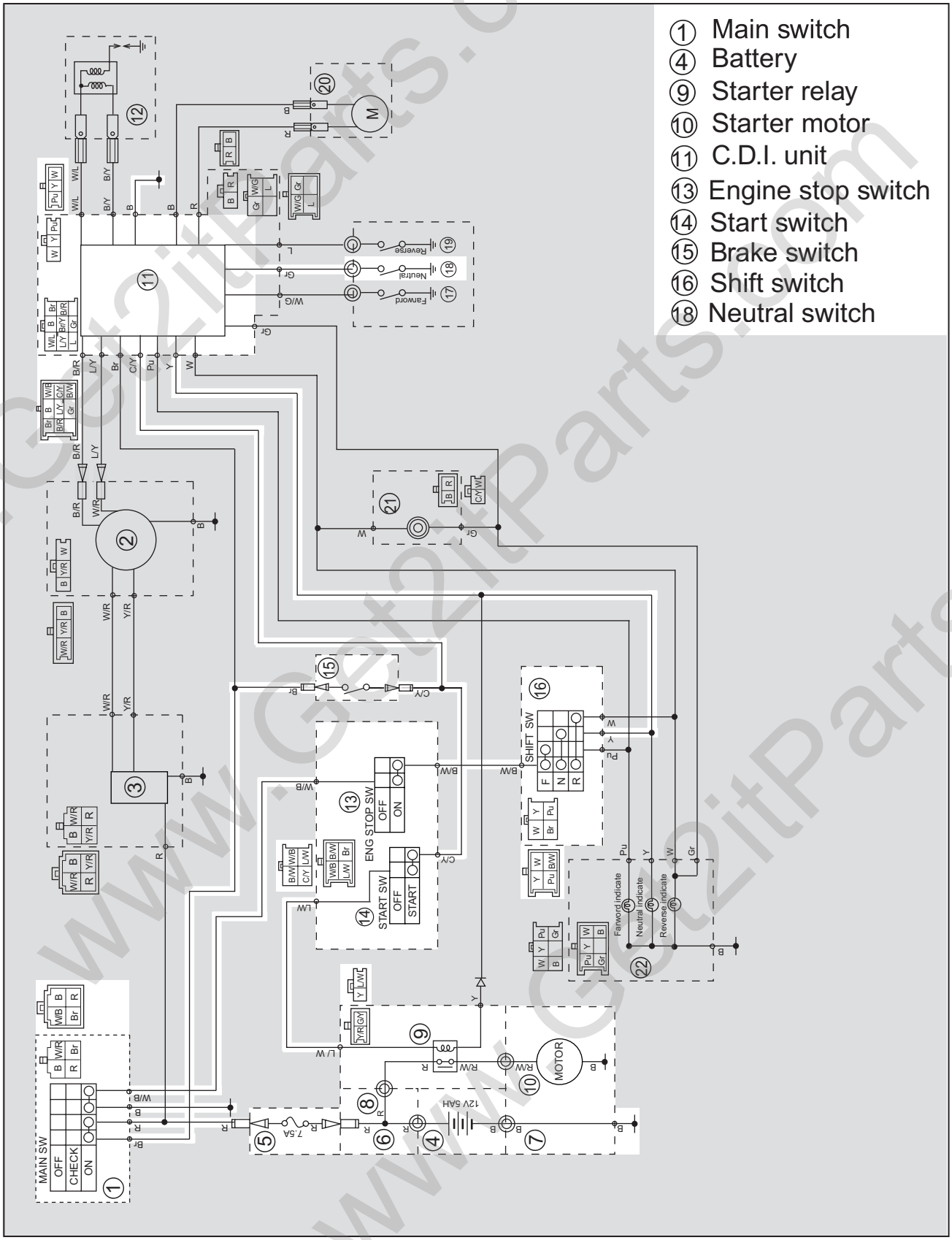
YES → NO

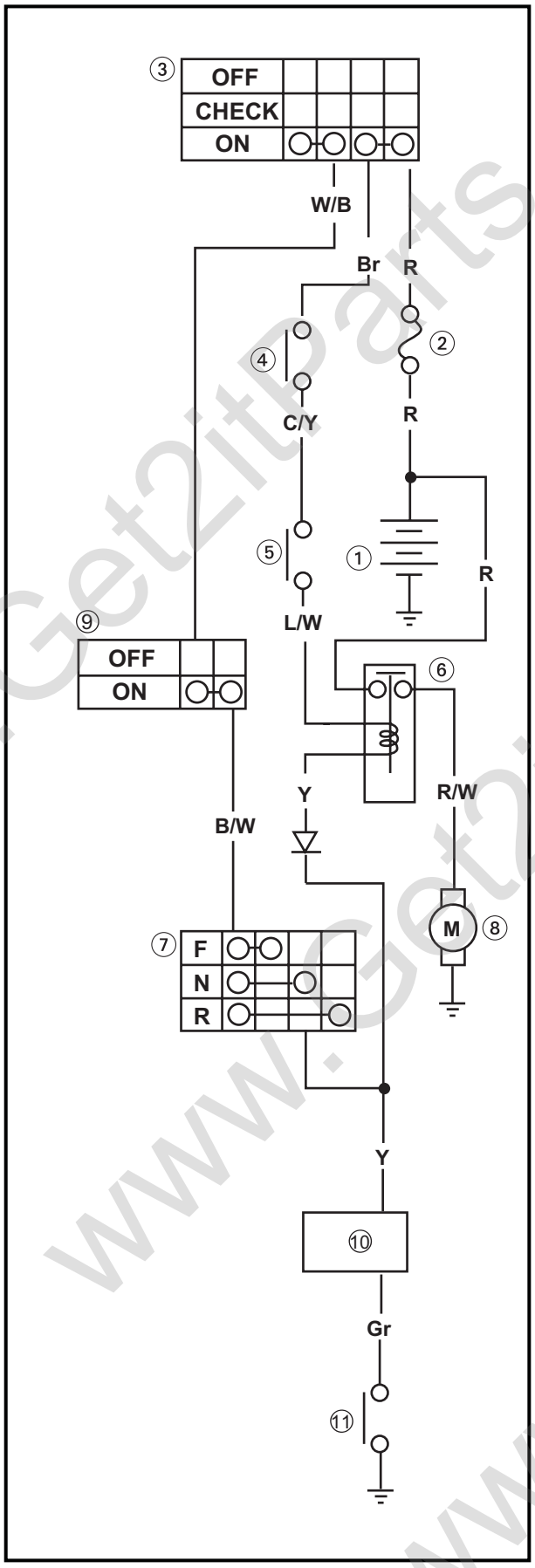
Replace the C.D.I. unit.

Properly connect or repair the ignition system's wiring.

ELECTRIC STARTING SYSTEM

CIRCUIT DIAGRAM





STARTING CIRCUIT OPERATION

The starting circuit on this model consists of the starter motor, starter relay, brake switch. If the main switch is on and the engine stop switch is in the ON position, the starter motor can be operated only if:

- You pull in the brake lever (the brake switch is ON).

① Battery
② Main fuse
③ Main switch
④ Brake switch
⑤ Start switch
⑥ Starter relay
⑦ Shift switch
⑧ Starter motor
⑨ Engine stop switch
⑩ C.D.I. unit
⑪ Neutral switch

TROUBLESHOOTING

The starter motor fails to turn.

Check:
1. main fuse
2. battery
3. starter motor
4. starter relay
5. main switch
6. brake switch
7. start switch
8. shift switch
9. neutral switch
10. wiring connections
(of the entire starting system)

TIP
- Before troubleshooting, remove the following part(s):
1. seat
2. front fender
3. rear fender
4. C.D.I. magneto cover
- Troubleshoot with the following special tool(s).

1. Main fuse
- Check the main fuse for continuity.
Refer to "CHECKING THE FUSE" in chapter 3.
- Is the main fuse OK?

YES

NO → Replace the fuse.

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

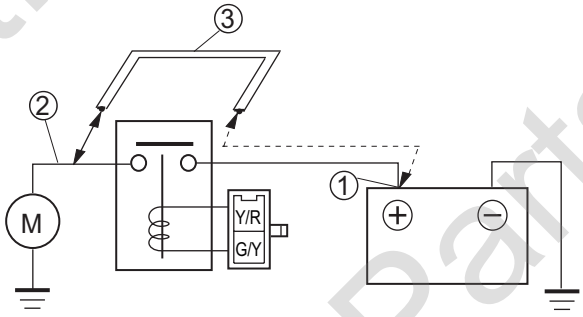
Minimum open-circuit voltage
12.0 V or more at 20 °C (68 °F)

- Is the battery OK?

YES

NO →
- Clean the battery terminals.
- Recharge or replace the battery.

3. Starter motor
- Connect the positive battery terminal ① and starter motor lead ② with a jumper lead ③.



WARNING
- **A wire that is used as a jumper lead must have at least the same capacity or more as that of the battery lead, otherwise the jumper lead may burn.**
- **This check is likely to produce sparks, therefore make sure nothing flammable is in the vicinity.**

- Does the starter motor turn?

YES

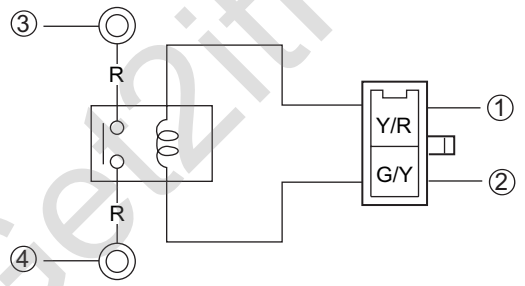
NO → Repair or replace the starter motor.

4. Starter relay

- Disconnect the starter relay coupler from the coupler.
- Connect the pocket tester (**Ω × 1**) and battery (12 V) to the starter relay coupler as shown.

Positive battery terminal → yellow/red ①
Negative battery terminal → green/yellow ②

Positive tester probe → red ③
Negative tester probe → red ④



- Does the starter relay have continuity between red and black?

YES → Replace the starter relay.
NO

5. Main switch

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

YES → Replace the main switch.
NO

6. Brake switch

- Check the brake switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the rear brake switch OK?

YES
NO → Replace the brake switch.

7. Start switch

- Check the start switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the start switch OK?

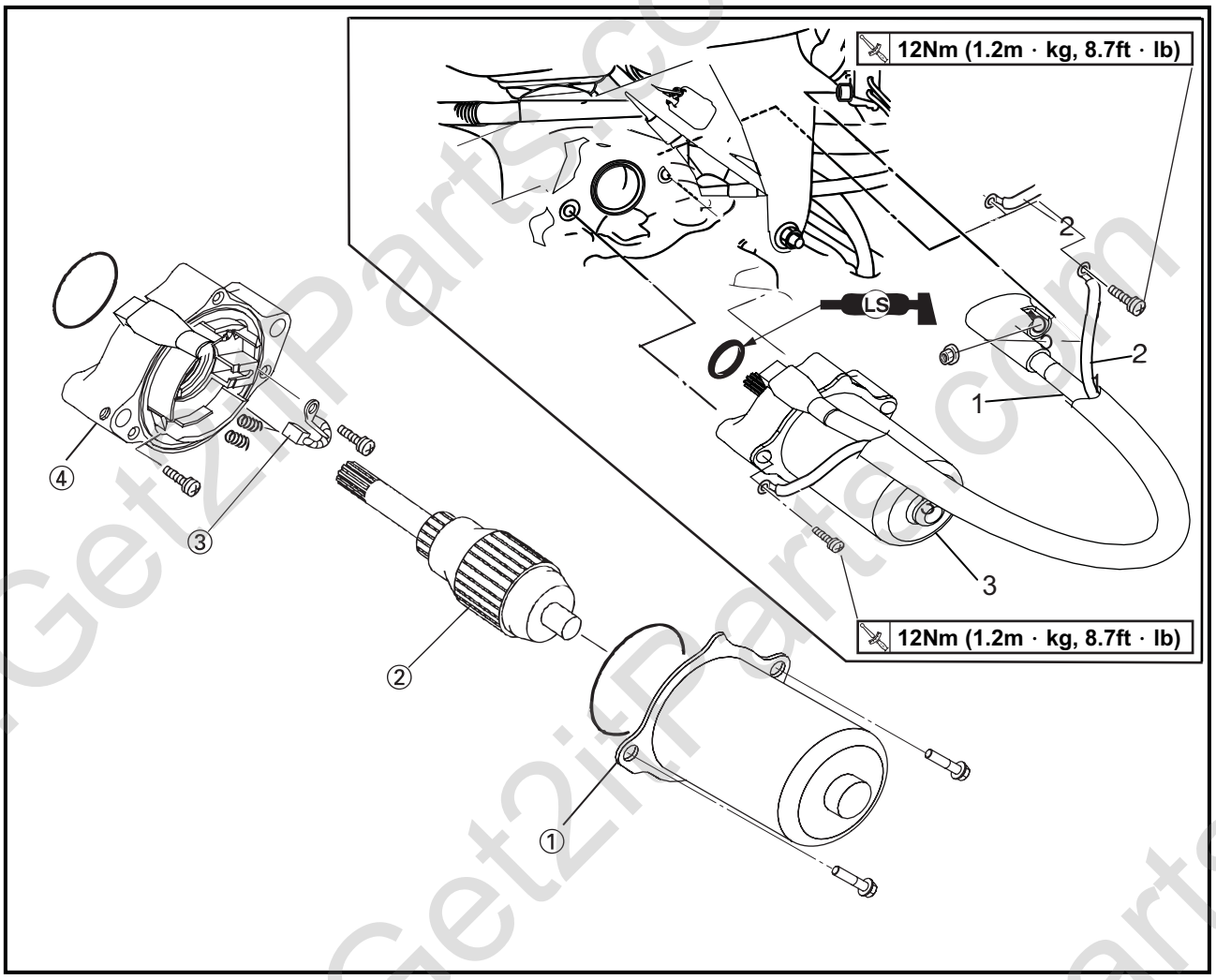
YES
NO → Replace the handlebar switch.

8.Wiring

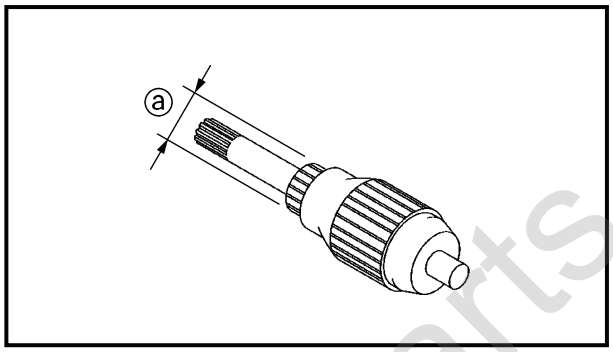
- Check the entire starting system’s wiring. Refer to “CIRCUIT DIAGRAM”.
- Is the starting system’s wiring properly connected and without defects?

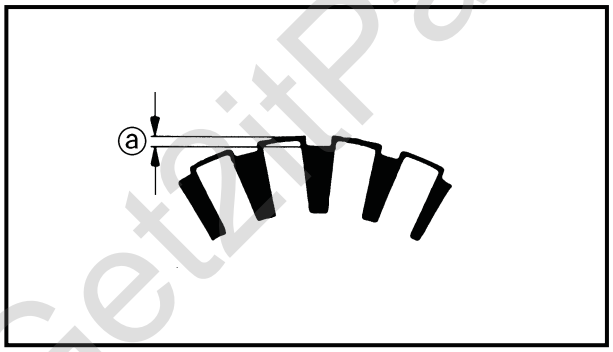
YES → The starting system circuit is OK.
NO → Properly connect or repair the starting system’s wiring.

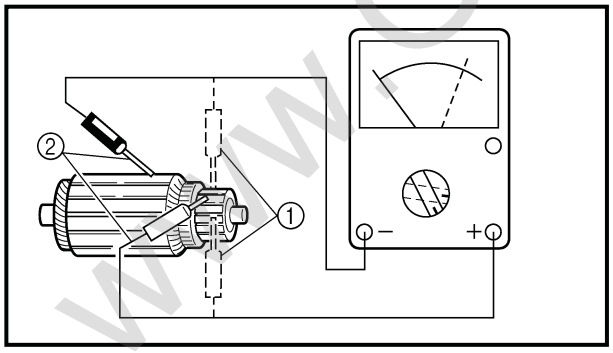
STARTER MOTOR



Order	Job/Part	Q'ty	Remarks
	Removing the starter motor		Remove the parts in the order listed.
1	Starter motor lead	1	
2	Ground lead	1	
3	Starter motor	1	
			For installation, reverse the removal procedure.
	Disassembling the starter motor		Remove the parts in the order listed.
①	Yoke	1	
②	Armature coil	1	Refer to "ASSEMBLING THE STARTER MOTOR".
③	Brush	1	
④	Bracket	1	
			For assembly, reverse the disassembly procedure.







CHECKING THE STARTER MOTOR

1. Check:
   • commutator
   Dirt → Clean with 600-grit sandpaper.
2. Measure:
   • commutator diameter ⓐ
   Out of specification → Replace the starter motor.

Commutator wear limit
19.5 mm (0.77 in)

3. Measure:
   • mica undercut ⓐ
   Out of specification → Scrape the mica to the proper measurement with a hacksaw blade that has been grounded to fit the commutator.

Mica undercut
1.6 mm (0.06 in)

TIP

The mica of the commutator must be undercut to ensure proper operation of the commutator.

4. 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 pocket tester.

Armature coil
Commutator resistance ①
0.014 ~ 0.019 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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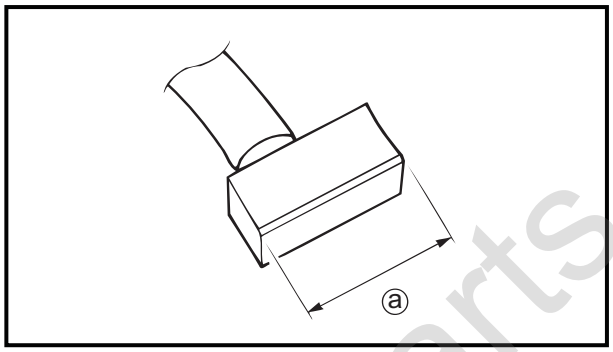


5. Measure:
   • brush length ⓐ
   Out of specification → Replace the brushes as a set.

Brush length wear limit
3.5 mm (0.14 in)

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

Brush spring force
1.0~ 3.0 N
(102 ~ 306 gf, 3.60 ~ 10.80 oz)

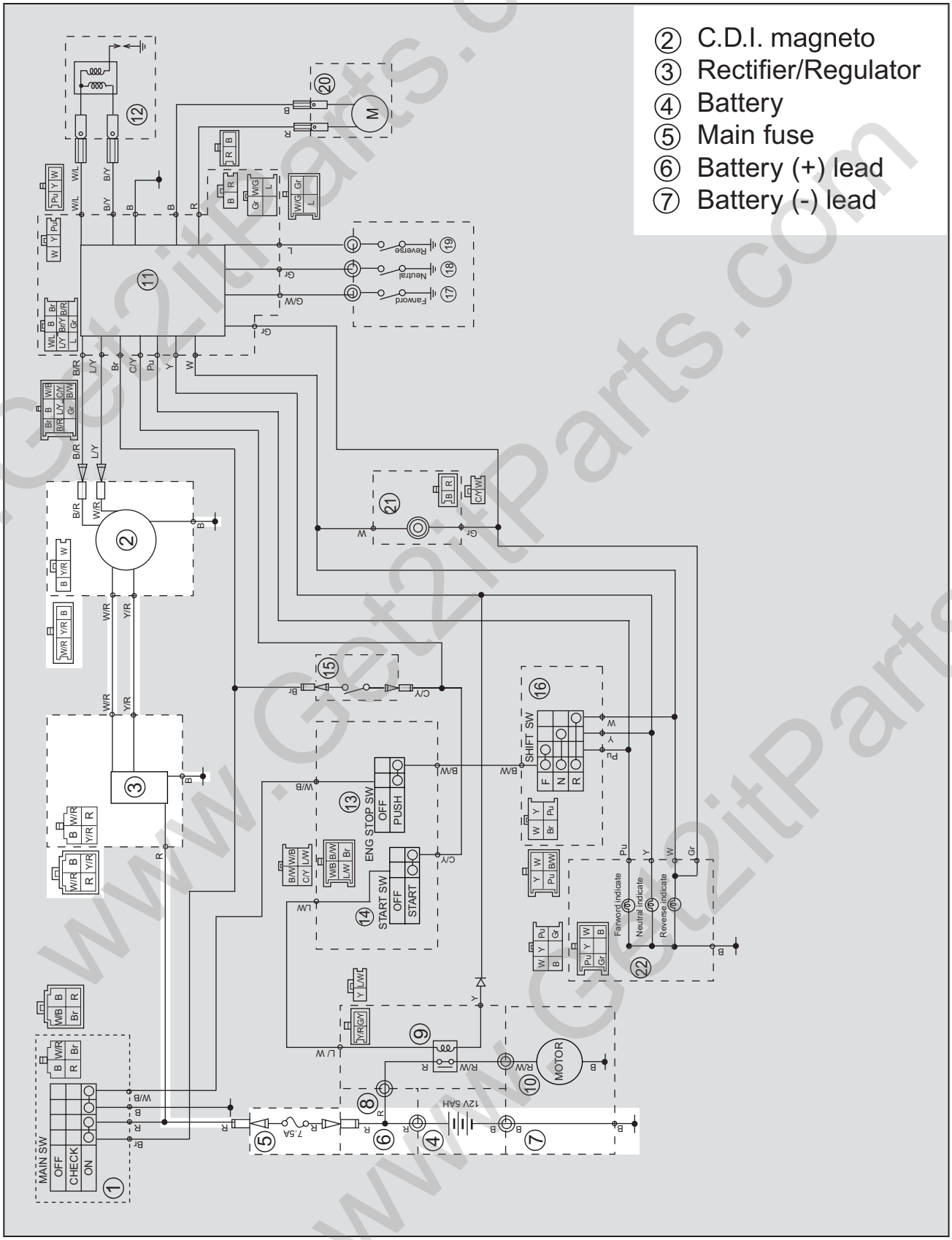
7. Check:
   • gear teeth
   Damage/wear → Replace the gear.
8. Check:
   • bearing
   • oil seal
   • O-rings
   Damage/wear → Replace the defective part(s).

ASSEMBLING THE STARTER MOTOR

1. Install:
   • bracket
   • brush
   • armature coil
   • yoke

CHARGING SYSTEM

CIRCUIT DIAGRAM



TROUBLESHOOTING

The battery is not being charged.

Check:
1. main fuse
2. battery
3. charging voltage
4. charging coil resistance
5. wiring connections
   (of the entire charging system)

TIP

- Before troubleshooting, remove the following part(s):

1. seat
2. rear fender

- Troubleshoot with the following special tool(s).

1. Main fuse

- Check the main fuse for continuity.
  Refer to “CHECKING THE FUSE” in chapter 3.
- Is the main fuse OK?

YES

NO

Replace the fuse.

2. Battery

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

Minimum open-circuit voltage
12.0 V or more at 20 °C (68 °F)

- Is the battery OK?

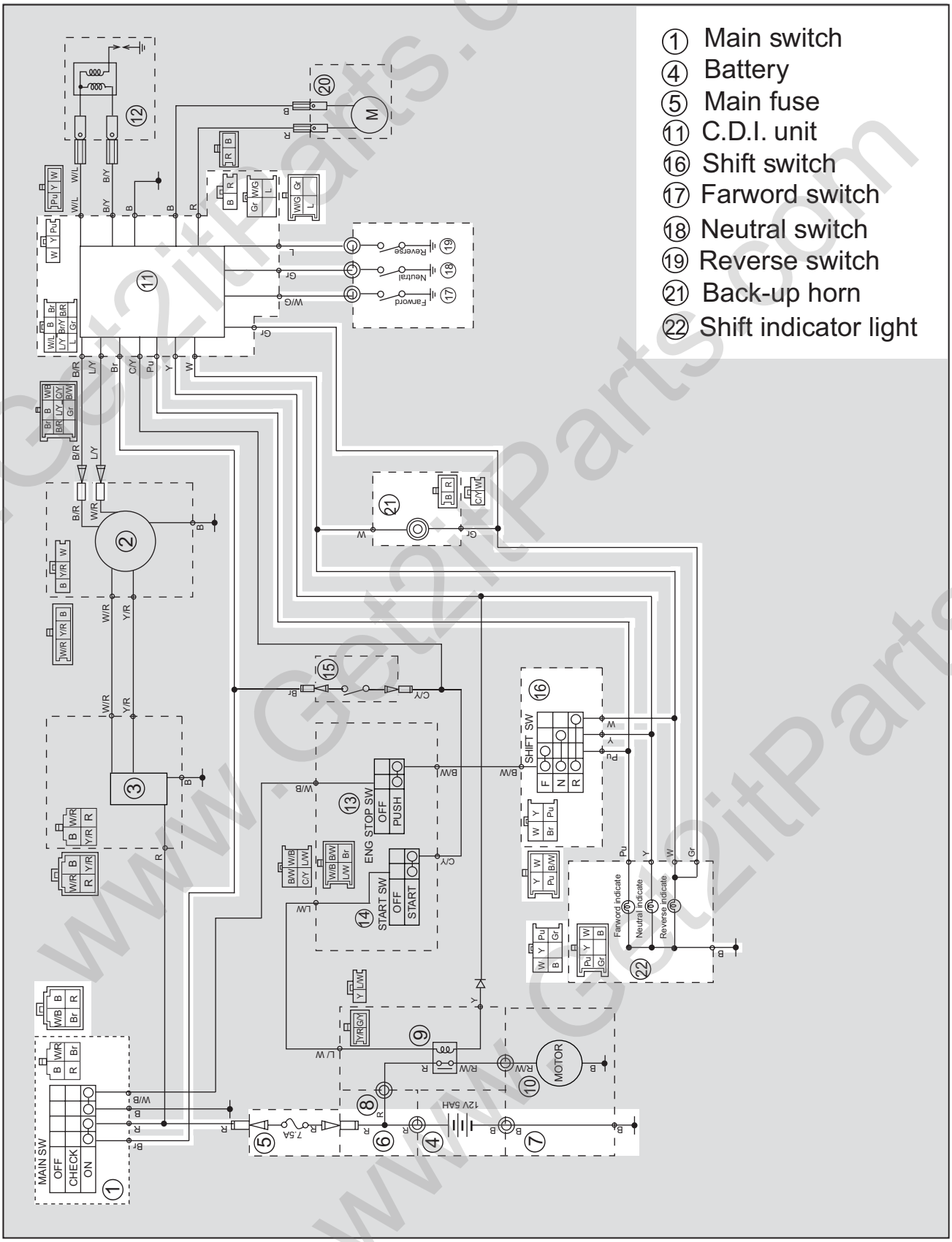
YES

NO

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

SIGNALING SYSTEM

CIRCUIT DIAGRAM



TROUBLESHOOTING

•Any of the following fail to light: flasher light, brake light or an indicator light.
•The horn fails to sound.

Check:
1. main fuse
2. battery
3. main switch
4. wiring connections (of the entire signaling system)

TIP

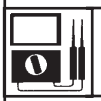
- Before troubleshooting, remove the following part(s):
  1. Seat
  2. Front fender
- Troubleshoot with the pocket tester.

1. Main fuse
- Check the fuse for continuity. Refer to "CHECKING THE FUSES" in chapter 3.
- Is the fuse OK?

YES → 2. Battery

NO → Replace the fuse.

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



Minimum open-circuit voltage 12.0 V or more at 20°C

- Is the battery OK?

YES → Clean the battery terminals.

NO → Recharge or replace the battery.

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

YES → 4. Wiring

NO → Replace the main switch.

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

YES → Check the condition of each of the signaling system's circuits. Refer to "CHECKING THE SIGNALING SYSTEM".

NO → Properly connect or repair the signaling system's wiring.

CHECKING THE SIGNALING SYSTEM

1. Brake switches
- Check the brake switches for continuity. Refer to "CHECKING THE SWITCHES".
- Is the brake light switch OK?

YES ↓

NO ↓

Replace the brake light switch.

2. The neutral indicator light fails to come on.

1. Neutral indicator light bulb and socket
- Check the neutral indicator light bulb and socket for continuity.
- Are the neutral indicator light bulb and socket OK?

YES ↓

NO ↓

Replace the neutral indicator light bulb, socket or both.

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

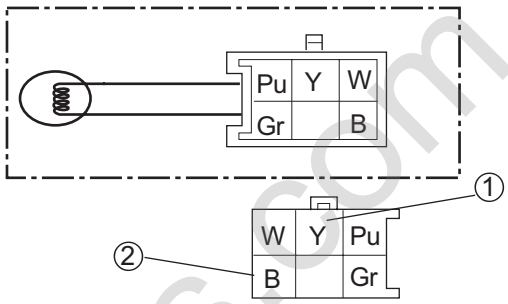
YES ↓

NO ↓

Replace the neutral switch.

3. Voltage
- Connect the pocket tester (DC 20 V) to the indicator light coupler (wire harness side) as shown.

Positive tester probe → yellow ①
Negative tester probe → black ②



- Set the main switch to "ON".
- Set the shift switch to "N".
- Measure the voltage (DC 12 V).
- Is the voltage within specification?

YES ↓

This circuit is OK.

NO ↓

The wiring circuit from the main switch to the indicator light coupler is faulty and must be repaired.

3. The forward indicator light fails to come on.

1. Forward indicator light bulb and socket
- Check the forward indicator light bulb and socket for continuity.
- Are the forward indicator light bulb and socket OK?

YES ↓

NO ↓

Replace the forward indicator light bulb, socket or both.

2. Forward switch

- Check the forward switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the forward switch OK?

YES

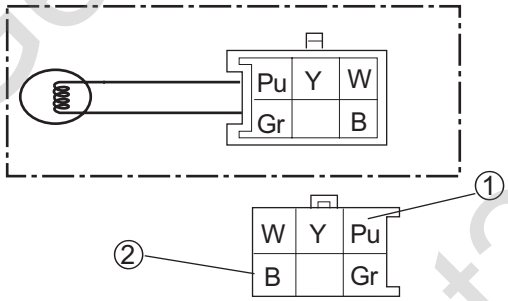
NO

Replace the forward switch.

3. Voltage

- Connect the pocket tester (DC 20 V) to the indicator light coupler (wire harness side) as shown.

Positive tester probe → purple ①
Negative tester probe → black ②



- Set the main switch to “ON”.
- Set the shift switch to “F”.
- Measure the voltage (DC 12 V).
- Is the voltage within specification?

YES

NO

This circuit is OK.

The wiring circuit from the main switch to the indicator light coupler is faulty and must be repaired.

4. The reverse indicator light fails to come on.

1. Reverse indicator light bulb and socket

- Check the reverse indicator light bulb and socket for continuity.
- Are the reverse indicator light bulb and socket OK?

YES

NO

Replace the reverse indicator light bulb, socket or both.

2. Reverse switch

- Check the reverse switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the reverse switch OK?

YES

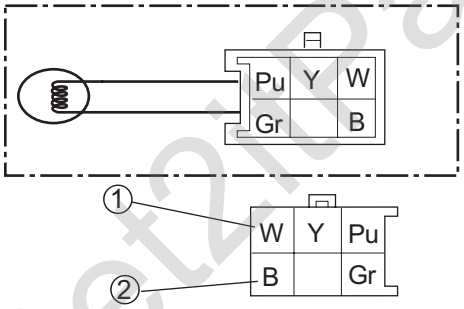
NO

Replace the reverse switch.

3. Voltage

- Connect the pocket tester (DC 20 V) to the indicator light coupler (wire harness side) as shown.

Positive tester probe → white ①
Negative tester probe → black ②



- Set the main switch to “ON”.
- Set the shift switch to “R”.
- Measure the voltage (DC 12 V).
- Is the voltage within specification?

YES

NO

This circuit is OK.

The wiring circuit from he main switch to the indicator light coupler is faulty and must be repaired.

5. The back-up horn fails to sound.

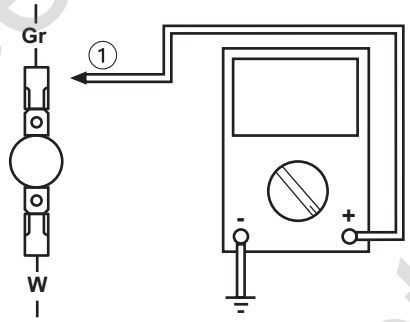
1. Reverse switch
- Check the reverse switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the reverse switch OK?

YES

NO → Replace the reverse switch.

2. Voltage
- Connect the pocket tester (DC 20 V) to the back-up horn connector at the back-up horn terminal as shown.

Positive tester probe → gray ①
Negative tester probe → ground



- Set the main switch to "ON".
- Set the shaft switch to "R".
- Measure the voltage (DC 12 V)
- Is the voltage within specification?

YES

NO → The wiring circuit from the shaft switchto the back-up horn connector is faulty and must be repaired

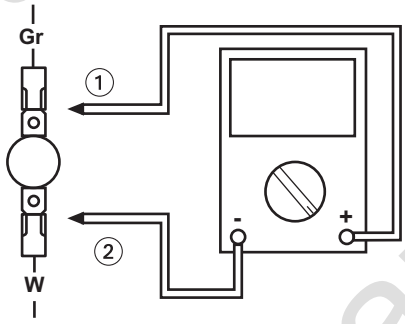
3. Back-up horn
- Disconnect the white connector at the back-up terminal.
- Connect a jumper lead to the back-up horn terminal and ground the jumper lead.
- Set the shift switch to "R".
- Does the back-up horn sound?

YES

NO → Replace the back-up horn.

4. Voltage
- Disconnect the white and gray/black connectors at the back-up horn terminal.
- Connect the pocket tester (DC 20 V) to the back-up horn connectors as shown.

Positive tester probe → gray ①
Negative tester probe → white ②



- Set the main switch to "ON".
- Set the shift switch to "R".
- Measure the voltage (DC 12 V) of the back-up horn terminal.
- Is the voltage within specification?

YES → This circuit is OK.

NO → The wiring circuit or shift switch is faulty and must be repaired.

TROUBLESHOOTING

TIP

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

STARTING FAILURE/HARD STARTING

FUEL SYSTEM

Fuel tank
- Empty
- Clogged fuel filter
- Clogged fuel strainer
- Clogged fuel breather hose
- Deteriorated or contaminated fuel

Fuel cock
- Clogged fuel hose

Carburetor
- Deteriorated or contaminated fuel
- Clogged pilot jet
- Clogged pilot air passage
- Sucked-in air
- Deformed float
- Worn needle valve
- Improperly sealed valve seat
- Improperly adjusted fuel level
- Improperly set pilot jet

Air filter
- Clogged air filter element

ELECTRICAL SYSTEM

Spark plug
- Improper plug gap
- Worn electrodes
- Wire between terminals broken
- Improper heat range
- Faulty spark plug cap

Ignition coil
- Broken or shorted primary/secondary
- Faulty spark plug lead
- Broken body

C.D.I. system
- Faulty C.D.I. unit
- Faulty pickup coil
- Faulty source coil
- Broken woodruff key

Switches and wiring
- Faulty main switch
- Faulty engine stop switch
- Broken or shorted wiring
- Faulty start switch

Starter motor
- Faulty starter motor
- Faulty starter relay

Battery
- Faulty battery

Shifting system
- Faulty C.D.I
- Faulty shift motor
- Faulty sensor (F, N, R)
- Faulty shift spring or gear
- Belt worn
- Front pulley worn or broken
- Lining of clutch worn
- Rollers worn
- Spring or rear pulley is distorted

COMPRESSION SYSTEM

Cylinder and cylinder head
- Loose spark plug
- Loose cylinder head or cylinder
- Broken cylinder head gasket
- Broken cylinder gasket
- Worn, damaged or seized cylinder

Valve, camshaft and crankshaft
- Improperly sealed valve
- Improperly contacted valve and valve seat
- Improper valve timing
- Broken valve spring
- Seized camshaft
- Seized crankshaft

Piston and piston rings
- Improperly installed piston ring
- Worn, fatigued or broken piston ring
- Seized piston ring
- Seized or damaged piston

Crankcase and crankshaft
- Improperly seated crankcase
- Seized crankshaft

Valve train
- Improperly adjusted valve clearance
- Improperly adjusted valve timing

POOR IDLE SPEED PERFORMANCE

POOR IDLE SPEED PERFORMANCE

Carburetor
- Loose pilot jet
- Clogged pilot jet
- Clogged pilot air jet
- Improperly adjusted idle speed (throttle stop screw)
- Improper throttle cable play
- Flooded carburetor

Electrical system
- Faulty battery
- Faulty spark plug
- Faulty C.D.I. unit
- Faulty pickup coil
- Faulty source coil
- Faulty ignition coil

Valve train
- Improperly adjusted valve clearance

Air filter
- Clogged air filter element

POOR MEDIUM AND HIGH-SPEED PERFORMANCE

POOR MEDIUM AND HIGH-SPEED PERFORMANCE

Refer to “STARTING FAILURE/HARD STARTING” and “POOR IDLE SPEED PERFORMANCE—Valve train”.

Carburetor
- Improper jet needle clip position
- Improperly adjusted fuel level
- Clogged or loose main jet
- Deteriorated or contaminated fuel

Air filter
- Clogged air filter element

FAULTY CLUTCH

ENGINE OPERATES BUT VEHICLE WILL NOT MOVE

V-belt
- Bent, damaged or worn V-belt
- Slipping V-belt

Plate ramp and piece slide
- Damaged or worn plate ramp
- Damaged or worn piece slide

Clutch spring(s)
- Damaged clutch spring

Transmission gears
- Damaged transmission gear

CLUTCH SLIPPING

Clutch shoe springs
- Damaged, loose or worn clutch shoe spring

Clutch shoes
- Damaged or worn clutch shoe

Primary sliding sheave
- Seized primary sliding sheave

POOR STARTING PERFORMANCE

V-belt
- V-belt slips
- Oil or grease on the V-belt

Primary sliding sheave
- Faulty operation
- Worn pin groove
- Worn pin

Clutch shoes
- Bent, damaged or worn clutch shoe

POOR SPEED PERFORMANCE

V-belt
- Oil or grease on the V-belt

Roller weight(s)
- Faulty operation
- Worn roller weight

Face driver
- Worn face driver

Face movable drive
- Worn face movable drive

Face comp, driven
- Seized face comp, driven

Face comp, movable driven
- Worn face comp, movable driven

FAULTY GEAR SHIFTING

Transmission gears
- Gear dogs worn
- Shift fork bent or damaged
- Worn mission gear

Hard to shift
- Shift fork bent
- Shift fork shaft bent
- Speed too fast

OVERHEATING

OVERHEATING

Ignition system
- Improper spark plug gap
- Improper spark plug heat range
- Faulty C.D.I. unit

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

Compression system
- Heavy carbon build-up

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

Brake
- Brake drag

FAULTY BRAKE

POOR BRAKING EFFECT

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

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

SHOCK ABSORBER MALFUNCTION

MALFUNCTION
- Bent or damaged damper rod
- Damaged oil seal lip
- Fatigued shock absorber spring
- Leaking oil

UNSTABLE HANDLING

UNSTABLE HANDLING

Handlebar
- Improperly installed or bent

Steering
- Incorrect toe-in
- Bent steering stem
- Improperly installed steering stem
- Damaged bearing or bearing race
- Bent tie rods
- Deformed steering knuckles

Tires
- Uneven tire pressures on both sides
- Incorrect tire pressure
- Uneven tire wear

Wheels
- Deformed wheel
- Loose bearing
- Bent or loose wheel axle
- Excessive wheel runout

Frame
- Bent
- Damaged frame

Swingarm
- Worn bearing or bushing
- Bent or damaged