



UTILITY VEHICLE





YUM1A YUM2A YUM2E

J0F-F8197-E1

IMPORTANT

This manual was produced by the Yamaha Motor Powered Products Co., Ltd. primarily for use by Yamaha dealers and their qualified mechanics. It is not possible to include all the knowledge of a mechanic in one manual. Therefore, anyone who uses this book to perform maintenance and repairs on Yamaha vehicles should have a basic understanding of mechanics and the techniques to repair these types of vehicles. Repair and maintenance work attempted by anyone without this knowledge is likely to render the vehicle unsafe and unfit for use.

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

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

TIP

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

IMPORTANT MANUAL INFORMATION

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

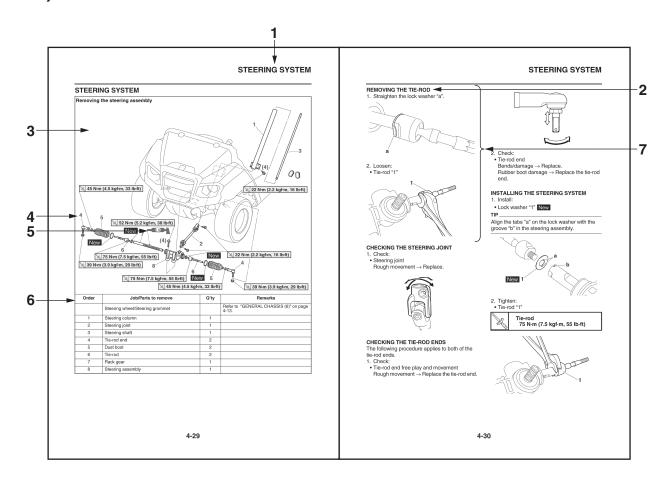
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\triangle	This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.
A WARNING	A WARNING indicates a hazardous situation which, 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.

YUM1A/YUM2A/YUM2E
SERVICE MANUAL
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LIT-19616-A0-37

HOW TO USE THIS MANUAL

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

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



SYMBOLS

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

TIP

The following symbols are not relevant to every vehicle.

SYMBOL	DEFINITION	SYMBOL	DEFINITION
	Serviceable with engine mounted	G	Gear oil
	Filling fluid	M	Molybdenum disulfide oil
-1	Lubricant	BF	Brake fluid
	Special tool	B	Wheel bearing grease
	Tightening torque	LS	Lithium-soap-based grease
	Wear limit, clearance		Molybdenum disulfide grease
	Engine speed	- (S)-1	Silicone grease
	Electrical data		Apply locking agent (LOCTITE®).
Ē	Engine oil	New	Replace the part with a new one.

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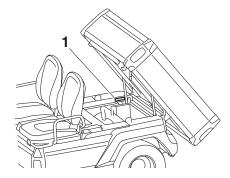
GENERAL INFORMATION

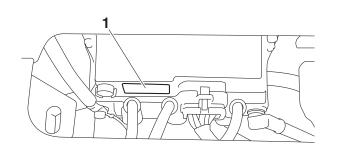
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IDENTIFICATION

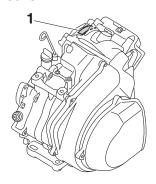
UTILITY VEHICLE SERIAL NUMBER

The utility vehicle serial number "1" is affixed to the frame under the cargo bed.



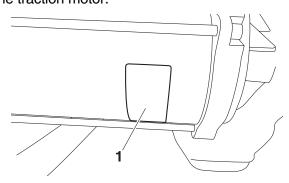


ENGINE SERIAL NUMBER (YUM1A/YUM2A) The engine serial number "1" is affixed to the cylinder head cover.



TRACTION MOTOR SERIAL NUMBER (YUM2E)

The traction motor serial number "1" is affixed to the traction motor.



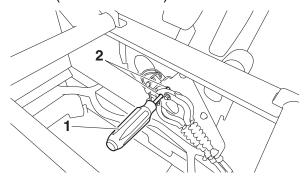
MOTOR CONTROL UNIT SERIAL NUMBER (YUM2E)

The motor control unit serial number "1" is affixed to the unit.

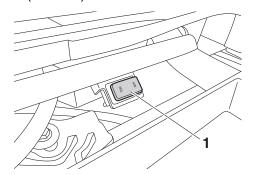
SAFETY PRECAUTIONS

SAFETY LOCKOUT PROCEDURE

- 1. Turn the main switch to "OFF" position.
- 2. Apply the parking brake.
- 3. Move the shift lever to the neutral position. Insert a screwdriver "1" into locking holes "2" to keep shifter from moving out of neutral position. (YUM1A/YUM2A)



4. Move the tow switch "1" to the "TOW" position. (YUM2E)

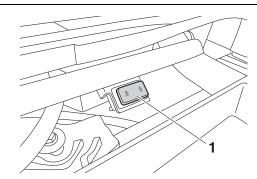


DISCHARGE THE MOTOR CONTROL UNIT CAPACITOR

- 1. Turn the main switch to "OFF" position.
- 2. Move the tow switch "1" to the "TOW" position.

TIP_

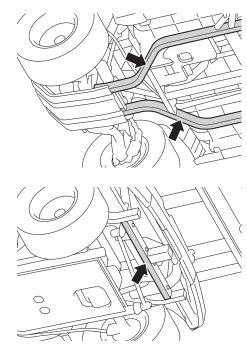
When moved to "TOW" position, the controller capacitor will discharge quickly.



3. Disconnect the negative battery lead.

RECOMMENDED JACK POINTS

Jack up the vehicle at the indicated jacking points.



- A. Front
- B. Rear

IMPORTANT INFORMATION

PREPARATION FOR REMOVAL AND DISASSEMBLY

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



- 2. Use only the proper tools and cleaning equipment.
 - Refer to "SPECIAL TOOLS" on page 1-10.
- 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.

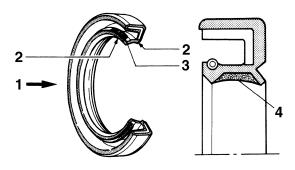
REPLACEMENT PARTS

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



GASKETS, OIL SEALS AND O-RINGS

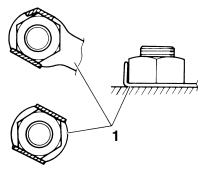
- When overhauling the engine, replace all gaskets, seals and O-rings. All gasket surfaces, oil seal lips and O-rings must be cleaned.
- 2. During reassembly, properly oil all mating parts and bearings and lubricate the oil seal lips with grease.



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

LOCK WASHERS/PLATES AND COTTER PINS

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



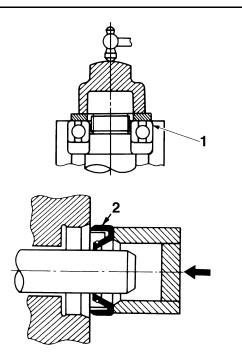
IMPORTANT INFORMATION

BEARINGS AND OIL SEALS

Install bearings "1" and oil seals "2" 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.

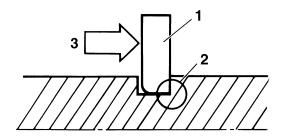
NOTICE

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



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.



RUBBER PARTS

Check rubber parts for deterioration during inspection. Some of the rubber parts are sensitive to gasoline, flammable oil, grease, etc. Do not allow any items other than the specified one to contact the parts.

QUICK FASTENERS

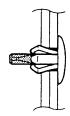
Rivet type

- 1. Remove:
 - Quick fastener

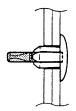
TIP_

To remove the quick fastener, push its pin with a screwdriver, then pull the fastener out.





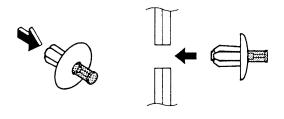


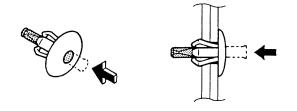


- 2. Install:
 - Quick fastener

TIP

To install the quick fastener, push its pin so that it protrudes from the fastener head, then insert the fastener into the part to be secured and push the pin in with a screwdriver. Make sure that the pin is flush with the fastener's head.





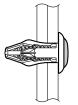
Screw type

- 1. Remove:
 - Quick fastener

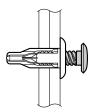
TIP

To remove the quick fastener, loosen the screw with a screwdriver, then pull the fastener out.





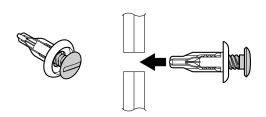


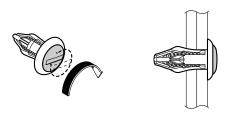


- 2. Install:
 - Quick fastener

TIP

To install the quick fastener, insert the fastener into the part to be secured and tighten the screw.



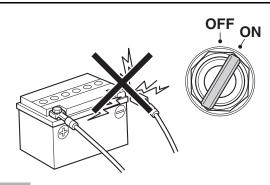


ELECTRICAL SYSTEM

Electrical parts handling

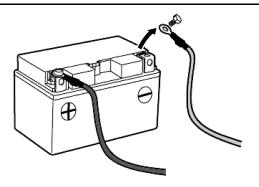
NOTICE

Never disconnect a battery lead while the engine is running; otherwise, the electrical components could be damaged.



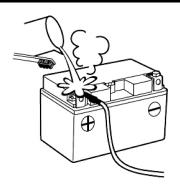
NOTICE

When disconnecting the battery leads from the battery, be sure to disconnect the negative battery lead first, then the positive battery lead. If the positive battery lead is disconnected first and a tool or similar item contacts the vehicle, a spark could be generated, which is extremely dangerous.



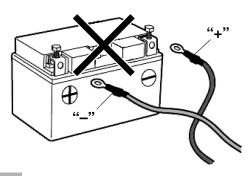
TIP_

If a battery lead is difficult to disconnect due to rust on the battery terminal, remove the rust using hot water.



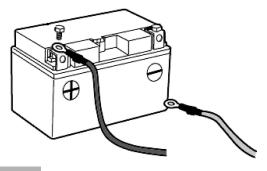
NOTICE

Be sure to connect the battery leads to the correct battery terminals. Reversing the battery lead connections could damage the electrical components.



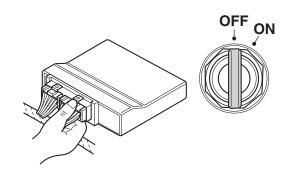
NOTICE

When connecting the battery leads to the battery, be sure to connect the positive battery lead first, then the negative battery lead. If the negative battery lead is connected first and a tool or similar item contacts the vehicle while the positive battery lead is being connected, a spark could be generated, which is extremely dangerous.



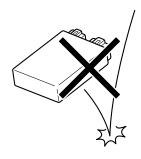
NOTICE

Turn the main switch to "OFF" before disconnecting or connecting an electrical component.



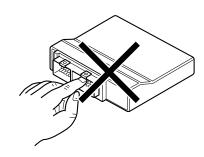
NOTICE

Handle electrical components with special care, and do not subject them to strong shocks.



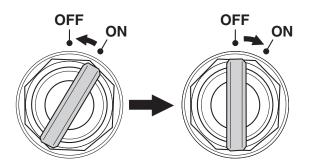
NOTICE

Electrical components are very sensitive to and can be damaged by static electricity. Therefore, never touch the terminals and be sure to keep the contacts clean.



TIP_

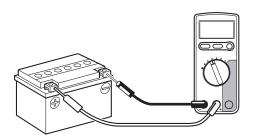
When resetting the ECU or MCU by turning the main switch to "OFF", be sure to wait approximately 5 seconds before turning the main switch back to "ON".



Checking the electrical system

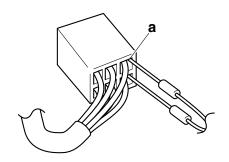
TIP

Before checking the electrical system, make sure that the battery voltage is at least 12 V (YUM1A/YUM2A) or 6V (YUM2E).



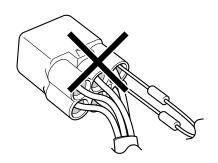
NOTICE

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



NOTICE

For waterproof couplers, never insert the tester probes directly into the coupler. When performing any checks using a waterproof coupler, use the specified test harness or a suitable commercially available test harness.



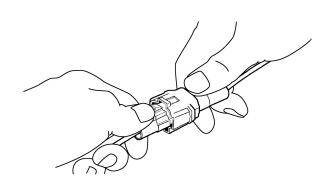
Checking the connections

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

- 1. Disconnect:
 - Lead
 - Coupler
 - Connector

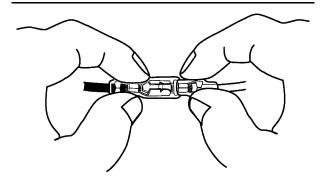
NOTICE

- When disconnecting a coupler, release the coupler lock, hold both sections of the coupler securely, and then disconnect the coupler.
- There are many types of coupler locks; therefore, be sure to check the type of coupler lock before disconnecting the coupler.



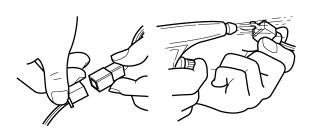
NOTICE

When disconnecting a connector, do not pull the leads. Hold both sections of the connector securely, and then disconnect the connector.



2. Check:

- Lead
- Coupler
- Connector
 Moisture → Dry with an air blower.
 Rust/stains → Connect and disconnect several times.

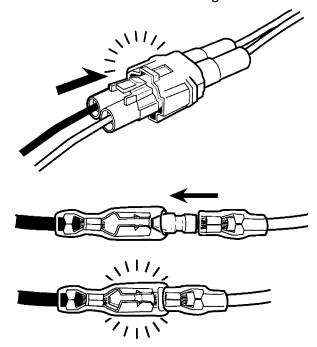


- 3. Connect:
 - Lead
- Coupler
- Connector

TIP

- When connecting a coupler or connector, push both sections of the coupler or connector together until they are connected securely.
- Make sure all connections are tight.

Make sure all connections are tight.



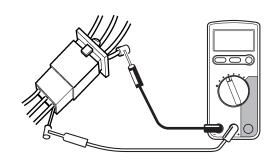
- 4. Check:
- Continuity (with the digital circuit tester)

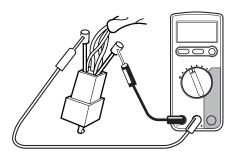


Digital circuit tester (CD732) 90890-03243 Model 88 Multimeter with tachometer YU-A1927

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.





5. Check:

Resistance



Digital circuit tester (CD732) 90890-03243 Model 88 Multimeter with tachometer YU-A1927

TIP

The resistance values shown were obtained at the standard measuring temperature of 20 °C (68 °F). If the measuring temperature is not 20 °C (68 °F), the specified measuring conditions will be shown.

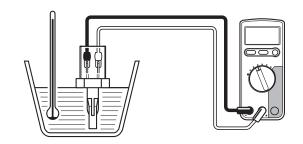


Intake air temperature sensor resistance

2.21–2.69 k Ω at 20 °C (2.21–2.69 k Ω at 68 °F)

Intake air temperature sensor resistance

0.322 kΩ at 80 °C (0.322 kΩ at 176 °F)



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

TIP_

- For U.S.A. and Canada, use part number starting with "YM-", "YU-", "YS-", "YK-", or "ACC-".
- For others, use part number starting with "90890-".

Tool name/Tool No.	Illustration	Reference pages
Digital circuit tester (CD732) 90890-03243 Model 88 Multimeter with tachometer YU-A1927		1-9, 1-9, 4-28, 5-19, 8-49, 8-50, 8-53, 8-54, 8-54, 8-54, 8-55, 8-56, 8-56, 8-57, 8-58, 8-58, 8-59, 8-62, 8-63, 8-77, 8-78
Throttle valve angle adjusting tool 90890-01597		3-13
Thickness gauge 90890-03180 Feeler gauge set YU-26900-9		3-20
Tappet adjusting tool 90890-01311 Six piece tappet set YM-A5970	90890-01311 3mm	3-21
	YM-A5970 Ø8 Ø9 Ø10 Ø10 Ø4	
Test harness– TPS (3P) 90890-03204 Test harness– TPS (3P) YU-03204		4-28
Extension 90890-04082	73	5-1

		Reference
Tool name/Tool No.	Illustration	pages
Compression gauge 90890-03081 Engine compression tester YU-33223	90890-03081	5-1
	YU-33223	
Valve spring compressor 90890-04019 Valve spring compressor YM-04019	931	5-12, 5-16
Valve guide remover (ø6) 90890-04064 Valve guide remover (6.0 mm) YM-04064-A		5-13
Valve guide installer (ø6) 90890-04065 Valve guide installer (6.0 mm) YM-04065-A		5-13
Valve guide reamer (ø6) 90890-04066 Valve guide reamer (6.0 mm) YM-04066		5-13
Rotor holding tool 90890-04166 Rotor holding tool YM-04166		5-22, 5-22, 7-4, 7-4
Flywheel puller set 90890-01468 Heavy duty puller YU-33270-B		5-22

Tool name/Tool No.	Illustration	Reference pages
Piston pin puller set 90890-01304 Piston pin puller YU-01304	90890-01304 M6×P1.0	5-29
	YU-01304	
Pressure gauge 90890-03153 Pressure gauge YU-03153	The state of the s	6-3
Fuel pressure adapter 90890-03186 Fuel pressure adapter YM-03186		6-3
Primary fixed sheave puller 90890-01876 Primary clutch puller YG-01876		7-4
Bolt JY2-SECND ST-1		7-5, 7-6
Tool JY2-SECND ST-2		7-5, 7-7
Nut JY2-SECND ST-3		7-5, 7-7
FI Diagnostic Tool 90890-03182 FI Diagnostic Tool YU-03182		8-36

Tool name/Tool No.	Illustration	Reference pages
Dynamic spark tester 90890-06754 Oppama pet–4000 spark checker YM-34487		8-55
Test harness S– pressure sensor 5S7 (3P) 90890-03207 Test harness S– pressure sensor 5S7 (3P) YU-03207		8-58
PC GENIUS2 diagnostic tool 90890-J0CDC-00	AMSER	9-8
DISCHARGE TESTER 36/48V LES-DISCH-AR-GE		8-73

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GENERAL SPECIFICATIONS

GENERAL SPECIFICATIONS

Model	
Model code	J0F2 (YUM1A)
	J0G2 (YUM2A)
	J0H2 (YUM2E)
Frame serial number	J0F-100101 (YUM1A)
	J0G-100101 (YUM2A)
	J0H-100101 (YUM2E)
Dimensions	
Overall length	2830 mm (111.5 in) (YUM1A)
3	3030 mm (119.4 in) (YUM2A/YUM2E)
Overall width	1255 mm (49.3 in)
Overall height (Steering height)	1235 mm (48.5 in)
Height of floor	330 mm (13.1 in)
Wheelbase	1680 mm (66.2 in) (YUM1A)
	1960 mm (77.2 in) (YUM2A/YUM2E)
Tread (front)	1015 mm (40.0 in) (YUM1A)
,	1025 mm (40.3 in) (YUM2A/YUM2E)
Tread (rear)	1020 mm (40.2 in)
Cargo bed size	,
Overall length	845 mm (33.2 in) (YUM1A)
C	1045 mm (41.1 in) (YUM2A/YUM2E)
Overall width	1170 mm (45.9 in)
Overall height	302 mm (11.9 in)
Minimum ground clearance	115 mm (4.5 in)
Weight	
Curb weight (without sun top)	424 kg (935 lb) (YUM1A)
.,	455 kg (1003 lb) (YUM2A)
	630 kg (1390 lb) (YUM2E)
Curb weight (with sun top)	452 kg (997 lb) (YUM1A)
	483 kg (1064 lb) (YUM2A)
	658 kg (1450 lb) (YUM2E)
Performance	
Factory speed setting	28 km/h (17.5 mph)
Maximum speed	31 km/h (19.5 mph)
Minimum turning radius	3.5 m (11.4 ft) (YUM1A)
	4.0 m (13.1 ft) (YUM2A/YUM2E)
Seat capacity	One occupant per seat
Vehicle combination rated capacity	363 kg (800 lb) (YUM1A)
	680 kg (1500 lb) (YUM2A/YUM2E)
Occupant capacity	181 kg (400 lb)
Maximum cargo bed capacity	136 kg (300lb) (YUM1A)
	363 kg (800 lb) (YUM2A/YUM2E)
Maximum tongue weight	45 kg (100 lb) (YUM1A)
-	68 kg (150 lb) (YUM2A/YUM2E)
	363 kg (800 lb) (YUM1A)
Maximum towing capacity	300 kg (300 lb) (10 ll 17 l)
Maximum towing capacity	680 kg (1500 lb) (YUM2A/YUM2E)
Maximum towing capacity Gross vehicle weight (with sun top)	

GENERAL SPECIFICATIONS

Hill claiming ability

1174 kg (2589 lb) (YUM2E) 20° (YUM1A) 15° (YUM2A/YUM2E)

ENGINE SPECIFICATIONS (YUM1A/YUM2A)

ENGINE SPECIFICATIONS (YUM1A/YUM2A)

	- · · · · · · · · · · · · · · · · · · ·			
Engine				
Engine type	4-stroke, Gasoline, 60° inline OHV			
Number of cylinders	Single			
Displacement	402 cm ³ 85 × 70.8 mm (3.30 × 2.79 in) 8.2:1 700–900 kPa (7.0–9.0 kgf/cm ² , 102–131 psi) Electric starter/generator 10.63 kw/3600 rpm/14.25 hp			
Bore × stroke				
Compression Ratio				
Compression Pressure				
Starting system				
Gross output				
Rated output	9.45 kw/3600 rpm/12.67 hp			
	01.10 km/0000 1pm/12107 11p			
Fuel				
Recommended fuel	Regular unleaded gasoline			
Fuel tank capacity	20 L (5.2 US gal, 4.4 Imp.gal)			
Engine oil				
Lubrication system	Splash-style positive oil lubrication			
Recommended brand	YAMALUBE			
Type	SAE 10W-30 or 10W-40			
Recommended engine oil grade	API SE type or higher, JASO MA or MB			
Engine oil quantity	1.1 L (1.16 US qt, 0.97 Imp.qt)			
	L (1.10 00 qt, 0.07 linp.qt)			
Cooling system				
Туре	Forced air-cooled			
Spark plug				
Manufacturer/model	NGK/BPR4ES			
Spark plug gap	0.7–0.8 mm (0.028–0.031 in)			
Cylinder head				
Warpage limit	0.05 mm (0.002 in)			
Camshaft				
Camshaft journal dimensions	15.965–15.990 mm (0.6285–0.5295 in)			
Crankcase hole inside diameter	16.000-16.018 mm (0.6299-0.6306 in)			
Crankcase cover hole inside diameter	16.000–16.018 mm (0.6299–0.6306 in)			
Camshaft to crankcase clearance	0.010-0.053 mm (0.0004-0.0021 in)			
Camshaft to crankcase cover clearance	0.010–0.053 mm (0.0004–0.0021 in)			
Camshaft lobe dimensions				
Lobe height (intake)	32.495-32.595 mm (1.2793-1.2833 in)			
Limit	32.395 mm (1.2754 in)			
Lobe height (exhaust)	32.495–32.595 mm (1.2793–1.2833 in)			
Limit	32.395 mm (1.2754 in)			
Rocker arm/rocker arm shaft				
Rocker arm inside diameter	12.000-12.018 mm (0.4724-0.4731 in)			
Limit	12.033 mm (0.4737 in)			
Rocker arm shaft out side diameter	11.981–11.991 mm (0.4717–0.4721 in)			
Limit	11.950 mm (0.4705 in)			
	11.000 11111 (0.1700 111)			

ENGINE SPECIFICATIONS (YUM1A/YUM2A)

Valve, valve seat, valve guide			
Valve clearance cold			
Intake and exhaust side	0.05–0.09 mm (0.0020–0.0035 in)		
Valve dimensions			
Valve seat contact width (intake)	0.7–0.9 mm (0.0276–0.0354 in) 1.6 mm (0.063 in) 0.7–0.9 mm (0.0276–0.0354 in) 1.6 mm (0.063 in)		
Valve seat contact width (intake) limit			
Valve seat contact width (exhaust)			
Valve seat contact width (exhaust) limit			
Valve-stem-to-valve-guide clearance (intake)	0.000 (0.0000 :)		
limit	0.080 mm (0.0032 in)		
Valve-stem-to-valve-guide clearance	0.100 mm (0.0020 in)		
(exhaust) limit Valve stem runout	0.100 mm (0.0039 in) 0.010 mm (0.0004 in)		
vaive sterri runout	0.010 111111 (0.0004 111)		
Valve push rod			
Valve push rod runout	0.15 mm (0.006 in)		
Valve spring			
Free length (intake)	36.2 mm (1.43 in)		
Limit	34.4 mm (1.35 in)		
Free length (exhaust)	36.2 mm (1.43 in)		
Limit	34.4 mm (1.35 in)		
	,		
Cylinder	05.000.05.000(0.0405.0.0450)		
Bore	85.000–85.020 mm (3.3465–3.3472 in)		
Wear limit	85.050 mm (3.3484 in)		
Piston	-		
Piston-to-cylinder clearance	0.043-0.057 mm (0.00017-0.0022 in)		
Diameter	84.977–84.998 mm (3.3456–3.3464 in)		
Piston pin outside diameter	19.995–20.000 mm (0.7872–0.7874 in)		
Limit	19.975 mm (0.7864 in)		
Piston pin bore inside diameter	20.0004-20.015 mm (0.7876-0.7880 in)		
Limit	20.045 mm (0.7892 in)		
Piston-pin-to-piston-pin-bore clearance	0.004-0.020 mm (0.0002-0.0008 in)		
Piston ring			
Top ring			
Ring type	Barrel		
End gap (installed) limit	0.60 mm (0.0236 in)		
Ring side clearance	0.040-0.080 mm (0.0016-0.0031 in)		
2nd ring	,		
Ring type	Taper		
End gap (installed) limit	0.80 mm (0.0350 in)		
Ring side clearance	0.030-0.070 mm (0.0012-0.0028 in)		
Crankshaft			
Runout limit	0.05 mm (0.002 in)		
Crankshaft pin outside diameter	35.969–35.984 mm (1.4161–1.4167 in)		
Crankshaft pin to connecting rod clearance	0.016–0.046 mm (0.0006–0.0018 in)		
1 1 2 2 2 2 3 2 3 3 3 3 3 3 3 3 3 3 3 3	(

ENGINE SPECIFICATIONS (YUM1A/YUM2A)

Air filter	
Type	Oil spread over pleated paper + urethane foam pre filter
Fuel pump	
Pump type	Electrical
Fuel line pressure	246-254 kPa (2.46-2.54 kgf/cm², 35.7-36.8 psi)
Fuel injector	
Model/quantity	J0B1 00/1
Resistance	12.0 Ω

CHASSIS SPECIFICATIONS

CHASSIS SPECIFICATIONS	
Chassis	
Toe-in (with tires touching the ground)	0–10 mm (0–0.4 in)
Wheel	
Tire size	
Front	$20 \times 10.00 - 10/4$ -ply turf type
Rear	$20 \times 10.00 - 10/4$ -ply turf type
Rim size	7.00-9.968 (Offset 1)
Tire pressure	
Recommended	
Front	137 kPa (1.37 kgf/cm²,20 psi)
Rear	151 kPa (1.57 kgf/cm², 22 psi)
Minimum	
Front	124 kPa (1.24 kgf/cm², 18 psi)
Rear	137 kPa (1.37 kgf/cm², 20 psi) (YUM1A)
	151 kPa (1.51 kgf/cm², 22 psi) (YUM2A/YUM2E
Wear limit	
Front	1.0 mm (0.04 in)
Rear	1.0 mm (0.04 in)
Steering system	
Type	Rack and Pinion
Steering angle (left)	1.85 turn
Steering angle (right)	1.85 turn
Brake	
Brake system	Mechanical drum brake on each rear wheel with
	self-adjusters (YUM1A)
	Mechanical drum brake on each wheel with self
	adjusters (YUM2A/YUM2E)
Type of brake	Dual internal expanding shoe leading/trailing
	shoes (self-adjusting)
Lining thickness limit	1.5 mm (0.06 in)
Brake drum inside diameter	166 mm (6.5 in)
Brake pedal free play	50–55 mm (1.97–2.17 in)
Parking brake	
Type	Foot type; parking brake with automatic release
Suspension	
Front	Independent (oil-over strut type)
Rear	Pivoted trailing arm (mono-link)

DRIVE TRAIN SPECIFICATIONS (YUM1A/YUM2A)

DRIVE TRAIN SPECIFICATIONS (YUM1A/YUM2A)

Primary and secondary sheave

Type V-belt automatic centrifugal engagement

V-belt width and outer line length $31.0 \times 1010 \text{ mm} (1.22 \times 39.75 \text{ in})$

V-belt wear limit 28.0 mm (1.10 in)

Secondary sheave torque cam angle 2-B

Transmission

Governor type Oil bath flyweight Secondary reduction system Helical gear

Secondary reduction ratio

Forward 11.48:1 Reverse 15.38:1

Shift stroke 15–17 mm (0.59–0.67 in)

Differential type Bevel gear

Transmission oil

Type SAE 80W-90 or SAE 90 gear oil Quantity 400 cm³ (0.44 US qt, 0.35 Imp.qt)

DRIVE TRAIN SPECIFICATIONS (YUM2E)

DRIVE TRAIN SPECIFICATIONS (YUM2E)

Transmission

Secondary reduction system
Secondary reduction ratio
Differential type
Helical gear
15.31:1
Bevel gear

Transmission oil

Type SAE 80W-90 or SAE 90 gear oil Quantity 355 cm³ (0.38 US qt, 0.31 Imp.qt)

Traction motor

Model AMT7179
Rated output 5 kW
Operating voltage 48 V DC

Weight 30.8 kg (67.9 lb)

Direction of rotation Clockwise and counterclockwise

Field coil resistance 0.0069Ω

ELECTRICAL SPECIFICATIONS (YUM1A/YUM2A)

ELECTRICAL SPECIFICATIONS (YUM1A/YUM2A)			
Voltage System voltage	12 V		
Ignition System			
Ignition System	TCI		
Ignition timing (B.T.D.C.)	16°/3000 r/min		
Ignition coil			
Minimum ignition spark gap	6 mm (0.24 in)		
Primary coil resistance	2.16–2.64 Ω		
Secondary coil resistance	8.64–12.69 kΩ		
Spark plug cap			
Resistance	3.75–6.25 kΩ		
Battery			
Model	424MF		
Voltage, capacity	12 V,70 Ah at 20h rate		
Lighting			
Headlight	LED		
Starter generator			
Series field coil resistance	0.005–0.007 Ω		
Shunt field coil resistance	4.5–5.5 Ω		
Brush overall length limit	16.0 mm (0.63 in)		
Brush spring force limit	3.4 N (347 gf, 12.2 oz)		
Commutator diameter limit	39.0 mm (1.54 in)		
Mica undercut (depth)	0.70 mm (0.03 in)		
Belt tension	8–12 mm (0.31–0.47 in)/100 N (10 kgf, 22lb)		
Voltage regulator			
Charging voltage	above 14 V at 5000 r/min		
Fuel sender			
Sender unit resistance (full)	4–10 Ω		
Sender unit resistance (empty)	93–100 Ω		
Fuel injection sensor			
Crankshaft position sensor	152–228 Ω		
Intake air pressure sensor output voltage	3.51-3.77 V at 101 kPa (3.51-3.77 V at 1.01 kgf/cm², 3.51-3.77 V at 14 psi)		
Intake air temperature sensor resistance	$0.322~\text{k}\Omega$ at 80 °C (0.322 k Ω at 176 °F)		
Intake air temperature sensor resistance	2.21–2.69 kΩ at 20 °C (2.21–2.69 kΩ at 68 °F)		
Engine temperature sensor resistance	210–221 Ω at 100 °C (210–221 Ω at 212 °F)		
Engine temperature sensor resistance	2513–2777 Ω at 20 °C (2513–2777 Ω at 68 °F)		
Fuses			
Main fuse	25 A		
Main switch fuse	10 A		
Lighting fuse	15 A		

ELECTRICAL SPECIFICATIONS (YUM1A/YUM2A)

USB fuse 5 A

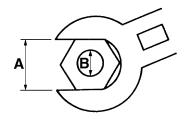
ELECTRICAL SPECIFICATIONS (YUM2E)

ELECTRICAL SPECIFICATIONS (YUM2E)		
Voltage		
System voltage	48 V	
Throttle position sensor		
Resistance	0.66–1.54 kΩ	
Battery		
Model	Trojan - golf car type	
Voltage, capacity	48 V (6 V × 8), T-105: 225 Ah at 20 h rate/115 minutes at 75 A	
Fuses		
Main fuse	10 A	
MCU fuse	3 A	
USB fuse	1 A	
Battery charger		
DC output		
Voltage-normal	48 V	
Voltage-maximum	67.2 V	
Current-maximum	18 A	
AC input		
Voltage-maximum	85–265 V	
Frequency	45–65 Hz	
Current-maximum	12 A @ 100 V AC/11.5 A @ 110 V AC/6.1 A @ 200 V AC/5.6 A @ 220 V AC/5.4 A @ 230 V AC/5.1 A @ 240 V AC	
Current-normal	10 A @ 120 V AC/6 A @ 200 V AC/5.5 A @ 220 V AC	
Safety timeout	20.5 hours (24.5 hours when boosting)	

TIGHTENING TORQUES

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			
A (liut) B (bolt)	N⋅m	kgf⋅m	lb⋅ft		
10 mm	6 mm	6	0.6	4.4	
12 mm	8 mm	15	1.5	11	
14 mm	10 mm	30	3.0	22	
17 mm	12 mm	55	5.5	41	
19 mm	14 mm	85	8.5	63	
22 mm	16 mm	130	13	96	

TIGHTENING TORQUES

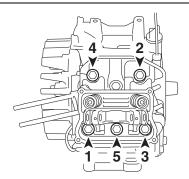
ENGINE TIGHTENING TORQUE (YUM1A/YUM2A)

Item	Thread size	Q'ty	Tightening torque	Remarks
Muffler nut	M8	2	17 N·m (1.7 kgf·m, 13 lb·ft)	
Muffler mount bolt	M8	2	17 N·m (1.7 kgf·m, 13 lb·ft)	
Muffler bracket bolt	M8	1	25 N·m (2.5 kgf·m, 18 lb·ft)	
Exhaust pipe bolt	M8	2	25 N·m (2.5 kgf·m, 18 lb·ft)	
Exhaust pipe stay bolt	M8	2	25 N·m (2.5 kgf·m, 18 lb·ft)	
Exhaust pipe clamp bolt	M8	1	17 N·m (1.7 kgf·m, 13 lb·ft)	
Exhaust pipe tail clamp	_	1	3.0 N·m (0.30 kgf·m, 2.2 lb·ft)	
Spark plug	_	1	20 N·m (2.0 kgf·m, 15 lb·ft)	
Cylinder head cover bolt	M6	4	11 N·m (1.1 kgf·m, 8.1 lb·ft)	
Ignition coil bolt	M6	2	10 N·m (1.0 kgf·m, 7.4 lb·ft)	
Cylinder head bolt	M10	5	See TIP.	
Air shroud bolt	M6	2	8 N·m (0.8 kgf·m, 5.9 lb·ft)	
Valve adjusting screw locknut	M5	2	7 N·m (0.7 kgf·m, 5.2 lb·ft)	
Rocker arm shaft set bolt	M5	2	2.3 N·m (0.23 kgf·m, 1.7 lb·ft)	
Starter generator bolt	M12	2	66 N·m (6.6 kgf·m, 49 lb·ft)	
Starter generator nut	M8	1	25 N·m (2.5 kgf·m, 18 lb·ft)	
Starter generator lead terminal nut	M6	4	5 N·m (0.5 kgf·m, 3.7 lb·ft)	
Rear bracket bolt	M6	2	7 N·m (0.7 kgf·m, 5.2 lb·ft)	
Brush holder screw	M5	2	4.2 N·m (0.42 kgf·m, 3.1 lb·ft)	
Brush screw	M4	4	2.0 N·m (0.20 kgf·m, 1.5 lb·ft)	
Front bracket bearing retainer screw	M5	3	4.2 N·m (0.42 kgf·m, 3.1 lb·ft)	
Pulley nut	M16	1	91 N·m (9.1 kgf·m, 67 lb·ft)	
Flywheel nut	M18	1	120 N·m (12 kgf·m, 89 lb·ft)	
Flywheel cover bolt	M6	3	8 N·m (0.8 kgf·m, 5.9 lb·ft)	
Air Intake cover screw	M6	3	2.0 N·m (0.20 kgf·m, 1.5 lb·ft)	
Air shroud (flywheel side) bolt	M6	2	7 N·m (0.7 kgf·m, 5.2 lb·ft)	
Crankshaft position sensor bolt	M6	2	10 N·m (1.0 kgf·m, 7.4 lb·ft)	
Engine temperature sensor	M10	1	16 N·m (1.6 kgf·m, 12 lb·ft)	
Engine ground lead bolt	M6	1	10 N·m (1.0 kgf·m, 7.4 lb·ft)	
Oil level switch bolt	M6	2	10 N·m (1.0 kgf·m, 7.4 lb·ft)	
Oil level switch lead guide bolt	M6	1	10 N·m (1.0 kgf·m, 7.4 lb·ft)	
Oil level switch terminal	M18	1	5 N·m (0.5 kgf·m, 3.7 lb·ft)	
Crankcase cover bolt	M8	8	See TIP.	
Engine oil drain bolt	M12	1	27 N·m (2.7 kgf·m, 20 lb·ft)	
Connecting rod cap bolt	M8	2	20 N·m (2.0 kgf·m, 15 lb·ft)	

TIP_

Cylinder head bolt

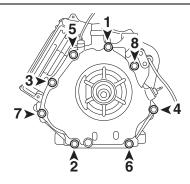
Tighten the cylinder head bolts to 50 N·m (5.0 kgf·m, 37 lb·ft) in the proper tightening sequence.



TIP_

Crankcase cover bolt

Tighten the crankcase cover bolts to 30 N·m (3.0 kgf·m, 22 lb·ft) in the proper tightening sequence.



FUEL SYSTEM TIGHTENING TORQUE (YUM1A/YUM2A)

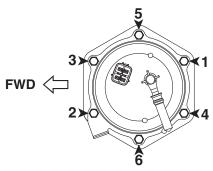
Item	Thread size	Q'ty	Tightening torque	Remarks
Fuel tank bolt	M6	2	7 N·m (0.7 kgf·m, 5.2 lb·ft)	
Fuel tank retainer bolt	M6	2	7 N·m (0.7 kgf·m, 5.2 lb·ft)	
Fuel pump nut	M6	6	7 N·m (0.7 kgf·m, 5.2 lb·ft)	
Air filter case bolt	M6	2	14 N·m (1.4 kgf·m, 10 lb·ft)	
Air filter case nut	M8	2	15 N·m (1.5 kgf·m, 11 lb·ft)	
Intake air temperature sensor screw	M5	1	3.5 N·m (0.35 kgf·m, 2.6 lb·ft)	
Fuel injector bolt	M6	1	12 N·m (1.2 kgf·m, 8.9 lb·ft)	

TIP_

Fuel pump nut

Tighten the fuel pump nuts to 7 N·m (0.7 kgf·m, 5.2 lb·ft) in the proper tightening sequence.

Fuel pump tightening sequence:



DRIVE TRAIN TIGHTENING TORQUE (YUM1A/YUM2A)

Item	Thread size	Q'ty	Tightening torque	Remarks
Primary sheave assembly bolt	1/2	1	85 N·m (8.5 kgf·m, 63 lb·ft)	
Primary sheave cup bolt	M6	3	5 N·m (0.5 kgf·m, 3.7 lb·ft)	
Spider roller nut	M5	3	6 N·m (0.6 kgf·m, 4.4 lb·ft)	
Spider roller collar set bolt	M5	6	3.5 N·m (0.35 kgf·m, 2.6 lb·ft)	-
Primary sliding sheave weight nut	M5	3	6 N·m (0.6 kgf·m, 4.4 lb·ft)	
Secondary sheave assembly bolt	M5	1	30 N·m (3.0 kgf·m, 22 lb·ft)	-LS
Ramp shoe bolt	M4	3	2.0 N·m (0.20 kgf·m, 1.5 lb·ft)	- (6)
Shift cable bracket bolt	M6	3	7 N·m (0.7 kgf·m, 5.2 lb·ft)	
Equalizer bracket nut	M8	1	16 N·m (1.6 kgf·m, 12 lb·ft)	
Reverse switch screw	M4	2	2.0 N·m (0.20 kgf·m, 1.5 lb·ft)	
Rear axle assembly bolt	M10	8	73 N·m (7.3 kgf·m, 54 lb·ft)	
Bearing cap bolt	3/8	4	55 N·m (5.5 kgf·m, 41 lb·ft)	
Differential cover bolt	5/16	10	28 N·m (2.8 kgf·m, 21 lb·ft)	
Ring gear nut	3/8	4	81 N·m (8.1 kgf·m, 60 lb·ft)	
Transmission case cover bolt	5/16	7	28 N·m (2.8 kgf·m, 21 lb·ft)	

DRIVE TRAIN TIGHTENING TORQUE (YUM2E)

Item	Thread size	Q'ty	Tightening torque	Remarks
Traction motor lead nut	M8	3	8 N·m (0.8 kgf·m, 5.9 lb·ft)	
Traction motor bolt	M6	3	12 N·m (1.2 kgf·m, 8.9 lb·ft)	
Rear axle assembly bolt	M10	8	73 N·m (7.3 kgf·m, 54 lb·ft)	
Bearing cap bolt	3/8	4	55 N·m (5.5 kgf·m, 41 lb·ft)	
Ring gear nut	3/8	4	81 N·m (8.1 kgf·m, 60 lb·ft)	
Differential cover bolt	5/16	10	28 N·m (2.8 kgf·m, 21 lb·ft)	
Terminal plate screw	M5	2	3.3 N·m (0.33 kgf·m, 2.4 lb·ft)	
Dust cover screw	M5	3	3.3 N·m (0.33 kgf·m, 2.4 lb·ft)	
Terminal plate nut	M8	3	6 N·m (0.6 kgf·m, 4.4 lb·ft)	
Speed sensor bolt	M6	1	3.3 N·m (0.33 kgf·m, 2.4 lb·ft)	
Front bracket bolt	M8	4	10 N·m (1.0 kgf·m, 7.4 lb·ft)	

CHASSIS TIGHTENING TORQUE

Item	Thread size	Q'ty	Tightening torque	Remarks
Engine mounting nut	M10	4	54 N·m (5.4 kgf·m, 40 lb·ft)	
Baffle plate bolt (YUM2A)	M6	3	7 N·m (0.7 kgf·m, 5.2 lb·ft)	
Seat back bolt	M6	6	7 N·m (0.7 kgf·m, 5.2 lb·ft)	
Seat frame bolt	M8	8	16 N·m (1.6 kgf·m, 12 lb·ft)	
Cargo bed pivot nut	M8	2	30 N·m (3.0 kgf·m, 22 lb·ft)	
Cargo bed damper nut (YUM2A/ YUM2E)	M8	4	16 N⋅m (1.6 kgf⋅m, 12 lb⋅ft)	
Hinge bracket bolt	M10	2	32 N·m (3.2 kgf·m, 24 lb·ft)	
Latch bolt	M8	4	16 N·m (1.6 kgf·m, 12 lb·ft)	
Corner post bolt	M8	12	16 N·m (1.6 kgf·m, 12 lb·ft)	
Cargo bed base bolt (YUM1A)	M6	6	8 N·m (0.8 kgf·m, 5.9 lb·ft)	
Cargo bed base bolt (YUM2A/ YUM2E)	M6	9	8 N⋅m (0.8 kgf⋅m, 5.9 lb⋅ft)	
Rear corner post bolt (lower)	M10	2	32 N·m (3.2 kgf·m, 24 lb·ft)	
Damper bolt	M6	2	7 N·m (0.7 kgf·m, 5.2 lb·ft)	
Striker bolt	M6	2	8 N·m (0.8 kgf·m, 5.9 lb·ft)	
Cargo panel bolt	M10	9	32 N·m (3.2 kgf·m, 24 lb·ft)	
Wire holder bolt	M6	4	8 N·m (0.8 kgf·m, 5.9 lb·ft)	
Lock assembly bolt	M6	2	8 N·m (0.8 kgf·m, 5.9 lb·ft)	
Tailgate inner cover bolt (short)	M6	4	8 N·m (0.8 kgf·m, 5.9 lb·ft)	
Tailgate inner cover bolt	M6	8	8 N·m (0.8 kgf·m, 5.9 lb·ft)	
Hinge shaft bolt	M6	3	7 N·m (0.7 kgf·m, 5.2 lb·ft)	
Rear side cover (right) bolt	M6	4	7 N·m (0.7 kgf·m, 5.2 lb·ft)	
Rear side cover (left) bolt	M6	4	7 N·m (0.7 kgf·m, 5.2 lb·ft)	
Tail cover	M6	4	7 N·m (0.7 kgf·m, 5.2 lb·ft)	
Mudguard bolt (YUM1A)	M6	4	7 N·m (0.7 kgf·m, 5.2 lb·ft)	
Side panel bolt (YUM1A)	M6	4	7 N·m (0.7 kgf·m, 5.2 lb·ft)	
Side panel bolt (YUM2A/YUM2E)	M6	6	7 N·m (0.7 kgf·m, 5.2 lb·ft)	
Side under panel bolt (YUM1A)	M6	4	8 N·m (0.8 kgf·m, 5.9 lb·ft)	
Side under panel bolt (YUM2A/ YUM2E)	M6	6	8 N⋅m (0.8 kgf⋅m, 5.9 lb⋅ft)	
Instrument panel assembly bolt	M6	2	4.0 N·m (0.40 kgf·m, 3.0 lb·ft)	
Instrument panel assembly screw	M5	1	1.5 N·m (0.15 kgf·m, 1.1 lb·ft)	
Hinge screw	M5	8	2.5 N·m (0.25 kgf·m, 1.8 lb·ft)	
Steering wheel nut	M12	1	35 N·m (3.5 kgf·m, 26 lb·ft)	
Front fender bolt	M6	2	7 N·m (0.7 kgf·m, 5.2 lb·ft)	
Headlight screw	M5	4	1.8 N·m (0.18 kgf·m, 1.3 lb·ft)	
Headlight bolt	M6	2	7 N·m (0.7 kgf·m, 5.2 lb·ft)	
Front grille bolt	M6	2	7 N·m (0.7 kgf·m, 5.2 lb·ft)	
Skid plate bolt	M6	6	7 N·m (0.7 kgf·m, 5.2 lb·ft)	
Front wheel nut	M12	8	102 N·m (10.2 kgf·m, 75 lb·ft)	

Item	Thread size	Q'ty	Tightening torque	Remarks
Front wheel hub nut	M16	2	162 N·m (16.2 kgf·m, 116 lb·ft)	
Rear wheel nut	M12	8	102 N·m (10.2 kgf·m, 75 lb·ft)	
Rear wheel hub nut	3/4	2	210 N·m (21 kgf·m, 155 lb·ft)	
Front brake plate nut (YUM2A/ YUM2E)	M8	8	41 N·m (4.1 kgf·m, 30 lb·ft)	
Rear brake plate nut	M8	8	42 N·m (4.2 kgf·m, 31 lb·ft)	
Brake cable adjusting locknut (YUM1A)	M8	1	17 N·m (1.7 kgf·m, 13 lb·ft)	
Brake cable adjusting locknut (YUM2A/YUM2E)	M8	2	17 N·m (1.7 kgf·m, 13 lb·ft)	
Pedal assembly bolt	M8	6	16 N⋅m (1.6 kgf⋅m, 12 lb⋅ft)	
Accelerator switch screw	M5	2	3.8 N·m (0.38 kgf·m, 2.8 lb·ft)	
Throttle position sensor screw (YUM2E)	M5	2	3.6 N·m (0.36 kgf·m, 2.7 lb·ft)	
Throttle position sensor bracket bolt (YUM2E)	M5	2	7 N·m (0.7 kgf·m, 5.2 lb·ft)	
Accelerator pedal bolt	M6	1	10 N·m (1.0 kgf·m, 7.4 lb·ft)	
Parking brake release bolt locknut	M8	1	16 N·m (1.6 kgf·m, 12 lb·ft)	
Brake rod locknut	M6	1	6 N·m (0.6 kgf·m, 4.4 lb·ft)	
Brake pedal arm bolt	M10	1	48 N·m (4.8 kgf·m, 35 lb·ft)	
Brake pedal nut	M6	1	10 N⋅m (1.0 kgf⋅m, 7.4 lb⋅ft)	
Parking brake pedal nut	M8	1	23 N·m (2.3 kgf·m, 17 lb·ft)	
Parking brake pedal cover nut	M6	2	7 N·m (0.7 kgf·m, 5.2 lb·ft)	
Latch plate bolt	M8	2	16 N·m (1.6 kgf·m, 12 lb·ft)	
Steering column bolt	M8	4	22 N·m (2.2 kgf·m, 16 lb·ft)	
Steering joint bolt	M8	2	22 N·m (2.2 kgf·m, 16 lb·ft)	
Tie-rod end nut	M12	2	39 N·m (3.9 kgf·m, 29 lb·ft)	
Tie-rod	_	2	75 N·m (7.5 kgf·m, 55 lb·ft)	
Tie-rod nut	M12	2	45 N·m (4.5 kgf·m, 33 lb·ft)	
Steering assembly bolt	M10	4	52 N·m (5.2 kgf·m, 38 lb·ft)	
Steering knuckle arm nut	M10	4	63 N·m (6.3 kgf·m, 47 lb·ft)	
Steering knuckle nut	M10	2	55 N·m (5.5 kgf·m, 41 lb·ft)	
Front shock absorber assembly upper nut	M10	2	73 N·m (7.3 kgf·m, 54 lb·ft)	
Front shock absorber assembly lower nut	M12	2	80 N·m (8.0 kgf·m, 59 lb·ft)	
Front lower arm nut	M10	4	47 N·m (4.7 kgf·m, 35 lb·ft)	
Front under bracket nut	M10	4	47 N·m (4.7 kgf·m, 35 lb·ft)	
Rear shock absorber assembly upper nut	M12	2	125 N·m (12.5 kgf·m, 92 lb·ft)	
Rear shock absorber assembly low- er nut	M12	2	125 N·m (12.5 kgf·m, 92 lb·ft)	
Stabilizer joint nut	M10	4	64 N·m (6.4 kgf·m, 47 lb·ft)	
Stabilizer holder bolt	M8	4	30 N⋅m (3.0 kgf⋅m, 22 lb⋅ft)	

Item	Thread size	Q'ty	Tightening torque	Remarks
Connecting rod nut	M12	2	100 N·m (10 kgf·m, 74 lb·ft)	
Rear suspension arm nut	M13	1	90 N·m (9.0 kgf·m, 66 lb·ft)	
Bushing bolt	M10	2	53 N·m (5.3 kgf·m, 39 lb·ft)	
Bottom panel bolt	M6	6	7 N·m (0.7 kgf·m, 5.2 lb·ft)	
USB plug bolt	M6	2	7 N·m (0.7 kgf·m, 5.2 lb·ft)	

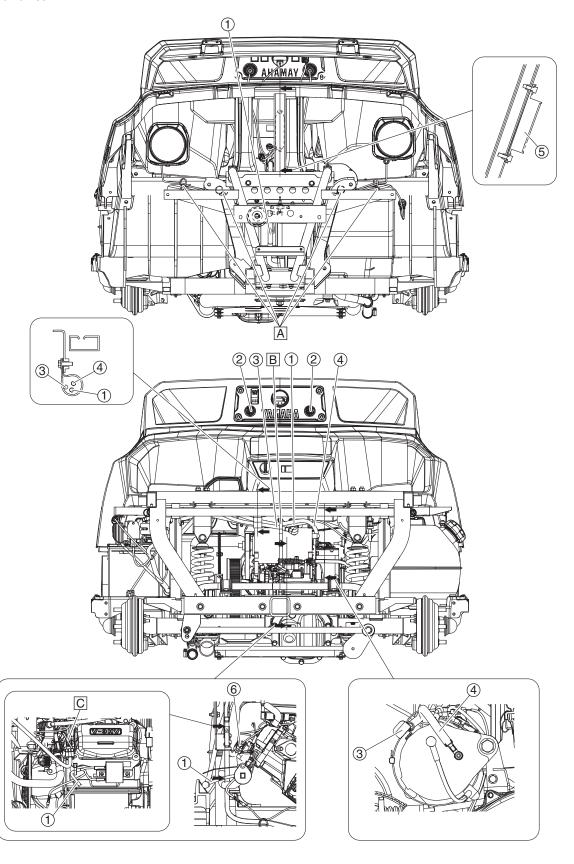
YUM1A

Frame (top view) 1 A 4 10 (15) D <u>.</u> C 9 8 6 8 **(5) B**(1) 1 13 12

- 1. Wire harness
- 2. Fuel hose
- 3. Fuel pump coupler
- 4. Intake air temperature sensor
- 5. Plastic band
- 6. Voltage regulator
- 7. Fuel pump relay
- 8. Positive battery lead
- 9. Negative battery lead
- 10. Accelerator switch coupler
- 11. Main switch
- 12. Ground lead
- 13. Main relay
- 14. Starter generator
- 15. Engine oil level switch lead
- 16. Rear brake cable (right)
- 17. Accelerator switch
- 18. Horn switch
- 19. Horn switch lead
- A. Install the intake air temperature sensor completely into the grommet.
- B. Make sure that there is no slack in the wire harness.
- C. Fasten the wire harness at the white tape to the frame with the plastic band.
- D. Route the engine oil level switch lead between the starter generator and the starter generator bracket.

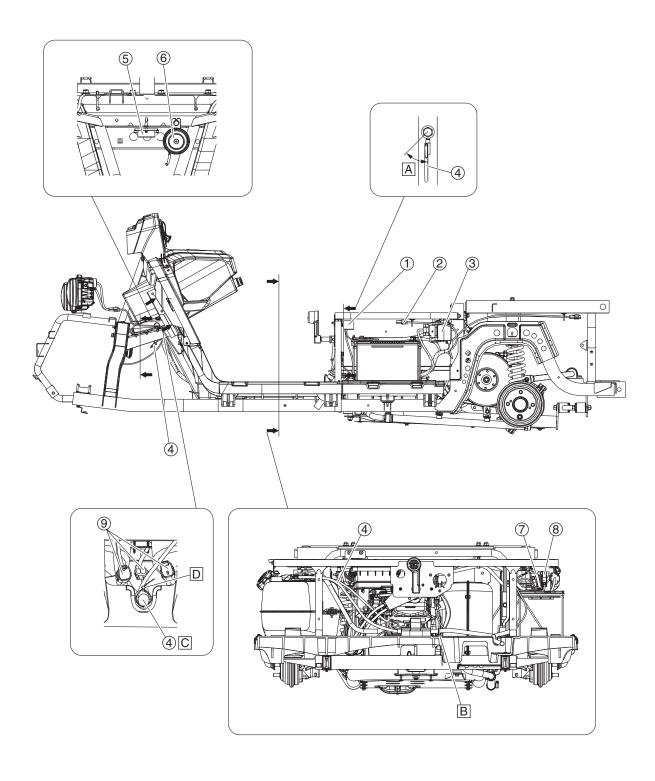
YUM1A

Front and rear



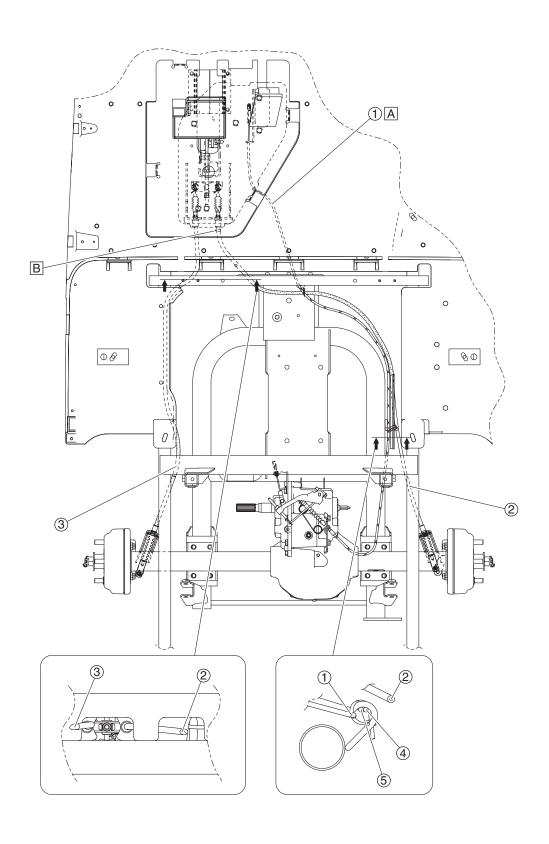
- 1. Wire harness
- 2. USB port
- 3. Starter generator
- 4. Negative battery lead
- 5. USB plug
- 6. Sub-wire harness
- A. Route the headlight leads through the clamps.
- B. Fasten the wire harness at the white tape with a plastic band.
- C. Connect to sub-wire harness

YUM1A Left side



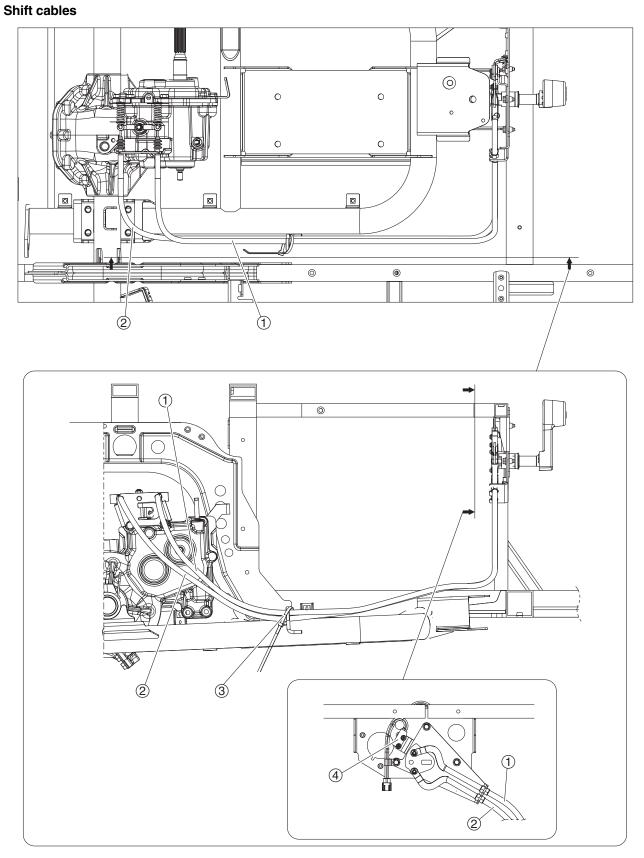
- 1. Fuse box
- 2. FI diagnostic tool coupler
- 3. ECU (Engine Control Unit)
- 4. Wire harness
- 5. Reverse buzzer
- 6. Horn
- 7. Voltage regulator
- 8. Fuel pump relay
- 9. USB couplers
- A. 0–45°
- B. Fasten the wire harness at the white tape with a plastic band.
- C. Pass the wire harness through the hole of the footrest.
- D. Fasten the wire harness at the white tape with a plastic band as shown in the illustration.

YUM1A Brake and throttle cables

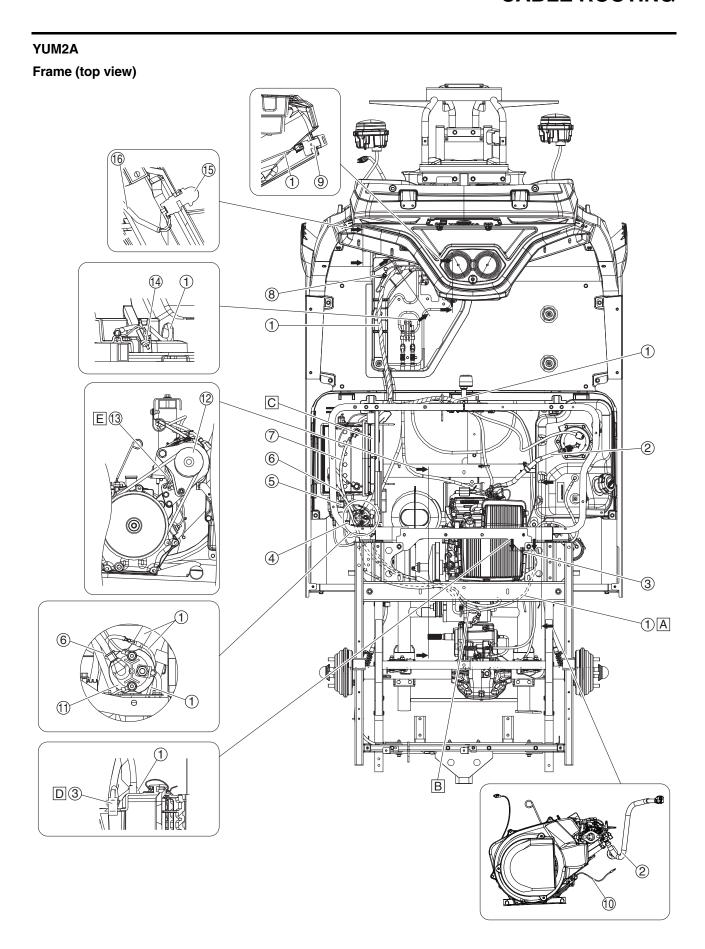


- 1. Throttle cable 1
- 2. Rear brake cable (right)
- 3. Rear brake cable (left)
- 4. Shift control cable (reverse)
- 5. Shift control cable (forward)
- A. Route the throttle cable 1 above the frame and rear suspension arm.
- B. Yellow ring

YUM1A

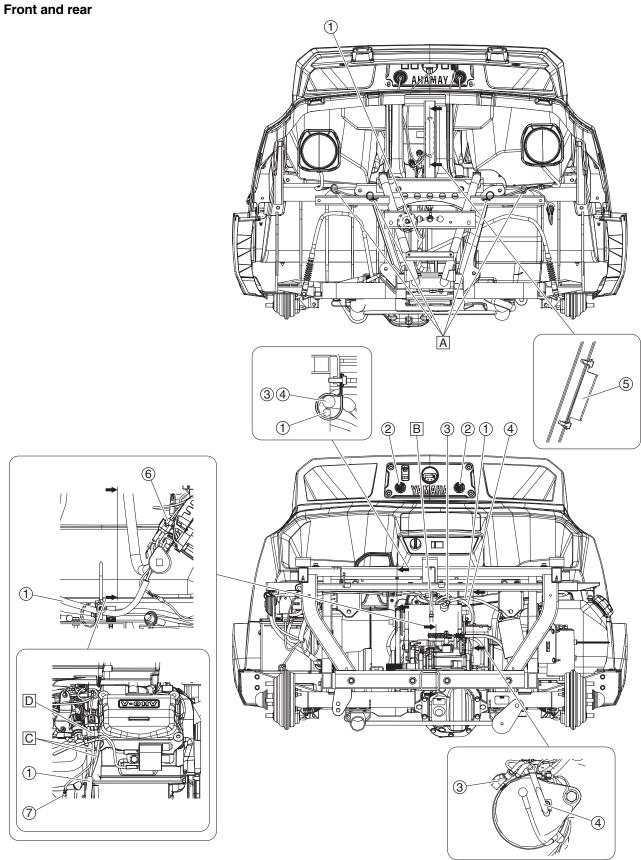


- 1. Shift control cable (forward)
- 2. Shift control cable (reverse)
- 3. Plastic band
- 4. Reverse switch



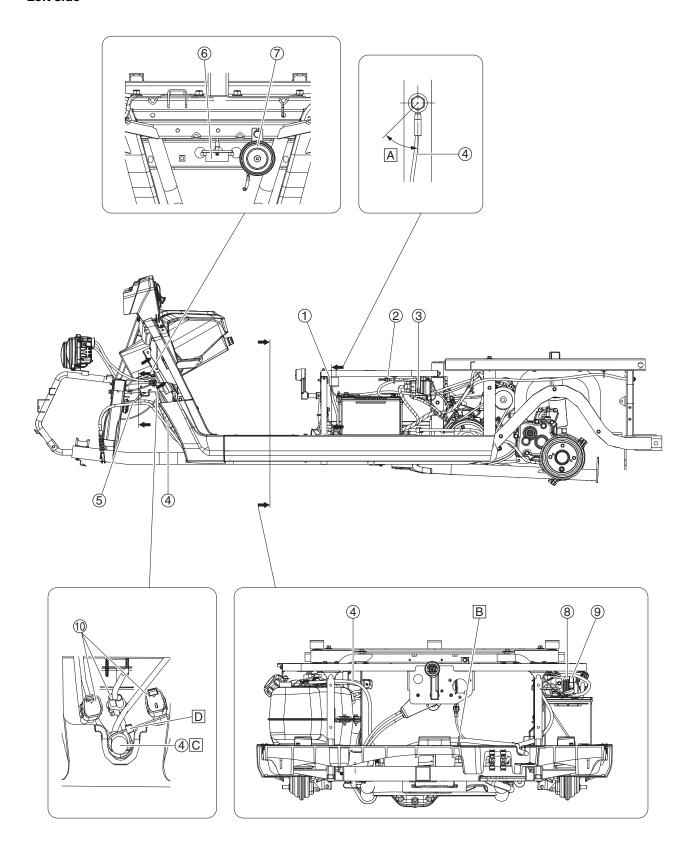
- 1. Wire harness
- 2. Fuel hose
- 3. Intake air temperature sensor
- 4. Voltage regulator
- 5. Fuel pump relay
- 6. Positive battery lead
- 7. Negative battery lead
- 8. Accelerator switch coupler
- 9. Main switch
- 10. Ground lead
- 11. Main relay
- 12. Starter generator
- 13. Engine oil level switch lead
- 14. Accelerator switch
- 15. Horn switch
- 16. Horn switch lead
- A. Make sure that there is no slack in the wire harness.
- B. Fasten the wire harness at the white tape to the starter generator with the plastic band. Face the white tape on wire harness upward.
- C. Fasten the wire harness at the white tape to the frame with the plastic band.
- D. Install the intake air temperature sensor completely into the grommet.
- E. Route the engine oil level switch lead between the starter generator and the starter generator bracket.

YUM2A



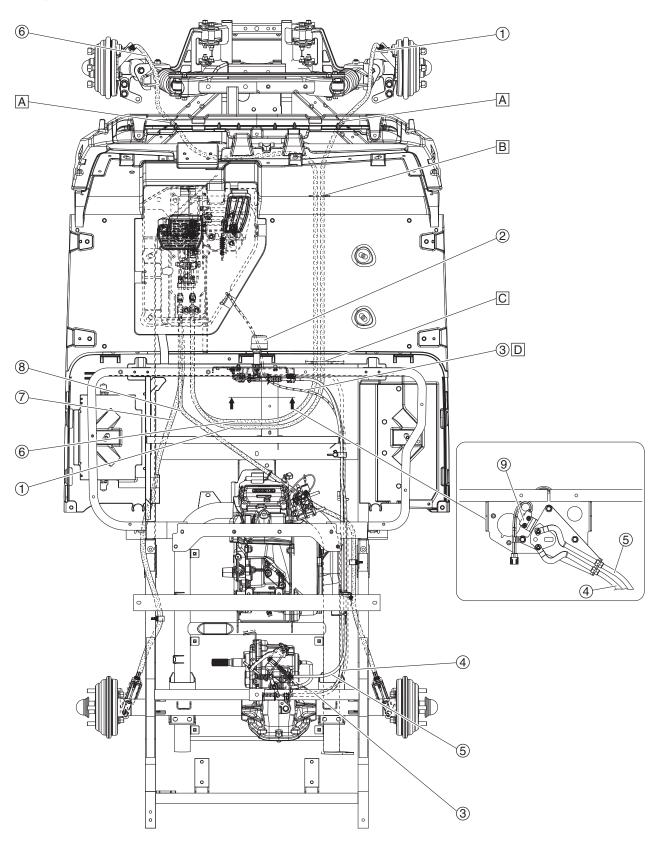
- 1. Wire harness
- 2. USB port
- 3. Starter generator
- 4. Negative battery lead
- 5. USB plug
- 6. Sub-wire harness
- 7. Ground lead
- A. Route the headlight leads through the clamps.
- B. Fasten the wire harness at the white tape with a plastic band.
- C. Route the sub-wire harness and ignition coil lead through the clamp.
- D. Connect to sub-wire harness

YUM2A Left side

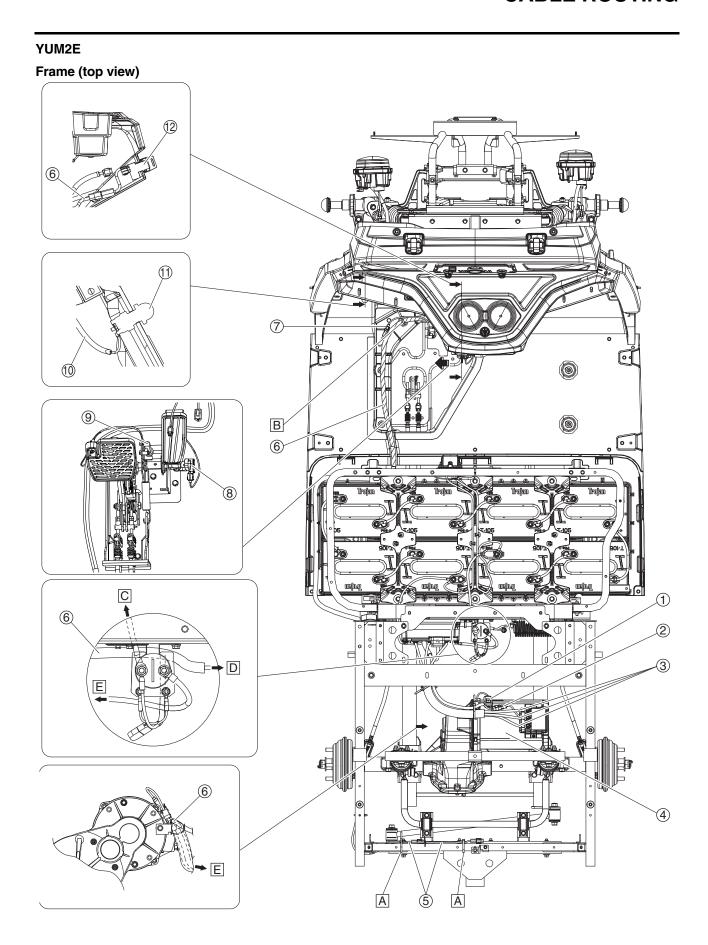


- 1. Fuse box
- 2. Fl diagnostic tool coupler
- 3. ECU (Engine Control Unit)
- 4. Wire harness
- 5. Reverse buzzer
- 6. Reverse buzzer lead
- 7. Horn
- 8. Voltage regulator
- 9. Fuel pump relay
- 10. USB couplers
- A. 0-45°
- B. Fasten the wire harness at the white tape with a plastic band.
- C. Pass the wire harness through the hole of the footrest.
- D. Fasten the wire harness at the white tape with a plastic band as shown in the illustration.

YUM2A Brake, throttle and shift cables



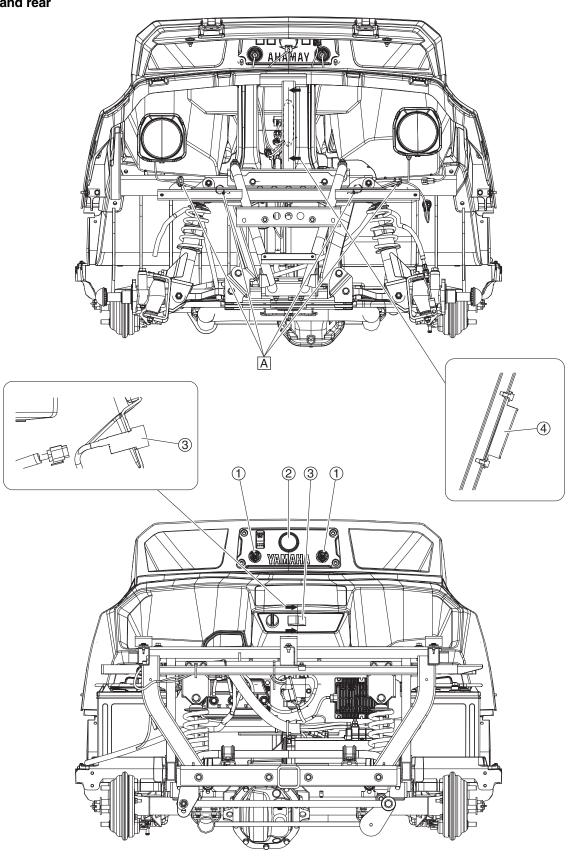
- 1. Front brake cable (right)
- 2. Shift lever
- 3. Throttle cable 1
- 4. Shift control cable (reverse)
- 5. Shift control cable (forward)
- 6. Front brake cable (left)
- 7. Rear brake cable (left)
- 8. Rear brake cable (right)
- 9. Reverse switch
- A. Pass the front brake cable through the guide. Align the guide with the white tape on the front brake cable.
- B. Pass the front brake cables through the guide.
- C. Route the front brake cables through the cutout in the footrest.
- D. Route the throttle cable 1 over the front brake cables.



- 1. Speed sensor coupler
- 2. Traction motor temperature sensor coupler
- 3. Traction motor leads
- 4. Traction motor
- 5. Taillight lead
- 6. Wire harness
- 7. Accelerator switch coupler
- 8. TPS (throttle position sensor)
- 9. Accelerator switch
- 10. Horn switch lead
- 11. Horn switch
- 12. Main switch
- A. Fasten the taillight lead with the plastic band.
- B. Fasten the wire harness at the white tape with a plastic band.
- C. To positive battery terminal
- D. To voltage regulator
- E. To MCU (motor control unit)

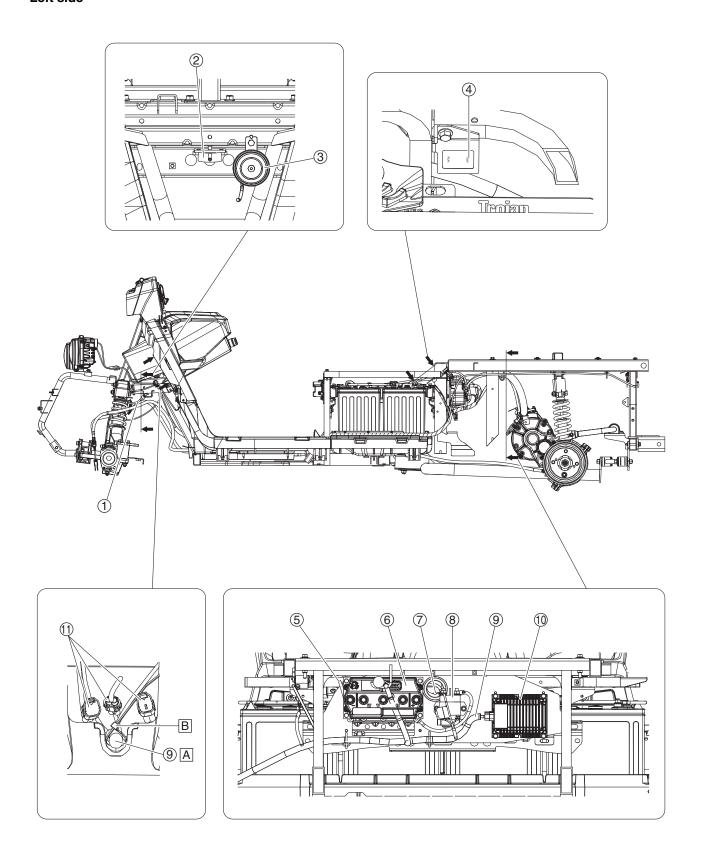
YUM2E

Front and rear



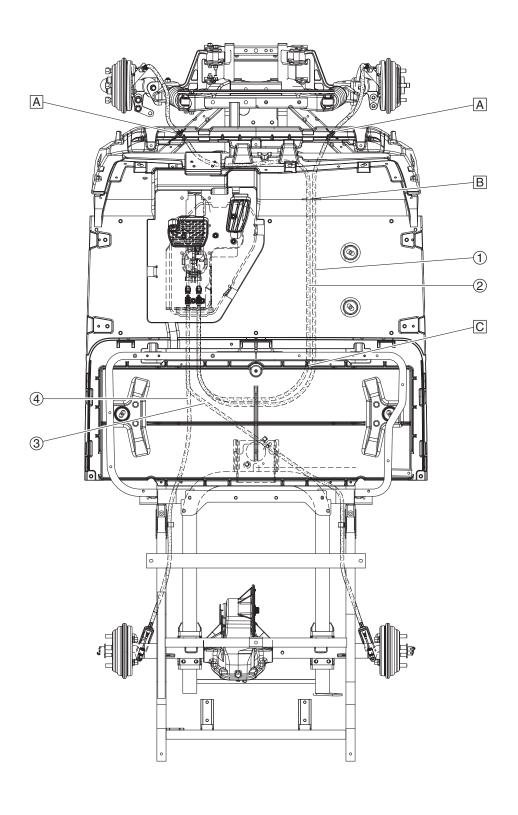
- 1. USB port
- 2. Battery gauge/warning light
- 3. Shift switch
- 4. USB plug
- A. Route the headlight leads through the clamps.

YUM2E Left side



- 1. Reverse buzzer lead
- 2. Reverse buzzer
- 3. Horn
- 4. Tow switch
- 5. Negative battery lead
- 6. MCU (motor control unit)
- 7. Positive battery lead
- 8. Main relay
- 9. Wire harness
- 10. Voltage regulator
- 11. USB couplers
- A. Pass the wire harness through the hole of the footrest.
- B. Fasten the wire harness at the white tape with a plastic band as shown in the illustration.

YUM2E Brake cable



- 1. Front brake cable (right)
- 2. Front brake cable (left)
- 3. Rear brake cable (right)
- 4. Rear brake cable (left)
- A. Pass the front brake cable through the guide. Align the guide with the white tape on the front brake cable.
- B. Pass the front brake cables through the guide.
- C. Route the front brake cables through the cutout in the footrest.

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PERIODIC MAINTENANCE

INTRODUCTION

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

PERIODIC MAINTENANCE CHARTS (YUM1A/YUM2A)

CS - CHECK CA - CHECK AND ADJUST R - REPLACE S - SERVICE CL - CLEAN AND LUBRICATE L - LUBRICATE

	Remarks	Daily Pre-Op- eration	20 hours 160 km 100 mi (Every month)	125 hrs 1000 km 600 mi (Every 6 months)	250 hrs 2000 km 1200 mi (Every year)	500 hrs 4000 km 2500 mi (Every 2 years)	1000 hrs 8000 km 5000 mi (Every 4 years)
PRE-OP	Check engine oil	CS	CS	CS			
	Check engine air cooling inlet duct	CS	CS	CS	CS	CS	CS
	Check fuel lines for leakage	CS	CS	CS	CS	CS	CS
	Check fuel level	CS	CS	CS	CS	CS	CS
	Check for looseness and corrosion of battery terminals and hold downs	cs	CS	CS	CS	CS	cs
	Check brake pedal free play and adjust if necessary	CS	CA	CA	CA	CA	CA
	Check steering operation	CS	CS	CS	CS	CS	
	Check tire pressure, tread depth, tire surface for damage	CS	CA	CA	CA	CA	CA
	Check body and chassis for damage	CS	CS	CS	CS	CS	cs
	Check tightness of all bolts, nuts, screws and rivets	CS	CS	CS	CS	CS	CS
	Check reverse alarm operation	CS	CS	CS	CS	CS	CS
EVERY	Check wear of drive belt		CS	CS	CS	CS	CS
MONTH	Check operation of Forward / Reverse shifting		CS	CS	CS	CS	CS
	Clean / Lube pedal control area		CL	CL	CL	CL	CL
EVERY 6 MONTHS	Wash pre-filter and check air filter element			S	S	S	S
	Check spark plug and plug cap condition* / Check compression			CS	CS	CS	CS
	Check brake cable operation Inspect for abrasions and damage, and replace if necessary			CS R	CS R	CS R	CS R
	Check shock absorbers for oil leaks and damaged springs			CS	CS	CS	CS
	Check fuel hoses for cracks or damage, and replace if necessary			CS R	CS R	CS R	CS R

^{*} Related to emission control system.

PERIODIC MAINTENANCE

CS - CHECK CA - CHECK AND ADJUST R - REPLACE S - SERVICE CL - CLEAN AND LUBRICATE L - LUBRICATE

	Remarks	Daily Pre-Op- eration	20 hours 160 km 100 mi (Every month)	125 hrs 1000 km 600 mi (Every 6 months)	250 hrs 2000 km 1200 mi (Every year)	500 hrs 4000 km 2500 mi (Every 2 years)	1000 hrs 8000 km 5000 mi (Every 4 years)
EVERY	Replace engine oil				R	R	R
YEAR	Adjust throttle cables*				CA	CA	CA
	Check tail pipe screen for obstructions				CS	CS	CS
	Lubricate primary sheave and secondary sheave				L	L	L
EVERY YEAR	Check starter V-belt for damage and tension				CS	CS	CS
	Check drive belt for slippage, wear or scratches				CS	CS	CS
	Check operation of speed limiter				cs	CS	cs
	Apply battery terminal protectant				S	S	S
	Check wiring connections and insulation				CS	CS	CS
	Check rear axle bearing play for roughness or free play				CS	CS	CS
	Check steering knuckle bushing free play / Adjust wheel alignment				CA	CA	CA
	Check wheel nut tightness, front wheel bearing play				CS	CS	cs
	Check transaxle oil level and inspect for leakage				CS	CS	cs
	Adjust parking brake release				CA	CA	CA
EVERY 4 YEARS	Check starter generator brushes for wear and commutator for dirt						CS S
	Check tightness of cylinder head / Adjust valves						CA
	Replace transaxle oil						CS R
	Inspect brake shoes and adjust or replace if necessary						CS R

^{*} Related to emission control system.

PERIODIC MAINTENANCE

PERIODIC MAINTENANCE CHARTS (YUM2E)

 $\textbf{CS} - \texttt{CHECK} \ \textbf{CA} - \texttt{CHECK} \ \texttt{AND} \ \texttt{ADJUST} \ \textbf{R} - \texttt{REPLACE} \ \textbf{S} - \texttt{SERVICE} \ \textbf{CL} - \texttt{CLEAN} \ \texttt{AND} \ \texttt{LUBRICATE} \ \textbf{L} - \texttt{LUBRICATE}$

	Remarks	Daily Pre-Op- eration	20 hours 160 km 100 mi (Every month)	125 hrs 1000 km 600 mi (Every 6 months)	250 hrs 2000 km 1200 mi (Every year)	500 hrs 4000 km 2500 mi (Every 2 years)	1000 hrs 8000 km 5000 mi (Every 4 years)
PRE-OP	Charge	S	S	S	S	S	S
	Clean battery tops, and check tightness of hold-down plate bolts and terminals	S	S	S	S	S	S
	Check brake pedal free play and adjust if necessary	CS	CA	CA	CA	CA	CA
	Check steering operation	CS	CS	CS	CS	CS	CS
	Check tire pressure, tread depth, tire surface for damage	CS	CA	CA	CA	CA	CA
	Check body and chassis for damage	CS	CS	CS	CS	CS	CS
	Check tightness of all bolts, nuts, screws and rivets	CS	CS	CS	CS	CS	CS
	Check reverse alarm operation	CS	CS	CS	CS	CS	CS
EVERY	Check electrolyte level		CS	CS	CS	CS	CS
MONTH	Check for loose or broken connections		CS	CS	CS	CS	CS
	Clean / Lube pedal control area		CL	CL	CL	CL	CL
EVERY 6 MONTHS	Check all wire insulation for cracks and worn spots			CS	CS	CS	CS
	 Check brake cable operation Inspect for abrasions and damage, and replace if nec- essary 			CS R	CS R	CS R	CS R
	Check shock absorbers for oil leaks and damaged springs			CS	CS	CS	CS
EVERY	Perform a discharge test				S	S	S
YEAR	Apply terminal protectant				S	S	S
	Check rear axle bearing play for roughness or free play				CS	CS	CS
	Check steering knuckle bushing free play / Adjust wheel alignment				CA	CA	CA
	Check wheel nut tightness, front wheel bearing play				CS	CS	CS
	Check transaxle oil level and inspect for leakage				CS	CS	CS
	Adjust parking brake release				CA	CA	CA
EVERY 4	Replace transaxle oil						CS R
YEARS	Inspect brake shoes and adjust or replace if necessary						CS R

CHECKING THE ENGINE OIL LEVEL (YUM1A/YUM2A)

- 1. Park the vehicle on a level surface and apply the parking brake.
- 2. Remove the under-seat panel (YUM1A).

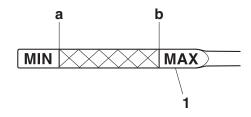
 Refer to "GENERAL CHASSIS (1)" on page
 4-1
- 3. Lift up the cargo bed (YUM2A).
- 4. Check:
 - Engine oil level

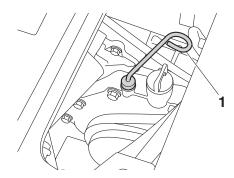
The engine oil level should be between the minimum level mark "a" and maximum level mark "b".

Below the minimum level mark \rightarrow Add the recommended engine oil to the proper level.



Insert the dipstick "1" completely into the hole, and then remove it again to check the oil level.



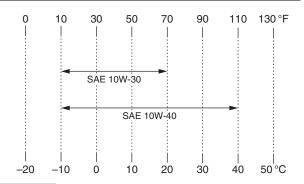




Recommended brand



Type
SAE 10W-30 or 10W-40
Recommended engine oil grade
API service SE type or higher,
JASO MA or MB



NOTICE

Do not allow foreign materials to enter the crankcase.

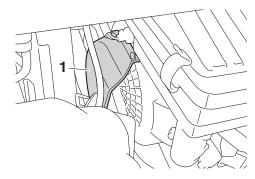
5. Check the engine oil level again.

NOTICE

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

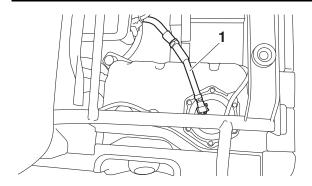
CHECKING THE ENGINE COOLING INLET DUCT (YUM1A/YUM2A)

- 1. Remove:
 - Under-seat panel Refer to "GENERAL CHASSIS (1)" on page 4-1.
- 2. Check:
 - Engine cooling inlet duct "1" Dirt/clogging → Clean.



CHECKING THE FUEL LINE (YUM1A/YUM2A)

- 1. Remove:
- Under-seat panel Refer to "GENERAL CHASSIS (1)" on page 4-1.
- 2. Check:
 - Fuel hose "1"
 Cracks/damage → Replace.
 Loose connection → Connect properly.



CHECKING THE FUEL LEVEL (YUM1A/YUM2A)

- 1. Check:
 - Fuel level

Low \rightarrow Add the recommended fuel.



Recommended fuel Regular unleaded gasoline (Gasohol [E10] or [E5] acceptable)

CHECKING THE BATTERY (YUM1A/YUM2A)

- 1. Remove:
 - Under-seat panel Refer to "GENERAL CHASSIS (1)" on page 4-1.
- 2. Clean:
 - Battery top (with the clean rag)
- 3. Check:
 - Battery terminals
 Dirt → Clean with a wire brush.

 Loose connection → Connect properly.
- 4. Check:
 - Battery hold down plate
 - Loose → Tighten.



Nut

2.5 N·m (0.25 kgf·m, 1.8 lb·ft)

CHECKING THE BATTERIES (YUM2E)

- 1. Remove:
 - Under-seat panel Refer to "GENERAL CHASSIS (1)" on page 4-1.
- 2. Clean:
 - Battery top (with the clean rag)
- 3. Check:
 - Battery terminals
 Dirt → Clean with a wire brush.
 Loose connection → Connect properly.



Terminal nut 10 N·m (1.0 kgf·m, 7.4 lb·ft)

- 4. Check:
 - Battery hold down plate Loose → Tighten.



Bolt

6 N·m (0.6 kgf·m, 4.4 lb·ft)

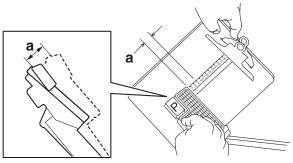
- 5. Charge:
 - Battery
 Refer to "CHECKING AND CHARGING THE
 BATTERY" on page 8-51.

CHECKING THE BRAKE PEDAL FREE PLAY

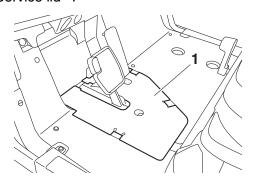
- 1. Check:
- Brake pedal free play "a"
 Out of specification → Adjust.



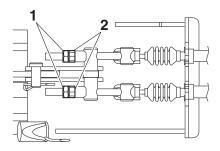
Brake pedal free play 50-55 mm (1.97-2.17 in)



- 2. Remove:
 - Floor mat
- Service lid "1"



- 3. Adjust:
 - Brake pedal free play
 - a. Loosen the locknuts "1".
 - b. Turn the adjusting nuts "2" until the correct free play is obtained.



c. Tighten the locknuts.

WARNING

Do not over-tighten the brake cables. Overtightening will increase brake wear and affect the overall performance of the vehicle. Premature brake wear can result. Death or serious personal injury can result from failing to comply with the warning labels in this manual.

- 4. Install:
 - Service lid
 - Floor mat

CHECKING THE STEERING OPERATION

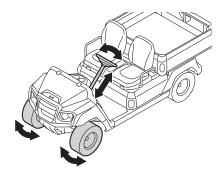
- 1. Park the vehicle on a level surface and apply the parking brake.
- 2. Check:
 - Steering wheel operation

Move the steering wheel up and down, and back and forth.

Turn the steering wheel slightly to the right and left.

Excessive play \rightarrow Check that the steering column bolts or steering wheel nut are tightened to specification.

Refer to "STEERING SYSTEM" on page 4-29.



CHECKING THE WHEELS

The following procedure applies to all of the wheels.

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

⚠ 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.
- 2. Check:
- Radial wheel runout
- Lateral wheel runout Refer to "CHECKING THE WHEELS" on page 4-19.
- 3. Check:
 - Wheel bearings Refer to "CHECKING THE WHEELS" on page 4-19.

CHECKING THE TIRES

The following procedure applies to all of 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

WARNING

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



Front tire
Size
20 × 10.00-10/4-ply
Rear tire
Size

 $20 \times 10.00 - 10/4 - ply$

Tire pressure

WARNING

- Tire pressure below the minimum specification could cause the tire to dislodge from the rim under severe riding conditions.
- Use no more than the following pressures when seating the tire beads.

Front

250 kPa (2.5 kgf/cm²) (36 psi)

Rear

250 kPa (2.5 kgf/cm²) (36 psi)

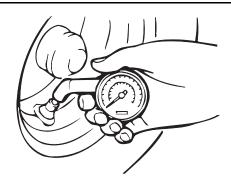
Higher pressures and fast inflation may cause a tire to burst. Inflate the tires very slowly and carefully.

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

⚠ WARNING

Uneven or improper tire pressure may adversely affect the handling of this vehicle and may cause loss of control.

- Maintain proper tire pressures.
- Set tire pressures when the tires are cold.
- Tire pressures must be equal in both front tires and equal in both rear tires.





Tire air pressure (measured on cold tires)

Recommended

Front

137 kPa (1.37 kgf/cm², 20 psi)

Rear

151 kPa (1.51 kgf/cm², 22 psi)

Minimum

Front

124 kPa (1.24 kgf/cm², 18 psi)

Rear

137 kPa (1.37 kgf/cm², 20 psi)

(YUM1A)

151 kPa (1.51 kgf/cm², 22 psi)

(YUM2A/YUM2E)

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

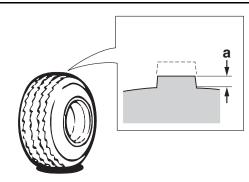


Wear limit

1.0 mm (0.04 in)

⚠ WARNING

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



a. Wear limit

CHECKING THE BODY AND CHASSIS

- 1. Check:
- Body
- Chassis
 Cracks/damage → Replace.

CHECKING THE FASTENERS

- 1. Check:
 - Fasteners

Loosen \rightarrow Tighten.

Damage/pitting \rightarrow Replace.

Refer to "GENERAL CHASSIS (1)" on page 4-1, "GENERAL CHASSIS (2)" on page 4-3 and "GENERAL CHASSIS (3)" on page 4-6.

CHECKING THE REVERSE BUZZER

- 1. Check:
 - Reverse buzzer operation
 Dose not sound → Repair or replace.
 Refer to "CHECKING THE REVERSE
 BUZZER" on page 8-57 or "CHECKING THE
 REVERSE BUZZER" on page 8-78.

MONTHLY CHECKS

CHECKING THE DRIVE BELT (YUM1A/YUM2A)

- 1. Park the vehicle on a level surface and apply the parking brake.
- 2. Remove the under-seat panel (YUM1A). Refer to "GENERAL CHASSIS (1)" on page 4-1.
- 3. Lift up the cargo bed.
- 4. Check:
 - Drive belt "1"

Cracks/damage/wear \rightarrow Replace.

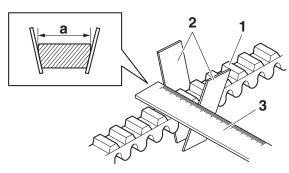
Grease/oil \rightarrow Clean the primary and secondary sheaves.

Refer to "REPLACING THE DRIVE BELT (YUM1A/YUM2A)" on page 3-8.

- 5. Measure:
 - Drive belt width "a"
 Out of specification → Replace.



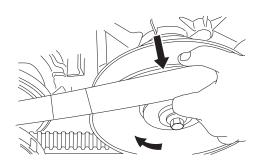
Drive belt width limit 28.0 mm (1.10 in)



- 2. Plastic board
- 3. Ruler

REPLACING THE DRIVE BELT (YUM1A/YUM2A)

- 1. Park the vehicle on a level surface and apply the parking brake.
- 2. Remove the under-seat panel (YUM1A). Refer to "GENERAL CHASSIS (1)" on page 4-1
- 3. Lift up the cargo bed.
- 4. Replace:
 - Drive belt
 - a. Pull up on the drive belt and push it outward over the edge of the secondary sheave.



- b. Turn the secondary sheave clockwise and the drive belt will roll off the sheave.
- c. Remove the drive belt from the primary sheave.
- d. Install a new drive belt.

CHECKING THE SHIFT LEVER (YUM1A/YUM2A)

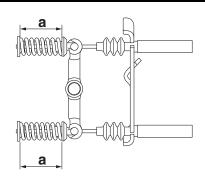
- 1. Check:
 - Shift lever operation
 Shift lever not working properly → Check the shift lever.

Refer to "TRANSMISSION (YUM1A/YUM2A)" on page 7-8.

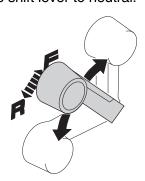
- 2. Check:
- Shift stroke "a"
 Out of specification → Adjust.



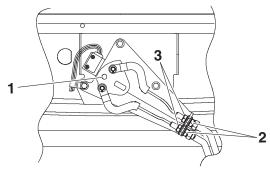
Shift stroke 15–17 mm (0.59–0.67 in)



- 3. Adjust:
 - Shift stroke
 - a. Set the shift lever to neutral.



- b. Insert screwdriver into locking hole "1".
- c. Loosen both locknuts "2".
- d. Turn the adjusting nuts "3" until the correct adjustment is obtained.



- e. Tighten the locknuts "2".
- f. Remove screwdriver.

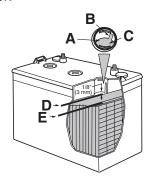
CHECKING THE BATTERY ELECTROLYTE (YUM2E)

The following procedure applies to all of the batteries.

- 1. Check:
- Battery fluid level

Remove the cap and check if the fluid level reaches the top of the plate.

Below the upper edge \rightarrow Add distilled water until the top of the plate is just hidden beneath the water.



- A. Electrolyte 3 mm (1/8 in) below bottom of fill well
- B. Fill well
- C. Electrolyte
- D. Max. level-charged battery
- E. Max. level-discharged battery

WARNING

Battery electrolyte is poisonous and dangerous, causing severe burns, etc. It contains sulfuric acid. Avoid contact with skin, eyes or clothing.

Antidote:

External: Flush with water.

Internal: Drink large quantities of water or milk. Follow with milk of magnesia, beaten egg, or vegetable oil. Call physician immediately.

Eyes: Flush with water for 15 minutes and get prompt medical attention.

Batteries produce explosive gases. Keep sparks, flame, cigarettes, etc., away. Ventilate when charging or using in enclosed space. Always shield eyes when working near batteries.

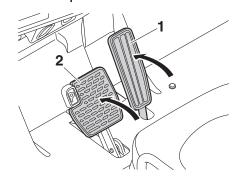
KEEP OUT OF THE REACH OF CHILDREN.

CHECKING THE WIRING CONNECTION (YUM2E)

- 1. Check:
- Wiring connection condition Loosen/damage → Properly connect or replace the wire harness.

CHECKING THE ACCELERATOR PEDAL AND BRAKE PEDAL OPERATION

- 1. Check:
- Acceleration pedal "1" operation
- Brake pedal "2" operation
 Improper operation → Adjust the cables.
 Unsmooth operation → Lubricate.



6-MONTH CHECKS

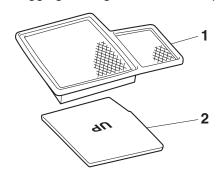
CHECKING THE AIR FILTER (YUM1A/YUM2A)

- 1. Remove:
- Air filter
- Air filter element
 Refer to "AIR FILTER CASE" on page 6-4.

NOTICE

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

- 2. Check:
 - Air filter "1"
 - Air filter element "2"
 Dirt/clogging/damage → Clean or replace.



- 3. Clean:
 - Air filter element
 - Carefully wash the air filter element in solvent.

WARNING

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



b. After cleaning, squeeze the air filter element to remove the excess solvent.

NOTICE

Do not twist the air filter element when squeezing it.



- c. Properly dispose of the used solvent.
- d. Carefully wash the air filter element in soap water.



e. Thoroughly rinse the air filter element with water, and then let it dry.

NOTICE

Do not twist the air filter element when squeezing it.

- 4. Install:
 - Air filter element
 - Air filter Refer to "AIR FILTER CASE" on page 6-4.

NOTICE

- The "UP" mark on the air filter element must face up. Also, ensure the profile matches the housing.
- To prevent air leaks, make sure that the sealing surface of the air filter is securely seated in the case during installation.

CHECKING THE ENGINE COMPRESSION PRESSURE (YUM1A/YUM2A)

Refer to "MEASURING THE COMPRESSION PRESSURE" on page 5-1.

CHECKING THE SPARK PLUG (YUM1A/YUM2A)

- 1. Disconnect:
 - Spark plug cap Refer to "CYLINDER HEAD AND ROCKER ARMS" on page 5-6.

- 2. Remove:
 - Spark plug Refer to "CYLINDER HEAD AND ROCKER ARMS" on page 5-6.

NOTICE

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

- 3. Check:
 - Spark plug type Incorrect → Change.



Manufacturer/model NGK/BPR4ES

- 4. Check:
 - Electrodes "1"

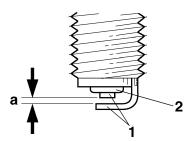
 $Damage/wear \rightarrow Replace \ the \ spark \ plug.$

- Insulator "2"
 Abnormal color → Replace the spark plug.

 Normal color is medium-to-light tan.
- 5. Clean:
 - Spark plug (with a spark plug cleaner or wire brush)
- 6. Measure:
 - Spark plug gap "a" (with a wire thickness gauge)
 Out of specification → Regap.



Spark plug gap 0.7-0.8 mm (0.028-0.031 in)



- 7. Install:
 - Spark plug



Spark plug 20 N·m (2.0 kgf·m, 15 lb·ft)

TIP

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

- 8. Connect:
 - Spark plug cap

CHECKING THE WIRE HARNESS (YUM2E)

- 1. Check:
 - Wire harness Cracks/frayed/corrosive → Replace.

CHECKING THE BRAKE CABLES

- 1. Check:
 - Brake cables
 Cracks/damage → Replace.
- Brake operation
 Improper operation → Adjust the brake.

CHECKING THE SHOCK ABSORBERS

The following procedure applies to all of the shock absorber assemblies.

- 1. Park the vehicle on a level surface and apply the parking brake.
- 2. Check:
- Shock absorber assembly Refer to "CHECKING THE FRONT SHOCK ABSORBER ASSEMBLIES" on page 4-34 and "CHECKING THE REAR SHOCK AB-SORBER ASSEMBLIES" on page 4-38.
- Operation

Pump the front shock absorber assembly up and down several times.

Unsmooth operation \rightarrow Replace shock absorber assembly.

Refer to "FRONT SUSPENSION COMPONENTS" on page 4-32 and "REAR SUSPENSION COMPONENTS" on page 4-36.

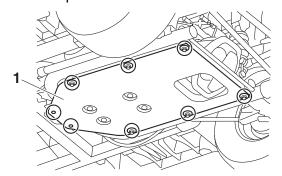
CHECKING THE FUEL HOSE (YUM1A/YUM2A)

- 1. Check:
 - Fuel hose
 Cracks/damage → Replace.
 Loosen the connector → Connect properly.

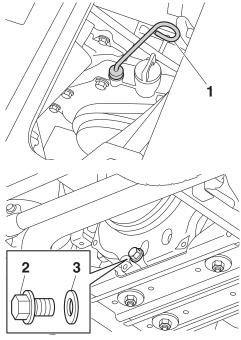
ANNUAL CHECKS

CHANGING THE ENGINE OIL (YUM1A/YUM2A)

- 1. Start the engine, warm it up for several minutes, and then turn it off.
- 2. Remove:
 - Bottom panel "1"



- 3. Place a container under the engine oil drain bolt.
- 4. Remove:
 - Dipstick "1"
 - Engine oil drain plug "2" (along with the gasket "3")



- 5. Drain:
 - Engine oil (completely from the crankcase)
- 6. Install:
 - Engine oil drain plug
 (along with the gasket New)



Engine oil drain plug 27 N·m (2.7 kgf·m, 20 lb·ft)

7. Fill:

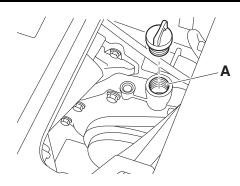
Crankcase

 (with the specified amount of the recommended engine oil)

 Refer to "CHECKING THE ENGINE OIL LEVEL (YUM1A/YUM2A)" on page 3-4.



Engine oil quantity
1.1 L (1.16 US qt, 0.97 Imp-qt)



- A. Oil filler hole
- 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 (YUM1A/YUM2A)" on page 3-4.
- 12.Install:
- Bottom panel



Bottom panel bolt 7 N·m (0.7 kgf·m, 5.2 lb·ft)

ADJUSTING THE THROTTLE CABLES (YUM1A/YUM2A)

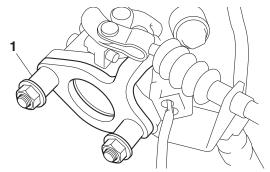
NOTICE

 When service is performed on the throttle body, throttle cables or governor parts, the vehicle maximum speed should be checked and the speed limiter setting adjusted as necessary.

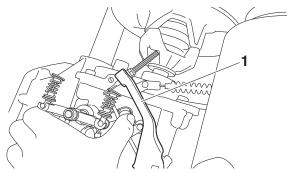
- There are two separate throttle cables.
 Each cable requires adjustment for free play and full throttle operation.
- 1. Turn the main switch to the "OFF" position.
- 2. Remove the under-seat panel (YUM1A). Refer to "GENERAL CHASSIS (1)" on page 4-1.
- 3. Lift up the cargo bed.
- 4. Remove:
- Service lid Refer to "GENERAL CHASSIS (5)" on page 4-10.
- Air filter case Refer to "AIR FILTER CASE" on page 6-4.
- 5. Attach:
 - Throttle valve angle adjusting tool "1"



Throttle valve angle adjusting tool 90890-01597



6. Turn the governor lever "1" counterclockwise until it stops.

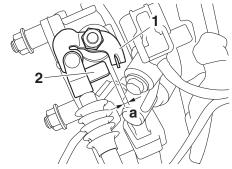


- 7. Measure:
 - Clearance "a"

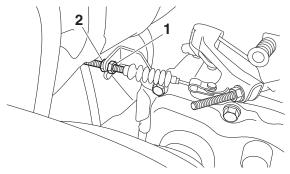
The clearance is between the throttle lever "1" and throttle valve angle adjusting tool "2". Out of specification \rightarrow Adjust.



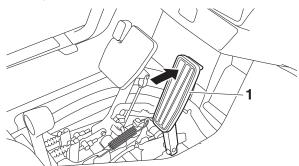
Clearance 0.2–1.5 mm (0.02–0.06 in)



- a. Loosen the locknut "1".
- b. Turn the adjusting nut "2" in or out until the clearance is obtained.



- c. Tighten the locknut.
- 8. Fully depress the acceleration pedal "1".

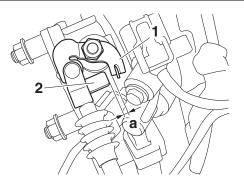


- 9. Measure:
 - Clearance "a"

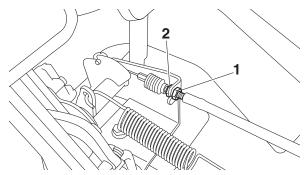
The clearance is between the throttle lever "1" and throttle valve angle adjusting tool "2". Out of specification \rightarrow Adjust.



Clearance 0.2-1.5 mm (0.02-0.06 in)



- a. Loosen the locknut "1".
- b. Turn the adjusting nut "2" in or out until the clearance is obtained.



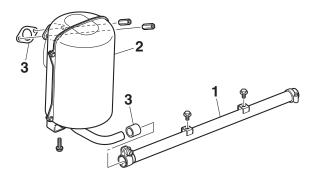
- c. Tighten the locknut.
- 10.Remove:
- Throttle valve angle adjusting tool
- 11.Install:
 - Air filter case Refer to "AIR FILTER CASE" on page 6-4.
 - Service lid Refer to "GENERAL CHASSIS (5)" on page 4-10.

CHECKING THE EXHAUST SYSTEM (YUM1A/YUM2A)

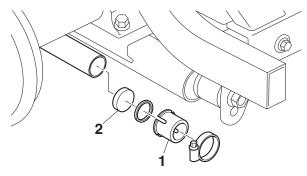
- 1. Check:
- Exhaust pipe "1"
- Muffler "2"
 Cracks/damage → Replace.
- Gaskets "3"
 Exhaust gas leaks → Replace.
- 2. Check:
 - Tightening torque



Muffler nut 17 N·m (1.7 kgf·m, 13 lb·ft) Exhaust pipe clamp bolt 17 N·m (1.7 kgf·m, 13 lb·ft) Mount bolt 25 N·m (2.5 kgf·m, 18 lb·ft)



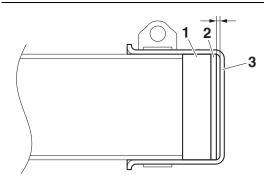
- 3. Remove:
 - Exhaust pipe tail cap "1"
 - Exhaust pipe tail screen "2"



- 4. Check:
 - Exhaust pipe tail screen
 Dirt/clogging/damage → Clean or replace.
- 5. Install:
- Exhaust pipe tail screen "1"
- Washer "2"
- Exhaust pipe tail cap "3"

TIP

When installing the exhaust pipe tail cap "3", install the cap all the way onto the exhaust pipe, and then move the cap back 1 mm (0.04 in) so that there is a space of 1 mm (0.04 in) between the washer "2" and the cap "3".



- 6. Tighten:
- Exhaust pipe tail clamp



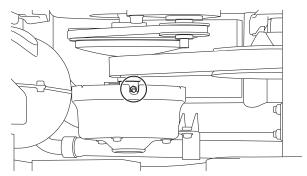
Exhaust pipe tail clamp 2.0 N·m (0.20 kgf·m, 1.5 lb·ft)

LUBRICATING THE PRIMARY SHEAVE (YUM1A/YUM2A)

- 1. Lift up the cargo bed (YUM2A).
- 2. Remove:
- Driver seat frame (YUM1A)
 Refer to "GENERAL CHASSIS (1)" on page 4-1.
- 3. Lubricate:
- Primary sheave



Recommended lubricant Lithium-soap-based grease



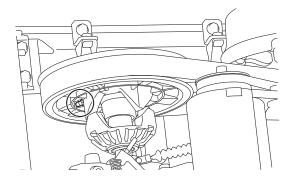
- 4. Install:
 - Driver seat frame (YUM1A)
 Refer to "GENERAL CHASSIS (1)" on page 4-1.

LUBRICATING THE SECONDARY SHEAVE (YUM1A/YUM2A)

- 1. Lift up the cargo bed.
- 2. Lubricate:
 - Secondary sheave

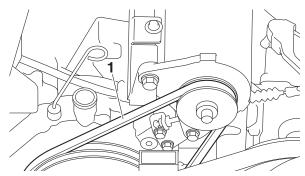


Recommended lubricant Lithium-soap-based grease



CHECKING AND ADJUSTING THE STARTER GENERATOR BELT (YUM1A/YUM2A)

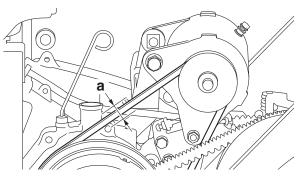
- Remove the under-seat panel (YUM1A).
 Refer to "GENERAL CHASSIS (1)" on page 4-1.
- 2. Lift up the cargo bed.
- 3. Check:
 - Starter generator belt "1"
 Cracks/damage/wear → Replace.
 Grease/oil → Clean.



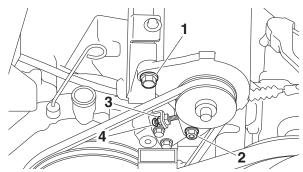
- 4. Check:
 - Starter generator belt tension "a"
 Apply 100 N (10 kg, 22 lb) of force to the center of the starter generator belt.
 Out of specification → Adjust.



Starter generator belt tension 8–12 mm (0.31–0.47 in)



- 5. Adjust:
 - Starter generator belt tension
 - a. Loosen the starter generator mounting bolts "1" and nut "2".
 - b. Loosen the locknut "3.
 - c. Turn the adjusting bolt "4" until the specified starter generator belt tension is obtained.



d. Tighten the locknut to specification.



Locknut 7 N·m (0.7 kgf·m, 5.2 lb·ft)

e. Tighten the starter generator mounting bolts to specification.



Starter generator mounting bolt 66 N·m (6.6 kgf·m, 49 lb·ft)

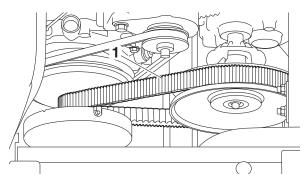
f. Tighten the nut to specification.



Starter generator mounting nut 25 N·m (2.5 kgf·m, 18 lb·ft)

CHECKING THE DRIVE BELT (YUM1A/YUM2A)

- 1. Lift up the cargo bed.
- 2. Remove:
 - Driver seat frame (YUM1A)
 Refer to "GENERAL CHASSIS (1)" on page 4-1
- 3. Check:
 - Drive belt "1"
 Cracks/damage/wear → Replace.
 Grease/oil → Clean.



- 4. Install:
 - Driver seat frame (YUM1A)
 Refer to "GENERAL CHASSIS (1)" on page 4-1.

CHECKING THE SPEED LIMITER OPERATION (YUM1A/YUM2A)

TIP

The speed limiter is properly adjusted at the factory. No adjustment is normally required.

NOTICE

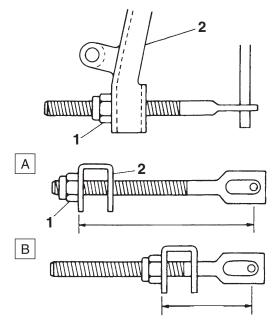
- When service is performed on the throttle body, throttle cables or governor parts, the vehicle maximum speed should be checked and the speed limiter setting adjusted as necessary.
- Before performing repairs, mark the present limiter setting with a paint mark for future reference. Return the adjustment to the original setting after repairs are completed, then test the vehicle speed.

- 1. Check:
 - Standard speed limiter setting Out of specification → Adjust.



Standard speed limiter setting 28 km/h (17.5 mph)

- 2. Lift up the cargo bed.
- 3. Adjust:
 - · Speed limiter setting
 - a. Turn the adjusting nut "1" to adjust it to the proper speed limiter setting.

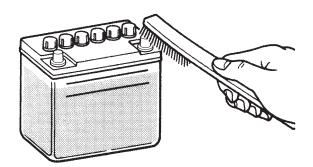


- A. Minimum speed limiter setting
- B. Maximum speed limiter setting
- 2. Speed limiter lever

CHECKING THE BATTERY TERMINALS

- 1. Check:
 - Battery terminals
 Looseness → Tighten.

Corrosion → Rinse with warm water and clean with a soft wire brush, etc.

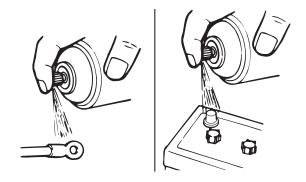


- 2. Lubricate:
 - Battery cable connector

Battery terminal



Yamaha battery terminal cleaner & protector ACC-BATTC-LN-PR



CHECKING THE WIRE HARNESS (YUM1A/YUM2A)

- 1. Check:
 - Wire harness Cracks/frayed/corrosive → Replace.

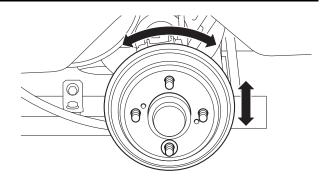
TESTING THE DISCHARGE LOAD (YUM2E)

- 1. Check:
 - Discharge load
 Refer to "Discharge Load Test" on page 8-73.

CHECKING THE REAR AXLE BEARINGS

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

- 1. Park the vehicle on a level surface and apply the parking brake.
- 2. Remove:
 - Rear wheel Refer to "FRONT AND REAR WHEELS" on page 4-16.
- 3. Release the parking brake.
- 4. Move the shift lever to the neutral position. (YUM1A/YUM2A)
- Move the tow switch to the "TOW" position. (YUM2E)
- 6. Check:
 - Rear axle bearing Rattle/abnormal noises/turns roughly → Replace.
 - a. Turn the rear axle slowly by hand.
 - b. Move the rear axle up and down.

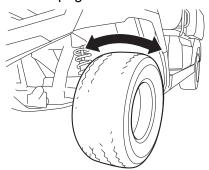


CHECKING THE STEERING KNUCKLES

- 1. Park the vehicle on a level surface and apply the parking brake.
- 2. Raise the front end of the vehicle so that there is no weight on the front wheels.
- 3. Check:
- Steering knuckle

Excessive free play \rightarrow Replace the steering knuckle.

Refer to "FRONT SUSPENSION COMPONENTS" on page 4-32.



ADJUSTING THE WHEEL ALIGNMENT

- 1. Park the vehicle on a level surface and apply the parking brake.
- 2. Measure:
 - Toe-in

Out of specification \rightarrow Adjust.



Toe-in 0-10 mm (0-0.39 in)

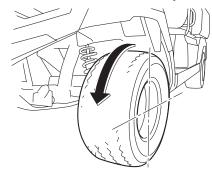
TIP

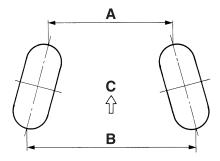
Before measuring the toe-in, make sure that the tire pressure is correct.

- a. Mark both front tire tread centers.
- b. Face the steering wheel 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.

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

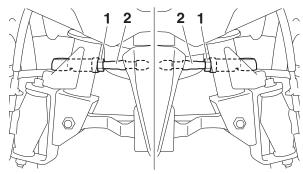




- C. Forward
- 3. Adjust:
- Toe-in

WARNING

- Be sure that both tie-rods are turned the same amount. If not, the vehicle will drift right or left even though the steering wheel is straight. This may lead to mishandling and an accident.
- After setting the toe-in to specification, run the vehicle slowly for some distance with both hands lightly holding the steering wheel and check that the steering wheel responds correctly. If not, turn either the right or left tie-rod within the toe-in specification.
 - Mark both tie-rods ends.
 This reference point will be needed during adjustment.
 - b. Loosen the tie-rod end locknuts "1" of both tie-rods.
 - c. The same number of turns should be given to both the right and left tie-rods "2" until the specified toe-in is obtained. This is to keep the length of the tie-rods the same.



d. Tighten the tie-rod end locknuts to specification.



Tie-rod end locknut 45 N⋅m (4.5 kgf⋅m, 33 lb⋅ft)

- 4. Check:
- Steering wheel Refer to "INSTALLING THE STEERING WHEEL" on page 4-14.

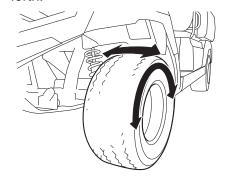
TIP

After adjusting the toe-in, the steering wheel should be centered.

CHECKING THE FRONT WHEEL BEARING

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

- 1. Park the vehicle on a level surface and apply the parking brake.
- 2. Check:
 - Front wheel bearing Rattle/abnormal noises/turns roughly → Replace.
 - a. Raise the front end of the vehicle so that there is no weight on the rear wheels.
 - b. Turn the front wheels.
 - c. Move the front wheels laterally back and forth.



ANNUAL CHECKS

CHECKING THE TRANSMISSION OIL LEVEL

- 1. Park the vehicle on a level surface and apply the parking brake.
- 2. Remove:
 - Oil level plug "1"
- 3. Check:
 - Transmission oil level

The transmission oil level should be up to the brim of the hole.

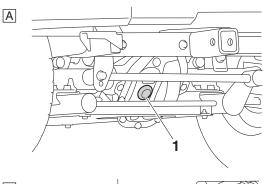
Below the brim \rightarrow Add the recommended transmission oil to the proper level.

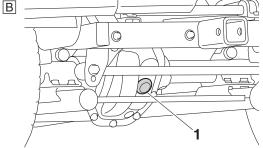


Гуре SAE 80W-90 or SAE 90 gear oil

NOTICE

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





- A. YUM1A/YUM2A
- B. YUM2E
- 4. Install:
 - Oil level plug

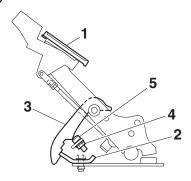
ADJUSTING THE PARKING BRAKE RELEASE TIMING

- 1. Adjust:
- Parking brake release timing

NOTICE

Before performing parking brake release adjustment, adjust brake pedal free play.

- a. Apply pressure to the parking brake pedal "1" until the brake nail "2" catches the first latch position on the sector "3".
- b. Loosen the locknut "4" and turn the bolt "5" counterclockwise until it contacts the sector
- c. Turn the bolt clockwise 120 degrees, then tighten locknut.



4-YEAR CHECKS

CHECKING THE STARTER GENERATOR BRUSHES AND COMMUTATOR (YUM1A/YUM2A)

- 1. Check:
 - Brush length
 - Commutator diameter Refer to "CHECKING THE STARTER GEN-ERATOR" on page 5-19.

CHECKING THE CYLINDER HEAD BOLTS (YUM1A/YUM2A)

- 1. Check:
 - Cylinder head bolts
 Loosen → Tighten.
 Refer to "INSTALLING THE CYLINDER
 HEAD" on page 5-9.

ADJUSTING THE VALVE CLEARANCE (YUM1A/YUM2A)

TIP

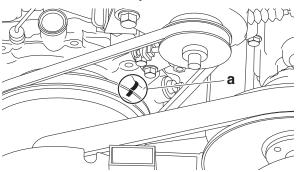
- Valve clearance adjustment should be made on a cold engine, at room temperature.
- When the valve clearance is to be measured or adjusted, the piston must be at top dead center (TDC) on the compression stroke.
- 1. Remove:
 - Seat frames (driver and passenger)
 Refer to "GENERAL CHASSIS (1)" on page 4-1.
- 2. Lift up the cargo bed (YUM2A).
- 3. Remove:
 - Spark plug
 - Cylinder head cover Refer to "CYLINDER HEAD AND ROCKER ARMS" on page 5-6.
- 4. Measure:
 - Valve clearance
 Out of specification → Adjust.



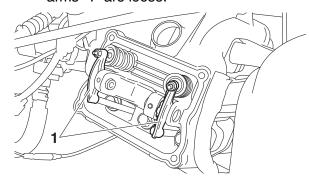
Valve clearance cold Intake and exhaust 0.05-0.09 mm (0.0020-0.0035 in)

- a. Carefully insert a dial gauge through the spark plug hole until it touches the top of the piston.
- Rotate the primary sheave assembly until the dial indicator reaches its highest position.

c. Paint alignment marks "a" on the primary sheave assembly and crankcase.



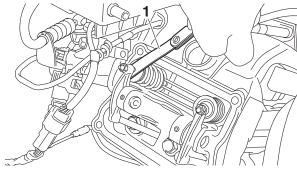
d. Check that the intake and exhaust rocker arms "1" are loose.



- e. If the intake and exhaust rocker arms are not loose, rotate the primary sheave assembly one full turn counterclockwise.
- f. Measure the valve clearance with a thickness gauge "1".



Thickness gauge 90890-03180 Feeler gauge set YU-26900-9

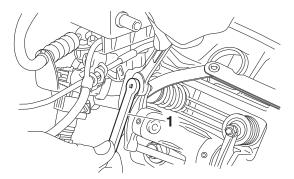


- 5. Adjust:
- Valve clearance
 - a. Loosen the locknut.
 - Turn the adjuster with the tappet adjusting tool "1" in or out until the specified clearance is obtained.

4-YEAR CHECKS



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



c. Tighten the locknut to specification.



Locknut 7 N·m (0.7 kgf·m, 5.2 lb·ft)

- 6. Install:
 - Cylinder head cover
 - Spark plug Refer to "CYLINDER HEAD AND ROCKER ARMS" on page 5-6.

TIP.

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

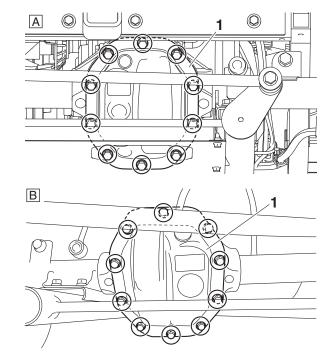


Cylinder head cover bolt 11 N·m (1.1 kgf·m, 8.1 lb·ft) Spark plug 20 N·m (2.0 kgf·m, 15 lb·ft)

CHANGING THE TRANSMISSION OIL

- 1. Park the vehicle on a level surface and apply the parking brake.
- 2. Place a container under the transmission case.
- 3. Remove:
 - Differential cover "1"
 - Gasket

Completely drain the transmission case of its oil.



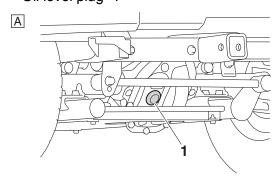
- A. YUM1A/YUM2A
- B. YUM2E
- 4. Install:
 - Gasket New
 - Differential cover

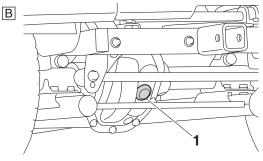


Differential cover bolt 28 N⋅m (2.8 kgf⋅m, 21 lb⋅ft)

5. Remove:

• Oil level plug "1"





A. YUM1A/YUM2A

B. YUM2E

- 6. Fill:
 - Transmission case (with the specified amount of the recommended transmission oil)



Type

SAE 80W-90 or SAE 90 gear oil

NOTICE

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

- 7. Check:
 - Oil level Refer to "CHECKING THE TRANSMISSION OIL LEVEL" on page 3-19.

CHECKING THE BRAKE SHOES

Refer to "CHECKING THE BRAKES" on page 4-22.

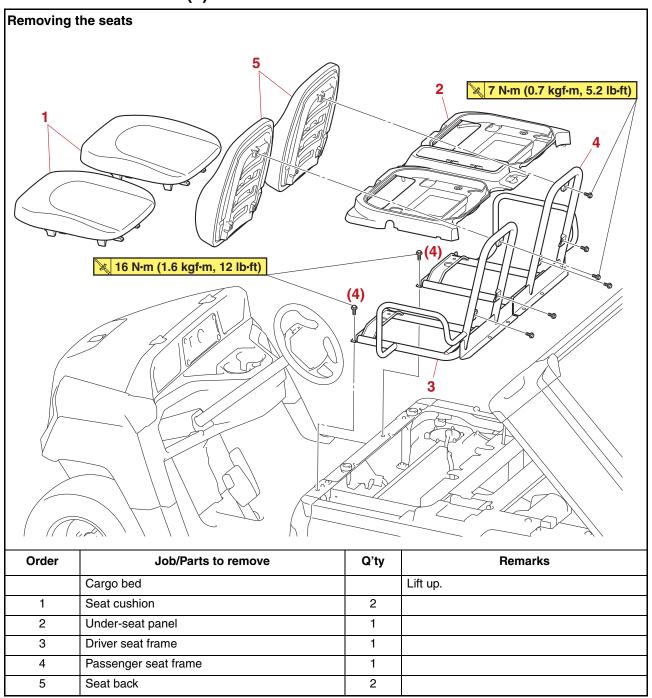
CHASSIS

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GENERAL CHASSIS (1)

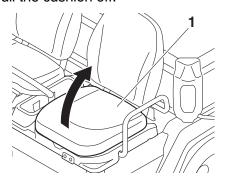
GENERAL CHASSIS (1)



REMOVING THE SEATS

The following procedure applies to both of the seats.

- 1. Remove:
 - Seat cushion "1"
 - a. Lift the front of the seat cushion.
 - b. Pull the cushion off.



INSTALLING THE SEATS

The following procedure applies to both of the seats.

- 1. Install:
 - Seat cushion "1"

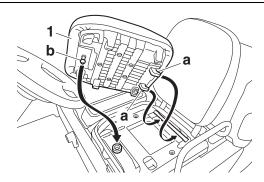
WARNING

A loose seat could cause the operator to lose control, or cause the operator or passenger to fall.

- a. Insert the projections "a" on the rear of the seat cushion under the seat frame.
- b. Insert the projection "b" on the front of the cushion into the grommet while pushing the cushion downward.

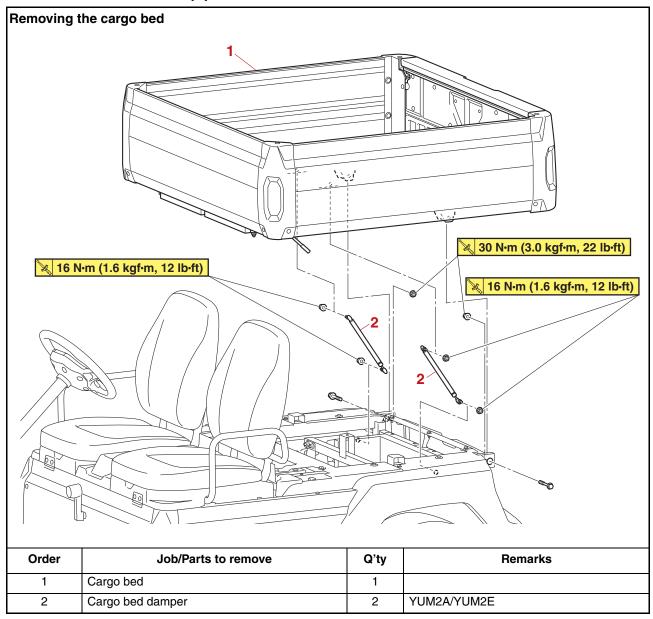
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Make sure the seats are properly secured before riding.

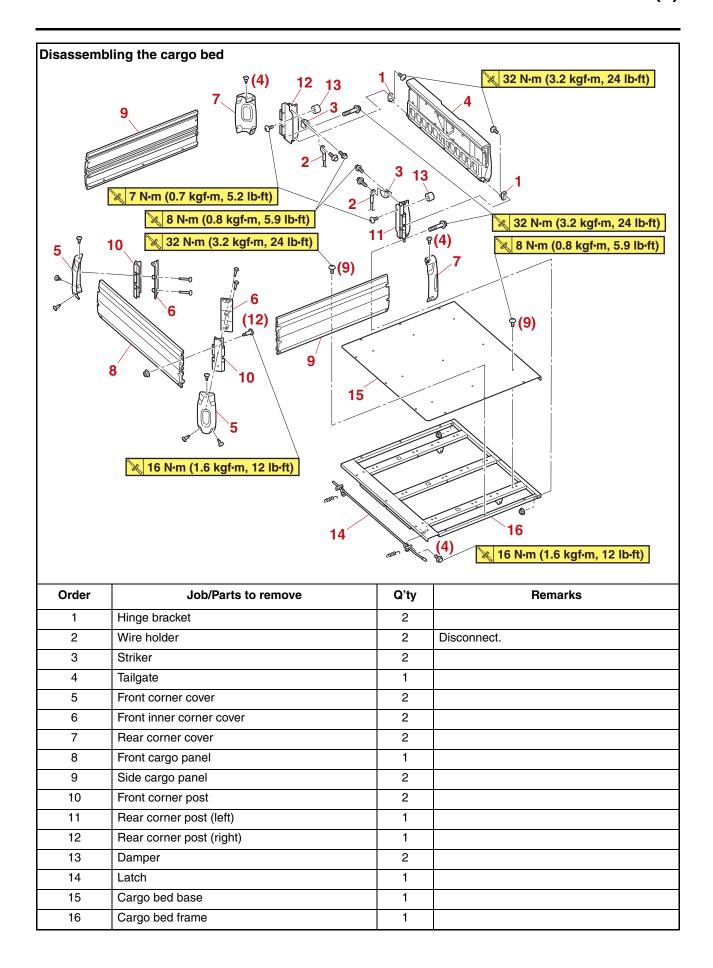


GENERAL CHASSIS (2)

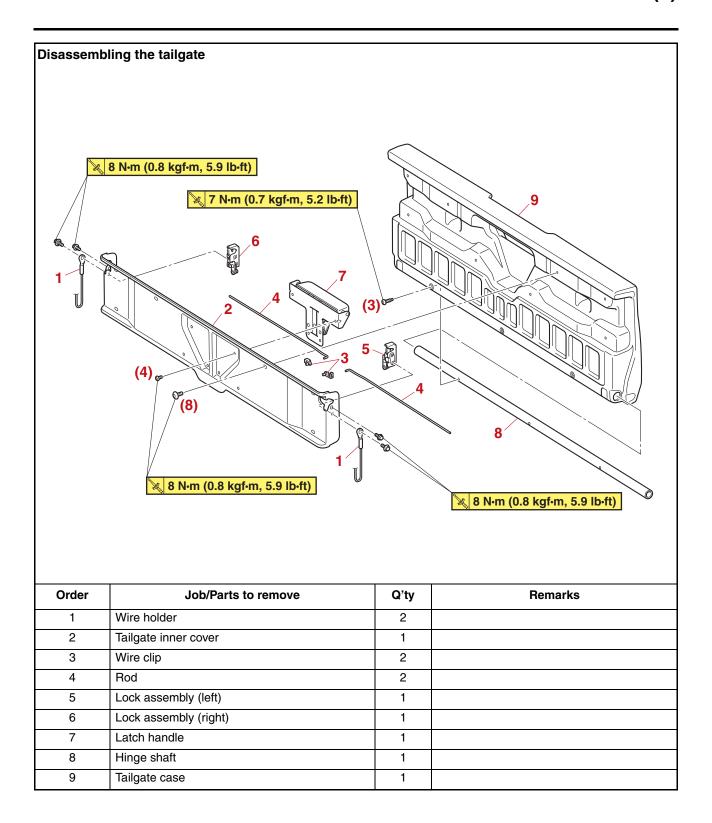
GENERAL CHASSIS (2)



GENERAL CHASSIS (2)

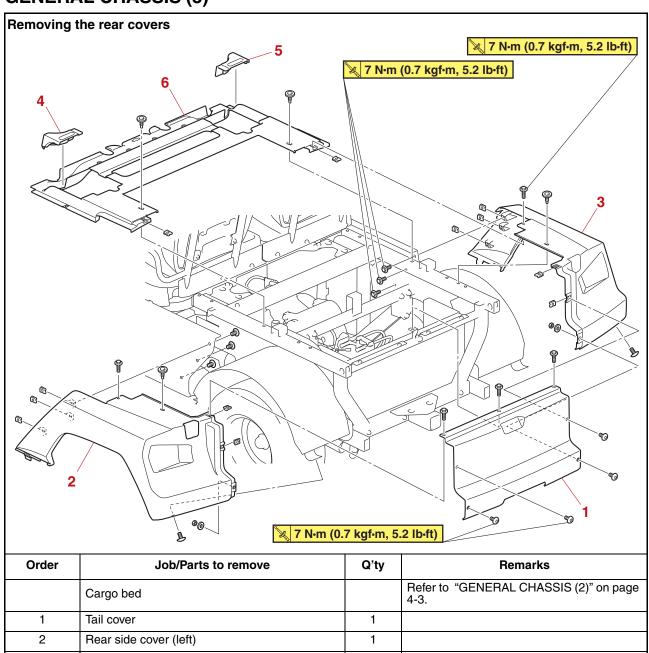


GENERAL CHASSIS (2)



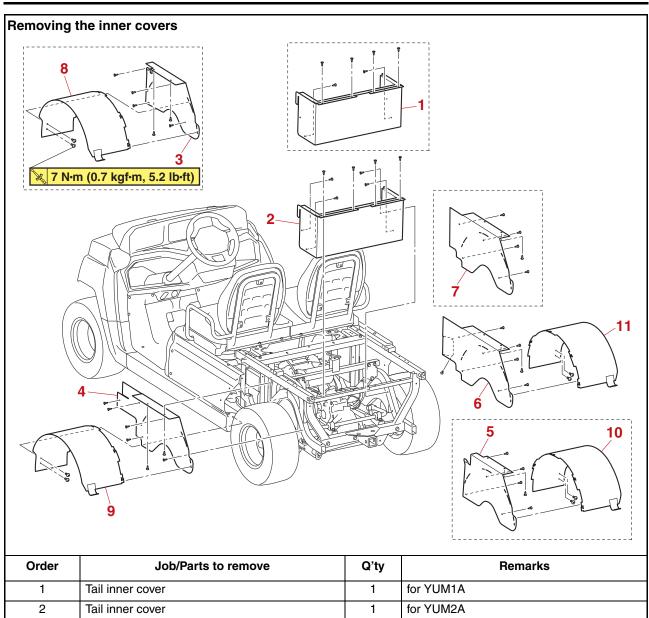
GENERAL CHASSIS (3)

GENERAL CHASSIS (3)



Order	Job/Parts to remove	Q'ty	Remarks
	Cargo bed		Refer to "GENERAL CHASSIS (2)" on page 4-3.
1	Tail cover	1	
2	Rear side cover (left)	1	
3	Rear side cover (right)	1	
4	Rear frame cover (left)	1	
5	Rear frame cover (right)	1	
6	Rear upper cover	1	

GENERAL CHASSIS (3)



Order	Job/Parts to remove	Q'ty	Remarks
1	Tail inner cover	1	for YUM1A
2	Tail inner cover	1	for YUM2A
3	Rear inner cover (left)	1	for YUM1A
4	Rear inner cover (left)	1	for YUM2A/YUM2E
5	Rear inner cover (right)	1	for YUM1A
6	Rear inner cover (right)	1	for YUM2A
7	Rear inner cover (right)	1	for YUM2E
8	Mudguard (left)	1	for YUM1A
9	Mudguard (left)	1	for YUM2A/YUM2E
10	Mudguard (right)	1	for YUM1A
11	Mudguard (right)	1	for YUM2A/YUM2E

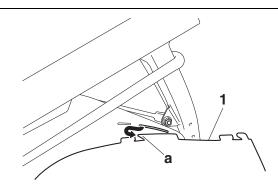
REMOVING THE MUDGUARD

The following procedure applies to both of the mudguards.

- 1. Remove:
 - Rear inner cover (With mudguard)
- 2. Remove:
 - Mudguard "1"

	_

Unhook the projections "a" on the mudguard from the rear inner cover.



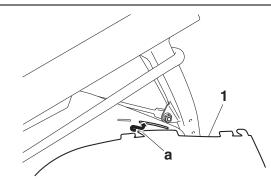
INSTALLING THE MUDGUARD

The following procedure applies to both of the mudguards.

- 1. Install:
 - Mudguard "1"

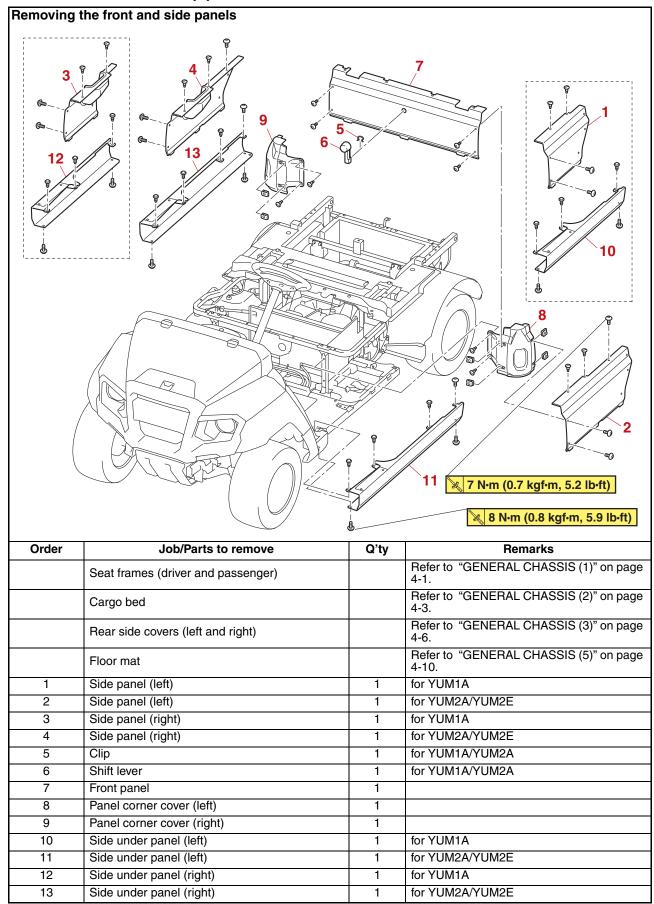
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Fit the projections "a" on the mudguard into the rear inner cover.



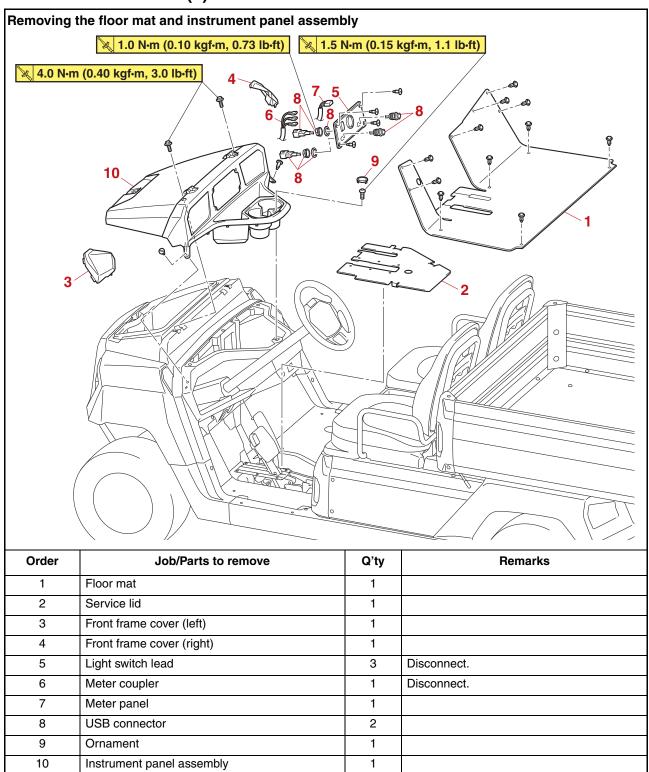
- 2. Install:
 - Rear inner cover (With mudguard)

GENERAL CHASSIS (4)

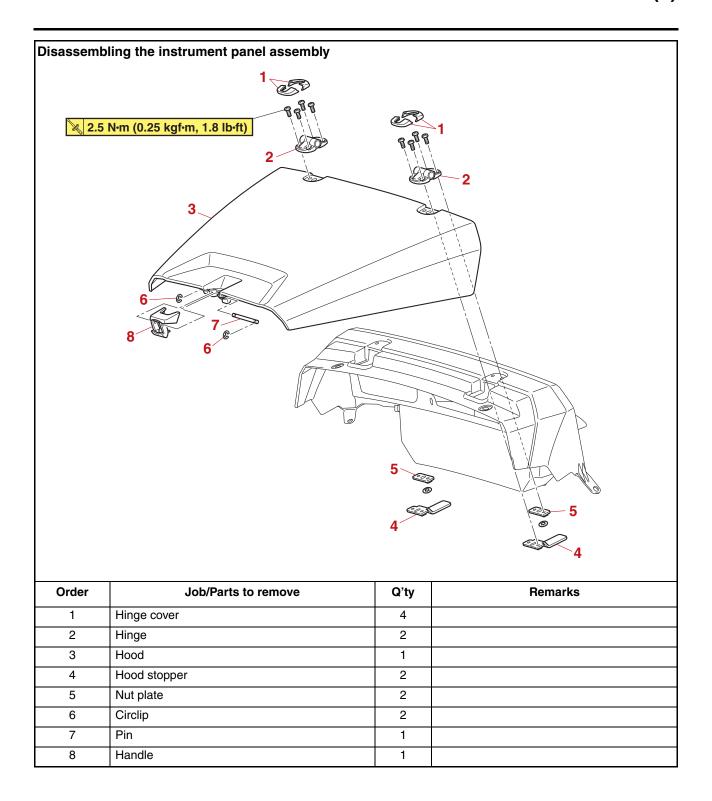


GENERAL CHASSIS (5)

GENERAL CHASSIS (5)



GENERAL CHASSIS (5)

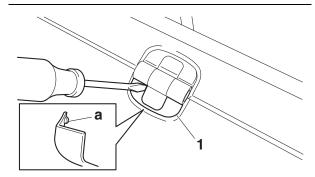


REMOVING THE HOOD

- 1. Remove:
 - Hinge cover

TIP ____

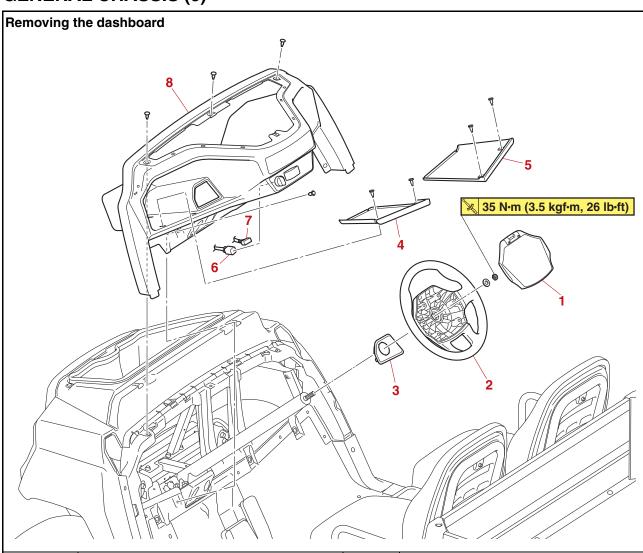
When removing the hinge cover "1", use a flathead screwdriver to push the cover outward and release the projection "a".



- 2. Remove:
 - Screws
 - Hood

GENERAL CHASSIS (6)

GENERAL CHASSIS (6)



Order	Job/Parts to remove	Q'ty	Remarks
	Instrument panel assembly		Refer to "GENERAL CHASSIS (5)" on page 4-10.
1	Scorecard holder	1	
2	Steering wheel	1	
3	Steering grommet	1	
4	Storage compartment mat (left)	1	
5	Storage compartment mat (right)	1	
6	Main switch coupler	1	Disconnect.
7	Shift switch coupler	1	for YUM2E Disconnect.
8	Dashboard	1	

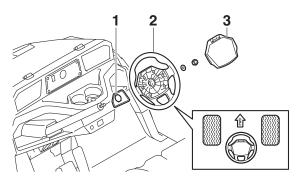
INSTALLING THE STEERING WHEEL

- 1. Install:
- Steering grommet "1"
- Steering wheel "2"Scorecard holder "3"

With the front wheels pointing straight ahead, install the steering wheel as shown in the illustration.

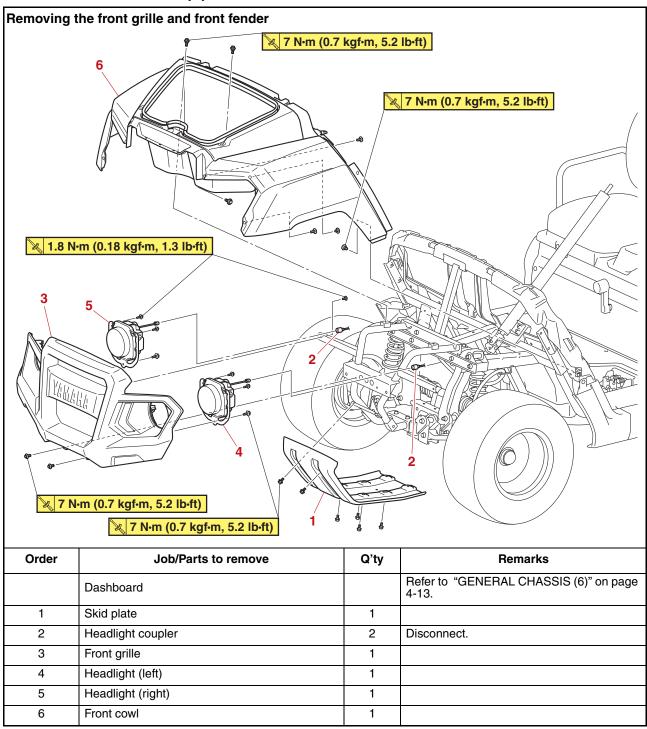


Steering wheel nut 35 N·m (3.5 kgf·m, 26 lb·ft)

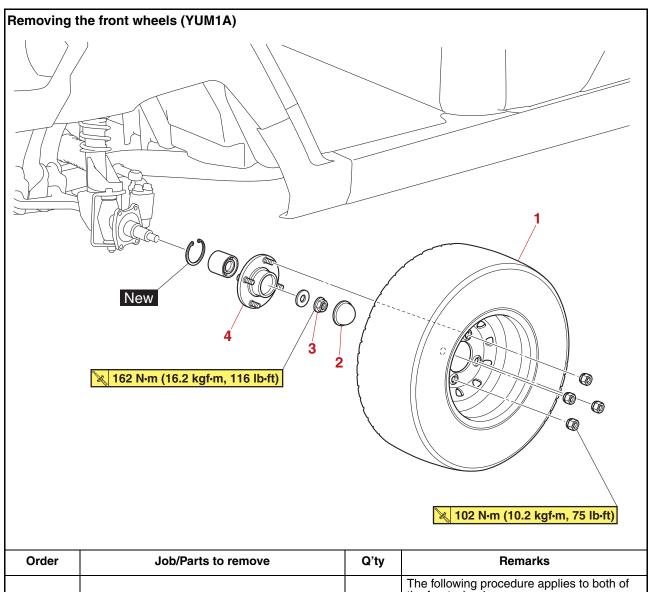


GENERAL CHASSIS (7)

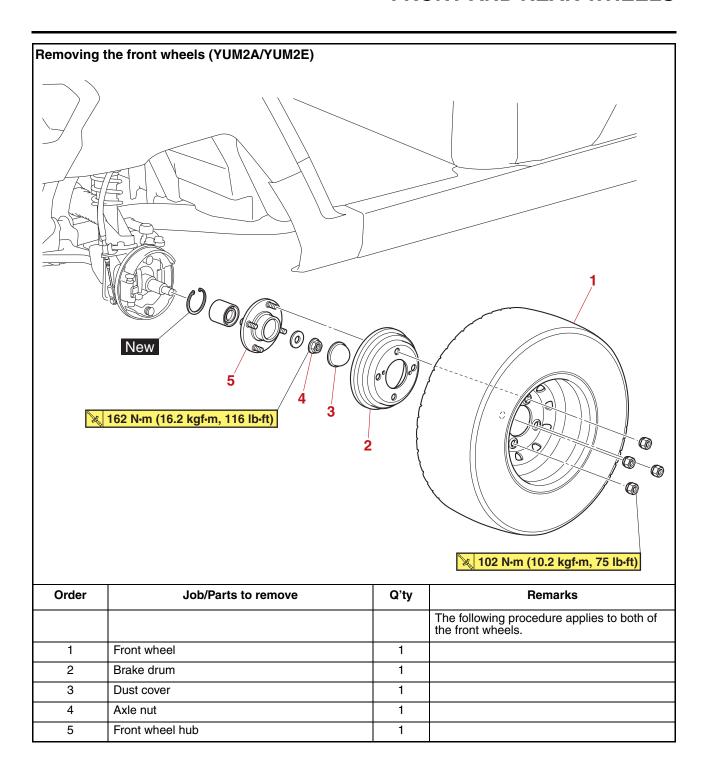
GENERAL CHASSIS (7)

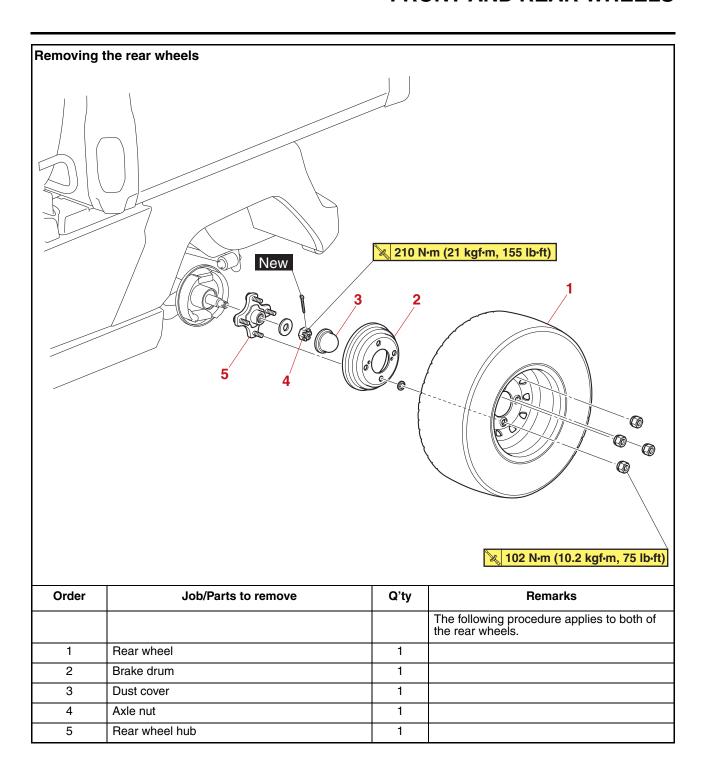


FRONT AND REAR WHEELS



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front wheels.
1	Front wheel	1	
2	Dust cover	1	
3	Axle nut	1	
4	Front wheel hub	1	





REMOVE THE WHEELS

- 1. Park the vehicle on a level surface and apply the parking brake.
- 2. Elevate:
 - Wheels

TIP_

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

CHECKING THE WHEELS

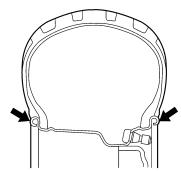
The following procedure applies to all of the wheels.

- 1. Check:
 - Tire
 - Wheel Refer to "CHECKING THE TIRES" on page 3-6 and "CHECKING THE WHEELS" on

page 3-6.

WARNING

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



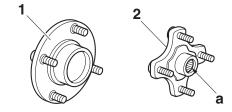
- 2. Check:
- Wheel bearings
 Wheel turns roughly or is le

Wheel turns roughly or is loose \rightarrow Replace.

CHECKING THE WHEEL HUBS

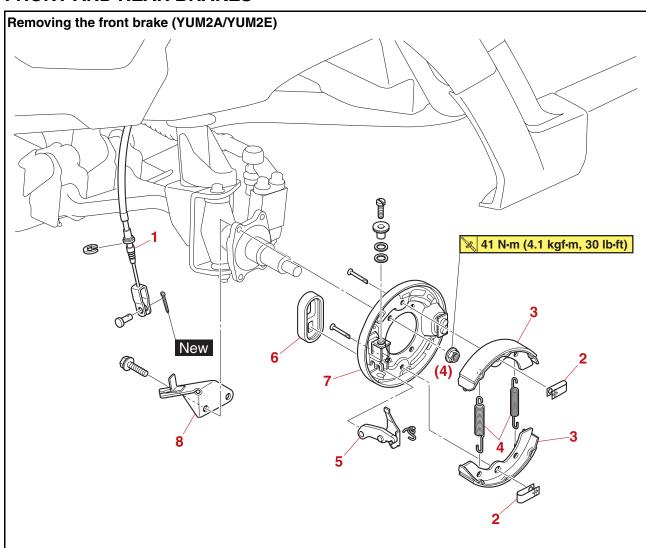
The following procedure applies to all of the wheel hubs.

- 1. Check:
 - Front wheel hub "1"
 - Rear wheel hub "2"
 Cracks/damage → Replace.
 - Splines (rear wheel hub) "a" Wear/damage → Replace.



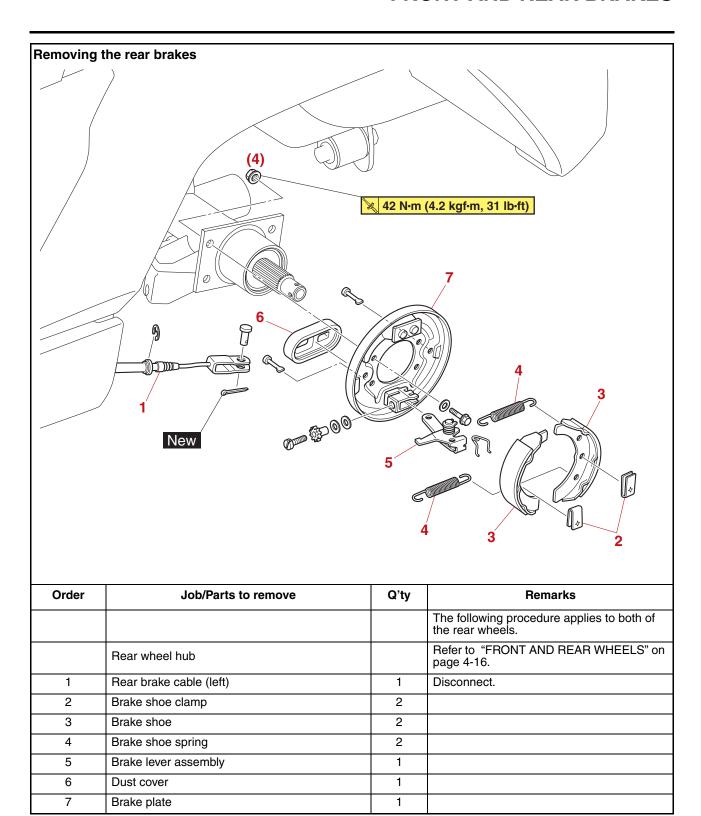
FRONT AND REAR BRAKES

FRONT AND REAR BRAKES



Order	Job/Parts to remove	Q'ty	Remarks
			The following procedure applies to both of the front brakes.
	Front wheel hub		Refer to "FRONT AND REAR WHEELS" on page 4-16.
1	Front brake cable (left)	1	Disconnect.
2	Brake shoe clamp	2	
3	Brake shoe	2	
4	Brake shoe spring	2	
5	Brake lever assembly	1	
6	Dust cover	1	
7	Brake plate	1	
8	Brake cable bracket	1	

FRONT AND REAR BRAKES



FRONT AND REAR BRAKES

CHECKING THE BRAKES

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

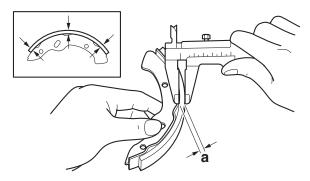
TIP

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

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



Lining thickness limit 1.5 mm (0.06 in)



WARNING

Do not allow oil or grease on the brake shoes.

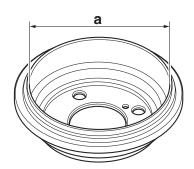
TIP

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

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



Brake drum inside diameter limit 166 mm (6.5 in)



- 4. Check:
 - Brake drum inner surface

Oil deposits \rightarrow Clean.

Remove the oil with a rag soaked in lacquer thinner or solvent.

Scratches \rightarrow Repair.

Lightly and evenly polish the scratches with an emery cloth.

- 5. Check:
 - Brake lever assembly Damage/wear → Replace.

INSTALLING THE BRAKES

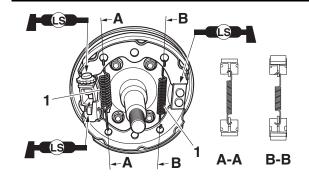
- 1. Install:
 - Brake shoe spring "1"
- Brake shoe
 Glazed areas → Repair.
 Sand the glazed areas with coarse sandpaper.

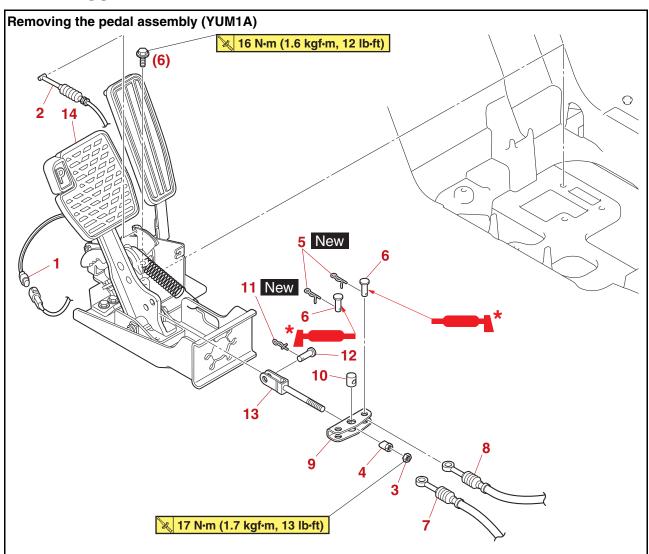
TIP

- Lubricate the pivot portion with a thin coat of lithium-soap-based grease.
- Do not to damage the springs during installation.
- Install the brake shoe springs as shown.

₩ WARNING

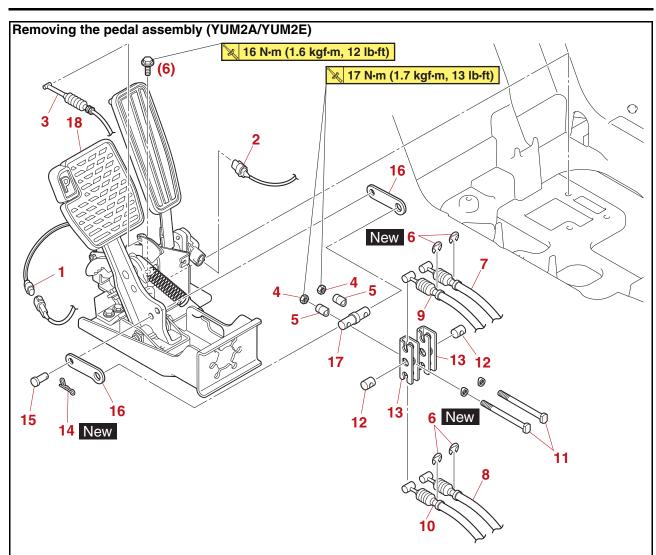
Do not apply grease to the brake shoe linings.



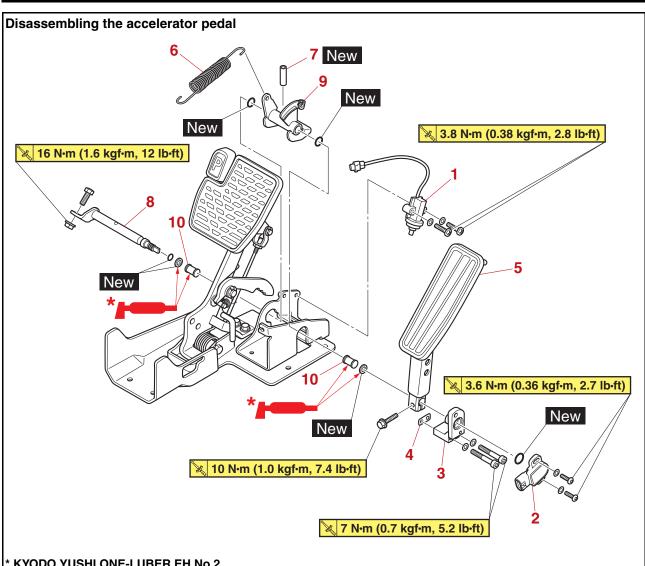


* Yamashield™ or LPS 3® Premier Rust Inhibitor

Order	Job/Parts to remove	Q'ty	Remarks
	Service lid		Refer to "GENERAL CHASSIS (5)" on page 4-10.
1	Accelerator switch coupler	1	Disconnect.
2	Throttle cable 1	1	Disconnect.
3	Brake cable locknut	1	
4	Brake cable adjusting nut	1	
5	Clip	2	
6	Pin	2	
7	Rear brake cable (left)	1	Disconnect.
8	Rear brake cable (right)	1	Disconnect.
9	Brake cable equalizer	1	
10	Pin	1	
11	Clip	1	
12	Pin	1	
13	Brake cable adjusting bolt	1	
14	Pedal assembly	1	

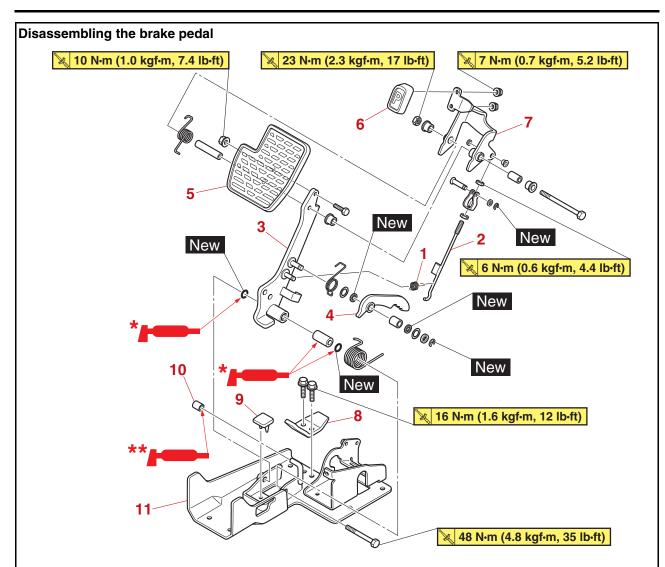


Order	Job/Parts to remove	Q'ty	Remarks
	Service lid		Refer to "GENERAL CHASSIS (5)" on page 4-10.
1	Accelerator switch coupler	1	Disconnect.
2	Throttle position sensor coupler	1	Disconnect. for YUM2E
3	Throttle cable 1	1	Disconnect. for YUM2A
4	Brake cable locknut	2	
5	Brake cable adjusting nut	2	
6	Circlip	4	
7	Front brake cable (left)	1	Disconnect.
8	Front brake cable (right)	1	Disconnect.
9	Rear brake cable (right)	1	Disconnect.
10	Rear brake cable (left)	1	Disconnect.
11	Brake cable adjusting bolt	2	
12	Pin	2	
13	Brake cable equalizer	2	
14	Clip	1	
15	Pin	1	
16	Link plate	2	
17	Link joint	1	
18	Pedal assembly	1	



* KYODO YUSHI ONE-LUBER EH No.2

Order	Job/Parts to remove	Q'ty	Remarks
1	Accelerator switch	1	
2	Throttle position sensor	1	for YUM2E
3	Throttle position sensor bracket	1	for YUM2E
4	Throttle position sensor shim	1	for YUM2E
5	Accelerator pedal	1	
6	Spring	1	
7	Pin	1	
8	Accelerator pedal shaft	1	
9	Accelerator pedal arm	1	
10	Bushing	2	



* KYODO YUSHI ONE-LUBER EH No.2 ** Yamabond 7

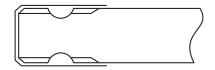
Order	Job/Parts to remove	Q'ty	Remarks
1	Spring	1	
2	Brake rod	1	
3	Brake pedal arm	1	
4	Parking brake sector	1	
5	Brake pedal	1	
6	Parking brake pedal cover	1	
7	Parking brake pedal	1	
8	Latch plate	1	
9	Brake pedal pad	1	
10	Brake rod damper	1	
11	Pedal base	1	

ASSEMBLING THE ACCELERATOR PEDAL

- 1. Install:
 - Oil seal New

TIP_

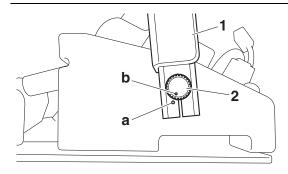
Before install the oil seal, cover the accelerator pedal shaft with a plastic bag to protect.



- 2. Install:
 - Accelerator pedal "1"

TIP

When installing accelerator pedal, align the punch mark "a" on accelerator pedal with the punch mark "b" on accelerator pedal shaft "2".



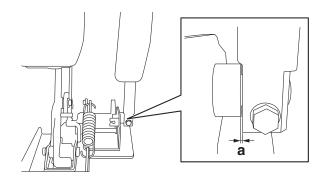


Accelerator pedal bolt 10 N·m (1.0 kgf·m, 7.4 lb·ft)

- 3. Check:
 - Accelerator pedal and bracket clearance "a"
 Out of specification → Re-assemble the accelerator pedal.



Accelerator pedal and bracket clearance 0.3–0.6 mm (0.12–0.24 in)



INSTALLING THE PEDAL ASSEMBLY

- 1. Install:
- Throttle cable (YUM1A/YUM2A)
- Brake cables
- 2. Adjust:
 - Accelerator pedal free play Refer to "ADJUSTING THE THROTTLE CA-BLES (YUM1A/YUM2A)" on page 3-12.
- 3. Adjust:
- Brake pedal free play Refer to "CHECKING THE BRAKE PEDAL FREE PLAY" on page 3-5.

ADJUSTING THE THROTTLE POSITION SENSOR (YUM2E)

NOTICE

- Handle the throttle position sensor with special care.
- Never subject the throttle position sensor to strong shocks. If the throttle position sensor is dropped, replace it.
- 1. Check:
 - Throttle position sensor Refer to "CHECKING THE THROTTLE PO-SITION SENSOR" on page 8-78.
- 2. Adjust:
 - Throttle position sensor angle
 - Connect the test harness–TPS (3P) "1" to the throttle position sensor and wire harness as shown.
 - b. Connect the digital circuit tester to the test harness– TPS (3P).



Test harness– TPS (3P) 90890-03204 Test harness– TPS (3P) YU-03204 Digital circuit tester (CD732) 90890-03243 Model 88 Multimeter with tachometer YU-A1927

- Positive tester probe blue (wire harness color)
 Negative tester probe
- Negative tester probe orange (wire harness color)
 - c. Turn the main switch to "ON".
 - d. Measure the throttle position sensor voltage when the accelerator pedal is fully pressed and when the pedal is released.
 - e. Adjust the throttle position sensor angle so that the voltage is within the specified range.



Throttle position sensor output voltage

When accelerator pedal is released

0 V

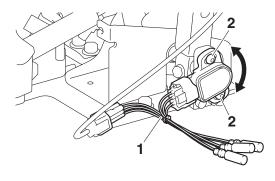
When accelerator pedal is fully pressed

3.9-5.0 V

f. After adjusting the throttle position sensor angle, tighten the throttle position sensor screws "2".

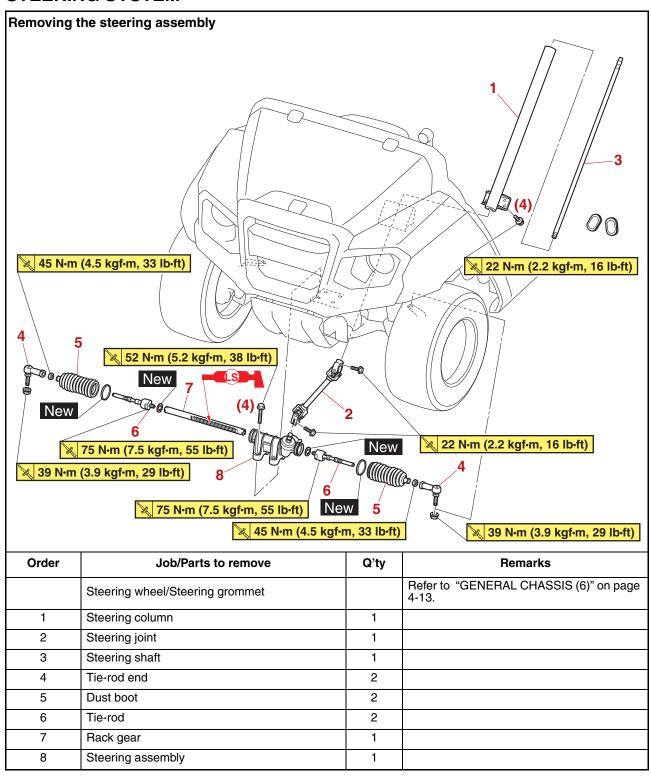


Throttle position sensor screw 3.6 N·m (0.36 kgf·m, 2.7 lb·ft)



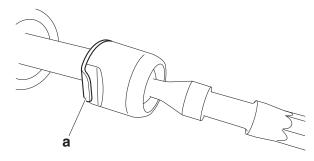
STEERING SYSTEM

STEERING SYSTEM

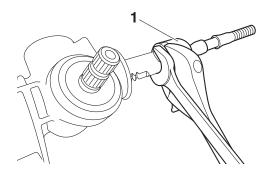


REMOVING THE TIE-ROD

1. Straighten the lock washer "a".



- 2. Loosen:
 - Tie-rod "1"



CHECKING THE STEERING JOINT

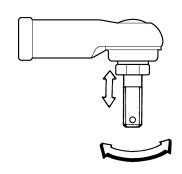
- 1. Check:
- Steering joint Rough movement \rightarrow Replace.



CHECKING THE TIE-ROD ENDS

The following procedure applies to both of the tie-rod ends.

- 1. Check:
 - Tie-rod end free play and movement Rough movement → Replace the tie-rod end.



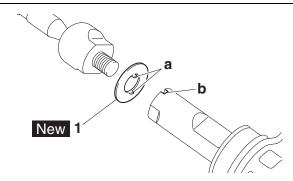
- 2. Check:
 - Tie-rod end Bends/damage → Replace. Rubber boot damage → Replace the tie-rod end.

INSTALLING THE STEERING SYSTEM

- 1. Install:
 - Lock washer "1" New

TIP_

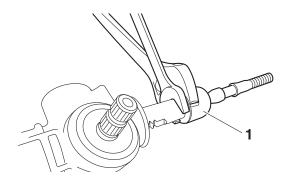
Align the tabs "a" on the lock washer with the groove "b" in the steering assembly.



- 2. Tighten:
 - Tie-rod "1"

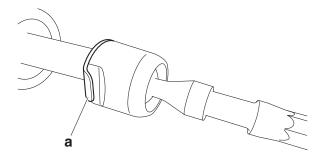


⁻ie-rod 75 N⋅m (7.5 kgf⋅m, 55 lb⋅ft)

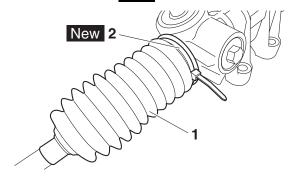


STEERING SYSTEM

3. Bends the lock washer "a".



- 4. Install:
 - Dust boots "1"
 - Boot band "2" New



- 5. Install:
 - · Steering assembly



Steering assembly bolt 52 N·m (5.2 kgf·m, 38 lb·ft)

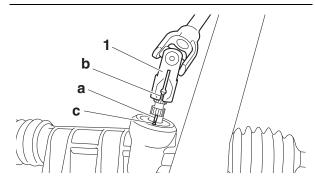
- 6. Install:
 - Steering joint "1"



Steering joint bolt 22 N·m (2.2 kgf·m, 16 lb·ft)

TIF

Align the alignment mark "a" on the steering assembly shaft and the slit "b" in the steering joint with the alignment mark "c" on the steering assembly housing.



- 7. Install
 - Steering wheel

Refer to "INSTALLING THE STEERING WHEEL" on page 4-14.

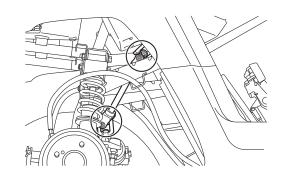
- 8. Adjust:
 - Toe-in Refer to "ADJUSTING THE WHEEL ALIGN-MENT" on page 3-17.

LUBRICATING THE STEERING SHAFT

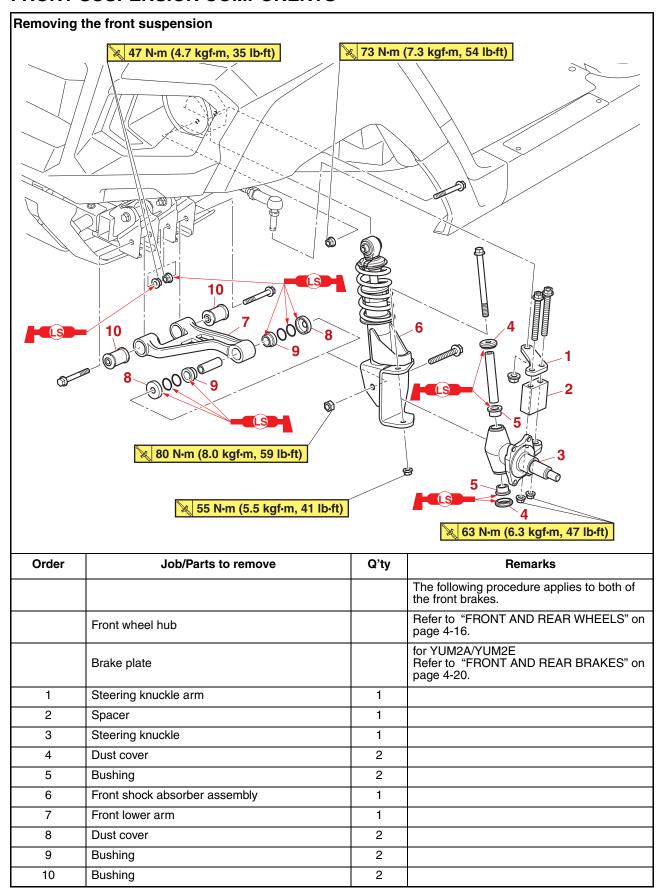
Lubricate the pivoting point and metal-to-metal moving parts of the shaft.

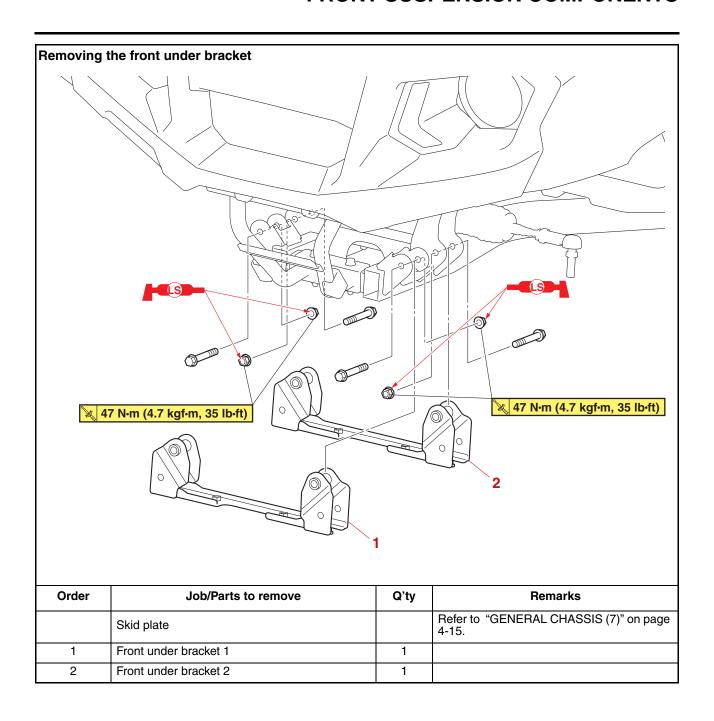


Recommended lubricant Lithium-soap-based grease



FRONT SUSPENSION COMPONENTS

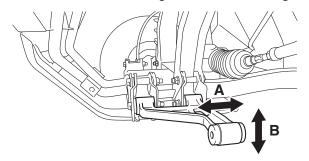




CHECKING THE FRONT LOWER ARMS

The following procedure applies to both of the front lower arms.

- 1. Check:
 - Front lower arm free play
 - 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.



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

CHECKING THE FRONT SHOCK ABSORBER ASSEMBLIES

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

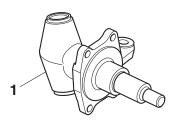
- 1. Check:
 - Front shock absorber assembly
 Oil leaks → Replace the front shock absorber assembly.
 - Front shock absorber rod Bends/damage → Replace the front shock absorber assembly.
 - Front shock absorber spring
 Move the spring up and down.
 Fatigue → Replace the front shock absorber
 assembly.

CHECKING THE STEERING KNUCKLES

The following procedure applies to all of the steering knuckles.

- 1. Check:
 - Steering knuckle "1" Cracks/damage → Replace.

Bushings
 Wear/damage → Replace.



INSTALLING THE FRONT LOWER ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES

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

- 1. Install:
- Front lower arm
- Front shock absorber assembly
- a. Install the front lower arm "1".

TIP

Temporarily tighten the front lower arm nuts "2".

b. Install the front shock absorber assembly "3".

TIP

Lubricate the front shock absorber lower mount bushing inner surface with lithium-soap-based grease.

- c. Temporarily tighten the nuts "4" and "5".
- d. Position the front lower arm "1" so that the distance "a" between the nuts "4" and "5" is 292.3 mm (11.5 in), and then tighten the front lower arm nuts "2" to specification.



Front lower arm nut 47 N·m (4.7 kgf·m, 35 lb·ft)

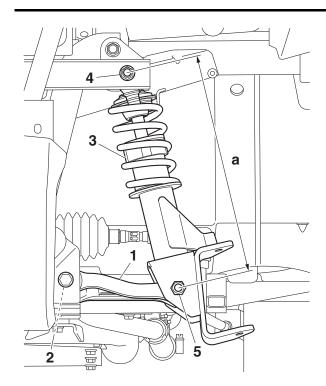
e. Tighten the nuts "4" and "5" to specification.



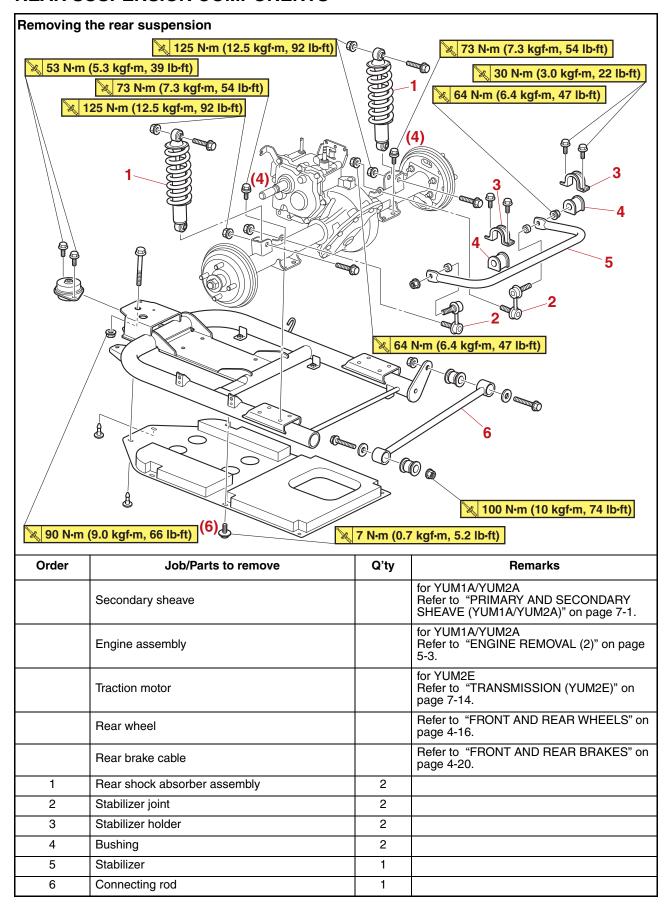
Front shock absorber assembly upper nut

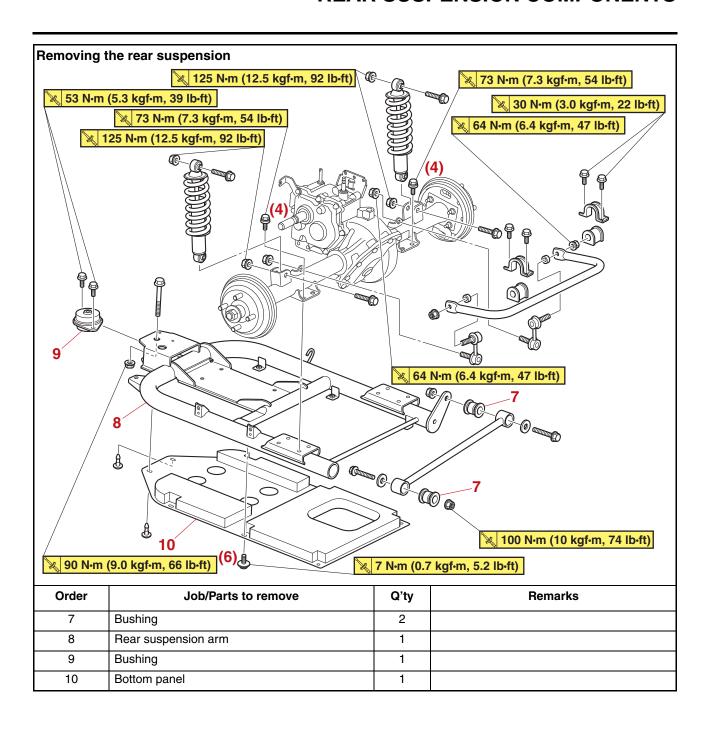
73 N·m (7.3 kgf·m, 54 lb·ft) Front shock absorber assembly lower nut

80 N·m (8.0 kgf·m, 59 lb·ft)



REAR SUSPENSION COMPONENTS





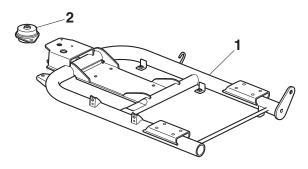
CHECKING THE REAR SHOCK ABSORBER ASSEMBLIES

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

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

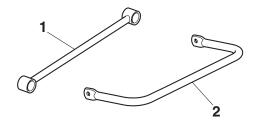
CHECKING THE REAR SUSPENSION ARM

- 1. Check:
- Rear suspension arm "1" Bends/cracks/damage → Replace.
- Bushings "2"
 Wear/damage → Replace.



CHECKING THE CONNECTING ROD AND STABILIZER

- 1. Check:
 - Connecting rod "1"
 - Stabilizer "2" Bends/cracks/damage → Replace.



- 2. Check:
 - Bushings
 Wear/damage → Replace.

INSTALLING THE CONNECTING ROD

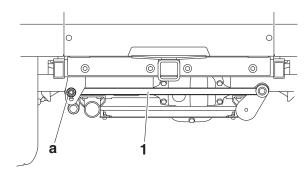
- 1. Install:
 - Connecting rod "1"

TIP __

Install the connecting rod to the upper hole "a" in the frame.



Connecting rod nut 100 N·m (10 kgf·m, 74 lb·ft)



ENGINE (YUM1A/YUM2A)

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ENGINE INSPECTION

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 "CHECKING THE ENGINE COOLING INLET DUCT (YUM1A/YUM2A)" on page 3-4.
- 2. Start the engine, warm it up for several minutes, and then turn it off.
- 3. Remove:
 - Seat frames (driver and passenger)
 Refer to "GENERAL CHASSIS (1)" on page 4-1.
- Drive belt Refer to "REPLACING THE DRIVE BELT (YUM1A/YUM2A)" on page 3-8.
- 4. Disconnect:
 - Spark plug cap
- 5. Remove:
 - Spark plug

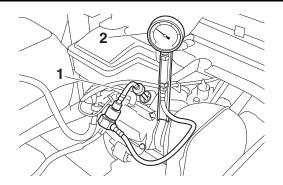
NOTICE

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

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



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



7. Measure:

Compression pressure
 Out of specification → Refer to steps (b) and (c).



Compression pressure 700–900 kPa (7.0–9.0 kgf/cm², 102–131 psi)

 a. Crank the engine by fully pressing the accelerator pedal until the reading on the compression gauge stabilizes.

⚠ WARNING

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

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

Refer to the following table.

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

- 8. Install:
 - Spark plug



Spark plug 20 N·m (2.0 kgf·m, 15 lb·ft)

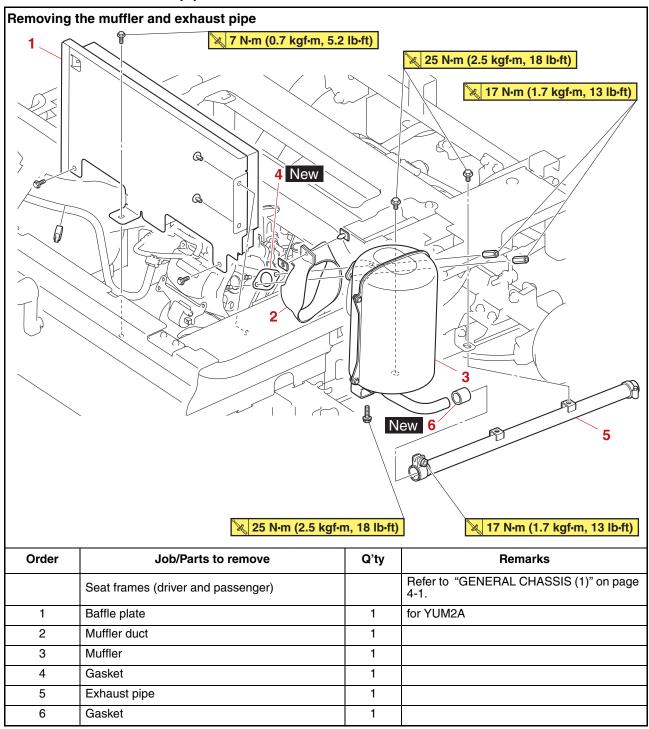
TIP.

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

- 9. Connect:
- Spark plug cap
- 10.Install:
- Drive belt Refer to "REPLACING THE DRIVE BELT (YUM1A/YUM2A)" on page 3-8.
- Seat frames (driver and passenger)
 Refer to "GENERAL CHASSIS (1)" on page 4-1.

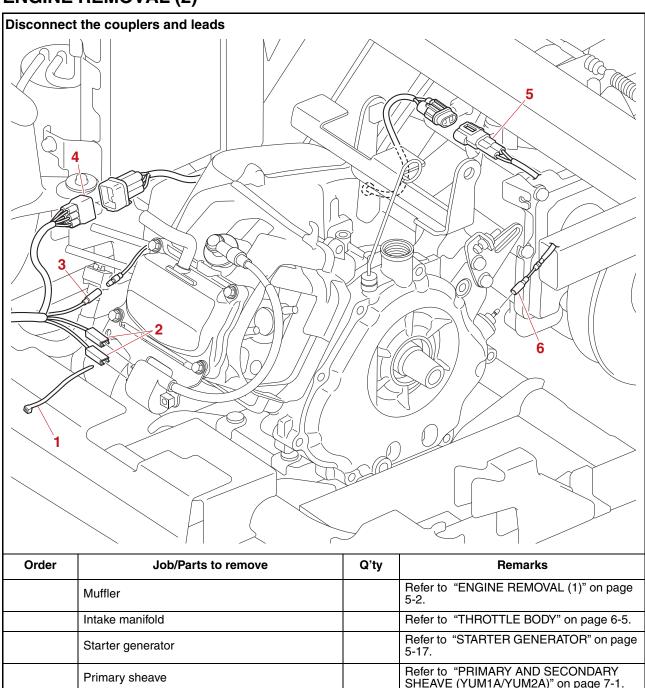
ENGINE REMOVAL (1)

ENGINE REMOVAL (1)

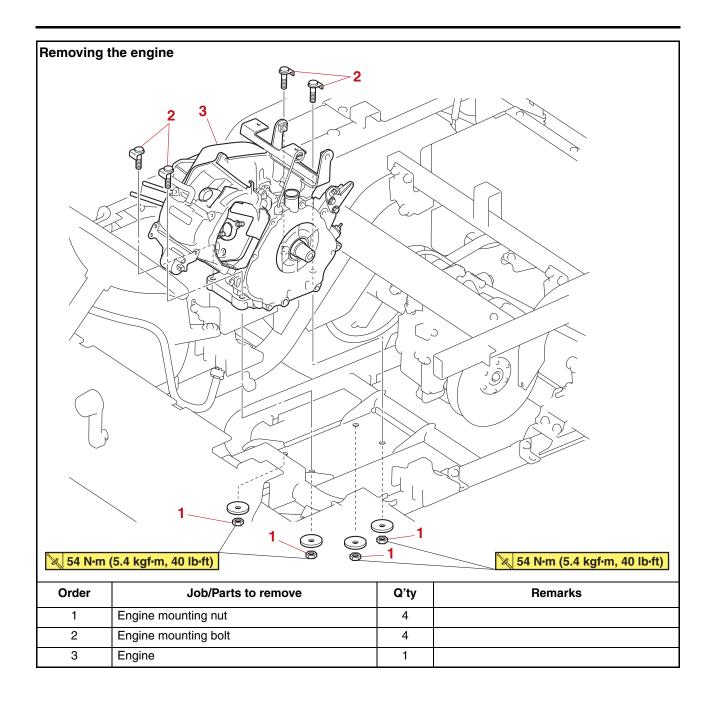


ENGINE REMOVAL (2)

ENGINE REMOVAL (2)



ENGINE REMOVAL (2)

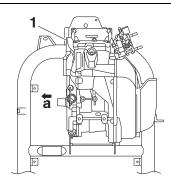


INSTALLING THE ENGINE

- 1. Install:
- Engine "1"
- Engine mounting bolts
- Engine mounting nuts
- 2. Tighten:
 - Engine mounting nuts

TIP

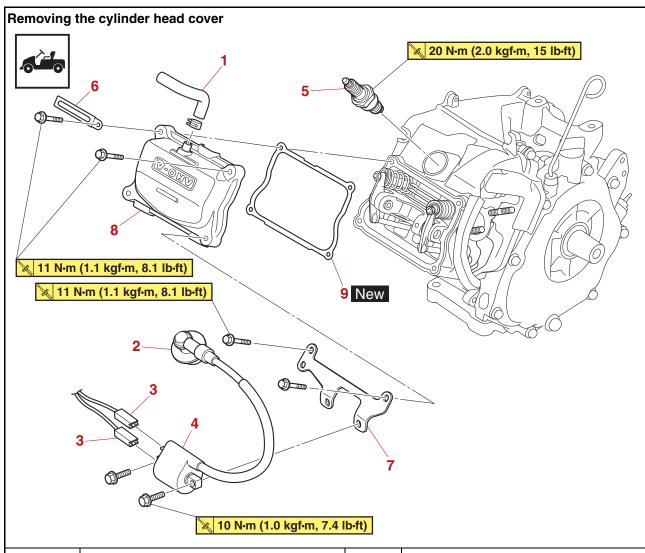
Before tightening the nuts, push the engine toward left side "a" of frame.



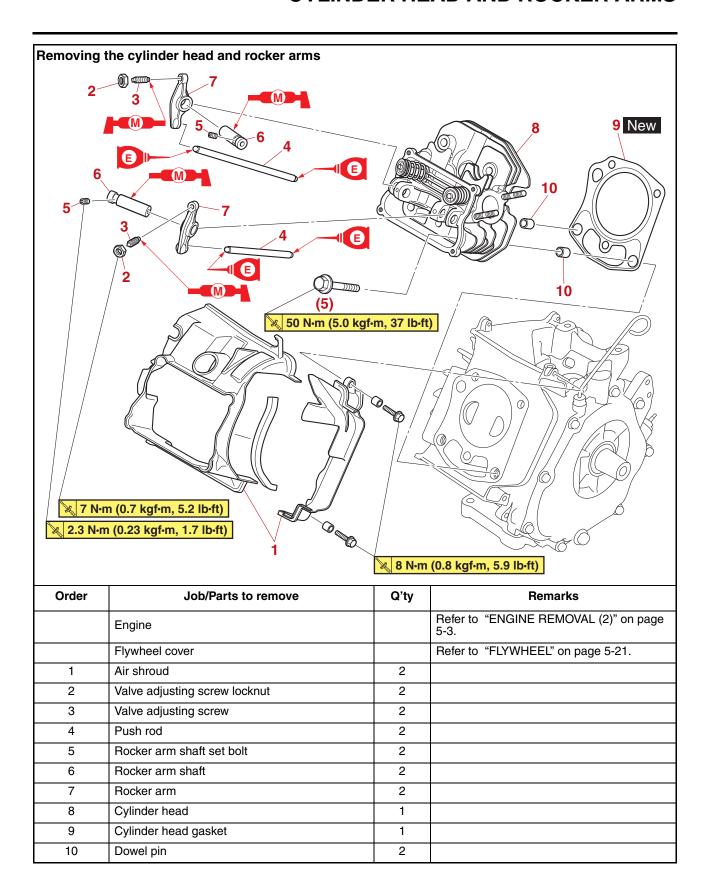


Engine mounting nut 54 N·m (5.4 kgf·m, 40 lb·ft)

CYLINDER HEAD AND ROCKER ARMS



Order	Job/Parts to remove	Q'ty	Remarks
	Seat frames (driver and passenger)		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Air filter case		Refer to "AIR FILTER CASE" on page 6-4.
	Throttle body		Refer to "THROTTLE BODY" on page 6-5.
	Baffle plate		for YUM2A Refer to "ENGINE REMOVAL (1)" on page 5-2.
1	Cylinder head breather hose	1	
2	Spark plug cap	1	Disconnect.
3	Ignition coil connector	2	Disconnect.
4	Ignition coil	1	
5	Spark plug	1	
6	Lead holder	1	
7	Ignition coil bracket	1	
8	Cylinder head cover	1	
9	Cylinder head cover gasket	1	

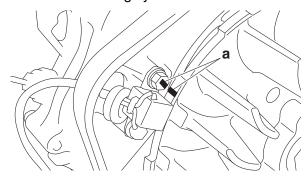


REMOVING THE CYLINDER HEAD

- 1. Remove:
 - Flywheel cover Refer to "FLYWHEEL" on page 5-21.
- 2. Align:
 - Piston

(to top dead center [TDC] on the compression stroke)

- Carefully insert a dial indicator into the spark plug hole until it contacts the top of the piston.
- b. Rotate the flywheel clockwise to position the piston at top dead center (TDC) on the compression stroke (when the dial indicator inserted into the spark plug hole reaches the highest position).
 - Check that both rocker arms are loose. If the rocker arms are not loose, rotate the flywheel one full turn (360°).
- c. Make alignment marks "a" on the flywheel and crankcase when the piston is at top dead center (TDC) on the compression stroke so that the piston can be positioned at TDC during cylinder head installation.



- 3. Remove:
 - Push rods
 - Rocker arm shafts
 - Rocker arms

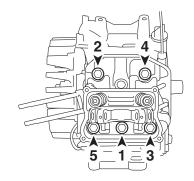
TIP.

Make a note of the position of each push rod, rocker arm shaft and rocker arm so that they can be reinstalled in their original place.

- 4. Remove:
 - Cylinder head bolts

TIF

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



CHECKING THE CYLINDER HEAD

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

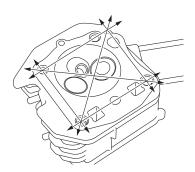
NOTICE

Do not use a sharp instrument; otherwise, the following may be damaged or scratched:

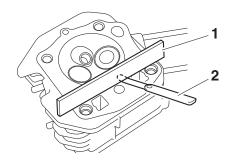
- Spark plug bore threads
- Valve seats
- 2. Check:
 - Cylinder head Damage/scratches → Replace.
- 3. Measure:
 - Cylinder head warpage
 Out of specification → Resurface the cylinder head.



Warpage limit 0.05 mm (0.002 in)



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



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



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

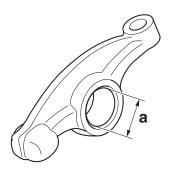
CHECKING THE ROCKER ARMS AND ROCKER ARM SHAFTS

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

- 1. Check:
 - Rocker arm
 Damage/wear → Replace.
- 2. Check:
 - Rocker arm shaft
 Blue discoloration/excessive wear/pitting/
 scratches → Replace or check the lubrication
 system.
- 3. Measure:
 - Rocker arm inside diameter "a"
 Out of specification → Replace.



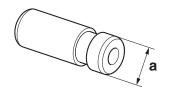
Rocker arm inside diameter 12.000–12.018 mm (0.4724–0.4731 in) Limit 12.033 mm (0.4737 in)



- 4. Measure:
 - Rocker arm shaft outside diameter "a"
 Out of specification → Replace.



Rocker arm shaft outside diameter
11.981-11.991 mm
(0.4717-0.4721 in)
Limit
11.950 mm (0.4705 in)



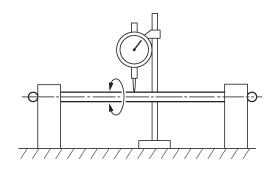
CHECKING THE PUSH RODS

The following procedure applies to all of the push rods.

- 1. Check:
- Push rod
- Push rod end Bends/damage → Replace.
- 2. Measure:
 - Push rod runout
 Out of specification → Replace.



Push rod runout 0.15 mm (0.006 in)



INSTALLING THE CYLINDER HEAD

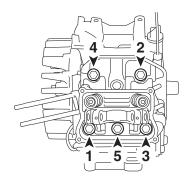
- 1. Install:
- Cylinder head bolts



Cylinder head bolt 50 N·m (5.0 kgf·m, 37 lb·ft)

TIP

Tighten the bolts in the proper sequence as shown.



2. Install:

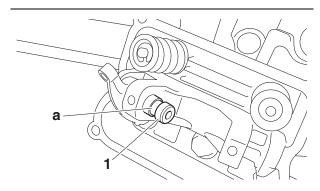
- Rocker arm shafts "1"
- Rocker arm shaft set bolt



Rocker arm shaft set bolt 2.3 N·m (0.23 kgf·m, 1.7 lb·ft)

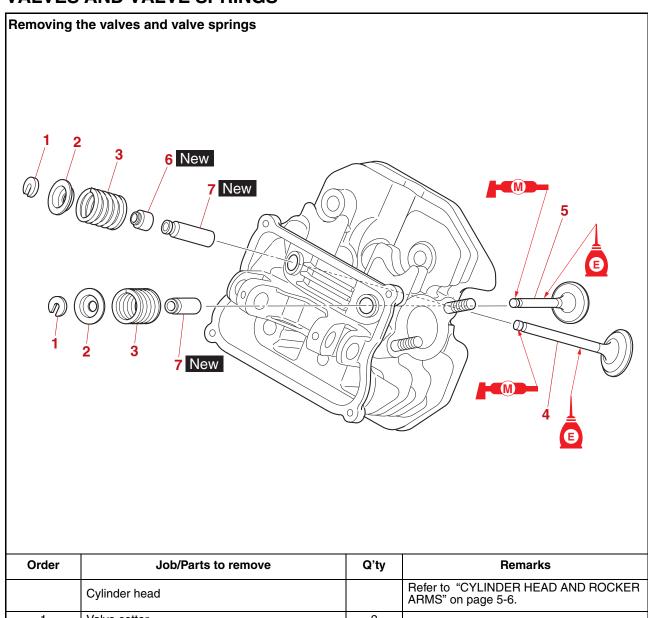
TIP_

When installing a rocker arm shaft set bolt, be sure to fit the bolt into the groove "a" in the rocker arm shaft.



VALVES AND VALVE SPRINGS

VALVES AND VALVE SPRINGS



Order	Job/Parts to remove	Q'ty	Remarks
	Cylinder head		Refer to "CYLINDER HEAD AND ROCKER ARMS" on page 5-6.
1	Valve cotter	2	
2	Valve spring retainer	2	
3	Valve spring	2	
4	Intake valve	1	
5	Exhaust valve	1	
6	Valve stem seal	1	Intake side only.
7	Valve guide	2	

VALVES AND VALVE SPRINGS

REMOVING THE VALVES

The following procedure applies to all of the valves and related components.

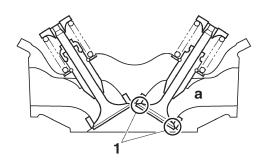
TIP

Before removing the internal parts of the cylinder head (e.g., valves, valve springs, valve seats), make sure the valves properly seal.

- 1. Check:
 - Valve sealing Leakage at the valve seat → Check the valve face, valve seat, and valve seat width.
 Refer to "CHECKING THE VALVE SEATS" on page 5-14.
 - a. Pour a clean solvent "a" into the intake and exhaust ports.
 - b. Check that the valves properly seal.

TID

There should be no leakage at the valve seat "1".



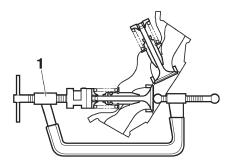
- 2. Remove:
 - Valve cotter

TIP

Remove the valve cotter by compressing the valve spring with the valve spring compressor "1".



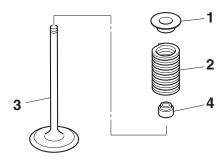
Valve spring compressor 90890-04019 Valve spring compressor YM-04019



- 3. Remove:
 - Valve spring retainer "1"
 - Valve spring "2"
- Valve "3"
- Valve stem seal "4" (intake side only)

TIP

Identify the position of each part very carefully so that it can be reinstalled in its original place.



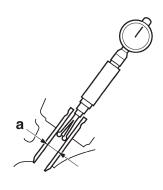
CHECKING THE VALVES AND VALVE GUIDES

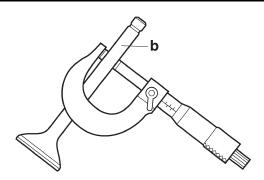
The following procedure applies to all of the valves and valve guides.

- 1. Measure:
 - Valve-stem-to-valve-guide clearance
 Out of specification → Replace the valve guide.
- Valve-stem-to-valve-guide clearance = Valve guide inside diameter "a" -Valve stem diameter "b"



Valve-stem-to-valve-guide clearance (intake) limit 0.080 mm (0.0031 in) Valve-stem-to-valve-guide clearance (exhaust) limit 0.100 mm (0.0039 in)





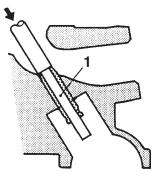
2. Replace:

• Valve guide

TIP

To ease valve guide removal and installation, and to maintain the correct fit, heat the cylinder head to 100 °C (212 °F) in an oven.

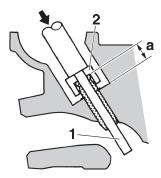
a. Remove the valve guide with the valve guide remover "1".



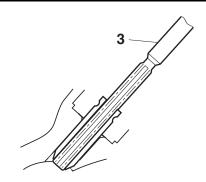
 Install the new valve guide with the valve guide installer "2" and valve guide remover "1".



Valve guide position (intake) 9.6 mm (0.38 in) Valve guide position (exhaust) 8.1 mm (0.32 in)



- a. Valve guide position
 - After installing the valve guide, bore the valve guide with the valve guide reamer "3" to obtain the proper valve-stem-tovalve-guide clearance.



TIP

After replacing the valve guide, reface the valve seat.



Valve guide remover (ø6) 90890-04064

Valve guide remover (6.0 mm) YM-04064-A

Valve guide installer (ø6) 90890-04065

Valve guide installer (6.0 mm) YM-04065-A

Valve guide reamer (ø6) 90890-04066

Valve guide reamer (6.0 mm) YM-04066

- 3. Eliminate:
- Carbon deposits
 (from the valve face and valve seat)
- 4. Check:
 - Valve face

Pitting/wear \rightarrow Grind the valve face.

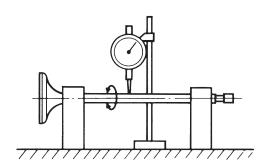
- Valve stem end Mushroom shape or diameter larger than the body of the valve stem → Replace the valve.
- 5. Measure:
 - Valve stem runout
 Out of specification → Replace the valve.

TIP

- When installing a new valve, always replace the valve guide.
- If the valve is removed or replaced, always replace the valve stem seal. (intake side only)



Valve stem runout 0.010 mm (0.0004 in)



CHECKING THE VALVE SEATS

The following procedure applies to all of the valves and valve seats.

- 1. Eliminate:
 - Carbon deposits (from the valve face and valve seat)
- 2. Check:
 - Valve seat
 Pitting/wear → Replace the cylinder head.
- 3. Measure:
 - Valve seat width "a"
 Out of specification → Replace the cylinder head.

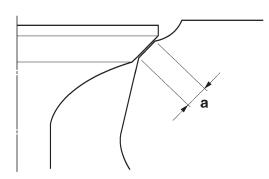


Valve seat contact width (intake) 0.7–0.9 mm (0.0276–0.0354 in) Valve seat contact width (intake) limit

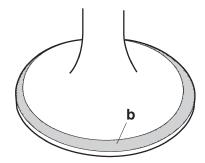
1.6 mm (0.063 in)
Valve seat contact width (exhaust)

0.7-0.9 mm (0.0276-0.0354 in) Valve seat contact width (exhaust) limit

1.6 mm (0.063 in)



a. Apply blue layout fluid "b" onto the valve face.



- b. Install the valve into the cylinder head.
- c. Press the valve through the valve guide and onto the valve seat to make a clear impression.
- d. Measure the valve seat width.

TIP

Where the valve seat and valve face contacted one another, the blueing will have been removed.

- 4. Lap:
 - Valve face
 - Valve seat

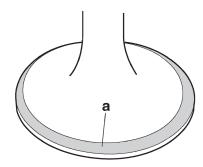
TIP_

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

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

NOTICE

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

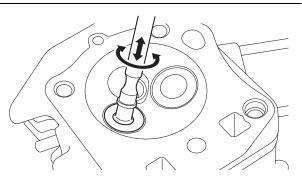


- b. Apply engine oil onto the valve stem.
- c. Install the valve into the cylinder head.
- d. Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the lapping compound.

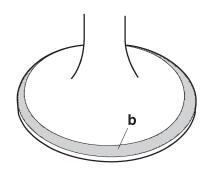
VALVES AND VALVE SPRINGS

TIP_

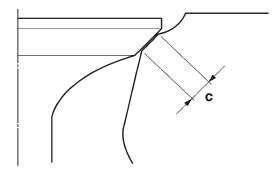
For the best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.



- e. Apply a fine lapping compound to the valve face and repeat the above steps.
- f. After every lapping procedure, be sure to clean off all of the lapping compound from the valve face and valve seat.
- g. Apply blue layout fluid "b" onto the valve face.



- h. Install the valve into the cylinder head.
- Press the valve through the valve guide and onto the valve seat to make a clear impression.
- Measure the valve seat width "c" again. If the valve seat width is out of specification, reface and lap the valve seat.



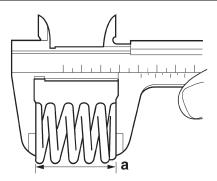
CHECKING THE VALVE SPRINGS

The following procedure applies to all of the valve springs.

- 1. Measure:
- Valve spring free length "a"
 Out of specification → Replace the valve spring.



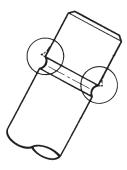
Free length (intake) 36.2 mm (1.43 in) Limit 34.4 mm (1.35 in) Free length (exhaust) 36.2 mm (1.43 in) Limit 34.4 mm (1.35 in)



INSTALLING THE VALVES

The following procedure applies to all of the valves and related components.

- 1. Deburr:
- Valve stem end (with an oil stone)



- 2. Lubricate:
 - Valve stem "1"
 - Valve stem seal "2" (intake side only) (with the recommended lubricant)



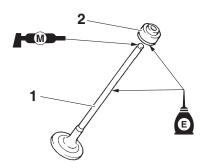
Recommended lubricant Engine oil

 Valve stem end (with the recommended lubricant)



Recommended lubricant
Molybdenum disulfide grease

VALVES AND VALVE SPRINGS

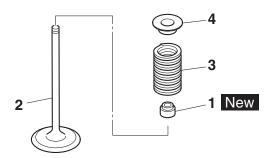


3. Install:

- Valve stem seal "1" (intake side only)
- Valve "2"
- Valve spring "3"
- Valve spring retainer "4"

TIP

Make sure each valve is installed in its original place.



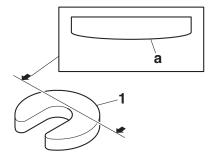
- 4. Install:
 - Valve cotter "1"

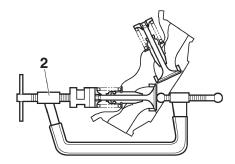
TIP

- Install the valve cotter with its rounded side "a" facing toward the valve.
- Install the valve cotter by compressing the valve spring with the valve spring compressor "2".



Valve spring compressor 90890-04019 Valve spring compressor YM-04019

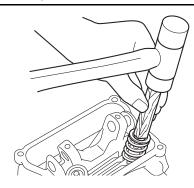




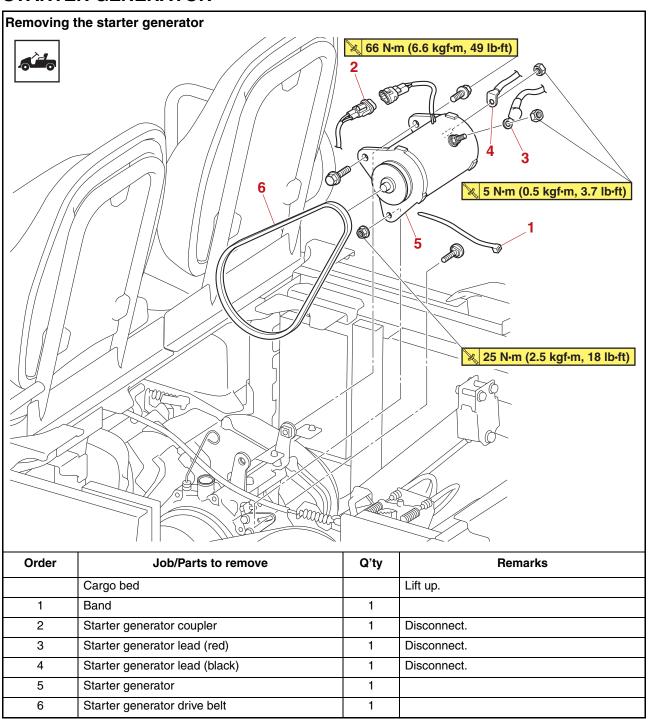
5. To secure the valve cotter onto the valve stem, lightly tap the valve tip with a soft-face hammer.

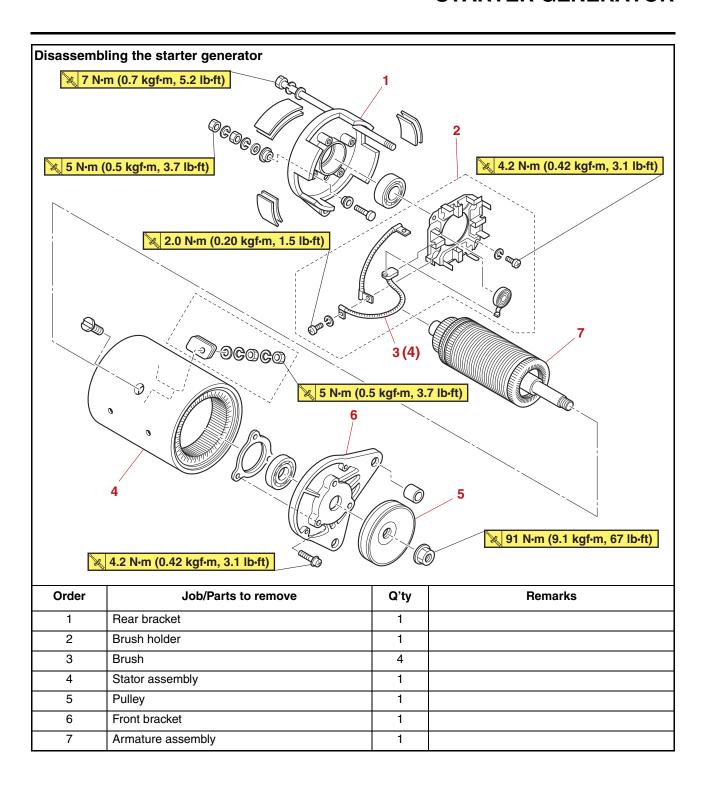
NOTICE

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



STARTER GENERATOR



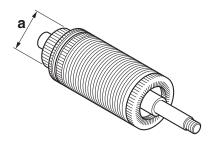


CHECKING THE STARTER GENERATOR

- 1. Check:
- Commutator
 Dirt → Clean with 600-grit sandpaper.
- 2. Measure:
 - Commutator diameter "a"
 Out of specification → Replace.



Commutator diameter limit 39 mm (1.54 in)



3. Measure:

Mica undercut "a"
 Out of specification → Cut the mica to the proper measurement with a hacksaw blade that has been grounded to fit the commutator.



Mica undercut (depth) 0.70 mm (0.03 in)

TIP

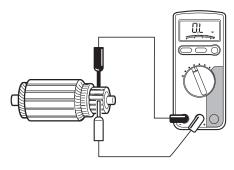
The mica of the commutator must be undercut to ensure proper operation of the commutator.



- 4. Measure:
 - Armature assembly
 - a. Connect the digital circuit tester and check the continuity.



Digital circuit tester (CD732) 90890-03243 Model 88 Multimeter with tachometer YU-A1927 b. If there is no continuity, replace the starter generator.

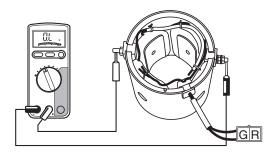


5. Measure:

Series field coil resistance
 Out of specification → Replace the stator assembly.



Series field coil resistance 0.005–0.007 Ω

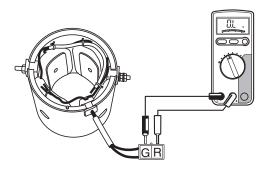


6. Measure:

Shunt field coil resistance
 Out of specification → Replace the stator assembly.



Shunt field coil resistance 4.5–5.5 Ω

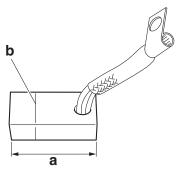


7. Measure:

• Brush length "a" $\text{Out of specification} \to \text{Replace}.$



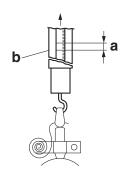
Brush overall length limit 16 mm (0.63 in)



- b. Limit mark
- 8. Measure:
 - Brush spring force "a"
 Out of specification → Replace.



Brush spring force limit 3.4 N (347 gf, 12.2 oz)



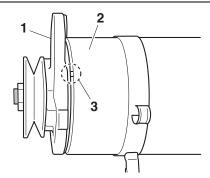
- b. Spring scale
- 9. Check:

ASSEMBLING THE STARTER GENERATOR

- 1. Install:
 - Armature (with the front bracket "1")

TIP

Align the pin hole of the front bracket with the stator pin "3" to assemble.



2. Stator

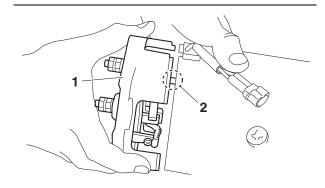
- 2. Install:
 - Rear bracket "1"



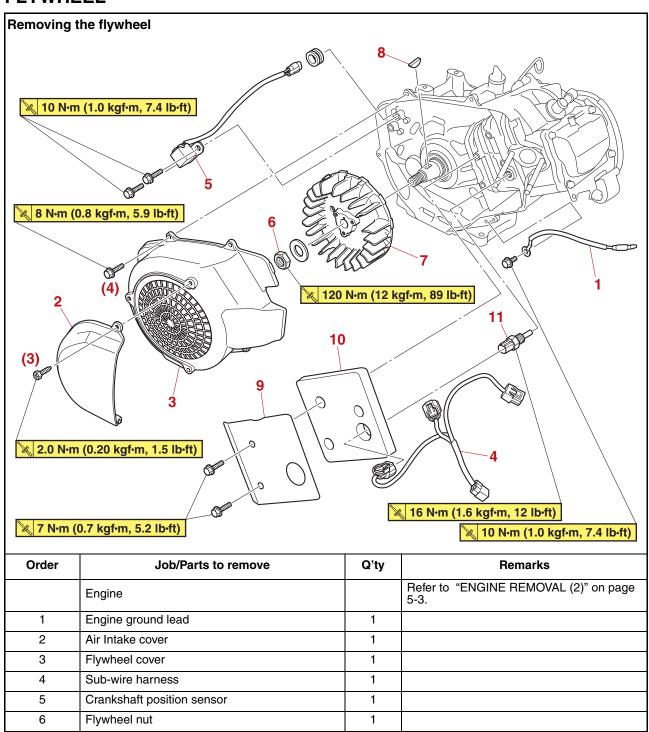
Starter generator 7 N·m (0.7 kgf·m, 5.2 lb·ft)

TIP .

Align the pin hole of the rear bracket with the stator pin "2" to assemble.



FLYWHEEL



'	Engine ground lead	l l	
2	Air Intake cover	1	
3	Flywheel cover	1	
4	Sub-wire harness	1	
5	Crankshaft position sensor	1	
6	Flywheel nut	1	
7	Flywheel	1	
8	Woodruff key	1	
9	Air shroud	1	
10	Air shroud damper	1	
11	Engine temperature sensor	1	
	•		

REMOVING THE FLYWHEEL

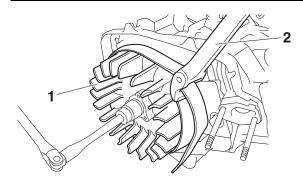
- 1. Remove:
- Flywheel nut
- Washer

TIP

Hold the flywheel "1" with the rotor holding tool "2" while loosening the flywheel nut.

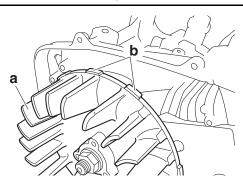


Rotor holding tool 90890-04166 Rotor holding tool YM-04166



NOTICE

Make sure that the end of rotor holding tool handle does not contact the fins "a" or projections "b" on the flywheel.



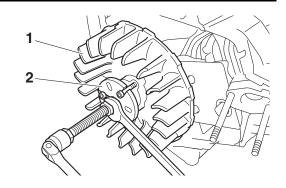
- 2. Remove:
 - Flywheel "1"
 - Woodruff key

TID

- Use a flywheel puller set "2" to separate the flywheel and crankshaft.
- Make sure the flywheel puller is centered over the flywheel.



Flywheel puller set 90890-01468 Heavy duty puller YU-33270-B



INSTALLING THE FLYWHEEL

- 1. Install:
 - Flywheel "1"
 - Washer
 - Flywheel nut



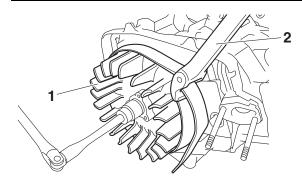
Flywheel nut 120 N·m (12 kgf·m, 89 lb·ft)

TIP_

Hold the flywheel with the rotor holding tool "2" while tightening the flywheel nut.

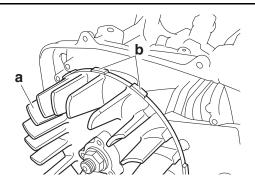


Rotor holding tool 90890-04166 Rotor holding tool YM-04166



NOTICE

Make sure that the end of rotor holding tool handle does not contact the fins "a" or projections "b" on the flywheel.



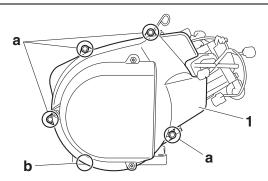
- 2. Install:
 - Flywheel cover "1"



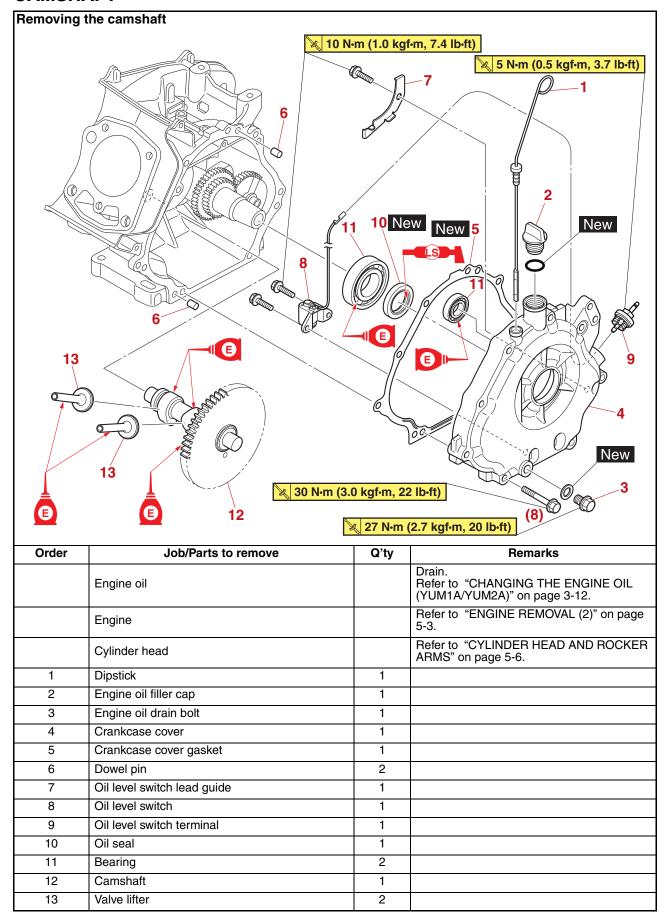
Flywheel cover bolt 8 N·m (0.8 kgf·m, 5.9 lb·ft)

TIP_

Install the flywheel cover bolts in the 4 locations "a", but do not install a bolt in the 1 location "b".



CAMSHAFT

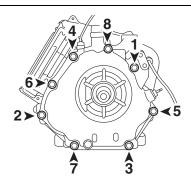


REMOVING THE CRANKCASE COVER

- 1. Remove:
 - Crankcase cover

TIP_

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

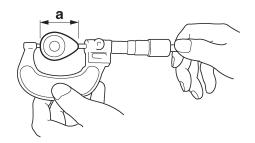


CHECKING THE CAMSHAFT

- 1. Check:
 - Camshaft lobes
 Blue discoloration/pitting/scratches → Replace the camshaft.
- 2. Measure:
 - Camshaft lobe dimensions "a"
 Out of specification → Replace the camshaft.



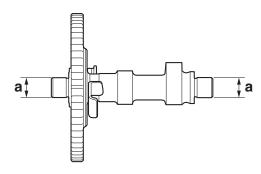
Camshaft lobe dimensions
Lobe height (Intake)
32.495–32.595 mm
(1.2793–1.2833 in)
Limit
32.395 mm (1.2754 in)
Lobe height (Exhaust)
32.495–32.595 mm
(1.2793–1.2833 in)
Limit
32.395 mm (1.2754 in)



- 3. Measure:
 - Camshaft journal diameter "a"
 Out of specification → Replace the camshaft.



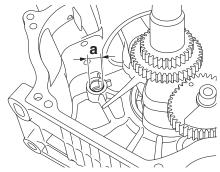
Camshaft journal dimensions 15.965–15.990 mm (0.6285–0.6295 in)



- 4. Measure:
 - Crankcase hole inside diameter "a"
 Out of specification → Replace the crankcase.



Crankcase hole inside diameter 16.000–16.018 mm (0.6299–0.6306 in)

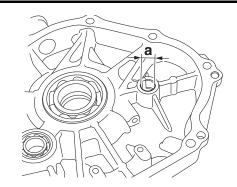


- 5. Measure:
 - Crankcase cover hole inside diameter "a"
 Out of specification → Replace the crankcase cover.



Crankcase cover hole inside diameter

16.000–16.018 mm (0.6299–0.6306 in)



- 6. Calculate:
 - Camshaft-to-crankcase clearance
 Out of specification → Replace the defective part(s).

TIP_

Calculate the clearance by subtracting the camshaft journal diameter (crankcase side) from the crankcase hole inside diameter.



Camshaft to crankcase clearance 0.010-0.053 mm (0.0004-0.0021 in)

- 7. Calculate:
 - Camshaft-to-crankcase cover clearance
 Out of specification → Replace the defective
 part(s).

TIP

Calculate the clearance by subtracting the camshaft journal diameter (crankcase cover side) from the crankcase cover hole inside diameter.



Camshaft to crankcase cover clearance 0.010-0.053 mm (0.0004-0.0021 in)

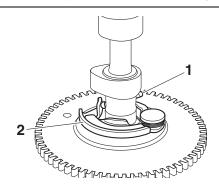
- 8. Check:
 - Camshaft drive gear
 - Camshaft driven gear Chips/pitting/roughness/wear → Replace the defective part(s).

CHECKING THE DECOMPRESSION SYSTEM

- 1. Check:
 - Decompression system

TIP

- Check that the decompression pin "1" projects from the camshaft.
- Check that the decompression cam "2" and decompression pin "1" moves smoothly.



CHECKING THE VALVE LIFTERS

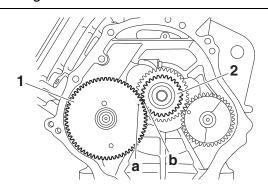
- 1. Check:
- Valve lifters
 Damage/wear → Replace the valve lifter.

INSTALLING THE CAMSHAFT

- 1. Install:
 - Camshaft

TIP

Align the punch mark "a" on the camshaft driven gear "1" with the punch mark "b" on the camshaft drive gear "2".

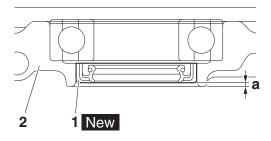


INSTALLING THE CRANKCASE COVER

- 1. Install:
 - Oil seal "1" New (into the crankcase cover "2")



Installed depth 0.5–1.5 mm (0.02–0.06 in)

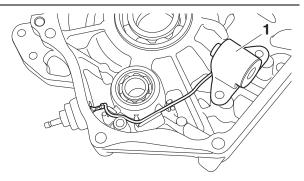


- a. Installed depth
- 2. Install:
 - Oil level switch "1"
- Oil level switch lead guide



Oil level switch bolt 10 N·m (1.0 kgf·m, 7.4 lb·ft) Oil level switch lead guide bolt 10 N·m (1.0 kgf·m, 7.4 lb·ft) TIP

Route the oil level switch lead as shown in the illustration.



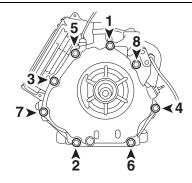
- 3. Install:
 - Crankcase cover



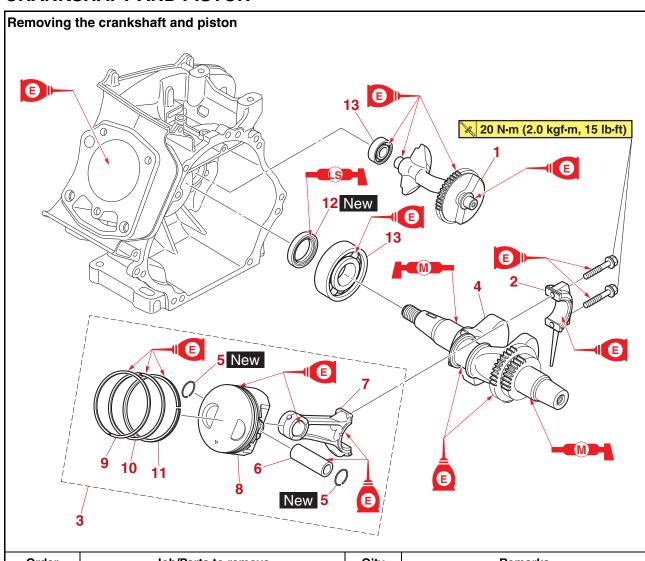
Crankcase cover bolt 30 N·m (3.0 kgf·m, 22 lb·ft)

TIP_

Tighten the bolts in the proper sequence as shown.



CRANKSHAFT AND PISTON

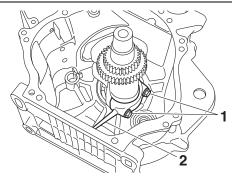


Order	Job/Parts to remove	Q'ty	Remarks
	Cylinder head		Refer to "CYLINDER HEAD AND ROCKER ARMS" on page 5-6.
	Flywheel		Refer to "FLYWHEEL" on page 5-21.
	Camshaft		Refer to "CAMSHAFT" on page 5-24.
1	Balancer	1	
2	Connecting rod cap	1	
3	Connecting rod and piston assembly	1	
4	Crankshaft	1	
5	Piston pin clip	2	
6	Piston pin	1	
7	Connecting rod	1	
8	Piston	1	
9	Top ring	1	
10	2nd ring	1	
11	Oil ring	1	
12	Oil seal	1	
13	Bearing	2	

REMOVING THE CONNECTING ROD AND **PISTON**

- 1. Remove:
- · Connecting rod cap bolts "1"
- Connecting rod cap "2"

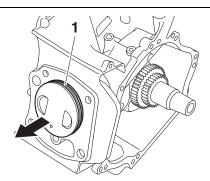
Loosen the connecting rod cap bolts and remove the connecting rod cap while the parts are in the crankcase.



2. Remove:

Connecting rod and piston assembly "1"

Remove the connecting rod and piston assembly in the direction of the arrow shown.



3. Remove:

- Piston pin clips
- Piston pin "1"
- Piston "2"
- · Connecting rod

NOTICE

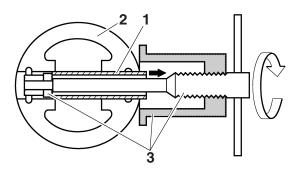
Do not use a hammer to drive the piston pin out.

TIP_

Before removing the piston pin, deburr the piston pin clip's groove and the piston's pin bore area. If both areas are deburred and the piston pin is still difficult to remove, remove it with the piston pin puller set "3".



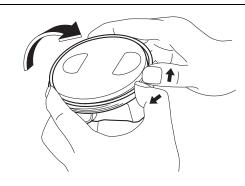
Piston pin puller set 90890-01304 Piston pin puller YU-01304



- 4. Remove:
 - Top ring
 - 2nd ring
 - Oil ring

TIP_

When removing a piston ring, open the end gap with your fingers and lift the other side of the ring over the piston crown.



CHECKING THE CYLINDER AND PISTON

- 1. Check:
 - Piston wall
 - Cylinder wall

Vertical scratches → Rebore or replace the crankcase, and replace the piston and piston rings as a set.

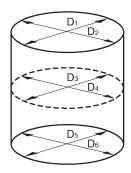
- 2. Measure:
 - Piston-to-cylinder clearance
 - a. Measure cylinder bore "C" with the cylinder bore gauge.

Measure cylinder bore "C" by taking side-to-side and front-to-back measurements of the cylinder.



Bore 85.000-85.020 mm (3.3465-3.3472 in) Wear limit 85.050 mm (3.3484 in)

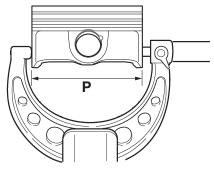
"C" = maximum of D_1 , D_2 , D_3 , D_4 , D_5 , D_6



- b. If out of specification, rebore or replace the crankcase, and replace the piston and piston rings as a set.
- c. Measure piston skirt diameter "P" with the micrometer.



Piston Diameter 84.977-84.998 mm (3.3456-3.3464 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 0.043-0.057 mm (0.0017-0.0022 in) f. If out of specification, rebore or replace the crankcase, and replace the piston and piston rings as a set.

CHECKING THE PISTON RINGS

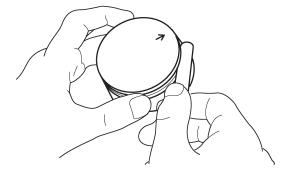
- 1. Measure:
- Piston ring side clearance
 Out of specification → Replace the piston
 and piston rings as a set.

TIP

Before measuring the piston ring side clearance, eliminate any carbon deposits from the piston ring grooves and piston rings.



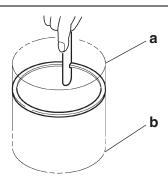
Piston ring
Top ring
Ring side clearance
0.040-0.080 mm
(0.0016-0.0031 in)
2nd ring
Ring side clearance
0.030-0.070 mm
(0.0012-0.0028 in)



- 2. Install:
 - Piston ring (into the cylinder)

TIE

Use the piston crown to level the piston ring near bottom of cylinder "a", where cylinder wear is lowest.



b. Upper of cylinder

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.



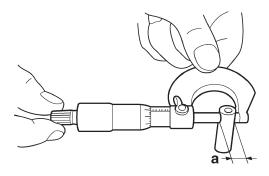
Piston ring
Top ring
End gap limit
0.60 mm (0.0236 in)
2nd ring
End gap limit
0.80 mm (0.0315 in)

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 "a"
 Out of specification → Replace the piston pin.



Piston pin outside diameter 19.995–20.000 mm (0.7872–0.7874 in) Limit 19.975 mm (0.7864 in)

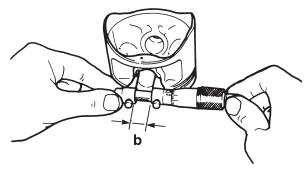


3. Measure:

Piston pin bore diameter "b"
 Out of specification → Replace the piston.



Piston pin bore inside diameter 20.004–20.015 mm (0.7876–0.7880 in) Limit 20.045 mm (0.7892 in)



4. Calculate:

- Piston-pin-to-piston-pin-bore clearance
 Out of specification → Replace the piston pin and piston as a set.
- Piston-pin-to-piston-pin-bore clearance = Piston pin bore diameter "b" -Piston pin outside diameter "a"



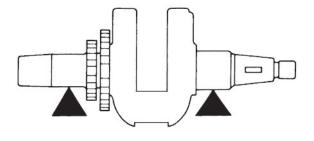
Piston-pin-to-piston-pin-bore clearance 0.004–0.020 mm (0.0002–0.0008 in)

CHECKING THE CRANKSHAFT AND CONNECTING ROD

- 1. Measure:
 - Crankshaft runout
 Out of specification → Replace the crankshaft.



Runout limit 0.05 mm (0.002 in)

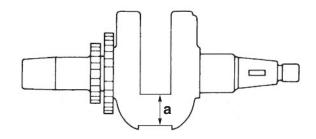


2. Check:

- Crankshaft journal surfaces
- Crankshaft pin surfaces
 Scratches/wear → Replace the crankshaft.
- $\begin{tabular}{ll} \bullet & Crankshaft sprocket \\ & Damage/wear \rightarrow Replace the crankshaft. \\ \end{tabular}$
- 3. Measure:
 - Crankshaft pin outside diameter "a"
 Out of specification → Replace the crankshaft.



Crankshaft pin outside diameter 35.969–35.984 mm (1.4161–1.4167 in)



4. Measure:

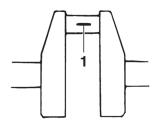
 Crankshaft pin to connecting rod clearance Out of specification → Replace the crankshaft or connecting rod.



Crankshaft pin to connecting rod clearance 0.016–0.046 mm

(0.0006–0.0018 in)

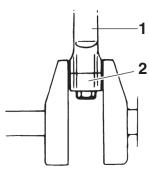
- a. Clean the crankshaft pin, and inside of the connecting rod halves.
- b. Put a piece of Plastigauge® "1" on the crankshaft pin.



- c. Lubricate the connecting rod cap bolts threads with engine oil.
- d. Assemble the connecting rod "1" and connecting rod cap "2".

NOTICE

Do not allow the connecting rod and crankshaft to rotate until the clearance measurement has been completed.

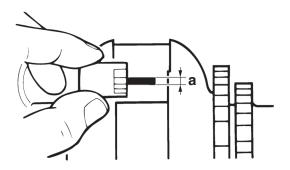


e. Tighten the connecting rod cap bolts to the specified torque in two stages.



Connecting rod cap bolt 20 N·m (2.0 kgf·m, 15 lb·ft)

- f. Remove the connecting rod and connecting rod cap.
- g. Measure the compressed Plastigauge® width "a".



CHECKING THE BALANCER

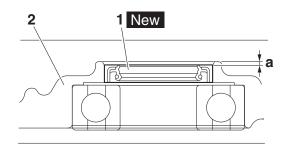
- 1. Check:
 - Balancer
 Scratches/wear/damage → Replace the balancer.

INSTALLING THE CONNECTING ROD AND PISTON

- 1. Install:
- Oil seal "1" New (into the crankcase "2")



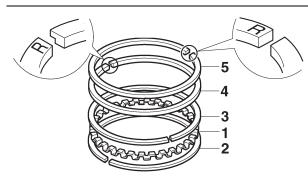
Installed depth 0.5–1.5 mm (0.02–0.06 in)



- a. Installed depth
- 2. Install:
 - Oil ring expander "1"
 - Lower oil ring rail "2"
 - Upper oil ring rail "3"
 - 2nd ring "4"
 - Top ring "5"

TIP_

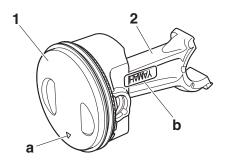
Be sure to install the piston rings so that the manufacturer's marks face up.

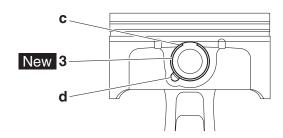


- 3. Install:
 - Piston "1" (onto the connecting rod "2")
 - Piston pin
 - Piston pin clips "3" New

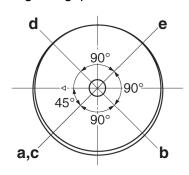
TIP

- Apply engine oil onto the piston pin.
- Make sure that the arrow mark "a" on the piston head and the "YAMAHA" mark "b" on the connecting rod are positioned as shown when assembling the piston to the connecting rod.
- Install the piston pin clips, so that the clip ends are 45 degrees "c" or more from the cutout "d" in the piston.





- 4. Offset:
 - Piston ring end gaps



- a. Top ring
- b. Upper oil ring rail
- c. Oil ring expander
- d. Lower oil ring rail
- e. 2nd ring
- 5. Lubricate:
 - Piston
 - Piston rings
 - Cylinder

(with the recommended lubricant)



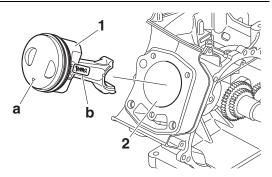
Recommended lubricant Engine oil

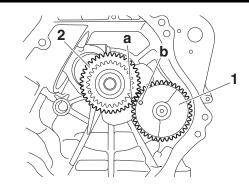
- 6. Install:
 - Connecting rod and piston assembly "1" (into the cylinder "2")

TIP

 Install the piston ring compressor onto the piston, and then insert the connecting rod and piston assembly into the cylinder.

 Make sure that the arrow mark "a" on the piston head faces toward the push rod cavity.
 Make sure that the "YAMAHA" mark "b" on the connecting rod faces toward the crankcase cover.





7. Install:

• Connecting rod cap "1"

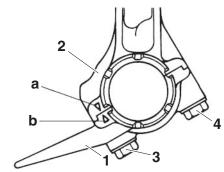


Connecting rod cap bolt 20 N·m (2.0 kgf·m, 15 lb·ft)

TIP

- Install the connecting rod cap making sure that the arrow mark "a" on the connecting rod "2" is aligned with the arrow mark "b" on the connecting rod cap.
- Tighten the connecting rod cap bolts to the specification in order.

Bolt "3" \rightarrow Bolt "4" \rightarrow Bolt "3" \rightarrow Bolt "4"



8. Install:

• Balancer "1"

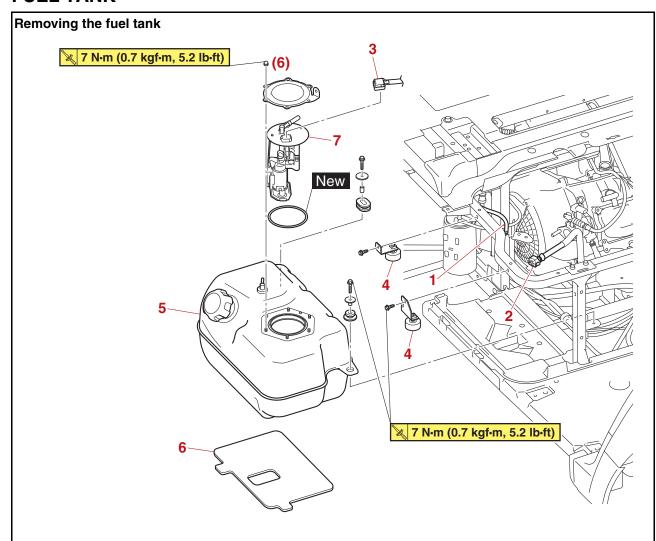
TIP_

Align the punch mark "a" on the crankshaft "2" with the punch mark "b" on the balancer.

FUEL SYSTEM (YUM1A/YUM2A)

FUEL IANK	b- I
REMOVING THE FUEL TANK	
REMOVING THE FUEL PUMP	6-2
CHECKING THE FUEL PUMP BODY	6-2
INSTALLING THE FUEL PUMP	
INSTALLING THE FUEL TANK	6-2
CHECKING THE FUEL PRESSURE	6-3
AIR FILTER CASE	6-4
THROTTLE BODY	6-5
REMOVING THE THROTTLE BODY	6-6
CHECKING THE FUEL INJECTOR	
CHECKING THE THROTTLE BODY	
CHECKING THE INTAKE MANIFOLD	6-6
CHECKING THE INTAKE MANIFOLD JOINT	6-6
INSTALLING THE THROTTLE BODY	6-6

FUEL TANK



Order	Job/Parts to remove	Q'ty	Remarks
	Seat frames (driver and passenger)		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Side panel (right)		Refer to "GENERAL CHASSIS (4)" on page 4-9.
	Front panel		Refer to "GENERAL CHASSIS (4)" on page 4-9.
	Baffle plate (for YUM2A)		Refer to "ENGINE REMOVAL (1)" on page 5-2.
1	Canister hose	1	Disconnect.
2	Fuel hose	1	Disconnect.
3	Fuel pump coupler	1	Disconnect.
4	Fuel tank retainer	2	
5	Fuel tank	1	
6	Damper	1	
7	Fuel pump	1	

REMOVING THE FUEL TANK

- 1. Extract the fuel in the fuel tank through the fuel tank cap with a pump.
- 2. Remove:
 - Fuel hose

WARNING

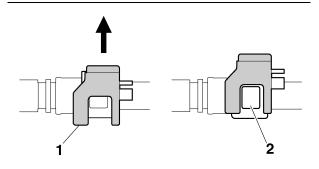
Cover fuel hose connections with a cloth when disconnecting them. Residual pressure in the fuel lines could cause fuel to spurt out when removing the hose.

NOTICE

Although the fuel has been removed from the fuel tank, be careful when removing the fuel hose, since there may be fuel remaining in it.

TIP_

- To disconnect the fuel hose, slide the fuel hose connector cover "1" on the end of the hose in direction of the arrow shown, press the two buttons "2" on the sides of the connector, and then disconnect the hose.
- Before removing the hose, place a few rags in the area under where it will be removed.



REMOVING THE FUEL PUMP

- 1. Remove:
 - Fuel pump bracket
 - Fuel pump
 - Fuel pump gasket

NOTICE

- Do not drop the fuel pump or give it a strong shock.
- Do not touch the base section of the fuel sender.

CHECKING THE FUEL PUMP BODY

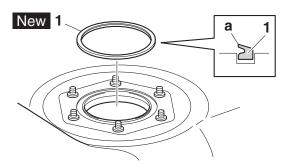
- 1. Check:
- Fuel pump body
 Obstruction → Clean.
 Cracks/damage → Replace the fuel pump.

INSTALLING THE FUEL PUMP

- 1. Install:
 - Fuel pump gasket "1" New

TIP

- Always use a new fuel pump gasket.
- Install the fuel pump gasket with the lip side "a" facing upward.



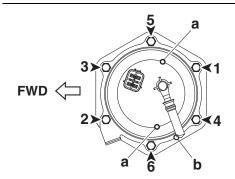
- 2. Install:
 - Fuel pump
 - Fuel pump bracket



Fuel pump nut 7 N·m (0.7 kgf·m, 5.2 lb·ft)

TIP_

- Do not damage the installation surfaces of the fuel tank when installing the fuel pump.
- Install the fuel pump in the direction shown in the illustration.
- Install the fuel pump bracket by aligning the projections "a" on the fuel pump with the projection "b" on the fuel tank.
- Tighten the nuts to specification in the proper tightening sequence as shown.



INSTALLING THE FUEL TANK

- 1. Tighten:
 - Fuel tank bolts
- Fuel tank retainer bolts



Fuel tank bolt 7 N·m (0.7 kgf·m, 5.2 lb·ft) Fuel tank retainer bolt 7 N·m (0.7 kgf·m, 5.2 lb·ft)

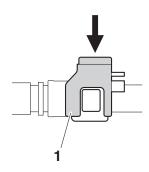
- 2. Install:
 - Fuel hose
 - Fuel pump coupler

NOTICE

When installing the fuel hose, make sure that it is securely connected, and that the fuel hose holder is in the correct position, otherwise the fuel hose will not be properly installed.

TIP_

- Connect the fuel hose securely onto the fuel injector until a distinct "click" is heard.
- To install the fuel hose, slide the fuel hose connector cover "1" on the end of the hose in direction of the arrow shown.

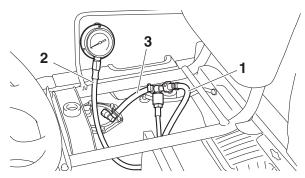


CHECKING THE FUEL PRESSURE

- 1. Check:
 - Fuel pressure
 - a. Remove the under-seat panel.
 Refer to "GENERAL CHASSIS (1)" on page 4-1.
 - b. Remove the drive belt.
 Refer to "REPLACING THE DRIVE BELT (YUM1A/YUM2A)" on page 3-8.
 - c. Disconnect the fuel hose "1" from the fuel tank.
 - Refer to "REMOVING THE FUEL TANK" on page 6-2.
 - d. Connect the pressure gauge "2" and adapter "3" to the fuel rail and fuel hose.



Pressure gauge 90890-03153 Pressure gauge YU-03153 Fuel pressure adapter 90890-03186 Fuel pressure adapter YM-03186



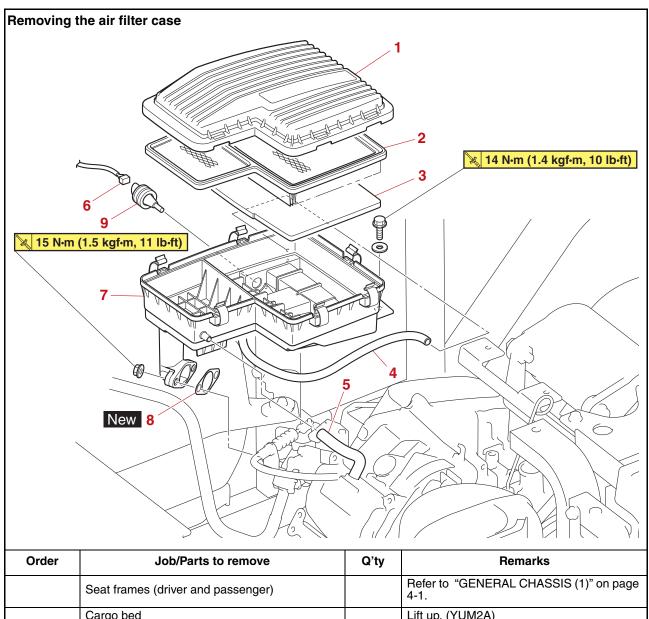
- e. Start the engine.
- f. Measure the fuel pressure.
 Out of specification → Replace the fuel pump.



Fuel line pressure at idling 246–254 kPa (2.46–2.54 kgf/cm², 35.7–36.8 psi)

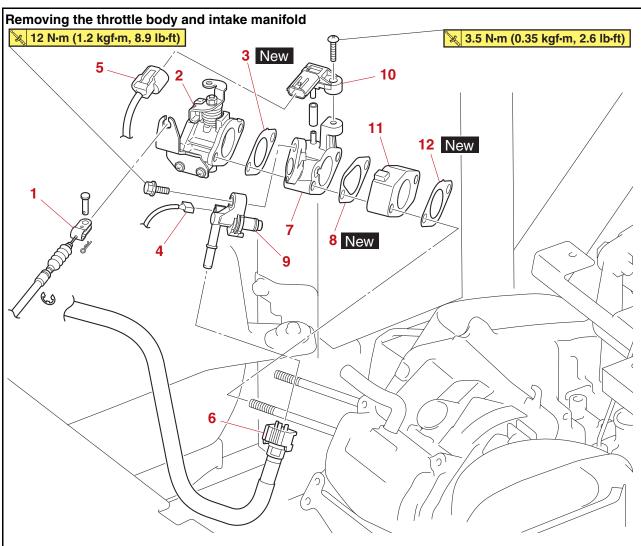
AIR FILTER CASE

AIR FILTER CASE



Order	Job/Parts to remove	Q'ty	Remarks
	Seat frames (driver and passenger)		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Cargo bed		Lift up. (YUM2A)
1	Air filter case cover	1	
2	Air filter	1	
3	Air filter element	1	
4	Canister hose	1	Disconnect.
5	Cylinder head breather hose	1	Disconnect.
6	Intake air temperature sensor coupler	1	Disconnect.
7	Air filter case	1	
8	Gasket	1	
9	Intake air temperature sensor	1	

THROTTLE BODY



Order	Job/Parts to remove	Q'ty	Remarks
	Air filter case		Refer to "AIR FILTER CASE" on page 6-4.
1	Throttle cable 2	1	Disconnect.
2	Throttle body	1	
3	Throttle body gasket	1	
4	Injection coupler	1	Disconnect.
5	Intake air pressure sensor coupler	1	Disconnect.
6	Fuel hose	1	Disconnect.
7	Intake manifold	1	
8	Intake manifold gasket	1	
9	Fuel injector	1	
10	Intake air pressure sensor	1	
11	Intake manifold joint	1	
12	Intake manifold joint gasket	1	

REMOVING THE THROTTLE BODY

- 1. Disconnect:
 - Fuel hose

WARNING

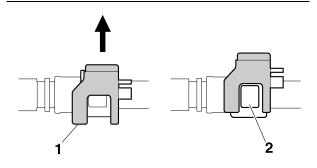
Cover fuel hose connections with a cloth when disconnecting them. Residual pressure in the fuel lines could cause fuel to spurt out when removing the hose.

NOTICE

- Be sure to disconnect the fuel hose by hand. Do not forcefully disconnect the hose with tools.
- Although the fuel has been removed from the fuel tank, be careful when removing the fuel hose, since there may be fuel remaining in it.

TIP_

- To disconnect the fuel hose from the fuel injector, slide the fuel hose connector cover "1" on the end of the hose in the direction of the arrow shown, press the two buttons "2" on the sides of the connector, and then disconnect the hose.
- Before disconnecting the hose, place a few rags in the area under where it will be disconnected.



CHECKING THE FUEL INJECTOR

- 1. Check:
- Fuel injector

Obstruction \rightarrow Replace and check the fuel pump/fuel supply system.

Deposit \rightarrow Replace.

Damage \rightarrow Replace.

- 2. Check:
 - Fuel injector resistance
 Refer to "CHECKING THE FUEL INJECTOR" on page 8-58.

CHECKING THE THROTTLE BODY

- 1. Check:
- Throttle body Cracks/damage → Replace the throttle body.

CHECKING THE INTAKE MANIFOLD

- 1. Check:
 - Intake manifold Cracks/damage → Replace.
- 2. Check:
 - Air passage
 Obstructions → Clean.
 - Wash the intake manifold in a petroleumbased solvent.
 - Do not use any caustic carburetor cleaning solution.
 - b. Blow out the passage with compressed air.

CHECKING THE INTAKE MANIFOLD JOINT

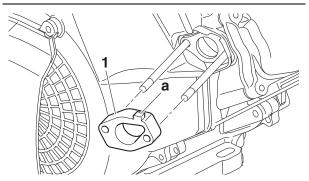
- 1. Check:
 - Intake manifold joint Cracks/damage → Replace.

INSTALLING THE THROTTLE BODY

- 1. Install:
- Intake manifold joint "1"

TIP_

Install the intake manifold joint so that the projection "a" on the joint is pointing outward.



- 2. Install:
 - Intake air temperature sensor "1"

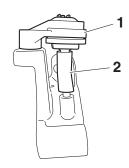


Intake air temperature sensor screw

3.5 N·m (0.35 kgf·m, 2.6 lb·ft)

TIP

Make sure that the hose "2" between the intake air temperature sensor and the intake manifold is not kinked or bent.



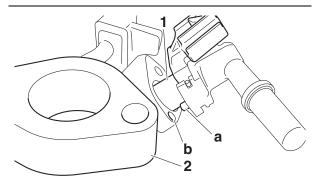
- 3. Install:
 - Fuel injector "1"



Fuel injector bolt 12 N·m (1.2 kgf·m, 8.9 lb·ft)

TIP

Fit the projection "a" on the fuel injector into the hole "b" in the intake manifold "2".



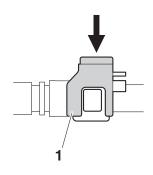
- 4. Connect:
 - Fuel hose

NOTICE

When installing the fuel hose, make sure that it is securely connected, and that the fuel hose connector cover on the fuel hose is in the correct position, otherwise the fuel hose will not be properly installed.

TIP_

- Connect the fuel hose securely onto the fuel injector until a distinct "click" in heard.
- To connect the fuel hose onto the fuel injector, slide the fuel hose connector cover "1" on the end of the hose in direction of the arrow shown.

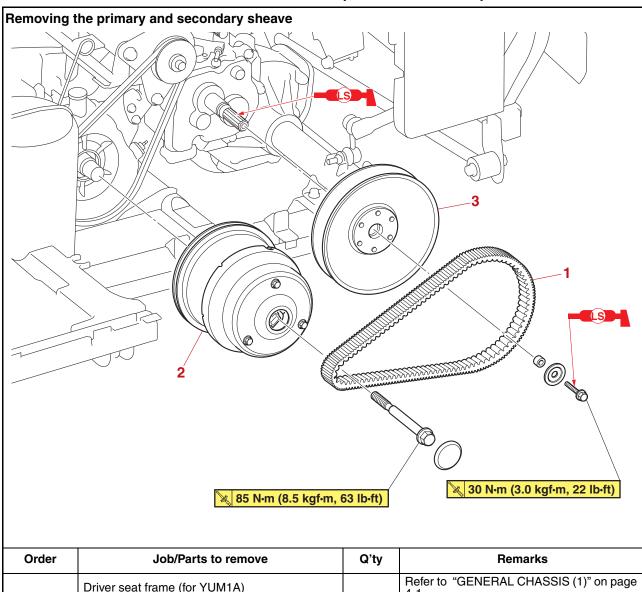


- 5. Adjust:
 - Throttle cable Refer to "ADJUSTING THE THROTTLE CA-BLES (YUM1A/YUM2A)" on page 3-12.

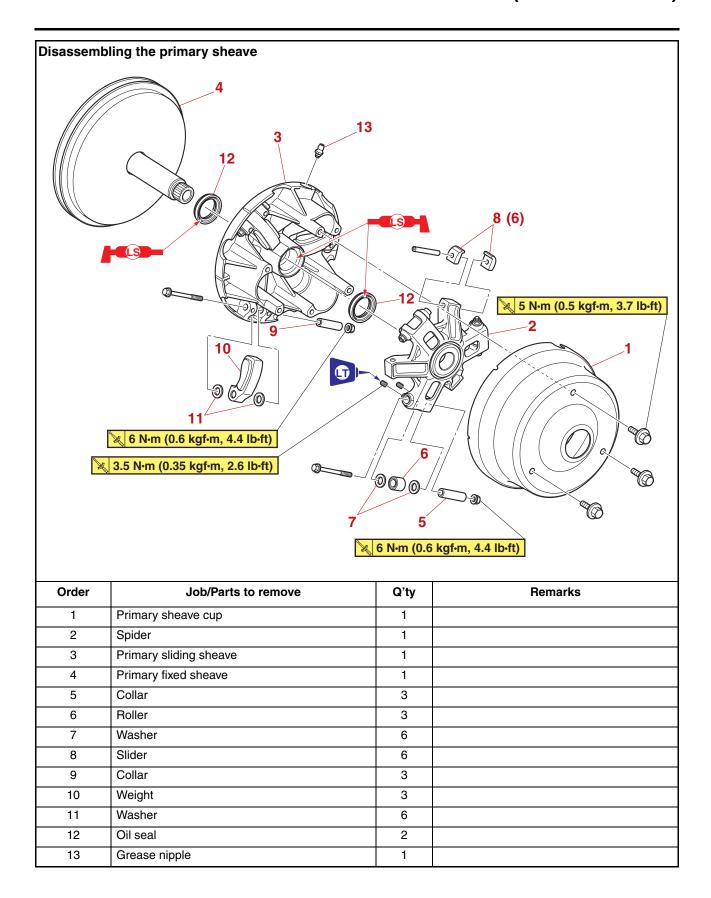
DRIVE TRAIN

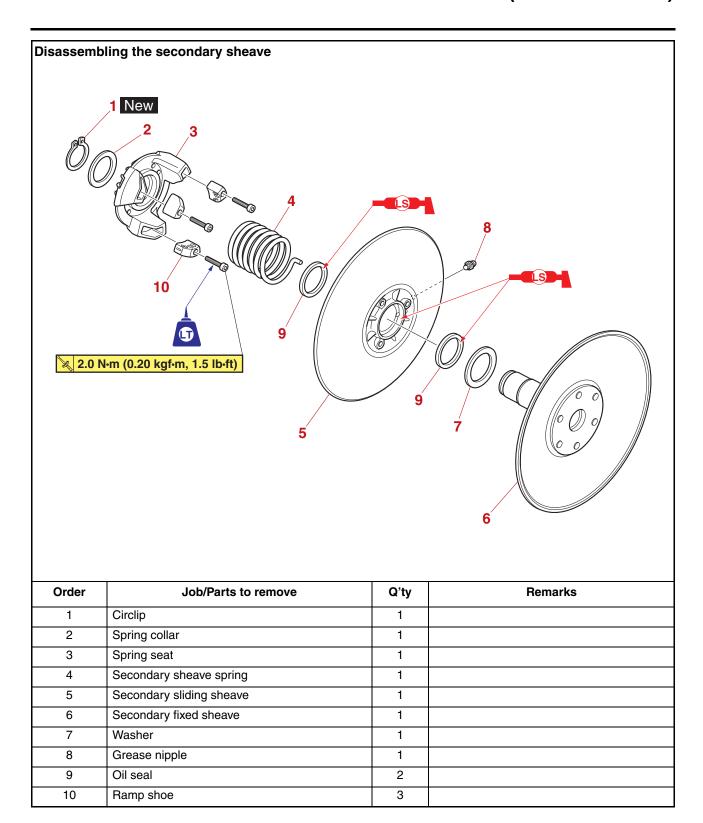
/-1
7-4
7-4
7-5
7-5
7-5
7-6
7-6
7-8
7-12
7-12
7-12
7-12
7-14
7-16
7-17
7-18

PRIMARY AND SECONDARY SHEAVE (YUM1A/YUM2A)



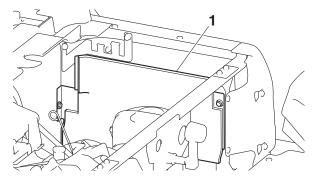
Order	Job/Parts to remove	Q'ty	Remarks	
	Driver seat frame (for YUM1A)		Refer to "GENERAL CHASSIS (1)" on page 4-1.	
	Battery plate (for YUM1A)			
	Rear shock absorber (for YUM1A)		Refer to "REAR SUSPENSION COMPONENTS" on page 4-36.	
	Side panel (left)		Refer to "GENERAL CHASSIS (4)" on page 4-9.	
1	Drive belt	1		
2	Primary sheave assembly	1		
3	Secondary sheave assembly	1		



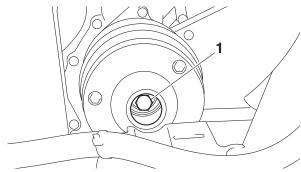


REMOVING THE PRIMARY SHEAVE

- 1. Park the vehicle on a level surface and apply the parking brake.
- 2. Remove:
 - Driver seat frame (YUM1A)
 Refer to "GENERAL CHASSIS (1)" on page 4-1.
 - Battery plate "1" (YUM1A)
 - Rear shock absorber (YUM1A)
 Refer to "REAR SUSPENSION COMPONENTS" on page 4-36.
 - Side panel (left)
 Refer to "GENERAL CHASSIS (4)" on page 4-9.



3. Jack up the rear suspension arm (YUM1A) to a height where the primary sheave bolt "1" can be accessed.



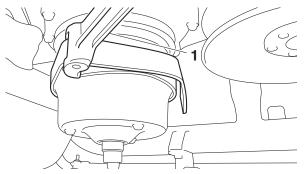
- 4. Remove:
 - Rubber cap
 - Primary sheave bolt

TIP

Use the rotor holding tool "1" to hold the primary sheave.



Rotor holding tool 90890-04166 Rotor holding tool YM-04166



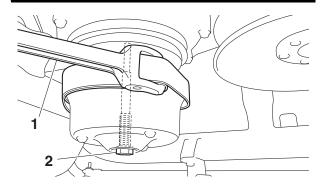
- 5. Remove:
- Primary sheave assembly

TIP

Use the rotor holding tool "1" and primary clutch puller "2".

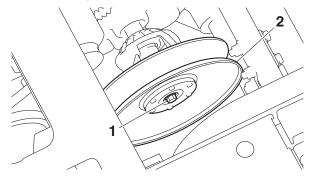


Rotor holding tool 90890-04166 Rotor holding tool YM-04166 Primary fixed sheave puller 90890-01876 Primary clutch puller YG-01876



REMOVING THE SECONDARY SHEAVE

- 1. Place the vehicle on a level surface.
- 2. Apply the parking brake securely.
- 3. Remove:
 - Secondary sheave bolt "1"
- Secondary sheave "2"

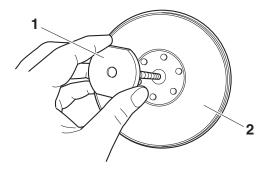


DISASSEMBLING THE SECONDARY SHEAVE

- 1. Attach:
 - Bolt "1" (to the secondary sheave "2")



Bolt JY2-SECND ST-1



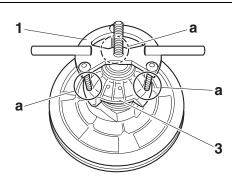
- 2. Attach:
 - Tool "1"
 - Nut "2"

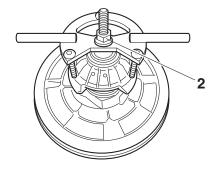


Tool JY2-SECND ST-2 Nut JY2-SECND ST-3

TIP

Set the tool "1" one step lower than the spring seat "3" so that the bolt tip "a" of the tool "1" contacts it and install the nut "2".

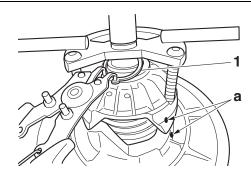




- 3. Remove:
 - Circlip "1"

TIP_

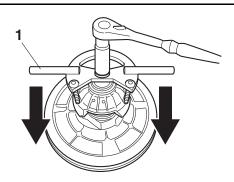
- Remove by tightening the nut until the drive shaft clip groove is visible.
- Put a mark "a" before disassembling the secondary sheave to make assembly work later easier.



- 4. Remove:
 - Nut
 - Tool "1"
 - Bolt

NOTICE

When detaching the nut from the bolt, hold the tool securely so that the tool "1" and secondary spring seat do not fly out due to the reactive force of the secondary sheave spring.



CHECKING THE PRIMARY SHEAVE

- 1. Check:
- Primary sliding sheave
- Primary fixed sheave
- Spider

Cracks/damage \rightarrow Replace.

CHECKING THE SECONDARY SHEAVE

- 1. Check:
- Secondary sliding sheave
- Secondary fixed sheave Cracks/damage \rightarrow Replace.

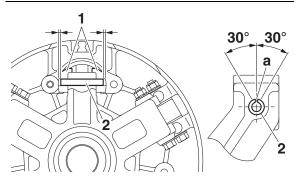
- 2. Check:
- Secondary sheave spring "1" Cracks/damage → Replace.

ASSEMBLING THE PRIMARY SHEAVE

- 1. Install:
 - Slider "1"

TIP_

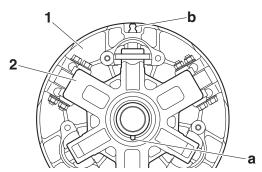
- Face the gap "a" in the spring pin "2" outward within the range shown.
- Position the spring pin "2" so that the spaces between the pin and the slider "1" are equal on both ends of the pin.



- 2. Install:
 - Primary sliding sheave "1"
 - Spider "2"

TIP_

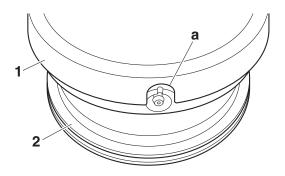
When installing the spider, make sure that the punch mark "a" on the primary fixed sheave shaft is positioned opposite the grease nipple "b" as shown.



- 3. Install:
 - Primary sheave cap "1"

TIP

Align the cutout "a" in the primary sheave cap with the grease nipple "2" on the primary sliding sheave.



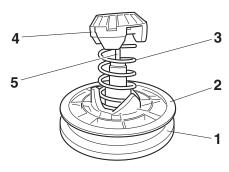
ASSEMBLING THE SECONDARY SHEAVE

- 1. Attach:
- Secondary fixed sheave "1"
- Washer
- Secondary sliding sheave "2"
- Secondary sheave spring "3"
- Spring seat "4"
- Bolt "5"

(from the secondary fixed sheave side)



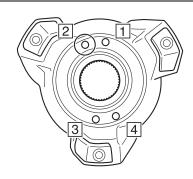
Bolt JY2-SECND ST-1

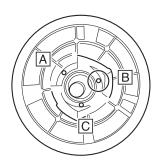


- 2. Set:
 - Secondary spring position

TIP

Insert the secondary sheave spring into the hole "2" of the secondary spring seat and the hole "B" of the secondary sliding sheave.





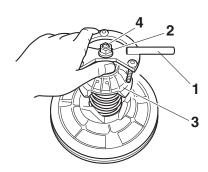
- 3. Attach:
 - Tool "1"
 - Nut "2"



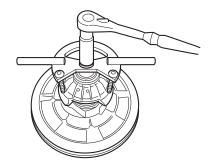
Tool
JY2-SECND ST-2
Nut
JY2-SECND ST-3

TIP_

- Check that the spring collar and circlip are installed before setting the nut and tool. These cannot be installed after they have been set with a special tool set.
- Set the tool "1" one step lower than the spring seat "3" so that the bolt tip contacts it and make sure the nut contacts the threaded part of the bolt "4" while pushing the tool.

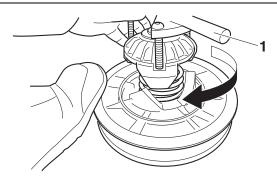


- 4. Tighten:
 - Nut



TIP

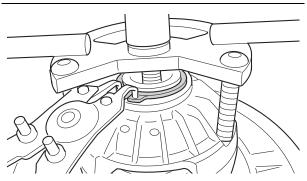
After tightening the nut to a certain extent, press down the secondary sheave, hold the handle "1" of tool and turn it clockwise, align to the alignment mark made when it was removed, and further tighten the nut.



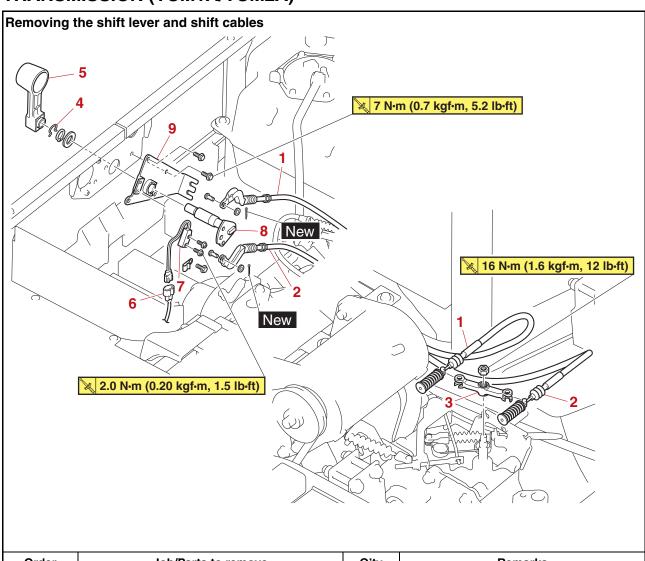
- 5. Install:
 - Circlip

TIP.

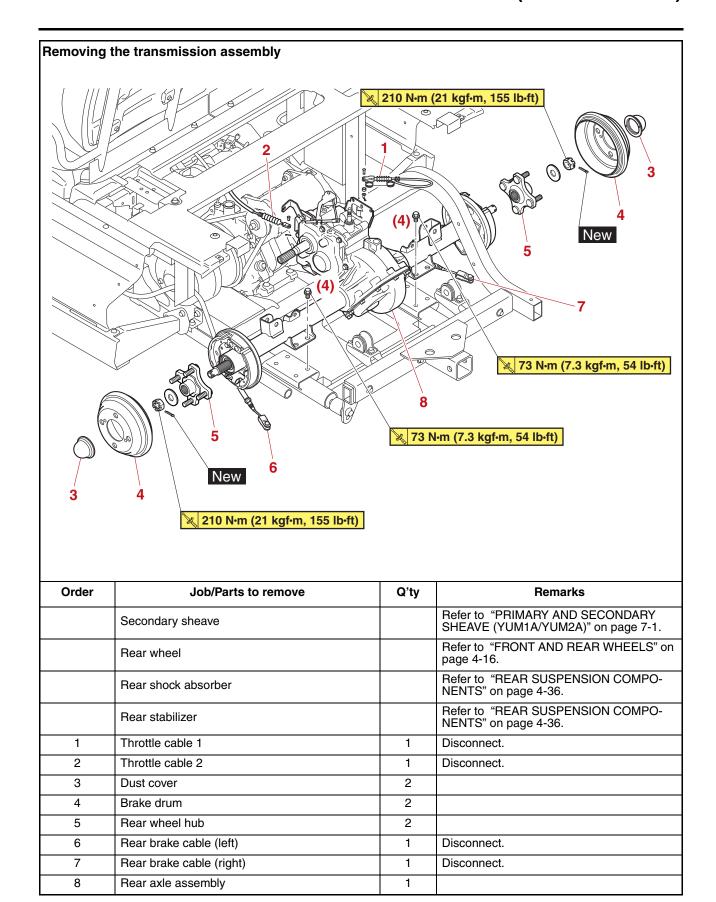
Fully tighten the nut, and install the circlip in the groove of the secondary sheave.

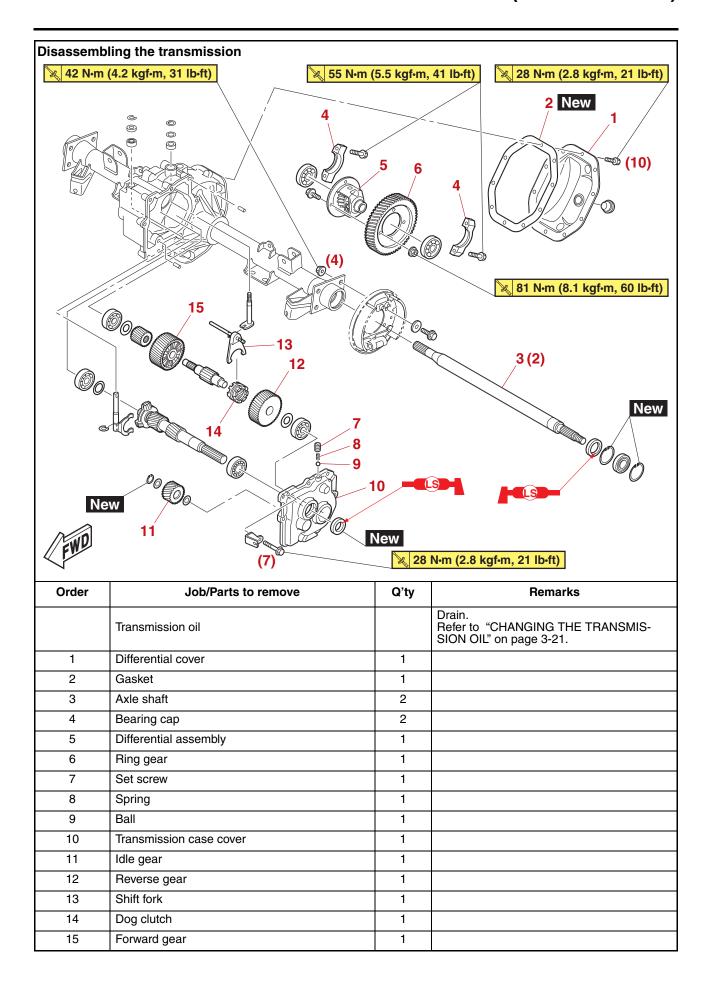


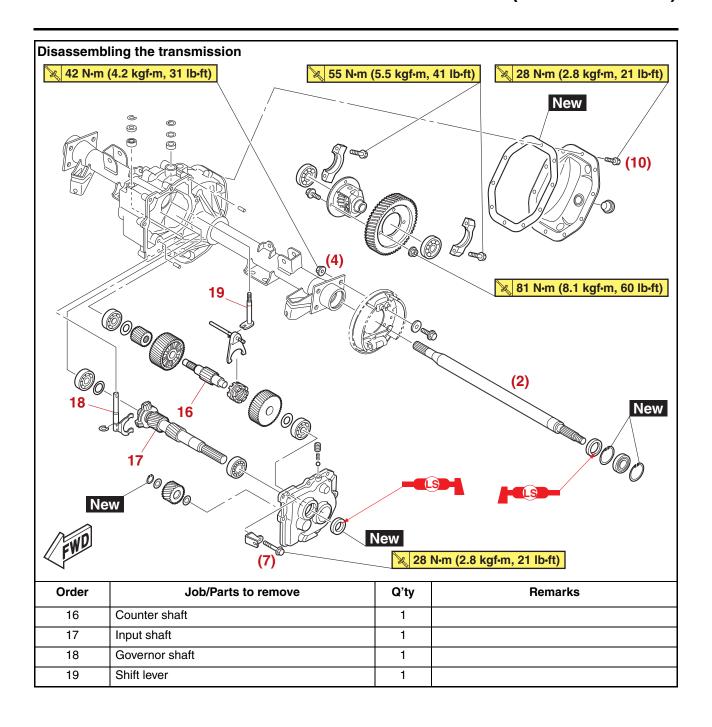
- 6. Remove:
 - Nut
 - Tool
 - Bolt



Order	Job/Parts to remove	Q'ty	Remarks
	Seat frames (driver and passenger)		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Cargo bed		Refer to "GENERAL CHASSIS (2)" on page 4-3.
1	Shift cable (forward)	1	
2	Shift cable (reverse)	1	
3	Equalizer bracket	1	
4	Clip	1	
5	Shift lever	1	
6	Reverse switch coupler	1	Disconnect.
7	Reverse switch	1	
8	Shift lever shaft	1	
9	Shift cable bracket	1	





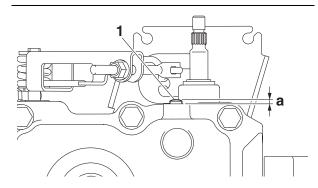


DISASSEMBLING THE TRANSMISSION

- 1. Remove:
 - Set screw "1"

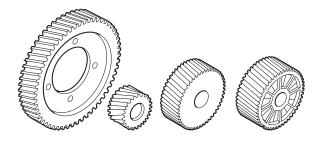
TIP_

Before loosening the set screw "1", measure the installed length "a" so that the screw can be installed in the same position.



CHECKING THE TRANSMISSION

- 1. Check:
 - Ring gear
- Idle gear
- Reverse gear
- Forward gear Blue discoloration/pitting/wear \rightarrow Replace.



- 2. Check:
 - Forward and reverse gear dogs
 - Dog clutch
 Cracks/damage/rounded edges → Replace.



- 3. Check:
 - Shift fork Bends/damage/scoring/wear → Replace.



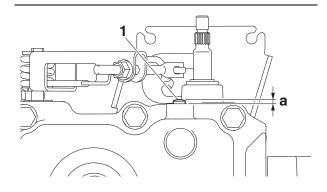
- 4. Check:
 - Bearings
 Damage → Replace.

ASSEMBLING THE TRANSMISSION

- 1. Install:
- Set screw "1"

TIP

Install the set screw "1" so that the installed length "a" is the same as the length measured before the screw was removed.

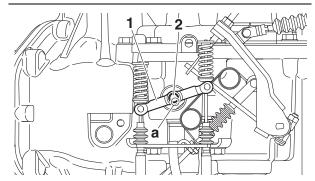


INSTALLING THE SHIFT CABLES

- 1. Install:
 - Equalizer bracket "1"

TIP

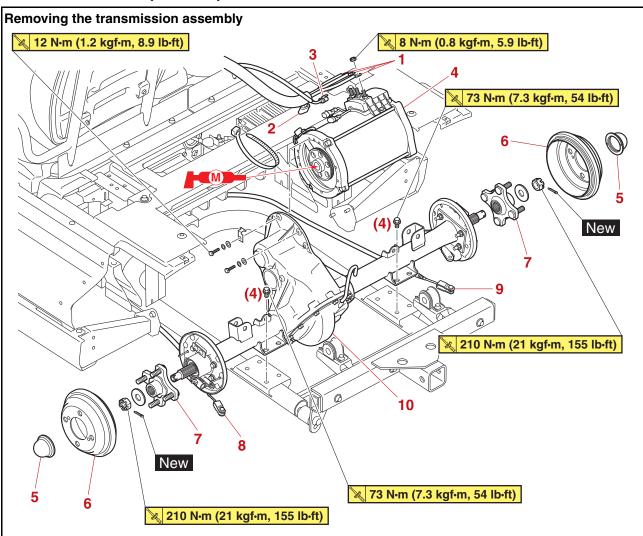
Align the flat portion "a" of the equalizer bracket "1" with the flat portion of the shift lever "2".



- 2. Adjust:
- Shift stroke

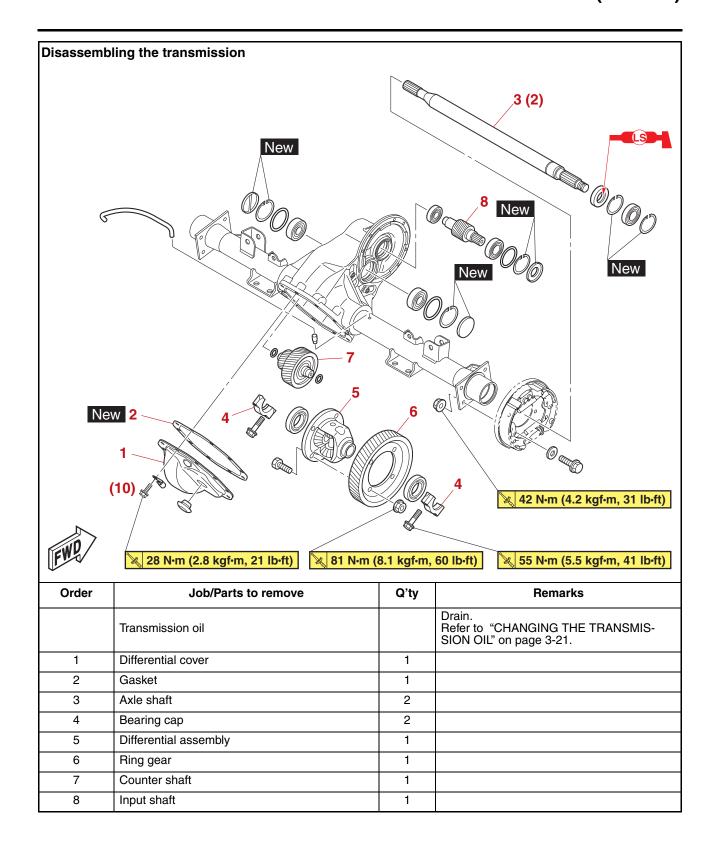
Refer to "CHECKING THE SHIFT LEVER (YUM1A/YUM2A)" on page 3-8.

TRANSMISSION (YUM2E)



Order	Job/Parts to remove		Remarks
	Cargo bed		Refer to "GENERAL CHASSIS (2)" on page 4-3.
	Rear wheel		Refer to "FRONT AND REAR WHEELS" on page 4-16.
	Rear shock absorber		Refer to "REAR SUSPENSION COMPONENTS" on page 4-36.
	Rear stabilizer		Refer to "REAR SUSPENSION COMPONENTS" on page 4-36.
1	Traction motor lead	3	Disconnect.
2	Speed sensor coupler	1	Disconnect.
3	Traction motor temperature sensor coupler	1	Disconnect.
4	Traction motor	1	
5	Dust cover	2	
6	Brake drum	2	
7	Rear wheel hub	2	
8	Rear brake cable (left)	1	Disconnect.
9	Rear brake cable (right)	1	Disconnect.
10	Rear axle assembly	1	

TRANSMISSION (YUM2E)

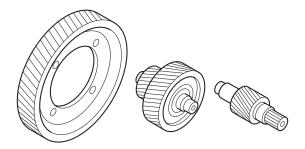


TRANSMISSION (YUM2E)

CHECKING THE TRANSMISSION

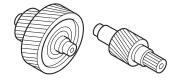
- 1. Check:
 - Ring gear
 - Counter gear
 - Input gear

Blue discoloration/pitting/wear \rightarrow Replace.



2. Check:

- Counter shaft
- Input shaft Bend/pitting \rightarrow Replace.



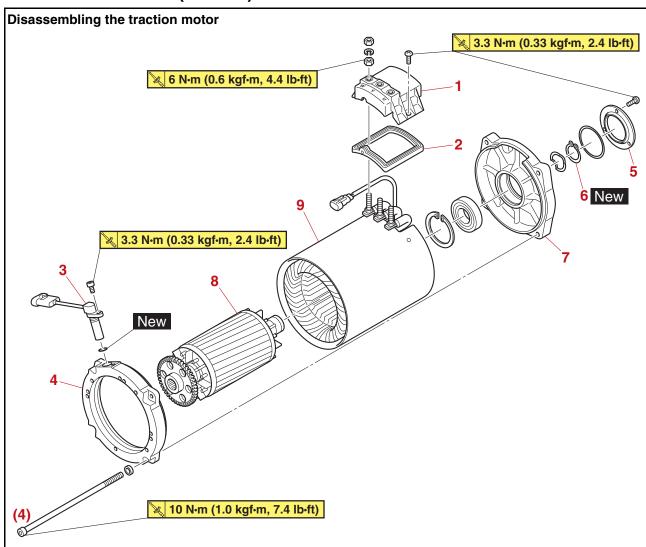
3. Check:

• Bearings

 $\mathsf{Damage} \to \mathsf{Replace}.$

TRACTION MOTOR (YUM2E)

TRACTION MOTOR (YUM2E)



Order	Job/Parts to remove	Q'ty	Remarks
	Traction motor		Refer to "TRANSMISSION (YUM2E)" on page 7-14.
1	Terminal plate	1	
2	Terminal plate seal	1	
3	Speed sensor	1	
4	Front bracket	1	
5	Dust cover	1	
6	Circlip	1	
7	End bracket	1	
8	Armature	1	
9	Stator	1	

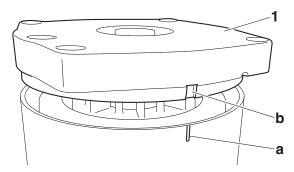
TRACTION MOTOR (YUM2E)

ASSEMBLING THE TRACTION MOTOR

- 1. Install:
 - End bracket "1"

TIP ___

Align the match mark "a" on the stator with the slot "b" on the end bracket.



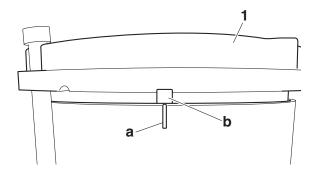
- 2. Install:
 - Front bracket "1"

TIP

Align the match mark "a" on the stator with the slot "b" on the front bracket.



Traction motor bracket bolt 10 N·m (1.0 kgf·m, 7.4 lb·ft)



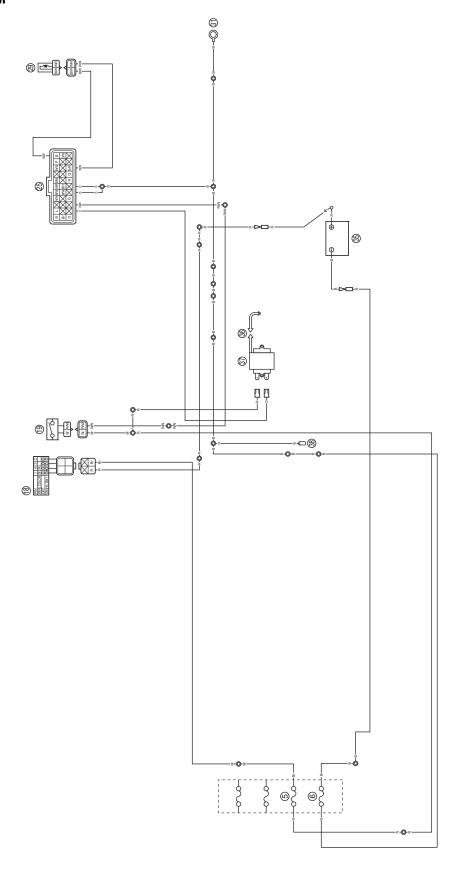
TRACTION MOTOR (YUM2E)

ELECTRICAL SYSTEM

IGNITION SYSTEM (YUM1A/YUM2A)	8-1
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CIRCUIT DIAGRAM



- 5. Main switch fuse
- 6. Main fuse
- 18.Main switch
- 19.Accelerator switch
- 25.ECU (engine control unit)
- 29. Crankshaft position sensor
- 31.Frame ground
- 35.Battery
- 36.Spark plug
- 37.Ignition coil
- 38.Engine ground

TROUBLESHOOTING The ignition system fails to operate (no spark or intermittent spark). • Before troubleshooting, remove the following part(s): 1. Under-seat panel 2. Service lid 3. Instrument panel assembly 1. Check the fuses. $NG \rightarrow$ (Main and Main switch) Replace the fuse(s). Refer to "CHECKING THE FUSES" on page 8-50. OK ↓ 2. Check the battery. $NG \rightarrow$ Refer to "CHECKING AND • Clean the battery terminals. CHARGING THE BATTERY" on • Recharge or replace the battery. page 8-51. OK ↓ 3. Check the spark plug. $NG \rightarrow$ Refer to "CHECKING THE SPARK Re-gap or replace the spark plug. PLUG (YUM1A/YUM2A)" on page 3-10. OK ↓ 4. Check the ignition spark gap. $OK \rightarrow$ Refer to "CHECKING THE IGNI-Ignition system is OK. TION SPARK GAP" on page 8-54. NG ↓ 5. Check the spark plug cap. $NG \rightarrow$ Refer to "CHECKING THE SPARK Replace the spark plug cap. PLUG CAP" on page 8-54. OK ↓ 6. Check the ignition coil. $NG \rightarrow$ Refer to "CHECKING THE IGNI-Replace the ignition coil. TION COIL" on page 8-54. OK ↓ 7. Check the crankshaft position sen- $NG \rightarrow$ Refer to "CHECKING THE CRANK-Replace the crankshaft position sensor.

8-3

SHAFT POSITION SENSOR" on

page 8-55.

OK ↓

8. Check the accelerator switch. Refer to "CHECKING THE SWITCHES" on page 8-48.

Replace the accelerator switch.

OK ↓

9. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-48.

 $\text{NG} \rightarrow$

 $NG \rightarrow$

Replace the main switch.

OK ↓

10.Check the entire ignition system wiring.Refer to "CIRCUIT DIAGRAM" on page 8-1.

 $\text{NG} \rightarrow$

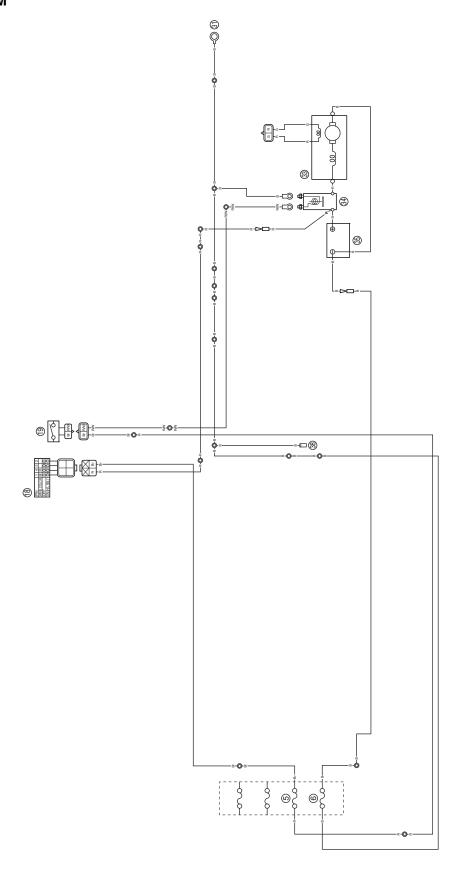
Properly connect or replace the wire harness.

 $\mathsf{OK} \downarrow$

Replace the ECU.

ELECTRIC STARTING SYSTEM (YUM1A/YUM2A)

CIRCUIT DIAGRAM



- 5. Main switch fuse
- 6. Main fuse
- 18.Main switch
- 19.Accelerator switch
- 31.Frame ground
- 33. Starter generator
- 34.Main relay
- 35.Battery
- 38.Engine ground

TROUBLESHOOTING The starter motor fails to turn. TIP_ • Before troubleshooting, remove the following part(s): 1. Under-seat panel 2. Cargo bed (lift up) 3. Service lid 4. Instrument panel assembly 1. Check the fuses. $NG \rightarrow$ (Main and Main switch) Replace the fuse(s). Refer to "CHECKING THE FUSES" on page 8-50. OK ↓ 2. Check the battery. $NG \rightarrow$ Refer to "CHECKING AND • Clean the battery terminals. CHARGING THE BATTERY" on • Recharge or replace the battery. page 8-51. OK ↓ 3. Check the starter generator opera- $OK \rightarrow$ Starter generator is OK. Perform the electric Refer to "CHECKING THE STARTstarting system troubleshooting, starting ER GENERATOR OPERATION" on with step 5. page 8-55. NG ↓ 4. Check the starter generator. $NG \rightarrow$ Refer to "CHECKING THE START-Repair or replace the starter generator. ER GENERATOR" on page 5-19. OK ↓ 5. Check the main relay. $NG \rightarrow$ Refer to "CHECKING THE RE-Replace the main relay. LAYS" on page 8-53. OK ↓ 6. Check the main switch. $NG \rightarrow$ Refer to "CHECKING THE Replace the main switch. SWITCHES" on page 8-48. OK ↓ 7. Check the accelerator switch. $NG \rightarrow$ Refer to "CHECKING THE Replace the accelerator switch. SWITCHES" on page 8-48. OK ↓

Check the entire starting system wiring.
 Refer to "CIRCUIT DIAGRAM" on

ОК↓

page 8-5.

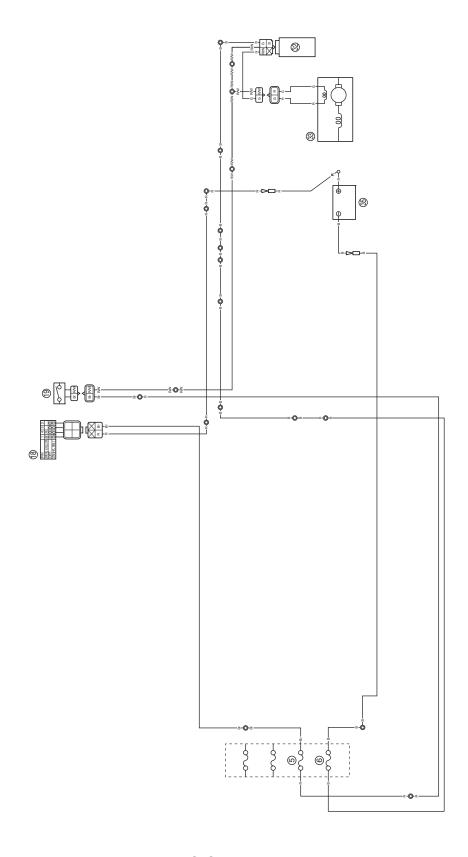
The electric starting system circuit is OK.

 $NG \rightarrow$

Properly connect or replace the wire harness.

CHARGING SYSTEM (YUM1A/YUM2A)

CIRCUIT DIAGRAM



CHARGING SYSTEM (YUM1A/YUM2A)

- 5. Main switch fuse
- 6. Main fuse
- 18.Main switch
- 19.Accelerator switch
- 32. Voltage regulator
- 33.Starter generator
- 35.Battery

CHARGING SYSTEM (YUM1A/YUM2A)

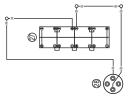
TROUBLESHOOTING The battery is not being charged. TIP_ • Before troubleshooting, remove the following part(s): 1. Under-seat panel 2. Cargo bed (lift up) 3. Service lid 4. Instrument panel assembly 1. Check the fuse. $NG \rightarrow$ (Main and main switch) Replace the fuse. Refer to "CHECKING THE FUSES" on page 8-50. OK ↓ 2. Check the battery. $NG \rightarrow$ Refer to "CHECKING AND • Clean the battery terminals. CHARGING THE BATTERY" on • Recharge or replace the battery. page 8-51. OK ↓ 3. Check the starter generator. $NG \rightarrow$ Refer to "CHECKING THE START-Repair or replace the starter generator. ER GENERATOR" on page 5-19. OK ↓ 4. Check the voltage regulator. $NG \rightarrow$ Refer to "CHECKING THE VOLT-Replace the voltage regulator. AGE REGULATOR" on page 8-56. OK ↓ 5. Check the main switch. $NG \rightarrow$ Refer to "CHECKING THE Replace the main switch. SWITCHES" on page 8-61. OK ↓ 6. Check the accelerator switch. $NG \rightarrow$ Refer to "CHECKING THE Replace the accelerator switch. SWITCHES" on page 8-61. OK ↓ 7. Check the entire charging system $NG \rightarrow$ Properly connect or replace the wire harwiring. Refer to "CIRCUIT DIAGRAM" on ness. page 8-9. OK ↓ The charging system circuit is OK.

CHARGING SYSTEM (YUM1A/YUM2A)

CHARGING SYSTEM (YUM2E)

CHARGING SYSTEM (YUM2E)

CIRCUIT DIAGRAM



27.Battery28.Charging receptacle

CHARGING SYSTEM (YUM2E)

TROUBLESHOOTING

The battery is not being charged.

TIP_

- Before troubleshooting, remove the following part(s):
- 1. Under-seat panel
 - Check the battery.
 Refer to "CHECKING AND
 CHARGING THE BATTERY" on
 page 8-63.

 $\text{NG} \rightarrow$

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

OK ↓

 Check the entire charging system wiring.
 Refer to "CIRCUIT DIAGRAM" on page 8-13.

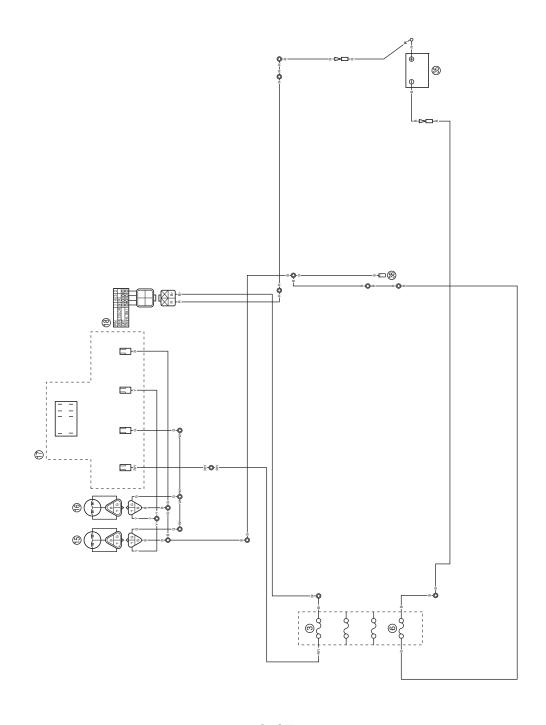
 $\text{NG} \rightarrow$

Properly connect or replace the wire harness.

OK ↓

The charging system circuit is OK.

CIRCUIT DIAGRAM



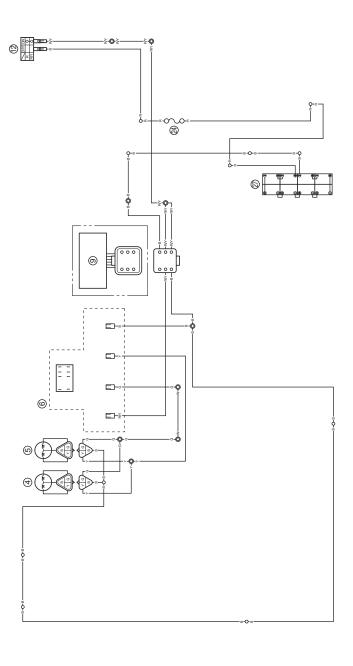
- 3. Lighting fuse
- 6. Main fuse
- 15.Headlight (right)
- 16.Headlight (left)
- 17.Light switch
- 18.Main switch
- 35.Battery
- 38.Engine ground

TROUBLESHOOTING Any of the following fail to light: headlight. TIP_ • Before troubleshooting, remove the following part(s): 1. Under-seat panel 2. Instrument panel assembly 3. Front grill 1. Check the fuses. $NG \rightarrow$ (Main and lighting) Replace the fuse(s). Refer to "CHECKING THE FUSES" on page 8-50. OK ↓ 2. Check the battery. $NG \rightarrow$ Refer to "CHECKING AND • Clean the battery terminals. CHARGING THE BATTERY" on • Recharge or replace the battery. page 8-51. OK ↓ 3. Check the main switch. $NG \rightarrow$ Refer to "CHECKING THE Replace the main switch. SWITCHES" on page 8-48. OK ↓ 4. Check the light switch. $NG \rightarrow$ Refer to "CHECKING THE Replace the light switch. SWITCHES" on page 8-48. OK ↓ 5. Check the entire lighting system wir- $NG \rightarrow$ Properly connect or replace the wire har-Refer to "CIRCUIT DIAGRAM" on ness. page 8-15.

ок↓

Replace the headlight (left and/or right).

CIRCUIT DIAGRAM



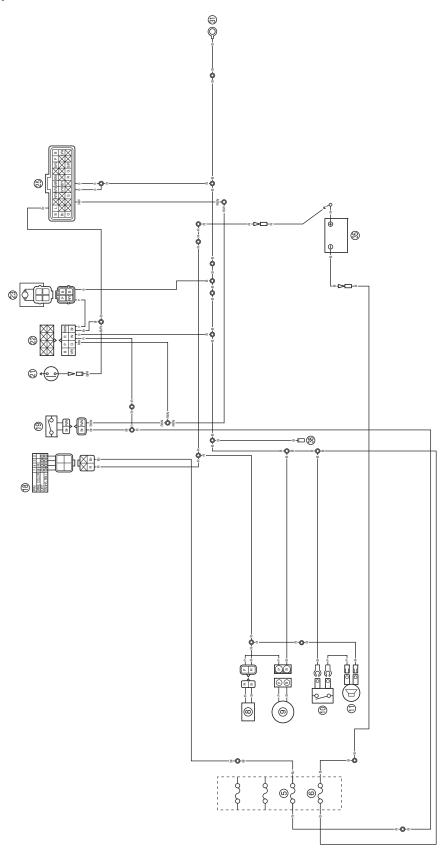
- 4. Headlight (right)5. Headlight (left)
- 6. Light switch
- 9. Voltage regulator
- 12.Tow switch
- 24.Main fuse
- 27.Battery

TROUBLESHOOTING Any of the following fail to light: headlight. TIP_ • Before troubleshooting, remove the following part(s): 1. Under-seat panel 2. Cargo bed (lift up) 3. Front grill 1. Check the fuses. $NG \rightarrow$ (Main) Replace the fuse(s). Refer to "CHECKING THE FUSES" on page 8-63. OK ↓ 2. Check the battery. $NG \rightarrow$ Refer to "CHECKING AND • Clean the battery terminals. CHARGING THE BATTERY" on • Recharge or replace the battery. page 8-63. OK ↓ 3. Check the tow switch. $NG \rightarrow$ Refer to "CHECKING THE Replace the tow switch. SWITCHES" on page 8-61. OK ↓ 4. Check the light switch. $NG \rightarrow$ Refer to "CHECKING THE Replace the light switch. SWITCHES" on page 8-61. OK ↓ 5. Check the entire lighting system wir- $NG \rightarrow$ Properly connect or replace the wire har-Refer to "CIRCUIT DIAGRAM" on ness. page 8-19. OK ↓

Replace the voltage regulator or head-

light (left and/or right).

CIRCUIT DIAGRAM



- 5. Main switch fuse
- 6. Main fuse
- 8. Reverse switch
- 9. Reverse buzzer
- 10.Horn switch
- 11.Horn
- 18.Main switch
- 19. Accelerator switch
- 21. Engine oil level switch
- 22.Meter assembly
- 23. Fuel pump assembly
- 25.ECU (engine control unit)
- 31.Frame ground
- 35.Battery
- 38.Engine ground

TROUBLESHOOTING

- The fuel gauge fails to come on.
- The hour meter fails to come on.
- The reverse buzzer fails to sound.
- The horn fails to sound.

TIP

- Before troubleshooting, remove the following part(s):
- 1. Under-seat panel
- 2. Service lid
- 3. Front grill
- 4. Instrument panel assembly
 - Check the fuses.
 (Main, and main switch)
 Refer to "CHECKING THE FUSES" on page 8-50.

 $\text{NG} \rightarrow$

Replace the fuse(s).

OK ↓

Check the battery.
 Refer to "CHECKING AND
 CHARGING THE BATTERY" on
 page 8-51.

 $NG \rightarrow$

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

OK ↓

3. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-48.

 $NG \rightarrow$

Replace the main switch.

OK ↓

 Check the entire signaling system wiring.
 Refer to "CIRCUIT DIAGRAM" on page 8-23.

 $NG \rightarrow$

Properly connect or replace the wire harness.

OK ↓

Check the condition of each of the signaling system circuits. Refer to "Checking the signaling system" on page 8-25.

Checking the signaling system

The fuel gauge fails to come on.

 Check the fuel sender.
 Refer to "CHECKING THE FUEL SENDER" on page 8-56. $NG \rightarrow$

Replace the fuel pump assembly.

OK ↓

2. Check the entire signaling system $NG \rightarrow$ wiring. Properly connect or replace the wire har-Refer to "CIRCUIT DIAGRAM" on ness. page 8-23. OK ↓ Replace the meter assembly. The hour meter fails to come on. 1. Check the accelerator switch. $NG \rightarrow$ Refer to "CHECKING THE Replace the accelerator switch. SWITCHES" on page 8-48. OK ↓ 2. Check the entire signaling system $NG \rightarrow$ Properly connect or replace the wire harwiring. Refer to "CIRCUIT DIAGRAM" on ness. page 8-23. OK ↓ Replace the meter assembly or ECU. The reverse buzzer fails to sound. 1. Check the reverse switch. $NG \rightarrow$ Refer to "CHECKING THE Replace the reverse switch. SWITCHES" on page 8-48. OK ↓ 2. Check the reverse buzzer. $NG \rightarrow$ Refer to "CHECKING THE RE-Replace the reverse buzzer. VERSE BUZZER" on page 8-57. OK ↓ 3. Check the entire signaling system $NG \rightarrow$ Properly connect or replace the wire har-Refer to "CIRCUIT DIAGRAM" on ness. page 8-23. OK ↓ The buzzer circuit is OK. The horn fails to sound. 1. Check the horn switch. $NG \rightarrow$ Refer to "CHECKING THE Replace the horn switch. SWITCHES" on page 8-48. OK ↓

 Check the entire signaling system wiring.
 Refer to "CIRCUIT DIAGRAM" on page 8-23. $NG \rightarrow$

Properly connect or replace the wire harness.

OK ↓

Replace the horn.

The engine oil level warning light fails to come on.

1. Check the engine oil level switch. Refer to "CHECKING THE SWITCHES" on page 8-48.

 $NG \rightarrow$

Replace the engine oil level switch.

OK ↓

 Check the entire signaling system wiring.
 Refer to "CIRCUIT DIAGRAM" on page 8-23.

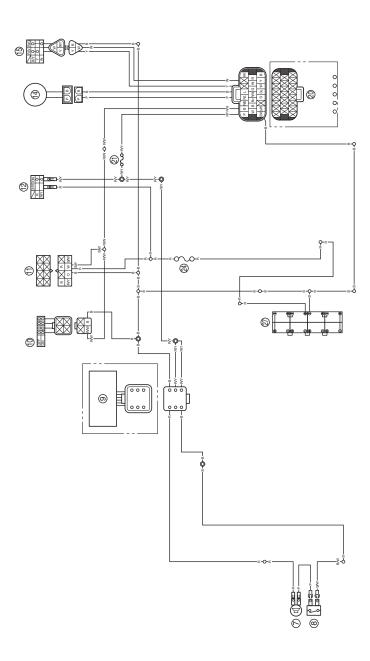
 $NG \rightarrow$

Properly connect or replace the wire harness.

OK ↓

Replace the meter assembly.

CIRCUIT DIAGRAM



- 7. Horn
- 8. Horn switch
- 9. Voltage regulator
- 10.Main switch
- 11.Battery gauge/warning light
- 12.Tow switch
- 14.Reverse buzzer
- 15.Shift switch
- 20.MCU (motor control unit)
- 21.MCU fuse
- 24.Main fuse
- 27.Battery

TROUBLESHOOTING

- The reverse buzzer fails to sound.
- The horn fails to sound.

TIP

- Before troubleshooting, remove the following part(s):
- 1. Under-seat panel
- 2. Cargo bed (lift up)
- 3. Front grill
- 4. Instrument panel assembly
 - Check the fuses.
 (Main, and MCU)
 Refer to "CHECKING THE FUSES"
 on page 8-63.

 $NG \rightarrow$

Replace the fuse(s).

OK ↓

Check the battery.
 Refer to "CHECKING AND
 CHARGING THE BATTERY" on
 page 8-63.

 $NG \rightarrow$

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

OK ↓

3. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-61. $\text{NG} \rightarrow$

Replace the main switch.

OK ↓

4. Check the tow switch.
Refer to "CHECKING THE
SWITCHES" on page 8-61.

 $NG \rightarrow$

Replace the tow switch.

OK ↓

 Check the entire signaling system wiring.
 Refer to "CIRCUIT DIAGRAM" on page 8-29.

 $NG \rightarrow$

Properly connect or replace the wire harness.

OK ↓

Check the condition of each of the signaling system circuits. Refer to "Checking the signaling system" on page 8-32.

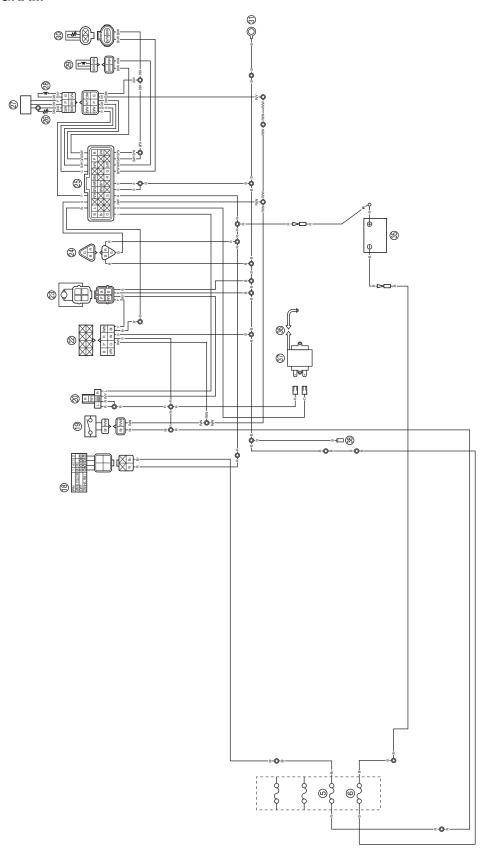
Checking the signaling system The reverse buzzer fails to sound. 1. Check the shift switch. $NG \rightarrow$ Refer to "CHECKING THE Replace the shift switch. SWITCHES" on page 8-61. OK ↓ 2. Check the reverse buzzer. $NG \rightarrow$ Refer to "CHECKING THE RE-Replace the reverse buzzer. VERSE BUZZER" on page 8-78. OK ↓ 3. Check the entire signaling system $NG \rightarrow$ Properly connect or replace the wire har-Refer to "CIRCUIT DIAGRAM" on ness. page 8-29. OK ↓ Replace the MCU. The horn fails to sound. 1. Check the horn switch. $NG \rightarrow$ Refer to "CHECKING THE Replace the horn switch. SWITCHES" on page 8-61. OK ↓ 2. Check the entire signaling system $NG \rightarrow$ Properly connect or replace the wire har-Refer to "CIRCUIT DIAGRAM" on ness. page 8-29. OK ↓

The battery gauge/warning light fails to come on.

Replace the meter assembly.

Replace the horn.

CIRCUIT DIAGRAM



- 5. Main switch fuse
- 6. Main fuse
- 18.Main switch
- 19.Accelerator switch
- 20. Fuel pump relay
- 22.Meter assembly
- 23. Fuel pump assembly
- 24. Diagnostic tool coupler
- 25.ECU (engine control unit)
- 26.Engine temperature sensor
- 27.Intake air pressure sensor
- 28. Fuel injector
- 29. Crankshaft position sensor
- 30.Intake air temperature sensor
- 31.Frame ground
- 35.Battery
- 36.Spark plug
- 37.Ignition coil
- 38.Engine ground

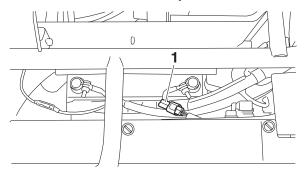
READING ERROR CODES – FUEL INJECTION SYSTEM

Reading Codes Using the FI Diagnostic Tool

WARNING

Lock out the vehicle when you perform this procedure. Refer to "SAFETY LOCKOUT PROCEDURE" on page 1-2. Unexpected vehicle movement could result in severe injury or death to persons inspecting or repairing the utility vehicle or bystanders.

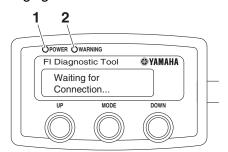
1. Remove the cap "1" from the diagnostic plug located behind the battery.



- 2. Plug the connector from the FI Diagnostic Tool into the diagnostic plug.
- 3. Turn the main switch to the "ON" position.



4. The green light will be on "1" and the yellow warning light "2" will be on.

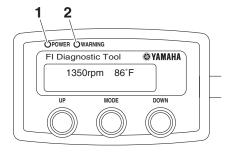


5. The screen will display "Waiting for Connection...".

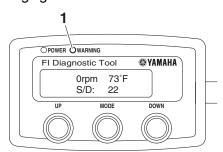
TIP.

The accelerator pedal must be pushed down and the engine rotated, to read error codes, even if the engine will not start.

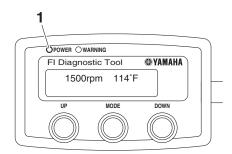
- 6. Push the accelerator pedal down to start the engine.
- 7. With the engine running, the screen will display engine rpm and engine temperature.
- 8. If there are error codes, both the green power light "1" and the yellow warning light "2" will be on.



- 9. Release the accelerator pedal to shut the engine off. Leave the main switch on.
- 10.If there is an active error code, the yellow warning light "1" will remain on.



- 11.The error code, in this case S/D: 22, will be displayed below the engine rpm and engine temperature. For error code identification and description, refer to "DIAGNOSTIC/ERROR CODE IDENTIFICATION CHART (YUM1A/ YUM2A)" on page 9-4.
- 12.If there is more than one error code, the first code will flash for several seconds, and then the next code will display and then the next code, etc. After the cycle ends, it will restart.
- 13.Once the problems have been fixed, turn the main switch on and restart the engine. Only the green power light "1" should be on, and the screen will display engine rpm and engine temperature.



Setting FI Tool to Diagnostic Mode

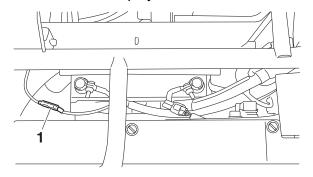
The FI Tool can be set to Diagnostic Mode to view the sensors' values and to perform some tests on components.

1. Connect the FI Tool to the vehicle following the procedure from "Reading Codes Using the FI Diagnostic Tool" on page 8-35.



FI Diagnostic Tool 90890-03182 FI Diagnostic Tool YU-03182

 Turn the main switch to the "OFF" position and disconnect the negative battery lead "1" approximately 5 seconds. FI diagnostic tool screen is not display.

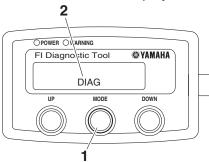


- 3. Connect the negative battery lead.
- 4. Turn the main switch to the "ON" position.

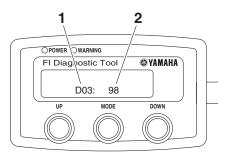
TID

The engine will not start when in the diagnostic mode. The accelerator pedal must be pushed down and the engine rotated for the tool to get readings.

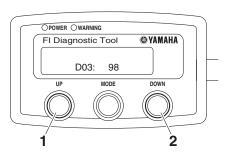
5. Hold-down the "MODE" button "1" and press the accelerator pedal to the "START" position. After 2 seconds, release the pedal. 6. The screen should now display "DIAG" "2".



7. Press and release the "MODE" button. The screen will now display the diagnostic code "1" and the value of the code "2".



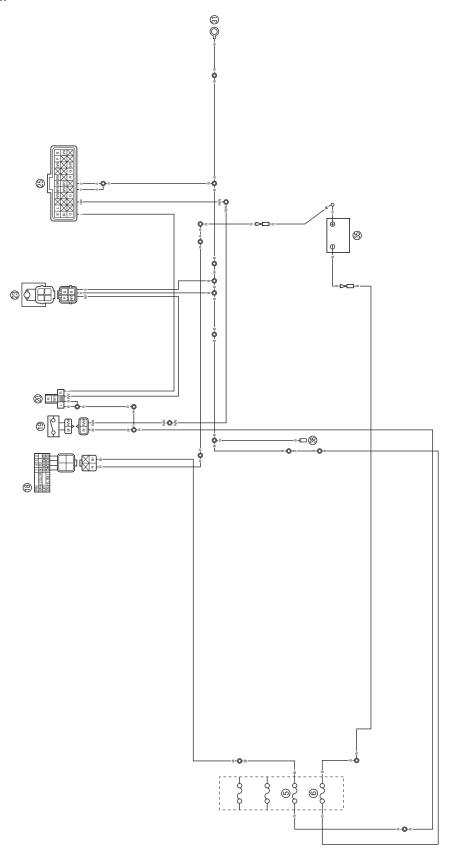
8. Use the "UP" button "1" to scroll up through the diagnostic codes or the "DOWN" button "2" to scroll down through the codes.



- 9. Pressing and holding the "UP" or "DOWN" buttons will automatically scroll through the codes.
- 10. Turning the main switch off will take you out of diagnostic mode.
- 11.Disconnect the negative battery lead and FI diagnostic tool.
- 12. Connect the negative battery lead.
- 13.Release the lock out and then, turn the main switch to "ON" and set the accelerator switch to "ON" to return to the normal mode.

TIP
If the engine is not start in the diagnostic mode,
turn the main switch to "OFF" and disconnect the
negative battery lead to release the diagnostic
mode.

CIRCUIT DIAGRAM

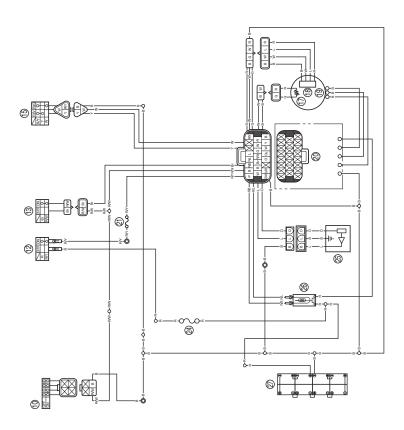


- 5. Main switch fuse
- 6. Main fuse
- 18.Main switch
- 19.Accelerator switch
- 20. Fuel pump relay
- 23.Fuel pump assembly
- 25.ECU (engine control unit)
- 31.Frame ground
- 35.Battery
- 38. Engine ground

TROUBLESHOOTING If the fuel pump fails to operate. TIP_ • Before troubleshooting, remove the following part(s): 1. Under-seat panel 2. Service lid 3. Instrument panel assembly 1. Check the fuses. $NG \rightarrow$ (Main, and main switch) Replace the fuse(s). Refer to "CHECKING THE FUSES" on page 8-50. OK ↓ 2. Check the battery. $NG \rightarrow$ Refer to "CHECKING AND • Clean the battery terminals. CHARGING THE BATTERY" on • Recharge or replace the battery. page 8-51. OK ↓ 3. Check the main switch. $NG \rightarrow$ Refer to "CHECKING THE Replace the main switch. SWITCHES" on page 8-48. OK ↓ 4. Check the accelerator switch. $NG \rightarrow$ Refer to "CHECKING THE Replace the accelerator switch. SWITCHES" on page 8-48. OK ↓ 5. Check the fuel pump relay. $NG \rightarrow$ Refer to "CHECKING THE RE-Replace the fuel pump relay. LAYS" on page 8-53. OK ↓ 6. Check the fuel pump. $NG \rightarrow$ Refer to "CHECKING THE FUEL Replace the fuel pump assembly. PUMP BODY" on page 6-2. OK ↓ 7. Check the entire fuel pump system $NG \rightarrow$ Properly connect or replace the wire harwiring. Refer to "CIRCUIT DIAGRAM" on ness. page 8-39. OK ↓ Replace the ECU.

DRIVE SYSTEM (YUM2E)

CIRCUIT DIAGRAM



DRIVE SYSTEM (YUM2E)

- 10.Main switch
- 12.Tow switch
- 13.Accelerator switch
- 15.Shift switch
- 17. Motor temperature sensor
- 18.Motor speed sensor
- 19.Traction motor
- 20.MCU (motor control unit)
- 21.MCU fuse
- 24.Main fuse
- 25.TPS (throttle position sensor)
- 26.Main relay
- 27.Battery

TROUBLESHOOTING • The drive system fails to operate. TIP_ • Before troubleshooting, remove the following part(s): 1. Under-seat panel 2. Cargo bed 3. Service lid 4. Instrument panel assembly 1. Check the fuses. $NG \rightarrow$ (Main, and MCU) Replace the fuse(s). Refer to "CHECKING THE FUSES" on page 8-63. OK ↓ 2. Check the battery. $NG \rightarrow$ Refer to "CHECKING AND • Clean the battery terminals. CHARGING THE BATTERY" on • Recharge or replace the battery. page 8-63. OK ↓ 3. Check the main switch. $NG \rightarrow$ Refer to "CHECKING THE Replace the main switch. SWITCHES" on page 8-61. OK ↓ 4. Check the tow switch. $NG \rightarrow$ Refer to "CHECKING THE Replace the tow switch. SWITCHES" on page 8-61. OK ↓ 5. Check the accelerator switch. $NG \rightarrow$ Refer to "CHECKING THE Replace the accelerator switch. SWITCHES" on page 8-61. OK ↓ 6. Check the shift switch. $NG \rightarrow$ Refer to "CHECKING THE Replace the shift switch. SWITCHES" on page 8-61. OK ↓ 7. Check the main relay. $NG \rightarrow$ Refer to "CHECKING THE RE-Replace the main relay. LAYS" on page 8-77. OK ↓ 8. Check the throttle position sensor. $NG \rightarrow$ Refer to "CHECKING THE THROT-Replace the throttle position sensor. TLE POSITION SENSOR" on page 8-78.

OK ↓

DRIVE SYSTEM (YUM2E)

Check the entire drive system wiring. Refer to "CIRCUIT DIAGRAM" on page 8-43.

ОК↓

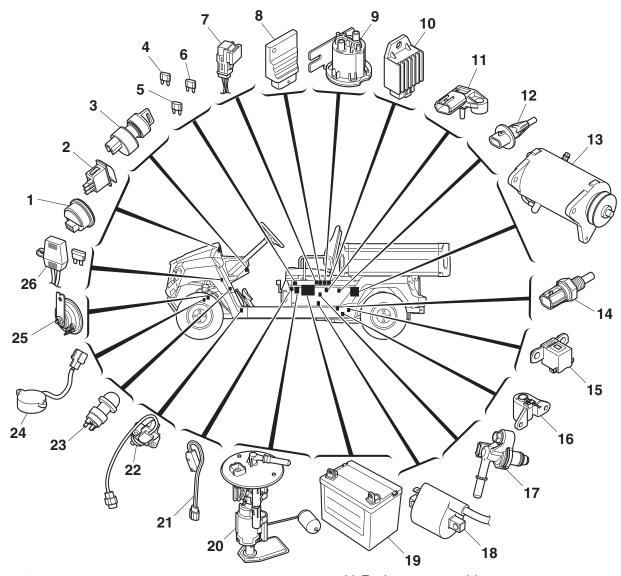
Replace the traction motor or MCU.

 $NG \rightarrow$

Properly connect or replace the drive system wiring.

ELECTRICAL COMPONENTS (YUM1A/YUM2A)

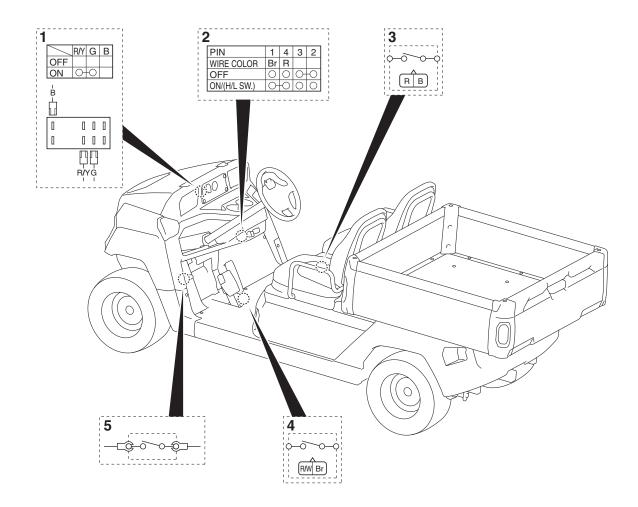
ELECTRICAL COMPONENTS (YUM1A/YUM2A)



- 1. Meter assembly
- 2. Light switch
- 3. Main switch
- 4. Main switch fuse
- 5. Main fuse
- 6. Lighting fuse
- 7. Fuel pump relay
- 8. ECU (engine control unit)
- 9. Main relay
- 10. Voltage regulator
- 11. Intake air pressure sensor
- 12.Intake air temperature sensor
- 13. Starter generator
- 14. Engine temperature sensor
- 15. Crankshaft position sensor
- 16. Engine oil level switch
- 17. Fuel injector
- 18.Ignition coil
- 19.Battery

- 20. Fuel pump assembly
- 21.Reverse switch
- 22.Accelerator switch
- 23. Horn switch
- 24. Reverse buzzer
- 25.Horn
- 26.USB fuse

CHECKING THE SWITCHES



- 1. Light switch
- 2. Main switch
- 3. Reverse switch
- 4. Accelerator switch
- 5. Horn switch

Check each switch for continuity with the digital circuit 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 "a". Always insert the probes from the opposite end of the coupler, taking care not to loosen or damage the leads.



Digital circuit tester (CD732) 90890-03243 Model 88 Multimeter with tachometer YU-A1927

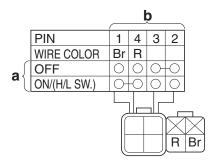
TIP

When checking for continuity, switch back and forth between the switch positions a few times.

The switches and their terminal connections are illustrated as in the following example of the main switch.

The switch positions "a" are shown in the far left column and the switch lead colors and terminal No. "b" are shown in the top row.

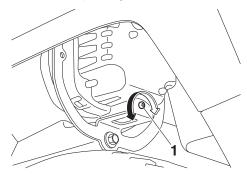
The continuity (i. e., a closed circuit) between switch terminals at a given switch position is indicated by "O—O". There is continuity between the brown and red leads when the switch is set to "ON".



ADJUSTING THE HEADLIGHT BEAMS

The following procedure applies to both of the headlights.

- 1. Adjust:
 - Headlight beam (vertically)
 - a. Turn the adjusting screw "1".



CHECKING THE FUSES

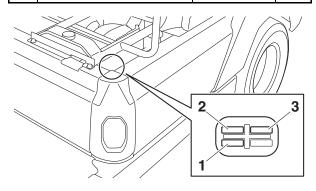
The following procedure applies to all of the fuses.

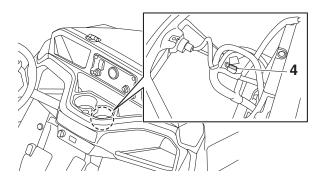
NOTICE

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

- 1. Remove:
- Seat cushion
- Under-seat panel Refer to "GENERAL CHASSIS (1)" on page 4-1.
- Instrument panel assembly Refer to "GENERAL CHASSIS (5)" on page 4-10.
- 2. Check:
 - Fuse

No.	Fuses	Amperage rating	Q'ty
1	Main	25 A	1
2	Main switch	10 A	1
3	Lighting	15 A	1
4	USB	5 A	1





a. Connect the digital circuit tester to the fuse and check the continuity.



Digital circuit tester (CD732) 90890-03243 Model 88 Multimeter with tachometer YU-A1927

- b. If the digital circuit tester indicates " ∞ ", replace the fuse.
- 3. Replace:
 - Blown fuse
 - a. Turn the main switch to "OFF".
 - b. Install a new fuse of the correct amperage rating.
 - c. Set on the switches to verify if the electrical circuit is operational.
 - d. If the fuse immediately blows again, check the electrical circuit.

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.

- 4. Install:
 - Instrument panel assembly Refer to "GENERAL CHASSIS (5)" on page 4-10.
 - Under-seat panel
 - Seat cushion Refer to "GENERAL CHASSIS (1)" on page 4-1.

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 VRLA (Valve Regulated Lead Acid) battery. Never remove the sealing caps because the balance between cells will not be maintained and battery performance will deteriorate.
- Charging time, charging amperage and charging voltage for a VRLA (Valve Regulated Lead Acid) battery are different from those of conventional batteries. The VRLA (Valve Regulated Lead Acid) battery should be charged according to the appropriate charging method. If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.

TIP

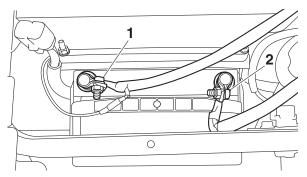
Since VRLA batteries are sealed, it is not possible to check the charge state of the battery by measuring the specific gravity of the electrolyte.

Therefore, the charge of the battery has to be checked by measuring the voltage at the battery terminals.

- 1. Remove:
- Seat cushion
- Under-seat panel Refer to "GENERAL CHASSIS (1)" on page 4-1.
- 2. Disconnect:
 - Battery leads (from the battery terminals)

NOTICE

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

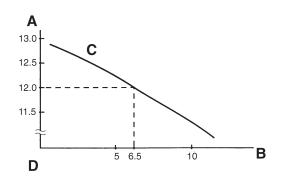


- 3. Remove:
 - Battery
- 4. Check:
 - Battery charge
 - a. Connect a digital circuit tester to the battery terminals.
- Positive tester probe → positive battery terminal
- Negative tester probe → negative battery terminal

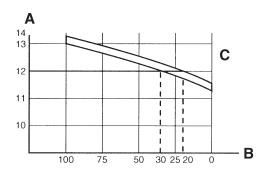
TIP_

- The charge state of a VRLA (Valve Regulated Lead Acid) battery can be checked by measuring its open-circuit voltage (i.e., the voltage when the positive battery terminal is disconnected).
- No charging is necessary when the open-circuit voltage equals or exceeds 12.8 V.
 - b. Check the charge of the battery, as shown in the charts and the following example.

Example
Open-circuit voltage = 12.0 V
Charging time = 6.5 hours
Charge of the battery = 20–30%



- A. Open-circuit voltage (V)
- B. Charging time (hours)
- C. Relationship between the open-circuit voltage and the charging time at 20 °C (68 °F)
- D. These values vary with the temperature, the condition of the battery plates, and the electrolyte level.



- A. Open-circuit voltage (V)
- B. Charging condition of the battery (%)
- C. Ambient temperature 20 °C (68 °F)
- 5. Charge:
 - Battery (refer to the appropriate charging method)

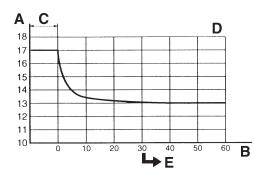
⚠ WARNING

Do not quick charge a battery.

NOTICE

- Do not use a high-rate battery charger since it forces a high-amperage current into the battery quickly and can cause battery overheating and battery plate damage.
- If it is impossible to regulate the charging current on the battery charger, be careful not to overcharge the battery.
- When charging a battery, be sure to remove it from the vehicle. (If charging has to be done with the battery mounted on the vehicle, disconnect the negative battery lead from the battery terminal.)

- To reduce the chance of sparks, do not plug in the battery charger until the battery charger leads are connected to the battery.
- Before removing the battery charger lead clips from the battery terminals, be sure to turn off the battery charger.
- Make sure the battery charger lead clips are in full contact with the battery terminal and that they are not shorted. A corroded battery charger lead clip may generate heat in the contact area and a weak clip spring may cause sparks.
- If the battery becomes hot to the touch at any time during the charging process, disconnect the battery charger and let the battery cool before reconnecting it. Hot batteries can explode!
- As shown in the following illustration, the open-circuit voltage of a VRLA (Valve Regulated Lead Acid) battery stabilizes about 30 minutes after charging has been completed. Therefore, wait 30 minutes after charging is completed before measuring the open-circuit voltage.



- A. Open-circuit voltage (V)
- B. Time (minutes)
- C. Charging
- D. Ambient temperature 20 °C (68 °F)
- E. Check the open-circuit voltage.

Charging method using a constant voltage charger

a. Measure the open-circuit voltage prior to charging.

TIP

Voltage should be measured 30 minutes after the engine is stopped.

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

 Make sure that the current is higher than the standard charging current written on the battery.

TIP_

If the current is lower than the standard charging current written on the battery, this type of battery charger cannot charge the VRLA (Valve Regulated Lead Acid) battery. A variable voltage charger is recommended.

d. Charge the battery until the battery's charging voltage is 15 V.

TIP_

Set the charging time at 20 hours (maximum).

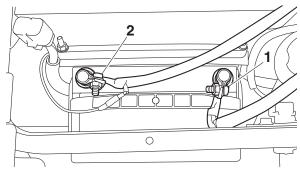
e. Measure the battery open-circuit voltage after leaving the battery unused for more than 30 minutes.

12.8 V or more --- Charging is complete. 12.7 V or less --- Recharging is required. Under 12.0 V --- Replace the battery.

- 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. Install:
 - Under-seat panel
 - Seat cushion
 Refer to "GENERAL CHASSIS (1)" on page 4-1.

CHECKING THE RELAYS

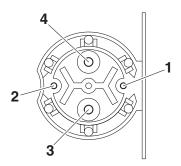
Check each switch for continuity with the digital circuit tester. If the continuity reading is incorrect, replace the relay.



Digital circuit tester (CD732) 90890-03243 Model 88 Multimeter with tachometer YU-A1927

- 1. Disconnect the wire harness from the relay.
- Connect the digital circuit tester and battery (12 V) to the relay terminal as shown.
 Check the relay operation.
 Out of specification → Replace.

Main relay

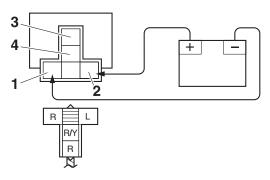


- 1. Positive battery terminal
- 2. Negative battery terminal
- 3. Positive tester probe
- 4. Negative tester probe



Result Continuity (between "3" and "4")

Fuel pump relay



- 1. Positive battery terminal
- 2. Negative battery terminal
- 3. Positive tester probe
- 4. Negative tester probe



Result Continuity (between "3" and "4")

CHECKING THE SPARK PLUG CAP

- 1. Check:
- Spark plug cap resistance
 Out of specification → Replace.

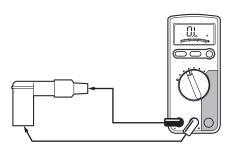


Resistance 3.75–6.25 k Ω

- a. Remove the spark plug cap from the spark plug lead.
- b. Connect the digital circuit tester to the spark plug cap as shown.



Digital circuit tester (CD732) 90890-03243 Model 88 Multimeter with tachometer YU-A1927



c. Measure the spark plug cap resistance.

CHECKING THE IGNITION COIL

- 1. Check:
 - Primary coil resistance
 Out of specification → Replace.



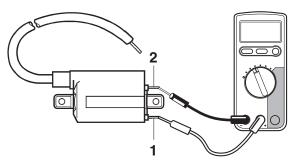
Primary coil resistance 2.16–2.64 Ω

- a. Disconnect the ignition coil connectors from the ignition coil terminals.
- b. Connect the digital circuit tester to the ignition coil as shown.



Digital circuit tester (CD732) 90890-03243 Model 88 Multimeter with tachometer YU-A1927

- Positive tester probe → red "1"
- Negative tester probe → orange "2"



- c. Measure the primary coil resistance.
- 2. Check:
- Secondary coil resistance
 Out of specification → Replace.



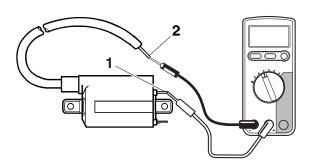
Secondary coil resistance 8.64–12.96 kΩ

- a. Disconnect the spark plug cap from the ignition coil.
- b. Connect the digital circuit tester to the ignition coil as shown.



Digital circuit tester (CD732) 90890-03243 Model 88 Multimeter with tachometer YU-A1927

- Positive tester probe \rightarrow red "1"
- Negative tester probe → Spark plug lead "2"



c. Measure the secondary coil resistance.

CHECKING THE IGNITION SPARK GAP

- 1. Check:
- Ignition spark gap

Out of specification \rightarrow Perform the ignition system troubleshooting, starting with step 5. Refer to "TROUBLESHOOTING" on page 8-3.



Minimum ignition spark gap 6.0 mm (0.24 in)

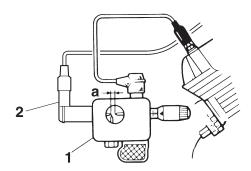
TIP_

If the ignition spark gap is within specification, the ignition system circuit is operating normally.

- a. Disconnect the spark plug cap from the spark plug.
- b. Connect the ignition checker "1" as shown.



Ignition checker 90890-06754 Oppama pet-4000 spark checker YM-34487



- 2. Spark plug cap
 - c. Measure the ignition spark gap "a".
 - d. Crank the engine by depressing the accel pedal and gradually increase the spark gap until a misfire occurs.

CHECKING THE CRANKSHAFT POSITION SENSOR

- 1. Disconnect:
 - Crankshaft position sensor coupler (from the wire harness)
- 2. Check:
 - Crankshaft position sensor resistance
 Out of specification → Replace the crankshaft position sensor.



Crankshaft position sensor resistance

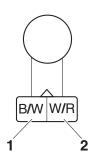
152–228 Ω

 Connect the digital circuit tester to the crankshaft position sensor coupler as shown.



Digital circuit tester (CD732) 90890-03243 Model 88 Multimeter with tachometer YU-A1927

- Positive tester probe → black/white "1"
- Negative tester probe → white/red "2"



b. Measure the crankshaft position sensor resistance.

CHECKING THE STARTER GENERATOR OPERATION

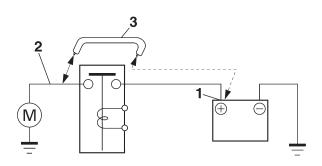
- 1. Check:
 - Starter generator operation
 Does not operate → Perform the electric
 starting system troubleshooting, starting with
 step 4.

Refer to "TROUBLESHOOTING" on page 8-7.

a. Connect the positive battery terminal "1" and starter generator lead "2" with a jumper lead "3".

WARNING

- A wire that is used as a jumper lead must have at least the same capacity of the battery lead, otherwise the jumper lead may burn.
- This check is likely to produce sparks, therefore, make sure no flammable gas or fluid is in the vicinity.



b. Check the starter generator operation.

CHECKING THE VOLTAGE REGULATOR

- 1. Remove:
 - Drive belt Refer to "REPLACING THE DRIVE BELT (YUM1A/YUM2A)" on page 3-8.
- 2. Check:
 - Charging voltage
 Out of specification → Replace the voltage
 regulator.



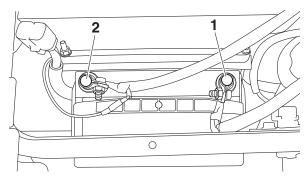
Charging voltage above 14 V at 5000 r/min

- a. Connect the engine tachometer to the spark plug lead.
- b. Connect the digital circuit tester to the battery as shown.



Digital circuit tester (CD732) 90890-03243 Model 88 Multimeter with tachometer YU-A1927

- Positive tester probe → positive battery terminal "1"
- Negative tester probe → negative battery terminal "2"



- c. Start the engine and let it run at approximately 5000 r/min.
- d. Measure the charging voltage.

CHECKING THE FUEL SENDER

- 1. Disconnect:
- Fuel pump coupler (from the wire harness)
- 2. Remove:
 - Fuel pump assembly (from the fuel tank)
- 3. Check:
 - Fuel sender resistance
 Out of specification → Replace the fuel pump assembly.



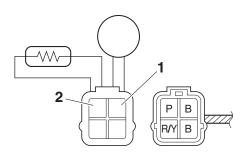
Sender unit resistance (full) 4–10 Ω Sender unit resistance (empty) 93–100 Ω

a. Connect the digital circuit tester to the fuel sender terminals as shown.

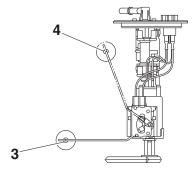


Digital circuit tester (CD732) 90890-03243 Model 88 Multimeter with tachometer YU-A1927

- Positive tester probe → pink "1"
- Negative tester probe → black "2"



b. Move the fuel sender float to minimum "3" and maximum "4" level positions.



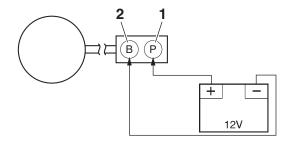
c. Measure the fuel sender resistance.

CHECKING THE REVERSE BUZZER

- 1. Check:
- Reverse buzzer

Does not sound \rightarrow Replace.

- a. Disconnect the reverse buzzer coupler from the wire harness.
- b. Connect the battery to the reverse buzzer coupler as shown.
- Positive battery terminal → pink "1"
- Negative battery terminal → black "2"



c. Check the buzzer sound.

CHECKING THE ENGINE TEMPERATURE SENSOR

- 1. Remove:
- Engine temperature sensor

WARNING

- Handle the engine temperature sensor with special care.
- Never subject the engine temperature sensor to strong shocks. If the engine temperature sensor is dropped, replace it.
- 2. Check:
 - Engine temperature sensor resistance
 Out of specification → Replace.



Engine temperature sensor resistance

2513–2777 Ω at 20 °C (2513–2777 Ω at 68 °F)

Engine temperature sensor resistance

210–221 Ω at 100 °C (210–221 Ω at 212 °F)

 Connect the digital circuit tester to the engine temperature sensor terminals as shown.



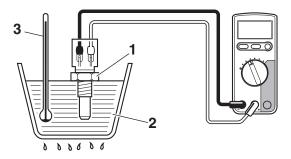
Digital circuit tester (CD732) 90890-03243 Model 88 Multimeter with tachometer YU-A1927

b. Immerse the engine temperature sensor "1" in a container filled with water "2".

TIP

Make sure the engine temperature sensor terminals do not get wet.

c. Place a thermometer "3" in the water.



- d. Heat the water or let it cool down to the specified temperatures.
- e. Measure the engine temperature sensor resistance.
- 3. Install:
- Engine temperature sensor



Engine temperature sensor 16 N·m (1.6 kgf·m, 12 lb·ft)

CHECKING THE INTAKE AIR PRESSURE SENSOR

⚠ WARNING

- Handle the intake air pressure sensor with special care.
- Never subject the intake air pressure sensor to strong shocks. If the intake air pressure sensor is dropped, replace it.
- 1. Check:
- Intake air pressure sensor output voltage Out of specification → Replace.



Intake air pressure sensor output voltage 3.51–3.77 V

a. Connect the test harness S

pressure sensor 5S7 (3P) "1" between the intake air pressure sensor and wire harness as shown.

b. Connect the digital circuit tester to the test harness S– pressure sensor 5S7 (3P).



Test harness S- pressure sensor 5S7 (3P) 90890-03207

Test harness S- pressure sensor 5S7 (3P)

YU-03207

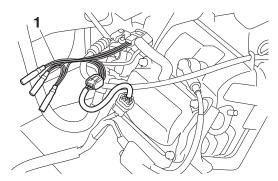
Digital circuit tester (CD732)

90890-03243

Model 88 Multimeter with ta-

chometer YU-A1927

- Positive tester probe → green (wire harness color)
- Negative tester probe → black/white (wire harness color)



- c. Turn the main switch to "ON".
- Measure the intake air pressure sensor output voltage.

CHECKING THE INTAKE AIR TEMPERATURE SENSOR

- 1. Remove:
 - Intake air temperature sensor (from the air filter case.)

WARNING

- Handle the intake air temperature sensor with special care.
- Never subject the intake air temperature sensor to strong shocks. If the intake air temperature sensor is dropped, replace it.
- 2. Check:
 - Intake air temperature sensor resistance
 Out of specification → Replace.



Intake air temperature sensor resistance

2.21–2.69 k Ω at 20 °C (2.21–2.69 k Ω at 68 °F) Intake air temperature sensor resistance (reference data) 0.322 k Ω at 80 °C (0.322 k Ω at 176 °F)

a. Connect the digital circuit tester to the intake air temperature sensor terminals as shown.



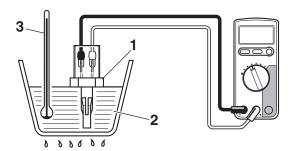
Digital circuit tester (CD732) 90890-03243 Model 88 Multimeter with tachometer YU-A1927

b. Immerse the intake air temperature sensor "1" in a container filled with water "2".

TIP

Make sure that the intake air temperature sensor terminals do not get wet.

c. Place a thermometer "3" in the water.



- d. Heat the water or let it cool down to the specified temperatures.
- Measure the intake air temperature sensor resistance.

CHECKING THE FUEL INJECTOR

- 1. Check:
 - Fuel injector resistance
 Out of specification → Replace the fuel injector



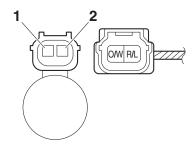
Resistance 12.0 Ω

- a. Disconnect the fuel injector coupler from wire harness.
- b. Connect the digital circuit tester to the fuel injector terminals as shown.



Digital circuit tester (CD732) 90890-03243 Model 88 Multimeter with tachometer YU-A1927

- Positive tester probe Fuel injector terminal "1"
- Negative tester probe Fuel injector terminal "2"



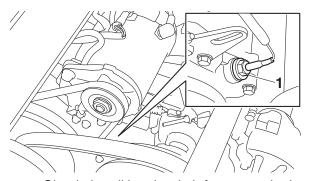
c. Measure the fuel injector resistance.

CHECKING THE OIL LEVEL SWITCH

- 1. Check:
 - Engine oil level
 - Refer to "CHECKING THE ENGINE OIL LEVEL (YUM1A/YUM2A)" on page 3-4.
- 2. Check:
- Oil level switch
 Out of specification → Replace.

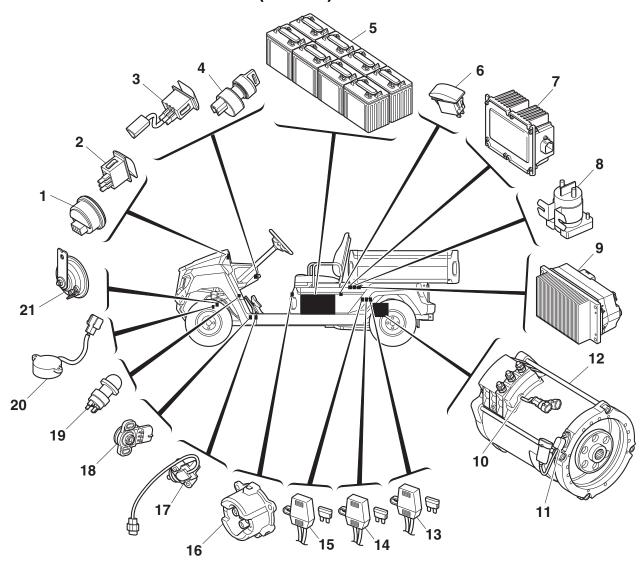


Engine oil is at the correct level No continuity (Between "1" and ground) Engine oil is drained Continuity (Between "1" and ground)



- a. Check the oil level switch for no continuity.
- b. Drain the engine oil.
- c. Check the oil level switch for continuity.

ELECTRICAL COMPONENTS (YUM2E)

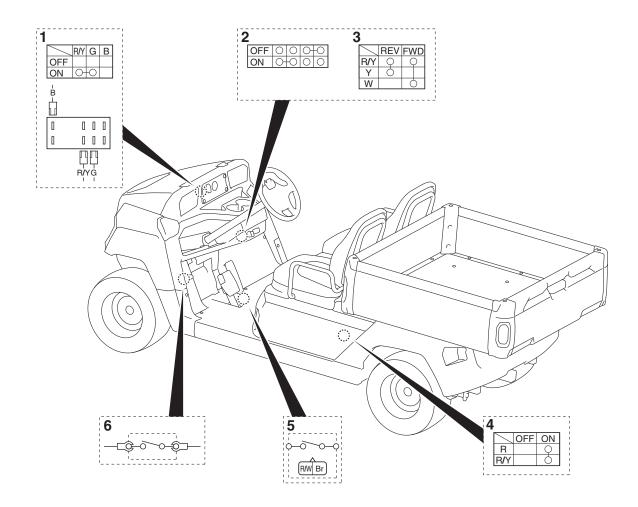


- 1. Battery gauge/warning light
- 2. Light switch
- 3. Shift switch
- 4. Main switch
- 5. Battery
- 6. Tow switch
- 7. Voltage regulator
- 8. Main relay
- 9. MCU (motor control unit)
- 10.Motor temperature sensor
- 11.Motor speed sensor
- 12. Traction motor
- 13.USB fuse
- 14.MCU fuse
- 15.Main fuse
- 16. Charging receptacle
- 17.Accelerator switch
- 18.TPS
- 19.Horn switch

20.Reverse buzzer

21.Horn

CHECKING THE SWITCHES



- 1. Light switch
- 2. Main switch
- 3. Shift switch
- 4. Tow switch
- 5. Accelerator switch
- 6. Horn switch

Check each switch for continuity with the digital circuit 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 "a". Always insert the probes from the opposite end of the coupler, taking care not to loosen or damage the leads.



Digital circuit tester (CD732) 90890-03243 Model 88 Multimeter with tachometer YU-A1927

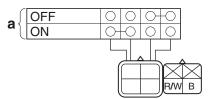
TIP

When checking for continuity, switch back and forth between the switch positions a few times.

The switches and their terminal connections are illustrated as in the following example of the main switch.

The switch positions "a" are shown in the far left column.

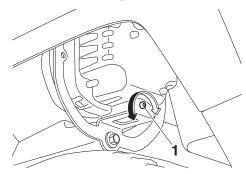
The continuity (i. e., a closed circuit) between switch terminals at a given switch position is indicated by "O—O". There is continuity between the red/white and black leads when the switch is set to "ON".



ADJUSTING THE HEADLIGHT BEAMS

The following procedure applies to both of the headlights.

- 1. Adjust:
 - Headlight beam (vertically)
 - a. Turn the adjusting screw "1".



CHECKING THE FUSES

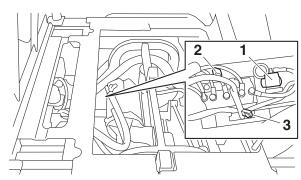
The following procedure applies to all of the fuses.

NOTICE

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

- 1. Lift up the cargo bed.
- 2. Check:
 - Fuse

No.	Fuses	Amperage rating	Q'ty
1	Main	10 A	1
2	MCU	3 A	1
3	USB	1 A	1



a. Connect the digital circuit tester to the fuse and check the continuity.



Digital circuit tester (CD732) 90890-03243 Model 88 Multimeter with tachometer YU-A1927

- b. If the digital circuit tester indicates "∞", replace the fuse.
- 3. Replace:
- Blown fuse
 - a. Turn the main switch to "OFF".
 - b. Install a new fuse of the correct amperage rating.
 - c. Set on the switches to verify if the electrical circuit is operational.
 - d. If the fuse immediately blows again, check the electrical circuit.

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.

4. Lower the cargo bed.

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

To ensure maximum battery performance:

- Batteries must be fully charged before using for the first time. This initial charge will prolong the life of the batteries. Periodic charging is also necessary during extended storage.
- Maintain proper electrolyte levels.
- Never overfill the batteries or allow the electrolyte level to drop below the top of the plates.
- Never overcharge the batteries. Failure to observe these points will result in shortened battery life.

Charging the batteries properly requires administering the right amount of current at the right voltage. The 48 V Battery Charger regulates these values and ensures adequate charge during extended storage. Before charging the batteries, read and understand the owner's manual provided with the charger.

WARNING

Batteries generate explosive hydrogen gas. Always follow these precautionary measures:

- Charge batteries in a well-ventilated area.
- Keep batteries away from sparks or open flames (e.g., welding equipment, lit cigarettes, etc.).
- Do not smoke when charging or handling batteries.

KEEP BATTERIES AND ELECTROLYTE OUT OF REACH OF CHILDREN.

Always wear protective clothing, gloves and goggles when handling batteries and electrolyte, and when charging your battery.

Charging Guidelines

- If feasible, connect the utility vehicle to the same charger every night.
- Recharge batteries as soon after usage as possible.

Charging Procedure

NOTICE

Water should only be added prior to charging when the electrolyte level IS NOT covering the battery plates.

- Check the water level of each battery cell to ensure it covers the plates. Add water only if necessary.
- 2. Tighten all vent caps before charging.

NOTICE

Damaged receptacle contacts can cause excessive resistance (heat) and lead to severe damage.

- Check the charge receptacle and battery charger contacts for damage or corrosion.
 Clean, repair or replace any damaged or corroded parts.
- 4. Plug the battery charger connector into the charge receptacle.
- Check the state of charge before and after the charging cycle to ensure adequate charge.
 Refer to "BATTERY CHARGER (YAMAHA
- PROVIDED CHARGER)" on page 8-65.

 6. Disconnect and stow the charger connector.
- 7. Check the water level in each battery to ensure the watering level is within limits.

BATTERY CHARGER (YAMAHA PROVIDED CHARGER)

Charger Safety

Read the following label located on the top of the charger before operating or using the charger and promptly replace the label if it becomes damaged.

OPERATING INSTRUCTIONS:

- 1. PLUG AC CORD INTO A GROUNDED RECEPTACLE 2. PLUG DC CORD INTO GOLF CAR RECEPTACLE
- 3. CHARGE CYCLE WILL BEGIN AFTER A FEW SECONDS AND AMMETER WILL TURN ON
- 4. CHARGER SHUTS OFF AUTOMATICALLY WHEN BATTERIES ARE CHARGED

INSTRUÇÕES DE UTILIZAÇÃO:

- 1. LIGUE O CÁBO DE ALIMENTAÇÃO A UMA TOMADA COM LIGAÇÃO À TERRA
- 2. LIGUE O CABO DE ALIMENTAÇÃO AO RECEPTÁCULO DO CARRO DE GOLFE
- 3. O CICLO DE CARGA COMECARÁ APÓS ALGUNS SEGUNDOS E ACENDE-SE UM INDICADOR LUMINOSO 4. O CARREGADOR DESLIGA-SE AUTOMATICAMENTE LOGO OUF A BATERIA ESTEJA CARREGADA

DANGER: RISK OF ELECTRIC SHOCK. CONNECT ONLY TO PROPERLY GROUNDED AC OUTLET. DO NOT TOUCH UNINSULATED PORTION OF OUTPUT CONNECTOR OR UNINSULATED BATTERY TERMINAL, DO NOT REMOVE COVER - NO OPERATOR SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL

DANGER: RISQUE DE CHOC ÉLECTRIQUE. RACCORDEZ UNIQUEMENT À UNE PRISE DE COURANT ALTERNATIVE CORRECTEMENT RELIÉE À LA TERRE. NE Touchez pas la partie isolée du connecteur de SORTIE OU LE TERMINAL DE BATTERIE ISOLÉ. NE RETIREZ PAS LE COUVERCLE - L'OPÉRATEUR NE PEUT RÉPARER AUCUNE PIÈCE A RÉPARER À L'INTÉRIEUR. CONFIEZ L'ENTRETIEN À UN PERSONNEL QUALIFIÉ.

PELIGRO: RIESGO DE DESCARGA ELÉCTRICA DEBE CONECTARSE SOLO A UNA TOMA DE CORRIENTE CA CON TOMA DE TIERRA. NO TOQUE PARTES DESPROTEGIDAS DEL CONECTOR DE SALIDA O EL TERMINAL DE LA BATERIA DESPROTEGIDO. NO QUITE LA CUBIERTA – EN EL INTERIOR NO HAY PIEZAS SUSCEPTIBLES DE MANTENIMIENTO. EL MANTENIMIENTO DEBE REALIZARLO PERSONAL CUALIFICADO.

CARDO E ALIMENTAÇÃO DO CARREGADOR A UMA
TOMADA CORRECTAMENTE INSTALADA E COM LIGAÇÃO
TERRA, DE ACORDO COM TODAS AS NORMAS E
REGULAMENTOS LOCAIS APLICÁVEIS. NÃO REMOVA A
TAMPA - NÃO HA PEÇAS NO INTERIOR QUE NECESSITEM
DE MANUTENÇÃO PÉLO OPERADOR. PARA
MANUTENÇÃO, CONSULTE PESSOAL QUALIFICADO.

危険: 感電注意。アース付AC電源をご使用 ください。バッテリー端子等の非絶縁通電部 に触れないでください。分解厳禁。使用者の 触る部分はありません。分解する場合、サー ビスマンにご連絡ください。

CONSIGNES D'UTILISATION:

- 1. BRANCHEZ LE CORDON CA DANS UNE PRISE RELIÉE À LA
- 2. BRANCHEZ LE CORDON DANS LA PRISE DE LA VOITURE DE GOLF
- 3. LE CYCLE DE CHARGEMENT COMMENCE AU BOUT DE QUELQUES SECONDES ET L'AMPÈREMÈTRE SE MET EN
- 4. LE CHARGEUR S'ARRÊTE AUTOMATIQUEMENT UNE FOIS LES BATTERIES CHARGÉES

DISPLAY PANEL LEGEND:

BATTERY > 80%

BATTERY = 100%

FAULT CODE = # RED BLINKS SEE MANUAL FOR ADDITIONAL INFORMATION

CAUTION: READ MANUAL BEFORE CHARGING. USE ONLY ON BATTERY SYSTEMS WITH AN ALGORITHM THAT IS APPROPRIATE TO THE SPECIFIED BATTERY TYPE - SEE MANUAL, CHARGING OTHER BATTERY TYPES OR VOLTAGES MAY CAUSE
PERSONAL INJURY AND DAMAGE. SURFACES MAY BE HOT-TO AVOID RISK OF BURNS, DO NOT TOUCH.

ATTENTION: VEUILLEZ LIRE LE MANUEL AVANT LE AT TENTION. VEUILLEZ LIRE LE MANUEL AVANT LE CHARGEMENT. UTILISEZ UNIQUEMENT SUR DES SYSTÈMES DE BATTERIE AVEC UN ALGORITHME CORRESPONDANT AU TYPE DE BATTERIE SPÉCIFIÉ - VOIR LE MANUEL. LE CHARGEMENT D'AUTRES TYPES DE BATTERIE OU DE TENSION PEUT ENTRAÎNER DES BLESSURES CORPORELLES OU DES DOMMAGES. LES SURFACES PEUVENT ÈTRE CHAUDES - NE TOUCHEZ PAS CAR VOUS RISQUEZ DE VOUS DEUT LE PARTIE DE LES SURFACES PEUVENT ÈTRE CHAUDES - NE TOUCHEZ PAS CAR VOUS RISQUEZ DE VOUS

ATENCIÓN: LEA EL MANUAL ANTES DE PROCEDER CON LA CARGA. DEBE UTILIZARSE SOLO EN SISTEMAS DE BATERIA QUE TENGAN UNA ALGORITIMO ADECUADA PARA EL TIPO ESPÉCIFICO DE BATERÍA - CONSULTE EL MANUAL. Cargar otro tipo de Baterías o Voltajes podría Causar Danos personales. Las superficies pueden CALENTARSE - PARA EVITAR RIESGO DE OUEMADURAS. NO DEBEN TOCARSE.

CUIDADO: LEIA O MANUAL ANTES DE USAR O CARREGADOR. USE O CARREGADOR APENAS EM SISTEMAS CARREGADUR. OSE O CARREGADUR METERAS EM SISTEMAS
DE BATERIAS COM UM ALGORITMO QUE SEJA ADEQUADO
AO TIPO ESPECIFICO DE BATERIA. QUALQUER OUTRA
UTILIZAÇÃO PODE PROVOCAR LESÕES PESSOAIS E DANOS.
AS SUPERFÍCIES PODEM ESTAR QUENTES - PARA EVITAR
RISCO DE QUEIMADURAS, NÃO TOQUE.

注意: 使用前に、マニュアルを参照ください。 指定外のパッテリーは使用厳禁。怪我や横傷につ ながる恐れがあります。火傷注意。表面が熱いの で触らないでください。

INSTRUCCIONES DE FUNCIONAMIENTO:

- 1. CONECTE EL CABLE CA EN UNA TOMA DE TIERRA 2. CONECTE EL CABLE CC EN UN RECEPTÁCULO DE COCHE DE GOLF 3. EL CICLO DE CARGA EMPEZARÁ TRAS POCOS SEGUNDOS Y EL AMPERÍMENTRO SE ENCENDERÁ
- 4. EL CARGADOR SE APAGA AUTOMÁTICAMENTE CUANDO LAS BATERÍAS SE HAN CARGADO

操作要領: 1.充電器のプラグをアース端子付きコンセントに差し

2.専用充電コードを車両側コンセントに奥まで差し込

3.充電は数秒後に開始し、充電ランプが点灯します。 4.充電終了後に充電動作は自動的に終了します。

WARNING: RISK OF EXPLOSIVE BATTERY GASES, ADEQUATE VENTILATION DURING CHARGING IS REQUIRED - CONSULT MANUAL. DO NOT DISCONNECT THE DC CORD SET PLUG FROM THE CHARGING RECEPTACLE WHEN THE CHARGER IS CHARGING. TO AVOID DAMAGE, DO NOT PULL ON CHARGE CORD. HAVE DEFECTIVE CORDS

OR PLUGS REPLACED IMMEDIATELY BY QUALIFIED PERSONNEL

AVERTISSEMENT: RISQUE DE GAZ EXPLOSIFS DANS LA BATTERIE. UNE VENTILATION ADÉQUATE LORS DU CHARGEMENT EST NÉCESSAIRE - VEUILLEZ CONSULTER LE MANUEL. NE DÉCONNECTEZ PAS LA PRISE DU CORDON CC DU SOCLE DE CHARGEMENT LORSQUE LE CHARGEUR EST EN COURS DE Chargement. Pour éviter des dommages, ne tirez pas sur LE CORDON DU CHARGEUR. FAITES REMPLACÉR IMMÉDIATEMENT LES CORDONS OU PRISES DÉFECTUEUX PAR UN PERSONNEL

AVISO: RIESGO DE GASES DE BATERÍA EXPLOSIVOS. DURANTE LA CARGA, ASEGURESE DE QUE EXISTA UNA BUENA VENTILACIÓN CONSULTÉ EL MANUAL. NO DESCONECTE LA TOMA DEL CABLE CC DEL RECEPTÁCULO MIENTRAS EL CARGADOR REALIZA EL CICLO DE CARGA. PARA EVITAR DAÑOS, NO TIRE DEL CABLE DEL CARGADOR. EN CASO DE CARLES O TOMAS DEFECTUOSOS, DEREN SER SUSTITUIDOS INMEDIATAMENTE POR PERSONAL CUALIFICADO.

ADVERTÊNCIA: AS BATERIAS PODEM GERAR GÁS DE HIDROGÉNIO EXPLOSIVO DURANTE O FUNCIONAMENTO NORMAL. HIDROGENIO EXPLOSIVO DURANTE O FUNCIONAMIENTO NORMAL.
ASSEGURE UNA VENTILAÇÃO DEQUADA OURANTE O
CARREGAMENTO. NÃO DESLIGUE O CABO DE ALIMENTAÇÃO
CONTINUA DO RECEPTÁCULO DE CARGA QUANDO O CARREGADOR
ESTIVER A CARREGAR. PARA EVITAR OS DÂNOS, NÃO PUXE PELO
CABO DO CARREGADOR. FAÇA SUBSTITUIR IMEDIATAMENTE CABOS
OU FICHAS DEFEITUOSOS PÓR PESSOAL QUALIFICADO.

警告: 充電中は水素ガスが発生し、爆発の危険あり。 接気された場所でご使用ください。詳細はマニュアルを 参照ください。充電中はDCブラグを抜かないでください。 火花が発生して爆発、地絡の危険があります。コードを 痛めない為、コードを引っ張らないでください。 ナイドを持ち出して場合では、コードが痛んだ場合には直ぐにサービスマンに交換を依頼して

Features and Benefits

Yamaha has developed a state-of-the-art battery/charger combination. The battery charger is designed to recharge deep-cycle, lead-acid batteries and delivers maximum performance through the use of "Smart Charger" technology. The charger runs diagnostic testing on the vehicle's electrical system to ensure optimized charging and battery performance. Additionally, built-in charge protection delays charging a battery in a fully charged state and initiates a new charge cycle after a completed charge cycle in the event of a power interruption. These features, coupled with the multi-step charge cycle and the other features and benefits listed below. have enabled Yamaha to offer an industry-leading battery warranty.

• Switching Mode Design:

High efficiency operation with smooth DC output.

• 10-LED Display:

Displays state of charge and charge error conditions.

Charge Protection:

Protects from improper connection, overload and excessive temperatures. Programmed safety features include charge time monitoring and over-temperature protection.

Charge Algorithm:

Designed for maximum battery life of Trojan 48 V batteries.

• Multi-Charge Steps:

Ensures a consistent and repeatable charge.

• Step 1: Pre-test:

Tests several conditions before charging begins.

If a problem is detected, charging is terminated.

• Step 2: Constant Current Step:

Battery is charged with full rated output current, restoring up to 80% of charge.

Step 3: Constant Voltage Step:

Regulated voltage "equalizes" individual battery cells, resulting in full charge delivered to the battery.

Step 4: Topping Off Step:

Battery pack is brought slowly to full charge without excess gassing.

• Step 5: Storage:

Keep the charger plugged into the AC outlet and the Yamaha vehicle while in storage. After 14 days from the last charge, if the voltage becomes less than 48 V, the charger will charge the batteries.

Automatic Battery Equalization:

Automatically detects when cell voltages are not balanced and extends the charge cycle to restore the pack to full capacity.

Installation

The AC line connected to the charger must be capable of supplying 12 A to the charger. **AVOID** connecting a charger and another device to a single 15 A/20 A circuit or the circuit may become overloaded.

Also, maximum Ampere varies depending on AC voltage. Please refer to "AC Input" in General Specifications.

⚠ WARNING

- RISK OF FIRE Use this charger only on circuits with a 15 A or higher branch circuit protection (circuit breaker or fuse) in accordance with the national electrical code, ANSI/NFPA 70 and all applicable local codes and ordinances.
- When using an extension cord, use only a grounded, 3-wire, 12-AWG cord no longer than 15 m (50 ft). The use of an improper extension cord could result in a risk of a fire or electric shock.

WARNING

The output of chargers with greater than 48 V may pose an energy and/or shock hazard under normal use.

The use of an extension cord with the charger should be avoided. The use of an improper extension cord could result in a risk of damage or electric shock.

Provide adequate ventilation for the batteries and charger. The convection and fan-cooled design requires an unobstructed flow of cooling air for proper operation. Keep all charger ventilation openings at least 5 cm (2 in) away from walls and other objects. Keep clothing, plastic, canvas, etc., away from charger at all times.

⚠ WARNING

Chargers can ignite flammable materials and vapors. Do not use near fuels, grain dust, solvents or other flammables.

WARNING

To reduce the risk of an electric shock, keep the charger dry. Do not expose it to rain. For storage, keep the charger indoors.

NOTICE

This charger is not designed for on-board use.

NOTICE

This charger is not designed for use with an electric generator.

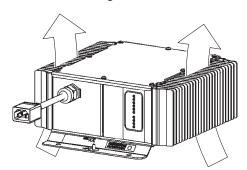
Mounting

WARNING

This charger is not designed for on-board use. Improper mounting or installation could result in a risk of fire or damage to the golf car.

Mount the charger on a shelf or on the wall with adequate ventilation.

Ideally it will be mounted horizontally with airflow from below. If it will be mounted vertically, it is recommended that the AC-input cord be at the lower end of the charger.



Keep the charger free of oil, dirt, mud or dust to keep the cooling fins operating as efficiently as possible.

Mount the charger by the mounting plate using appropriate fasteners.

TIP.

The charger's AC plug must be located at least 46 cm (18 in) above the ground and the display visible to the user.

WARNING

Chargers can ignite flammable materials and vapors. Do not use near fuels, grain dust, solvents or other flammables.

Grounding

The battery charger must be grounded to reduce the risk of electric shock. The charger is equipped with an AC cord set having an equipment-grounding conductor. The AC cord set must be connected to an appropriate receptacle that is properly installed and grounded in accordance with the National Electrical Code and all local codes and ordinances.

⚠ WARNING

Improper connection of the equipmentgrounding conductor can result in a risk of electric shock.

The conductor with insulation having an outer surface that is green, with or without yellow stripes, is the equipment-grounding conductor. Do not repair the charger's AC cord; just replace it. If replacement of the charger's AC cord set is necessary, do not connect the equipment-grounding connector to a live terminal.

Charging

⚠ WARNING

To reduce the risk of electric shock, connect only to a properly grounded, single-phase (3-wire) outlet. Also, refer to grounding instructions.

WARNING

Risk of electric shock! Do not touch any uninsulated parts of the charger output plug, battery charging receptacle or battery terminals.

NOTICE

Charge only 48 V battery systems manufactured by Trojan Battery Company.

Damage to the charger and batteries may result if this charger is used on the wrong battery type.

WARNING

Visually and manually inspect to verify that the DC output cord, plug and battery charging receptacle are in good working condition before each and every use, and do not use the charger if:

- The DC charging receptacle does not grip the DC cord set plug tightly, is loose or does not make a good electrical connection.
- The DC cord set plug or charging receptacle feels hotter than normal.

- The DC cord set plug or charging receptacle contacts are bent, corroded, or are dark or bluish in appearance.
- The DC cord set plug, cords, receptacle or equipment charging wiring are cut, worn, broken or have any exposed conductors.
- The DC cord plug, cords, charger or receptacles are damaged or distressed in any way.

Using the charger with any of the above symptoms could result in damage, property damage or personal injury.

WARNING

Do not disconnect the DC cord set plug from the charging receptacle when the charger is on. If the charger must be stopped, first disconnect the AC power supply cord from its AC outlet and then disconnect the charger DC cord set plug from the charging receptacle.

WARNING

When removing AC or DC cord set plugs from receptacles, pull from the plugs' body and not from their respective cords. Be sure area around battery is well-ventilated while battery is being charged.

The operating instructions printed on the charger (as depicted below) are for daily reference. The charger is factory preset to use with Trojan 48 V utility vehicle batteries.

NOTICE

Always move the tow switch to the TOW position before charging the batteries.

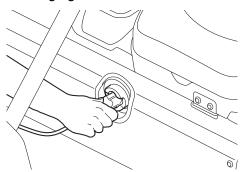
Damage to the electrical system may result if the tow switch is not in the TOW position.

OPERATING INSTRUCTIONS

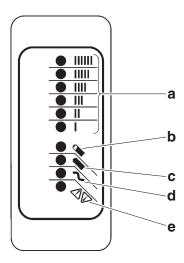
- 1. MOVE TOW SWITCH TO THE TOW POSITION.
- 2. PLUG AC CORD INTO A GROUNDED RE-CEPTACLE.
- 3. PLUG DC CORD INTO A VEHICLE RECEPTACLE.
- 4. WHEN CHARGING IS COMPLETED, DIS-CONNECT DC CORD FROM VEHICLE.

Connect charger's AC cord set to AC power. Then, connect the DC cord set plug to the vehicle charging receptacle by grasping the plug handle and pushing the plug straight into the receptacle.

The charger will start automatically. Upon connection to AC power source, the lower four LEDs come on as a Power-On Self-Test, then the AC power LED turns on. Upon connection to battery pack, output indicators turn on to indicate charging is active.



Under normal charge circumstances, the LEDs operate as follows:



	Comes on	Blinking
Ammeter "a" (Amber)	Displays approximate scale of current output during Step 2.	High internal charger temperature. Current output reduced.
80% Charge "b" (Amber)	80% charged, Step 2 complete. Begin Step 3.	With no battery connected, indicates algorithm # selected by number of flashes at startup.
100% Charge "c" (Green)	Charging complete. Charger in Storage Mode.	Step 3 complete. Begin Step 4.
AC On "d" (Amber)	AC power good.	_
Fault "e" (Red)	_	Charger error. Refer to Troubleshooting on next page.

To reset charger after 100% charge (Green LED), disconnect the DC plug from battery for more than 30 seconds. Then, reconnect DC plug.

Troubleshooting

1. LED Error Codes (For Battery Condition)

WARNING

Incorrect reassembly may result in a risk of electric shock or fire. The following procedures are intended only to determine if a malfunction may exist in the charger.

WARNING

To reduce the risk of electric shock, always disconnect the charger's AC cord set plug from AC power and its DC cord set plug from batteries before attempting any maintenance or cleaning.

WARNING

Do not operate the charger if it is malfunctioning. Personal injury or property damage could result.

If a fault occurs, count the number of red flashes between pauses and refer to the table below:

Red Flashes	Cause	Solution		
*	Battery High Voltage	Check battery size and condition and reset charger (interrupt DC connection for 15 seconds).		
**	Battery Low Voltage	Check battery size and condition and reset charger (interrupt DC connection for 15 seconds).		
***	Charge Time-out caused by battery pack not reaching required voltage.	Check connections.		
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Charger output was reduced due to high temperatures.	Operate charger at a lower ambient temperature.		
***	Check Battery: Battery could not be trickle charged up to minimum voltage.	Check for shorted or damaged cells.		
***	Over-Temperature: Charger shut down due to high internal temperature.	Ensure sufficient cooling airflow and reset charger (interrupt DC connection for 15 seconds).		
***	Charger Internal Fault	Reset charger (interrupt AC power for 15 seconds). Return to qualified service depot if fault persists.		

WARNING

Have qualified service technician inspect if problems persist.

2. Hardware System Faults

Problem Description	Cause	Remedy		
Charger does not start. No LEDs illuminate or blink when AC cord is connected.	No AC power to charger.	Ensure correct voltage at AC outlet. Check AC cord connections. Replace AC cord if damaged.		

Problem Description	Cause	Remedy
Charger does not start charging when DC cord set is plugged into the receptacle and the Amber AC On LED is illuminated.	Incorrect wiring or disconnection from DC cord, receptacle and batteries. Battery voltage less than 20 V.	Ensure polarity for wiring is correct from DC cord, receptacle and batteries. Check battery pack voltage.
Charger runs longer than 20 hours.	Charger may be in "boosting" stage.	Confirm Green 100% LED is blinking. (This indicates boosting.)

• WARNING Have qualified service technician inspect if problems persist.

Battery Charging

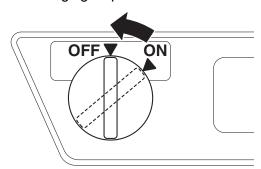
WARNING

Read and understand the owner's manual provided with your golf car's battery charger before charging batteries. Death or serious personal injury can result from failing to comply with the safety instructions in this manual.

WARNING

Explosive hydrogen gas is produced while batteries are being charged. Only charge batteries in well ventilated areas (a minimum of five air changes per hour is recommended). Death or serious personal injury can result from failing to comply with the safety instructions in this manual.

To charge the batteries in your golf car, follow the instructions contained in your battery charger's owner's manual. The following is a summary of the charging steps.

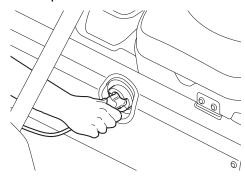


1. Turn main switch to OFF position.

NOTICE

Always put the tow switch in the TOW position before charging battery or damage to the electrical system may result.

2. Lift up the seat and move the tow switch to the TOW position.



 With the charger properly connected and grounded (see charger's owner's manual), insert the DC output into the golf car receptacle

WARNING

Do not disconnect the DC output cord from the battery receptacle when the charger is on or an arc could occur that may cause an explosion. Death or serious personal injury can result from failing to comply with the safety instructions in this manual.

- 4. The charger will turn off automatically when the batteries reach full charge.
- After the charger has turned off, disconnect the DC output plug from the golf car receptacle by grasping the plug body and pulling the plug straight out of the receptacle.

Specific Gravity Test

- 1. Do not add water at this time.
- 2. Apply a drop of electrolyte to the glass testing area of the refractometer.
- 3. Take a reading and record it.
- 4. Check all cells in the battery.
- 5. Replace the vent caps and wipe off any electrolyte that might have been spilled.
- 6. Adjust the readings to 26.7 °C (80 °F) as indicated in the table 1 below:

Tempe	erature	Satisfactory Uncorrected		
°C	°F	Refractometer Reading		
48.9	120	1.244		
43.3	110	1.248		
37.8	100	1.252		
32.2	90	1.256		
26.7	80	1.260		
21.1	70	1.264		
15.6	60	1.268		
10	50	1.272		
4.4	40	1.276		
-1.1	30	1.280		

Table 1

- 7. Compare the readings.
- 8. Check the state of charge using the table 2.

State of Charge as related to specific gravity and operating circuit voltage							
Percentage of Charge	Specific Gravity Corrected to 26.7 °C (80 °F)	Open-Circuit Voltage 48 V					
100	1.277	50.93					
90	1.258	50.47					
80	1.238	49.99					
70	1.217	49.49					
60	1.195	48.96					
50	1.172	48.41					
40	1.148	47.83					
30	1.124	47.26					
20	1.098	46.63					
10	1.073	46.03					

Table 2

- If any specific gravity reading still registers lower than the factory specification of 1.277 ± 0.007, then one or more of the following conditions may exist:
 - a. The battery is old and approaching the end of its life.
 - b. The battery was left in a state of discharge too long.
 - c. Electrolyte was lost due to spillage or overflow.
 - d. A weak or bad cell is developing.
 - e. Battery was watered excessively before testing.

Batteries identified with any one of the conditions listed in items 9a through 9e should be taken to a specialist for further evaluation or retired from service.

Open-Circuit Voltage Test

For accurate voltage readings, batteries must remain idle (no charging, no discharging) for at least six hours, preferably 24 hours.

- 1. Disconnect all loads from the batteries.
- 2. Measure the voltage using a DC voltmeter.
- 3. Check the state of charge with the table in "Specific Gravity Test".
- 4. Charge the battery if it registers 0% to 70% charged.
- 5. After charging, if battery registers below the table in "Specific Gravity Test" values, the following conditions may exist:
 - a. The battery was left in a state of discharge too long.
 - b. The battery has a bad cell.

Batteries in these conditions should be taken to a specialist for further evaluation or retired from service.

Discharge Load Test

№ WARNING

Batteries generate explosive hydrogen gas. Always follow these precautionary measures:

- Charge batteries in a well-ventilated area.
- Keep batteries away from sparks or open flames (e.g., welding equipment, lit cigarettes, etc.).
- Do not smoke when charging or handling batteries.

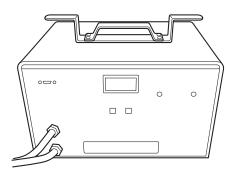
The purpose of the discharge load test is to determine how many minutes it will take to bring the total voltage of a fully charged 48 V battery pack to 42 V. This test represents the maximum work or runtime capability of a 48 V battery pack at 26.7 °C (80 °F) to fall to 42 V.

Sixty minutes should deliver 36 holes of golf for most courses. A shorter time period will indicate that one or more of the batteries needs service or replacement.

When you are load testing, you will need a load tester and a high-quality digital voltmeter capable of reading at least 55 V DC. Yamaha recommends using the Lester 17770 Battery Discharge Unit.



DISCHARGE TESTER 36/48V LES-DISCH-AR-GE



Use the voltmeter to monitor the overall voltage decrease of the pack and the decreasing voltage of each individual battery during testing. Individual batteries that decrease at a faster rate are the weaker batteries in the pack. Note the weaker batteries as they will require additional measurement after the discharge tester shuts off.

Once the weaker batteries are identified, they need to be replaced with batteries of comparable age and strength of the remaining pack. Remember that 60 minutes is the industry standard considered adequate for 36 holes of play at 26.7 °C (80 °F) and that ambient temperature has an effect on discharge times.

When temperatures are low, discharge times decrease. The "Battery Discharge Chart" on page 8-76 may be used for predicting the effects on discharge times.

The Lester 36/48 V Battery Discharge Unit has the following features:

- Specifically Designed for Golf Batteries
- Simple to Operate
- Tests 36 V and 48 V Battery Systems
- Microprocessor Controlled Logic
- Automatic Test Cycle, Disconnects when Complete
- No AC Power Required
- Available with Translated Graphics and Manual
- Bright LED Display

Lester Battery Discharge units provide accurate vehicle battery testing for both 36 V and 48 V systems. The automatic test regime discharges batteries at the appropriate BCI rate and displays the run time in minutes at the end of the test. The test can be restarted momentarily to allow for measuring individual cell voltages. The Lester Battery Discharge unit requires no AC power to operate and requires little training for operation. A multifunction display and micro-

processor control logic board ensure the accurate measurement and display of the information

you need. It can be programmed to shut off with time or voltage. Discharge data can be viewed on the display or with a terminal or computer. Large 500 A alligator clips, heavy duty DC cables, and a durable 18G powder coated steel case ensure years of trouble free use. Repair parts are also available, should the unit ever become damaged.

Private branding and translation into other lanquages is available, with a minimum order.

Scheduling Discharge Load Test

Test each car once during the first year of operation and twice each succeeding year. If your course exceeds the national average of 250 rounds each year, then your discharge test schedule must be increased accordingly. Consult your Yamaha service representative for help with schedule adjustments.

If you start out discharge testing an older fleet with questionable batteries, then at least 10% (i.e., 10 cars out of 100) should be tested. These results will give you a feel for your replacement battery needs. Widespread failures or lack of 36-hole performance in the second year is not normal. It is normal to have a few battery failures on cars in their third or fourth year of service.

Before testing, complete the following tasks:

- 1. Fully charge the batteries (a full charge cycle).
- 2. Inspect all cables and connections.
- 3. Check the water level in each cell and add water as necessary.
- 4. Start the charger and let it finish charging again.
- 5. Let the batteries cool for five minutes. The following instructions are specifically for the Lester 17770 Battery Discharge Unit. You will also need a thermometer and a voltmeter.
- 1. Attach the Lester 17770 Battery Discharge Unit to the battery pack, remembering to observe polarity.

TIP

Heavily coated battery terminals may not provide good electrical connections. Clean if necessary.

- 2. Record surface voltage from the discharge unit readout panel.
- 3. Record the ambient temperature using the thermometer.
- Turn the discharge unit "ON" and wait at least three minutes. If you have a bad connection or reverse polarity, the discharge unit will automatically shut off in three minutes. Correct any problems.
- Let the discharge unit run until it shuts off and immediately record the surface voltage from the discharge unit readout panel. Restart the discharge unit and let it run until the voltage reaches 42 V.
- 6. While the discharge unit is still connected and operating, measure and record each individual battery voltage. Look over the voltage measurements you just recorded. A difference of 0.5 V from the highest to lowest measurement indicates a weak battery.

WARNING

If the fan is running and you disconnect the unit, a spark will be produced and could result in explosion and damage.

7. Turn off the discharge unit. Wait until the fan stops and then disconnect the battery leads. Be sure to do the loaded individual battery measurements with the battery pack fully discharged to 42 V. Failure to do this part of the test immediately after the discharge unit shutoff will allow the batteries to recover.

Recovered batteries will give false readings. If more than a few minutes elapse before you do the individual battery measurements, turn the discharge unit back on. Allow the discharge unit to run until the total battery pack voltage is again approaching 42 V. This will prevent a false "good" voltage measurement from a recovered battery.

Battery Discharge Chart

Discharge Minutes Adjusted for Temperature

Temperature												
	°C	27	24	21	18	15.5	13	10	7	4.5	2	-1
	°F	80	75	70	65	60	55	50	45	40	35	30
	105	105										
	100	100	103	107								
	95	95	98	101	105							
	90	90	93	96	100	103	107					
	85	85	88	91	94	97	101	105				
	80	80	83	85	88	92	95	99	103			
	75	75	77	80	83	86	89	93	97	101	105	
Minutes	70	70	72	75	77	80	83	87	90	94	98	103
lin.	65	65	67	69	72	75	77	80	84	87	91	96
	60	60	62	64	66	69	71	74	77	81	84	88
Discharge	55	55	57	59	61	63	65	68	71	74	77	81
cha	50	50	52	53	55	57	60	61	64	67	70	74
)is	45	45	46	48	50	52	54	56	58	60	63	66
	40	40	41	43	44	46	48	50	52	54	56	59
	35	35	36	37	39	40	42	43	45	47	49	51
	30	30	31	32	33	34	36	37	39	40	42	44
	25	25	26	27	28	29	30	31	32	34	35	37
	20	20	21	21	22	23	24	25	26	27	28	29
	15	15	15	16	17	17	18	19	19	20	21	22
	10	10	10	11	11	11	12	12	13	13	14	15

Adjusted Discharge Minutes = <u>Discharge Minutes</u> 1-(((80-temp)/100)*.64)

REMOVING AND REPLACING THE BATTERY

WARNING

- Secure the vehicle and discharge the controller capacitor. Refer to "SAFETY LOCK-OUT PROCEDURE" on page 1-2.
- Always remove the negative (-) battery cables first and ensure they are stowed in a manner to prevent arching.
- 1. Put tow switch in TOW position.
- 2. Loosen the battery hold-down nuts with an insulated 12 mm wrench, then remove the hold-down plates.



Battery removal requires the ability to lift at least 28.1 kg (62 lb) and the use of one (1) battery-lifting strap.

- 3. Attach a battery-lifting strap to each battery and remove, remembering to use proper lifting techniques.
- 4. Clean and dry the battery tray and surrounding area.
- 5. Inspect and replace any worn or corroded battery hold-down rods.

WARNING

When installing batteries:

- Carefully position the cables and holddowns making sure the cables do not lay across the battery vent caps.
- Install the negative (-) battery cable last.
- 6. Using one battery-lifting strap, install each battery.

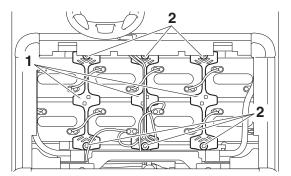
NOTICE

Do not over-tighten the battery hold-down nuts. Excessive force will damage the battery casing.

7. Install the battery hold-down plates "1" and 12 mm nuts "2". The battery hold-downs should be tightened to specification.



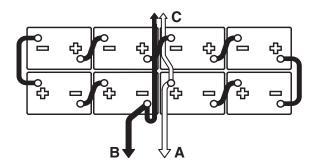
Battery hold-down plate nut 6 N·m (0.6 kgf·m, 4.4 lb·ft)



8. Connect the battery cables and wire leads as shown. Tighten battery clamps to specification.



Battery cable clamp screw 10 N·m (1.0 kgf·m, 7.4 lb·ft)



- A. To relay
- B. To MCU
- C. To charging receptacle

CHECKING THE RELAYS

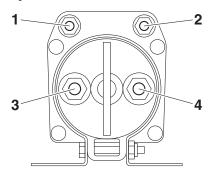
Check each switch for continuity with the digital circuit tester. If the continuity reading is incorrect, replace the relay.



Digital circuit tester (CD732) 90890-03243 Model 88 Multimeter with tachometer YU-A1927

- 1. Disconnect the wire harness from the relay.
- Connect the digital circuit tester and battery (12 V) to the relay terminal as shown.
 Check the relay operation.
 Out of specification → Replace.

Main relay



- 1. Positive battery terminal
- 2. Negative battery terminal
- 3. Positive tester probe
- 4. Negative tester probe



Result Continuity

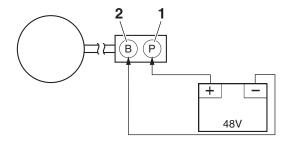
(between "3" and "4")

CHECKING THE REVERSE BUZZER

- 1. Check:
 - Reverse buzzer

Does not sound \rightarrow Replace.

- a. Disconnect the reverse buzzer coupler from the wire harness.
- b. Connect the battery to the reverse buzzer coupler as shown.
- Positive battery terminal → pink "1"
- Negative battery terminal → black "2"



c. Check the buzzer sound.

CHECKING THE THROTTLE POSITION SENSOR

- 1. Remove:
 - Throttle position sensor

WARNING

 Handle the throttle position sensor with special care.

- Never subject the throttle position sensor to strong shocks. If the throttle position sensor is dropped, replace it.
- 2. Check:
- Throttle position sensor maximum resistance Out of specification → Replace the throttle position sensor.



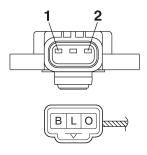
Resistance 0.66–1.54 kΩ

 a. Connect the digital circuit tester to the throttle position sensor terminals as shown.



Digital circuit tester (CD732) 90890-03243 Model 88 Multimeter with tachometer YU-A1927

- Positive tester probe → black "1"
- Negative tester probe → orange "2"



- b. Measure the throttle position sensor maximum resistance.
- 3. Install:
 - Throttle position sensor

TIF

When installing the throttle position sensor, adjust its angle properly. Refer to "ADJUSTING THE THROTTLE POSITION SENSOR (YUM2E)" on page 4-27.

TROUBLESHOOTING

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TROUBLESHOOTING (YUM1A/YUM2A)

TROUBLESHOOTING (YUM1A/YUM2A)

GENERAL INFORMATION

TIP

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

STARTING FAILURES

Engine

- 1. Cylinder and cylinder head
 - · Loose spark plug
- Loose cylinder head or cylinder
- Damaged cylinder head gasket
- Worn or damaged cylinder
- Incorrect valve clearance
- Improperly sealed valve
- Incorrect valve-to-valve-seat contact
- Incorrect valve timing
- Faulty valve spring
- Seized valve
- 2. Piston and piston ring(s)
 - Improperly installed piston ring
 - · Damaged, worn or fatigued piston ring
 - · Seized piston ring
 - Seized or damaged piston
- 3. Air filter
 - Improperly installed air filter
 - Clogged air filter element
- 4. Crankcase and crankshaft
 - Improperly assembled crankcase
 - Seized crankshaft

Fuel system

- 1. Fuel tank
 - · Empty fuel tank
 - · Clogged fuel tank breather hose joint
 - Clogged fuel tank breather hose joint hose
 - Deteriorated or contaminated fuel
- 2. Fuel pump
 - Faulty fuel pump
 - Faulty fuel pump relay
 - Clogged or damaged fuel hose
- 3. Throttle body
 - Deteriorated or contaminated fuel
 - Sucked-in air

Electrical system

- 1. Battery
- Discharged battery
- Faulty battery
- 2. Fuse(s)
 - Blown, damaged or incorrect fuse
 - Improperly installed fuse
- 3. Spark plug
 - Incorrect spark plug gap
 - Incorrect spark plug heat range
 - Fouled spark plug
 - Worn or damaged electrode
 - Worn or damaged insulator
 - Faulty spark plug cap
- 4. Ignition coil
 - Cracked or broken ignition coil body
 - Broken or shorted primary or secondary coils
 - Faulty spark plug lead
- 5. Ignition system
 - Faulty ECU
 - Faulty crankshaft position sensor
 - Broken flywheel woodruff key
- 6. Switches and wiring
 - Faulty main switch
 - Broken or shorted wiring
 - Improperly grounded circuit
 - Loose connections
- 7. Starting system
 - Faulty starter generator
 - Faulty main relay

POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE

Refer to "STARTING FAILURES" on page 9-1.

Engine

- 1. Air filter
 - Clogged air filter element

Fuel system

- 1. Fuel pump
- Faulty fuel pump

FAULTY GEAR SHIFTING

Shifting is difficult

Refer to "FAULTY DRIVE TRAIN PERFOR-MANCE" on page 9-2.

TROUBLESHOOTING (YUM1A/YUM2A)

SHIFT LEVER DOES NOT MOVE

Shift shaft and shift forks

- · Bent shift shaft
- Seized shift fork

Transmission

- Seized transmission gear
- Foreign object between transmission gears
- Improperly assembled transmission

FAULTY DRIVE TRAIN PERFORMANCE

Engine operates but vehicle will not move

- 1. V-belt
- Bent, damaged or worn V-belt
- Slipping V-belt
- 2. Primary sheave weight and primary sheave slider
 - Damaged or worn primary sheave weight
- Damaged or worn primary sheave slider
- 3. Transmission gear(s)
- Damaged transmission gear

Poor starting performance

- 1. V-belt
 - V-belt slips
 - Oil or grease on the V-belt
- 2. Primary and secondary sheaves
 - Faulty operation
 - Worn secondary sheave spring

Poor speed performance

- 1. V-belt
 - Oil or grease on the V-belt
- 2. Primary sheave weight(s)
 - Faulty operation
 - Worn primary sheave weight
- 3. Primary fixed sheave
 - Worn primary fixed sheave
- 4. Primary sliding sheave
 - Worn primary sliding sheave
- 5. Secondary fixed sheave
 - Worn secondary fixed sheave
- 6. Secondary sliding sheave
 - Worn secondary sliding sheave

OVERHEATING

Engine

- 1. Clogged cooling air passages
- 2. Cylinder head and piston
 - Heavy carbon buildup

- 3. Engine oil
 - Incorrect oil level
- Incorrect oil viscosity
- Inferior oil quality

Cooling system

- 1. Cooling system
 - Clogged engine cooling inlet duct
 - Damaged flywheel fin

Fuel system

- 1. Throttle body
- Faulty throttle body
- Damaged or loose intake manifold
- 2. Air filter
 - Clogged air filter element

Chassis

- 1. Brake(s)
- Dragging brake

Electrical system

- 1. Spark plug
 - Incorrect spark plug gap
 - Incorrect spark plug heat range
- 2. Ignition system
 - Faulty ECU

POOR BRAKING PERFORMANCE

- Worn brake shoe
- Worn or rusty brake drum
- Incorrect brake pedal free play
- Incorrect brake shoe adjuster position
- Incorrect brake shoe position
- Damaged or fatigued brake shoe spring
- Oil or grease on the brake shoe
- Oil or grease on the brake drum

FAULTY SHOCK ABSORBER ASSEMBLY

Malfunction

- Fatigued or damaged shock absorber spring
- Bent or damaged damper rod
- Leaking oil

UNSTABLE HANDLING

- 1. Steering wheel
- Bent or improperly installed steering wheel
- 2. Steering components
- Incorrect toe-in
- · Bent steering shaft
- Improperly installed steering shaft
- Damaged bearing

TROUBLESHOOTING (YUM1A/YUM2A)

- Bent tie-rods
- Deformed steering knuckles
- 3. Shock absorber assembly(-ies)
 - Faulty shock absorber spring
 - Leaking oil
- 4. Tire(s)
 - Uneven tire pressures (left and right)
 - Incorrect tire pressure
 - Uneven tire wear
- 5. Wheel(s)
 - Damaged wheel bearing
 - Bent or loose wheel axle
 - Excessive wheel runout
- 6. Frame
 - Bent frame
 - Damaged frame

FAULTY LIGHTING SYSTEM

Headlight does not come on

- Faulty headlight
- Too many electrical accessories
- Hard charging
- Incorrect connection
- Improperly grounded circuit
- Poor contacts (light switch)

DIAGNOSTIC/ERROR CODE IDENTIFICATION CHART (YUM1A/YUM2A)

DIAGNOSTIC/ERROR CODE IDENTIFICATION CHART (YUM1A/YUM2A)

Diagnostic code	Error code	Description	Symptom	Possible cause	Engine starts
_	12	Crankshaft position sensor	No signal from the crankshaft position sensor	Crankshaft position sensor open or short circuit Pickup rotor Wire harness ECU Incorrectly installed sensor	No
D03	13	Intake air pressure sensor	Abnormal intake air pressure values	Intake air pressure sensor open or short circuit ECU Wire harness Incorrectly installed sensor	No
	14			Clogged intake air flow or trouble of the intake valve system.	No
D05	22	Intake air temperature sensor	No signal from temperature sensor	Intake air temperature sensor open or short circuit ECU Wire harness Incorrectly installed sensor	Yes
D11	28	Engine temperature sensor	Abnormal engine temperature values	Engine temperature sensor open or short circuit ECU Wire harness Incorrectly installed sensor	Yes
D30	_	Ignition system	No ignition or spark	Ignition coil open or short circuit ECU Wire harness Incorrectly installed ignition coil	_
_	39	Fuel injector	No fuel injection	Fuel injector open or short circuit ECU Wire harness Incorrectly installed fuel injector	No
_	44	EPROM write error	Failure to write EPROM	ECU	Yes
_	46	Vehicle power supply	Voltage to fuel injector is abnormal	Low battery charge Wire harness Charging system	Yes
_	50	ECU internal failure	Faulty ECU memory	ECU	No
_	89	Engine overheating	High engine temperatures	Engine cooling fins plugged Cooling fan Engine ducting	Yes
D61		Error history	No Error = "00" History of error code is displayed in the order of lower number.		_

DIAGNOSTIC/ERROR CODE IDENTIFICATION CHART (YUM1A/YUM2A)

Diagnostic code	Error code	Description	Symptom	Possible cause	Engine starts
D62	_	Number of error history and clear error history	Indicate the number of the kind of error history. History will be clear when press the mode button with mode.	_	_
D70	_	Indicate the software version	_	_	_
D91	_	Integration time of engine operation (× 100) 100 hour = 1	Indicate the time unit of 100 hour	_	_
D92	_	Integration time of engine operation (× 1) 1 = 1 hour	Indicate the time unit of "99 hour between 1 hour"	_	_
D93	_	Integration time of engine operation (× 0.01) 1 = 0.01 hour	Indicate the time unit of "after the decimal point"	_	_

TROUBLESHOOTING (YUM2E)

GENERAL INFORMATION

TIP_

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

POOR PERFORMANCE

Traction motor

- 1. Traction motor
- · Out of round armature
- Broken or shorted armature coil

Electrical system

- 1. Battery
 - Discharged battery
 - Faulty battery
- 2. Fuse(s)
- Blown, damaged or incorrect fuse
- Improperly installed fuse
- 3. Switches and wiring
- Faulty main switch
- Broken or shorted wiring
- Faulty shift switch
- · Faulty tow switch
- Improperly grounded circuit
- Loose connections
- 4. Motor control system
 - Faulty MCU
 - Faulty main relay

POOR BRAKING PERFORMANCE

- Worn brake shoe
- Worn or rusty brake drum
- Incorrect brake pedal free play
- Incorrect brake shoe adjuster position
- Incorrect brake shoe position
- · Damaged or fatigued brake shoe spring
- Oil or grease on the brake shoe
- Oil or grease on the brake drum

FAULTY SHOCK ABSORBER ASSEMBLY

Malfunction

- Fatigued or damaged shock absorber spring
- · Bent or damaged damper rod

· Leaking oil

UNSTABLE HANDLING

- 1. Steering wheel
- Bent or improperly installed steering wheel
- 2. Steering components
 - Incorrect toe-in
 - · Bent steering shaft
 - Improperly installed steering shaft
 - Damaged bearing
 - Bent tie-rods
 - Deformed steering knuckles
- 3. Shock absorber assembly(-ies)
 - Faulty shock absorber spring
 - Leaking oil
- 4. Tire(s)
 - Uneven tire pressures (left and right)
 - Incorrect tire pressure
 - Uneven tire wear
- 5. Wheel(s)
 - · Damaged wheel bearing
 - Bent or loose wheel axle
- Excessive wheel runout
- 6. Frame
- Bent frame
- Damaged frame

FAULTY LIGHTING SYSTEM

Headlight does not come on

- Faulty headlight
- Too many electrical accessories
- Hard charging
- Incorrect connection
- Improperly grounded circuit
- Poor contacts (light switch)

RESETTING MOTOR CONTROL UNIT (MCU) (YUM2E)

Before performing any tests in this section, it is advisable to reset the motor control unit and again verify the problem still exists.

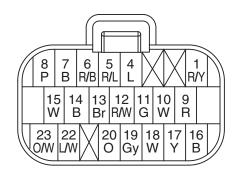
- 1. Turn the main switch "OFF".
- 2. Move tow switch to the "TOW" position.
- 3. Wait 30 seconds and turn the main switch "ON".
- 4. Turn tow switch to the "RUN" position. If this procedure corrects the problem, there are two potential causes for this condition:
 - a. The user operated the tow switch without allowing the system to reset.

b. There may be a poor or intermittent connection.

MCU MAIN HARNESS COUPLER (YUM2E)

TIP

Shows the open end of a disconnected coupler.



Position	Wire color	Function
1	Red/Yellow	Tow switch
2	Not used	
3	Not used	
4	Blue	Throttle position sensor
5	Red/Blue	Main relay
6	Red/Black	Main relay
7	Black	Reverse buzzer
8	Pink	Reverse buzzer
9	Red	Motor speed sensor
10	White	Motor speed sensor
11	Green	Motor speed sensor
12	Red/White	Main switch
13	Brown	Accelerator switch
14	Black	Motor temperature sensor
15	White	Motor temperature sensor
16	Black	Ground splice A
17	Yellow	Shift switch - Forward
18	White	Shift switch - Reverse
19	Gray	DC receptacle (input for interlock signal)
20	Orange	Throttle position sensor
21	Not used	
22	Blue/White	CAN (CAN-H)
23	Orange/ White	CAN (CAN-L)

PC GENIUS DIAGNOSTIC SYSTEM (YUM2E)

INTRODUCTION

The PC genius diagnostic system is a software program designed to access the diagnostic and programming features of the motor control unit (MCU). The system is used in conjunction with a computer and CAN-BUS cable combination to communicate with the motor control unit's internal program.

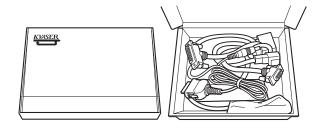
PC GENIUS DIAGNOSTIC TOOL

PC GENIUS2 diagnostic tool kit contents

- IR transmitter (for DC models)
- IR transmitter adapter (for 2014 and newer DC models)
- IR reader (Windows 8[®] for DC models)
- IR reader (Windows 10® for DC models)
- IR reader extension cable
- Ext. wire harness (9 pin to 3 pin) (for AC models)
- Kvaser[®] CAN-BUS cable (for AC models)



PC GENIUS2 diagnostic tool 90890-J0CDC-00

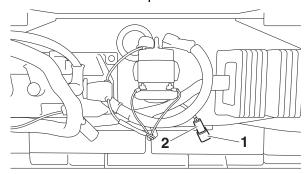


The PC genius diagnostic tool includes both software and hardware that is designed to access the diagnostic and programming features of the motor control unit (MCU).

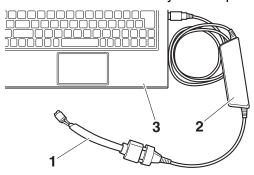
The PC genius diagnostic system is used in conjunction with a computer running Windows[®] (not included). The transfer of data from the car's MCU is accomplished by using a CAN-BUS device for the AC model.

CONNECTING THE PC GENIUS

- 1. CAN-BUS device is must be connected with wire harness before use the PC genius.
- 2. Remove the cap "1" from the wire harness connector "2" connector is located on the inside of rear access panel beside the MCU.



3. Connect the IR CAN-BUS cable "2" and the Ext. wire harness "1" to your computer "3".



 Connect the Kvaser[®] CAN-BUS cable and the Ext. wire harness connect to the wire harness connector.

DIAGNOSTIC MODE

The PC genius diagnostic system allows the user to access the MCU to monitor usage and performance data for diagnostic and trouble-shooting purposes.

This includes the following information:

Diagnostic data:

- Car number
- Amp hours
- Battery volts
- Hours
- Miles
- Mode
- Status
- MCU serial number
- MCU software version number
- Previous mode
- Previous mode hour
- Motor part number

System performance is continually monitored and fault codes identified for troubleshooting purposes. The fault codes identify the problem area and any necessary corrective action.

TIP

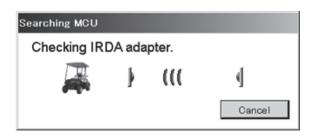
Put the TOW switch in the RUN position and the main switch in the ON position.

PC operation procedures

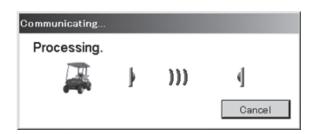
1. Select the PC genius diagnostic icon on your computer.



The checking screen will appear automatically. PC genius is automatically determined AC or DC by the connected device to the computer.



3. When the connection is completed, a window will display communicating and processing.



4. The PC genius diagnostic screen will appear.

Help button

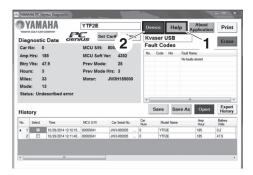
The Help screen will appear with the following 13 topics. When open the help screen, click the "Help" button "1".

Topics:

- Check adapter before connection
- Communicating dialog
- "Read" button
- Fault code description
- "Print" button
- "Set Car#" button
- "Erase" button
- History
- "Open" button
- "Save" button
- "Save As" button
- "Export History" button
- "Device" button

"Device" button

When you clicked device button "2", can choose IrDA or CAN as a communication method with MCU.



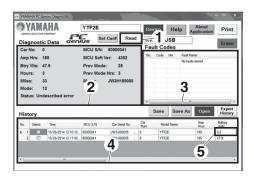
"Read" button

When clicked "Read" button "1", PC genius start to communicate to the MCU.

When communication is successful, diagnostic data "2" and fault codes "3" are displayed on the screen. In addition, the data are listed in the history "4".

TIP_

If the main switch is in the "OFF" position, the battery voltage will not display. This is displayed in the history information on record No.1 "5".



"Set Car#" button

Sets car number stored in MCU within a range of 0 to 511.

If the communication method is CAN, you can set car serial number. (less than 20 characters)

"Erase" button

Fault codes stored in MCU are erased.

"Save" button

If any of the checked boxes (history) are selected, then the selected data is saved into file. If there is no selection, all data in the history is saved.

When the communication method is IrDA, data is saved into PCG file. When the method is CAN, data is saved into CSV file.

"Save As" button

User is prompted for saving destination. Other functions are same as save button.

"Open" button

Previously saved file for history is opened. The file name is displayed next to history.

"Export History" button

If any of the checked boxes (history) are selected, then the selected data is saved into excel/acrobat (PDF) file. If there is no selection, all data in the history is exported. If any of checked boxes (history) are clicked, clicked data is printed. If checked boxes are not selected, all of the data is printed.

TROUBLESHOOTING USING PC GENIUS

This section identifies the diagnostic codes/display names used in the PC Genius diagnostic tool. Check and service the items or components that are the probable cause of the malfunction according to the following table.

Fault code No. 8

Fault code No.		8				
Displa	Display name		Main relay drive fault			
Symp	atom	Main	relay malfunction			
Cymp	NOIII	Vehic	le stopped			
Step	Inspection items		Diagnostic procedure	Confirmation steps after diagnostic procedure		
1	Resetting the MCU		Cycle the TOW switch off and on (RUN \rightarrow TOW \rightarrow RUN).	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 5. NG → Go to step 2.		
2	Main relay operation		Check the main relay. Refer to "CHECKING THE RELAYS" on page 8-77. Replace if defective.	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 5. NG → Go to step 3.		
3	Wire harness continuity		Open or short circuit → Properly connect or replace the wire harness. Between the main relay terminal and MCU coupler. Red/black—Red/black Red/blue—Red/blue	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK \rightarrow Go to step 5. NG \rightarrow Go to step 4.		
4	Malfunction in MCU		Replace the MCU.	Go to step 5.		
5	Operation check		Set the TOW switch to RUN, the main switch to ON, depress the accelerator pedal, and check if the vehicle runs.	OK → Maintenance job completion. NG → Refer to "Vehicle stopped" on page 9-23.		

Fault code No.		20				
Display name		Over current				
Symn	tom	Over	Over current (Short circuit between motor and MCU)			
Symptom		Vehic	Vehicle stopped			
Step	Inspection items		Diagnostic procedure	Confirmation steps after diagnostic procedure		
1	Resetting the MCU		Cycle the TOW switch off and on (RUN \rightarrow TOW \rightarrow RUN).	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK \rightarrow Go to step 4. NG \rightarrow Go to step 2.		

Fault o	Fault code No.		20			
Displa	ıy name	Over	current			
Symp	tom	Over	current (Short circuit between mot	tor and MCU)		
Symp	itom	Vehic	le stopped			
Step	Inspection items		Diagnostic procedure	Confirmation steps after diagnostic procedure		
2	Cable continuity		Short circuit → Properly connect or replace the cable. Between motor terminal and MCU terminal. "U": Black–Black "V": Black–Black "W": Black–Black	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK \rightarrow Go to step 4. NG \rightarrow Go to step 3.		
3	Defective stator		Replace the stator of the motor.	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 4.		
4	Operation check		Set the TOW switch to RUN, the main switch to ON, depress the accelerator pedal, and check if the vehicle runs.	OK → Maintenance job completion. NG → Refer to "Vehicle stopped" on page 9-23.		

Fault o	Fault code No.		22			
Displa	y name	Over	Over voltage			
Symp	tom	Over	voltage (battery voltage failure)			
Oymp	NOIII	Vehic	ele stopped			
Step	tep Inspection items		Diagnostic procedure	Confirmation steps after diagnostic procedure		
1	Resetting the MCU		Cycle the TOW switch off and on (RUN \rightarrow TOW \rightarrow RUN).	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 3. NG → Go to step 2.		
2	Malfunction in MCU		Replace the MCU.	Go to step 3.		
3	Operation check		Set the TOW switch to RUN, the main switch to ON, depress the accelerator pedal, and check if the vehicle runs.	OK → Maintenance job completion. NG → Refer to "Vehicle stopped" on page 9-23.		

Fault code No. 23, 24, 25

Fault o	code No.	23, 24	ł, 25			
Display name [2 [2 [2 [2		[24] C	[23] Power circuit overheated [24] Control circuit overheated [25] Internal circuit overheated			
		[23] Main circuit overheated[24] Circuit board overheated[25] Condenser overheated				
		Vehic	le stopped			
Step	Inspection items		Diagnostic procedure	Confirmation steps after diagnostic procedure		
1	Resetting the MCU		Cycle the TOW switch off and on (RUN \rightarrow TOW \rightarrow RUN).	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 4. NG → Go to step 2.		
2	MCU overheated		Allow the vehicle to rest until the MCU has reached room temperature.	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 4. NG → Go to step 3.		
3	Malfunction in MCU		Replace the MCU.	Go to step 4.		
4	Operation check		Set the TOW switch to RUN, the main switch to ON, depress the accelerator pedal, and check if the vehicle runs.	OK → Maintenance job completion. NG → Refer to "Vehicle stopped" on page 9-23.		

Fault o	Fault code No.		26			
Displa	y name	Motor	circuit short			
Symp	tom	Improp	per connection of the cable betwe	en the motor and MCU		
Symp	ton	Vehicle	e stopped			
Step	Step Inspection items		Diagnostic procedure	Confirmation steps after diagnostic procedure		
1	Resetting the MCU		Cycle the TOW switch off and on (RUN $ ightarrow$ TOW $ ightarrow$ RUN).	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 3. NG → Go to step 2.		
2	Cable connection		Check the cable connection between the motor and MCU. Motor side "U"-MCU side "U" Motor side "V"-MCU side "V" Motor side "W"-MCU side "W"	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 3.		
3	Operation check	I	Set the TOW switch to RUN, the main switch to ON, depress the accelerator pedal, and check if the vehicle runs.	OK → Maintenance job completion. NG → Refer to "Vehicle stopped" on page 9-23.		

Fault code No. 27

Fault code No.		27			
Displa	ay name	MCU to	emperature too low		
Symp	tom.	Tempe	erature too low (MCU temperature	e too low)	
Symp	ntom	Vehicle	e stopped		
Step	Inspection items		Diagnostic procedure	Confirmation steps after diagnostic procedure	
1	Resetting the MCU		Cycle the TOW switch off and on (RUN $ ightarrow$ TOW $ ightarrow$ RUN).	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK \rightarrow Go to step 3. NG \rightarrow Go to step 2.	
2	Temperature too low		Warm MCU to -20 °C (-4 °F) or higher	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 3.	
3	Operation check		Set the TOW switch to RUN, the main switch to ON, depress the accelerator pedal, and check if the vehicle runs.	OK → Maintenance job completion. NG → Refer to "Vehicle stopped" on page 9-23.	

Fault code No. 29, 30, 31, 33

Fault code No. 29, 30, 31, 33						
Fault code No.		29, 30	29, 30, 31, 33			
Displa	y name	мси	internal error			
Symptom		[29] Defective main circuit temperature sensor [30] Defective circuit board temperature sensor [31] Defective condenser temperature sensor [33] Defective abnormal offset current				
			Vehicle stopped			
Step	Inspection items		Diagnostic procedure	Confirmation steps after diagnostic procedure		
1	Resetting the MCU		Cycle the TOW switch off and on (RUN \rightarrow TOW \rightarrow RUN).	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 3. NG → Go to step 2.		
2	MCU internal error		Replace the MCU.	Go to step 3.		
3	Operation check		Set the TOW switch to RUN, the main switch to ON, depress the accelerator pedal, and check if the vehicle runs.	OK → Maintenance job completion. NG → Refer to "Vehicle stopped" on page 9-23.		

Fault code No. 32

Fault code No.		32				
Display name N		MCU	MCU internal error			
Symp	tom	Defec	tive motor temperature sensor			
Symp	tom	Vehic	Vehicle stopped			
Step	Inspection items		Diagnostic procedure	Confirmation steps after diagnostic procedure		
1	Resetting the MCU		Cycle the TOW switch off and on (RUN \rightarrow TOW \rightarrow RUN).	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 5. NG → Go to step 2.		
2	Defective motor temperature sensor		Replace the stator of the motor.	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 5. NG → Go to step 3.		
3	Wire harness continuity		Open or short circuit → Properly connect or replace the wire harness. Between the motor temperature sensor coupler and MCU coupler. White-White Black-Black	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 5. NG → Go to step 4.		
4	Malfunction in MCU		Replace the MCU.	Go to step 4.		
5	Operation check		Set the TOW switch to RUN, the main switch to ON, depress the accelerator pedal, and check if the vehicle runs.	OK → Maintenance job completion. NG → Refer to "Vehicle stopped" on page 9-23.		

rault code No. 35						
Fault code No. 35		35	35			
Displa	y name	TPS s	signal too high			
Symp	tom	Throt	tle position sensor voltage failure l	nigh side		
Jynip	tom	Vehic	Vehicle stopped			
Step	ep Inspection items		Diagnostic procedure	Confirmation steps after diagnostic procedure		
1	Resetting the MCU		Cycle the TOW switch off and on (RUN \rightarrow TOW \rightarrow RUN).	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK \rightarrow Go to step 5. NG \rightarrow Go to step 2.		
2	Throttle position sensor		Check the throttle position sensor. Refer to "CHECKING THE THROTTLE POSITION SENSOR" on page 8-78. Replace if defective.	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 5. NG → Go to step 3.		

Fault code No.		35			
Displa	ay name	TPS signal too high			
Symp	ntom	Throttle position sensor voltage failure I	nigh side		
Symp	, tom	Vehicle stopped			
Step Inspection items		Diagnostic procedure	Confirmation steps after diagnostic procedure		
3	Wire harness continuity	Open or short circuit → Properly connect or replace the wire harness. Between the throttle position sensor coupler and MCU coupler. Orange-Orange Blue-Blue Black-Black	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 5. NG → Go to step 4.		
4	Malfunction in MCU	Replace the MCU.	Go to step 5.		
5	Operation check	Set the TOW switch to RUN, the main switch to ON, depress the accelerator pedal, and check if the vehicle runs.	OK → Maintenance job completion. NG → Refer to "Vehicle stopped" on page 9-23.		

Fault	Fault code No.		36		
Display name		Invali	d logic for TPS and switch		
Symp	tom	Mism	atch between the accelerator swit	ch and throttle position sensor	
Symp	ntom	Vehic	le stopped		
Step	Inspection items		Diagnostic procedure	Confirmation steps after diagnostic procedure	
1	Resetting the MCU		Cycle the TOW switch off and on (RUN \rightarrow TOW \rightarrow RUN).	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK \rightarrow Go to step 6. NG \rightarrow Go to step 2.	
2	Accelerator switch		Checking the accelerator switch. Refer to "CHECKING THE SWITCHES" on page 8-61. Replace if defective.	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 6. NG → Go to step 3.	
3	Throttle position sensor		Check the throttle position sensor. Refer to "CHECKING THE THROTTLE POSITION SENSOR" on page 8-78. Replace if defective.	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 6. NG → Go to step 4.	

Fault code No.		36		
Displa	ay name Invalid logic for TPS and switch			
Symp	tom	Mism	atch between the accelerator swite	ch and throttle position sensor
Jynip	NOIII	Vehic	ele stopped	
Step	Inspection items		Diagnostic procedure	Confirmation steps after diagnostic procedure
4	Wire harness continuity		Open or short circuit → Properly connect or replace the wire harness. Between the accelerator switch coupler and MCU coupler. Red/white–Red/white Brown–Brown Between the throttle position sensor coupler and MCU coupler. Orange–Orange Blue–Blue Black–Black	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 6. NG → Go to step 5.
5	Malfunction in MCU		Replace the MCU.	Go to step 6.
6	Operation check		Set the TOW switch to RUN, the main switch to ON, depress the accelerator pedal, and check if the vehicle runs.	OK → Maintenance job completion. NG → Refer to "Vehicle stopped" on page 9-23.

Fault code No.		37			
Displa	y name	Invalid logic for shift switch			
Symp	tom	Shift switch mismatch			
Зупір	tom	Vehicle stopped			
Step	Inspection items	Diagnostic prod	cedure Confirmation steps after diagnostic procedure		
1	Resetting the MCU	Cycle the TOW switch on (RUN \rightarrow TOW \rightarrow			
2	Shift switch	Checking the shift sw Refer to "CHECKINO SWITCHES" on page Replace if defective.	G THE diagnostic tool, and check if any		
3	Wire harness continuity	Open or short circuit - connect or replace th harness. Between the shift swit and MCU coupler. Yellow-Yellow White-White Black-Black	e wire diagnostic tool, and check if any errors are continuously		
4	Malfunction in MCU	Replace the MCU.	Go to step 5.		

Fault code No. 37					
Displa	y name	Invalid logic for shift switch			
Symptom			Shift switch mismatch Vehicle stopped		
Step	Inspection items		Diagnostic procedure	Confirmation steps after diagnostic procedure	
5	Operation check		Set the TOW switch to RUN, the main switch to ON, depress the accelerator pedal, and check if the vehicle runs.	OK → Maintenance job completion. NG → Refer to "Vehicle stopped" on page 9-23.	

Fault (Fault code No. 38, 39				
Fault code No. 38		38, 39)		
Displa	ay name		[38] Main relay keep close [39] Main relay keep open [38] Main relay contact failure ON [39] Main relay contact failure OFF		
Symp	otom				
		Vehic	cle stopped		
Step	tep Inspection items		Diagnostic procedure	Confirmation steps after diagnostic procedure	
1	Resetting the MCU		Cycle the TOW switch off and on (RUN \rightarrow TOW \rightarrow RUN).	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 3. NG → Go to step 2.	
2	Main relay		Checking the main relay. Refer to "CHECKING THE RELAYS" on page 8-77. Replace if defective.	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. Go to step 3.	
3	Operation check		Set the TOW switch to RUN, the main switch to ON, depress the accelerator pedal, and check if the vehicle runs.	OK → Maintenance job completion. NG → Refer to "Vehicle stopped" on page 9-23.	

Fault code No.		40			
Display name		Low voltage			
Symptom		Low voltage failure (IV determination)			
-	- Cymptom		Vehicle stopped		
Step	Inspection items		Diagnostic procedure	Confirmation steps after diagnostic procedure	
1	Resetting the MCU		Cycle the TOW switch off and on (RUN \rightarrow TOW \rightarrow RUN).	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK \rightarrow Go to step 6. NG \rightarrow Go to step 2.	

Fault o	code No.	40	40			
Displa	Display name		Low voltage			
Curren	Symptom		oltage failure (IV determination)			
Symp			le stopped			
Step	Inspection items		Diagnostic procedure	Confirmation steps after diagnostic procedure		
2	Battery		Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-63. Charge or replace the battery.	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. $OK \to Go \text{ to step 6.} \\ NG \to Go \text{ to step 3.}$		
3	Fuse		Check the main and MCU fuse. Refer to "CHECKING THE FUSES" on page 8-63. Replace if defective.	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 6. NG → Go to step 4.		
4	TOW switch		Check the TOW switch. Refer to "CHECKING THE SWITCHES" on page 8-61. Replace if defective.	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 6. NG → Go to step 5.		
5	Wire harness continuity		Open or short circuit → Properly connect or replace the wire harness. Between the battery terminal and the main fuse terminal. Red–Red Between the TOW switch coupler and the main fuse terminal. Red–Red Between the MCU fuse terminal and the MCU coupler. Red/yellow–Red/yellow Between the battery terminal and the MCU coupler. Black–Black	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 6.		
6	Operation check		Set the TOW switch to RUN, the main switch to ON, depress the accelerator pedal, and check if the vehicle runs.	OK → Maintenance job completion. NG → Refer to "Vehicle stopped" on page 9-23.		

Fault code No. 41

Fault code No.		41			
Displa	ay name	Low v	voltage		
Symp	atom	Low	voltage failure (battery low voltage)		
Jynip	, tom	Vehic	sle stopped		
Step	Inspection items		Diagnostic procedure	Confirmation steps after diagnostic procedure	
1	Resetting the MCU		Cycle the TOW switch off and on (RUN \rightarrow TOW \rightarrow RUN).	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 3. NG → Go to step 2.	
2	Cable routing between batteries		Check the cable routing between batteries. Refer to "REMOVING AND REPLACING THE BATTERY" on page 8-77. Bad cable routing → Correct the routing.	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 3.	
3	Operation check		Set the TOW switch to RUN, the main switch to ON, depress the accelerator pedal, and check if the vehicle runs.	OK → Maintenance job completion. NG → Refer to "Vehicle stopped" on page 9-23.	

Fault code No.		42			
Displa	ay name	High	voltage		
Symn	atom	Over	voltage failure		
Oynip	Symptom		le stopped		
Step	Step Inspection items		Diagnostic procedure	Confirmation steps after diagnostic procedure	
1	Resetting the MCU		Cycle the TOW switch off and on (RUN \rightarrow TOW \rightarrow RUN).	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 3. NG → Go to step 2.	
2	Battery		Check the battery. Is the specified battery used? Not specified battery → Replace the battery.	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 3.	
3	Operation check		Set the TOW switch to RUN, the main switch to ON, depress the accelerator pedal, and check if the vehicle runs.	OK → Maintenance job completion. NG → Refer to "Vehicle stopped" on page 9-23.	

Fault code No. 43

Fault code No.		43	43			
Displa	ay name	Moto	r overheated			
Symn	tom	Motor	r overheated			
Symp	ntoni	Vehic	le stopped			
Step	Step Inspection items		Diagnostic procedure	Confirmation steps after diagnostic procedure		
1	Resetting the MCU		Cycle the TOW switch off and on (RUN \rightarrow TOW \rightarrow RUN).	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK \rightarrow Go to step 3. NG \rightarrow Go to step 2.		
2	Motor overheated		Wait until the motor temperature drops to room temperature.	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 3.		
3	Operation check		Set the TOW switch to RUN, the main switch to ON, depress the accelerator pedal, and check if the vehicle runs.	OK → Maintenance job completion. NG → Refer to "Vehicle stopped" on page 9-23.		

Fault code No.		44	44			
Display name		Speed	Speed sensor error			
Symn	Symptom		Motor speed sensor malfunction			
Symp			le stopped			
Step			Diagnostic procedure	Confirmation steps after diagnostic procedure		
1	Resetting the MCU		Cycle the TOW switch off and on (RUN \rightarrow TOW \rightarrow RUN).	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 4. NG → Go to step 2.		
2	Defective motor speed sensor		Replace the motor speed sensor.	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK \rightarrow Go to step 4. NG \rightarrow Go to step 3.		
3	Wire harness continuity		Open or short circuit → Properly connect or replace the wire harness. Between the motor speed sensor coupler and the MCU coupler. Red-Red White-White Green-Green Black-Black	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 4.		

Fault code No.		44			
Display name		Speed sensor error			
Symptom			Motor speed sensor malfunction Vehicle stopped		
Step	Inspection items		Diagnostic procedure	Confirmation steps after diagnostic procedure	
4	Operation check		Set the TOW switch to RUN, the main switch to ON, depress the accelerator pedal, and check if the vehicle runs.	OK → Maintenance job completion. NG → Refer to "Vehicle stopped" on page 9-23.	

Fault code No. 45, 46

Fault code No.		45, 46				
Display name		Speed sensor error				
Symptom		Motor speed sensor malfunction (internal disconnection)				
Symp	ntoin	Vehicle stopped				
Step	Inspection items	Diagnostic procedure	Confirmation steps after diagnostic procedure			
1	Resetting the MCU	Cycle the TOW switch off and on (RUN \rightarrow TOW \rightarrow RUN).	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK \rightarrow Go to step 4. NG \rightarrow Go to step 2.			
2	Motor speed sensor failure	Replace the motor speed sensor.	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK \rightarrow Go to step 4. NG \rightarrow Go to step 3.			
3	Wire harness continuity	Open or short circuit → Properly connect or replace the wire harness. Between the motor speed sensor coupler and the MCU coupler. Red-Red White-White Green-Green Black-Black	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 4.			
4	Operation check	Set the TOW switch to RUN, the main switch to ON, depress the accelerator pedal, and check if the vehicle runs.	OK → Maintenance job completion. NG → Refer to "Vehicle stopped" on page 9-23.			

Vehicle stopped

Fault code No.		None			
Display name		None			
Symptom		Vehicle stopped			
Step	Inspection items	Diagnostic procedure	Confirmation steps after diagnostic procedure		
1	Resetting the MCU	Cycle the TOW switch off and on (RUN \rightarrow TOW \rightarrow RUN).	Connect the PC Genius diagnostic tool, and check if any errors are continuously occurring. OK → Go to step 2. NG → To troubleshooting for fault code number		
2	Main switch	Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-61. Replace if defective.	No malfunctions were found \rightarrow Go to step 3. Repair the malfunctions \rightarrow Go to step 5.		
3	Wire harness continuity	Open or short circuit → Properly connect or replace the wire harness. Between the MCU coupler and accelerator switch coupler. Brown–Brown Between the accelerator switch coupler and main switch coupler. Red/white–Red/white Between the main switch coupler and battery terminal. Black–Black	No malfunctions were found \rightarrow Go to step 4. Repair the malfunctions \rightarrow Go to step 5.		
4	Malfunction in MCU or mo	or Replace the MCU or motor	Go to step 5.		
5	Operation check	Set the TOW switch to RUN, the main switch to ON, depress the accelerator pedal, and check if the vehicle runs.	OK → Maintenance job completion.		

Fault code table

Fault code No.	Display name	Item	Symptom	Possible cause
8	Main relay drive fault	Main relay drive fault	Motor output shut-off, vehicle stopped (no regeneration)	Main relay drive short circuit Short circuit in the harness between the MCU and relay drive
20	Over current	Over current fault	Motor output shut-off, vehicle stopped (no regeneration)	Motor internal short circuit Short circuit in the cable between the motor and MCU
22	Over voltage	Over voltage fault	Motor output shut-off, vehicle stopped (no regeneration)	MCU over voltage protection
23	Power circuit overheated	Main circuit overheated	Motor output shut-off, vehicle stopped (no regeneration)	MCU heat protection
24	Control circuit overheated	Control circuit overheated	Motor output shut-off, vehicle stopped (no regeneration)	MCU heat protection
25	Internal circuit overheated	Condenser overheated	Motor output shut-off, vehicle stopped (no regeneration)	MCU heat protection
26	Motor circuit short	Interphase short circuit	Motor output shut-off, vehicle stopped (no regeneration)	Short circuit of the cable between the motor and MCU due to incorrect assembly when reassembling the motor or MCU
27	MCU temperature too low	Temperature too low	Vehicle stopped (with regeneration)	Protection from MCU failure due to low temperature
29	MCU internal error	Main circuit temperature sensor connection failure	Vehicle stopped (with regeneration)	MCU internal circuit error
30	MCU internal error	Control circuit temperature sensor connection failure	Vehicle stopped (with regeneration)	MCU internal circuit error
31	MCU internal error	Condenser temperature sensor connection failure	Vehicle stopped (with regeneration)	MCU internal circuit error
32	MCU internal error	Motor temperature sensor connection failure	Vehicle stopped (with regeneration)	MCU internal circuit error
33	MCU internal error	Abnormal offset current	Vehicle stopped (with regeneration)	MCU internal circuit error
35	TPS signal too high	Accelerator sensor voltage failure high side	Vehicle stopped (with regeneration)	Accelerator sensor failure

Fault code No.	Display name	Item	Symptom	Possible cause
36	Invalid logic for TPS and switch	Accelerator mismatch	Vehicle stopped (with regeneration)	Accelerator sensor failure
37	Invalid logic for shift switch	Shift switch mismatch	Vehicle stopped (with regeneration)	Defective shift switch The shift switch is kept in the intermediate state by user operation.
38	Main relay keep close	Main relay contact failure ON	Motor output shut-off, vehicle stopped (no regeneration)	Welded contact point of main relay
39	Main relay keep open	Main relay contact failure OFF	Motor output shut-off, vehicle stopped (no regeneration)	Stuck main relay
40	Low voltage	Low voltage failure (IV determination)	Vehicle stopped (with regeneration)	Battery low voltage
41	Low voltage	Low voltage failure	Vehicle stopped (with regeneration)	Battery low voltage
42	High voltage	Over voltage failure	Motor output shut-off, vehicle stopped (no regeneration)	High battery voltage
43	Motor overheated	Motor overheated	Vehicle stopped (with regeneration)	Motor overheated
44	Speed sensor error	Speed sensor malfunction	Motor output shut-off, vehicle stopped (no regeneration)	Defective motor speed sensor
45	Speed sensor error	Speed sensor warning phase A	Motor output shut-off, vehicle stopped (no regeneration)	Open or short circuits in the motor speed sensor phase A
46	Speed sensor error	Speed sensor warning phase B	Motor output shut-off, vehicle stopped (no regeneration)	Open or short circuits in the motor speed sensor phase B

PC GENIUS GOLF CAR PROGRAMMING SYSTEM (YUM2E)

PC GENIUS GOLF CAR PROGRAMMING SYSTEM (YUM2E)

GOLF CAR PROGRAMMING MODE

User selects either MCU type and enters a password to login to change the top speed and regenerative brake settings.

PC operation procedures

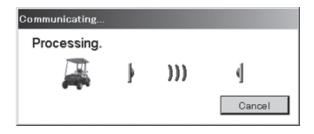
TIP_

Both the AC models and DC models TOW switch will need to be placed in the RUN position. Both AC models and DC models will need the main switched to the OFF position while programming, otherwise, a communication error will appear.

1. Select the PC genius programmer icon on your laptop PC.



The intro screen will appear automatically.
 PC genius is automatically determined AC or
 DC by the connected device to the PC.
 The communication window is displayed until
 the connection is completed between the laptop PC and MCU.



3. Enter your password. The generic password is 13121. then click "LOGIN" button.

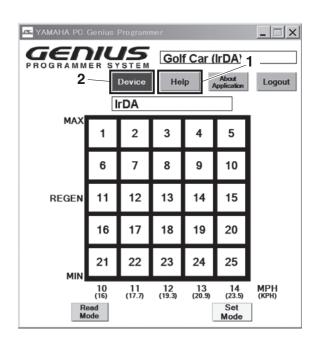


4. The PC genius programmer screen will appear.

Help button

The help screen will appear with the following 10 topics.

When open to help screen, click the "Help" button "1".



PC GENIUS GOLF CAR PROGRAMMING SYSTEM (YUM2E)

Topics:

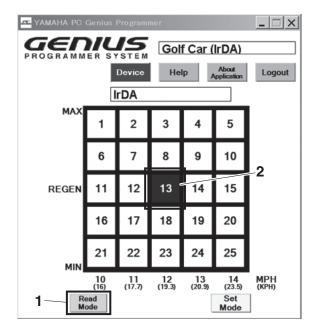
- Check adapter before connection
- Communicating dialog
- Password
- Select MCU type
- "LOGIN" button
- Read mode button
- Set mode button
- Device button
- Logout button
- Overview of PTV programmer

Device button

When you clicked "Device" button "2", can choose IrDA or CAN as a communication method with MCU.

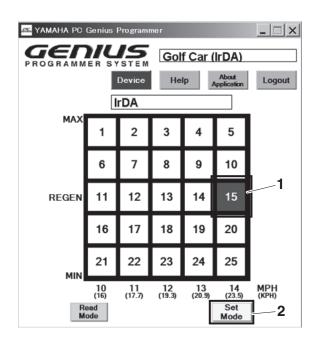
Read mode button

When you clicked "Read Mode" button "1", PC genius start to communicate to the MCU. When communication is successful, the top speed and regenerative brake settings displayed on the screen with the solid cursor in blue "2".



Set mode button

- 1. The user selects the intended mode number. The number will flash green for the intended setting "1".
- 2. When you clicked "Set Mode" button "2", PC genius start to communicate to the MCU.
- 3. When communication is successful, the speed/regen setting for the MCU will be displayed with solid cursor in blue "1".



TIP

If communication was unsuccessful you will see a communication error screen. Steps 1–3 must be repeated. Select "OK" to return to data screen. If a communication error is persistent, cycle the tow/run switch. If communication error continues disconnect and reconnect USB from PC

About application button

The about application screen will show the end user license agreement, software version and copyright information.

Logout button

It will return to the login screen.

PC GENIUS GOLF CAR PROGRAMMING SYSTEM (YUM2E)

WIRING DIAGRAM

YUM1A/YUM2A

- 1. Auxiliary DC jack (option)
- 2. Deluxe lighting kit (option)
- 3. Lighting fuse
- 4. Auxiliary DC jack fuse (option)
- 5. Main switch fuse
- 6. Main fuse
- 7. USB fuse
- 8. Reverse switch
- 9. Reverse buzzer
- 10. Horn switch
- 11. Horn
- 12. USB unit
- 13. Tail light (left) (option)
- 14. Tail light (right) (option)
- 15. Headlight (right)
- 16. Headlight (left)
- 17. Light switch
- 18. Main switch
- 19. Accelerator switch
- 20. Fuel pump relay
- 21. Engine oil level switch
- 22. Meter assembly
- 23. Fuel pump assembly
- 24. Diagnostic tool coupler
- 25. ECU (engine control unit)
- 26. Engine temperature sensor
- 27. Intake air pressure sensor
- 28. Fuel injector
- 29. Crankshaft position sensor
- 30. Intake air temperature sensor
- 31. Frame ground
- 32. Voltage regulator
- 33. Starter generator
- 34. Main relay
- 35. Battery

Y/R

- 36. Spark plug
- 37. Ignition coil
- 38. Engine ground

COLOR CODE

В	Black
Br	Brown
G	Green
L	Blue
0	Orange
Р	Pink
R	Red
W	White
Υ	Yellow
B/R	Black/Red
B/W	Black/White
B/Y	Black/Yellow
Br/W	Brown/White
G/W	Green/White
O/W	Orange/White
R/W	Red/White
R/Y	Red/Yellow
W/R	White/Red

Yellow/Red

YUM2E

- 1. Tail light (left) (option)
- 2. Tail light (right) (option)
- 3. Deluxe lighting kit (option)
- 4. Headlight (right)
- 5. Headlight (left)
- 6. Light switch
- 7. Horn
- 8. Horn switch
- 9. Voltage regulator
- 10. Main switch
- 11. Battery gauge/warning light
- 12. Tow switch
- 13. Accelerator switch
- 14. Reverse buzzer
- 15. Shift switch
- 16. Diagnostic tool coupler
- 17. Motor temperature sensor
- 18. Motor speed sensor
- 19. Traction motor
- 20. MCU (motor control unit)
- 21. MCU fuse
- 22. USB fuse
- 23.USB unit
- 24. Main fuse
- 25. TPS (throttle position sensor)
- 26. Main relay
- 27. Battery
- 28. Charging receptacle

COLOR CODE

- В Black Br Brown Green G Gy Gray L Blue 0 Orange Ρ Pink R Red W White
- Y Yellow
 B/W Black/White
 L/W Blue/White
 O/W Orange/White
- R/B Red/Black R/L Red/Blue R/W Red/White
- R/Y Red/Yellow



YUM1A/YUM2A WIRING DIAGRAM

