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YAMAHA 2002

YFM660F(P)

5KM2-AE1

SERVICE MANUAL

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**YFM660F(P) 2002
SERVICE MANUAL
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NOTICE

This manual was produced by the Yamaha Motor Company 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, so it is assumed that anyone who uses this book to perform maintenance and repairs on Yamaha machine has a basic understanding of the mechanical ideas and the procedures of machine repair. Repairs attempted by anyone without this knowledge are likely to render the machine unsafe and unfit for use.

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

NOTE:

Designs and specifications are subject to change without notice.

IMPORTANT INFORMATION

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



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



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



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

NOTE:

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

HOW TO USE THIS MANUAL

MANUAL ORGANIZATION

This manual consists of chapters for the main categories of subjects. (See "Illustrated symbols")

1st title ①: This is the title of the chapter with its symbol in the upper right corner of each page.

2nd title ②: This title indicates the section of the chapter and only appears on the first page of each section. It is located in the upper left corner of the page.

3rd title ③: This title indicates a sub-section that is followed by step-by-step procedures accompanied by corresponding illustrations.

EXPLODED DIAGRAMS

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

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

② CLUTCH

① ENG

CLUTCH

ENG

④

⑤

⑥

⑦

Order	Job name/Part name	Qty	Remarks
Removing the clutch			
Primary and secondary sheaves			
1	Clutch housing assembly	1	Remove the parts in the order below. Refer to "PRIMARY AND SECONDARY SHEAVES".
2	Gasket/dowel pin	1/2	
3	One-way clutch bearing	1	
4	Nut	1	
5	Clutch carrier assembly	1	
For installation, reverse the removal procedure.			

③

⑧

REMOVING THE CLUTCH

1. Remove:

- Clutch housing assembly
- Gasket
- Dowel pins

NOTE:

Working in crisscross pattern, loosen each bolt 1/4 of a turn. Remove them after all of them are loosened.

2. Straighten:

- Punched portion of the nut ①.

3. Remove:

- Nut ①

NOTE:

Use a clutch holding tool ② to hold the clutch carrier assembly.

Clutch holding tool:
P/N. YM-91042, 90890-04086

CHECKING THE CLUTCH

1. Check:

- Clutch housing ③
- Heat damage/wear/damage → Replace.
- One-way clutch bearing ②
- Chaling/wear/damage → Replace.

NOTE:

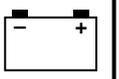
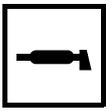
- Replace the one-way clutch assembly and clutch housing as a set.
- The one-way clutch bearing must be installed with the flange side facing in.

Checking steps:

- Install the one-way clutch bearing and clutch carrier assembly to the clutch housing and hold the clutch carrier assembly.
- When turning the clutch housing clockwise ④, the clutch housing should turn freely. If not, the one-way clutch assembly is faulty. Replace it.
- When turning the clutch housing counter-clockwise ⑤, the clutch housing and crankshaft should be engaged. If not, the one-way clutch assembly is faulty. Replace it.

4 - 60

4 - 62

① GEN INFO 	② SPEC 
③ CHK ADJ 	④ ENG 
⑤ COOL 	⑥ CARB 
⑦ DRIV 	⑧ CHAS 
⑨ ELEC 	⑩ TRBL SHTG ?
⑪ 	⑫ 
⑬ 	⑭ 
⑮ 	⑯ 
⑰ 	⑱ 
⑲  ⑳  ㉑ 	
㉒  ㉓  ㉔ 	
㉕ 	㉖ New

EB003000

ILLUSTRATED SYMBOLS

Illustrated symbols ① to ⑩ are printed on the top right of each page and indicate the subject of each chapter.

- ① General information
- ② Specifications
- ③ Periodic checks and adjustments
- ④ Engine
- ⑤ Cooling system
- ⑥ Carburetion
- ⑦ Drive train
- ⑧ Chassis
- ⑨ Electrical
- ⑩ Troubleshooting

Illustrated symbols ⑪ to ⑱ are used to identify the specifications appearing in the text.

- ⑪ Can be serviced with engine mounted
- ⑫ Filling fluid
- ⑬ Lubricant
- ⑭ Special tool
- ⑮ Torque
- ⑯ Wear limit, clearance
- ⑰ Engine speed
- ⑱ Ω, V, A

Illustrated symbols ⑲ to ⑳ in the exploded diagrams indicate the types of lubricants and lubrication points.

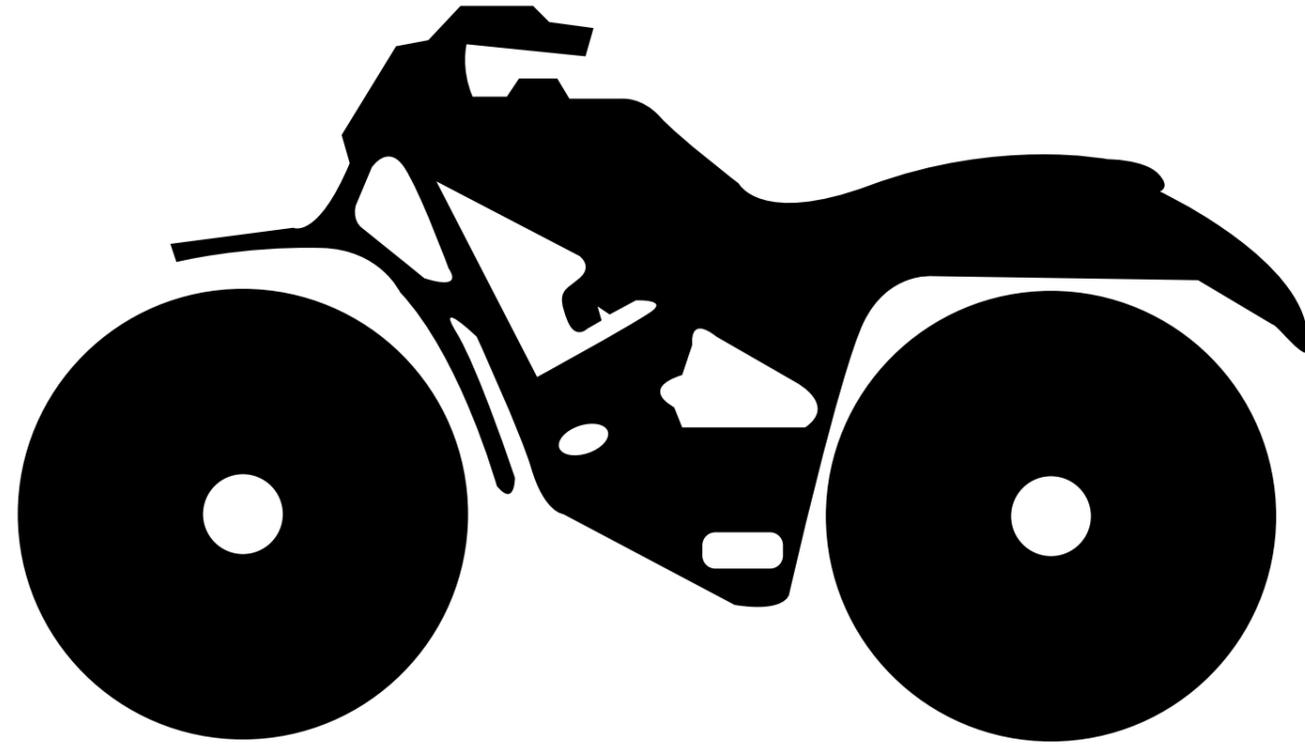
- ⑲ Apply engine oil
- ⑳ Apply gear oil
- ㉑ Apply molybdenum disulfide oil
- ㉒ Apply wheel bearing grease
- ㉓ Apply lightweight lithium-soap base grease
- ㉔ Apply molybdenum disulfide grease

Illustrated symbols ㉕ to ㉖ in the exploded diagrams indicate where to apply a locking agent ㉕ and when to install a new part ㉖.

- ㉕ Apply the locking agent (LOCTITE®)
- ㉖ Replace

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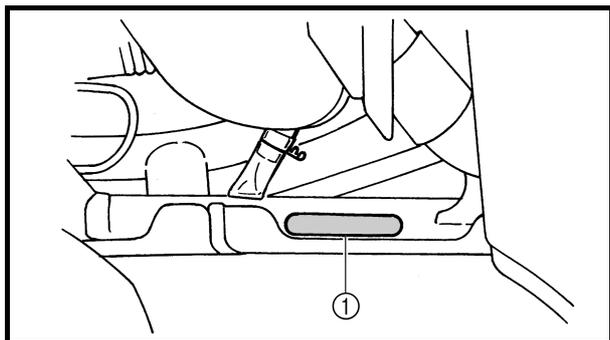


**GEN
INFO**



CHAPTER 1. GENERAL INFORMATION

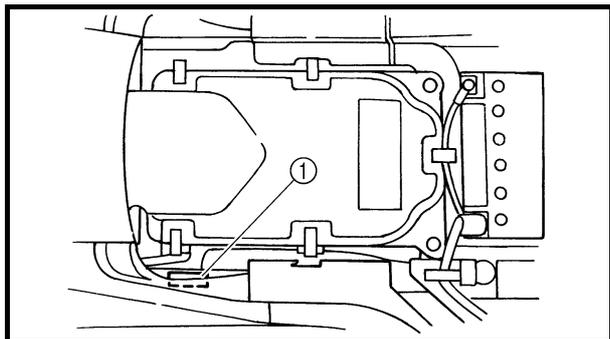
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GENERAL INFORMATION
MACHINE IDENTIFICATION

VEHICLE IDENTIFICATION NUMBER

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



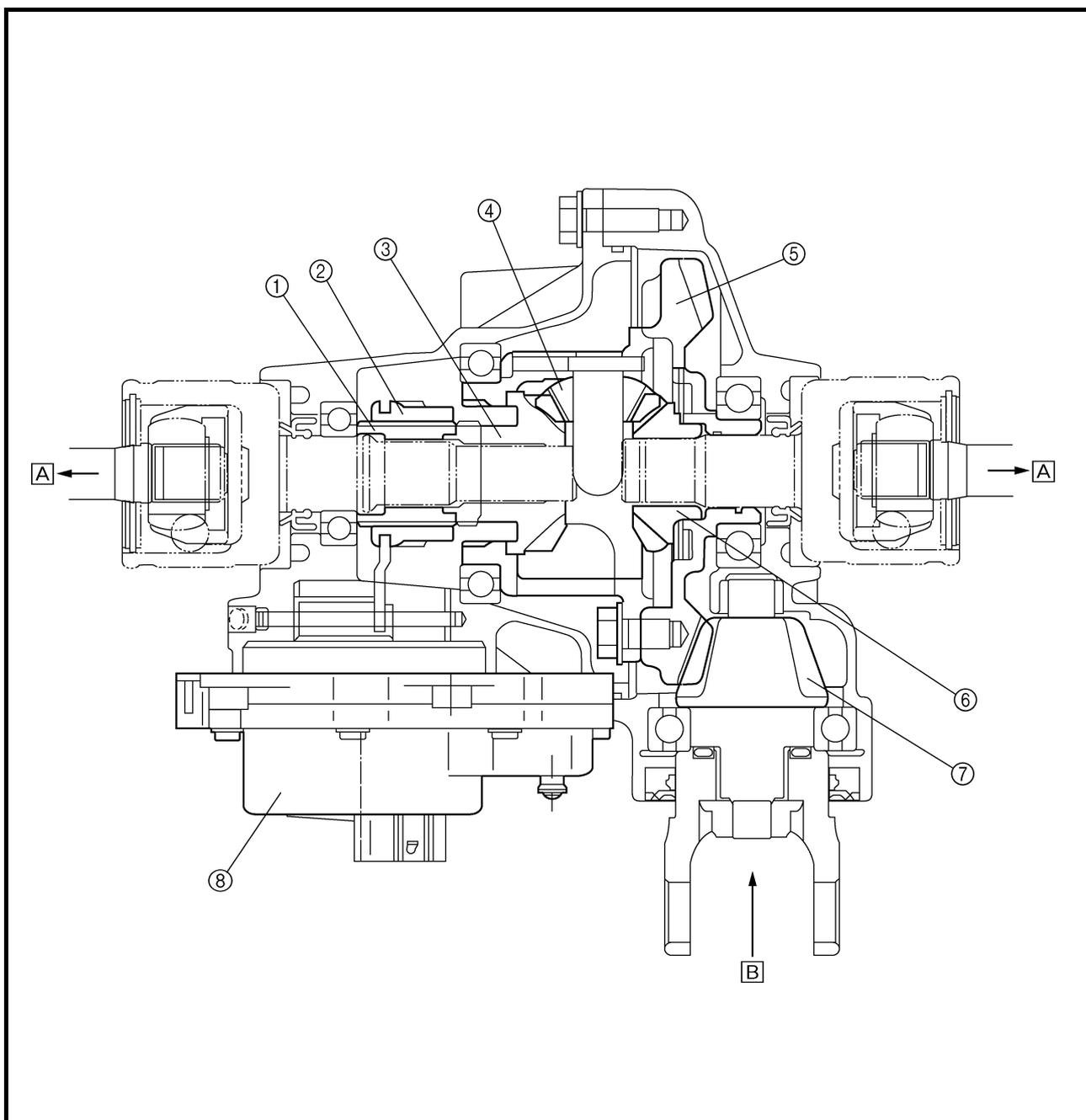
MODEL LABEL

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

FEATURES

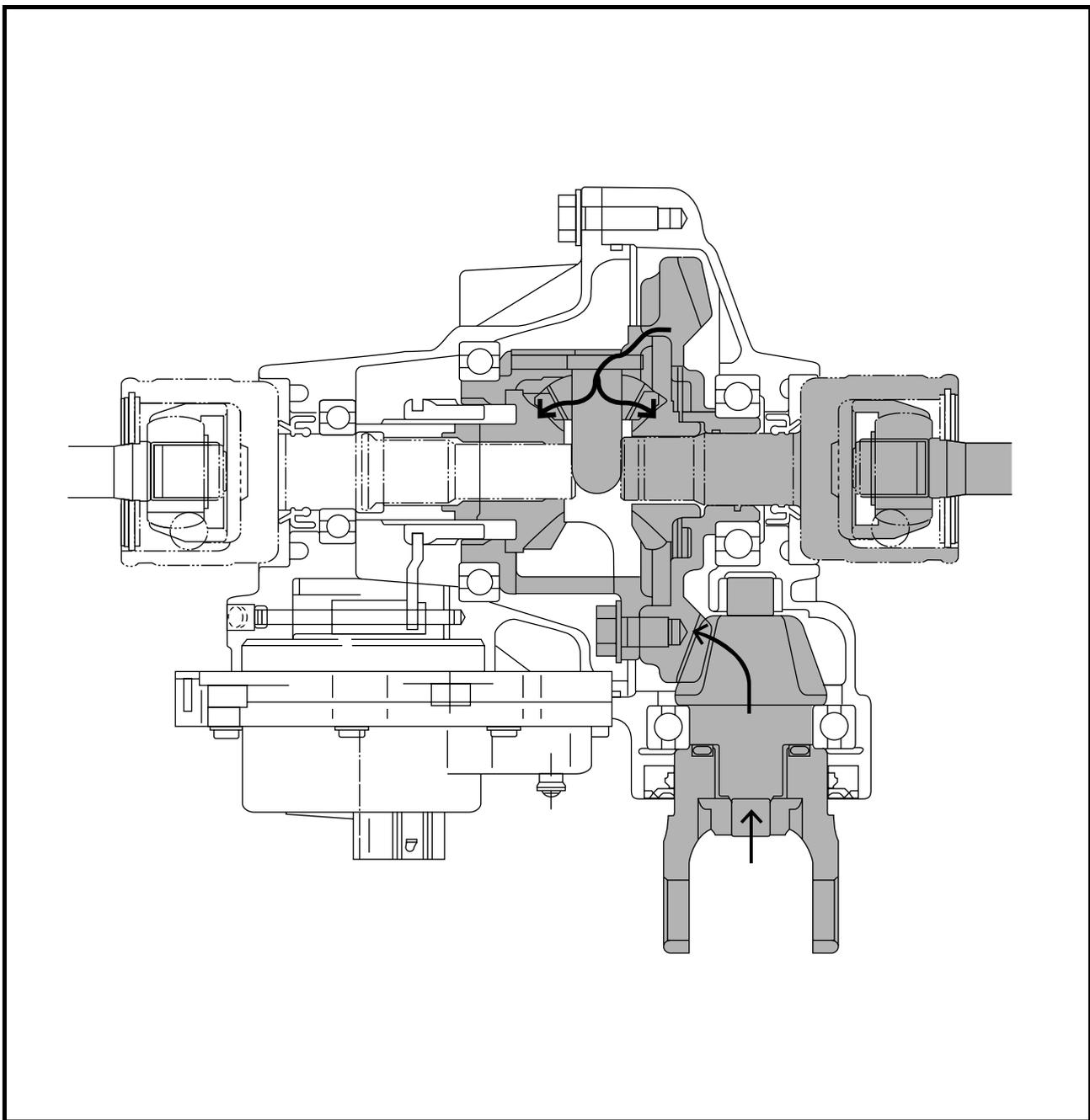
FRONT DIFFERENTIAL

- ① Adapter
 - ② Drive clutch
 - ③ Differential side gear (left)
 - ④ Differential pinion gear
 - ⑤ Ring gear
 - ⑥ Differential side gear (right)
 - ⑦ Drive pinion gear
 - ⑧ Gear motor
- Ⓐ To front wheel
Ⓑ From the middle gear



2WD

Power is transmitted as follows: middle gear → front drive shaft → drive pinion gear ⑦ → ring gear ⑤ → differential pinion gear ④. In the 2WD mode, the left differential side gear ③ and the drive clutch ② are not engaged, therefore, the left side gear runs idle and does not transmit power to the left front constant velocity joint.



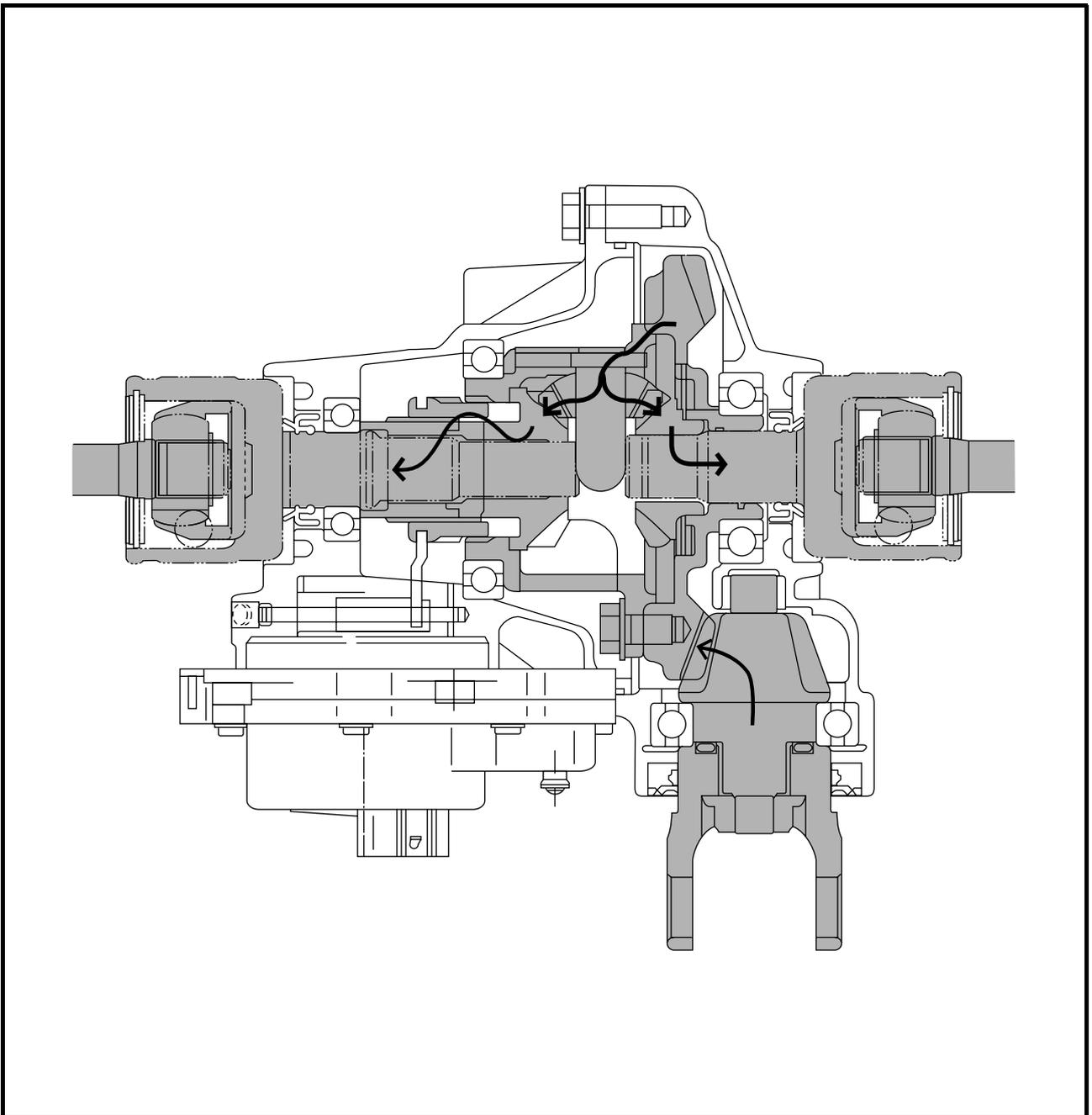


4WD

When the 4WD mode is selected, the gear motor is operated, and the drive clutch ② moves to the right and engages with the left differential side gear ③. Accordingly, power is transmitted as follows: ring gear ⑤ → differential pinion gear ④ → left differential side gear ③ → drive clutch ② → adapter ① → left front constant velocity joint.

Meanwhile, power from the differential pinion gear ④ is transmitted to the right front constant velocity joint via the right differential side gear ⑥.

The ring gear ⑤ and the drive clutch ② are not engaged at this time. Therefore, the rotational difference that occurs between the right and left wheels, while the handlebar is being turned, is absorbed by the difference in the rotational speeds of the ring gear ⑤ and the left differential side gear ③.



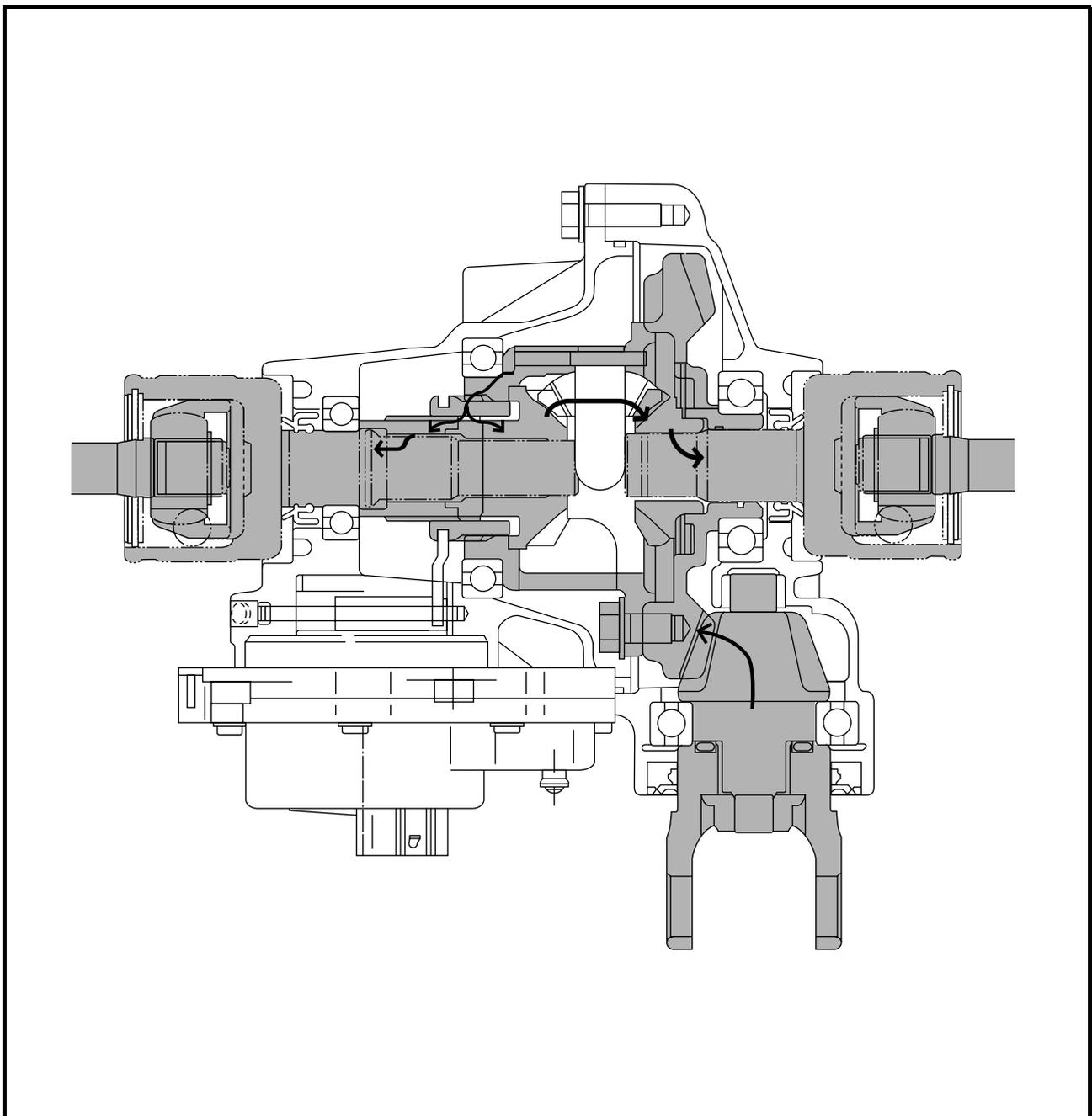


4WD (Diff-Lock)

When the 4WD (Diff-Lock) mode is selected, the gear motor moves the drive clutch ② further to the right, which causes the ring gear ⑤ and the drive clutch ② to engage. As a result, power is transmitted directly from the ring gear ⑤ to the drive clutch ②, then to the left front constant velocity joint via the adapter ①.

Meanwhile, because the ring gear ⑤ and the drive clutch ② are engaged, the ring gear ⑤, the drive clutch ②, and the right differential side gear ⑥ become locked coaxially. Thus, power is transmitted as follows: differential pinion gear ④ → right differential pinion gear ⑥ → right front constant velocity joint.

When the ATV is in the 4WD (Diff-Lock) mode, the right and left wheels rotate constantly at the same speed, which affects the maneuverability of the ATV (e.g., making it difficult to steer). Therefore, the maximum traveling speed is limited to 35 km/h (22 mph).





In addition, the 4WD (Diff-Lock) mode can be engaged only when the ATV is stopped. Even if an attempt is made to select this mode when the ATV is traveling, it will only result in a standby condition (i.e., when the differential lock select switch and the differential gear are not matched).

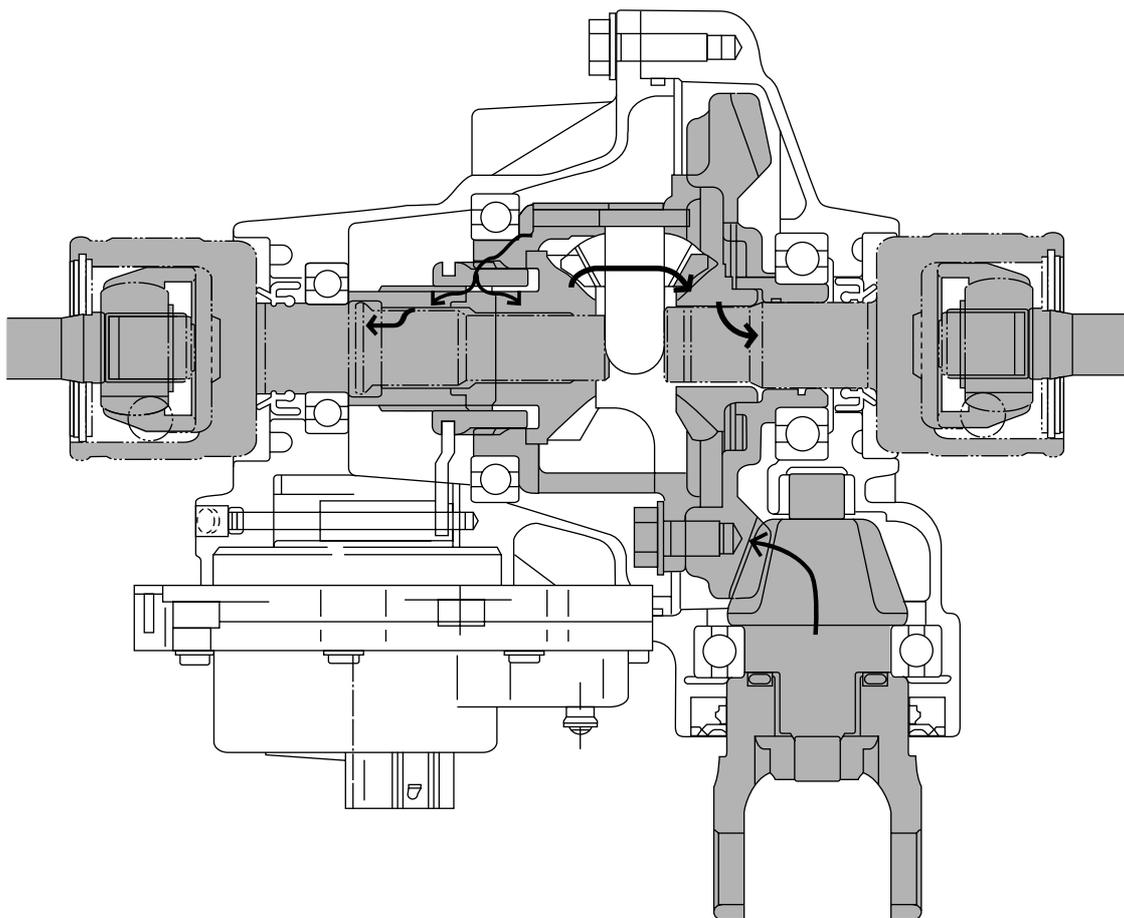
(1) When the ATV is traveling

Even if the 4WD (Diff-Lock) mode is selected, the gear motor will stand by, instead of operating. Therefore, the ATV can be driven in the normal 4WD mode. When this occurs, the differential gear lock indicator light “” in the speedometer unit will flash to alert the driver that the control is on standby. When the ATV is stopped, the control transfers to the condition described in (2).

(2) When the ATV is stopped

The gear motor operates to connect the drive clutch to the differential case, thus resulting in the differential lock condition. When this occurs, the differential gear lock indicator light “” in the speedometer unit changes to a constant illumination.

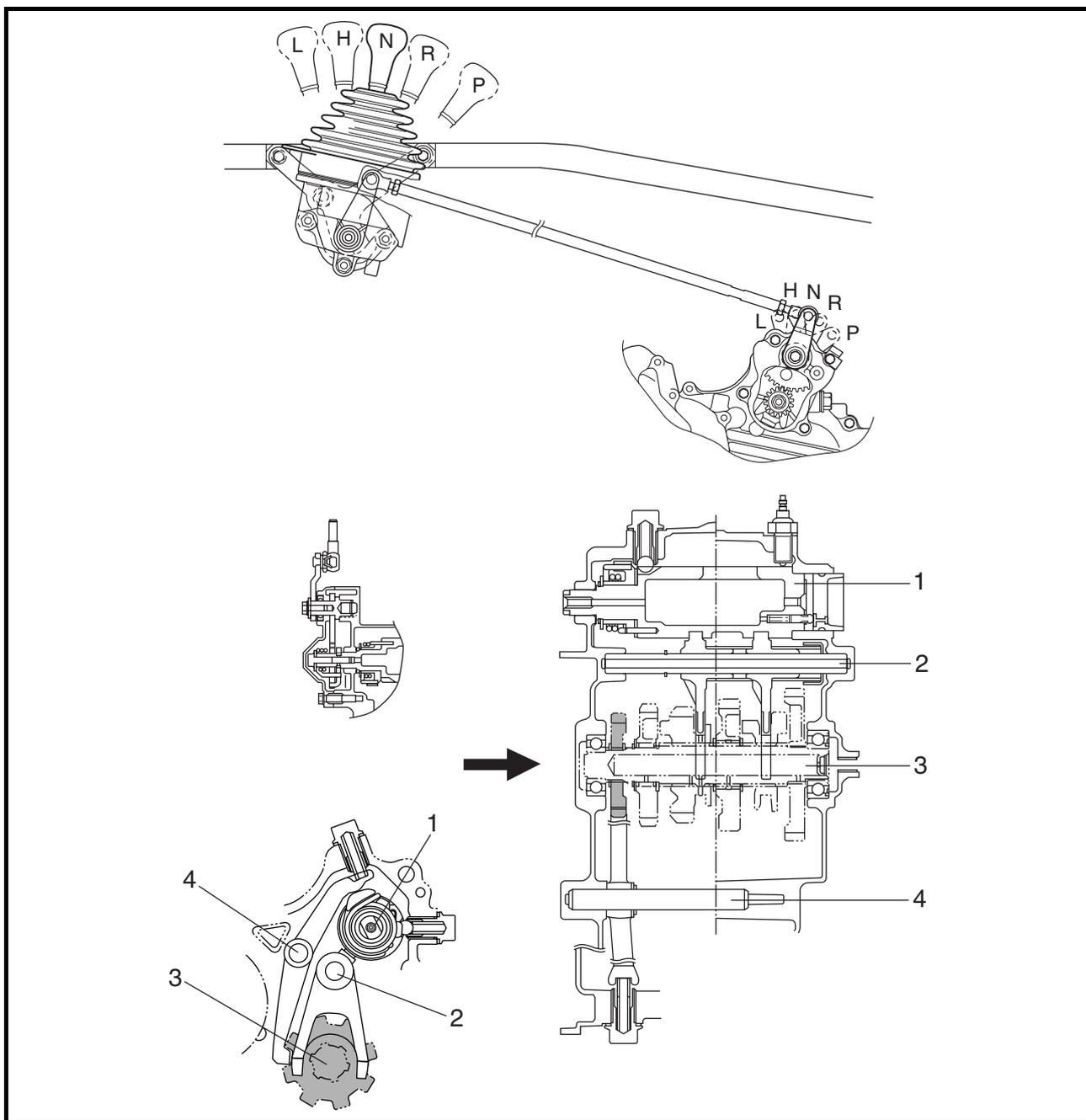
* Until the drive clutch and the differential case mesh together (i.e., the splines are unmeshed) the engine misfires to control the engine speed. During this time, the differential gear lock indicator light in the speedometer unit continues to flash.



Shift mechanism

A new shift mechanism with a parking position has been added to the YFM660F.

- 1.Shift cam
- 2.Shift fork guide bar
- 3.Drive axle
- 4.Stopper lever shaft



Parking**(1) L (Low), H (High), N (Neutral), and R (Reverse) positions**

The end of the stopper lever is held by the return spring ①. Then, the stopper lever tab is separated from the drive axle stopper to free the drive axle.

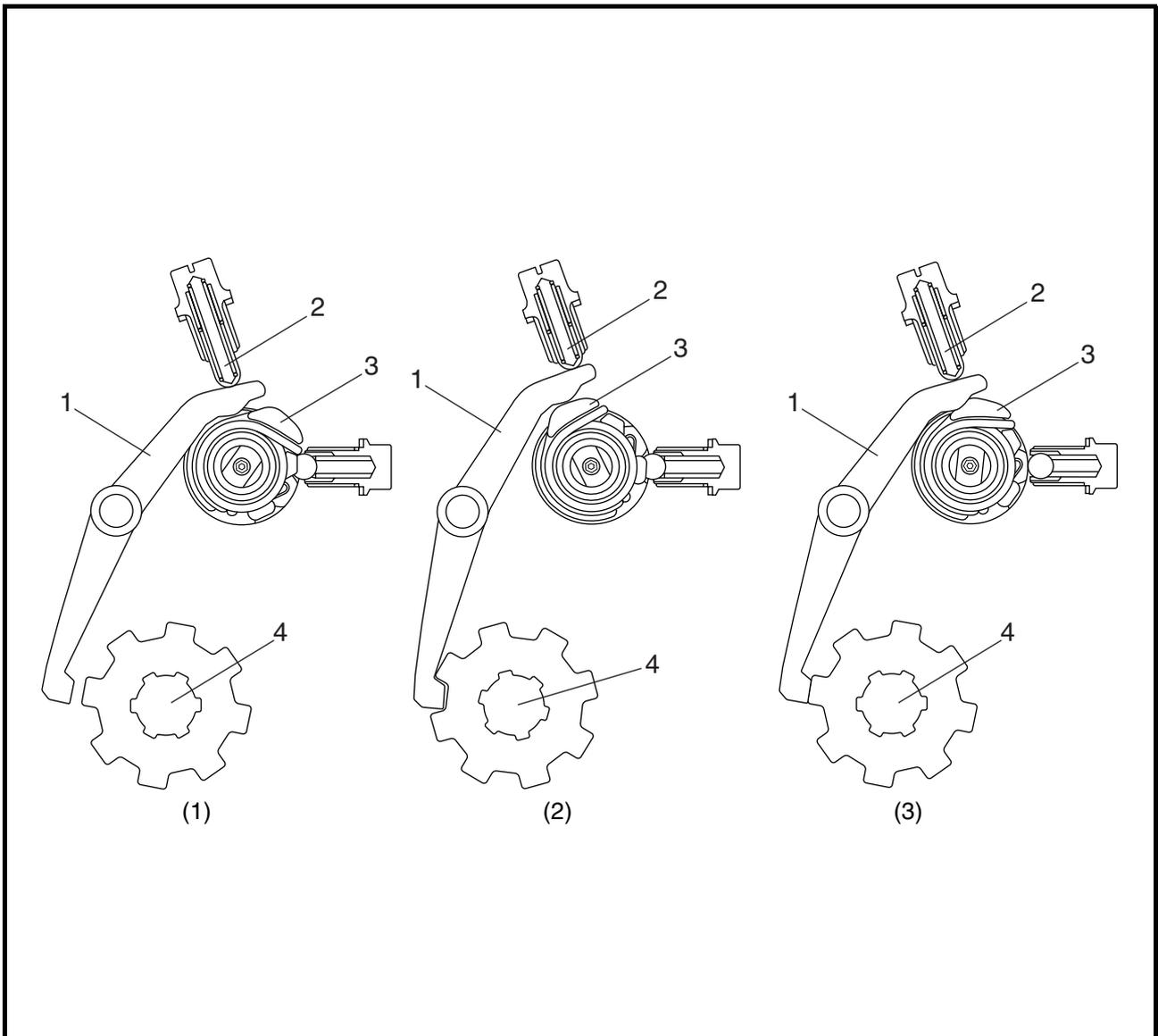
(2) P (Park) position

When the drive select lever is shifted to the "P" position, the cam lever of the shift cam pushes up on the end of the stopper lever. Then, the stopper lever tab pushes against the drive axle stopper to lock the drive axle.

(3) Not synchronized

If the stopper lever tab and the drive axle stopper are not synchronized, the torsion spring is compressed. As a result, the spring pushes the stopper lever tab against the drive axle stopper and waits until the synchronization is completed. When the stop lever tab and the drive axle are synchronized, the stop lever tab pushes against the drive axle stopper in order to lock the drive axle.

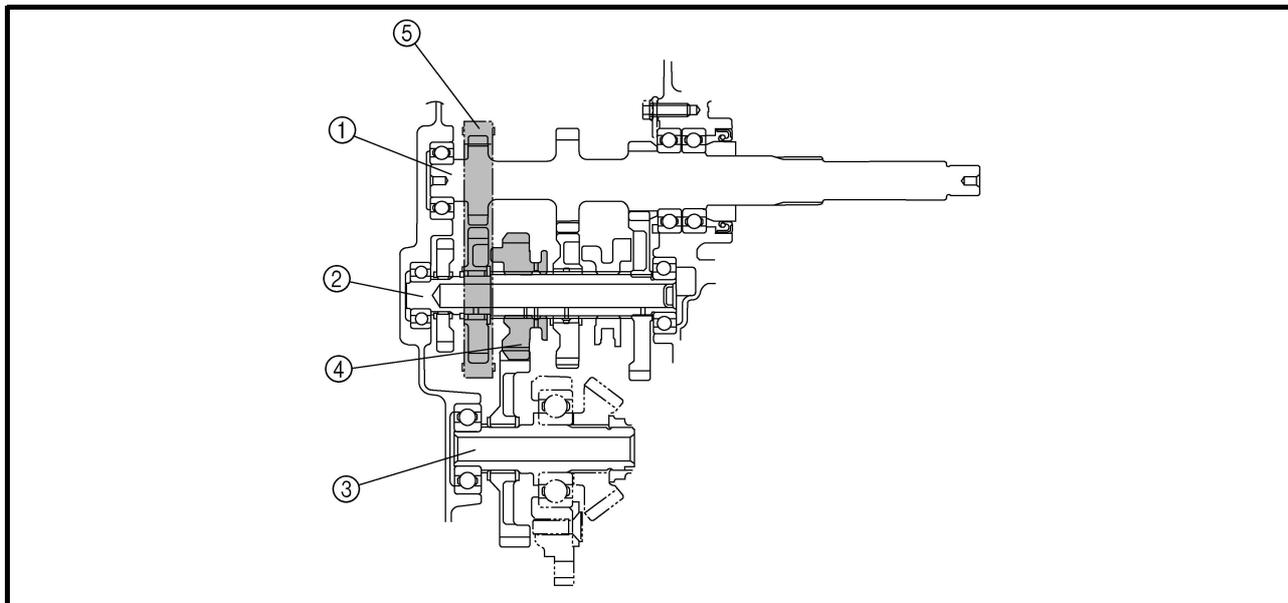
- 1 Stopper lever
- 2 Return spring
- 3 Shift cam
- 4 Drive axle



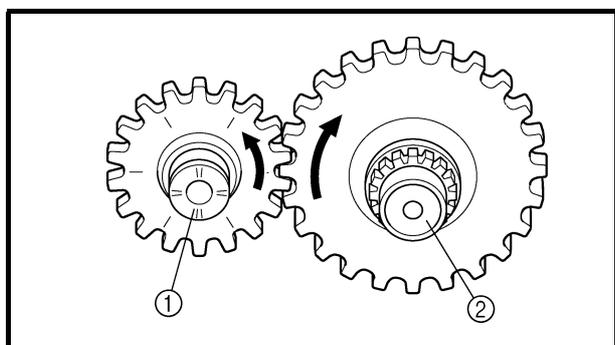
TRANSMISSION

To create a compact, 3-axle transmission, a chain drive has been adopted for the reverse transmission.

- ① Secondary shaft
- ② Drive axle
- ③ Middle drive shaft
- ④ Low wheel gear
- ⑤ Chain

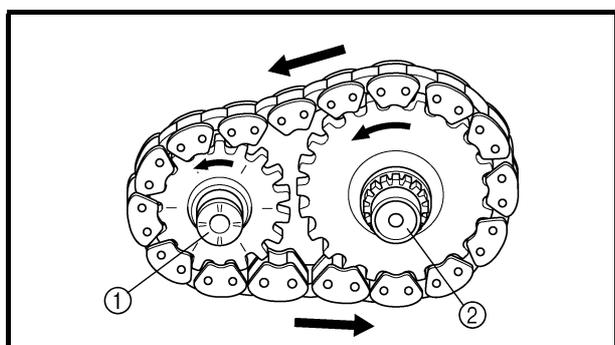


- ① Secondary shaft
- ② Drive axle



L (Low) or H (High) mode

When the transmission is in either the low or high mode, the drive axle is driven via the secondary shaft and gear. Therefore, the rotation of the drive axle is the opposite of the secondary shaft.



R (Reverse) mode

When the transmission is in the reverse mode, the drive axle is driven via the drive chain. Therefore, the rotation of the drive axle is the same as the secondary shaft. (As a result, the rotation of the drive axle is opposite to that of the low and high modes.)



EB101000

IMPORTANT INFORMATION PREPARATION FOR REMOVAL PROCEDURES

1. Remove all dirt, mud, dust and foreign material before removal and disassembly.
2. Use proper tools and cleaning equipment. Refer to the "SPECIAL TOOLS" section.
3. When disassembling the machine, always keep mated parts together. This includes gears, cylinder, piston and other parts that have been "mated" through normal wear. Mated parts must always be reused or replaced as an assembly.
4. During machine disassembly, clean all 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.

EB101010

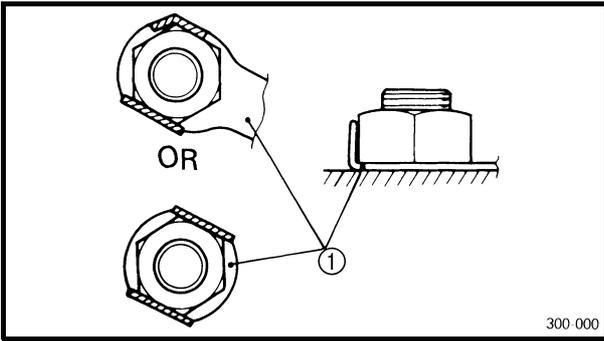
REPLACEMENT PARTS

1. 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.

EB101020

GASKETS, OIL SEALS AND O-RINGS

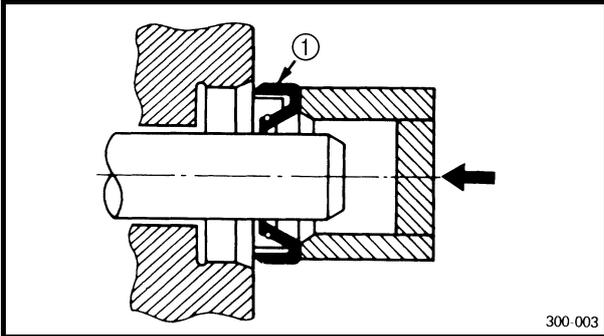
1. Replace all gaskets, seals and O-rings when overhauling the engine. All gasket surfaces, oil seal lips and O-rings must be cleaned.
2. Properly oil all mating parts and bearings during reassembly. Apply grease to the oil seal lips.



EB101030

LOCK WASHERS/PLATES AND COTTER PINS

1. Replace all lock washers/plates ① and cotter pins after removal. Bend lock tabs along the bolt or nut flats after the bolt or nut has been tightened to specification.



EB101040

BEARINGS AND OIL SEALS

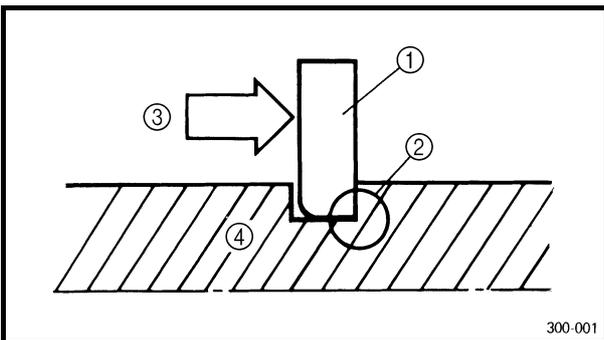
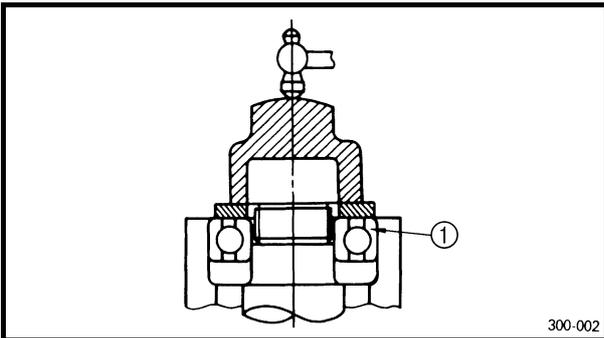
1. Install bearings and oil seals so that the manufacturer's marks or numbers are visible. When installing oil seals, apply a light coating of lightweight lithium base grease to the seal lips. Oil bearings liberally when installing, if appropriate.

① Oil seal

CAUTION:

Do not use compressed air to spin the bearings dry. This will damage the bearing surfaces.

① Bearing

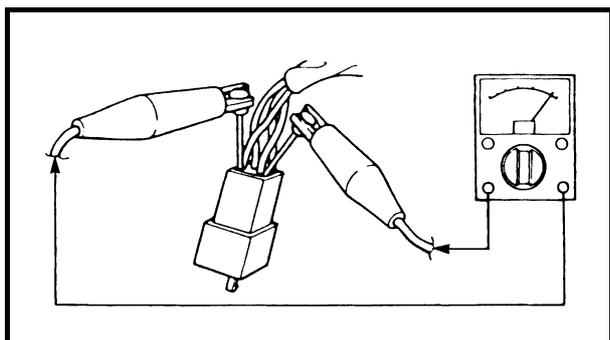
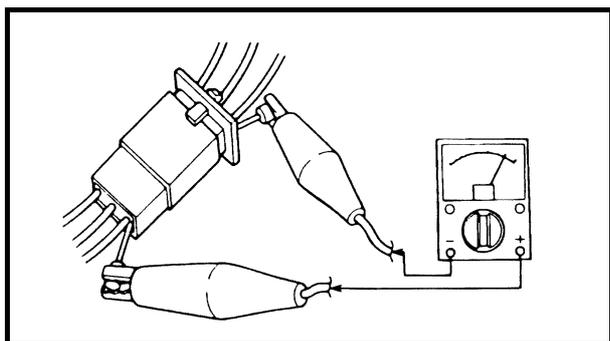
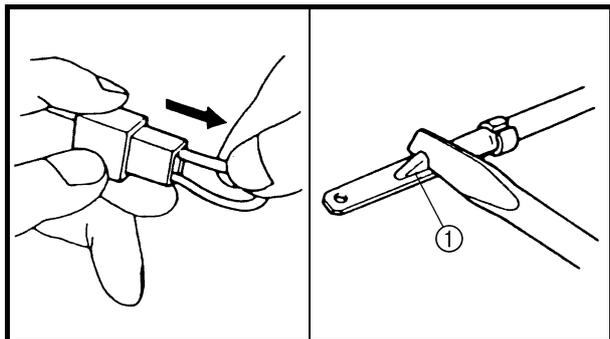
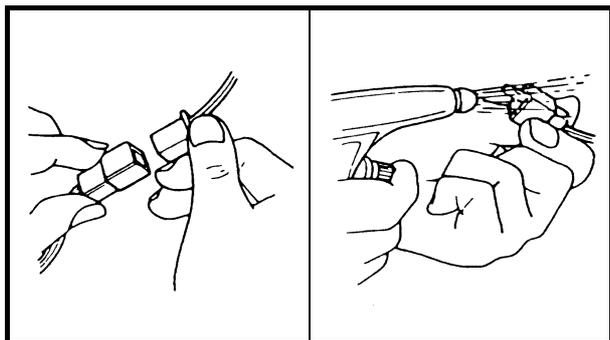


EB101050

CIRCLIPS

1. Check all circlips carefully before reassembly. Always replace piston pin clips after one use. Replace distorted circlips. When installing a circlip ①, make sure that the sharp-edged corner ② is positioned opposite the thrust ③ it receives. See sectional view.

④ Shaft



EB801000

CHECKING OF CONNECTIONS

Check the connectors for stains, rust, moisture, etc.

1. Disconnect:

- Connector

2. Check:

- Connector

Moisture → Dry each terminal with an air blower.

Stains/rust → Connect and disconnect the terminals several times.

3. Check:

- Connector leads

Looseness → Bend up the pin ① and connect the terminals.

4. Connect:

- Connector terminals

NOTE:

The two terminals “click” together.

5. Check:

- Continuity (using a pocket tester)

NOTE:

- If there is no continuity, clean the terminals.
- When checking the wire harness be sure to perform steps 1 to 3.
- As a quick remedy, use a contact revitalizer available at most part stores.
- Check the connector with a pocket tester as shown.

EB102001

SPECIAL TOOLS

The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools; this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools may differ by shape and part number from country to country. In such a case, two types are provided.

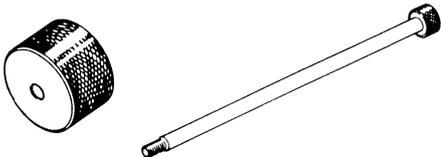
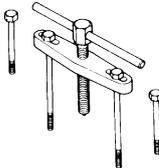
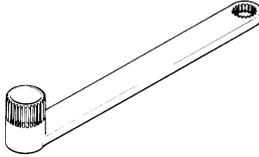
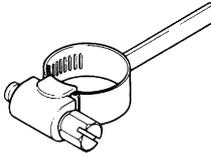
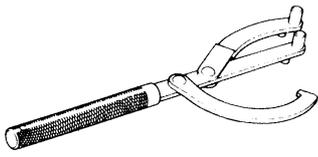
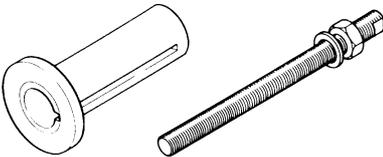
When placing an order, refer to the list provided below to avoid any mistakes.

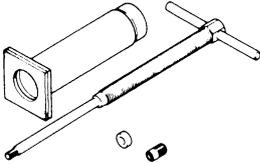
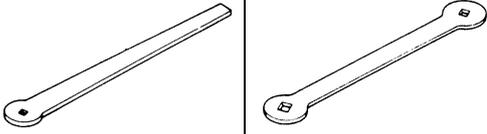
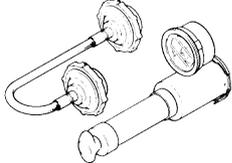
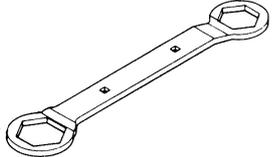
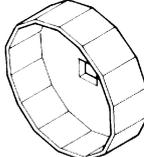
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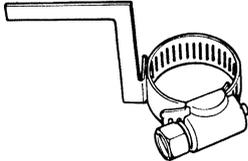
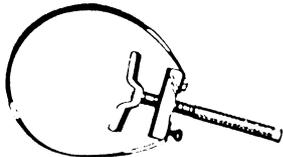
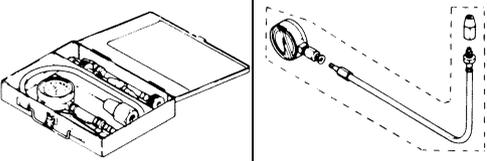
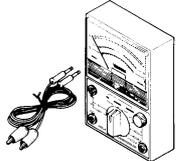
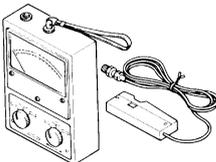
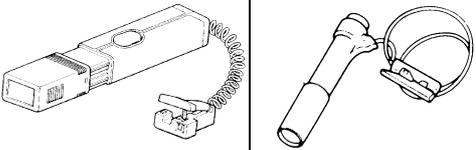
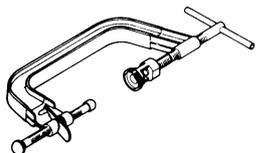
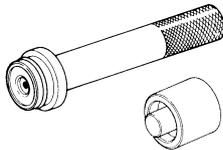
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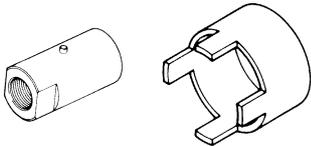
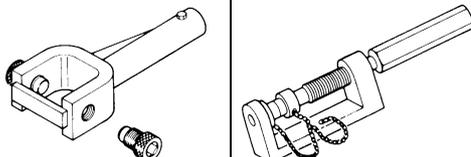
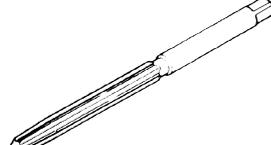
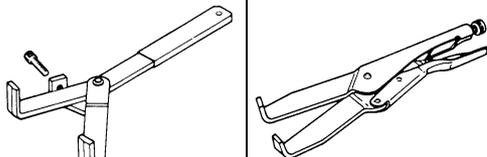
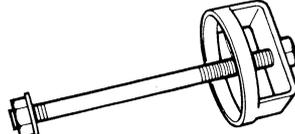
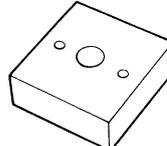
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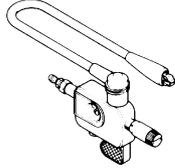
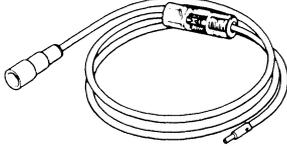
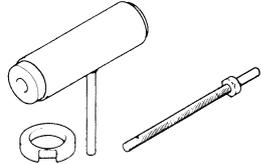
Tool No.	Tool name/How to use	Illustration
90890-01309	Spacer This tool is used to install the crankshaft.	
Bolt 90890-01083 Weight 90890-01084 Set YU-01083-A	Slide hammer bolt (M6)/weight/set These tools are used to remove the rocker arm shaft.	
90890-01135 YU-01135-A	Crankcase separating tool This tool is used to separate the crankcase.	
90890-01229 YM-01230	Coupling gear/middle shaft tool This tool is needed when removing or installing the coupling gear nut.	
90890-01231 YM-01231	Gear lash measurement tool This tool is used to removing or installing the coupling gear nut.	
90890-01235 YU-01235	Rotor holding tool This tool is needed to hold the starter puller when removing/installing the starter puller bolt or camshaft sprocket bolts.	
Pot 90890-01274 Bolt 90890-01275	Crankshaft installer pot Crankshaft installer bolt These tools are used to install the crankshaft.	

Tool No.	Tool name/How to use	Illustration
90890-01304 YU-01304	Piston pin puller This tool is used to remove the piston pin.	
90890-01311 YU-08035	Tappet adjusting tool (3 mm) This tool is necessary for adjusting the valve clearance.	
90890-01312 YM-01312-A	Fuel level gauge This gauge is used to measure the fuel level in the float chamber.	
90890-01325 YU-24460-01	Radiator cap tester This tool is used to check the cooling system.	
90890-01327 YM-01327	Damper rod holder (30 mm) This tool is needed to loosen and tighten the steering stem bearing retainer.	
90890-01348	Locknut wrench This tool is needed when removing or installing the secondary sheave spring.	
90890-01352 YU-33984	Radiator cap tester adapter This tool is used to check the cooling system.	
90890-01404 YM-01404	Flywheel puller These tools are needed to remove the rotor.	
90890-01426 YU-38411	Oil filter wrench This tool is needed to loosen or tighten the oil filter cartridge.	

Tool No.	Tool name/How to use	Illustration
90890-01430 YM-38404	Ring nut wrench This tool is needed to removing and installing the middle driven shaft bearing retainer.	
90890-01467 YM-01467	Gear lash measurement tool This tool is used to measure the gear lash.	
90890-01701 YU-01880	Sheave holder This tool is needed to hold the primary sheave when removing or installing the sheave bolts.	
Set 90890-03081 YU-33223 Adapter 90890-04082 YU-33223-3	Compression gauge Adapter (Compression gauge) These tools are needed to measure engine compression.	
90890-03112 YU-03112	Pocket tester This instrument is needed for checking the electrical system.	
90890-03113	Engine tachometer This tool is needed for observing engine rpm.	
90890-03141 YM-33277-A	Timing light This tool is necessary for checking ignition timing.	
Compressor 90890-04019 YM-04019 Attachment 90890-01243	Valve spring compressor Valve spring compressor attachment This tool is needed to remove and install the valve assemblies.	
Middle driven shaft bearing driver 90890-04058 YM-04058-1 Mechanical seal installer 90890-04078 YM-33221	Middle driven shaft bearing driver Mechanical seal installer These tools are used to install the water pump seal.	

Tool No.	Tool name/How to use	Illustration
Adapter 90890-04059 YM-90069 Spacer 90890-04081 YM-91044	Adapter Spacer (crankshaft installer) These tools are used to install the crankshaft.	
90890-04062 YM-04062	Universal joint holder This tool is needed when removing or installing the universal joint yoke nut.	
90890-04064 YM-04064-A	Valve guide remover (ø 6) This tool is needed to remove and install the valve guide.	
90890-04065 YM-04065-A	Valve guide installer (ø 6) This tool is needed to install the valve guide.	
90890-04066 YM-04066	Valve guide reamer (ø 6) This tool is needed to rebores the new valve guide.	
90890-04086 YM-91042	Universal clutch holder This tool is needed to hold the clutch carrier when removing or installing the carrier nut.	
90890-04128 YM-04128	Bearing retainer wrench This tool is needed when removing or installing the middle driven pinion gear bearing retainer.	
90890-04134 YM-04134	Sheave spring compressor This tool is needed when removing or installing the secondary sheave spring.	
90890-04135 YM-04135	Sheave fixed block This tool is needed when removing or installing the secondary sheave spring.	



Tool No.	Tool name/How to use	Illustration
90890-06754	Ignition checker This instrument is necessary for checking the ignition system components.	
Bond 90890-85505 Sealant ACC-11001-05-01	Yamaha bond No. 1215 Sealant (Quick Gasket®) This sealant (bond) is used on crankcase mating surfaces, etc.	
YM-34487	Dynamic spark tester This instrument is necessary for checking the ignition system components.	
YU-8036-A	Inductive tachometer This tool is needed for observing engine rpm.	
YU-90050	Crankshaft installer set These tools are used to install the crankshaft.	

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