













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SERVICE MANUAL

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⚠ Safety while working

To prevent an accident or injury and to provide quality service, observe the following safety procedures.

Rotating part

- Hands, feet, hair, jewelry, clothing, personal flotation device straps, and so on, can become entangled with internal rotating parts of the engine, resulting in serious injury or death.
- Keep the top cowling installed whenever possible. Do not remove or install the top cowling when the engine is running.
- Only operate the engine with the top cowling removed according to the specific instructions in the manual. Keep hands, feet, hair, jewelry, clothing, personal flotation device straps, and so on, away from any exposed moving parts.

Hot part

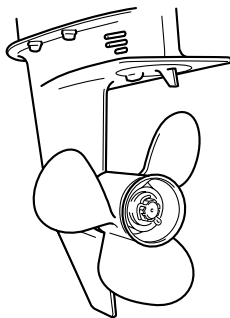
During and after operation, engine parts are hot enough to cause burns. Do not touch any parts under the top cowling until the engine has cooled.

Electric shock

Do not touch any electrical parts while starting or operating the engine. Otherwise, shock or electrocution could result.

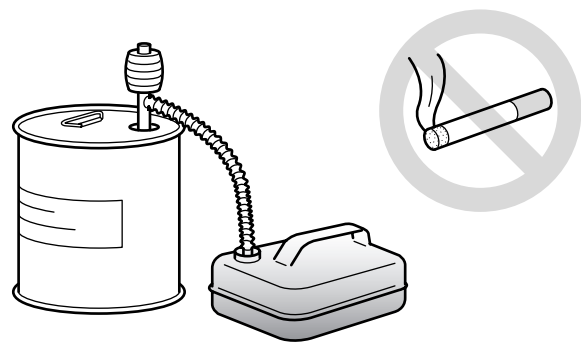
Propeller

Do not hold the propeller with your hands when loosening or tightening the propeller nut.



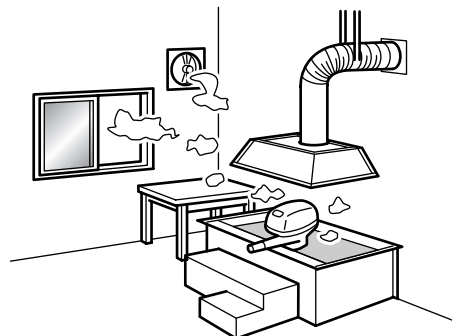
Handling of gasoline

- Gasoline is highly flammable. Keep gasoline and all flammable products away from heat, sparks, and open flames.
- Gasoline is poisonous and can cause injury or death. Handle gasoline with care. Never siphon gasoline by mouth. If you swallow some gasoline, inhale a lot of gasoline vapor, or get some gasoline in your eyes, see your doctor immediately. If gasoline spills on your skin, wash with soap and water. If gasoline spills on your clothing, change your clothes.



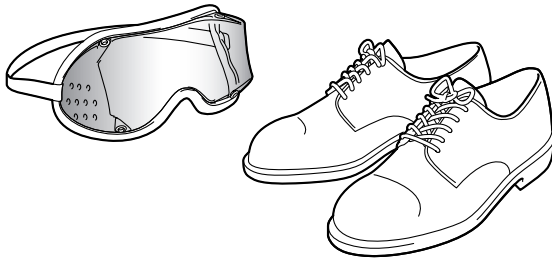
Ventilation

- Gasoline vapor and exhaust gas are heavier than air and extremely poisonous. If gasoline vapor or exhaust gas is inhaled in large quantities, it may cause loss of consciousness and death within a short time.
- When test running an engine indoors (for example, in a water tank) make sure to do so where adequate ventilation can be maintained.



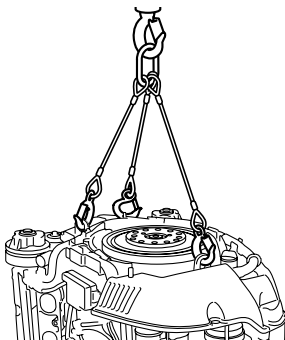
Self-protection

- Protect your eyes by wearing safety glasses or safety goggles during all operations involving drilling and grinding, or when using an air compressor.
- Protect your hands and feet by wearing protective gloves and safety shoes when necessary.



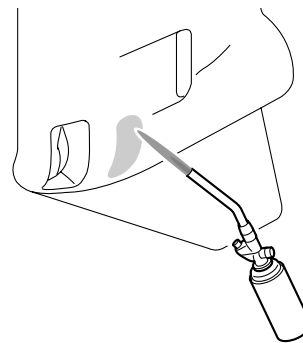
Working with crane

- Outboard motors weighing 18.0 kg (39.7 lb) and over must be carried by a crane.
- Use the wire ropes of adequate strength, and lift up the outboard motor using the three point suspension.
- If the outboard motor does not have three or more points to be suspended, support it using additional ropes or the like so that the outboard motor can be lifted and carried in a stable manner.



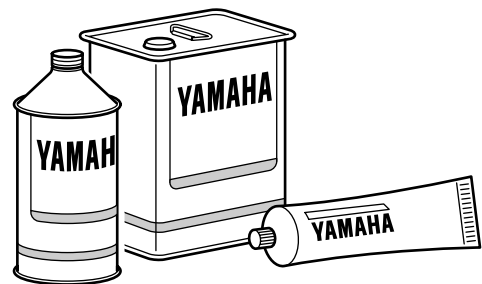
Handling of gas torch

- Improper handling of a gas torch may result in burns. For information on the proper handling of the gas torch, see the operation manual issued by the manufacturer.
- When using a gas torch, keep it away from the gasoline and oil, to prevent a fire.
- Components become hot enough to cause burns. Do not touch any hot components directly.



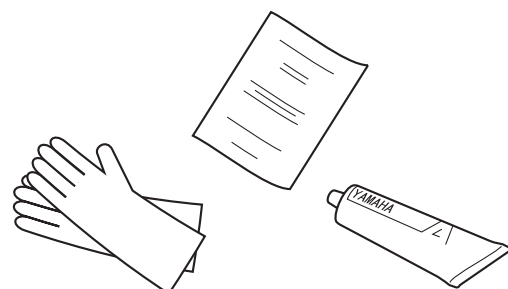
Part, lubricant, and sealant

Use only genuine Yamaha parts, lubricants, and sealants, or those recommended by Yamaha, when servicing or repairing the outboard motor.



Handling of sealant

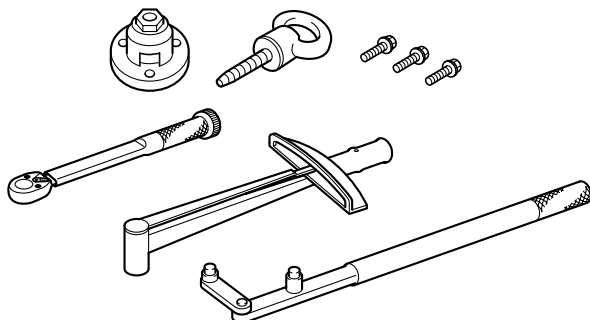
- Wear protective gloves to protect your skin, when using the sealants.
- See the material safety data sheet issued by the manufacturer. Some of the sealants may be harmful to human health.





Special service tool

Use the recommended special service tools to work safely, and to protect parts from damage.

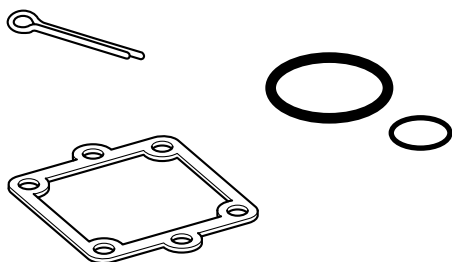


Tightening torque

Follow the tightening torque specifications provided throughout the manual. When tightening nuts, bolts, and screws, tighten the large sizes first, and tighten fasteners starting in the center and moving outward.

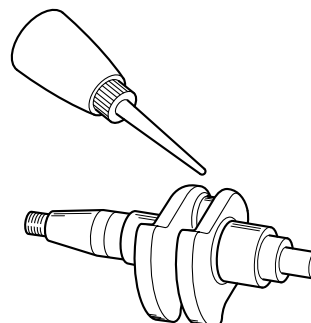
Non-reusable part

Always use new gaskets, seals, O-rings, cotter pins, and so on, when installing or assembling parts.



Disassembly and assembly

- Use compressed air to remove dust and dirt during disassembly.
- Apply engine oil to the contact surfaces of moving parts before assembly.



- Install bearings so that the bearing identification mark is facing in the direction indicated in the installation procedure. In addition, make sure to lubricate the bearings liberally.
- Apply a thin coat of water resistant grease to the lip and periphery of an oil seal before installation.
- Check that moving parts operate normally after assembly.

How to use this manual

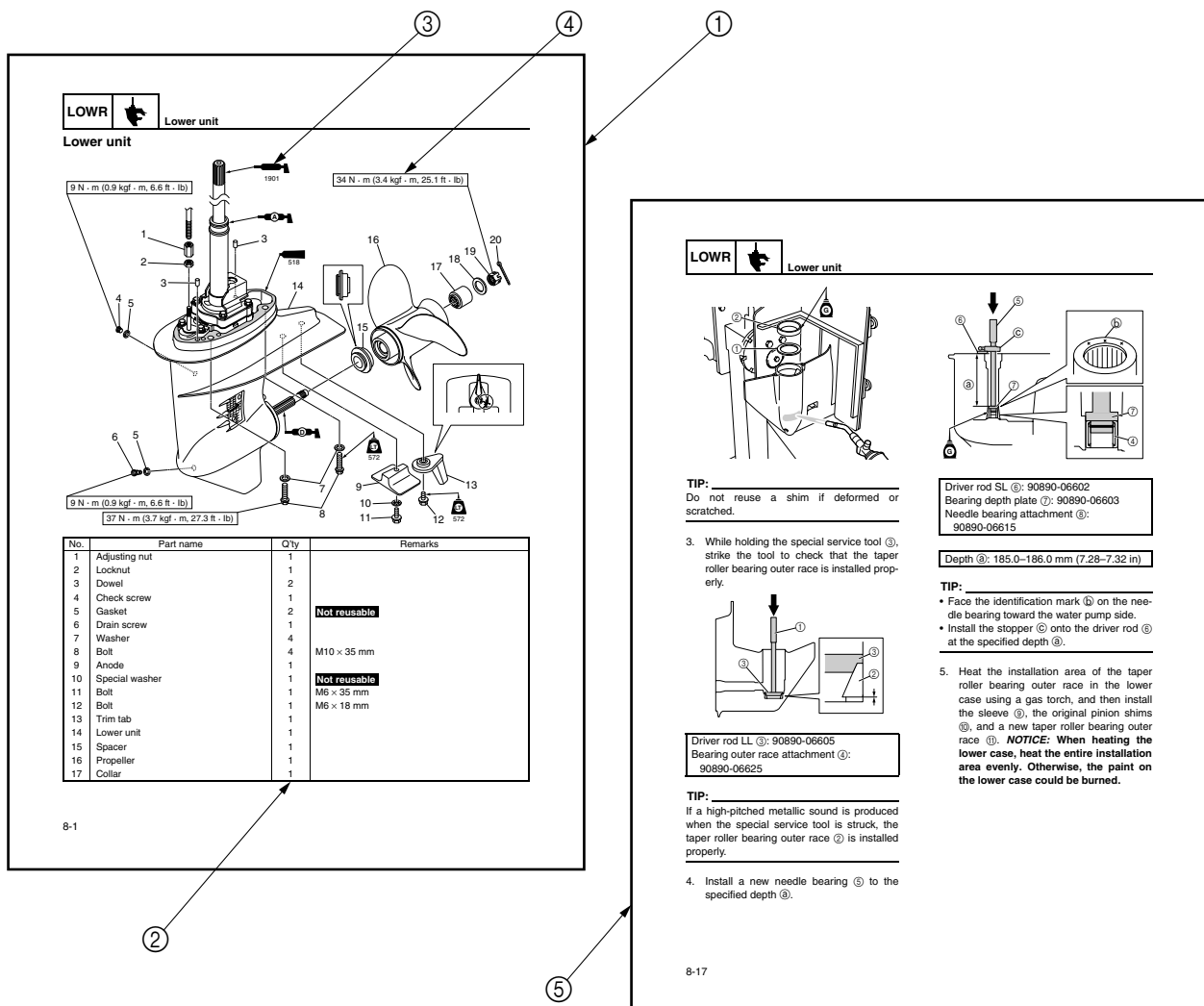
Manual format

The format of this manual has been designed to make service procedures clear and easy to understand. Use the following information as a guide for effective and quality service.

- Parts are shown and detailed in an exploded diagram and are listed in the component list (see ① in the following figure for an example page).
- The component list consists of part names and quantities, as well as bolt and screw dimensions (see ② in the following figure).
- Symbols are used to indicate important aspects of a procedure, such as the grade of lubricant and the lubrication points (see ③ in the following figure).
- Tightening torque specifications are provided in the exploded diagrams (see ④ in the following figure), and in the related detailed instructions. Some torque specifications are listed in stages as torque figures or angles in degrees.
- Separate procedures and illustrations are used to explain the details of removal, checking, and installation where necessary (see ⑤ in the following figure for an example page).

TIP:

For troubleshooting procedures, see Chapter 4, "Troubleshooting."





Abbreviation








The following abbreviations are used in this service manual.

Abbreviation	Description
ABYC	American Boat and Yacht Council
API	American Petroleum Institute
ATDC	After Top Dead Center
BTDC	Before Top Dead Center
CARB	California Air Resources Board
CCA	Cold Cranking Ampere
CDI	Capacitor Discharge Ignition
C/L	Centerline
EX	Exhaust
EPA	Environmental Protection Agency
F	Forward
IN	Intake
LED	Light-Emitting Diode
MCA	Marine Cranking Ampere
N	Neutral
PON	Pump Octane Number = (RON + Motor Octane Number) /2
PORT	Port side
PTT	Power Trim and Tilt
R	Reverse
RC	Reserve Capacity
SAE	Society of Automotive Engineers
SOHC	Single Overhead Camshaft
STBD	Starboard side
TDC	Top Dead Center






Lubricant, sealant, and thread locking agent





Symbol

Symbols in an exploded diagram or illustration indicate the grade of lubricant and the lubrication points.

Symbol	Name	Application
	Yamaha 4-stroke motor oil	Lubricant
	Gear oil	Lubricant
	Water resistant grease (Yamaha grease A)	Lubricant
	Molybdenum disulfide grease	Lubricant
	Corrosion resistant grease (Yamaha grease D)	Lubricant
	Low temperature resistant grease (Yamaha grease C)	Lubricant
	ThreeBond 1901	Lubricant

Symbols in an exploded diagram or illustration indicate the type of sealant or thread locking agent and the application points.

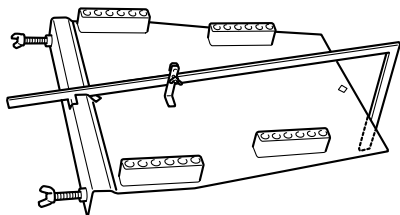
Symbol	Name	Application
	LOCTITE 518	Sealant
	ThreeBond 1322	Sealant
	ThreeBond 1377B	Sealant
	ThreeBond 1401	Thread locking agent
	LOCTITE 271 (red)	Thread locking agent

GEN INFO		General information	
Symbol	Name	Application	
	LOCTITE 242 (blue)	Thread locking agent	
	LOCTITE 572 (white)	Sealant	
	Silicone sealant	Sealant	

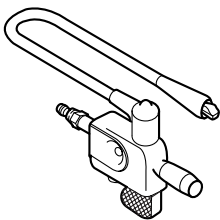
Special service tool

For U.S.A. and Canada
Special service tools with part numbers “YB-*****” are distributed by K & L.
Special service tools with Yamaha part numbers (90890-*****) are distributed by the Parts Division.

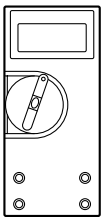
Drilling plate
90890-06783



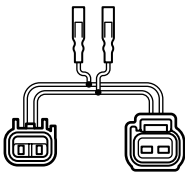
Spark checker
YM-34487



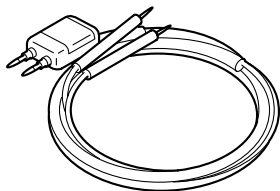
Digital multimeter
YU-34899-A



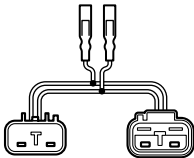
Test harness (2 pins)
YB-06867



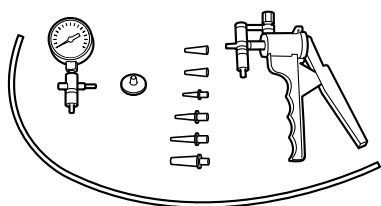
Peak volt adapter
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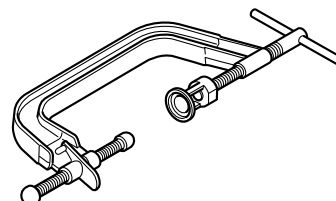
Test harness (2 pins)
YB-06887



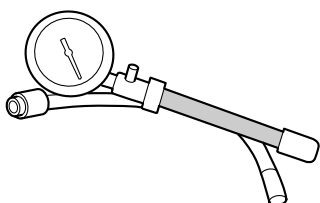
Pressure/vacuum tester
YB-35956-A



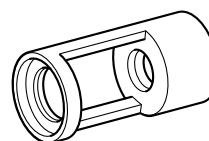
Valve spring compressor
YM-04019



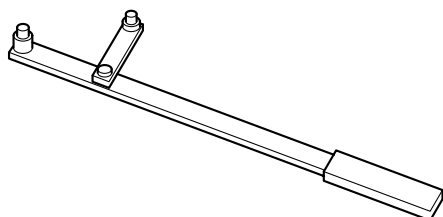
Compression gauge
YU-33223



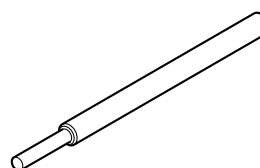
Valve attachment
YB-06320



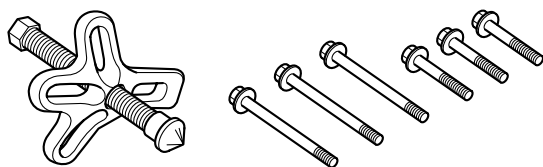
Flywheel magnet holder
YB-06139



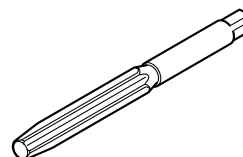
Valve guide remover
YB-06801



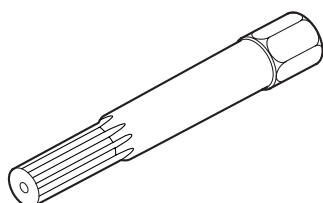
Universal puller
YB-06117



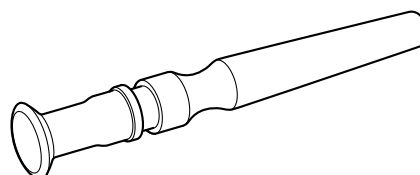
Valve guide reamer
YM-01196



Crankshaft holder
YW-06355

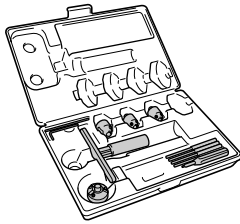


Valve lapping tool
YM-A8998

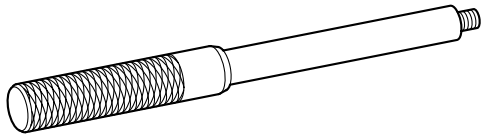




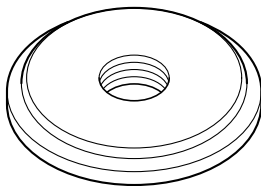
**Neway valve seat kit
YB-91044**



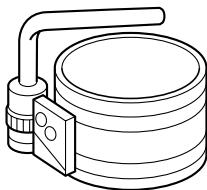
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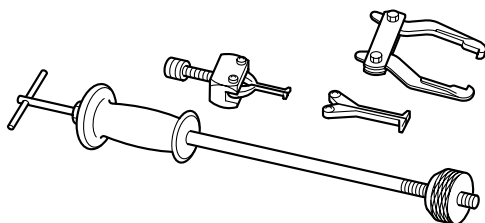
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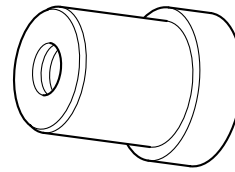
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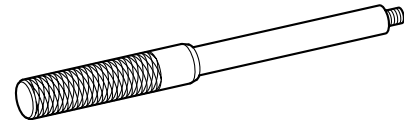
**Slide hammer
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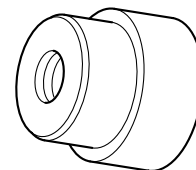
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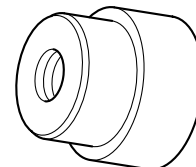
**Driver handle (small)
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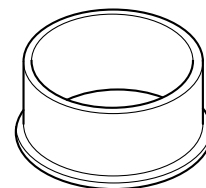
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remover/installer
YB-06082**



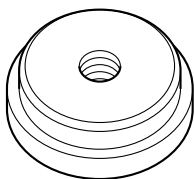
**Driveshaft needle bearing installer and
remover
YB-06196**



**Bearing inner race attachment
90890-06640**



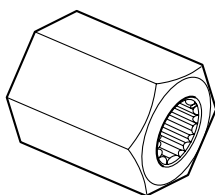
**Forward gear outer race installer
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**Oil seal installer
YB-06023**



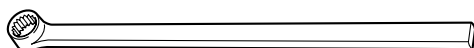
**Driveshaft holder
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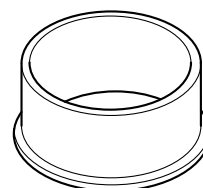
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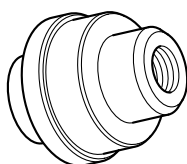
**Pinion nut wrench
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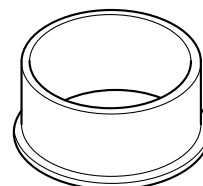
**Bearing inner race attachment
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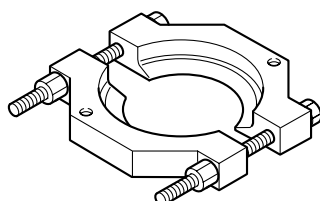
**Oil seal installer
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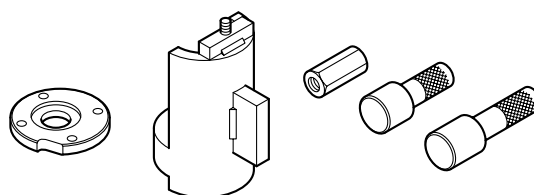
**Bearing inner race attachment
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**Bearing splitter plate
YB-06219**

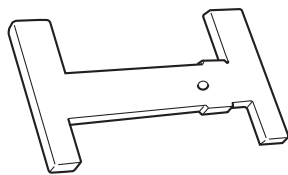


**Pinion shim selecting tool
YB-34432-10, YB-34432-11A, YB-34432-16,
YB-34432-17**

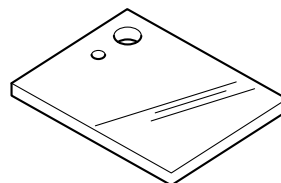




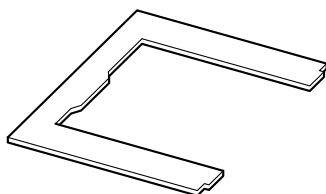
**Forward gear shim gauge
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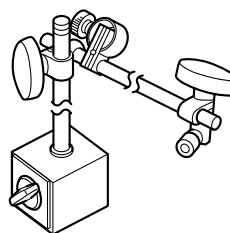
**Backlash adjustment plate
YB-07003**



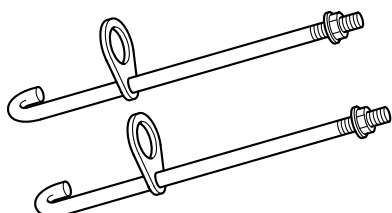
**Reverse gear shim gauge
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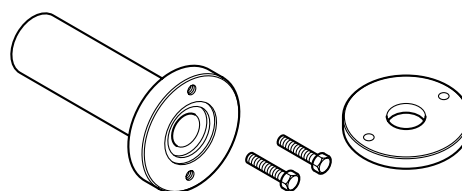
**Magnetic base stand
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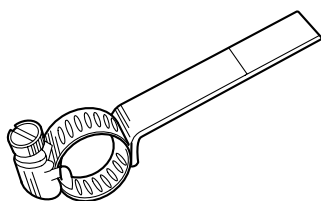
**Bearing housing puller
YB-06234**



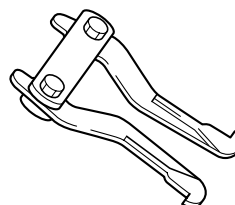
**Pinion height gauge
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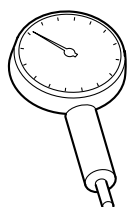
**Backlash indicator rod
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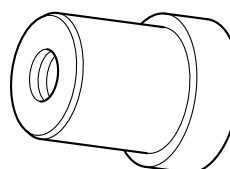
**Bearing puller legs
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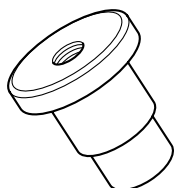
**Dial indicator gauge
YU-03097**



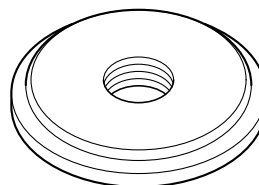
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YB-06112**



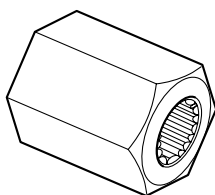
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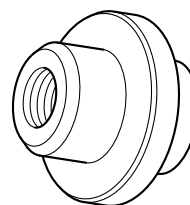
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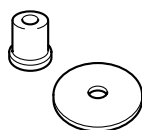
**Driveshaft holder
YB-06079**



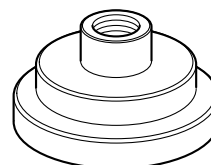
**Forward gear bearing installer
YB-06270-A**



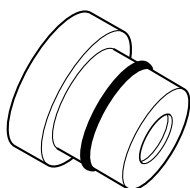
**Roller bearing installer/remover
YB-06432**



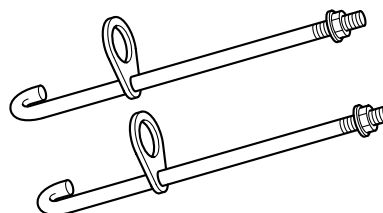
**Bearing installer-reverse gear bearing
YB-06016**



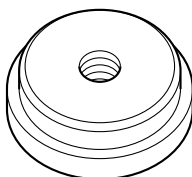
**Driveshaft needle bearing
remover/installer
YB-06063**



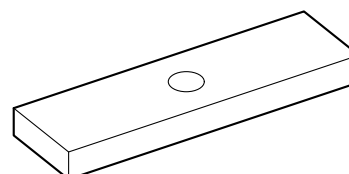
**Bearing housing puller
YB-06207**

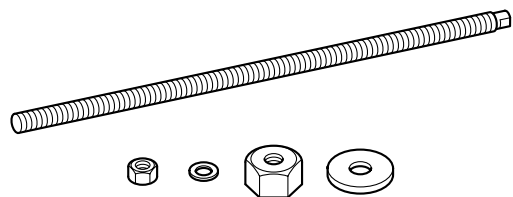
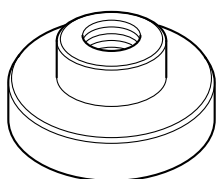
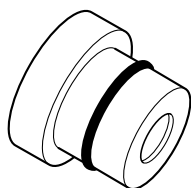
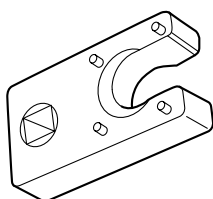
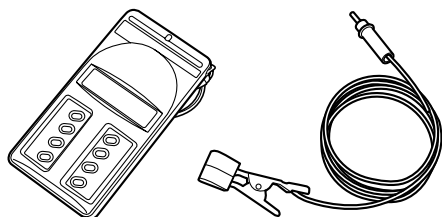


**Forward gear outer race installer
YB-41446**



**Reverse gear bearing remover
YB-41707**



**Pinion gear bushing installer
YB-06029-4****Crankshaft seal installer
YB-06349****Driveshaft needle bearing installer and
remover
YB-06230****Trim/cylinder wrench
YB-06175-2B****Digital tachometer
YU-39951-B**

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