

Disassembly—Introduction

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INTRODUCTION TO DISASSEMBLY

Detail has not been spared in this section in order that the motorcycle can not only be taken apart but also back together properly as well. Photographs, diagrams, notes, cautions, warnings, and detailed descriptions have been included wherever necessary. Nevertheless, even a detailed account has limitations; a certain amount of basic knowledge is also required for successful work.

Especially note the following:

- (1) **Edges**
Watch for sharp edges, especially during major engine disassembly and assembly. Protect your hands with gloves or a piece of thick cloth when lifting the engine or turning it over.
- (2) **Dirt**
Before removal and disassembly, clean the motorcycle. Any dirt entering the engine, carburetor or other parts will work as an abrasive and shorten the life of the motorcycle. For the same reason, before installing a new part, clean off any dust or metal fillings.
- (3) **Tightening Sequence**
Where there is a tightening sequence indication in this Service Manual; the bolts, nuts, or screws must be tightened in the order and method indicated. When installing a part with several bolts, nuts, or screws; they should all be started in their holes and tightened to a snug fit. Then tighten them evenly, according to the tightening sequence, to the specified torque. This is to avoid distortion of the part and/or causing gas or oil leakage. Conversely when loosening the bolts, nuts, or screws; loosen all of them about a quarter of turn and then remove them.
- (4) **Torque**
The torque values given in this Service Manual should always be adhered to. Either too little or too much torque may lead to serious damage. Use a good quality, reliable torque wrench.
- (5) **Force**
Common sense should dictate how much force is necessary in assembly and disassembly. If a part seems especially difficult to remove or install, stop and examine what may be causing the problem. Whenever tapping is necessary, tap lightly using a wooden or plastic-faced mallet. Use an impact driver for screws (particularly for the removal of screws held by a locking agent) in order to avoid damaging the screw heads.
- (6) **Lubricant**
Don't use just any oil or grease. Some oils and greases in particular should be used only in certain applications and may be harmful if used in an application for which they are not intended.
- (7) **Battery Ground**
Before performing any disassembly operations on the motorcycle, remove the ground (—) lead from the battery to prevent the possibility of accidentally turning the engine over while partially disassembled.
- (8) **Engine Rotation**
When turning the crankshaft by hand, always turn it in the direction of normal rotation; which is counterclockwise, viewed from the right side of the engine. This will ensure proper adjustments.
- (9) **Lubrication**
Engine wear is generally at its maximum while the engine is warming up and before all the rubbing surfaces have an adequate lubricative film. During assembly, oil or grease (whichever is more suitable) should be applied to any rubbing surface which has lost its lubricative film. Old grease and dirty oil should be cleaned off. Deteriorated grease has lost its lubricative quality and may contain abrasive foreign particles.
- (10) **Press**
A part installed using a press or driver, such as a wheel bearing, should first be coated with oil on its outer or inner circumference so that it will go into place smoothly.
- (11) **Oil Seal, Grease Seal**
Replace any oil or grease seals that were removed with new ones, as removal generally damage seals. A seal guide is required for certain oil or grease seals during installation to avoid damage to the seal lips. Before a shaft passes through a seal, apply a little oil, preferably high temperature grease on the lips to reduce rubber to metal friction.
- (12) **Gasket, O Ring**
When in doubt as to the condition of a gasket or O ring, replace it with a new one. The mating surfaces around the gasket should be free of foreign matter and perfectly smooth to avoid oil or compression leaks.

(13) Liquid Gasket, Non-permanent Locking Agent

Follow manufacturer's directions for cleaning and preparing surfaces where these compounds will be used. Apply sparingly. Excessive amounts may block engine oil passages and cause serious damage. An example of a non-permanent locking agent commonly available in North America is Loctite Lock'n Seal (Blue).

(14) Ball Bearing, Oil Seal, Grease Seal Installation

When installing a ball bearing, the bearing race which is affected by friction should be pushed by a suitable driver. This prevents severe stress on the balls and races, and prevents races and balls from being dented. Press a ball bearing until it stops at the stop in the hole or on the shaft. Seals should be pressed into place using a suitable driver, which contacts evenly with the side of the seal until the face of the seal is even with the end of the hole.

(15) Circlip, Retaining Ring

Replace any circlips and retaining rings that were removed with new ones, as removal weakens and deforms them. When installing circlips and retaining rings, take care to compress or expand them only enough to install them and no more.

(16) High Flash-point Solvent

A high-flash point solvent is recommended to reduce fire danger. A commercial solvent commonly available in North America is Stoddard solvent (generic name). Always follow manufacturer and container directions regarding the use of any solvent.

(17) Molybdenum Disulfide (MoS_2) Grease

This manual makes reference to molybdenum disulfide grease in the assembly of certain engine and chassis parts. Always check manufacturer recommendations before using such special lubricants.

(18) Electrical Leads

All the electrical leads are either single-color or two-color and, with only a few exceptions, must be connected to leads of the same color. On any of the two-color leads there is a greater amount of one color and a lesser amount of a second color, so a two-color lead is identified by first the primary color and then the secondary color. For example, a yellow wire with thin red stripes is referred to as a "yellow/red" wire; it would be a "red/yellow" wire if the colors were reversed to make red the main color.

TORQUE AND LOCKING AGENT

Tighten all bolts and nuts to the proper torque using an accurate torque wrench. If insufficiently tightened, a bolt or nut may become damaged or fall off, possibly resulting in damage to the motor-cycle and injury to the rider. A bolt or nut which is overtightened may become damaged, strip an internal thread, or break and then fall out. The following table lists the tightening torque for the major bolts and nuts, and the parts requiring use of a non-permanent locking agent.

Parts marked with a cross (†) must be retorqued according to the Periodic Maintenance Chart (Pg. 10). One at a time, loosen each bolt or nut $\frac{1}{2}$ turn, then tighten it to the specified torque. Follow the sequence if specified. For engine fasteners, retorqued them when the engine is cold (at room temperature).

ENGINE

Part	Locking Agent (●) Required	Quantity	Metric (kg-m)	English (ft-lbs)	See Pg.
Air suction valve cover bolts $\phi 6$ P1.0	—	(8)	1.5	11.0	49,50
Alternator cover Allen bolt $\phi 6$ P1.0	●	(1)	—	—	76
Alternator rotor bolt $\phi 12$ P1.25	—	1	13.0	94	78,98
Alternator stator Allen bolts $\phi 5$ P0.8	●	3	1.0	87 in-lbs	76
Breather cover bolt $\phi 8$ P1.25	—	1	1.5	11.0	63

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Part	Locking Agent (●), Liquid Gasket (★) Required	Quantity	Metric (kg-m)	English (ft-lbs)	See Pg.
Camshaft cap bolts $\phi 6$ P1.0	—	16	1.7	12.0	12,52
Camshaft chain guide screw (front) $\phi 6$ P1.0	●	1	—	—	62
Camshaft chain guide sprocket Allen bolt $\phi 6$ P1.0	●	4	1.0	87 in-lbs	53,61
Camshaft sprocket bolts $\phi 6$ P1.0	●	6	1.5	11.0	54
Carburetor holder screws $\phi 6$ P1.0	●	8	—	—	61
Carburetor mounting screws $\phi 6$ P1.0	●	8	—	—	45
Clutch hub nut $\phi 20$ P1.5	—	1	12.0	87	83,97
Clutch release ball ramp mounting Allen bolts $\phi 6$ P1.0	—	2	1.0	87 in-lbs	73
Clutch spring Allen bolts $\phi 6$ P1.0	—	6	1.1	95 in-lbs	83,97
Crankcase bolts $\phi 6$ P1.0	● ★	22	1.0	87 in-lbs	97,99
$\phi 8$ P1.25	● ★	8	2.5	18.0	97
Crankshaft main bearing cap bolts $\phi 8$ P1.25	—	4	2.5	18.0	96,105
†Cylinder head bolts $\phi 6$ P1.0	—	2	1.2	104 in-lbs	55
nuts $\phi 10$ P1.25	—	12	4.0	29	55
Cylinder head cover bolts $\phi 6$ P1.0	—	(16)	1.5	11.0	50
Damper cam nut $\phi 14$ P1.5	—	1	12.0	87	73
Engine drain plug $\phi 20$ P1.5	—	1	3.0	22	20,84,90
†Engine mounting bolts (front) $\phi 10$ P1.25	—	1	4.0	29	92
(center) $\phi 12$ P1.25	—	2	4.0	29	92
(rear) $\phi 10$ P1.25	—	2	4.0	29	92
Engine mounting bracket bolts $\phi 8$ P1.25	—	8	2.4	17.5	92
Front bevel gear bearing housing Allen bolts $\phi 8$ P1.25	—	8	2.5	18.0	70,71
Front bevel drive gear nut $\phi 20$ P1.5	—	1	12.0	87	70,72
driven gear bolt $\phi 12$ P1.25	—	1	12.0	87	68
†Muffler exhaust pipe holder nuts $\phi 8$ P1.25	—	8	—	—	—
†Muffler rear mounting bolts $\phi 8$ P1.25	—	4	—	—	—
Neutral switch $\phi 12$ P1.5	—	1	1.5	11.0	63

Part	Locking Agent (●), Liquid Gasket (★) Required	Quantity	Metric (kg-m)	English (ft-lbs)	See Pg.
Oil filter mounting bolt $\phi 20$ P1.5	—	1	2.0	14.5	20,84,90
Oil pan bolts $\phi 6$ P1.0	—	17	1.0	87 in-lbs	85,97
Oil passage plug $\phi 14$ P1.5	●	1	—	—	—
Oil pressure switch $\phi 20$ P1.5	—	1	0.60	52 in-lbs	63,191
Oil pump cover screws $\phi 6$ P1.0	●	5	—	—	85
Oil pump mounting bolts $\phi 6$ P1.0	●	3	0.80	69 in-lbs	85,97
Ratchet gear arm stop bolts $\phi 6$ P1.0	●	2	1.0	87 in-lbs	104
Return spring pin $\phi 8$ P1.25	●	1	2.0	14.5	75
Right engine cover Allen bolts (upper) $\phi 6$ P1.0	●	(3)	—	—	97
Shift drum pin plate screw $\phi 6$ P1.0	●	1	—	—	75,100
†Shift pedal bolt $\phi 6$ P1.0	—	1	—	—	—
Spark plugs $\phi 14$ P1.25	—	4	2.8	20	12,55
Starter motor clutch Allen bolts $\phi 8$ P1.25	—	3	4.0	29	78
Starter motor lead terminal nuts $\phi 6$ P1.0	—	2	0.50	43 in-lbs	79,93
Starter motor retaining bolts $\phi 6$ P1.0	●	2	1.0	87 in-lbs	80,98
Stud bolts cylinder $\phi 10$ P1.5	● ★	12	less than 1.0	less than 87 in-lbs	—
exhaust $\phi 8$ P1.0	●	8	less than 0.50	less than 43 in-lbs	—
Timing advancer bolt $\phi 8$ P1.25	—	1	2.5	18.0	81,98

CHASSIS

Part	Locking Agent (●) Required	Quantity	Metric (kg-m)	English (ft-lbs)	See Pg.
†Clutch lever pivot bolt $\phi 6$ P1.0	—	1	—	—	—
Disc brake parts	See Table G1 on Pg. 112.				
†Final bevel gear case mounting nuts $\phi 10$ P1.25	—	4	3.0	22	125
Final bevel gear case cover bolts $\phi 8$ P1.25	—	8	2.5	18.0	127,132

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Part	Locking Agent (●), Liquid Gasket (★) Required	Quantity	Metric (kg-m)	English (ft-lbs)	See Pg.
Final bevel gear case drain plug φ8 P1.25	—	1	2.0	14.5	29,124,125
Final pinion gear nut φ16 P1.25	—	1	12.0	87	128
†Footpeg mounting bolts φ10 P1.25	—	2	—	—	—
† nuts φ10 P1.25	—	4	—	—	—
†Front axle clamp bolts φ8 P1.25	—	4	2.0	14.5	109
†Front axle nut φ16 P1.5	—	1	8.0	58	109
†Front fender mounting bolts φ8 P1.25	—	4	—	—	—
Front fork bottom Allen bolts φ12 P1.75	● ★	2	4.0	29	149
†Front fork clamp bolts (lower) φ8 P1.25	—	4	2.0	14.5	26,145,147
(upper) φ10 P1.25	—	2	2.8	20	145,147
Front fork top plugs	—	2	2.8	20	147,149
†Handlebar clamp bolts φ8 P1.25	—	4	2.0	14.5	26,142
†Rear axle nut φ18 P1.5	—	1	14.0	101	118
†Rear brake pedal bolt φ8 P1.25	—	1	—	—	—
†Rear shock absorber mounting nuts φ12 P1.25	—	4	2.5	18.0	150,151
†Side stand bolt φ10 P1.25	—	1	—	—	—
†Steering stem head bolt φ16 P1.5	—	1	4.0	29	26,145
†Steering stem head rear clamp bolt φ8 P1.25	—	1	2.0	14.5	26,145
Swing arm pivot shafts φ20 P1.25	—	2	1.5	11.0	151
†Swing arm pivot shaft locknuts φ20 P1.25	—	2	—	—	—
†Swing arm pivot shaft stop Allen bolts φ8 P1.25	—	6	—	—	—
†Valve stem nut (tire) φ8 P0.8	—	2	0.15	13 in-lbs	133

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The table below, relating tightening torque to thread diameter and pitch, lists the basic torque for the bolts and nuts used on Kawasaki Motorcycles. However, the actual torque that is necessary may vary among bolts and nuts with the same thread diameter and pitch. The bolts and nuts listed on Pg. 33 ~ 36 vary to a greater or lesser extent from what is given in this table. Refer to this table for only the bolts and nuts not included in the table on Pg. 33 ~ 36. All of the values are for use with dry solvent-cleaned threads.

Coarse threads

dia (mm)	pitch (mm)	kg-m	ft-lbs
5	0.80	0.35~0.50	30~43 in-lbs
6	1.00	0.60~0.90	52~78 in-lbs
8	1.25	1.6~2.2	11.5~16.0
10	1.50	3.1~4.2	22~30
12	1.75	5.4~7.5	39~54
14	2.00	8.3~11.5	60~83
16	2.00	13~18	94~130
18	2.50	18~25	130~181
20	2.50	26~35	188~253

Fine threads

dia (mm)	pitch (mm)	kg-m	ft-lbs
5	0.50	0.35~0.50	30~43 in-lbs
6	0.75	0.60~0.80	52~69 in-lbs
8	1.00	1.4~1.9	10.0~13.5
10	1.25	2.6~3.5	19.0~25
12	1.50	4.5~6.2	33~45
14	1.50	7.4~10.2	54~74
16	1.50	11.5~16	83~116
18	1.50	17~23	123~166
20	1.50	23~33	166~239

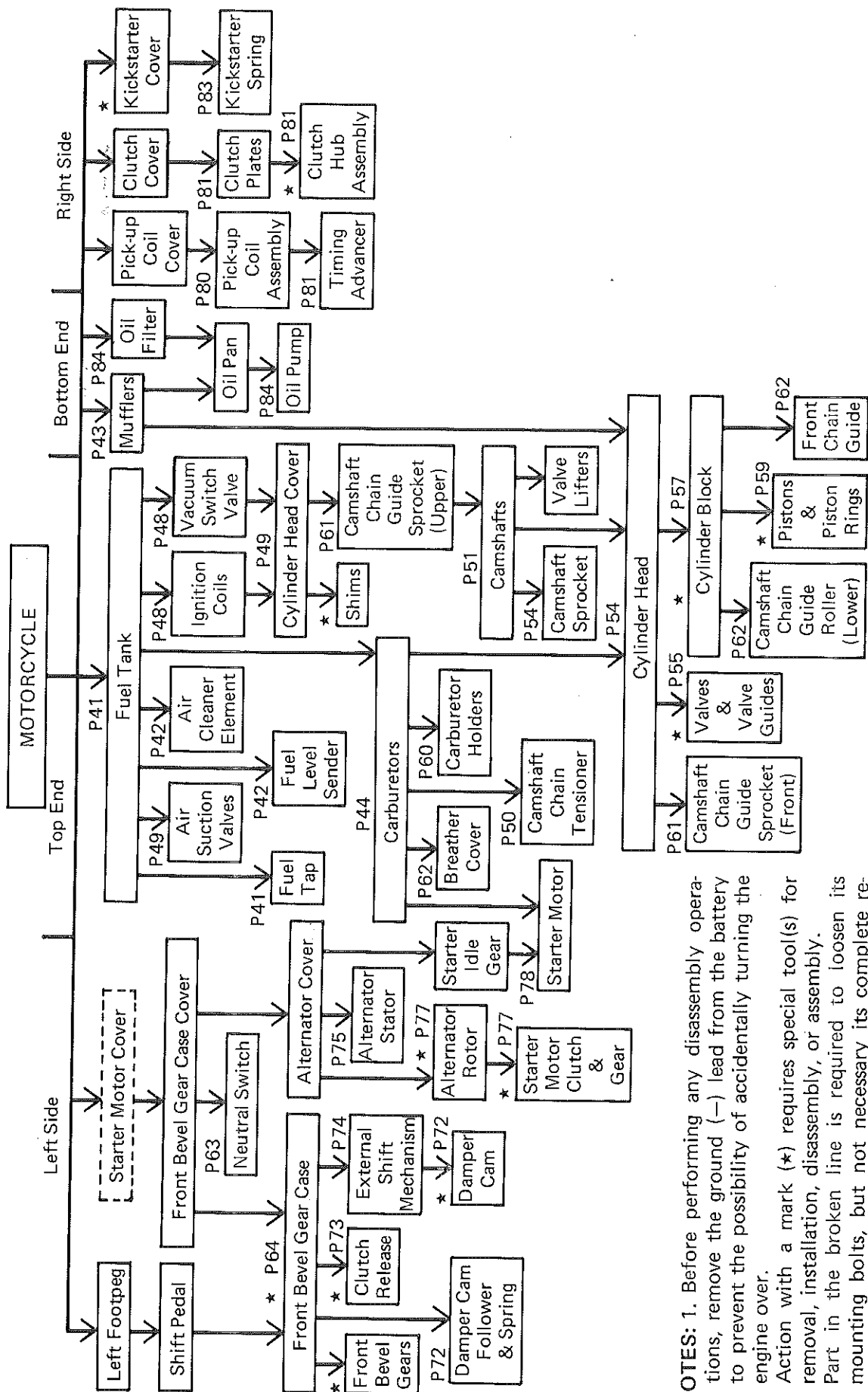
Disassembly—Engine Installed

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FLOW CHART
Disassembly — Engine Installed

The following chart is intended to be aids to proper removal. Select the component you wish to remove and follow the arrows to that point on the chart.

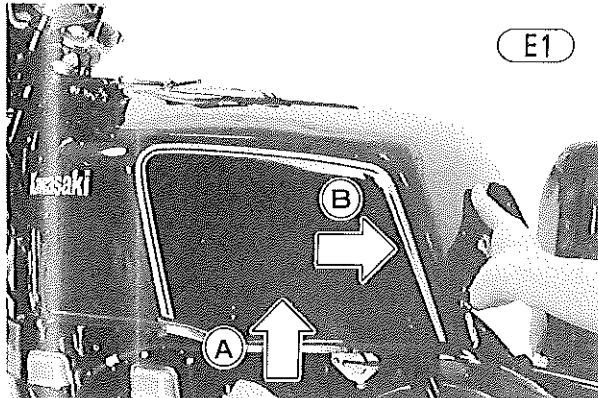


- NOTES:**
1. Before performing any disassembly operations, remove the ground (—) lead from the battery to prevent the possibility of accidentally turning the engine over.
 2. Action with a mark (*) requires special tool(s) for removal, installation, disassembly, or assembly.
 3. Part in the broken line is required to loosen its mounting bolts, but not necessary its complete removal for disassembly.

FUEL TANK

Removal:

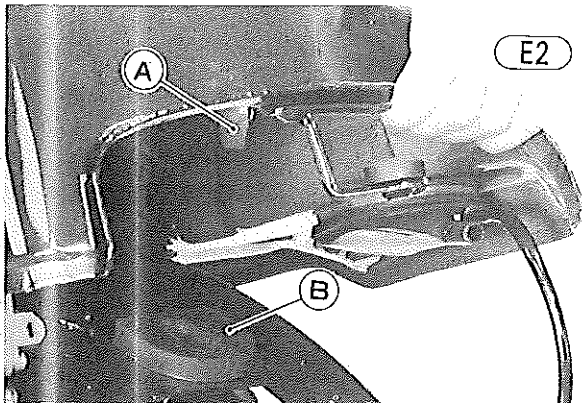
- Unlock the seat and swing it open.
- Turn the fuel tap to the "ON" or "RES" position, slide the hose clamps down, and pull the fuel hose and vacuum hose off the tap.
- Disconnect the fuel level sender lead 2-pin connector.
- Lift the rear end of the fuel tank up about 30 mm, and then pull the fuel tank off toward the rear.



A. Lift. B. Pull.

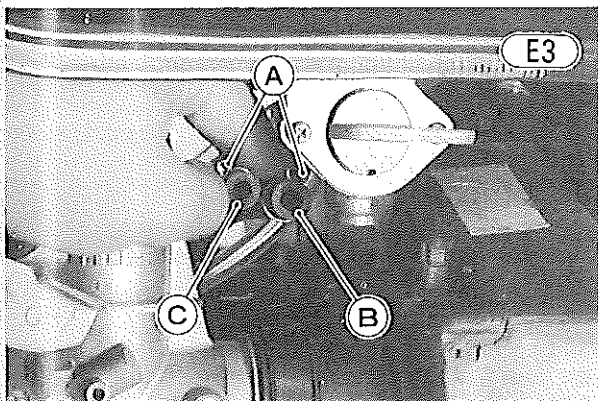
Installation:

- Install the fuel tank. Be sure the retaining projection is seated in the retaining rubber hole.



A. Retaining Projection B. Retaining Rubber Hole

- Fit the fuel hose and vacuum hose back onto the fuel tap, and slide the hose clamps back into place. The vacuum hose has a smaller diameter than the fuel hose.



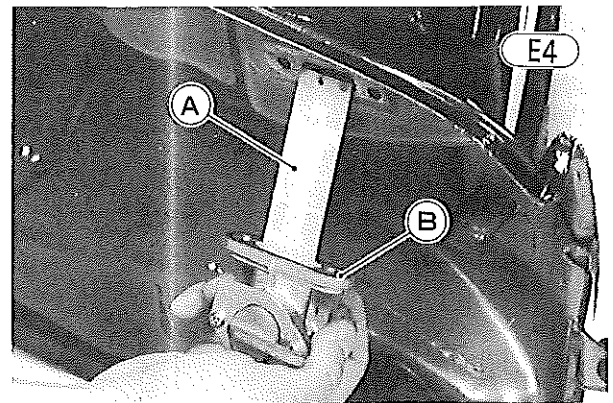
A. Clamps B. Fuel Hose C. Vacuum Hose

- Connect the fuel level sender lead 2-pin connector.
- Push the seat back down.

FUEL TAP

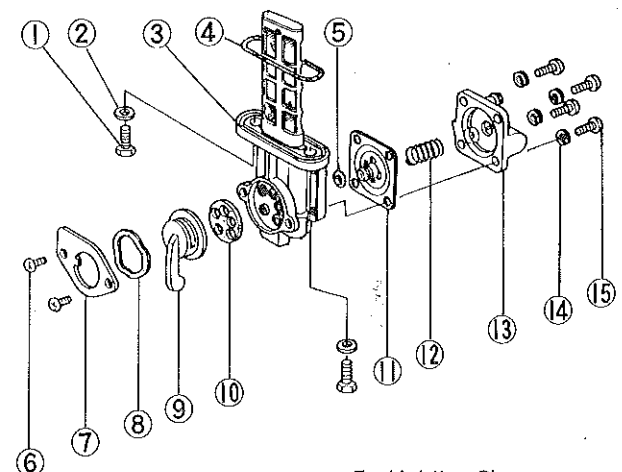
Removal:

- Remove the fuel tank (Pg.41).
- Holding a container under the fuel tap, turn the tap to the "PRI" position to drain the tank.
- Remove the bolts ① and gasket ② (2 ea), and pull the fuel tap ③ off the fuel tank. Be careful not to damage the filter.



A. Filter B. O Ring

Fuel Tap



- | | |
|-------------|------------------------|
| 1. Bolt | 7. Holding Plate |
| 2. Gasket | 8. Wave Washer |
| 3. Fuel Tap | 9. Tap Lever |
| 4. O Ring | 10. Valve Gasket |
| 5. O Ring | 11. Diaphragm Assembly |
| 6. Screw | 12. Spring |
| | 13. Diaphragm Cover |
| | 14. Lockwasher |
| | 15. Screw |

Installation Notes:

1. Check the O ring ④, and replace it with a new one if it is damaged or deteriorated.

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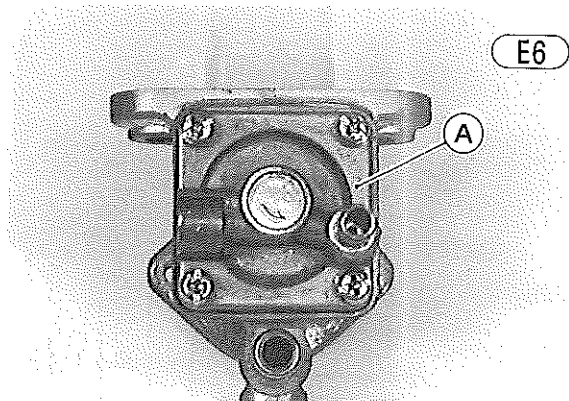
2. After installing the fuel tap on the tank, make sure that the fuel stops when the engine stops.
3. The vacuum hose is the small diameter hose; the fuel hose is larger (Fig. E3).

Disassembly:

- Remove the screws (6) (2), and remove the tap lever (9), wave washer (8), and holding plate (7).
- Take out the valve gasket (10).
- Remove the screws (15) and lockwashers (14) (4 ea), and remove the diaphragm cover (13) and spring (12).
- Remove the diaphragm assembly (11) from the fuel tap.

Assembly Notes:

1. Check and clean all the parts (Pg. 155). Replace damaged parts with new ones.
2. Install the diaphragm cover in the direction shown in Fig. E6, making sure that the spring is compressed at the center of the diaphragm between the diaphragm and the cover.

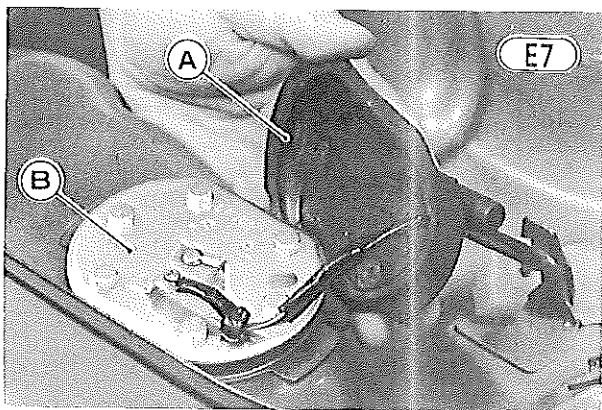


A. Diaphragm Cover

FUEL LEVEL SENDER

Removal:

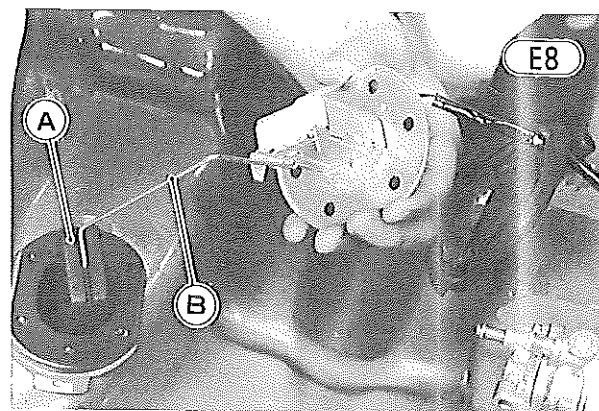
- Turn the fuel tap to the "ON" or "RES" position, slide the hose clamps down, and pull the fuel hose and vacuum hose off the tap.
- Holding a container under the fuel tap, turn the tap to the "PRI" position to drain the tank.
- Remove the fuel tank (Pg. 41).
- Slide the dust cover off.



A. Dust Cover

B. Fuel Level Sender

- Remove the sender mounting bolts (6), and take off the fuel level sender and rubber gasket. Be careful not to damage the fuel level sender float and its arm during sender removal.



A. Float

B. Arm

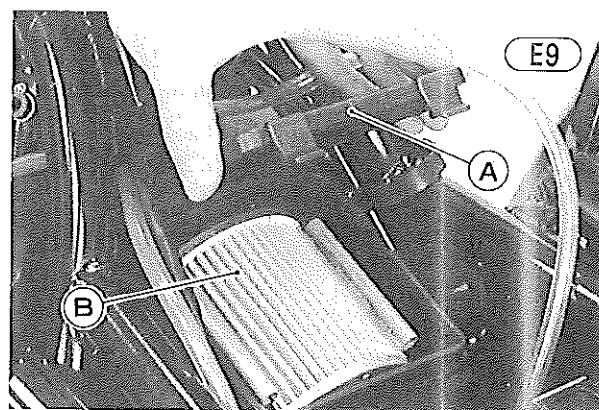
Installation Note:

- Replace the rubber gasket with a new one, if it was damaged.

AIR CLEANER ELEMENT

Removal:

- Remove the fuel tank (Pg. 41).
- Remove the tool box.
- Take off the air cleaner housing cap, and pull out the air cleaner element.



A. Housing Cap

B. Element

Installation:

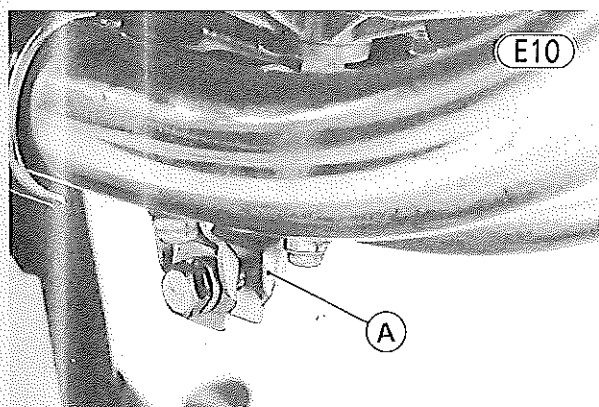
- The open side of the air cleaner element must face to the rear. Working carefully so that the sponge gasket will stay in place, push the air cleaner element into the air cleaner housing until it stops at the bottom.

- Fit the sponge gasket into the air cleaner housing cap, and install the cap.
- Install the tool box.
- Install the fuel tank (Pg. 41).

MUFFLERS

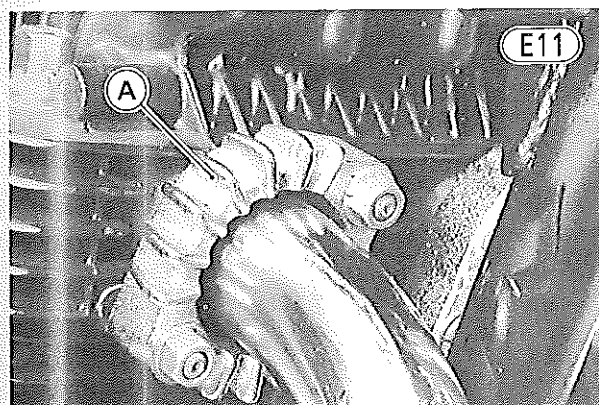
Removal:

- Loosen the muffler connecting clamp bolt, and loosen the #2 and #3 exhaust pipe clamps.



A. Exhaust Pipe Clamp

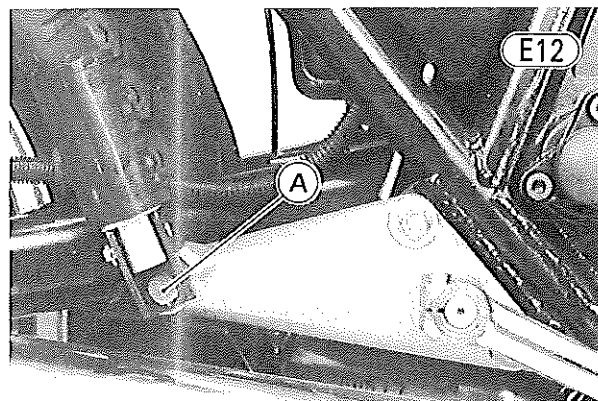
- Remove the exhaust pipe holder nuts and lockwashers (8 ea), and slide the holders (4) off the studs.



A. Exhaust Pipe Holder

- Remove the rear footpeg mounting bolts and footpegs (2 ea) to complete muffler removal. Also, remove the

gasket and split keeper for each exhaust pipe. There is a flat washer, lockwasher, and nut behind the muffler mounting bracket.

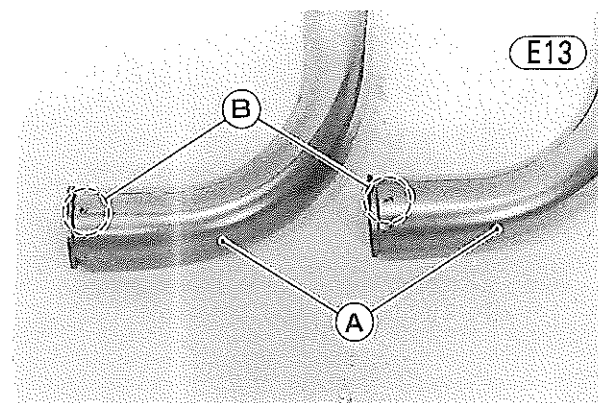


A. Rear Footpeg Mounting Bolt

Installation:

- Separate the #2 and #3 exhaust pipes from the left and right mufflers.
- Fit a new gasket into the #1 and #4 exhaust port, and place the exhaust holders on the studs.
- Fit the end of the exhaust pipes into the exhaust ports, and attach the mufflers to the frame, connecting the muffler cross-over tube with the clamp. Tighten the rear footpeg mounting bolts. Each bolt has a flat washer, lockwasher, and nut behind the bracket.
- Fit new #2 and #3 exhaust port gaskets and place the exhaust pipe holders over the exhaust pipes.
- Fit the #2 and #3 exhaust pipes into the exhaust ports, inserting their lower ends into the mufflers.

NOTE: There is an identification mark on the #2 and #3 exhaust pipes. Do not mix up those exhaust pipes.

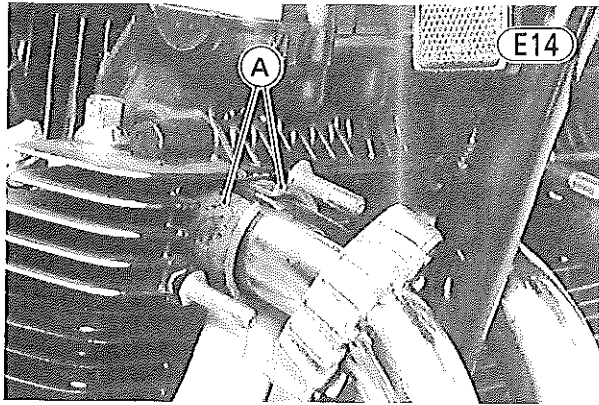


A. Exhaust Pipes

B. Identification Marks

- Put the split keeper into place, slide the holders over the studs, and then tighten the exhaust pipe holder nuts evenly to avoid an exhaust leak. Finally, tighten the rear footpeg mounting bolts.

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A. Split Keeper

- Tighten the exhaust pipe clamp bolts, and tighten the muffler cross-over tube clamp bolt.
- Thoroughly warm up the engine, wait until the engine grows cold, and retighten all the clamp bolts.

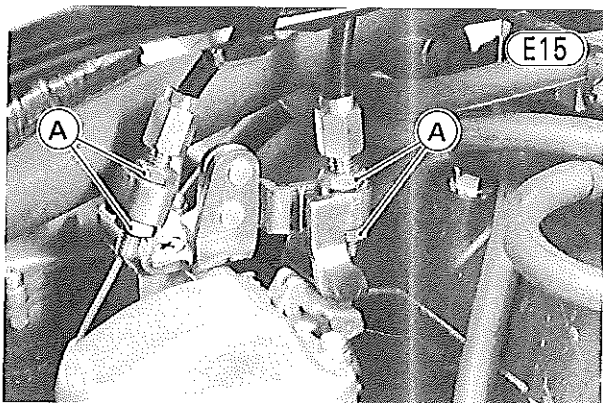
CARBURETORS

Removal:

- Remove the fuel tank (Pg. 41).
- Remove the tool box.
- Loosen the carburetor holder clamp and air cleaner duct clamp for each carburetor, and slip the ducts of place.
- Screw in fully the locknuts and adjusting nuts at the upper end of the throttle cables to give the cables plenty of play.

CAUTION Attempting to remove the throttle cables from the carburetors without enough cable play, may cause throttle cable damage.

- Loosen the throttle cable adjuster mounting nuts (2 ea) fully. Remove the accelerator throttle cable adjuster from its bracket, and slip the tip of its inner cable out of the pulley. Then do the same with the decelerator throttle cable.



A. Mounting Nuts

- Remove the carburetor air vent tubes (2) from the fittings on the air cleaner silencer and air cleaner housing mounts, and pull them out towards the engine.
- Pull the carburetor overflow tubes (4) off the rubber guide at the right rear of the engine.

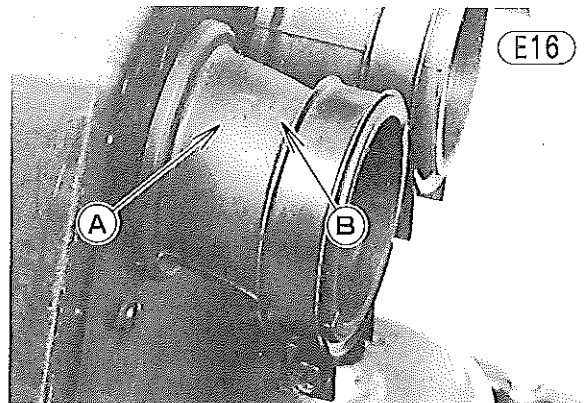
- Pull the carburetors off to the rear and out.

Installation:

NOTE: If the carburetors are disassembled and assembled, perform mechanical initial synchronization (Pg. 16) before installing the carburetors.

- Check that the air cleaner ducts and clamps are fitted properly in the air cleaner housing. Check that the carburetor holder clamps are in place.

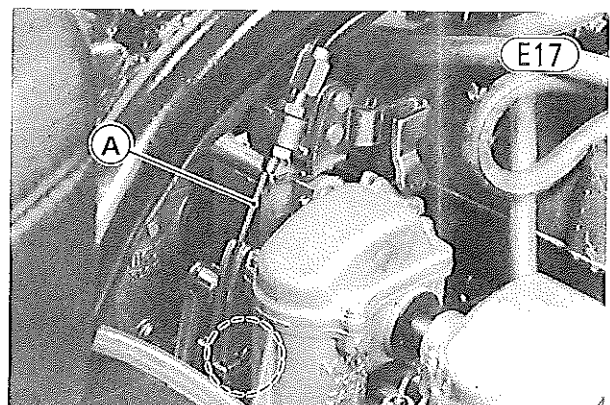
NOTE: There are "UP" marks on the air cleaner ducts. Install them with the "UP" marks facing upwards. There is also an "L" mark on the outer left duct and an "R" mark on the outer right duct.



A. "UP" Mark

B. "R" Mark

- Slip the carburetors back into place in the reverse of the removal procedure.
- Fit the tip of the throttle accelerator cable into the rear catch in the pulley, and install its adjuster in the cable bracket. Be sure that both throttle cables run between the frame top tube and the right side cradle tube without kinks or sharp bends, and that they do not twist around each other.



A. Accelerator Cable

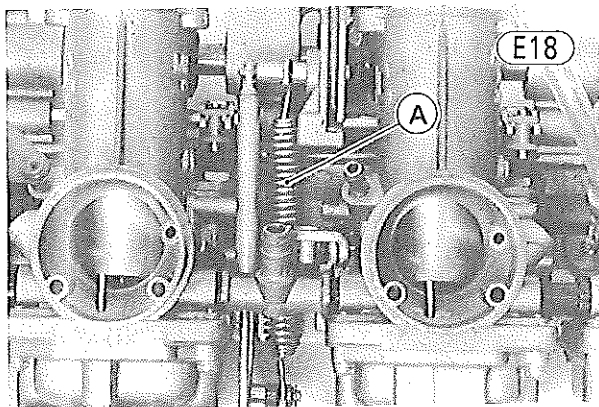
- Fit the tip of the other cable into the other catch, and install its adjuster in the bracket, turning the throttle grip at the same time if necessary.
- Center each adjuster in its place in the bracket, and tighten the mounting nuts.
- Check that the ducts and holders are all properly fitted on the carburetors, and tighten all eight clamps.

- Route the carburetor overflow tubes (4) to the right rear through the rubber guide.
- Route the carburetor air vent tubes (2) through the hole in the frame gusset, and snap them onto the air cleaner housing mounts.
- Connect the carburetor air vent tubes to the fittings on the air cleaner silencer.
- Fit the tool box.
- Install the fuel tank (Pg. 41).
- Adjust the throttle cables (Pg. 15).
- Adjust the carburetors (Pg. 16).

Carburetor Separation:

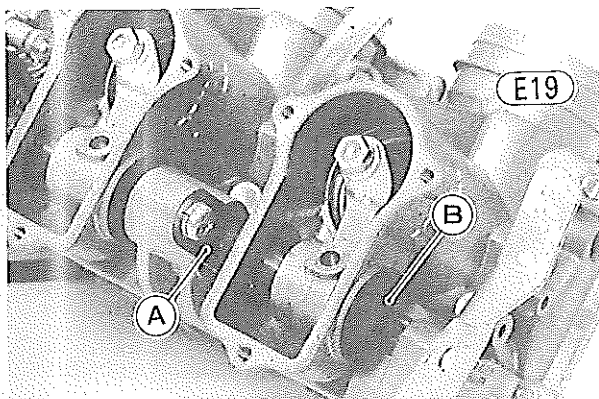
NOTES: 1. The four carburetors look the same but they are slightly different from each other. Note the details of assembly prior to separation, especially the following.

- Position of the drain plug
- Existence of the fuel hose joint(s)
- 2. All carburetor parts except for the fuel hose joints and the starter plungers can be removed without separating the carburetors from the mounting plate.
- Remove the idle adjusting screw (10) and spring (9).
- Remove the screws (34) and lockwashers (35) (12 ea), and take out the top covers (36) and gaskets (37) (4 ea).
- Remove the throttle return spring (38).



A. Return Spring

- Unscrew the throttle arm mounting bolts (39) (4) and pulley mounting bolt (40). Each bolt has a lockwasher.
- Remove the screw (71) and lockwasher (70), and remove the throttle shaft set plate (69).



A. Shaft Set Plate

B. Rubber Cap

- Remove the rubber caps from both sides of the carburetor assembly.
- Push one end of the throttle shaft (68) until it can be pulled out by the other end.
- Remove the mounting screws (73) (8) and remove the carburetors from the mounting plate. For US model, there are rubber hoses (53) (3) at the float bowl which lead from the accelerator pump outlet to the pump nozzle in each carburetor. Each rubber hose has two clips (54).

NOTE: The #2 carburetor on US model can be removed with the accelerator pump rod and pulley still attached.

Assembly Notes:

1. Apply a non-permanent locking agent to the mounting screw threads.
2. Apply a thin coat of grease on the throttle shaft before inserting the shaft through the carburetors.
3. Perform mechanical initial synchronization (Pg. 16) before installing the top covers.
4. If it is damaged, replace the top cover gasket with a new one.
5. If accelerator pump related parts are replaced, adjust the accelerator pump as explained in the Accelerator Pump Assembly Notes (Pg. 47).

Throttle Valve, Jet Needle Removal:

NOTE: The throttle valve and jet needle can be removed without separating the carburetor from the mounting plate.

- Remove the throttle shaft as explained in the Carburetor Separation section (Pg. 45).
- Lift up the linkage, and pull out the throttle valve (40) and jet needle (7).
- Remove the screws (1) and lockwashers (2) (2 ea), and take the throttle valve bracket (3), jet needle holding plate (4), spacer (5), jet needle (7), spring seat (8), and spring (9) out of the throttle valve.

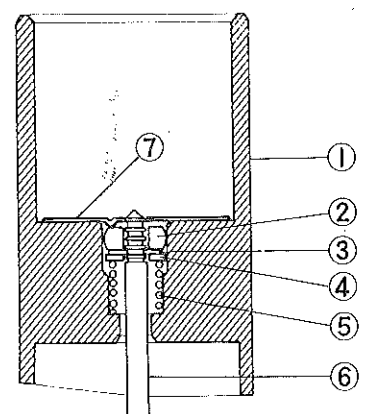
Assembly Notes:

1. Install the jet needle holding plate so that the projection on the plate faces the spacer.

Holding Plate Installation

(E20)

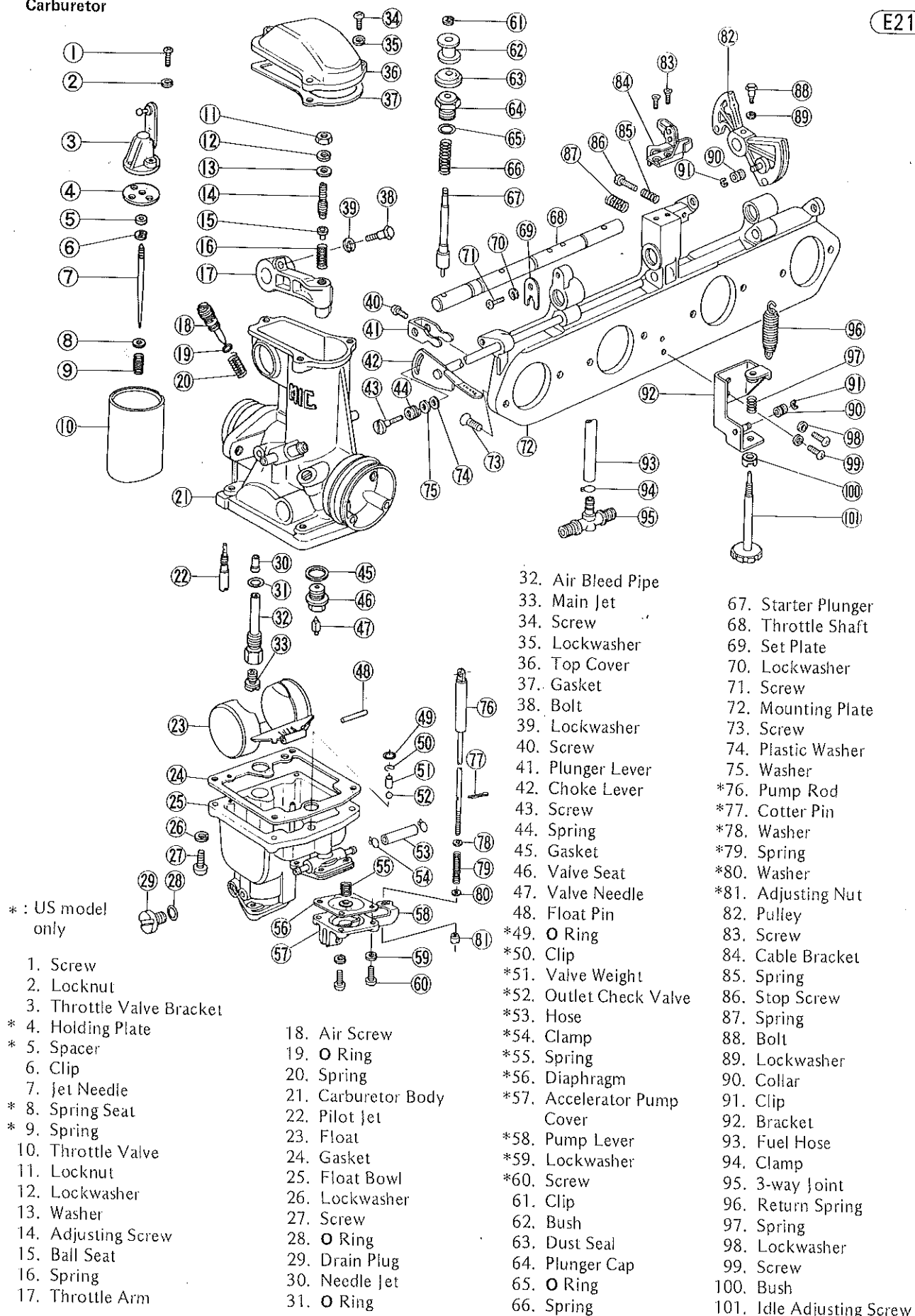
1. Throttle Valve
2. Spacer
3. Clip
4. Spring Seat
5. Spring
6. Jet Needle
7. Holding Plate



46 DISASSEMBLY—ENGINE INSTALLED

Carburetor

E21



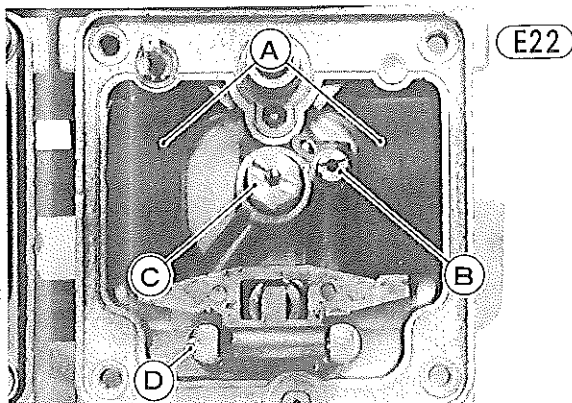
2. Apply a thin coat of grease on the throttle shaft before inserting the shaft through the carburetors.
3. Perform mechanical initial synchronization (Pg. 16) before installing the top covers.

Carburetor Body Disassembly (per carburetor):

NOTE: The following procedure explains removal of the carburetor parts listed below, and these parts except the #1, #2, and #3 starter plungers can be removed without separating the carburetors from the mounting plate.

Main Jet	Float
Air Bleed Pipe	Float Valve
Needle Jet	Starter Plunger
Pilot Jet	Accelerator Pump Outlet
Air Screw	Check Valve (US model)

- If the air screw ⑩ is to be removed, turn in the air screw and count the number of turns until it seats fully but not tightly, and then remove it with its O ring ⑨ and spring ⑪.
- Remove the screws ⑫ and lockwashers ⑬ (4 ea), and take off the float bowl ⑭, gasket ⑮, and O ring ⑯.
- Now, the main jet ⑳, air bleed pipe ㉑, and pilot jet ㉒ can be removed.



A. Float
B. Pilot Jet
C. Main Jet
D. Pin

- To remove the float valve seat 46, first push out the float pin 48, remove the float ㉓, and pull out the float valve needle 47.
- Remove the float valve seat and gasket 45.
- To remove the starter plunger 67, unscrew the plunger cap 64, and pull out the unit.
- Remove the clip 61 and pull out the starter plunger and spring 66.
- To remove the needle jet ㉔, remove the throttle valve and air bleed pipe.
- Make sure that the float is removed so that it does not get damaged during needle jet removal. Push on the top of the needle jet with a wooden or other soft rod, and it will fall out the bottom of the carburetor.
- For US model, remove the clip 50, and take off the valve weight and outlet check valve 52.

Assembly Notes:

1. Replace any O rings and gaskets if damaged or deteriorated.

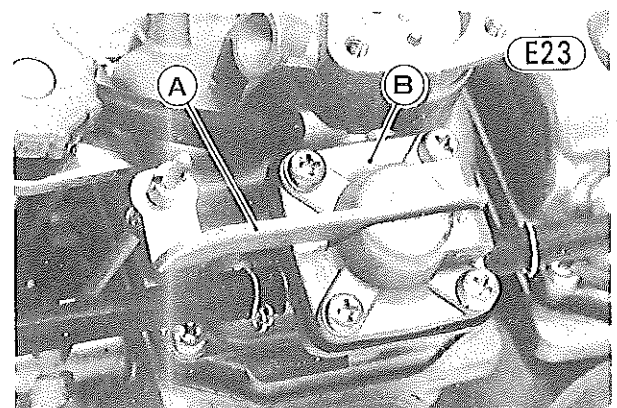
2. Install the plug 29 securely if it was removed.
3. If the air screw is removed, adjust the idle mixture (Pg. 17) after installation (US model). For other than US model, turn in the air screw until it seats lightly, and then back it out 1 1/4 turns.
4. If the clip 50, valve weight 51, and outlet check valve 52 are removed, check the clip and replace with a new one if it was damaged.
5. If accelerator pump related parts are replaced, adjust the accelerator pump as explained in the Accelerator Pump Assembly Notes (US model).

Accelerator Pump Disassembly (on US Model):

NOTE: The accelerator pump can be disassembled without separating the carburetor from the mounting plate.

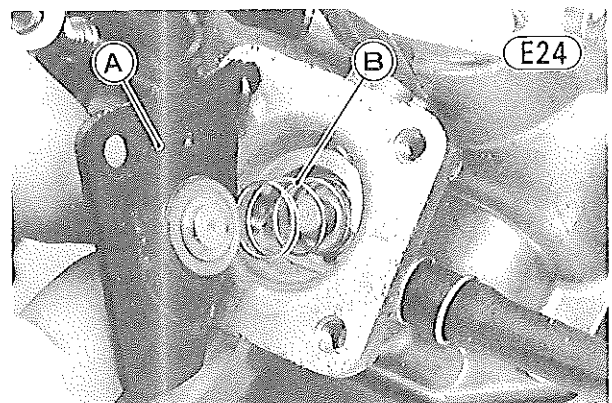
- Remove the screws 60 and lockwashers 69 (4 ea), and remove the pump cover 57 with the pump lever 58 connected to the pump rod 76. Be careful not to bend the rod.

CAUTION Do not attempt to separate the pump lever from the pump rod. This cannot be done without breaking the pump rod.



A. Pump Lever
B. Accelerator Pump Cover

- Remove the diaphragm 55 and spring 55.



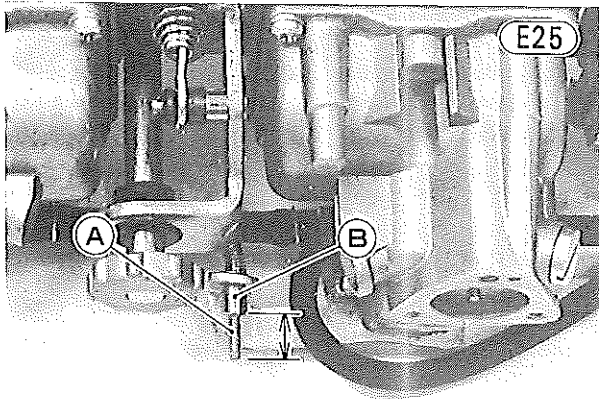
A. Diaphragm
B. Spring

Accelerator Pump Assembly Notes (on US Model):

1. Check the diaphragm, and replace it with a new one if it shows any damage.

48 DISASSEMBLY—ENGINE INSTALLED

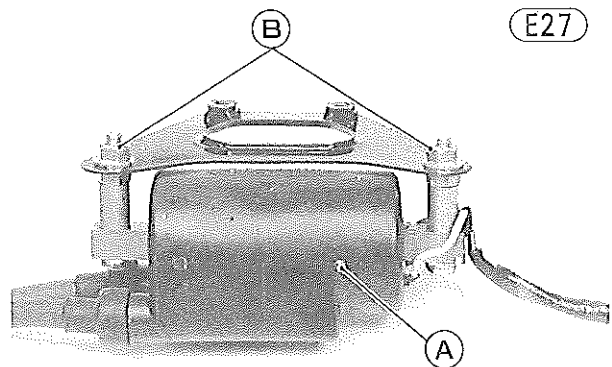
2. If the accelerator pump rod is replaced with a new one, adjust the pump rod as follows:
 - Turn the adjusting nut so that the length shown in Fig. E25 is between 10.7 ~ 10.9 mm.



A. Pump Rod B. Adjusting Nut

- Apply a drop of a non-permanent locking agent to the adjusting nut threads to lock the adjusting nut in place.

- Remove the nuts and lockwashers (2 ea) that connect the ignition coil to the mounting bracket.



A. Ignition Coil B. Nuts

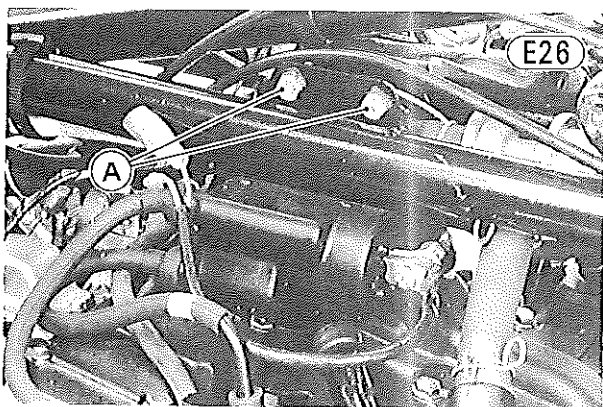
Installation Note:

- Ignition coil leads are connected as follows:
 - Pink lead ↔ Main harness pink lead
 - Black lead ↔ IC Igniter black lead
 - Green lead ↔ IC Igniter green lead
- The spark plug leads are labeled with the spark plug numbers (counted from the left).

IGNITION COILS

Removal (each ignition coil):

- Remove the fuel tank (Pg. 41).
- Pull the spark plug leads off the plugs.
- To remove the left ignition coil, disconnect the black and pink leads of the left ignition coil.
- To remove the right ignition coil, disconnect the green and pink leads of the right ignition coil.
- Remove the ignition coil mounting bracket bolts (2), and remove the ignition coil.

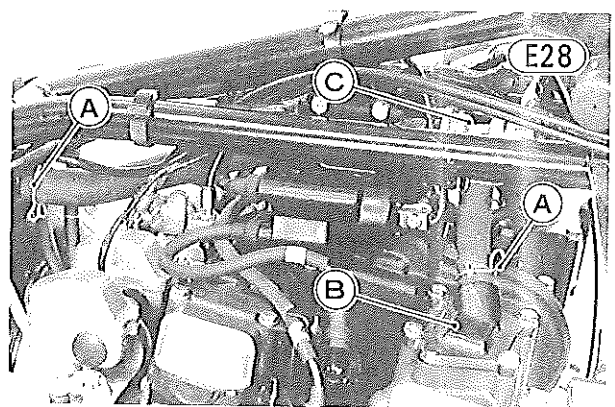


A. Mounting Bracket Bolts

VACUUM SWITCH VALVE (on US Model)

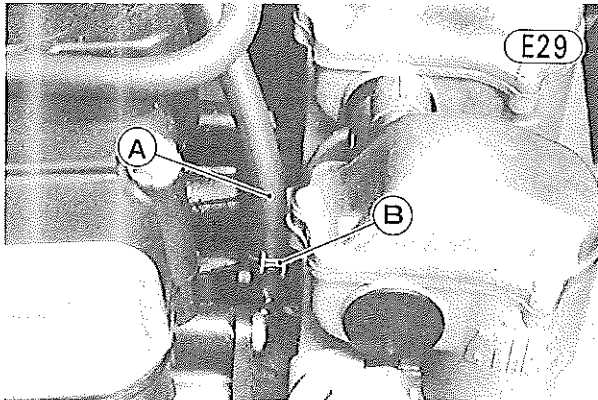
Removal:

- Remove the fuel tank (Pg. 41).
- Slide the clamp out of place, and pull the hose off each air suction valve cover.



A. Clamp B. Air Suction Valve Cover C. Vacuum Switch Valve

- Slide the clamp out of place, and pull the hose off the air cleaner housing.
- Slide the clamp out of place, and pull the vacuum hose off #1 and #4 carburetor holders.

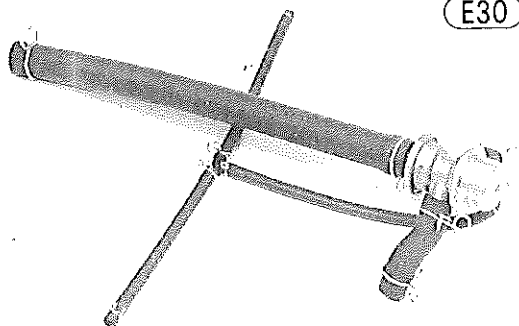


A. Vacuum Hose B. Clamp

- Pull the vacuum switch valve with the hoses attached free off the motorcycle.

Installation Note:

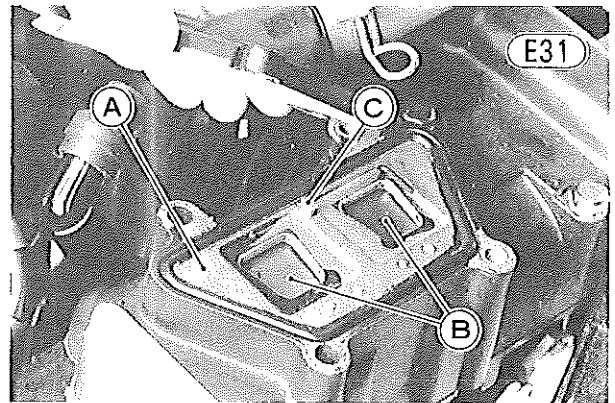
- Check that all hoses fit in place, and that all clamps are installed.



AIR SUCTION VALVES (on US Model)

Removal (either side):

- Remove the fuel tank (Pg. 41).
- Remove the air suction valve cover bolts, and lift the cover off the air suction valve assembly.
- Remove the valve assembly taking care not to damage the valve reeds and reed contact areas. If the valve assembly sticks in the cylinder head cover, pull it up by grasping the projection with pliers.



A. Valve Assembly B. Valve Reeds C. Projection

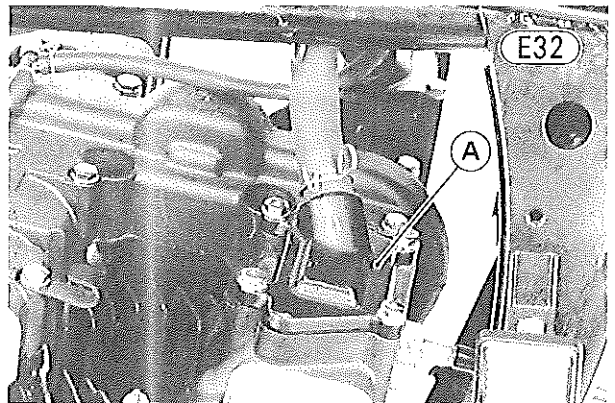
Installation Notes (either side):

1. Check the air suction valve assembly, and replace it with a new one if it is damaged (Pg. 172).
2. Tighten the cover bolts (4) to 1.5 kg-m (11.0 ft-lbs) of torque with a flat washer installed under each bolt head.

CYLINDER HEAD COVER

Removal:

- Remove the fuel tank (Pg. 41).
- Remove the ignition coils (Pg. 48).
- Slide up the hose clamps (2), and pull the hoses (2) off the air suction valve covers (US model).



A. Air Suction Valve Cover

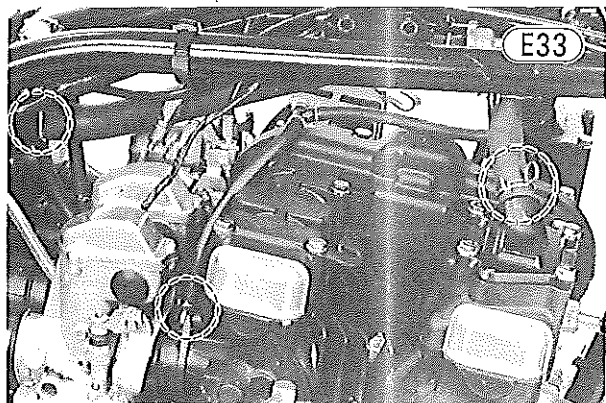
- Swing the vacuum switch valve aside so that it does not hinder cylinder head cover removal (US model).
- Remove the one of the air suction valves (US model).
- Remove the cylinder head cover bolts and flat washers (14 ea), and slip the cover off the cylinder head towards the side on which the air suction valve is installed.

Installation Notes:

1. Replace the cylinder head rubber plugs (4) and cover gasket with new ones, applying a liquid gasket to both ends of each rubber plug before installation.

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2. Tighten the cylinder head cover bolts and air suction valve cover bolts (20) to 1.5 kg-m (11.0 ft-lbs) of torque with a flat washer installed under each bolt head.
3. Check to see that the vacuum switch valve is connected firmly to the air cleaner housing, air suction valves, and the #1 and #4 carburetor holders. Each hose end should be secured by a hose clamp.



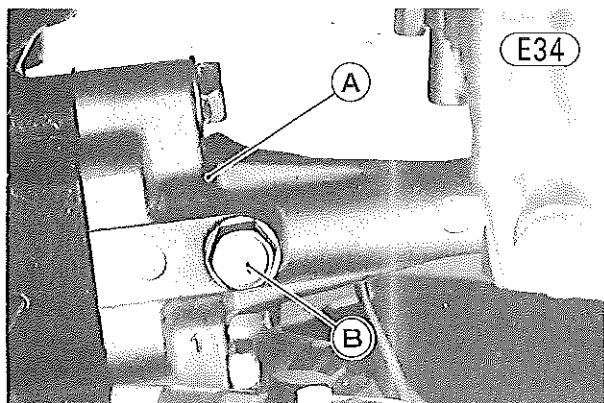
4. Thoroughly warm up the engine, allow it to cool completely, and then retighten all the cylinder head cover bolts to the specified torque.

CAMSHAFT CHAIN TENSIONER

Once the push rod in the camshaft chain tensioner moves out to take up chain slack automatically, it does not return to its original position. So, lock the tensioner before starting any disassembly operation that slackens the chain: camshaft chain guide sprocket (upper) removal, camshaft removal, etc.

To lock the tensioner:

- Remove the lock bolt and washer originally installed on the tensioner, and then screw in a longer 110B0616 bolt and tighten it securely to hold the tensioner push rod in place. (Any 6 mm diameter bolt or screw with 1.0 mm pitch threads about 16 mm long or longer will work.)



A. Tensioner Body

B. Lock Bolt

- Continue the disassembly and assembly operation.

- After completion of the assembly operation, remove the longer lock bolt, and install the original lock bolt and washer to plug the hole.

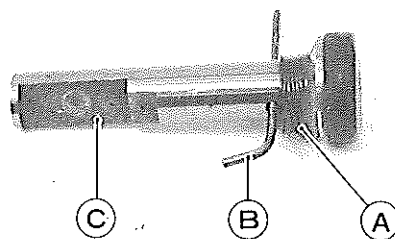
If the tensioner was extended fully, install it as follows:

CAUTION When removing the chain tensioner, do not take out a mounting bolt only half-way. Retightening the mounting bolts from this position could damage the chain tensioner and the camshaft chain.

To install the tensioner:

- Loosen the lock bolt several turns, and take out the push rod and soft spring.
- Compressing the spring against the push rod head, insert a thin wire through the hole in the push rod to keep the spring in place.

E35



A. Spring

B. Wire

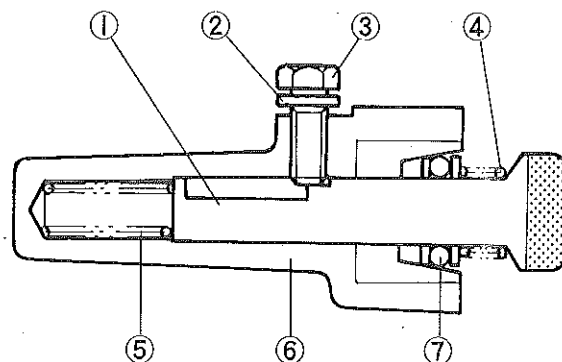
C. Push Rod

- Check to see that the stiff spring is in the tensioner body.

- Insert the push rod upwards into the tensioner body going through the ball retainer. Hold the tensioner body with the open end down so that the balls will fall away from the ramp inside the tensioner and allow the push rod to go in. Keep the flat side of the push rod toward the lock bolt, and push in the rod by hand until the wire rests against the tensioner mating surface.

Camshaft Chain Tensioner

E36



1. Push Rod

2. Washer

3. Lock Bolt

4. Spring

5. Spring

6. Tensioner Body

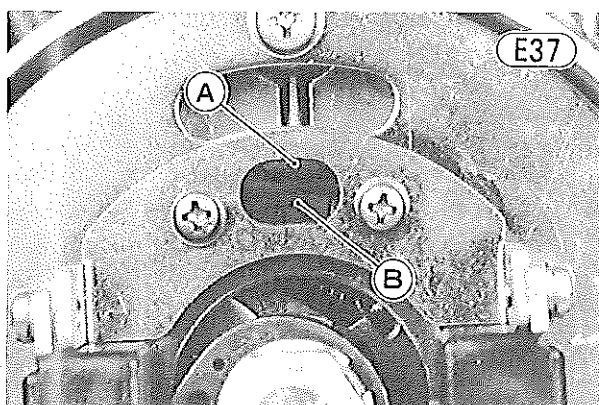
7. Ball and Retainer

- Holding the push rod in position, with the flat side toward the bolt, tighten the lock bolt securely to prevent the push rod from coming out, and then pull out the wire.
- If the gasket is damaged, replace it. Install the chain tensioner on the cylinder block.
- Loosen the lock bolt and then tighten it. With the bolt loose, the stiff spring inside takes up any slack automatically.

CAMSHAFTS

Removal:

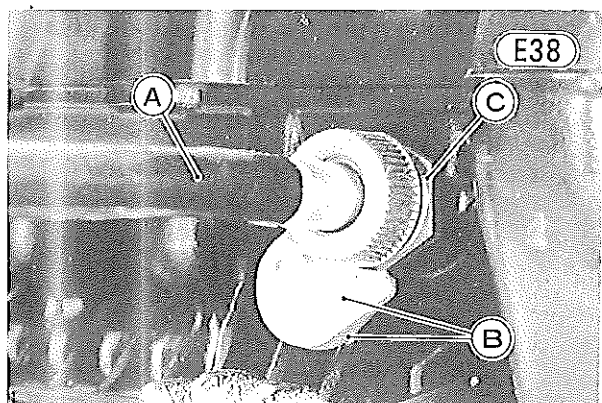
- Remove the fuel tank (Pg. 41).
- Remove the battery ground lead.
- Remove the pick-up coil cover and gasket.
- Using a 17 mm wrench on the crankshaft, turn the crankshaft until the "T" mark on the timing advancer is aligned with the timing mark. At this point pistons #1 and #4 are at top dead center.



A. Timing Mark B. "T" Mark

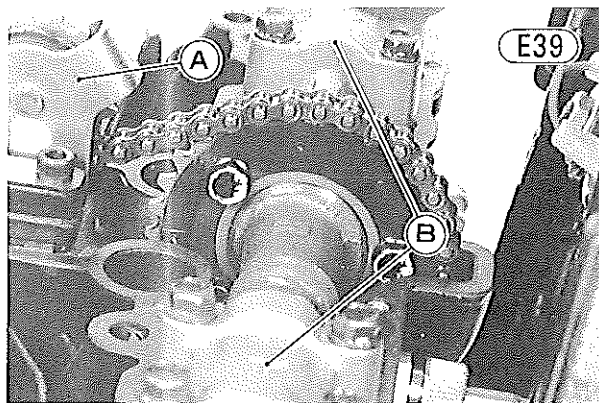
- Remove the Allen bolt and pinion holder stops (2), and pull the tachometer pinion holder and pinion with the tachometer cable off the cylinder head.

CAUTION Do not attempt to install the camshafts with the tachometer pinion left in the cylinder head as it may cause tachometer gear damage.



A. Tachometer Cable B. Stops C. Pinion Holder

- Lock the chain tensioner (Pg. 50).
- Remove the cylinder head cover (Pg. 49).
- Remove the Allen bolts (4), and remove the camshaft chain guide sprocket.



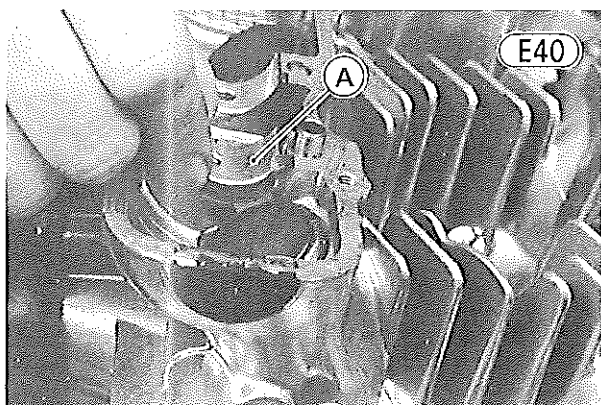
A. Chain Guide Sprocket B. Camshaft Caps

- Remove the camshaft cap bolts (16), and take off the camshaft caps (4). Mark the bearing inserts under each cap as to location. Any bearing inserts that are to be re-used must go back into their original locations.
- Remove the camshafts. Use a screwdriver or wire to keep the chain from falling down into the cylinder block.

CAUTION Always pull the camshaft chain taut while turning the crankshaft. If the camshaft chain is loose, the chain could kink on the lower (crankshaft) sprocket. A kinked chain could damage the chain and sprocket.

Installation:

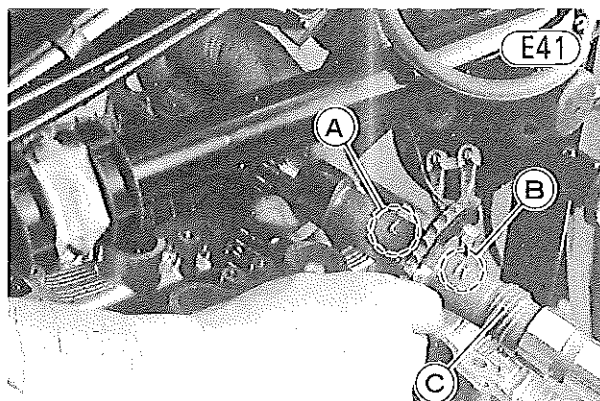
- Check that the tachometer pinion is removed from the cylinder head, and all camshaft cap knock pins (8) are fitted.
- Check that all bearing inserts (16) are properly fitted into the cylinder head and camshaft caps.



A. Bearing Insert

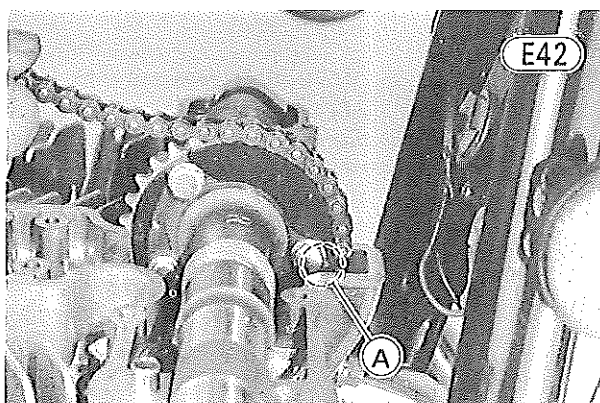
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- Check crankshaft position to see that pistons #1 and #4 are still at TDC (Fig. E37), and readjust if necessary. Remember to pull the camshaft chain taut before rotating the crankshaft.
- Apply clean engine oil to all cam parts. If the camshaft(s) and/or bearing inserts are replaced with new ones, apply a thin coat of a molybdenum disulfide engine assembly grease to the new cam part surfaces.
- Feed the exhaust camshaft through the chain and remove the screwdriver. (Exhaust camshaft has a tachometer gear worm, and the "L" mark must come to the left side and the "R" mark to the right.)



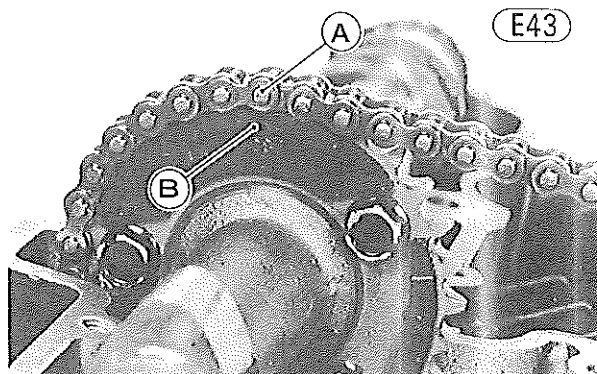
A. "L" Mark
B. "R" Mark
C. Tachometer Gear Worm

- Turn the exhaust camshaft so that the timing mark (arrow) on the sprocket is aligned with the cylinder head surface pointing to the front.
- Pull the chain taut, and fit it onto the exhaust camshaft sprocket.



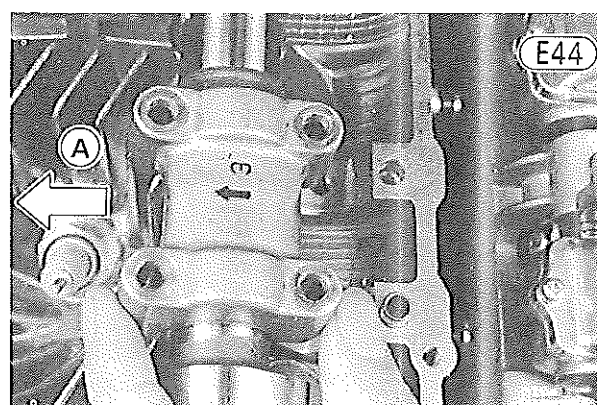
A. Arrow Mark

- Starting with the next chain link pin above the one that coincides with the exhaust camshaft sprocket timing mark, count to the 28th pin. Feed the inlet camshaft through the chain and align that 28th pin with the line adjoining the "28" mark. (Inlet camshaft has an "L" and "R" mark. Position these marks the same as on the exhaust camshaft.)



A. 28th Pin
B. "28" Mark

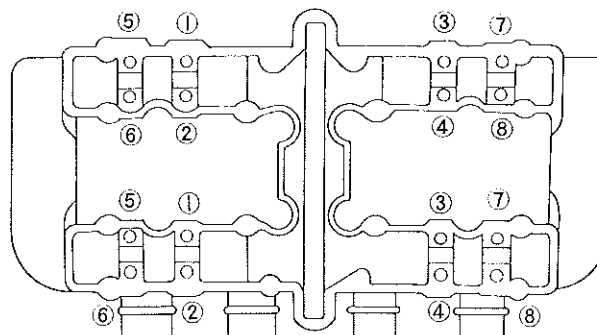
- Because the camshaft caps are machined with the cylinder head, they must be installed so that the number on the camshaft caps matches the number on the cylinder head, and so that the arrow on the cap points forward (toward the exhaust side).



A. Front

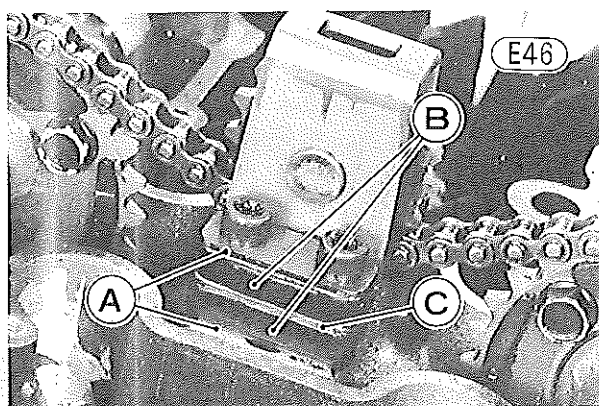
- Partially tighten the left inside camshaft cap bolts first, to seat the camshaft. Fully tighten all the bolts to 1.7 kg-m (12.0 ft-lbs) of torque, following the tightening sequence shown in the figure.

Camshaft Cap Tightening Order



- Apply a non-permanent locking agent to the camshaft chain guide sprocket Allen bolts (4), and install the camshaft chain guide sprocket tightening the bolts to 1.0 kg-m (87 in-lbs) of torque.

NOTE: If the rubber dampers (4) of the camshaft chain guide sprocket are removed from the sprocket holder, attach them to the holder with the steel plates facing outward.



A. Steel Plates
B. Rubber Dampers

C. Holder

- Remove the chain tensioner locking bolt (screw), and tighten the original bolt with a flat washer.
- Before rotating the crankshaft, check that, with the crankshaft positioned so #1 and #4 pistons are at TDC, the timing marks on the exhaust and inlet camshaft sprockets are aligned with the cylinder head surface (Fig. E48).

CAUTION Rotation of the crankshaft with improper camshaft timing could cause the valves to contact each other or the piston, and bend.

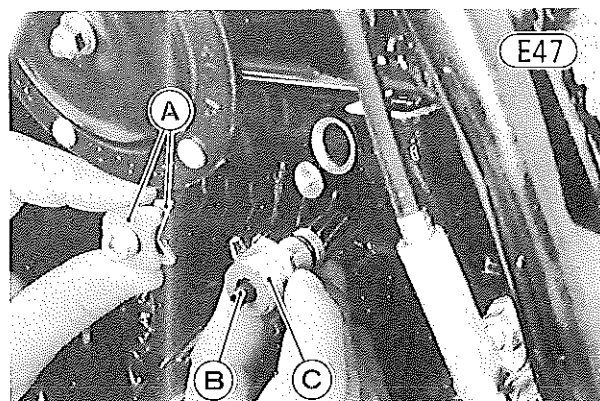
- Turn the crankshaft over clockwise until pistons #1 and #4 are at TDC, and re-check the camshaft timing. If the three timing mark pairs are aligned as shown in the figure above, the cam timing is correct.

CAUTION 1. If any resistance is felt when turning over the crankshaft, stop immediately, and check the camshaft chain timing. Valves may be bent if the timing was not properly set.

2. Do not try to turn the crankshaft and camshafts with a wrench on the camshaft sprocket. Use a 17 mm wrench on the ends of the crankshaft.

NOTE: If a new camshaft, cylinder head, valve or valve lifter was installed, check valve clearance at this time (Pg. 13), and adjust if necessary.

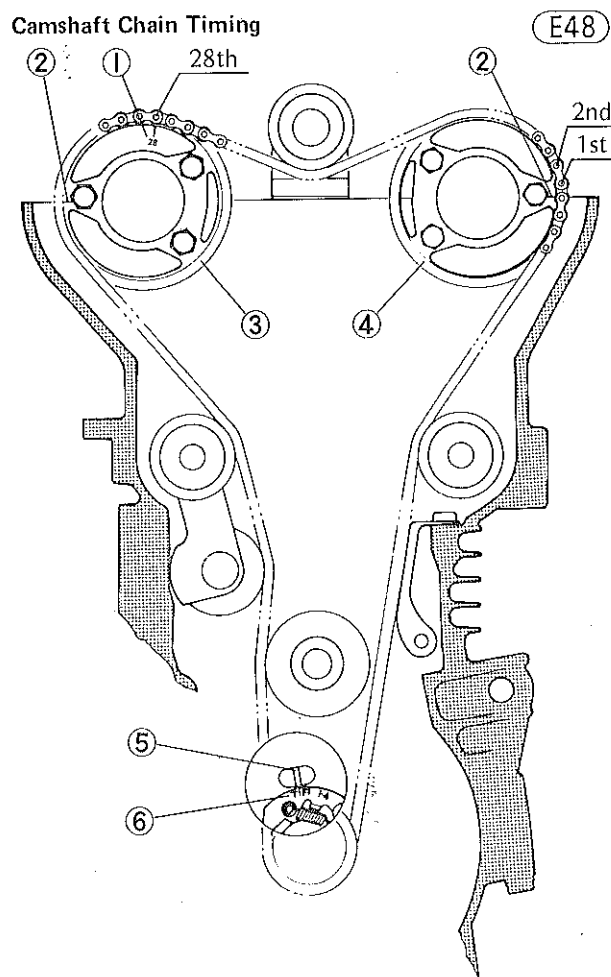
- Apply a small amount of a molybdenum disulfide engine assembly grease to the tachometer pinion shaft, insert the pinion and pinion holder into the cylinder head, and secure the pinion holder in the cylinder head with the holder stop and screw.



A. Stops

B. Tachometer Pinion Shaft

C. Pinion Holder



1. 28th Pin Mark
2. Timing Mark
3. Inlet Camshaft Sprocket
4. Exhaust Camshaft Sprocket
5. Timing Mark
6. #1,4 TDC Mark

- Replace the cylinder head rubber plugs with new ones, applying a liquid gasket to both ends of each rubber plug before installation.
- Install the cylinder head cover (Pg. 49).

54 DISASSEMBLY—ENGINE INSTALLED

- Install the fuel tank (Pg. 41).
- Check the idle and adjust the carburetors if necessary (Pg. 17).
- Install the pick-up cover gasket and cover.

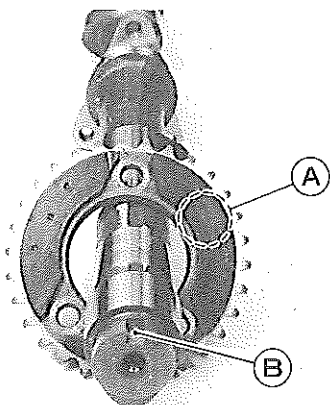
CAMSHAFT SPROCKET

Removal (on each camshaft):

- Remove the fuel tank (Pg. 41).
- Remove the camshaft (Pg. 51).
- Remove the camshaft sprocket bolts (3), and slide the sprocket off the camshaft.

Installation:

- Set the sprocket on the camshaft aligning the bolt holes. The side marked "IN" on the inlet camshaft sprocket or "EX" on the exhaust camshaft sprocket must face the notch on the end of the shaft.



A. Mark

B. Notch

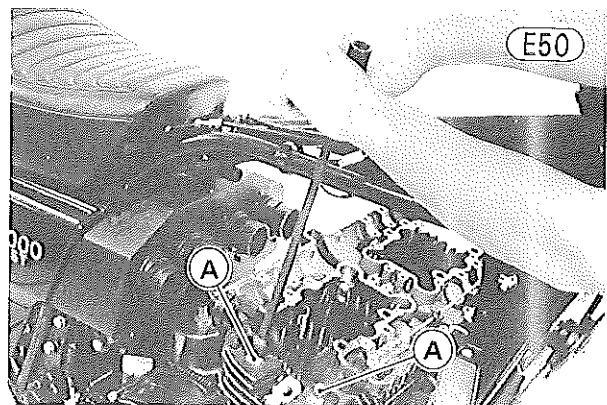
- Apply a non-permanent locking agent to the sprocket bolts (3), and then install the bolts, tightening them to 1.5 kg-m (11.0 ft-lbs) of torque.
- Install the camshaft (Pg. 51), check valve clearance, and adjust if necessary (Pg. 13).
- Install the fuel tank (Pg. 41).
- Check the idle and adjust the carburetors if necessary (Pg. 17).

CYLINDER HEAD

Removal:

- Remove the mufflers (Pg. 43).
- Remove the fuel tank (Pg. 41).

- Remove the carburetors (Pg. 44).
- Remove the camshafts (Pg. 51).
- Take out the spark plugs using a plug wrench.
- Remove the bolt at either end of the cylinder head nut.
- Remove the cylinder head nuts (12) with the steel washers (8) and copper washers (4).



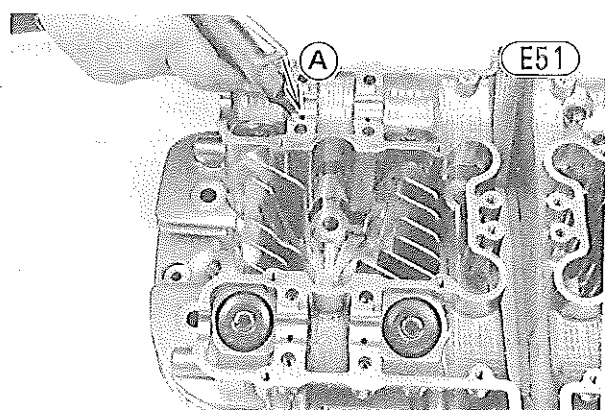
A. Cylinder Head Nut

- Mark all the valve lifters and shims, as they must be returned to the same location.
- Take off the cylinder head, gaskets (2), and O ring.

Installation:

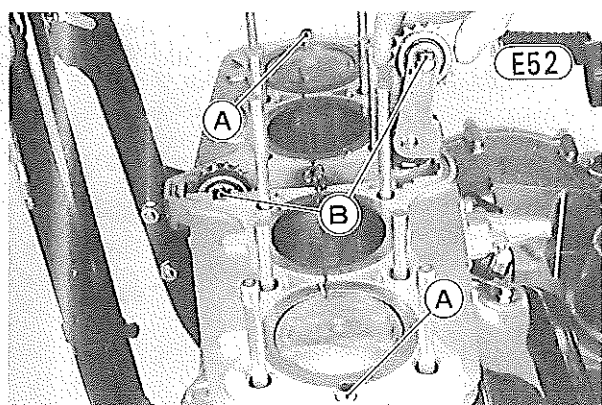
NOTE: The camshaft caps are machined with the cylinder head, so if a new cylinder head is installed, use the caps that are supplied with the new cylinder head.

- Using compressed air, blow out any particles which may obstruct the oil passages.



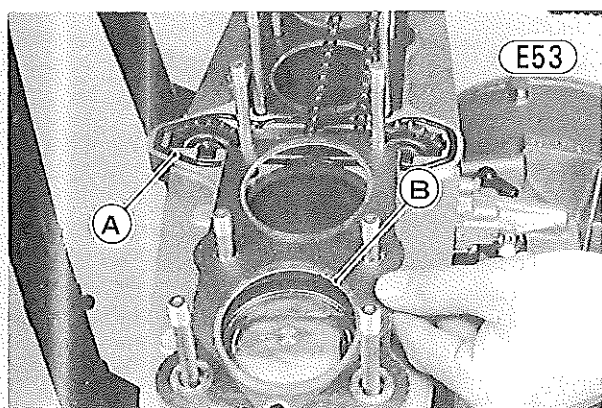
A. Compressed Air

- Apply clean engine oil to the valve lifters and shims, and return them to their original locations.
- Be sure that the rubber dampers (4) of the camshaft chain tensioner and guide sprocket shafts are in place, and that the knock pins (2) are in place.



A. Knock Pin B. Rubber Dampers

- Install the new gaskets and O ring. Make sure that the O ring is properly placed into the groove and that the gaskets are placed with the folded-over metal edges upward. There is no distinction between left and right gaskets.



A. O Ring B. Folded-over Metal

- Install the cylinder head.
- Put the steel flat washers (8) and new copper flat washers (4) under the cylinder head nuts. The copper washers should be located under the nuts at the extreme right and left ends of the cylinder head. These are indicated by the numbers 8, 9, 11, and 12 in Fig. E54.

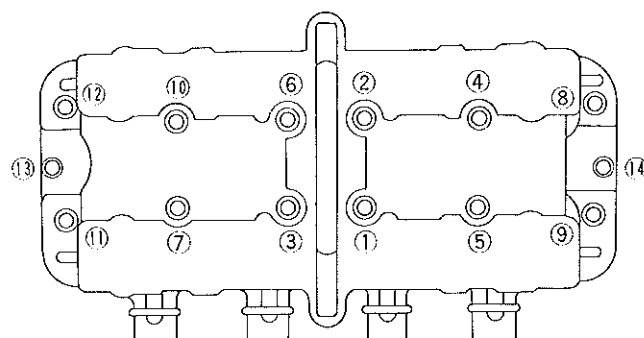
CAUTION Replace any damaged copper flat washers with new ones to prevent oil leaks. These copper washers work as gaskets.

- Tighten the cylinder head nuts first to about 2.5 kg-m (18.0 ft-lbs) of torque and then to 4.0 kg-m (29 ft-lbs) of torque, following the tightening sequence shown.
- Tighten the cylinder head bolts (2) to 1.2 kg-m (104 in-lbs) of torque.
- Install the spark plugs, and tighten them to 2.8 kg-m (20 ft-lbs) of torque.
- Lift up the camshaft chain, and use a screwdriver to keep the chain from falling down into the cylinder block.
- Install the camshafts (Pg. 51).

NOTE: If a new camshaft, bearing inserts, cylinder head, valve, or valve lifter was installed; check valve clearance (Pg. 13), and adjust if necessary.

Cylinder Head Tightening Order

E54



- Install the carburetors (Pg. 44), and adjust the throttle cables (Pg. 15).
- Install the fuel tank (Pg. 41).
- Install the mufflers (Pg. 43).
- Check the idle and adjust the carburetors if necessary (Pg. 17).

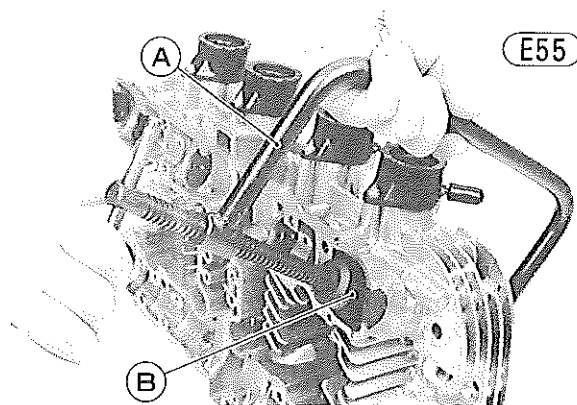
VALVE, VALVE GUIDE

Removal (each valve and valve guide):

- Remove the mufflers (Pg. 43).
- Remove the fuel tank (Pg. 41).
- Remove the carburetors (Pg. 44).
- Remove the camshafts (Pg. 51).
- Remove the cylinder head (Pg. 54).
- Pull out the valve lifters (8) and shims (8), marking them as to location.

NOTE: If more than one valve is to be removed, mark them as to location so they can be reinstalled in the proper place.

- Using the valve spring compressor assembly and adapter (special tools) to press down the valve spring retainer (4), remove the split keeper (3).

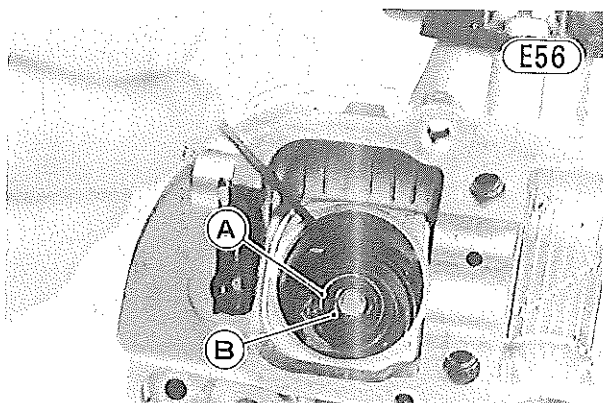


A. Valve Spring Compressor Assembly (57001-241)
B. Valve Spring Compressor Adapter (57001-243)

- Remove the tool, and then remove the spring retainer (4), outer spring (5), and inner spring (6).
- Push out the valve (11) or (12).

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- Remove the clip and pull off the oil seal ⑦.

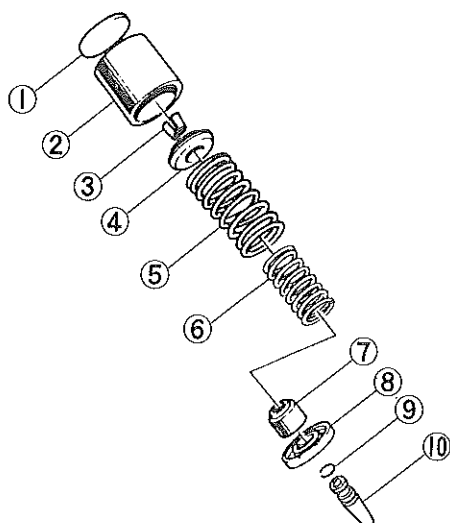


A. Clip

B. Oil Seal

- Remove the spring seat ⑧.
- Heat the area around the guide to about 120~150°C

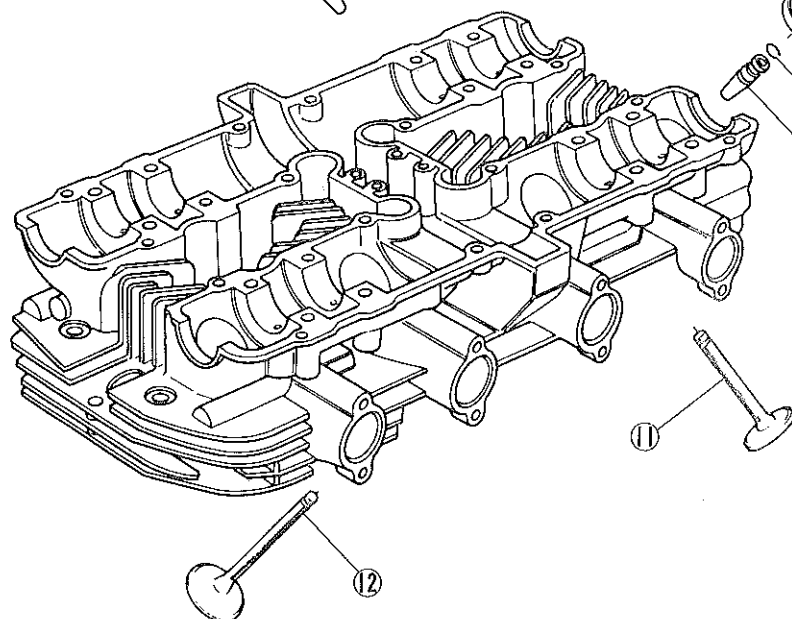
Valve and Valve Guide



(248 ~ 302°F), and hammer lightly on the valve guide arbor (special tool) to remove the guide from the top of the cylinder head.



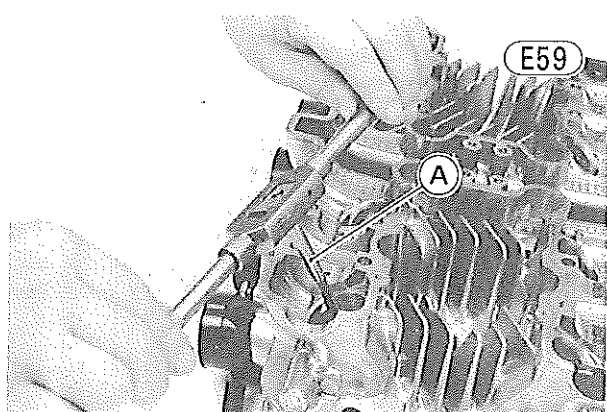
A. Valve Guide Arbor (57001-163)



1. Shim
2. Valve Lifter
3. Split Keeper
4. Valve Spring Retainer
5. Outer Valve Spring
6. Inner Valve Spring
7. Oil Seal
8. Valve Spring Seat
9. Circlip
10. Valve Guide
11. Exhaust Valve
12. Inlet Valve

Installation (each valve and valve guide):

- Apply oil to the valve guide, and snap the circlip into the groove on the valve guide.
- Heat the area around the valve guide hole to about 120 ~ 150°C (248 ~ 302°F), and drive the valve guide it from the top of the head using the valve guide arbor (special tool). The circlip stops the guide from going in too far.
- Ream the valve guide with the valve guide reamer (special tool) even if the old guide is re-used.

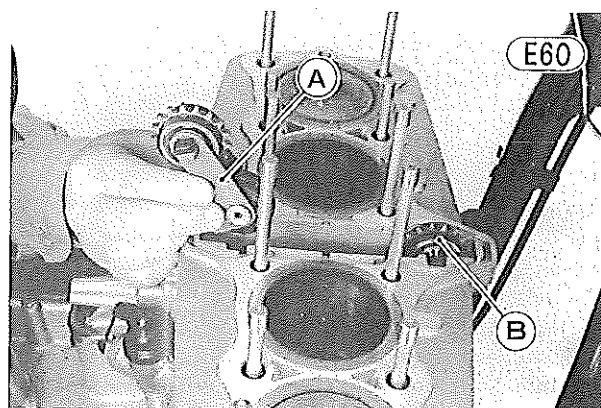
**A. Valve Guide Reamer (57001-162)**

- Lap the valve to check that it is seating properly. If it is uneven, refer to the Maintenance Section (Pg. 169).
 - Push a new oil seal into place, and replace its clip.
 - Apply a thin coat of a molybdenum disulfide engine assembly grease to the valve stem, insert the valve, and install the spring seat and the outer and inner springs.
 - Install the spring retainer, press it down with the valve spring compressor assembly (special tool), and put on the split keeper.
 - After making sure that the split keeper, spring retainer, and valve stem are all properly fitted, remove the valve spring compressor assembly.
 - Apply engine oil to the valve lifters and shims, and mount them in their original locations. If the valve lifter is replaced, apply a thin coat of a molybdenum disulfide engine assembly grease to the valve lifter.
 - Install the cylinder head (Pg. 54).
 - Install the camshafts (Pg. 51).
- NOTE:** Check valve clearance (Pg. 13), and adjust if necessary before the cylinder head cover is installed.
- Install the carburetors (Pg. 44) and adjust the throttle cables (Pg. 15).
 - Install the fuel tank (Pg. 41).
 - Install the mufflers (Pg. 43).
 - Check the idle and adjust the carburetors if necessary (Pg. 17).

CYLINDER BLOCK**Removal:**

- Remove the mufflers (Pg. 43).
- Remove the fuel tank (Pg. 41).

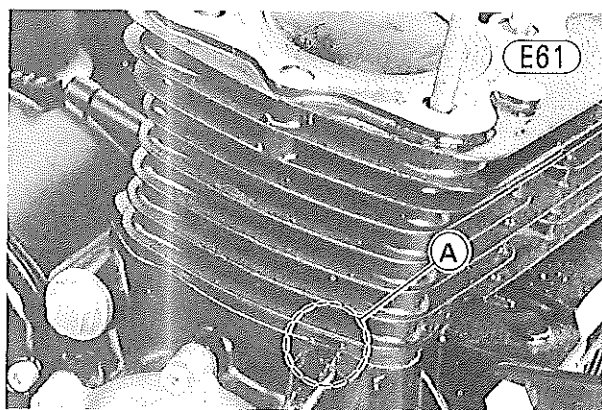
- Remove the carburetors (Pg. 44).
- Remove the camshafts (Pg. 51).
- Remove the cylinder head, gaskets and O ring (Pg. 54).
- Remove the camshaft chain tensioner and guide sprocket.

**A. Chain Tensioner****B. Guide Sprocket**

- With a wide screwdriver, pry at the gap in each side of the cylinder base to free the cylinder block from the crankcase.

CAUTION

Do not hammer on the screwdriver while it is in the pry point as engine damage could result.

**A. Pry Point**

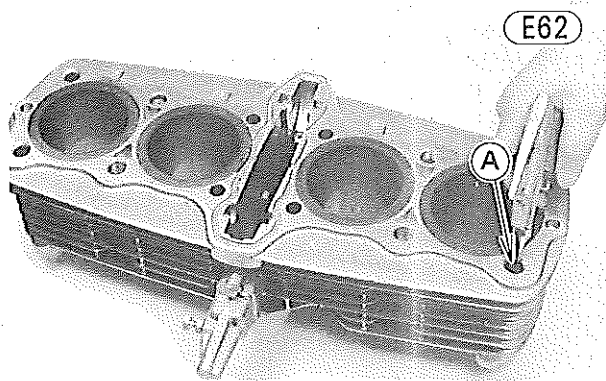
- After lifting up the cylinder slightly, wrap a clean cloth around the base of each piston so that no parts or dirt will fall into the crankcase, and then lift off the cylinder block and gasket.

Installation:

NOTE: If the cylinder block is replaced with a new one, piston to cylinder clearance must be checked against the specified value (Pg. 175).

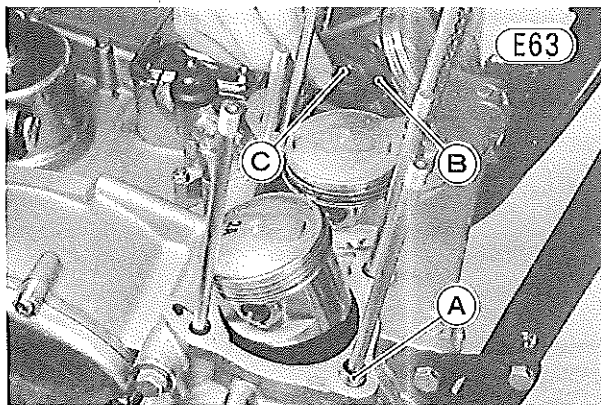
- With compressed air, blow out the oil passages to remove dirt or particles which may obstruct oil flow.

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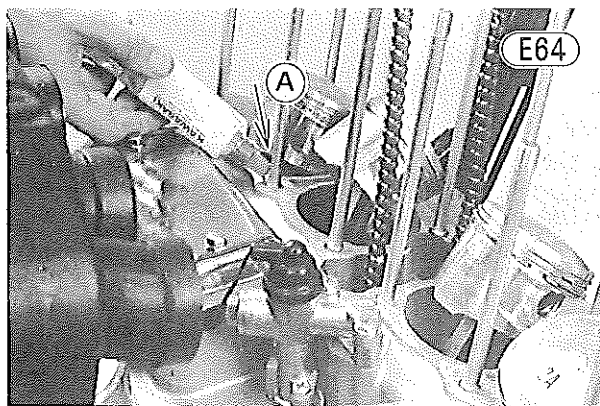
A. Compressed Air

- Remove the cloth from under each piston.
- Be sure that the knock pins (2) and the rubber dampers (2) on the camshaft chain guide roller shaft are in place. The knock pins must fit into the forward tension stud hole on either side of the crankcase.



A. Knock Pin
B. Guide Roller
C. Rubber Damper

- Put new O rings (4) on the cylinder bases.
- Apply a little liquid gasket around the studs (4) indicated in the figure. Wipe clean the excess liquid gasket that adheres to the mating surface.



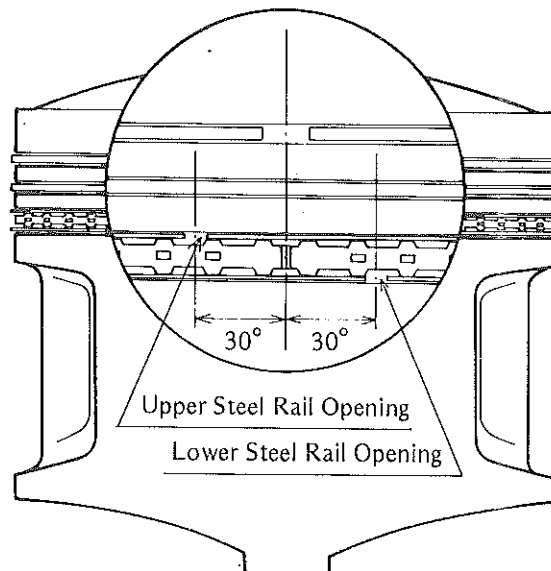
A. Apply a little liquid gasket.

- Install a new cylinder base gasket.
- Lifting up the cam chain so it doesn't get caught, turn the crankshaft so that all the pistons are at about the

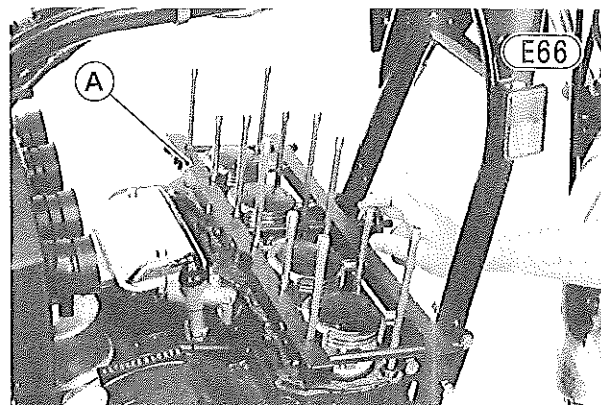
same height, and slip the piston bases (special tools) under the pistons to hold them level.

- Position each piston ring so that the opening in the top ring and oil ring expander of each piston is facing forward, and the second ring opening faces the rear. The openings of the oil ring steel rails must be about 30° to either side of the opening of the expander.

Piston Ring Installation



- Apply engine oil to the piston rings and cylinder inside surfaces. If the pistons and/or cylinder block are replaced, apply a thin coat of a molybdenum disulfide engine assembly grease to the new pistons and cylinder inside surfaces.
- Compress the piston rings using a piston ring compressor (special tool).



A. Piston Ring Compressor (57001-532)

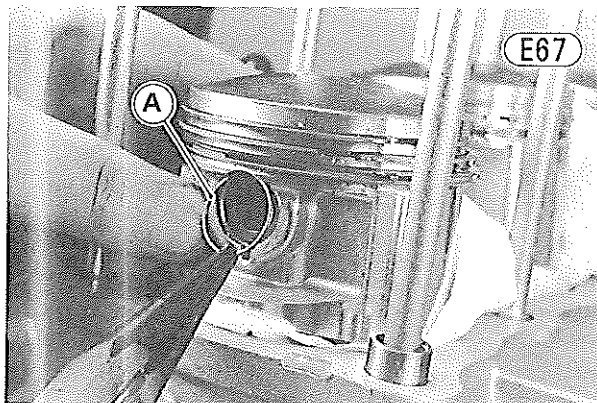
- Rest the bottom of the cylinders on the piston ring compressor.
- Pull the camshaft chain up through the cylinders and insert a screwdriver through it to avoid the chain falling into the crankcase.
- Work the bottom of each cylinder past the rings, and set the cylinder block in place while removing the special tool.

- Install the cylinder head (Pg. 54).
- Install the camshafts (Pg. 51), check valve clearance and adjust if necessary (Pg. 13).
- Install the carburetors (Pg. 44) and adjust the throttle cables (Pg. 15).
- Install the fuel tank (Pg. 41).
- Install the mufflers (Pg. 43).
- Check the idle and adjust the carburetors if necessary (Pg. 17).

PISTON, PISTON RINGS

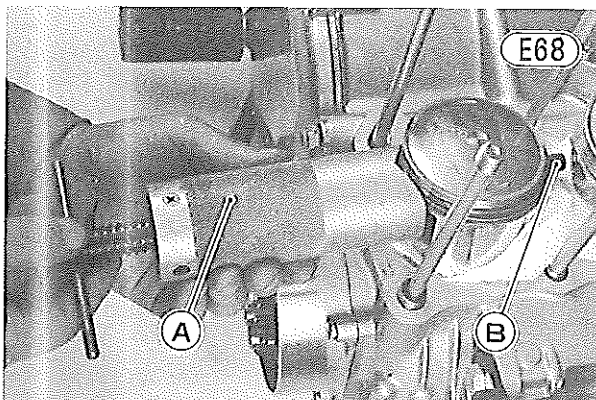
Removal:

- Remove the mufflers (Pg. 43).
- Remove the fuel tank (Pg. 41).
- Remove the carburetors (Pg. 44).
- Remove the camshafts (Pg. 51).
- Remove the cylinder block (Pg. 57).
- Wrap a clean cloth around the base of each piston to secure it in position for removal and so that no parts or dirt will fall into the crankcase.
- Remove the piston pin snap ring from the outside of each piston.



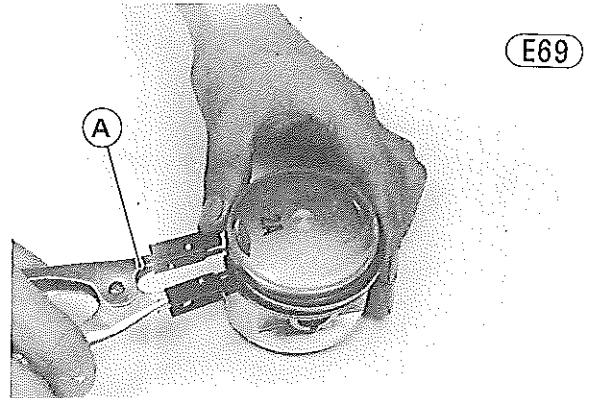
A. Piston Pin Snap Ring

- Remove each piston by pushing its piston pin out the side from which the snap ring was removed, and then put the pin back inside the piston as it must not be mixed up with the other pins. Mark the pistons as to cylinder number. Use the piston pin puller and adapter "C" (special tools) if necessary.

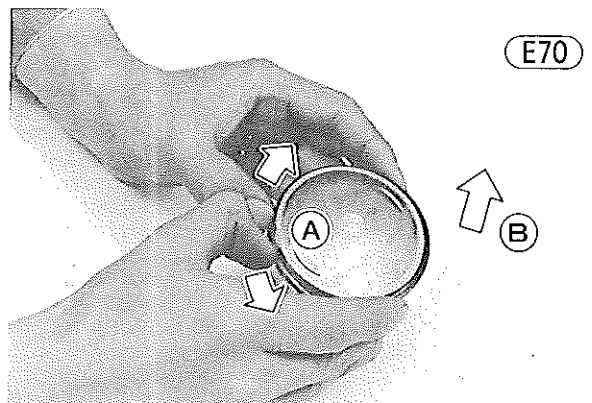


A. Piston Pin Puller (57001-910)
B. Adapter "C" (57001-914)

- Remove the top and second rings with the piston ring pliers (special tool). To remove a ring by hand, spread the ring opening with both thumbs, and then push up on the opposite side (Figs. E69 or E70).

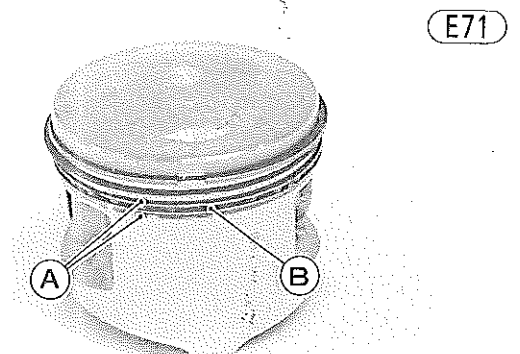


A. Piston Ring Pliers (57001-115)



A. Open. B. Push up.

- Remove the upper and lower piston ring steel rails, and then remove the expander.



A. Steel Rails B. Expander

Installation:

NOTE: If the piston is replaced with a new one, check that the piston to cylinder clearance is correct (Pg. 175).

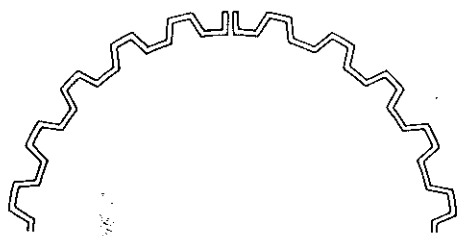
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Also, when a new piston or piston pin is installed, check that the piston to pin clearance is correct (Pg. 177).

- To install the oil ring, first install the expander so that the expander ends butt together.

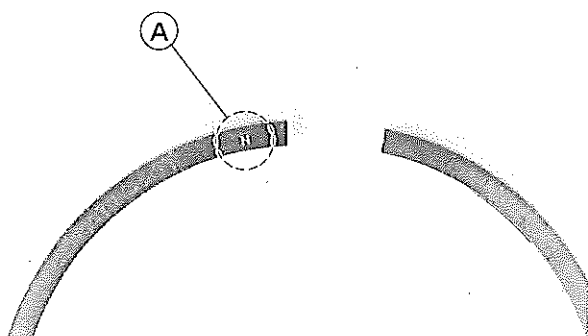
Oil Ring Expander Installation

(E72)



- Install the upper and lower steel rails. The two steel rails are identical. There is no "up" or "down" to the rails: They can be installed either way.
- Install the top and second rings so that the correct side (marked "N") faces up (Fig. E73). Do not mix up the top and second rings. The outer edges of the top ring are chamfered; the upper inner edge of the second ring is notched.

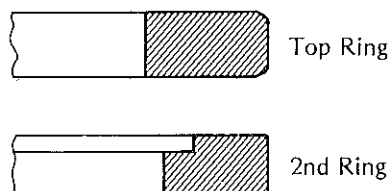
(E73)



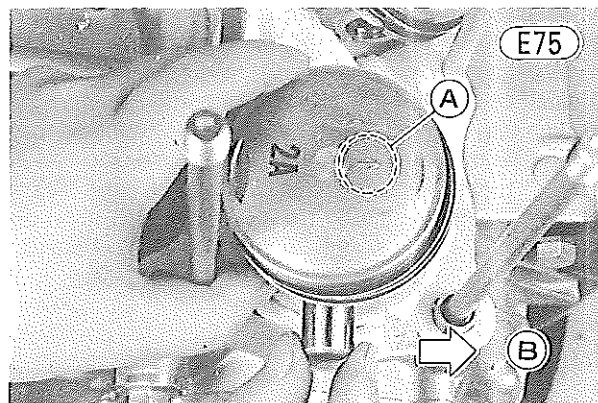
A. N Mark

Piston Rings

(E74)



- Apply a little engine oil to the piston pins. If the piston and/or piston pin are replaced, apply a thin coat of a molybdenum disulfide engine assembly grease to the piston pin.
- Install the pistons and piston pins. The arrow on the top of each piston must point towards the front.



A. Arrow Mark

B. Front

- Fit a new piston pin snap ring in each piston, as removal weakens and deforms the snap ring.
- Install the cylinder block (Pg. 57).
- Install the cylinder head (Pg. 54).
- Install the camshafts (Pg. 51), check valve clearance and adjust if necessary (Pg. 13).
- Install the carburetors (Pg. 44) and adjust the throttle cables (Pg. 15).
- Install the fuel tank (Pg. 41).
- Install the mufflers (Pg. 43).
- Check the idle and adjust the carburetors if necessary (Pg. 17).

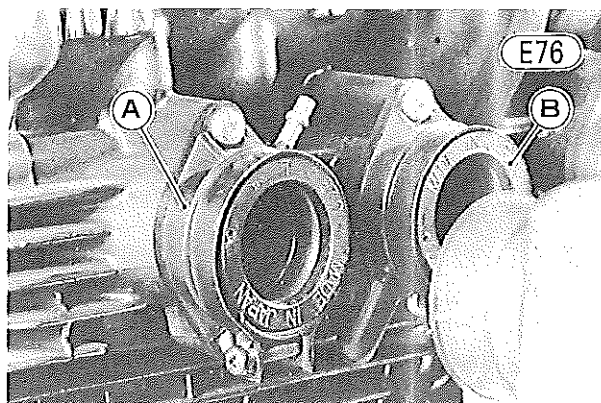
CARBURETOR HOLDERS

Removal:

- Remove the fuel tank (Pg. 41).
- Remove the carburetors (Pg. 44).
- Pull the vacuum hoses off the attachments.
- Remove the screws (8), and remove the carburetor holders from the cylinder head.

Installation Notes:

- For US model, install the #1 and #4 carburetor holders so that the vacuum hose attachments point upward and to the inside, and install the #2 and #3 carburetor holders so that the attachments point downward and to the outside.



A. #1 Carburetor Holder

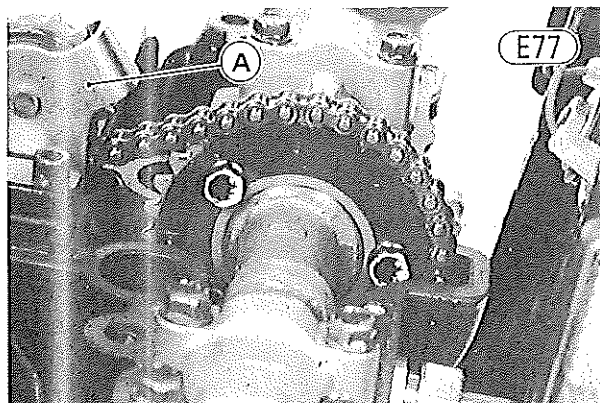
B. #2 Carburetor Holder

2. Apply a non-permanent locking agent to the mounting screw threads.

CAMSHAFT CHAIN GUIDE SPROCKET (Upper)

Removal:

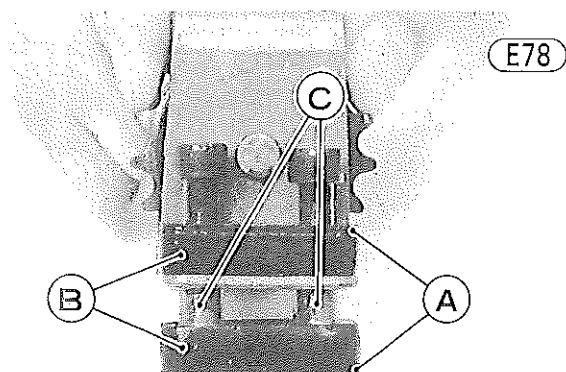
- Remove the fuel tank (Pg. 41).
- Remove the ignition coils and resistor (Pg. 48).
- Remove the cylinder head cover (Pg. 49).
- Remove the Allen bolts (4), and remove the camshaft chain upper guide sprocket.



A. Camshaft Chain Upper Guide

Installation Notes:

1. Assemble the rubber dampers and collars as shown in Fig. E78. Do not forget to insert the collars into the rubbers.



A. Steel Plates
B. Rubber Dampers

C. Collars

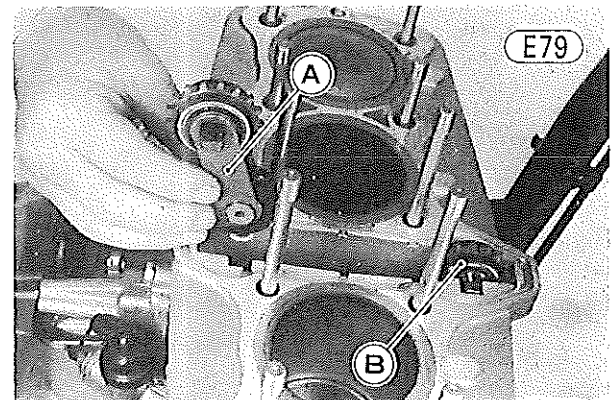
2. When installing the camshaft chain guide sprocket, apply a non-permanent locking agent to the Allen bolts (4), and tighten them to 1.0 kg-m (87 in-lbs) of torque.
3. After installing the chain guide sprocket, check the camshaft chain timing (Fig. E48 on Pg. 53).

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CAMSHAFT CHAIN GUIDE SPROCKET, ROLLER (Tensioner, Front)

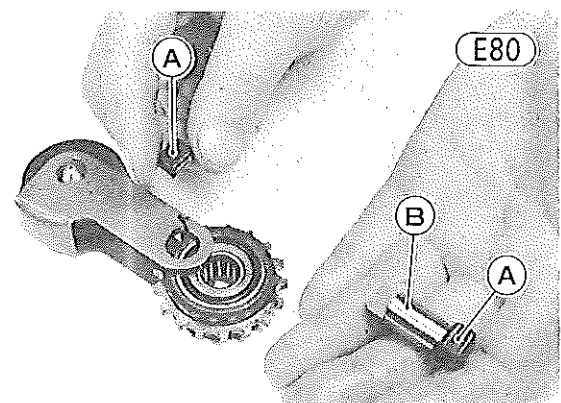
Removal:

- Remove the cylinder head (Pg. 54).
- Remove the camshaft chain tensioner assembly and front chain guide sprocket.



A. Chain Tensioner
B. Front Chain Guide Sprocket

- Remove the rubber dampers, and pull the sprocket shafts out of the sprockets.

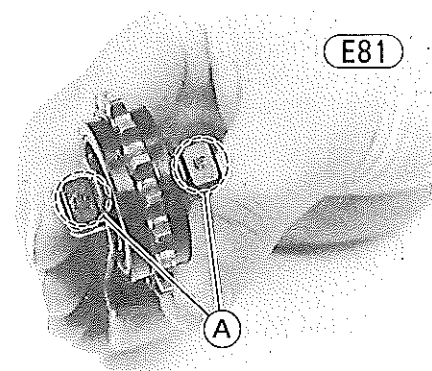


A. Rubber Damper

B. Shaft

Installation Notes:

1. Install the rubber dampers on the sprocket shaft ends using an adhesive agent with the side marked "UP", facing upwards.



A. "UP" Marks

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2. If the shafts and/or guide sprockets are replaced with new ones, apply a thin coat of a molybdenum disulfide engine assembly grease to them.

CAMSHAFT CHAIN GUIDE (Front), GUIDE ROLLER (Lower)

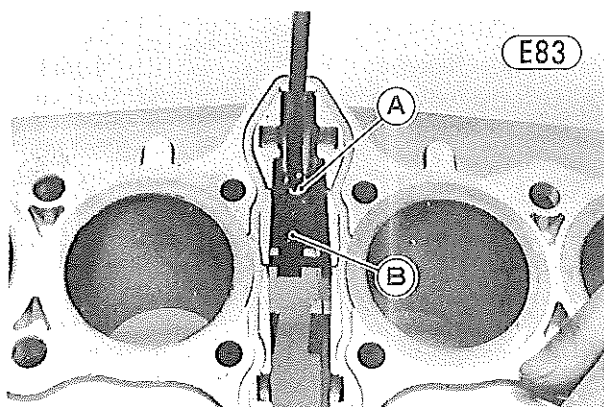
Removal:

- Remove the cylinder block (Pg. 57).
- Remove the lower chain guide roller from the crankcase.



A. Chain Guide Roller

- Remove the screw, and take the front chain guide out of the cylinder block.

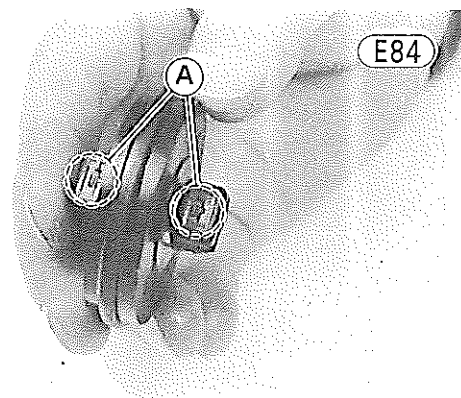


A. Screw

B. Chain Guide

Installation Notes:

1. Install the rubber dampers on the roller shaft ends using an adhesive agent with the side marked "UP" facing upwards.



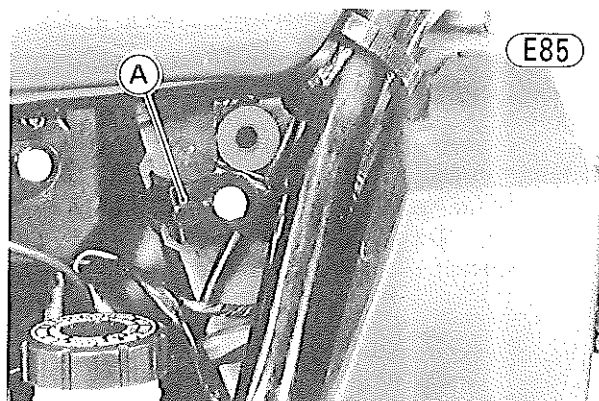
A. "UP" Marks

2. If the shaft or guide roller are replaced with new ones, apply engine oil to them.
3. Apply a non-permanent locking agent to the front chain guide mounting screw.

BREATHER COVER

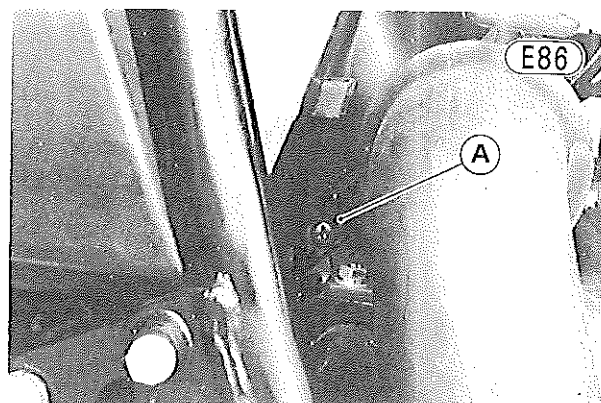
Removal:

- Remove the fuel tank (Pg. 41).
- Remove the carburetors (Pg. 43).
- Pull off the left and right side covers.
- Remove the air cleaner housing mounting bracket bolts, and take off the brackets (2). Each bolt has a lock-washer and flat washer.



A. Mounting Bracket

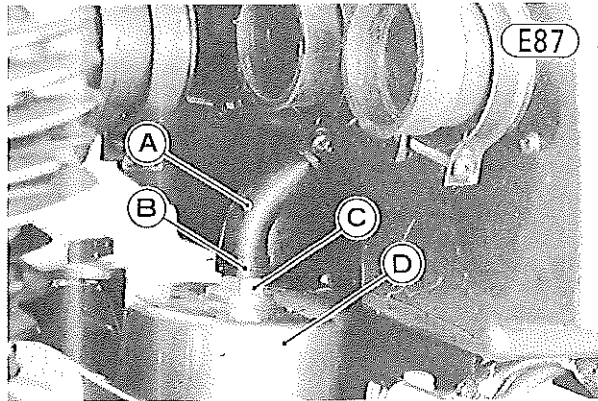
- Loosen the clamp that connects the air cleaner housing to the silencer.



A. Clamp

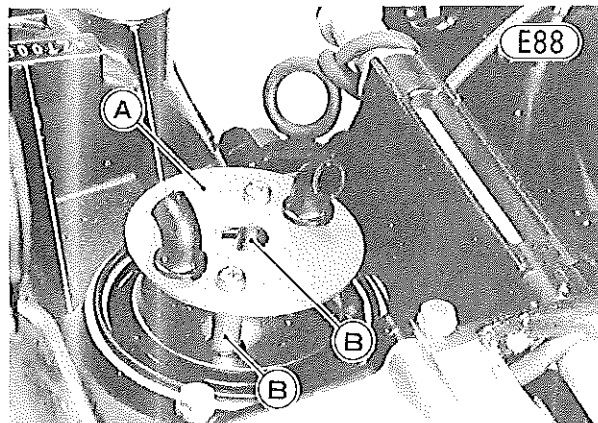
DISASSEMBLY—ENGINE INSTALLED 63

- Slide the clip out of place, and remove the breather hose from the breather cover bolt.



A. Breather Hose
B. Clip
C. Cover Bolt
D. Breather Cover

- Take off the air cleaner housing.
- Remove the breather cover bolt and O ring, and take off the breather cover and O ring.
- Remove the breather plate screws (2), and remove the collars and breather plates with the breather tubes.



A. Breather Plates
B. Collar

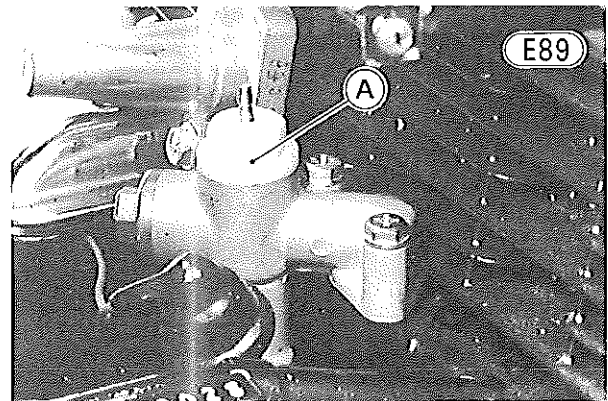
Installation Notes:

1. Replace the breather cover O ring, or breather cover bolt O ring with a new one if deteriorated or damaged, and apply a little engine oil to them before fitting them back into place.
2. Tighten the breather cover bolt to 1.5 kg-m (11.0 ft-lbs) of torque.

OIL PRESSURE SWITCH

Removal:

- Pull the oil pressure switch lead off the switch.
- Unscrew the switch, and remove the O ring.



A. Oil Pressure Switch

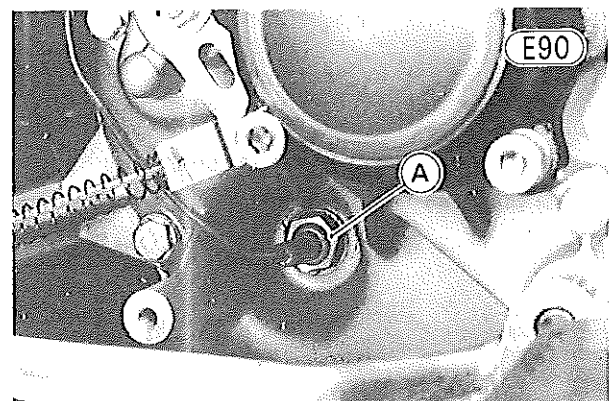
Installation Note:

- Tighten the oil pressure switch to 0.60 kg-m (52 in-lbs) of torque.

NEUTRAL SWITCH

Removal:

- Set the motorcycle up on its center stand.
- Place the oil pan beneath the front bevel gear case.
- Loosen the starter motor cover bolts (2).
- Remove the front bevel gear case cover bolts and flat washers (4 ea), and take off the cover.
- Disconnect the neutral switch lead from the switch.



A. Neutral Switch

- Unscrew the neutral switch and gasket.

Installation:

- Install the neutral switch and gasket, tightening the switch to 1.5 kg-m (11.0 ft-lbs) of torque.
- Connect the neutral switch lead to the switch terminal.
- Install the front bevel gear case cover, and tighten the cover bolts with the flat washers. Be careful not to pinch the wiring (starter, alternator, etc.) between the crankcase and the cover.

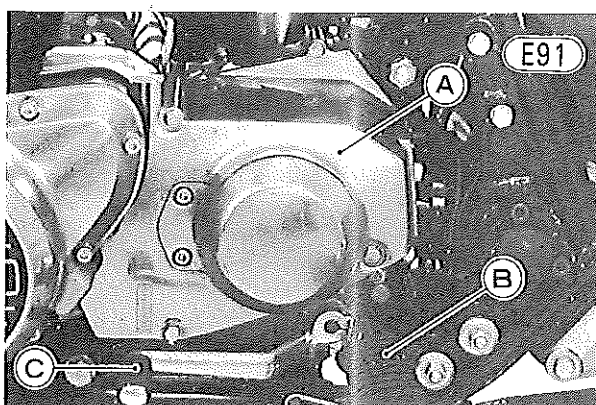
64 DISASSEMBLY—ENGINE INSTALLED

- Tighten the starter motor cover bolts (2).
- Check the engine oil level (Pg. 19), and add oil if necessary.

FRONT BEVEL GEAR CASE

Removal:

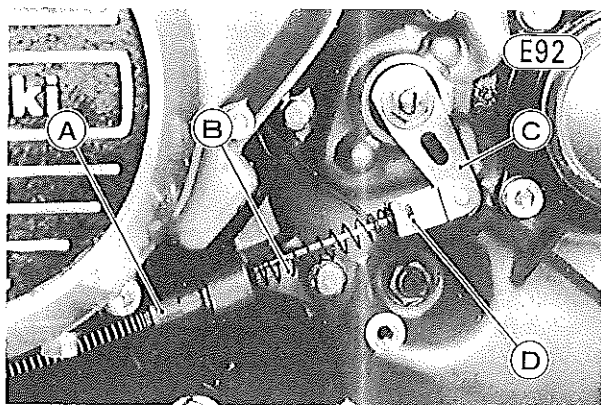
- Set the motorcycle up on its center stand.
- Place an oil pan beneath the front bevel gear case.
- Loosen the starter motor cover bolts (2).
- Remove the front bevel gear case cover bolts and flat washers (4 ea), and take off the cover.



A. Front Bevel Gear Case Cover
B. Left Footpeg

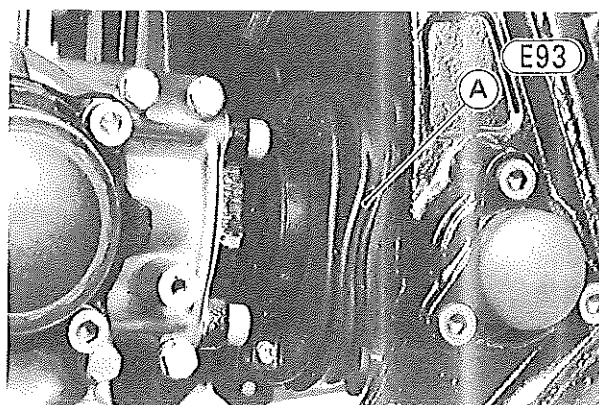
C. Shift Pedal

- Remove the left footpeg cap nuts and flat washers (2 ea), and take off the left footpeg.
- Check that the transmission is in neutral.
- Remove the shift pedal bolt, and take off the shift pedal.
- Turn in fully the locknut and adjusting nut at the center of the clutch cable to give the cable plenty of play.
- Remove the cotter pin from the clutch release lever, and free the clutch inner cable tip from the lever and front bevel gear case mount. The spring comes off with the cable.



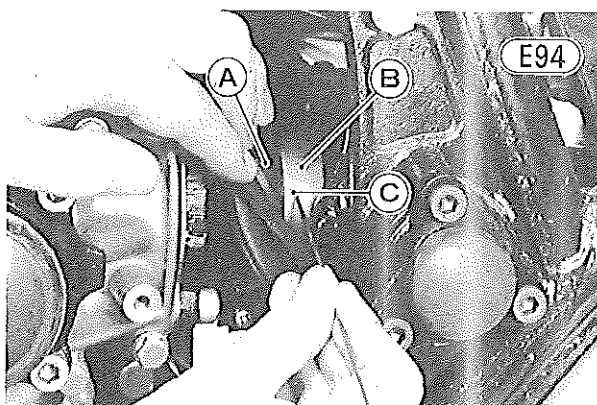
A. Clutch Cable
B. Spring

C. Clutch Release Lever
D. Cotter Pin



A. Dust Cover

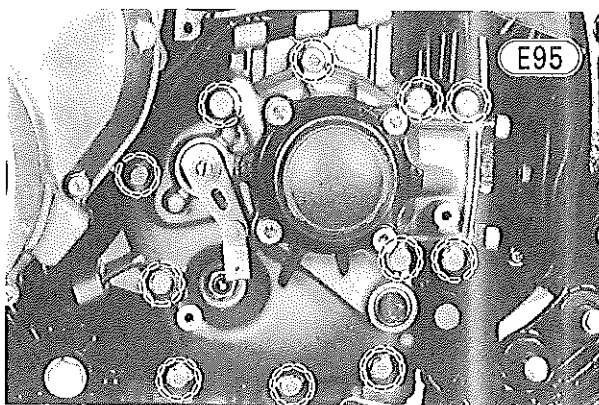
- Turn the rear wheel so that the sliding joint connecting pin hole at the yoke of the propeller shaft faces out.
- Pushing lightly on the sliding joint connecting pin with a suitable wire or tool, slide back the yoke of the propeller shaft to free the shaft from the driven gear joint.



A. Driven Gear Joint
B. Yoke

C. Pin

- Remove the front bevel gear case bolts (11), and take off the case and its gasket. There are two knock pins. The damper cam and spring come off with the case.



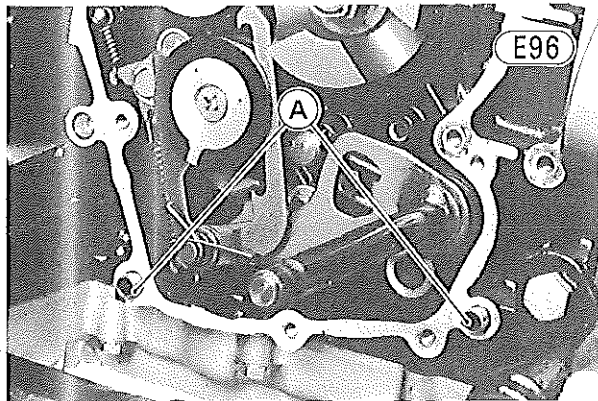
A. Case Bolts

- Loosen the rear shock absorber upper mounting cap nuts and the grab rail mounting bolt (Fig. G135, Pg. 149).
- Remove the rear shock absorber lower mounting nuts and pull the bottom ends of the shock absorbers off the studs.
- Remove the bolts (3 ea.) that secure the pivot shaft stop on both sides, and pull out the pivot shafts with their stops.
- Pushing lightly on the sliding joint connecting pin with a suitable wire or tool, slide back the yoke of the propellor shaft by pulling the rear wheel back slightly to free the shaft from the driven gear joint.

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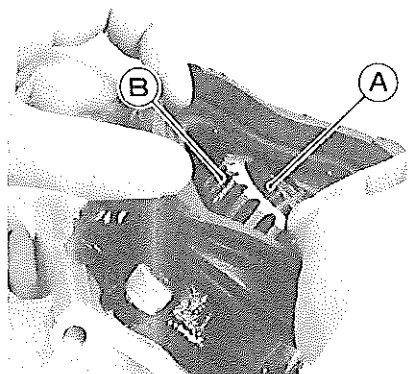
Installation:

- Check that the knock pins (2) are in place, and fit a new gasket onto the crankcase.



A. Knock Pins

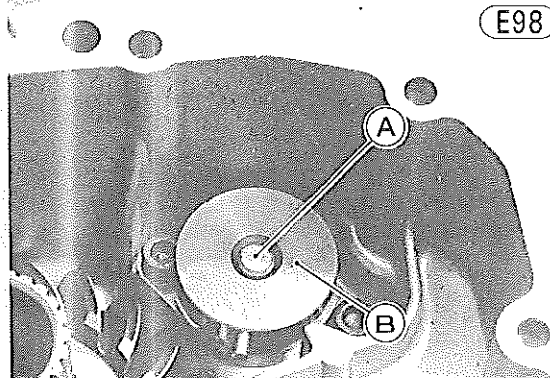
- Check that the sliding joint connecting pin spring is in place, and turn the gear so that the connecting pin hole faces up.



A. Spring

B. Pin Hole

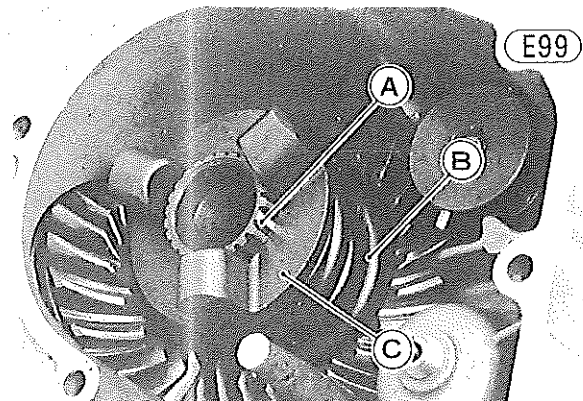
- Check that the sliding joint dust cover is fitted with the clamp.
- Check that the inside end of the clutch release adjusting screw is below the surface of the release shaft.



A. Adjusting Screw

B. Release Shaft

- Apply a thin coat of a molybdenum disulfide engine assembly grease to the end of the clutch push rod.
- Apply a high temperature grease to the splines of the sliding joint.
- Install the cam damper spring and damper cam follower on the front bevel drive gear shaft.



A. Drive Gear Shaft
B. Spring

C. Cam Follower

- E97** • To ease installation of the bevel gear case, pull the rear wheel back slightly and hold it in that position.
(Lift for further instructions)

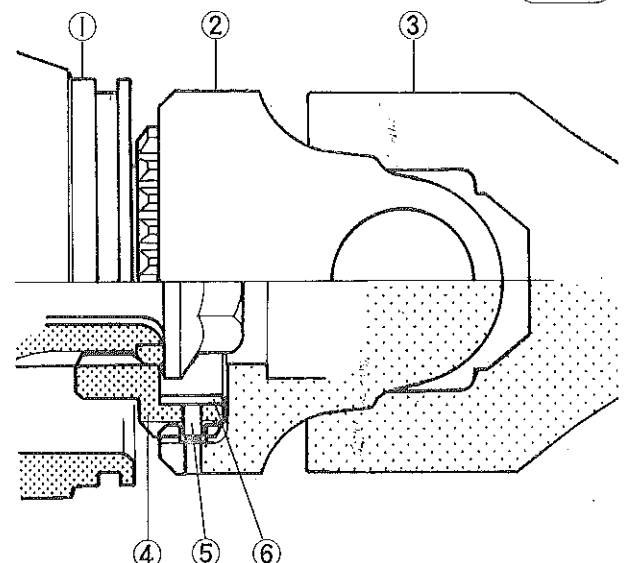
- Install the sliding joint connecting pin in the driven gear joint.

CAUTION

Do not push the connecting pin too far as it may fall inside the driven gear joint.

Connecting Pin Installation

E100



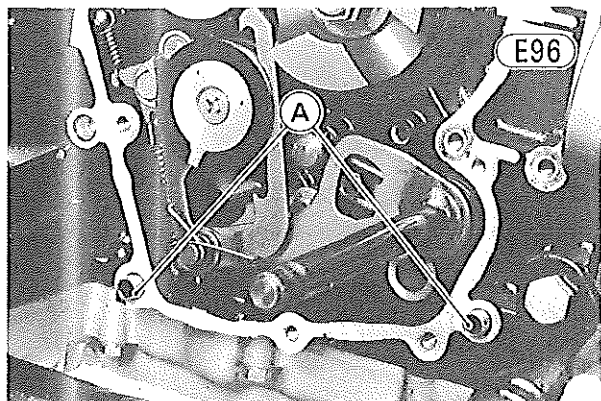
1. Bearing Housing
2. Yoke
3. Propeller Shaft

4. Driven Gear Joint
5. Connecting Pin
6. Pin Spring

DISASSEMBLY--ENGINE INSTALLED 65

Installation:

- Check that the knock pins (2) are in place, and fit a new gasket onto the crankcase.



A. Knock Pins

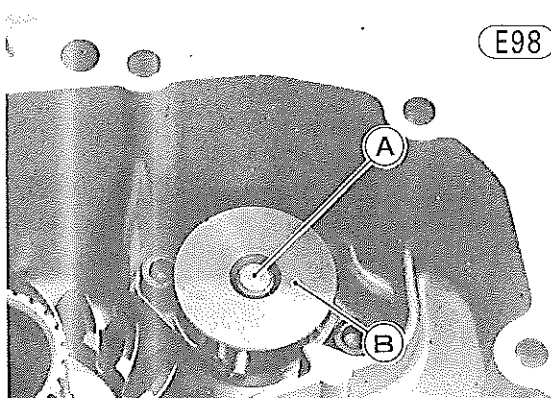
- Check that the sliding joint connecting pin spring is in place, and turn the gear so that the connecting pin hole faces up.



A. Spring

B. Pin Hole

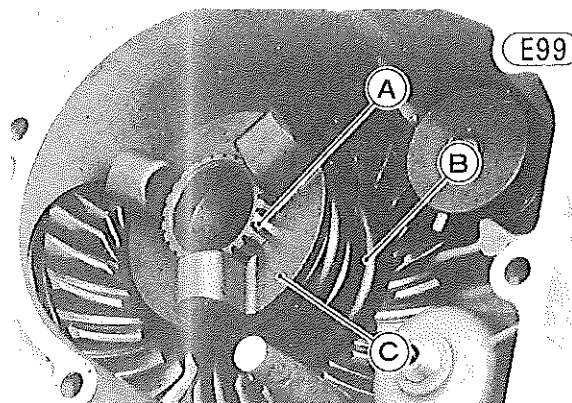
- Check that the sliding joint dust cover is fitted with the clamp.
- Check that the inside end of the clutch release adjusting screw is below the surface of the release shaft.



A. Adjusting Screw

B. Release Shaft

- Apply a thin coat of a molybdenum disulfide engine assembly grease to the end of the clutch push rod.
- Apply a high temperature grease to the splines of the sliding joint.
- Install the cam damper spring and damper cam follower on the front bevel drive gear shaft.



A. Drive Gear Shaft

B. Spring

C. Cam Follower

Insert the shift shaft oil seal guide (special tool P/N: 57001-266) in the front bevel gear case oil seal, and install the front bevel gear case so that the damper cam follower on the drive gear shaft fits into the damper cam on the end of the output shaft. Be careful not to pinch the wiring (starter motor, alternator, etc.) between the crankcase and the gear case.

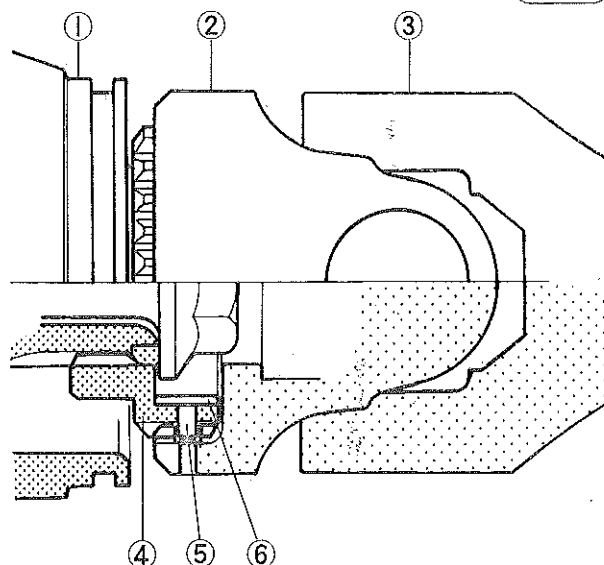
Tighten the case bolts (11).

- Install the sliding joint connecting pin in the driven gear joint.

CAUTION Do not push the connecting pin too far as it may fall inside the driven gear joint.

Connecting Pin Installation

E100

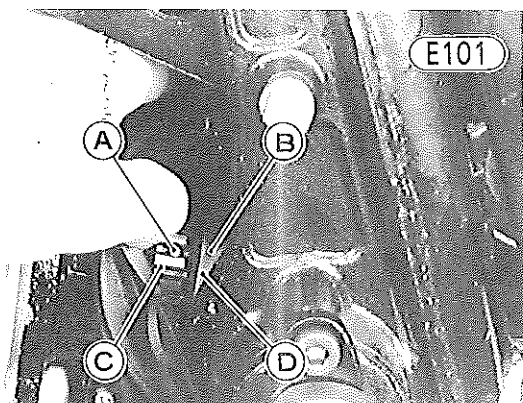


1. Bearing Housing
2. Yoke
3. Propeller Shaft

4. Driven Gear Joint
5. Connecting Pin
6. Pin Spring

66 DISASSEMBLY—ENGINE INSTALLED

- Align the connecting pin with the hole in the yoke of the propeller shaft, and fit the yoke to the driven gear joint, pushing lightly on the sliding joint connecting pin.



A. Pin
B. Hole
C. Driven Gear Joint
D. Yoke

Install the rear shock absorbers, and tighten their mounting nuts (4) to 2.5 kg-m (18.0 lb-ft) of torque.

Tighten the grab rail mounting bolt.

Install the pivot shafts with their stops, one on each side, and tighten the Allen bolts (6). If a pivot shaft locknut was loosened during removal, perform the pivot shaft installation procedure described in Swing Arm Installation (Pg. 150, 151).

(Lift for further instructions)

- Tighten the starter motor cover bolts (2).
- Mount the shift pedal so that the end of it is at the same as the lower left bolt on the front bevel gear case cover.
- Tighten the shift pedal bolt.
- Mount the left footpeg with its nuts and washers.
- Fill the engine with oil, checking the oil level (Pg. 19).

Front Bevel Gear Disassembly:

The front bevel gear disassembly section is divided as follows:

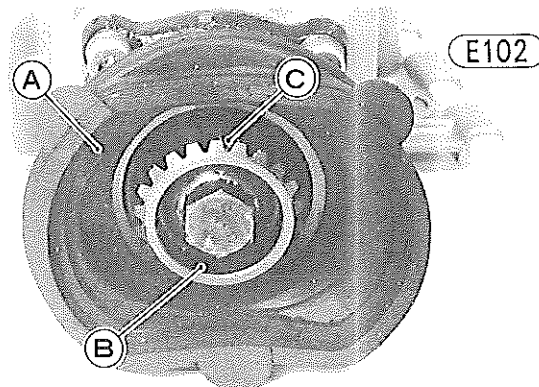
- Driven Gear Disassembly
- Driven Gear Assembly
- Drive Gear Disassembly
- Drive Gear Assembly
- Backlash and Tooth Contact Adjustment

- NOTES:** 1. Driven Gear Assembly and Drive Gear Assembly cover the bevel gear bearing preload adjustments. Improper preload can lead to damage of the bearings. The preload must be adjusted every time the driven gear bolt or drive gear nut is loosened.
2. Check and adjust the backlash and tooth contact of the bevel gears when replacing any of the parts which influence these items (Pg. 70).

3. The driven gear and drive gear are lapped together at the factory to get the best tooth contact. For this reason, they must be replaced as a set.

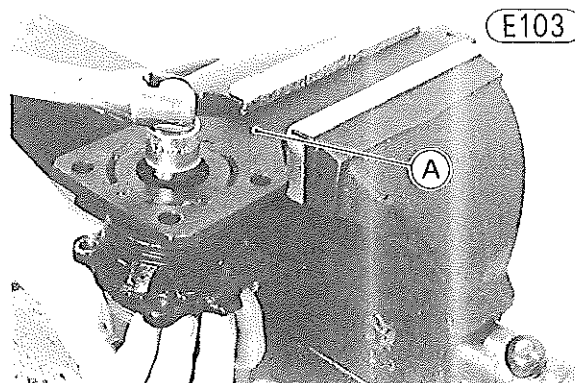
Driven Gear Disassembly:

- Remove the sliding joint dust cover clamp, and take off the dust cover.



A. Dust Cover
B. Spring
C. Connecting Pin

- Pull out the sliding joint connecting pin, and take out the spring.
- Remove the Allen bolts (4) and washers (4), and take out the driven gear bearing housing and shim(s) with the gear. Be careful not to damage the O ring at the outer side of the housing.
- Holding the driven gear joint with the driven gear holder (special tool), remove the driven gear bolt. To hold the driven gear joint with the driven gear holder, fit the gear assembly to the holder by hand or suitable bolts and nuts (See Fig. G55), and then grip the holder with a vise.



A. Driven Gear Holder (57001-1027)

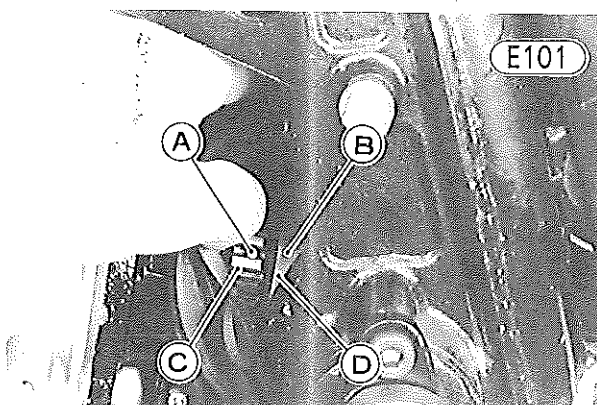
- Remove the O ring and driven gear joint, and take off the driven gear. The distance collar and spacer come out with the gear.
- Remove the oil seal and tapered roller bearing inner race from the housing.
- Using a soft rod, tap the tapered roller bearing outer races (2) and oil fence out of the housing.

Driven Gear Assembly:

- Replace the oil fence with a new one if it was damaged.

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- Align the connecting pin with the hole in the yoke of the propeller shaft, and fit the yoke to the driven gear joint, pushing lightly on the sliding joint connecting pin.



A. Pin
B. Hole
C. Driven Gear Joint
D. Yoke

- Slip the connecting joint dust cover back onto the swing arm.
- Connect the neutral switch lead to the switch.
- Run the clutch cable into the front bevel gear case mount and spring, and fit the tip of the inner cable into the clutch release lever.
- Using a new cotter pin, secure the cable tip to the release lever.
- Route the wiring (starter motor, alternator, etc.) between the crankcase and the front bevel gear case.
- Adjust the clutch (Pg. 18).
- Install the front bevel gear case cover, and tighten its bolts (4) with the flat washers. Be careful not to pinch the wiring (starter motor, alternator, etc.) between the crankcase and the cover.
- Tighten the starter motor cover bolts (2).
- Mount the shift pedal so that the end of it is at the same as the lower left bolt on the front bevel gear case cover.
- Tighten the shift pedal bolt.
- Mount the left footpeg with its nuts and washers.
- Fill the engine with oil, checking the oil level (Pg. 19).

Front Bevel Gear Disassembly:

The front bevel gear disassembly section is divided as follows:

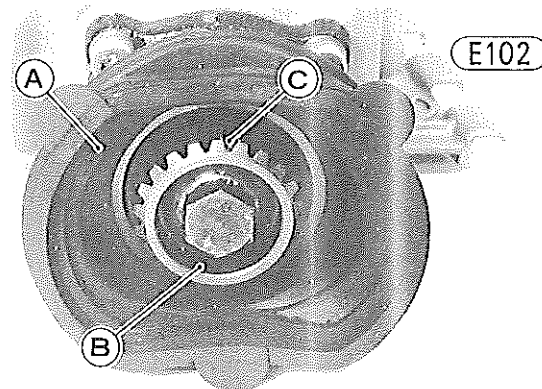
- Driven Gear Disassembly
- Driven Gear Assembly
- Drive Gear Disassembly
- Drive Gear Assembly
- Backlash and Tooth Contact Adjustment

- NOTES:** 1. Driven Gear Assembly and Drive Gear Assembly cover the bevel gear bearing preload adjustments. Improper preload can lead to damage of the bearings. The preload must be adjusted every time the driven gear bolt or drive gear nut is loosened.
2. Check and adjust the backlash and tooth contact of the bevel gears when replacing any of the parts which influence these items (Pg. 70).

3. The driven gear and drive gear are lapped together at the factory to get the best tooth contact. For this reason, they must be replaced as a set.

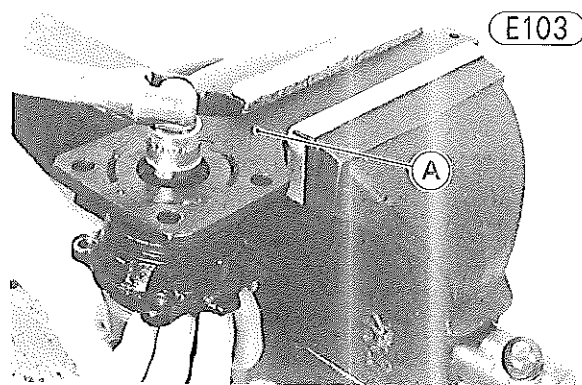
Driven Gear Disassembly:

- Remove the sliding joint dust cover clamp, and take off the dust cover.



A. Dust Cover
B. Spring
C. Connecting Pin

- Pull out the sliding joint connecting pin, and take out the spring.
- Remove the Allen bolts (4) and washers (4), and take out the driven gear bearing housing and shim(s) with the gear. Be careful not to damage the O ring at the outer side of the housing.
- Holding the driven gear joint with the driven gear holder (special tool), remove the driven gear bolt. To hold the driven gear joint with the driven gear holder, fit the gear assembly to the holder by hand or suitable bolts and nuts (See Fig. G55), and then grip the holder with a vise.



A. Driven Gear Holder (57001-1027)

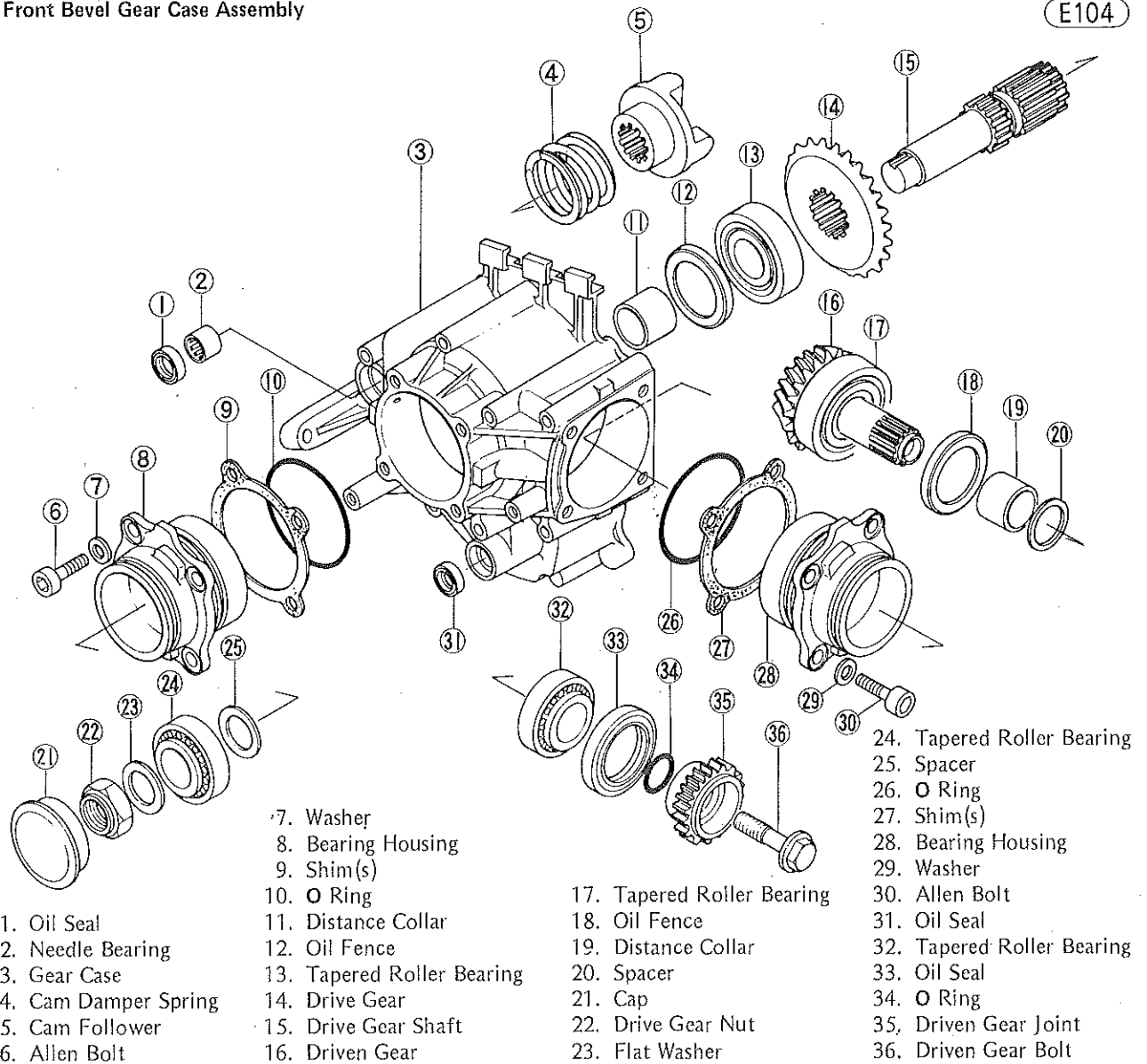
- Remove the O ring and driven gear joint, and take off the driven gear. The distance collar and spacer come out with the gear.
- Remove the oil seal and tapered roller bearing inner race from the housing.
- Using a soft rod, tap the tapered roller bearing outer races (2) and oil fence out of the housing.

Driven Gear Assembly:

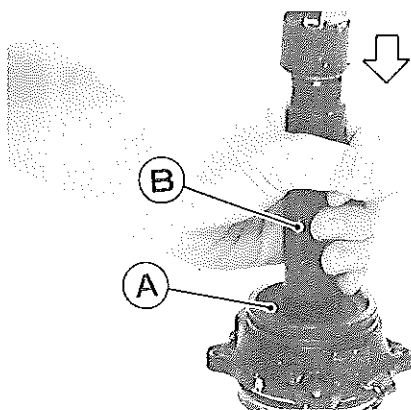
- Replace the oil fence with a new one if it was damaged.

Front Bevel Gear Case Assembly

E104



●Using the bearing driver and bearing driver holder (special tools), press the oil fence and tapered roller bearing outer races in until they stop at the bottom of the housing hole.



A. Bearing Driver (57001-140)
B. Bearing Driver Holder (57001-139)

Table E1 Bearing Driver Necessary for Bearing Housing Assembly

	Special Tool P/No.
Oil Fence	57001-140
Small Outer Race	57001-140
Large Outer Race	Not Necessary

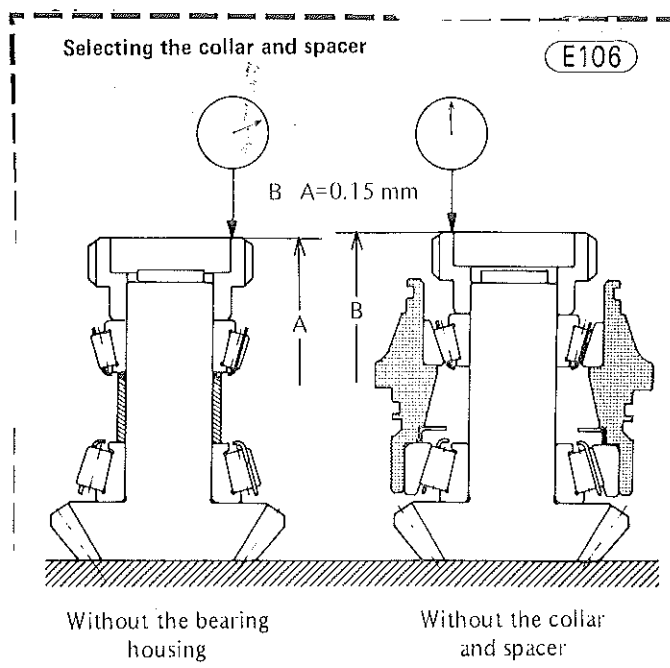
- Install the small tapered roller bearing inner race, and press in the oil seal until the face of the seal is level with the end of the housing hole.
- Adjust the driven gear bearing preload using the following 6 steps.
- Select the distance collar and spacer so that the total width of them is 0.15 mm less than the distance between the inner races of the tapered roller bearings.

CAUTION

Do not use the collar and spacer so that the total width of them is 0.5 mm less than the distance between the inner races of the

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bearings. If the driven gear bolt is tightened to proper torque using the shorter collar and spacer, the tapered roller bearings have a damage.



Measure the difference between the height of the "A" and the "B". It is the difference between the total width of the collar and spacer and the distance between the tapered roller bearing inner races.

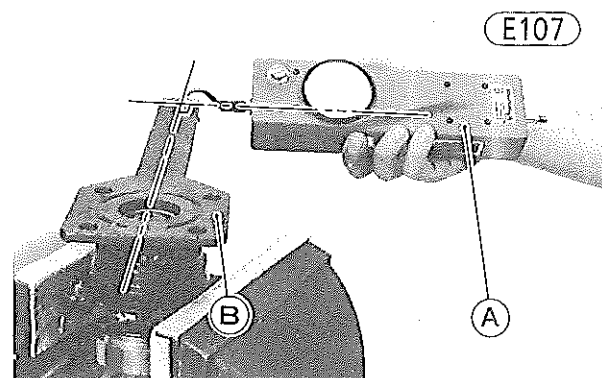
- Install the driven gear with the selected collar and spacer, and install the driven gear joint and O ring.
- Using the driven gear holder (special tool), tighten the driven gear bolt to 12.0 kg-m (87 ft-lbs) of torque.
- Attach the driven gear holder to the gear joint, and turn the driven gear one full turn clockwise and then

counterclockwise 20 times so that the bearing preload becomes constant.

- Attach a spring scale to the hole in the handle of the holder. Pull on the scale, keeping it at a right angle to the handle of the holder, and measure the force needed to start the driven gear turning.

Table E2 Driven Gear Bearing Preload (with Oil Seal)

Spring Scale Reading
0.35 ~ 0.55 kg



- A. Spring Scale
- B. Driven Gear Holder (57001-1027)

CAUTION Because the tapered roller bearings may be damaged, they must be replaced with new ones, if the bearing preload is more than 0.70 kg-m.

○If the preload is not correct, replace the distance collar and/or spacer referring to the following notes, and recheck the driven gear bearing preload.

NOTES: 1. Distance collar and spacer are available in the sizes shown in the following table.

Table E3 Distance Collars and Spacers

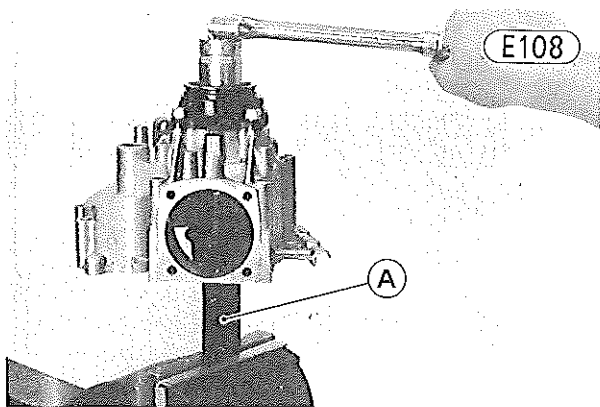
Collar		Spacers	
Width (mm)	P/No.	Width (mm)	P/No.
22.8	92027-1152	1.70	92025-1072
22.9	92027-1153	1.72	92025-1073
23.0	92027-1154	1.74	92025-1074
23.1	92027-1155	1.76	92025-1075
23.2	92027-1156	1.78	92025-1076
23.3	92027-1157	1.80	92025-1077
23.4	92027-1158		
23.5	92027-1159		
23.6	92027-1160		
23.7	92027-1161		
23.8	92027-1162		
23.9	92027-1163		
24.0	92027-1164		
24.1	92027-1165		

2. To decrease the torque of the driven gear bearing preload by 0.10 kg-m (9 in-lbs), increase the total width of the distance collar and spacer by about 0.08 mm, and vice versa.

- Stake the driven gear bolt to the driven gear shaft.
- Adjust the backlash and tooth contact of the front bevel gears (Pg. 70), if the driven gear, bearing housing, or tapered roller bearing was replaced.

Drive Gear Disassembly:

- Remove the driven gear assembly as explained in driven gear disassembly (Pg. 66).
- Remove the drive gear cap.
- Pry up the staked portion of the drive gear nut.
- Hold the drive gear shaft with the drive gear holder (special tool) gripped in a vise, and remove the drive gear nut.

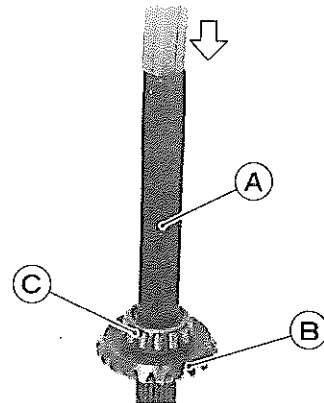


A. Drive Gear Holder (57001-1026)

- Remove the flat washer, the tapered roller bearing inner race, and the drive gear shaft with the drive gear and the other tapered roller bearing inner race attached to it. The distance collar and spacer also come out with the shaft.
- To separate the drive gear from the shaft, press the shaft from the small diameter side, and remove the shaft from the drive gear and tapered roller bearing inner race.
- Remove the Allen bolts (4) and washers (4), and take the drive gear bearing housing and shim(s). Be careful not to damage the O ring at the outside of the housing.
- Using a soft rod, tap the tapered roller bearing outer races (2) and oil fence out of the housing.

Drive Gear Assembly:

- Replace the oil fence with a new one if it is damaged.
- Using the bearing driver and bearing driver holder (special tools), press the oil fence and the tapered roller bearing outer races in until they stop at the bottom of the housing hole. See Table E1 on Pg. 67.
- Using a transmission circlip driver (special tool), press in the drive gear.



A. Transmission Circlip Driver (57001-380)

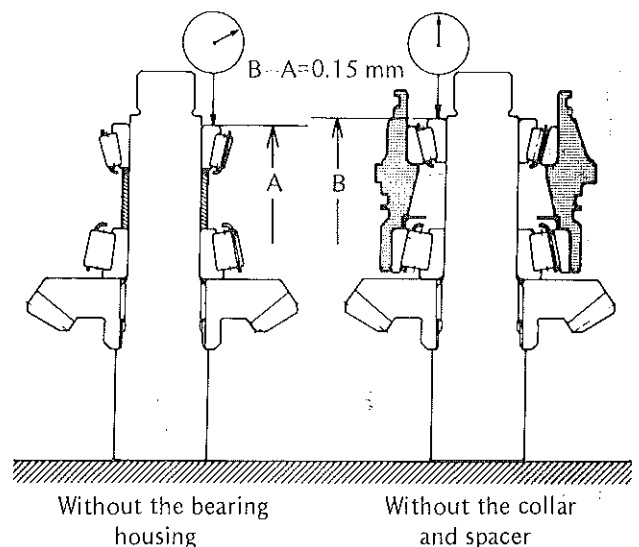
B. Drive Gear

C. Inner Race

- Press in the tapered roller bearing inner race with the same driver used for pressing on the drive gear.
- Adjust the drive gear bearing preload using the following 7 steps.
- Select the distance collar and spacer so that the total width of the collar and spacer is 0.15 mm less than the distance between the inner races of the tapered roller bearing.

Selecting the collar and spacer

E110



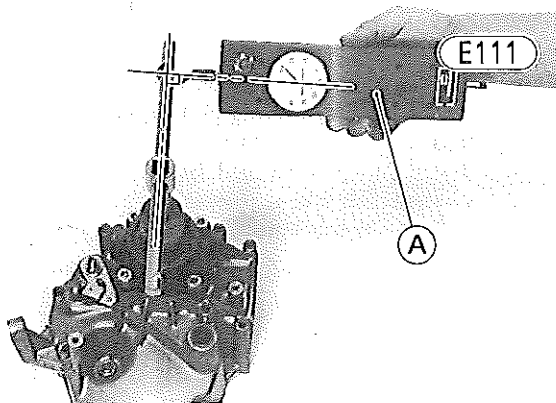
Measure the difference between the height of the "A" and the "B". It is the difference between the total width of the collar and spacer and the distance between the tapered roller bearing inner races.

CAUTION

Do not use the collar and spacer so that the total width of them is 0.5 mm less than the distance between the inner races of the bearings. If the drive gear nut is tightened to proper torque using the shorter collar and spacer, the tapered roller bearings have a damage.

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- Install the drive gear and shaft assembly in the bearing housing, and fit a selected distance collar and spacer.
- Replace the drive gear nut if it has two staked portions.
- Install the tapered roller bearing inner race and flat washer, and tighten the drive gear nut to 12.0 kg-m (87 ft-lbs) of torque, holding the shaft with the drive gear holder (special tool) gripped in a vise.
- Attach a socket wrench to the drive gear nut, and turn the drive gear one full turn clockwise and counterclockwise 20 times each so that the bearing preload becomes constant.
- Attach a spring scale to the wrench at a point 200 mm from the center of the drive gear shaft. Pull on the scale, keeping it at a right angle to the socket wrench handle, and measure the force needed to start the drive gear turning.



A. Spring Scale

CAUTION Because the tapered roller bearings may be damaged, they must be replaced with new ones, if the bearing preload is more than 0.70 kg-m.

Table E4 Drive Gear Bearing Preload

Spring Scale Reading
0.3 ~ 0.5 kg

○If the preload is not correct, replace the distance collar and/or spacer referring to the following notes, and recheck the drive gear preload.

- NOTES:** 1. Distance collars and shims are available in the sizes shown in Table E3.
2. To decrease the preload by 0.10 kg-m (9 in-lbs), increase the total width of the distance collar and spacer by 0.08 mm, and vice versa.
- To install the drive gear bearing housing in the front bevel gear case, remove the drive gear nut and separate the drive gear from the bearing housing.
 - Adjust the backlash and tooth contact of the front bevel gear, if the drive gear, gear shaft, bearing housing, or tapered roller bearing was replaced.

Backlash and Tooth Contact Adjustment:

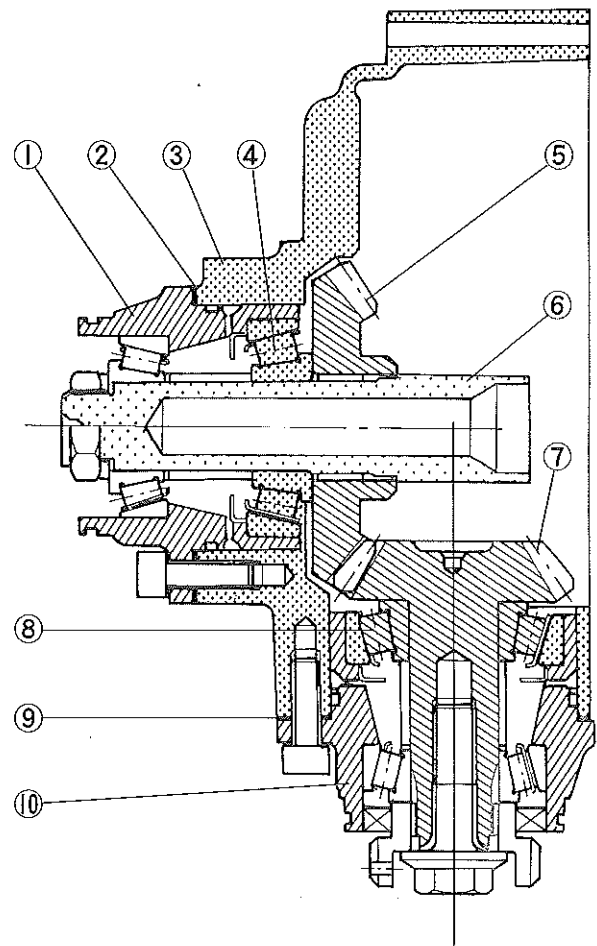
Backlash and tooth contact of bevel gears

Improper backlash or tooth contact of the bevel gears may lead to noise and gear damage.

Be sure to check and adjust the backlash and tooth contact of the bevel gears whenever the following parts are replaced. First, adjust the gear backlash, and then get the correct tooth contact pattern by replacing shims.

Parts which change the backlash and/or tooth contact

(E112)

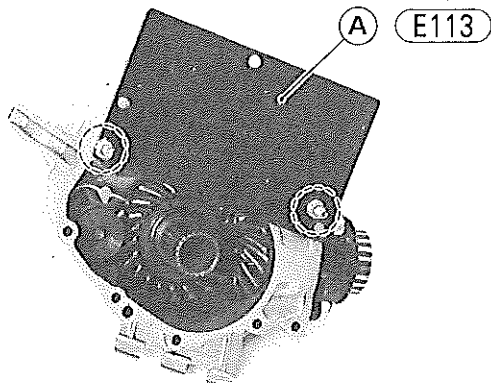


1. Drive Gear Bearing Housing
2. Shim(s) for Drive Gear
3. Front Bevel Gear Case
4. Tapered Roller Bearing
5. Drive Gear
6. Drive Gear Shaft
7. Driven Gear
8. Tapered Roller Bearing
9. Shim(s) for Driven Gear
10. Driven Gear Bearing Housing

Backlash adjustment

- Clean any dirt and oil off the teeth of the bevel gears.
- Install the drive gear bearing housing in the front bevel gear case with a 0.9 mm standard shim.
- Tighten the housing Allen bolts (4) and flat washers (4) to 2.5 kg-m (18.0 ft-lbs) of torque.
- Install the drive gear and shaft assembly in the bearing housing with the selected distance collar and shim.

- Install the tapered roller bearing inner race and flat washer.
- Tighten the drive gear nut securely.
- Install the driven gear assembly in the front bevel gear case with a 0.9 mm standard shim.
- Tighten the driven gear bearing housing Allen bolts (4) and flat washers (4) to 2.5 kg-m (18.0 ft-lbs) of torque.
- Mount the dial gauge holder (special tool) on the front bevel gear case, using the gear case bolts and nuts. (Any 6 mm diameter nut with 1.0 mm pitch threads will work.)

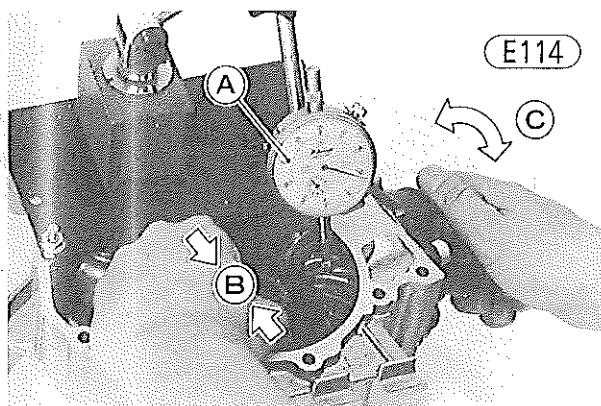


A. Dial Gauge Holder (57001-1049)

- Mount a dial gauge on the holder with its tip against one of the driven gear teeth.
- To measure the backlash, move the driven gear back and forth while holding the drive gear steady. The difference between the highest and lowest gauge readings is the amount of backlash.

Table E5 Front Bevel Gear Backlash

Standard
0.13~0.18 mm



A. Dial Gauge

B. Hold

C. Move

- If the backlash is incorrect, replace the shim at the drive gear housing and/or shim at the driven gear housing referring the following notes, and recheck the backlash.

NOTES: 1. Shims are available in the sizes shown in the following table.

Table E6 Shim Sizes

Thickness (mm)	P/N
0.15	92025-1078
0.5	92025-1079
0.6	92025-1080
0.7	92025-1081
0.8	92025-1082
0.9	92025-1083
1.0	92025-1084
1.2	92025-1085

- To increase the amount of backlash by 0.1 mm, decrease the drive gear shim(s) thickness by about 0.13 mm, and vice versa. In the case of the driven gear shim(s), decrease the thickness by about 0.25 mm.

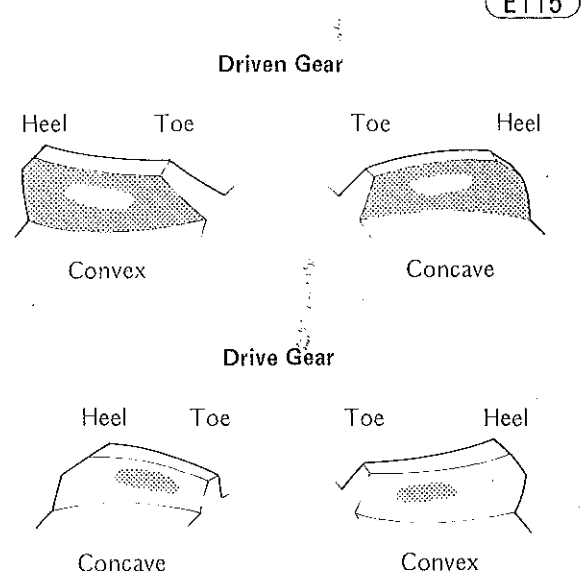
Tooth contact adjustment

- To check the tooth contact, apply checking compound to 4 or 5 teeth of the driven gear.

- NOTES: 1. Check that there is no dirt or oil on the teeth.
- Special compounds are available from automotive supply stores for the purpose of checking differential gear tooth patterns and contact. Use this for checking the bevel gears.
 - The checking compound must be smooth and firm, with the consistency of tooth paste.
 - Apply the checking compound to the teeth in a thin, even coat with a fairly stiff paint brush. If painted too thickly, the exact tooth pattern may not appear.
 - Turn the driven gear for 3 or 4 revolutions in the drive and reverse (coast) directions, while creating a drag on the drive gear.
 - Check the drive pattern and coast pattern of the bevel gear teeth.

NOTE: The tooth contact patterns of both drive and coast sides should be centrally located between the top and bottom of the tooth. The drive side of the drive gear is the convex side, and the coast side is the concave side.

Correct Tooth Contact Pattern



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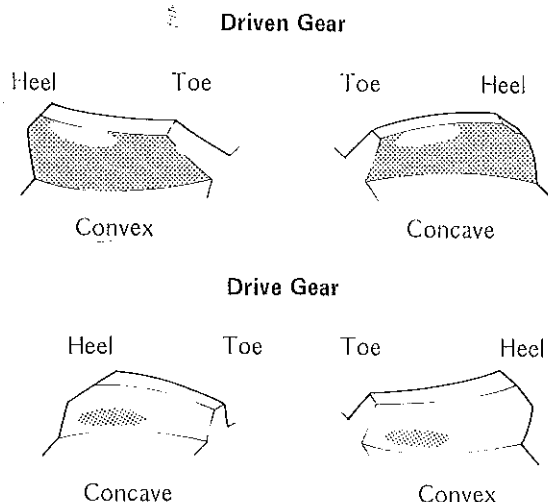
- If the tooth contact pattern is incorrect, replace the shims following the examples below. Then erase the tooth contact patterns, and check them again. Also, check the backlash every time the shims are replaced.

Ex. 1: Incorrect tooth contact pattern 1

Decrease the thickness of the shim pack at the drive gear housing by 0.05 mm, and increase the thickness of the shim pack at the driven gear housing by 0.1 mm to correct the pattern as shown in Fig. E115. Repeat the shim change procedure as necessary. Check that the tooth contact pattern.

Incorrect Tooth Contact Pattern 1

E116

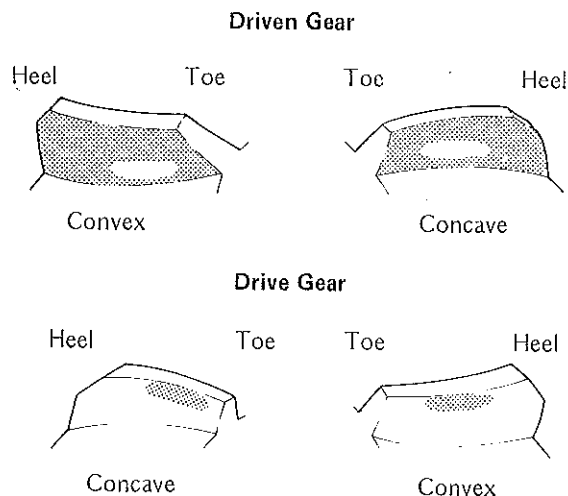


Ex. 2: Incorrect tooth contact pattern 2

Increase the drive gear shim pack thickness by 0.1 mm, and decrease the driven gear shim pack by 0.05 mm. Check the tooth contact pattern. Repeat the shim change procedure as necessary.

Incorrect Tooth Contact Pattern 2

E117

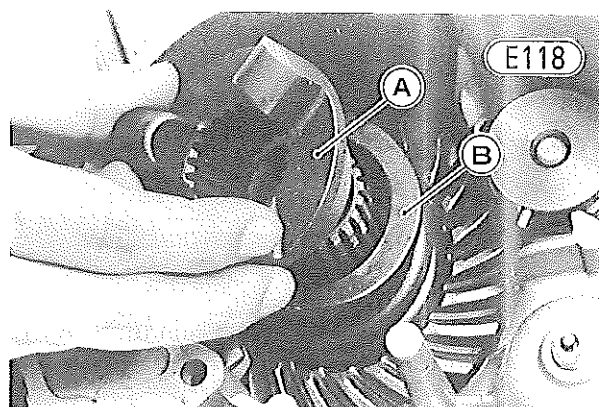


- When the correct tooth contact pattern is obtained, clean the checking compound off the gears.

- Stake the drive gear nut to the notch on the drive gear shaft after tightening it to 12.0 kg-m (87 ft-lbs) of torque.
- Replace the drive gear cap if it is damaged. Install the cap on the front bevel gear case.

DAMPER CAM, CAM FOLLOWER, SPRING Removal:

- Remove the front bevel gear case (Pg. 64), and take the damper cam follower and spring off the drive gear shaft.



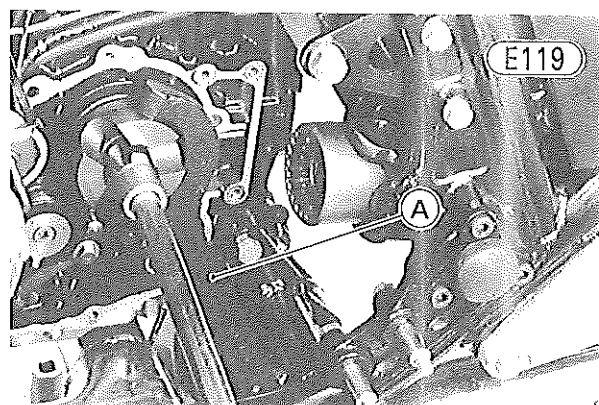
A. Damper Cam Follower

B. Spring

- Remove the external shift mechanism shaft as explained in external shift mechanism removal (Pg. 74).

- Pry up the staked portion of the damper cam nut. **CAUTION** Be careful not to damage the output shaft during this operation.

- Hold the damper cam on the output shaft with the damper cam holder (special tool), and remove the damper cam nut and flat washer.



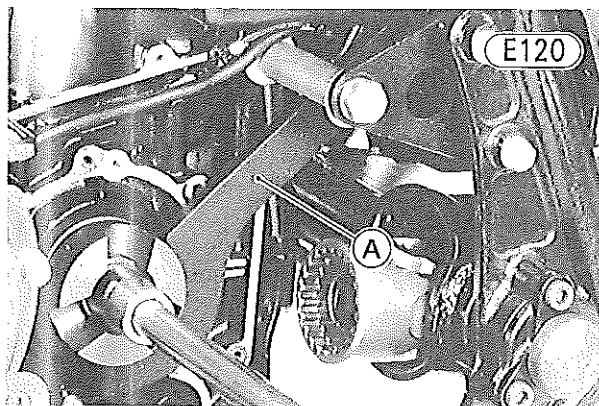
A. Damper Cam Holder (57001-1025)

Installation:

- Mount the damper cam on the output shaft. Install the flat washer.

DISASSEMBLY—ENGINE INSTALLED 73

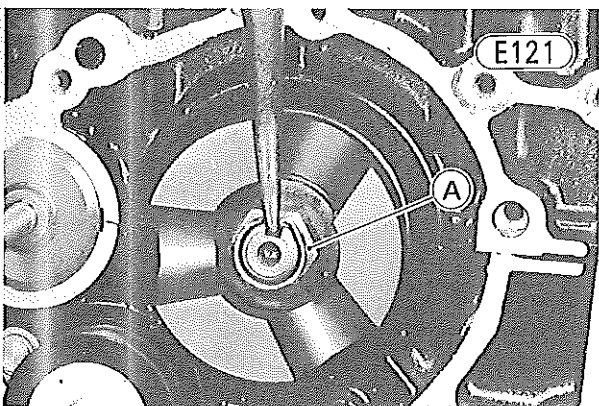
- Replace the damper cam nut if it has two staked areas. Install the nut, and tighten it to 12.0 kg-m (87 ft-lbs) of torque while using the damper cam holder (special tool) to keep the damper cam steady.



A. Damper Cam Holder (57001-1025)

- Stake the damper cam nut to the notch on the output shaft.

CAUTION Be careful not to damage the output shaft during this operation.



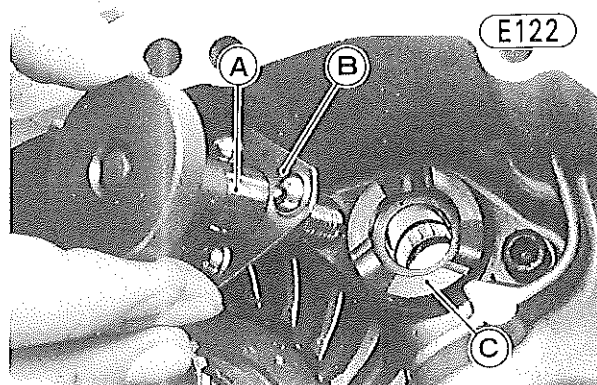
A. Damper Cam Nut

- Install the external shift mechanism shaft as explained in the external shift mechanism installation section (Pg. 75).
- Install the damper cam follower and spring as explained in the front bevel gear case installation section (Pg. 65).
- Adjust the clutch (Pg. 18).
- Fill the engine with oil, checking the oil level (Pg. 19).

CLUTCH RELEASE Removal:

- Remove the front bevel gear case (Pg. 64).

- Remove the clutch adjusting screw locknut, and take off the flat washer and clutch release lever.
- Pull off the clutch release shaft and ball assembly.



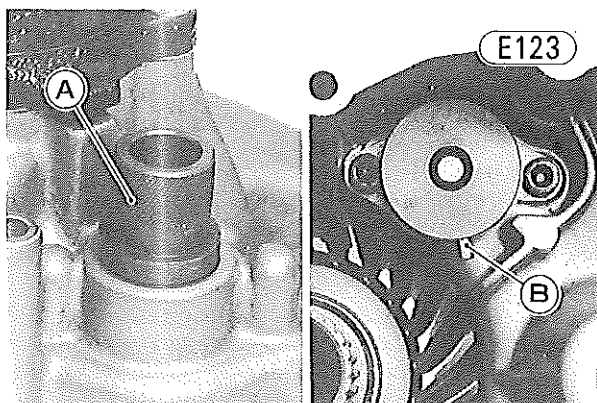
A. Clutch Release Shaft
B. Ball Assembly

C. Ramp

- Remove the ball ramp mounting Allen bolts (2), and take off the ramp.
- Using a hook, pull out the clutch release shaft oil seal, insert a metal rod from the inside of the case, and remove the needle bearing by tapping evenly around the bearing.

Installation:

- Inspect the needle bearing and oil seal, and replace if necessary (Pg. 192).
- Drive in the needle bearing until it stops at the bottom of the hole. The marked side of the bearing faces out.
- Install the ball ramp, and tighten the mounting Allen bolts (2) to 1.0 kg-m (87 in-lbs) of torque.
- Press the oil seal in until the face of the seal is level with the end of the grease seal hole.
- Apply a high temperature grease to the oil seal lip.
- Install the ball assembly and clutch release shaft using the oil seal guide (special tool). The clutch release shaft stop pin must point to the direction as shown.

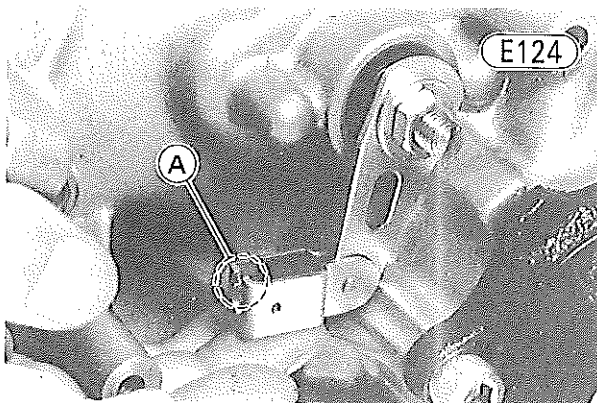


A. Oil Seal Guide (57001-261)

B. Pin

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- Install the clutch release lever, flat washer, and locknut. The notch of the lever must face up.



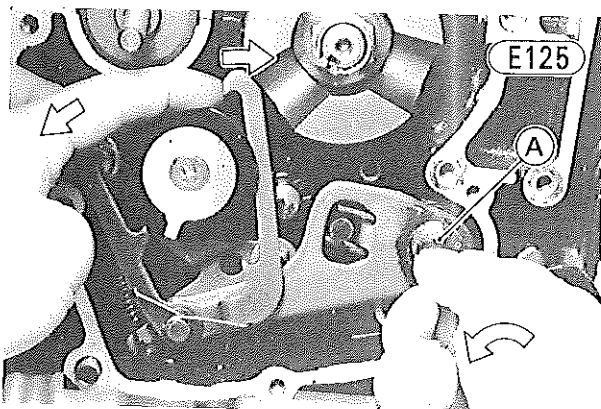
A. Notch

- Install the front bevel gear case (Pg. 65).
- Adjust the clutch (Pg. 18).

EXTERNAL SHIFT MECHANISM

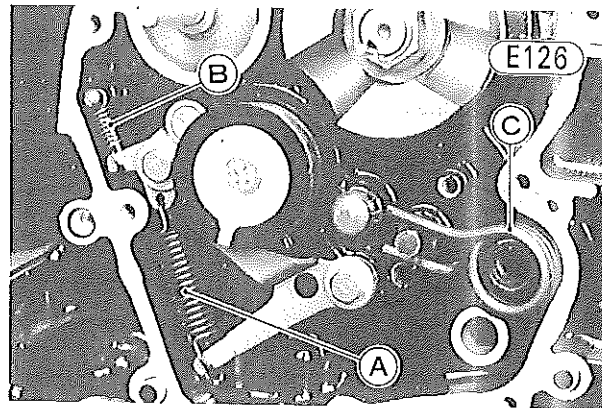
Removal:

- Remove the front bevel gear case (Pg. 64).
- Move the shift mechanism arm 7 and overshift limiter 8 out of their positions on the end of the shift drum, and pull out the shift shaft 14 turning the shaft counter-clockwise.



A. Shift Shaft

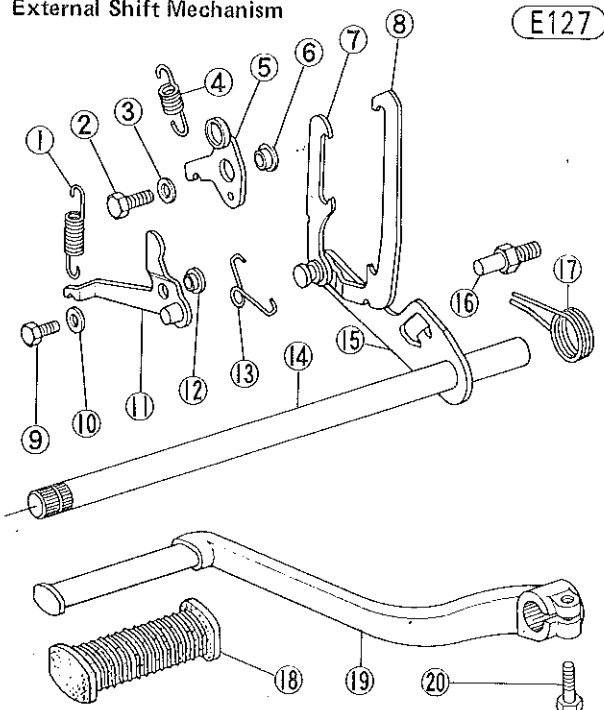
- Remove the return spring 17.
- Remove the gear position detent arm spring 1 and neutral detent arm spring 4.



- A. Gear Position Detent Arm Spring
- B. Neutral Detent Arm Spring
- C. Return Spring

- Remove the gear position detent arm pivot bolt 9, and take off the flat washer 10, gear position detent arm 11, and collar 12.
- Remove the pivot bolt 2, and take off the flat washer 3, neutral detent arm 5, and collar 6.

External Shift Mechanism



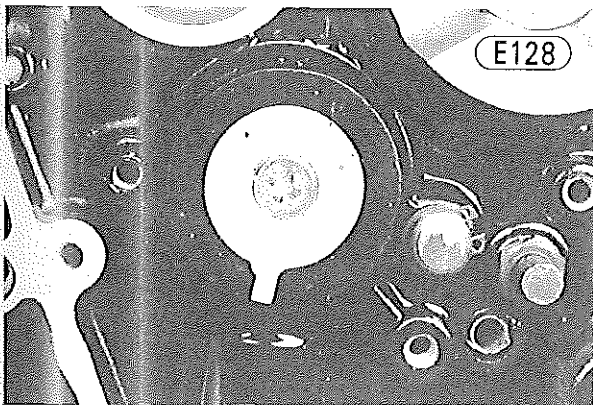
- | | |
|------------------------|------------------------------|
| 1. Spring | 11. Gear Position Detent Arm |
| 2. Bolt | 12. Collar |
| 3. Flat Washer | 13. Pawl Spring |
| 4. Spring | 14. Shift Shaft |
| 5. Neutral Detent Arm | 15. Shift Arm |
| 6. Collar | 16. Return Spring Pin |
| 7. Shift Mechanism Arm | 17. Return Spring |
| 8. Overshift Limiter | 18. Pedal Rubber |
| 9. Bolt | 19. Shift Pedal |
| 10. Flat Washer | 20. Bolt |

NOTE: Do not pull the shift rod more than 40 mm out of the crankcase, or the shift forks inside the crankcase will fall to the bottom of the oil pan,

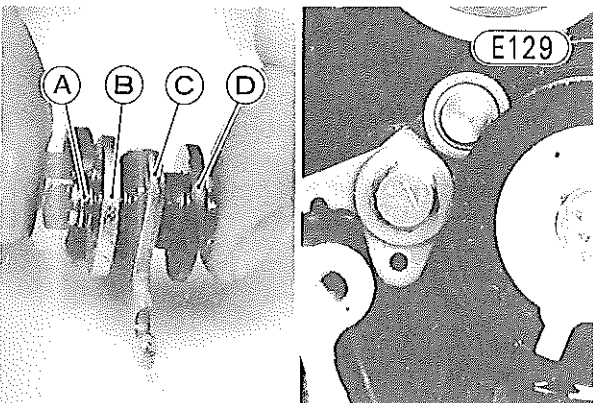
requiring removal of the mufflers and oil pan to install them.

Installation:

- If the shift drum pins were removed, make sure the one long pin is assembled in the position shown. If this pin is assembled in the wrong position, the neutral indicator light will not light when the gears are in neutral. Apply a non-permanent locking agent to the screw when installing the pin plate.
- Check that the external shift mechanism return spring pin is not loose. If it is loose, remove it, apply a non-permanent locking agent to the threads, and tighten it to 2.0 kg-m (14.5 ft-lbs) of torque.
- Check that the shift drum is in the neutral position.



- Fit the neutral detent arm, and tighten the pivot bolt. The sequence is pivot bolt, flat washer, detent arm, and collar. The protruding side of the collar must face toward the detent arm.

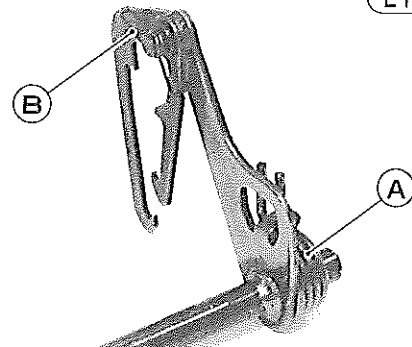


A. Bolt
B. Flat Washer

C. Detent Arm
D. Collar

- Install the gear position detent arm in the same way as the neutral detent arm.
- Hook the neutral detent arm spring and gear position detent arm spring. The gear position detent arm spring is longer than the other.
- Check that the return spring is properly fitted on the shaft and that the pawl spring is on the two arms.

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A. Return Spring

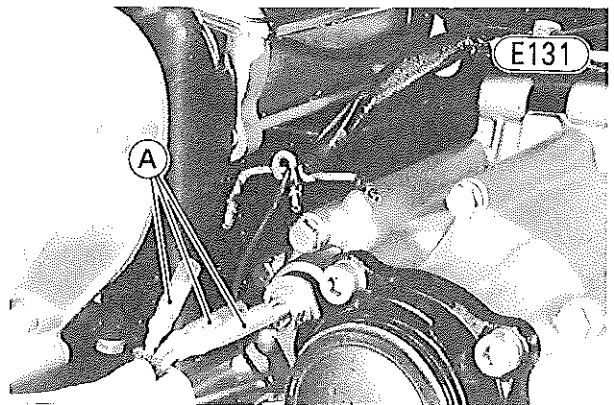
B. Pawl Spring

- Install the shift shaft, turning it counterclockwise, and place the shift mechanism arm and overshift limiter on the shift drum pins.
- Install the front bevel gear case (Pg. 65).

ALTERNATOR STATOR

Removal:

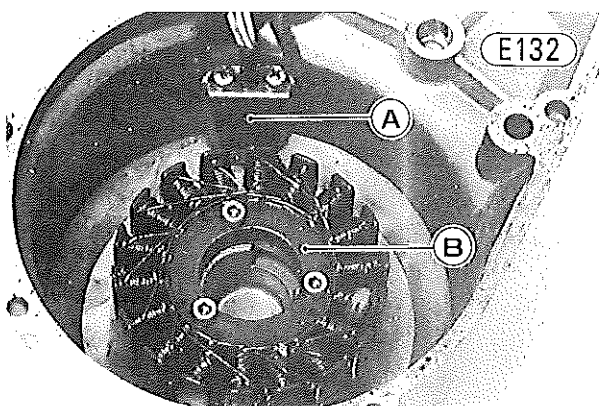
- Loosen the starter motor cover bolts (2).
- Remove the front bevel gear case cover bolts and flat washers (4 ea), and take off the cover.
- Pull out the alternator yellow leads (3) towards the left side of the engine, releasing the leads from the clamps (2).
- Disconnect the alternator yellow leads (3).



A. Alternator Leads

- Place an oil pan beneath the alternator cover.
- Remove the alternator cover Allen bolts (8), and pull off the cover and gasket. There are two knock pins.
- Remove the screws and lockwashers (2 ea), and take off the lead holding plate.

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A. Lead Holding Plate

B. Stator

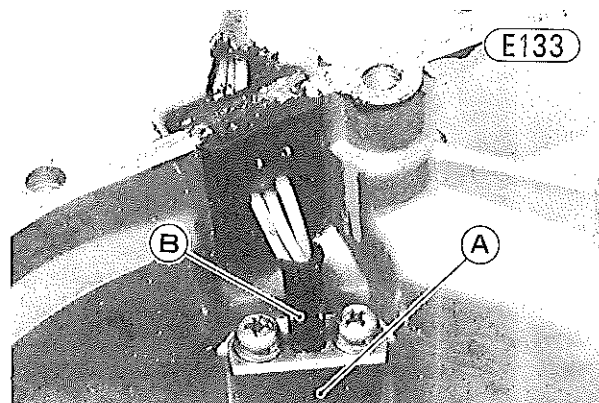
- Remove the stator Allen bolts (3), and pull the stator and grommet out of the cover.

Installation:

- Apply a liquid gasket around the circumference of the alternator lead grommet, install the grommet, and set the stator into place.
- Apply a non-permanent locking agent to each stator Allen bolt, and tighten the bolts (3) to 1.0 kg-m (87 ft-lbs) of torque.

Alternator, Starter Motor Clutch

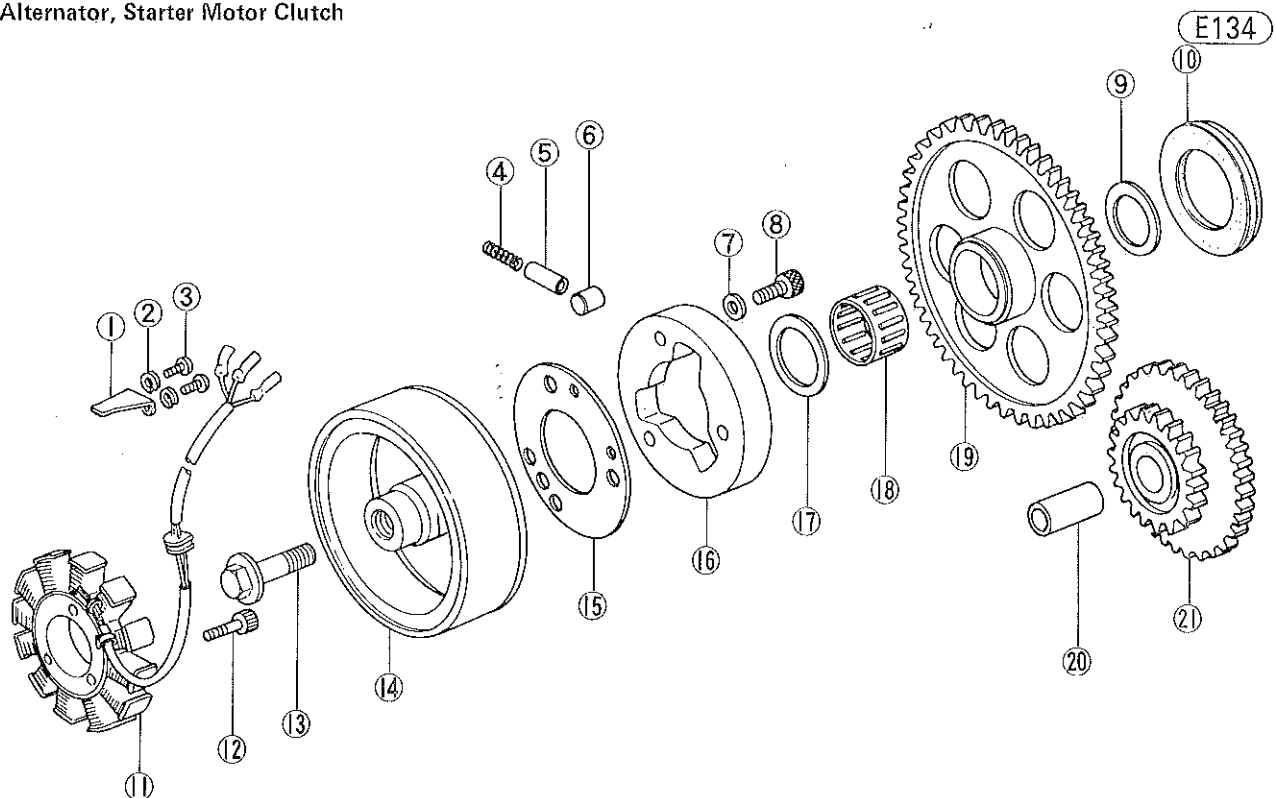
- Fit the leads into the groove, and hold them in place with the lead holding plate. Tighten the screws (2). Each screw has a lockwasher.



A. Lead Holding Plate

B. Leads

- Check that the knock pins (2) are in place, install the alternator cover using a new gasket, and tighten its Allen bolts (8). Apply a non-permanent locking agent to the screw which goes through the upper knock pin.
- Connect the alternator yellow leads (3), and secure them in the clamps (2).



- Lead Holding Plate
- Lockwasher
- Screw
- Spring
- Spring Cap
- Roller
- Flat Washer

- Allen Bolt
- Thick Thrust Washer
- Rubber Damper
- Stator
- Allen Bolt
- Rotor Bolt
- Rotor

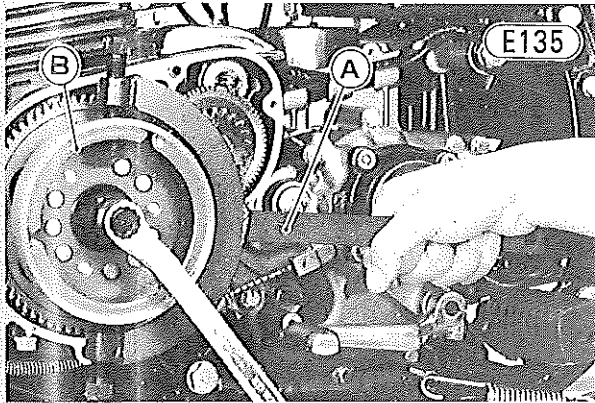
- Steel Plate
- Starter Motor Clutch
- Thin Thrust Washer
- Needle Bearing
- Starter Clutch Gear
- Shaft
- Starter Idle Gear

- Install the front bevel gear case cover, and tighten its bolts and flat washers (4 ea). Be careful not to pinch the leads (starter motor, alternator, etc.) between the crankcase and the cover.
- Tighten the starter motor cover bolts (2).
- Check the oil level (Pg. 19), and add more if necessary.

ALTERNATOR ROTOR, STARTER MOTOR CLUTCH, GEAR, IDLE GEAR

Removal:

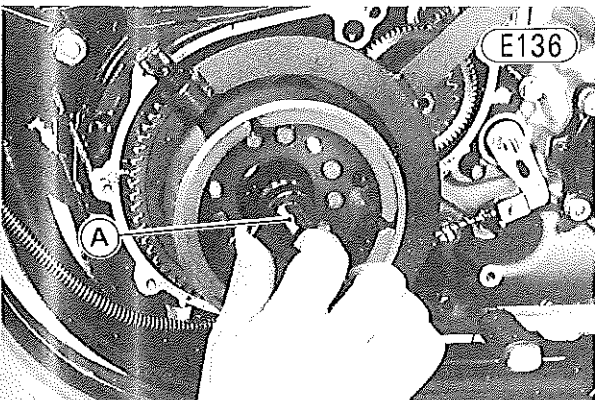
- Remove the alternator cover as explained in alternator removal (Pg. 75).
- Hold the alternator rotor (14) steady with the flywheel holder (special tool), and remove the rotor bolt (13).



A. Flywheel Holder (57001-308)
B. Rotor

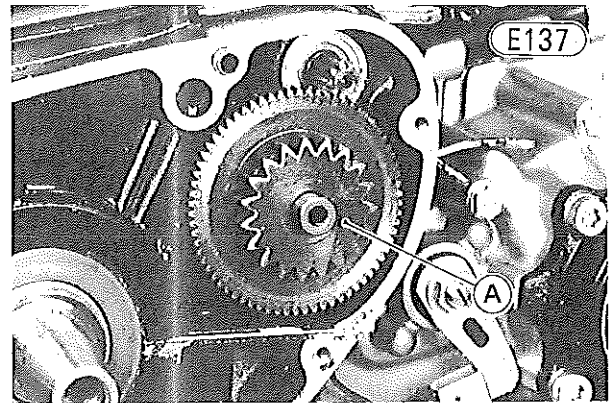
- Using the special tool to hold the rotor steady, remove the rotor, starter motor clutch assembly (16), and starter clutch gear (19) with the rotor puller (special tool). There is a thin thrust washer (17) between the starter clutch gear hub and the rotor. The rubber damper (10) may come out with the starter clutch gear.

CAUTION If the rotor is difficult to remove and a hammer is used to tap the dynamo rotor puller, be careful not to strike the rotor itself. Striking the rotor can cause the magnets to lose their magnetism.



A. Rotor Puller (57001-1016)

- Remove the needle bearing (18) and thick thrust washer (9).
- Remove the shaft (20) and starter idle gear (21).

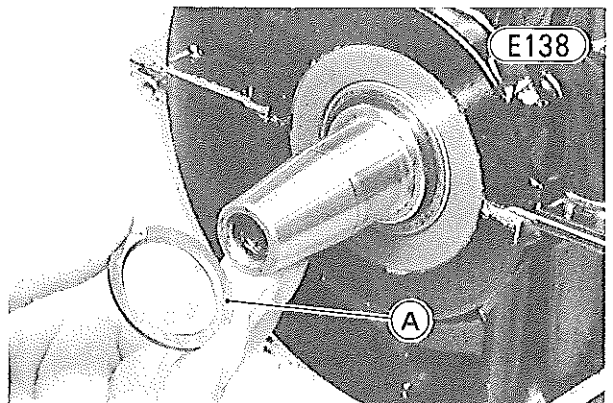


A. Starter Idle Gear

Installation:

NOTE: If the alternator rotor, starter clutch gear, crankshaft, and/or crankcase are replaced with new ones, it is necessary to select the right rubber damper from three dampers of different thicknesses.

- Apply a thin coat of a molybdenum disulfide engine assembly grease to the shaft. Install the starter idle gear and its shaft.
- Put the thick thrust washer, needle bearing, starter clutch gear, thin thrust washer, and rotor onto the crankshaft without inserting the damper. The thick thrust washer must go onto the crankshaft with its chamfered side facing in.



A. Thrust Washer

- Measure the clearance by pressing the rotor into place by hand, and then select the right rubber damper as shown below. There is an identification mark on the damper.

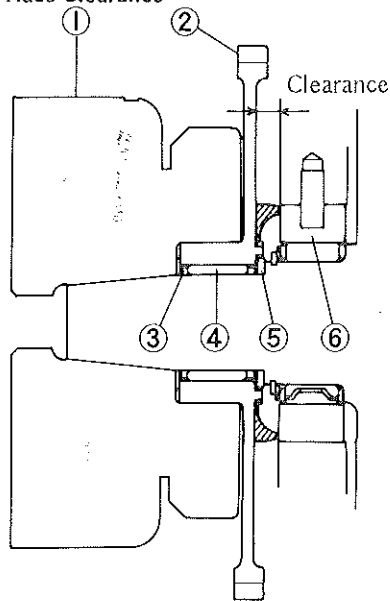
Table E7 Rubber Damper Selection

Clearance	Rubber Damper P/N	ID Mark
5.06~6.05 mm	92075-1129	★
6.06~7.05 mm	92075-1130	★★
7.06~8.05 mm	92075-1131	★★★

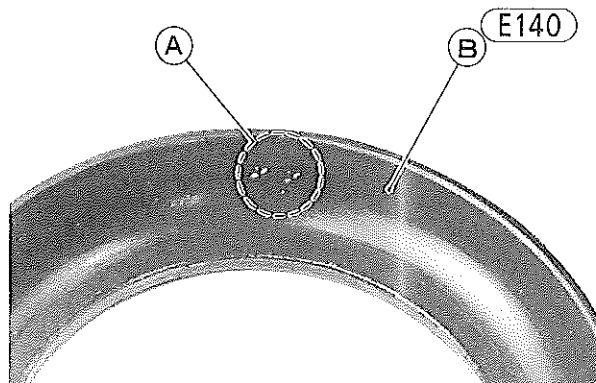
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Starter Clutch Gear/Main Bearing Outer Race Clearance

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- | | |
|------------------------|------------------------|
| 1. Rotor | 4. Needle Bearing |
| 2. Starter Clutch Gear | 5. Thick Thrust Washer |
| 3. Thin Thrust Washer | 6. Main Bearing |

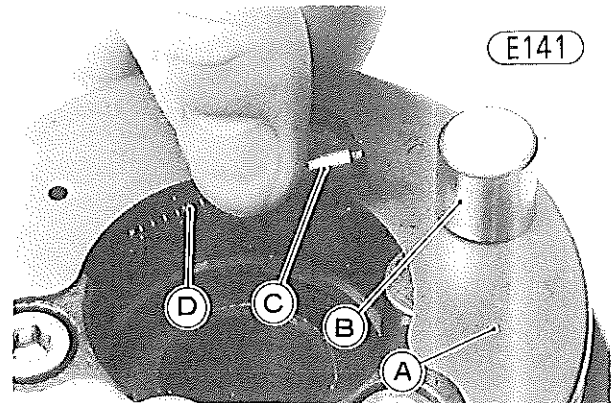


- A. Identification Mark B. Rubber Damper

- Remove the rotor and starter clutch gear, and fit the correct rubber damper onto the starter clutch gear.
- Apply a thin coat of a molybdenum disulfide engine assembly grease to the rubber damper and needle bearing. Using a high flash-point solvent, clean off any oil or dirt that may be on the crankshaft taper and rotor hub.
- Fit the rubber damper and starter clutch gear back onto the crankshaft. Be careful that the rubber damper do not be over the thick thrust washer.
- Fit the rotor back onto the crankshaft.
- Tighten the rotor bolt to 13.0 kg-m (94 ft-lbs) of torque while holding the rotor steady with the flywheel holder (special tool).
- Install the alternator cover as explained in alternator stator installation (Pg. 76).
- Check the oil level (Pg. 19), and add more oil if necessary.

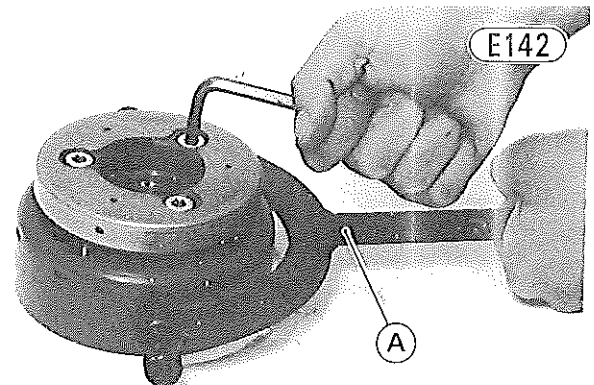
Disassembly:

- Remove the rollers (6), springs (4), and spring caps (5) (3 ea) from the starter motor clutch.



- A. Starter Motor Clutch C. Spring Cap
B. Roller D. Spring

- Place the alternator rotor face down on the workbench. Holding the rotor steady with the flywheel holder (special tool), remove the Allen bolts (8) (3) to separate the rotor and starter motor clutch. Each bolt has a flat washer (7).



- A. Flywheel Holder (57001-308)

- Remove the steel plate (15) from the rotor.

Assembly Note:

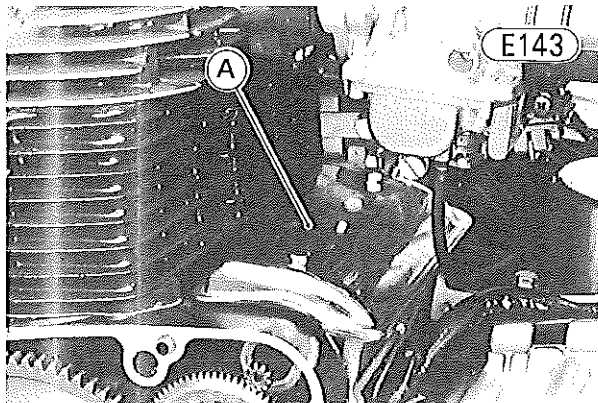
- Apply a non-permanent locking agent to the starter motor clutch Allen bolts (3), and tighten the bolts to 4.0 kg-m (29 ft-lbs) of torque.

STARTER MOTOR

Removal:

- Remove the alternator cover as explained in alternator stator removal (Pg. 75).
- Remove the starter motor cover bolts and flat washers (2 ea), and take off the cover and gasket.

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A. Starter Motor Cover

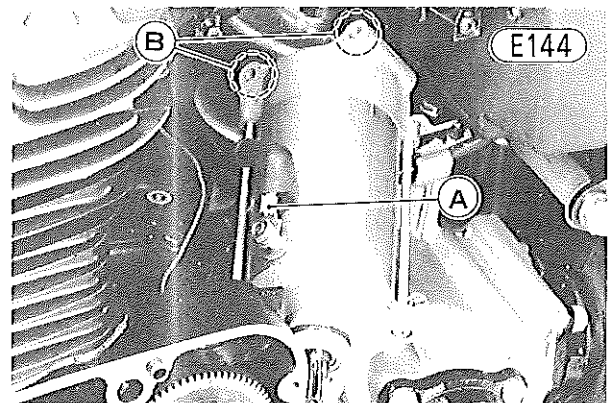
- Remove the carburetors (Pg. 44).
- Remove the starter motor retaining bolts (2).
- Pry the starter motor loose from the crankcase with a screwdriver, slide the starter motor off towards the right side of the engine, and then lift it upwards.

CAUTION Do not tap on the starter motor shaft. Tapping on the shaft may damage the motor.

- Slide out the rubber cap, remove the starter motor terminal nut and lockwasher, and take the lead off the motor.

Installation:

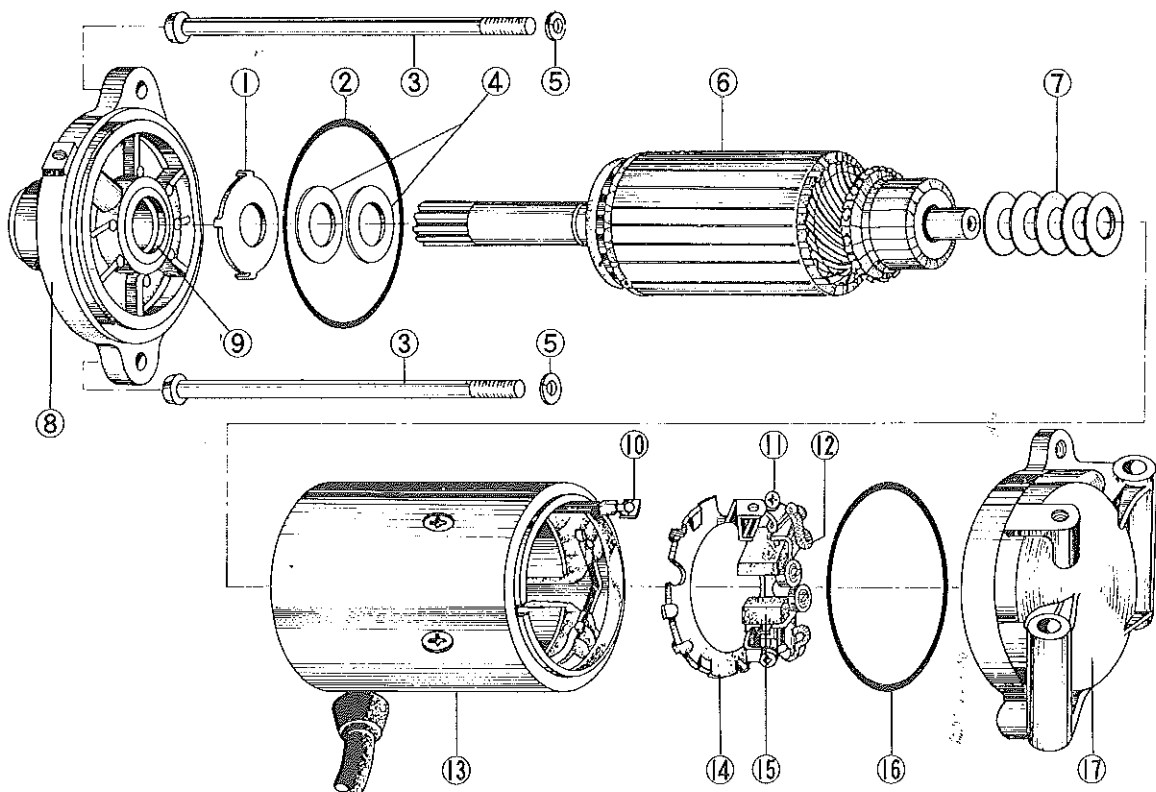
- Clean the starter motor lugs and crankcase where the starter motor is grounded.
- Connect the motor lead onto the terminal with its nut and lockwasher, and install the rubber cap. Tighten the nut to 0.50 kg-m (43 in-lbs) of torque.



A. Starter Motor Lead

B. Starter Motor Lugs

Starter Motor



1. Toothed Washer
2. O Ring
3. Screw
4. Shim
5. Lockwasher

6. Armature
7. Shim
8. End Cover
9. Grease Seal

10. Field Coil Lead
11. Screw
12. Brush Lead
13. Yoke Assembly

14. Brush Plate
15. Brush
16. O Ring
17. End Cover

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- Replace the O ring with a new one, if it is deteriorated or damaged, and apply a little oil to it.
- Push the starter motor back into position, apply a non-permanent locking agent to the starter motor retaining bolts, and tighten the bolts to 1.0 kg-m (87 in-lbs) of torque.
- Install the alternator cover as explained in alternator installation (Pg. 76).
- Check that the oil pressure switch lead grommet is in place.
- Install the starter motor cover and gasket, and tighten the cover bolts (2) with the flat washers (2).
- Install the carburetors (Pg. 44).
- Check the oil level (Pg. 19), and add more oil if necessary.

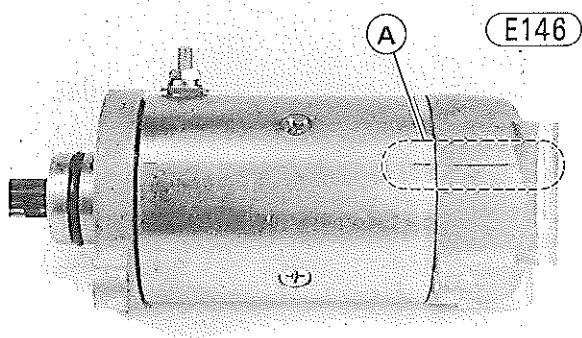
Disassembly:

- Remove the screws (3) (2), lockwashers (5) (2), and remove one end cover (17), O ring (16), and shims (7).
- Remove the screw (11) which connects the brush lead (12) to the field coil lead (10), and remove the brush plate (14) and brushes (15). The screw has a lockwasher.
- Take off the other end cover (8) and O ring (2), and remove the yoke assembly (13) and armature (6). There are shims (4) and a toothed washer (1) on this end of the armature shaft.

NOTE: The yoke assembly (13) is not meant to be disassembled.

Assembly Notes:

1. Replace any O rings and gaskets that are deteriorated or damaged with new ones.
2. Align the line on the end cover with the line on the housing.

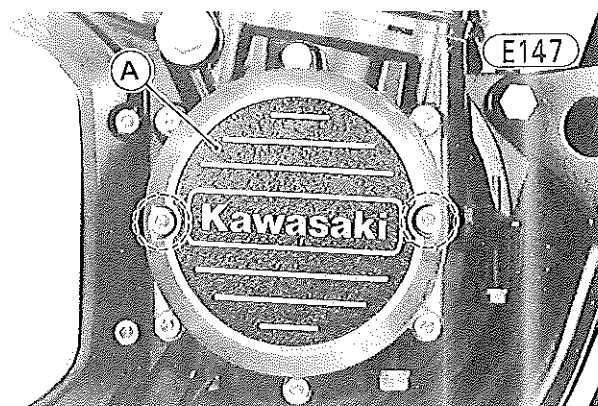


A. Align the line.

PICK-UP COIL ASSEMBLY

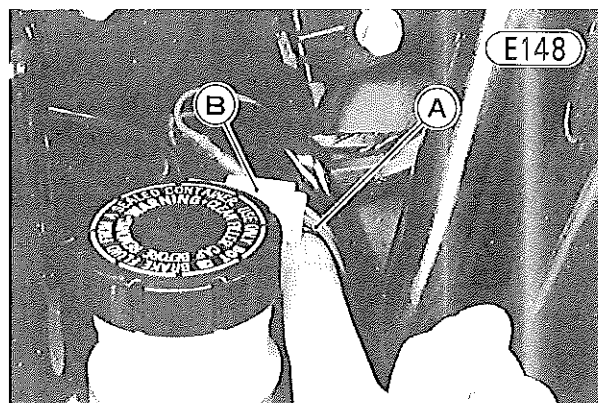
Removal:

- Remove the pick-up coil cover and gasket.



A. Pick-up Coil Cover

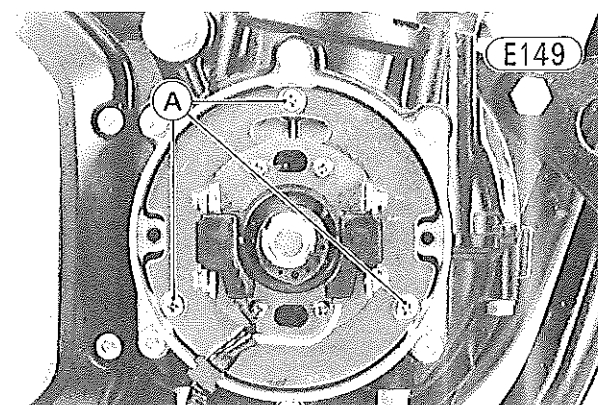
- Pull off the right side cover, disconnect the 4-pin connector that joins the pick-up coil leads to the IC igniter, and slide the leads free from the clamps (2) beneath the engine.



A. Pick-up Coil Leads

B. 4-pin Connector

- Remove the pick-up coil assembly mounting screws (3), and remove the pick-up coil assembly. Each screw has a lockwasher and flat washer.



A. Mounting Screws

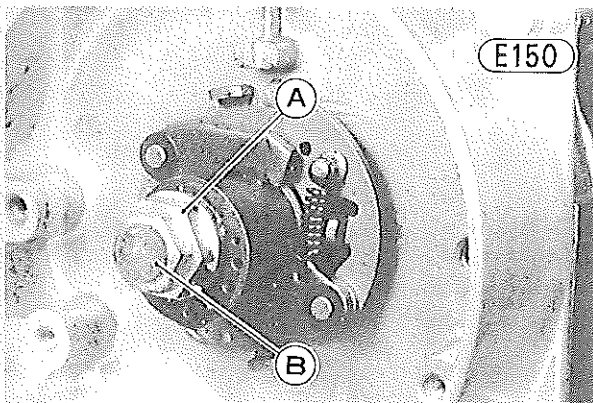
Installation Note:

- Fit the lead grommet into the notch in the right engine cover.

TIMING ADVANCER

Removal:

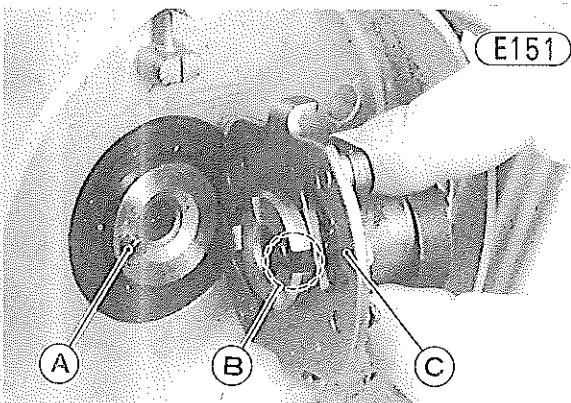
- Remove the pick-up coil cover and gasket.
- Remove the pick-up coil assembly mounting screws (3), and take off the assembly. Each screw has a lockwasher and flat washer.
- Hold the crankshaft from turning with a 17 mm wrench on the crankshaft rotation nut, while removing the advancer mounting bolt. Then take off the rotation nut and the timing advancer.



A. Crankshaft Rotation Nut
B. Advancer Mounting Bolt

Installation Note:

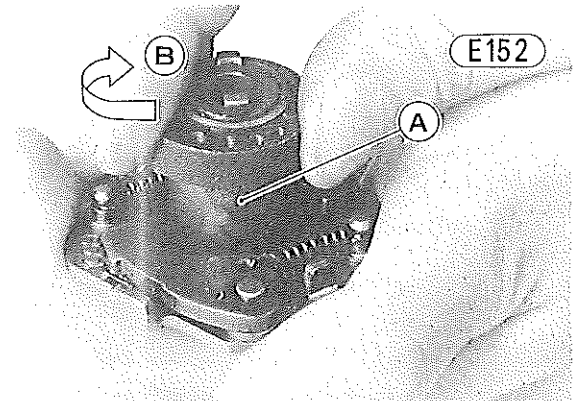
- Fit the timing advancer onto the crankshaft, matching its notch with the pin in the end of the crankshaft, and install the crankshaft rotation nut and advancer mounting bolt. The notches in the nut fit the projections on the timing advancer. Tighten the bolt to 2.5 kg-m (18.0 ft-lbs) of torque.



A. Pin B. Notch C. Timing Advancer

Disassembly:

- Turn the timing rotor clockwise, and pull off the rotor.



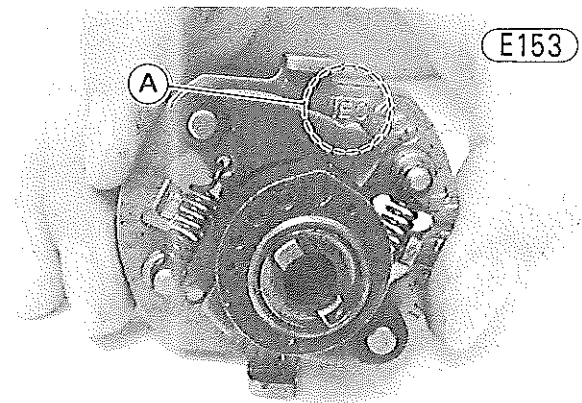
A. Rotor

B. Turn.

- Remove the C rings (2), washers (4), and weights (2).
- Remove the washers (2) from the advancer body.

Assembly Notes:

1. Wipe the advancer clean, and fill the groove inside the rotor with grease.
2. Install the timing rotor, aligning the projection on the rotor with the "TEC" mark on the advancer body.



A. TEC Mark

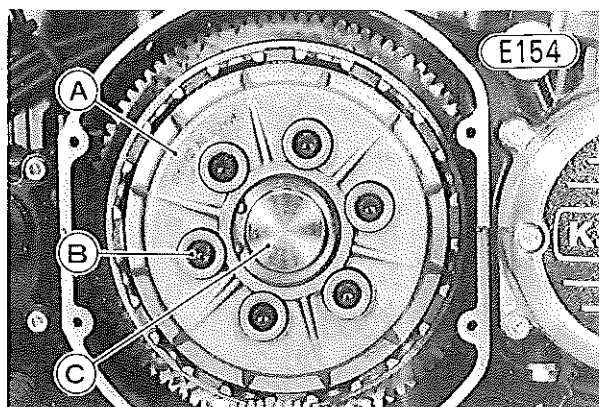
CLUTCH HUB, CLUTCH PLATES

Removal:

- With the motorcycle on its center stand, place an oil pan beneath the clutch cover.
- Remove the Allen bolts (9), and pull off the clutch cover and gasket.

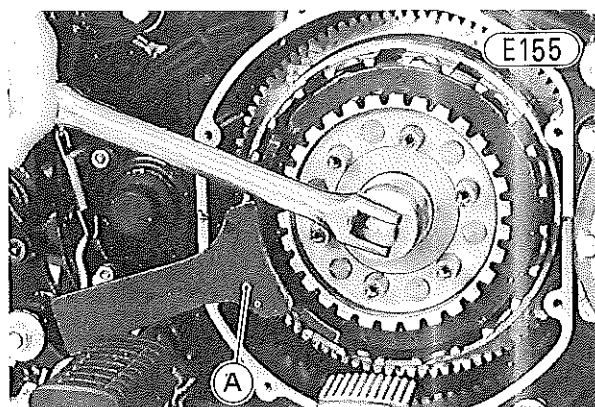
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- Remove the clutch spring Allen bolts (18), washers (17), and springs (16) (6 ea).



A. Clutch Spring Plate
B. Allen Bolt
C. Spring Plate Pusher

- Pull off the spring plate (15) with the spring plate pusher (21), circlip (22), and short push rod, and then tilt the motorcycle so that the steel ball will fall out.
 - Remove the friction plates (13) (9) and steel plates (14) (8).
 - Pry up the staked portion of the clutch hub nut.
- CAUTION** Be careful not to damage the drive shaft during this operation.
- Hold the clutch hub from turning using the clutch hub holder (special tool), and remove the clutch hub nut (20) and splined washer (19).



A. Clutch Hub Holder (57001-119)

- Pull off the clutch hub assembly and splined collar (5). There is a thrust washer (4) at the rear of the clutch hub.

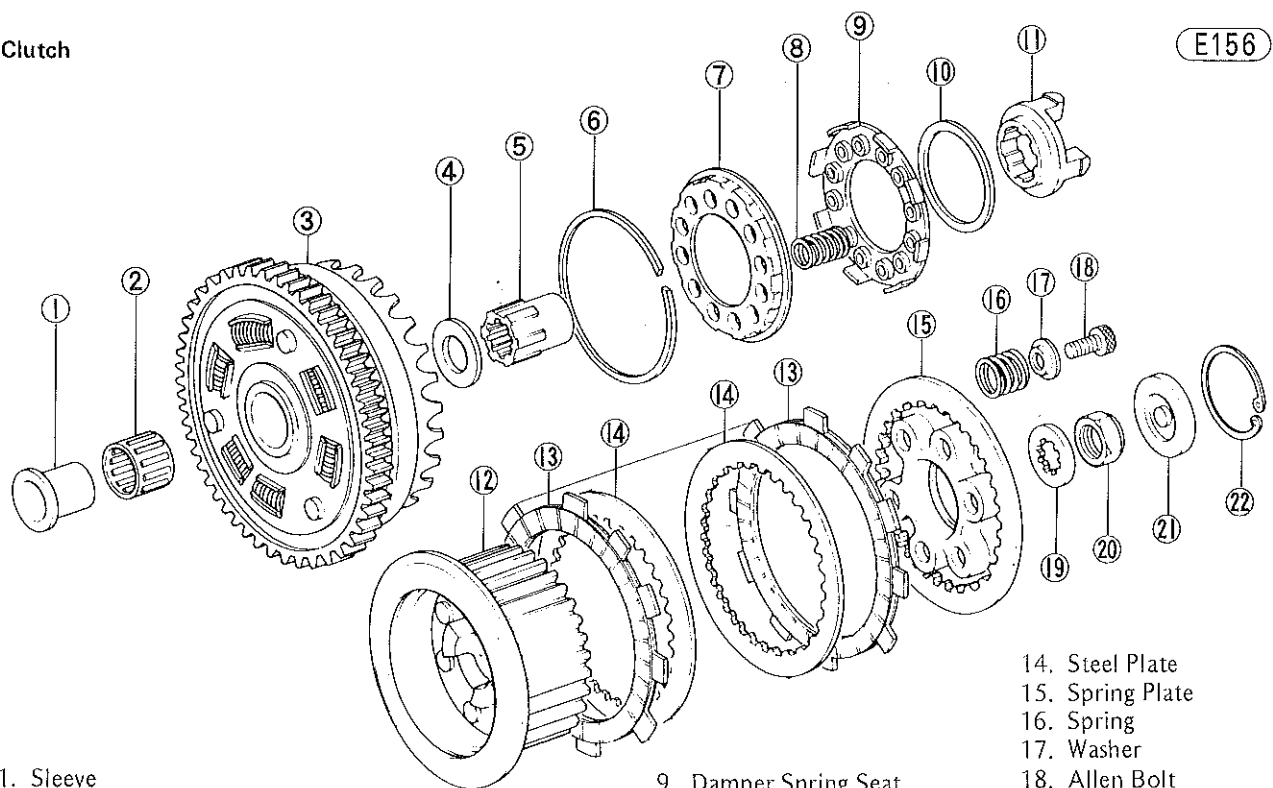
NOTE: The clutch housing cannot be removed without major disassembly work. To remove the clutch housing, refer to the crankcase splitting section (Pg. 93).

- To disassemble the clutch hub assembly, push in the damper spring plate (7) and remove the circlip (6). Then remove the damper spring plate, damper springs (8) (12), spring seat (9), seat stop (10), and damper cam follower (11) from the clutch hub (12).

Installation:

- To assemble the clutch hub assembly, install the damper cam follower, spring seat stop, spring seat,

Clutch



1. Sleeve
2. Needle Bearing
3. Clutch Housing
4. Thrust Washer
5. Splined Collar

6. Circlip
7. Damper Spring Plate
8. Spring

9. Damper Spring Seat
10. Seat Stop
11. Damper Cam Follower
12. Clutch Hub
13. Friction Plate

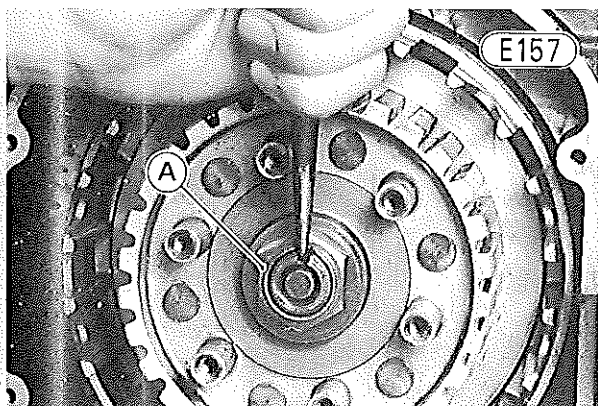
14. Steel Plate
15. Spring Plate
16. Spring
17. Washer
18. Allen Bolt
19. Splined Washer
20. Nut
21. Spring Plate Pusher
22. Circlip

springs, and spring plate, and then install the circlip while depressing the damper spring plate.

- Install the thrust washer, splined collar, clutch hub assembly, and splined washer. Replace the clutch hub nut with a new one if it has two staked areas, install the nut, and tighten it to 12.0 kg-m (87 ft-lbs) of torque, while holding the hub with the clutch hub holder (special tool).
- Stake the clutch hub nut to the notch on the drive shaft.

CAUTION

Be careful not to damage the drive shaft during this operation.



A. Clutch Hub Nut

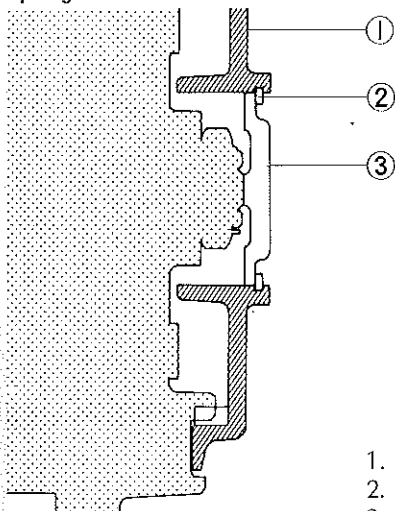
- Install the friction plates (9) and steel plates (8), starting with a friction plate and alternating them.

CAUTION

If new, dry steel plates and friction plates are installed, apply engine oil to the surfaces of each plate to avoid clutch plate seizure.

- Apply molybdenum disulfide engine assembly grease to the steel ball and short push rod surfaces.
- Insert the steel ball and short push rod.
- Install the spring plate with the spring plate pusher and circlip, springs, washers, and spring Allen bolts (6 ea). The protruding side of the spring plate pusher must face out. Cross-tighten the Allen bolts evenly to 1.1 kg-m (95 in-lbs) of torque.

Spring Plate Pusher Installation

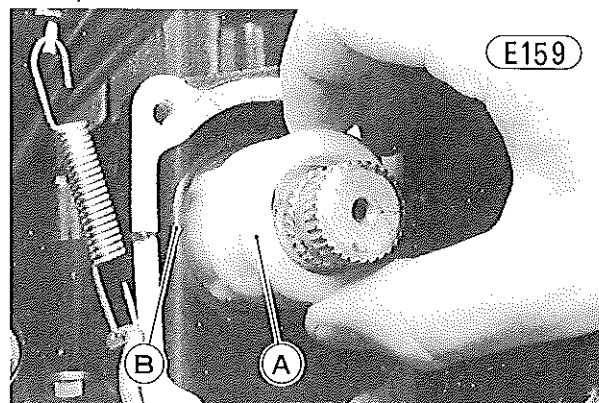


1. Spring Plate
2. Circlip
3. Spring Plate Pusher

- Using a new clutch cover gasket, fit the clutch cover onto the crankcase, and tighten the cover Allen bolts (9).
- Check the oil level (Pg. 19), and add oil if necessary.
- Adjust the clutch (Pg. 18).

KICKSTARTER SPRING**Removal:**

- Remove the rubber cap from the end of the kick shaft.
- Remove the kickstarter cover Allen bolts (4), and pull off the cover and gasket. There are two knock pins.
- Pull out the spring guide, and remove the kickstarter spring.

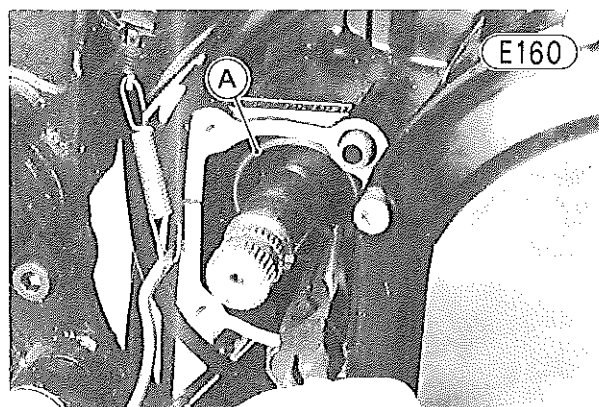


A. Spring Guide

B. Kickstarter Spring

Installation Notes:

1. To install the kick spring, turn the kick shaft all the way clockwise, insert one end of the spring into the crankcase hole, insert the other end into the kick shaft using needle nose pliers, and, while holding the spring in place, insert the kick spring guide.

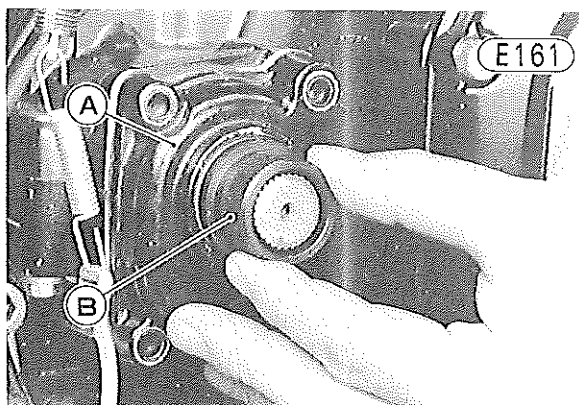


A. Kickstarter Spring

2. Check to see that the knock pins (2) are in place.
3. Using a new kickstarter cover gasket, fit the kickstarter cover onto the crankcase. Use the kick shaft

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oil seal guide (special tool) to protect the kick shaft oil seal. Tighten the Allen bolts (4) firmly.

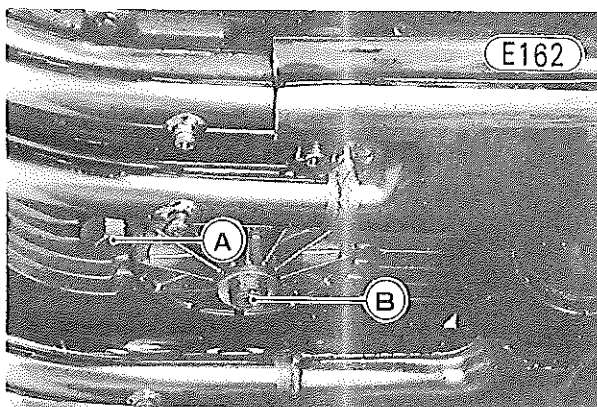


A. Kickstarter Cover
B. Kick Shaft Oil Seal Guide (57001-131)

OIL FILTER

Removal:

- Remove the engine drain plug, and drain the oil from the engine.



A. Engine Drain Plug
B. Filter Mounting Bolt

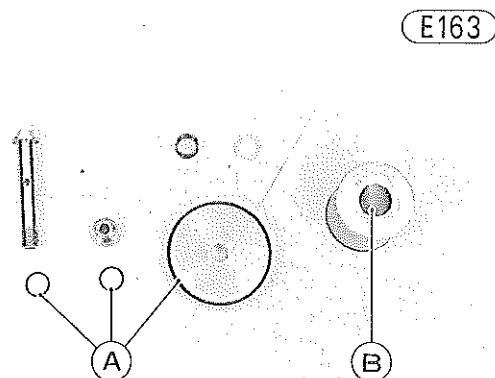
- Remove the filter mounting bolt and drop out the filter.
- Pull the filter off the mounting bolt. There is a spring seat and spring between the oil filter and the filter cover.

Installation:

- Remove the filter mounting bolt from the filter cover, and make sure that the O rings on the filter mounting bolt, drain plug, and filter cover are all properly in place. Replace the O rings with new ones if they have deteriorated or are damaged.

CAUTION Using damaged or deteriorated O rings instead of replacing them with new ones will cause oil leaks and eventually result in little or no oil left in the engine. This will cause serious engine damage. The oil in the oil filter housing is pressurized

by the engine oil pump, so these O rings must be inspected with special care. Look for discoloration (indicating the rubber has deteriorated), hardening (the sides which face the mating surfaces are flattened), scoring, or other damage.



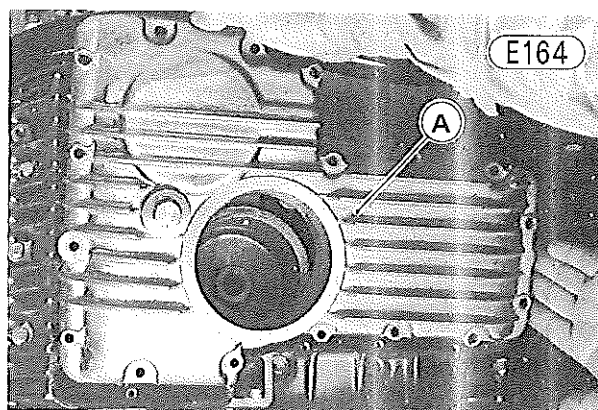
A. O Rings
B. Grommet

- Apply a little engine oil to the O ring on the filter mounting bolt, push the bolt through the filter cover, and install the spring and spring seat in this order.
- Put a little engine oil on the oil filter grommets, and turn the filter mounting bolt while holding the filter steady to work the new filter into place. Be careful that the filter grommets do not slip out of place.
- Install the oil filter, tightening its bolt to 2.0 kg-m (14.5 ft-lbs) of torque.
- Install the engine drain plug, and tighten it to 3.0 kg-m (22 ft-lbs) of torque.
- Fill the engine with oil, checking the level (Pg. 19).

ENGINE OIL PUMP

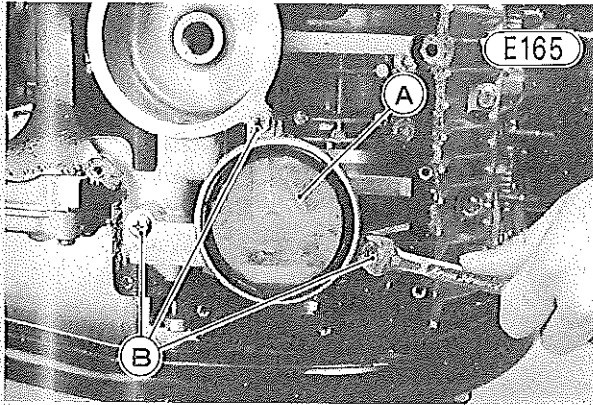
Removal:

- With the motorcycle on its center stand, place an oil pan beneath the engine, and remove the engine drain plug to drain out the oil.
- Remove the mufflers (Pg. 43).
- Remove the oil filter (Pg. 84).
- Remove the oil pan bolts (17), and take off the oil pan, gasket, and O ring.



A. Oil Pan

- Remove the engine oil pump mounting bolts (13) (3), and take off the engine oil pump (10) and oil passage O ring. There are two knock pins (12).



A. Oil Pump

B. Mounting Bolts

Installation Notes:

- If the oil passage O ring and oil pan O ring have deteriorated or are damaged, replace them with new ones. Use a new oil pan gasket.

Oil Pump

- Fill the oil pump with engine oil for initial lubrication.
- Check to see that the knock pins (2) are in place.
- Be sure the oil pump gear and pump drive gear at the crankshaft mesh properly.
- Apply a non-permanent locking agent to the engine oil pump mounting bolts (3), and tighten them to 0.80 kg-m (69 in-lbs).
- Tighten the oil pan bolts (17) to 1.0 kg-m (87 in-lbs) of torque.
- Fill the engine with oil, checking the oil level (Pg. 19).

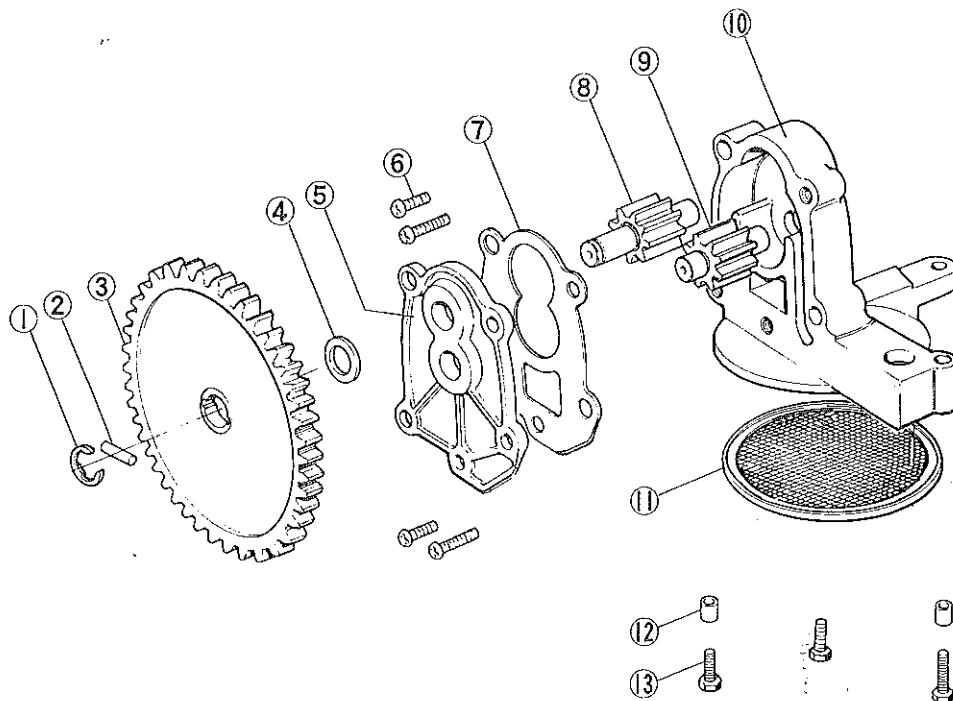
Disassembly:

- Remove the circlip (1), main gear (3), alignment pin (2), and washer (4).
- Remove the screws (6) (5), and take off the oil pump cover (5) and gasket (7).
- Remove the driving gear (8) and driven gear (9).

Assembly Notes:

- Clean the mating surfaces of the pump cover and pump body and use a new gasket in assembly.
- Apply a non-permanent locking agent to the screws.
- Check to see that the knock pins (2) are in place.

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- Circlip
- Alignment Pin
- Main Gear
- Washer
- Cover
- Screw
- Gasket
- Driving Gear
- Driven Gear
- Pump Body
- Screen
- Knock Pin
- Mounting Bolt