

Shop Manual

PC300-3 PC300LC-3 PC360LC-3

HYDRAULIC EXCAVATOR

SERIAL NUMBERS PC300/LC-3 12001 and up
PC300LC-3 A13424 and up
PC360LC-3 10001 and up

KOMATSU®

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July 1992

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IMPORTANT SAFETY NOTICE

Proper service and repair is extremely important for the safe operation of your machine. The service and repair techniques recommended by Komatsu and described in this manual are both effective and safe methods of operation. Some of these operations require the use of tools specially designed by Komatsu for the purpose.

To prevent injury to workers, the symbols  and  are used to mark safety precautions in this manual. The cautions accompanying these symbols should always be followed carefully. If any dangerous situation arises or may possibly arise, first consider safety, and take the necessary actions to deal with the situation.



SAFETY

GENERAL PRECAUTIONS

Mistakes in operation are extremely dangerous. Read the Operation and Maintenance Manual carefully BEFORE operating the machine.

1. Before carrying out any greasing or repairs, read all the precautions given on the decals which are fixed to the machine.
2. When carrying out any operation, always wear safety shoes and helmet. Do not wear loose work clothes, or clothes with buttons missing.
 - Always wear safety glasses when hitting parts with a hammer.
 - Always wear safety glasses when grinding parts with a grinder, etc.
3. If welding repairs are needed, always have a trained, experienced welder carry out the work. When carrying out welding work, always wear welding gloves, apron, glasses, cap and other clothes suited for welding work.
4. When carrying out any operation with two or more workers, always agree on the operating procedure before starting. Always inform your fellow workers before starting any step of the operation. Before starting work, hang UNDER REPAIR signs on the controls in the operator's compartment.
5. Keep all tools in good condition and learn the correct way to use them.

6. Decide a place in the repair workshop to keep tools and removed parts. Always keep the tools and parts in their correct places. Always keep the work area clean and make sure that there is no dirt or oil on the floor. Smoke only in the areas provided for smoking. Never smoke while working.

PREPARATIONS FOR WORK

7. Before adding oil or making any repairs, park the machine on hard, level ground, and block the wheels or tracks to prevent the machine from moving.
8. Before starting work, lower blade, ripper, bucket or any other work equipment to the ground. If this is not possible, insert the safety pin or use blocks to prevent the work equipment from falling. In addition, be sure to lock all the control levers and hang warning signs on them.
9. When disassembling or assembling, support the machine with blocks, jacks or stands before starting work.
10. Remove all mud and oil from the steps or other places used to get on and off the machine. Always use the handrails, ladders or steps when getting on or off the machine. Never jump on or off the machine. If it is impossible to use the handrails, ladders or steps, use a stand to provide safe footing.

PRECAUTIONS DURING WORK

11. When removing the oil filler cap, drain plug or hydraulic pressure measuring plugs, loosen them slowly to prevent the oil from spurting out.
Before disconnecting or removing components of the oil, water or air circuits, first remove the pressure completely from the circuit.
12. The water and oil in the circuits are hot when the engine is stopped, so be careful not to get burned.
Wait for the oil and water to cool before carrying out any work on the oil or water circuits.
13. Before starting work, remove the leads from the battery. Always remove the lead from the negative (–) terminal first.
14. When raising heavy components, use a hoist or crane.
Check that the wire rope, chains and hooks are free from damage.
Always use lifting equipment which has ample capacity.
Install the lifting equipment at the correct places. Use a hoist or crane and operate slowly to prevent the component from hitting any other part. Do not work with any part still raised by the hoist or crane.
15. When removing covers which are under internal pressure or under pressure from a spring, always leave two bolts in position on opposite sides. Slowly release the pressure, then slowly loosen the bolts to remove.
16. When removing components, be careful not to break or damage the wiring. Damaged wiring may cause electrical fires.
17. When removing piping, stop the fuel or oil from spilling out. If any fuel or oil drips on to the floor, wipe it up immediately. Fuel or oil on the floor can cause you to slip, or can even start fires.
18. As a general rule, do not use gasoline to wash parts. In particular, use only the minimum of gasoline when washing electrical parts.
19. Be sure to assemble all parts again in their original places.
Replace any damaged parts with new parts.
 - When installing hoses and wires, be sure that they will not be damaged by contact with other parts when the machine is being operated.
20. When installing high pressure hoses, make sure that they are not twisted. Damaged tubes are dangerous, so be extremely careful when installing tubes for high pressure circuits. Also, check that connecting parts are correctly installed.
21. When assembling or installing parts, always use the specified tightening torques. When installing protective parts such as guards, or parts which vibrate violently or rotate at high speed, be particularly careful to check that they are installed correctly.
22. When aligning two holes, never insert your fingers or hand. Be careful not to get your fingers caught in a hole.
23. When measuring hydraulic pressure, check that the measuring tool is correctly assembled before taking any measurements.
24. Take care when removing or installing the tracks of track-type machines.
When removing the track, the track separates suddenly, so never let anyone stand at either end of the track.

FOREWORD

This shop manual has been prepared as an aid to improve the quality of repairs by giving the serviceman an accurate understanding of the product and by showing him the correct way to perform repairs and make judgements. Make sure you understand the contents of this manual and use it to full effect at every opportunity.

This shop manual mainly contains the necessary technical information for operations performed in a service workshop.

For ease of understanding, the manual is divided into chapters for each main group of components; these chapters are further divided into the following sections.

STRUCTURE AND FUNCTION

This section explains the structure and function of each component. It serves not only to give an understanding of the structure, but also serves as reference material for troubleshooting.

TESTING AND ADJUSTING

This section explains checks to be made before and after performing repairs, as well as adjustments to be made at completion of the checks and repairs.

Troubleshooting charts correlating "Problems" to "Causes" are also included in this section.

DISASSEMBLY AND ASSEMBLY

This section explains the order to be followed when removing, installing, disassembling or assembling each component, as well as precautions to be taken for these operations.

MAINTENANCE STANDARD

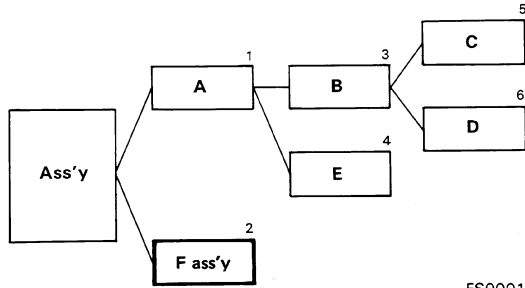
This section gives the judgement standards when inspecting disassembled parts.

NOTICE

The specifications contained in this shop manual are subject to change at any time and without any advance notice. Contact your KOMATSU distributor for the latest information.

NETWORK (Disassembly and assembly relationship drawings)

In the shop manual the following network drawings show relationship between work items and sequence for assembly and disassembly.



FS0001

In this network the sequence of disassembly is marked on the top right of each work item so that handling can be easily understood. For example, when taking **D** of the Ass'y follow the sequence **A** → **B** → **D**, when removing **E** follow the sequence **A** → **E**.

F ass'y indicates a further separate disassembly, and indicates the existence of a previous work network. For assembly the sequence is shown using the same kind of network.

TROUBLESHOOTING CHART

As shown below, the symptoms relating to a particular trouble are described in the line designated "Problems". The probable cause of the trouble is then marked under the "Causes" column.

Example:

Symptom: Reduced tractive power or slow travel speed.

Problems	Causes	
	Oil leaks in torque converter	Air suction in the hydraulic pump
Torque converter oil pressure gauge shows lower than normal pressure. (normal 3 – 4.8 kg/cm ²)	○	○
Transmission oil pressure gauge shows lower than normal pressure. (normal 20 – 23 kg/cm ²)	○	○
	○	

MAINTENANCE STANDARD

Standard size, Tolerance

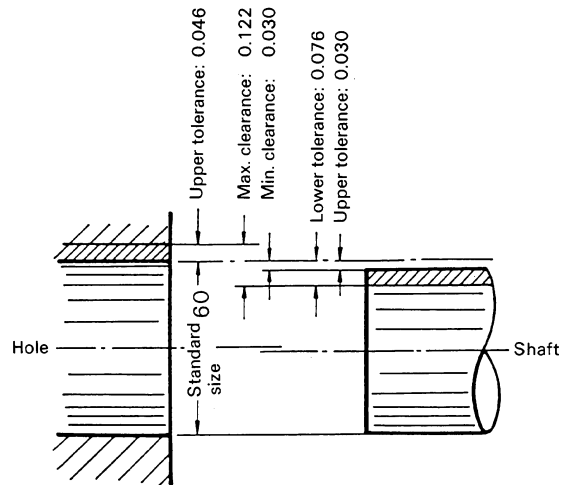
The dimensions of finished parts each differ a little. Therefore, when determining the finished dimensions of parts, a dimension that will be standard is determined provisionally, then the difference allowed from it is indicated. The former is called the standard size, and the latter the tolerance.

The way to show this is by a plus or a minus sign with the tolerance in smaller numerals to the right of the standard size.

Example: $120 \begin{matrix} -0.026 \\ -0.126 \end{matrix}$
 (It equals 119.874 – 119.978 mm)

Moreover, when expressing the dimensions of a hole and the shaft that goes inside it, for the sake of convenience, the standard size for the hole and the shaft are usually taken as the same, and the tolerances changed to indicate the tightness of the fit. For example, the fit of a revolving shaft is indicated as follows, and is shown in the drawing.

Hole: $60 \begin{matrix} +0.046 \\ 0 \end{matrix}$ Shaft: $60 \begin{matrix} -0.030 \\ -0.076 \end{matrix}$



FS0002

HOW TO READ THE SHOP MANUAL

Standard size

This is the standard value at the time of design.

Repair limit

This is the limit in dimensions which the part can be used. When parts exceed the repair limit, they must be repaired or replaced as specified.

Example:

Unit: mm

No.	Check item	Criteria		Remedy
		Standard size	Repair limit	

Standard clearance

This is the clearance between new parts after assembly. It is recorded as a range between minimum clearance and maximum clearance. The clearance is adjusted to this value.

Clearance limit

This is the maximum clearance allowed.

When the clearance exceeds the clearance limit, the parts must be repaired or replaced as specified.

Example:

Unit: mm

No.	Check item	Criteria				Remedy	
		Standard size	Tolerance		Standard clearance		Clearance limit
			Shaft	Hole			

PRECAUTIONS FOR DISASSEMBLY AND ASSEMBLY

1. PREPARATIONS BEFORE DISASSEMBLY

1. Washing before taking a machine into the repair shop

Thoroughly wash the machine to remove sand, mud and dust before taking it into the shop. Taking a dirty machine into the shop will decrease work efficiency, cause damage to parts, and increase the intrusion of dust and dirt into the machine when it is reassembled.

2. Checking the machine before disassembly

Before disassembly, study the entire disassembly procedure from beginning to end in the reference materials, and carefully check and record the items listed below. This will help to save unnecessary disassembly and parts costs. It will also give clues on how to prevent recurrence of the trouble.

- Machine model, serial number and service meter reading.
- Reason for disassembly. (Symptoms, locations, and cause of trouble)
- Any dirty air cleaner elements or air leakage.
- Properties of fuel used, clogging of fuel filter elements, water mixed in fuel, and leaky or constricted fuel pipes.
- Oil capacities, dirtiness of oils (viscosity, color, and any impurities), water mixed in oil, oil leakage, and any clogging of oil filter elements.
- Tension of the V-belt and tracks.
- Any damaged parts or loose bolts.

3. Preparation for disassembly

Prepare the required facilities, tools, and space for the disassembly work and rack space for storing the disassembled parts. Make sure that they are all clean.

2. PRECAUTIONS FOR DISASSEMBLY AND REASSEMBLY

1. During disassembly

- 1) If the disassembly involves draining oil or lubricants, have containers of suitable capacity on hand. Do not spill any oil or lubricants on the floor.
- 2) Mark the parts clearly to prevent confusion at the time of reassembly.
- 3) For disassembly of certain designated parts, use only the special tool prescribed for that purpose.
- 4) When, after removal of fastening nuts and bolts, a part still can not be removed, never force it. Instead, investigate and correct the cause.
- 5) Maintain disassembled parts in good order for storage, paying special care not to confuse parts that appear similar. Tag them or mark with ink if necessary.
- 6) Store standard parts such as bolts and nuts with reference to where they are to be used and in a manner that will prevent loss.

2. During reassembly

- 1) Thoroughly clean and examine all parts before reassembly. Repair any scratched or dented surfaces.
 - ★ Foreign matter is especially damaging to sliding surfaces, and will greatly decrease their service life.
- 2) Clean new parts to remove any rust preventative coating.

Solvent: Light oil or trichloroethane
- 3) Carefully align any match marks provided.
- 4) Use a press or press-fitting tool to assemble bearings, bushings and oil seals.

3. Checks and inspections during disassembly/reassembly

- 1) During disassembly, watch carefully for evidence of seizing, interference, or improper contact of sliding parts.
- 2) Measure and record end clearances, gear backlashes, protrusions, and the like during the disassembly/reassembly. Quite often they cannot be measured afterwards.

PRECAUTIONS FOR DISASSEMBLY AND ASSEMBLY

3. DETERGENTS

1. Precautions for cleaning

- 1) Thoroughly clean disassembled parts and group them by unit for storage. Be especially sure to remove sludge from oil holes and pipes.
- 2) Never use dirty solvents to clean important parts.
- 3) Take extreme care with special chemical agents. Observe the manufacturer's handling instructions and take measures to prevent the agent from coming into contact with your skin or eyes.

2. Selection of detergents

Parts	Detergents
Ordinary parts	Kerosene, light oil, or trichloroethane
Finely machined parts (Bearings etc.)	Clean kerosene or neutral dehydrated light oil
Large castings (Cylinder head, cylinder block etc.)	Alkaline detergent, PH10 – 12. (Immerse in 50 – 70°C detergent for 5 – 10 minutes. Then rinse thoroughly with water.)

3. Detergents for washing rubber parts (O-rings, oil seals etc.)

Detergents	Rubber				
	Nitrile rubber	Ester rubber	Silicon rubber	Fluorine rubber	
Trichloroethane	○	○	○	○	
Trichloroethylene	○	X	X	○	
Gasoline	X	X	X	○	
Thinner	X	X	X	X	
Light oil	○	○	X	○	
Steam	○	X	○	○	

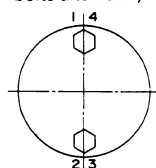
○: Immersion allowed for a short time only
 X: Detergent detrimental to rubber

4. NUTS AND BOLTS

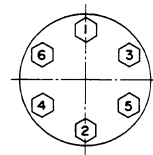
Unless otherwise specified in the DISASSEMBLY AND ASSEMBLY, tighten all bolts to a torque of page 00-29.

- 1) Use bolts having the exact length required for the parts they are to join.
 If too long, the bolt presses against the bottom of the tapped hole; this pressure makes proper tightening impossible. If too short, the bolt lacks the number of threads necessary to hold the parts together.
- 2) Tighten each nut and bolt to the specified torque.
- 3) Tighten bolts evenly and in order.

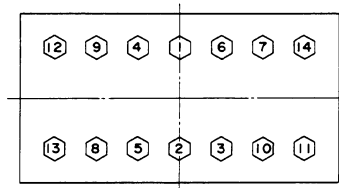
Tighten mutually opposing bolts alternately.



Tighten in turn on opposite sides.



Tighten from the center outwards and on alternate sides.



FS0003

- 4) The Template Method is prescribed for tightening bolts on certain specific parts of the engine.

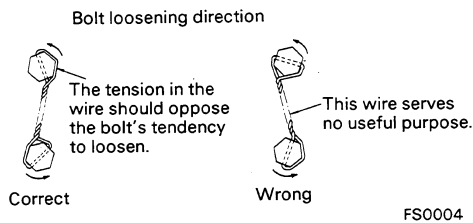
The Template Method obtains good fittings of bolts with their seats and of bearings with their races to ensure uniform overall tightening. The bolts are tightened in stages, then loosened, and then tightened once more.

PRECAUTIONS FOR DISASSEMBLY AND ASSEMBLY

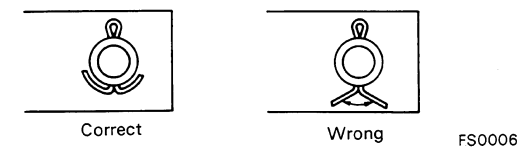
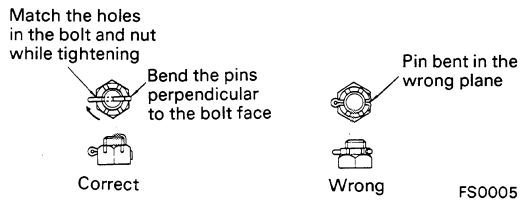
5. HANDLING LOCKING DEVICES

Nuts and bolts which cannot be checked visually from the outside or which are located in vital areas must be firmly locked into position with wires, cotter pins, and lock washers. Never reuse these locking devices.

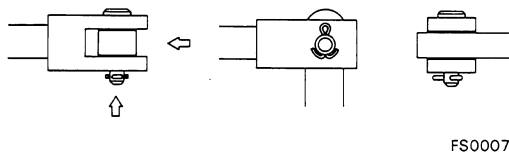
1. Lock wire



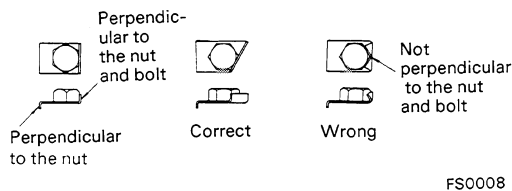
2. Cotter pin



- Bend the head and ends of the cotter pin upwards as far as possible.



3. Lock washer



4. Thread tightener

- 1) Wash and degrease the bolt and bolt hole with trichloroethylene and dry. Coat the bolt threads with two or three drops of thread tightener and tighten the bolts.
- 2) After an hour had passed, the bolt cannot be loosened or tightened any further. If retightening becomes necessary, the bolt must be completely removed, the old thread tightener removed, and a new coat applied.

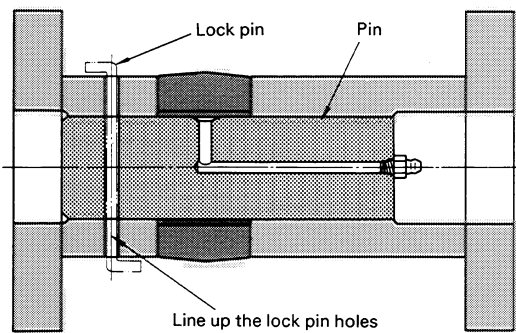
6. PRECAUTIONS FOR PRESS-FITTING

- Coat the surfaces of the parts to be press-fitted with anti-friction grease (molybdenum disulfide) – unless they are tapered.
- For taper spline-to-serration fittings
 - 1) Check that the splines and serrations are free from dust, burr, dents and indentations.
 - 2) Insert and align the splines and serrations by hand before press-fitting the shaft into the hole.
 - 3) If the spline-serration assembly is loose, disassemble and examine for wear. Replace worn parts with new ones.

PRECAUTIONS FOR DISASSEMBLY AND ASSEMBLY

7. PRECAUTIONS FOR ASSEMBLING THE PIN AND SHAFT

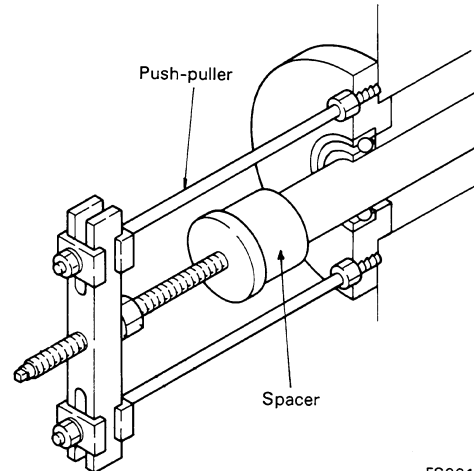
Before reassembling the pin and shaft, check the positions of the locking device and fastening device on the other side. This is especially important when the shaft is retracted from the inside of the hole as illustrated in the accompanying diagram. To ensure proper reassembly, make sure that the lock pin holes coincide.



FS0009

2. Push-puller

When the screw of the push-puller does not reach the surface of the part to be pushed, insert a spacer. It is also a good idea to insert a plate to prevent the head of the screw from damaging the part.

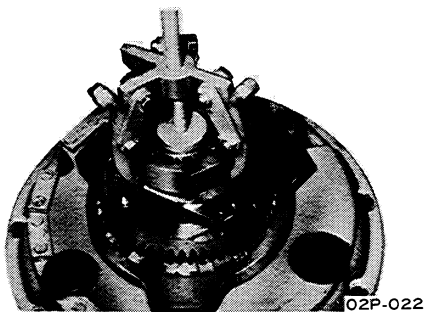


FS0010

8. SERVICE TOOLS

1. Gear puller

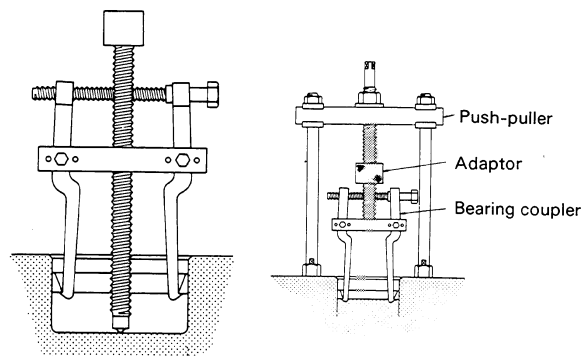
Fit the gear puller over the gear or bearing and tighten the bolt on the gear puller to remove the part from the shaft.



3. Bearing coupler

This can be used two ways:

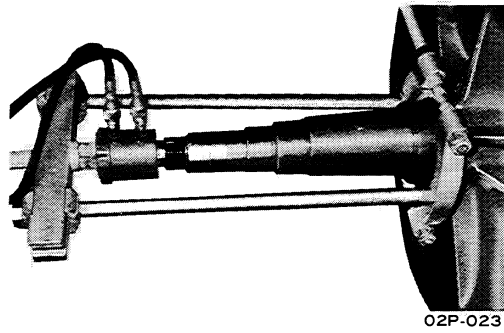
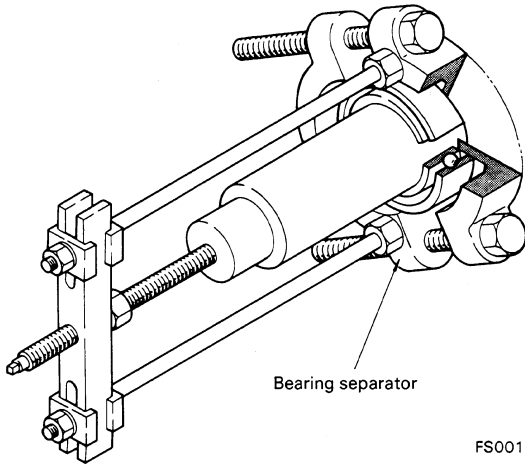
- 1) When the bottom of the hole is strong enough to withstand the applied force.
- 2) When the bottom of the hole is not strong enough to withstand the applied force.



FS0011

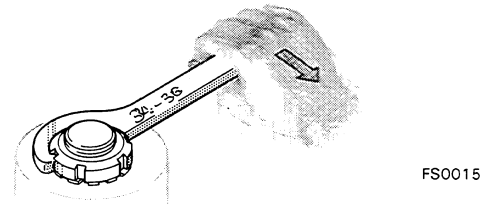
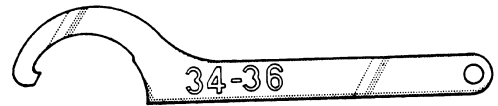
FS0012

4. Bearing separator

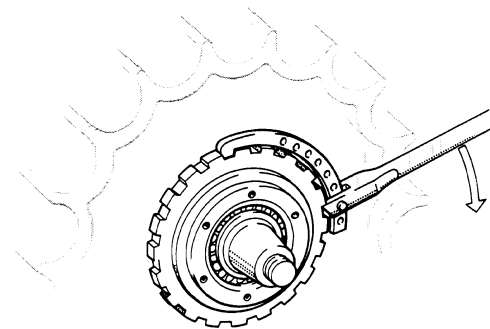


5. Hook wrench

A hook wrench has a claw which hooks into the turning sockets of round nuts. The wrench size is defined by the outer diameter of the round nut turned. The accompanying figure shows a hook wrench designed for use with round nuts of two different sizes.



Removal and Installation of the Sprocket Wheel

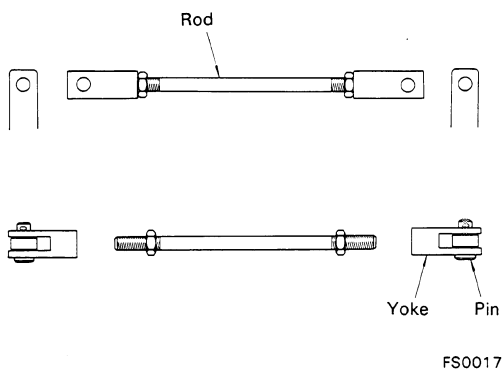


PRECAUTIONS FOR DISASSEMBLY AND ASSEMBLY**9. CLEARANCE ADJUSTMENTS**

Store each set of shims or washers so that they can be installed in their original condition at the time of reassembly.

10. LINK RODS

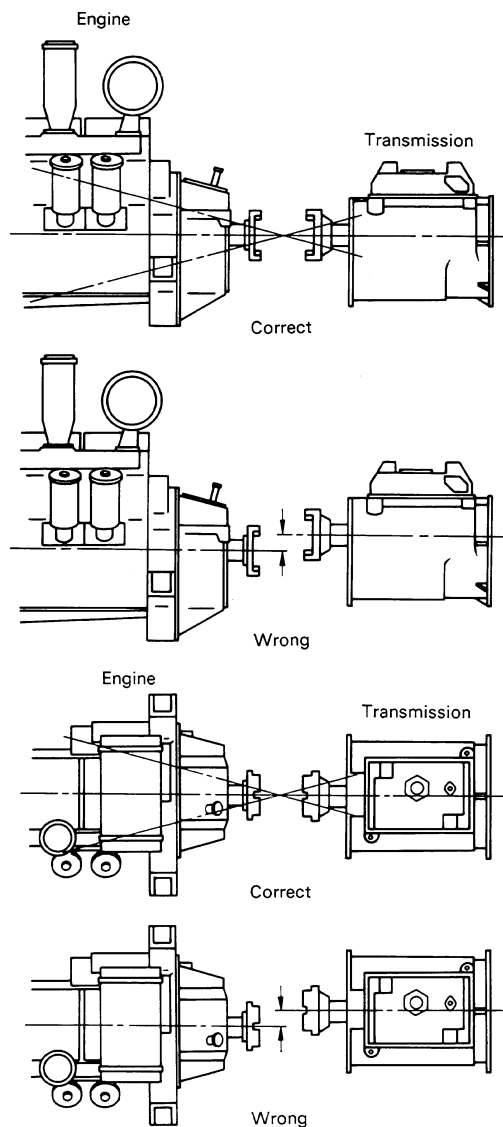
- 1) If it is necessary to change the length of the link rod in order to remove it, first record the original length so that the rod can be easily reassembled in its original condition.
- 2) Remove the link rod at the pins.

**11. SHIMS AND WASHERS**

- 1) Shims are used to center the engine and adjust the action of the bevel gears. Handle very carefully as they get deformed easily.
- 2) Record the numbers and positions to speed adjustment after reinstallation.
- 3) Do not reuse any shims or washers that are deteriorated, damaged, bent or deformed.
- 4) Insert thin shims between thicker ones.

12. CENTERING

Centering is very important for interfaces in the power train — for example, between the engine and the transmission and between the bevel gear shaft and the final drives. Incorrect centering only increases the stresses acting on the turning parts, so always make sure that the deviation is within the specified limits.



FS0018