

SHOP MANUAL



SK818-5 SK820-5 turbo

SKID-STEER LOADER

SERIAL NUMBER

SK818-5 37BF50111 and up

SK820-5 turbo 37BTF50112 and up

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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 Utility and describe in this manual are both effective and safe methods of operation. Some of these operations require the use of tools specially designed by Komatsu Utility 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 carefully followed. If any danger arises or may possibly arise, first consider safety, and take necessary steps to face.



SAFETY

GENERAL PRECAUTIONS

Mistakes in operation extremely dangerous.

Read all the Operation and Maintenance Manual carefully BEFORE operating the machine.

1. Before carrying out any greasing or repairs, read all the precautions written on the decals which are stuck on 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 or making any repairs, park the machine on hard, level ground, and block the wheels to prevent the machine from moving.
8. Before starting work, lower outrigger, bucket or any other work equipment to the ground. If this is not possible, use blocks to prevent the work equipment from falling down. In addition, be sure to lock all the control levers and hang warning sign 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 hydraulic circuit and engine cooling circuit, first remove the pressure completely from the circuit.
12. The water and oil in the circuits are not hot when the engine is stopped, so be careful not to get burned. Wait for the oil water to cool before carrying out any work on the cooling 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.
Damage 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 damage 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 tightened.
21. When assembling or installing parts, always use specified tightening torques.
When installing the parts which vibrate violently or rotate at high speed, be particularly careful to check that they are correctly installed.
22. When aligning two holes, never insert your fingers or hand.
23. When measuring hydraulic pressure, check that the measuring tool is correctly assembled before taking any measurement.
24. Take care when removing or installing wheels.

FOREWORD

This shop manual has been prepared as an aid to improve the quality of repairs by giving the operator 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.

The manual is divided into chapters on 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 sections 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.

NOTE

The specifications contained in this shop manual are subject to change at any time and without any notice.

Contact your Komatsu Utility distributor for the latest information.

HOW TO READ THE SHOP MANUAL

VOLUMES

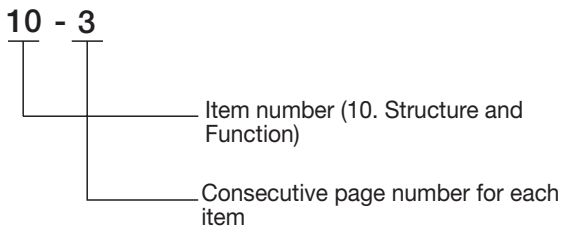
Shop manual are issued as a guide to carry out repairs. These various volumes are designed to avoid duplicating the same information.

DISTRIBUTION AND UPDATING

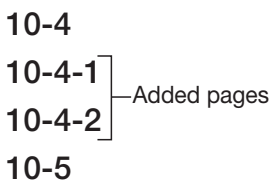
Any additions, amendments or other changes will be sent to Komatsu Utility distributors. Get the most up-to-date information before you start any work.

FILING METHOD

1. See the page number on the bottom of the page. File the pages in correct order.
2. Following examples show you how to read the page number. Example:



3. Additional pages: additional pages are indicated by a hyphen (-) and number after the page number. File as in the example. Example:



REVISED EDITION MARK

(1000...)

When a manual is revised, an edition mark is recorded on the bottom outside corner of the pages.

REVISIONS

Revised pages are shown on the LIST OF REVISED PAGES between the title page and SAFETY page.

SYMBOLS

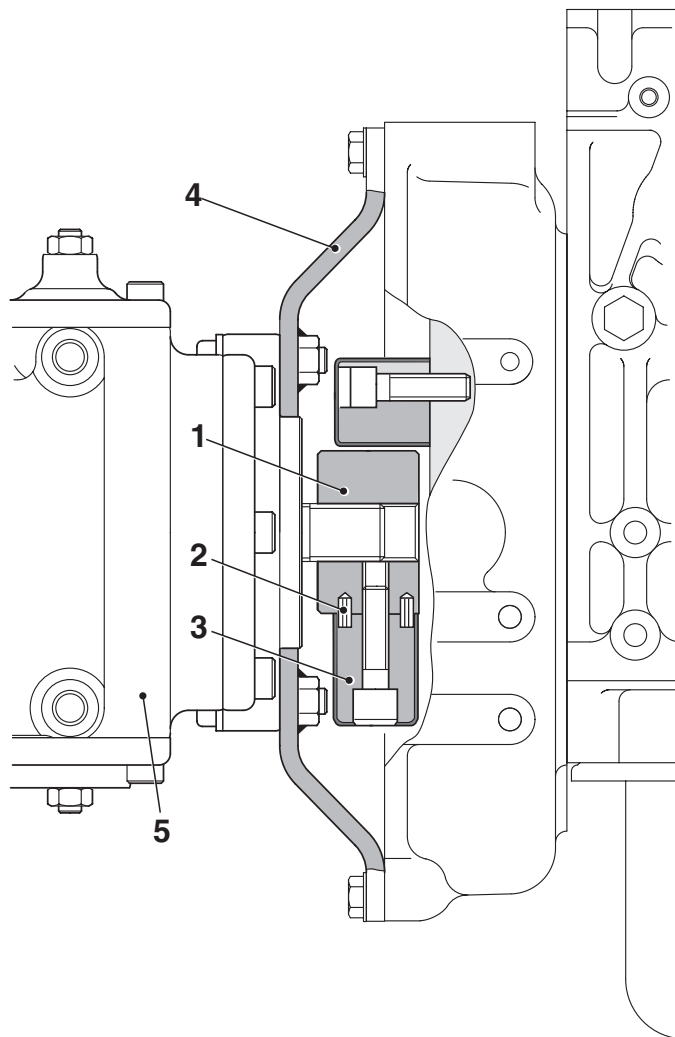
In order to make the shop manual greatly helpful, important points about safety and quality are marked with the following symbols.

| Symbol | Item | Remarks |
|--------|-------------------|--|
| | Safety | Special safety precautions are necessary when performing the work. |
| | | Extra special safety precautions are necessary when performing the work because it is under internal pressure. |
| | Caution | Special technical precautions or other precautions for preserving standards are necessary when performing the work. |
| | Weight | Weight of parts or systems. Caution necessary when selecting hoisting wire, or when working posture is important, etc. |
| | Tightening torque | Parts that require special attention for the tightening torque during assembly. |
| | Coat | Parts to be coated with adhesives and lubricants etc. |
| | Oil, water | Places where oil, water or fuel must be added, and their quantity. |
| | Drain | Places where oil or water must be drained, and quantity to be drained. |

10 STRUCTURE AND FUNCTION

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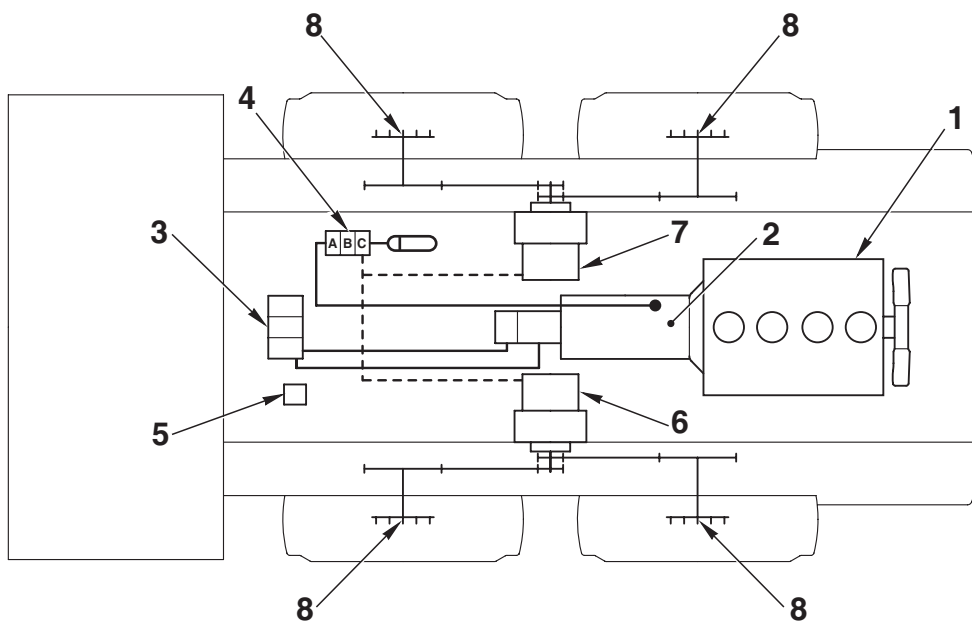
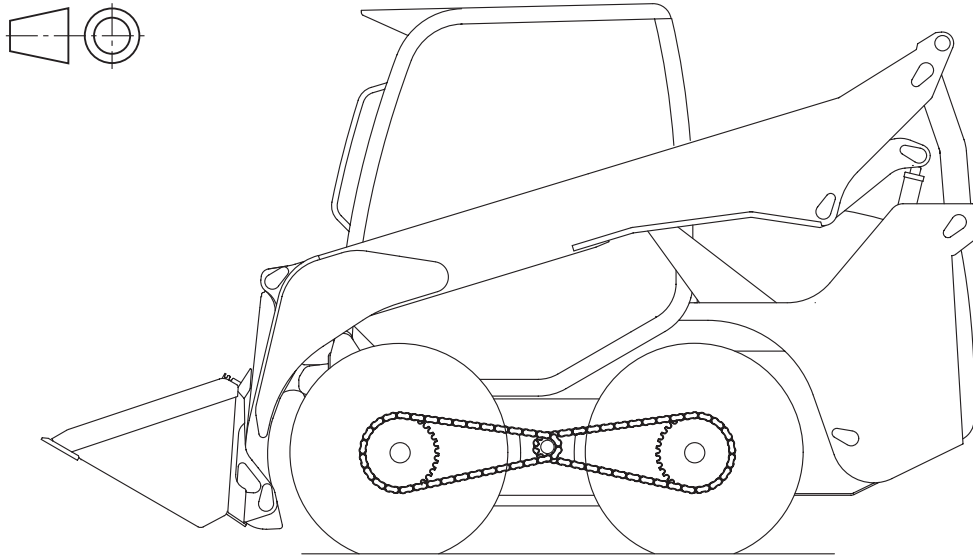
P.T.O.



RKS01090

1. Joint
2. Spring pin
3. Dumper
4. Flywheel cover
5. Hydraulic pump

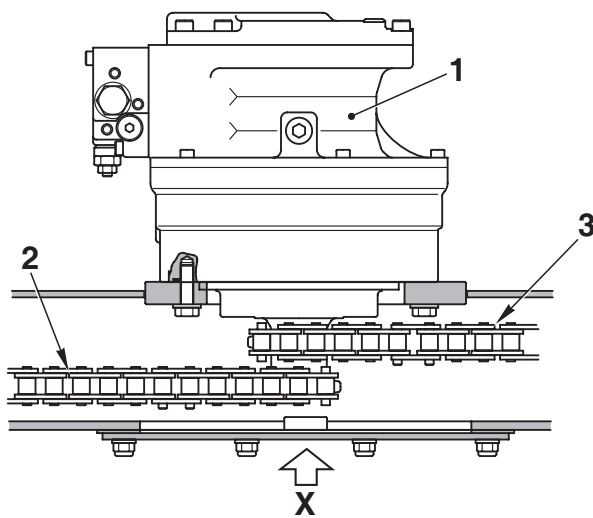
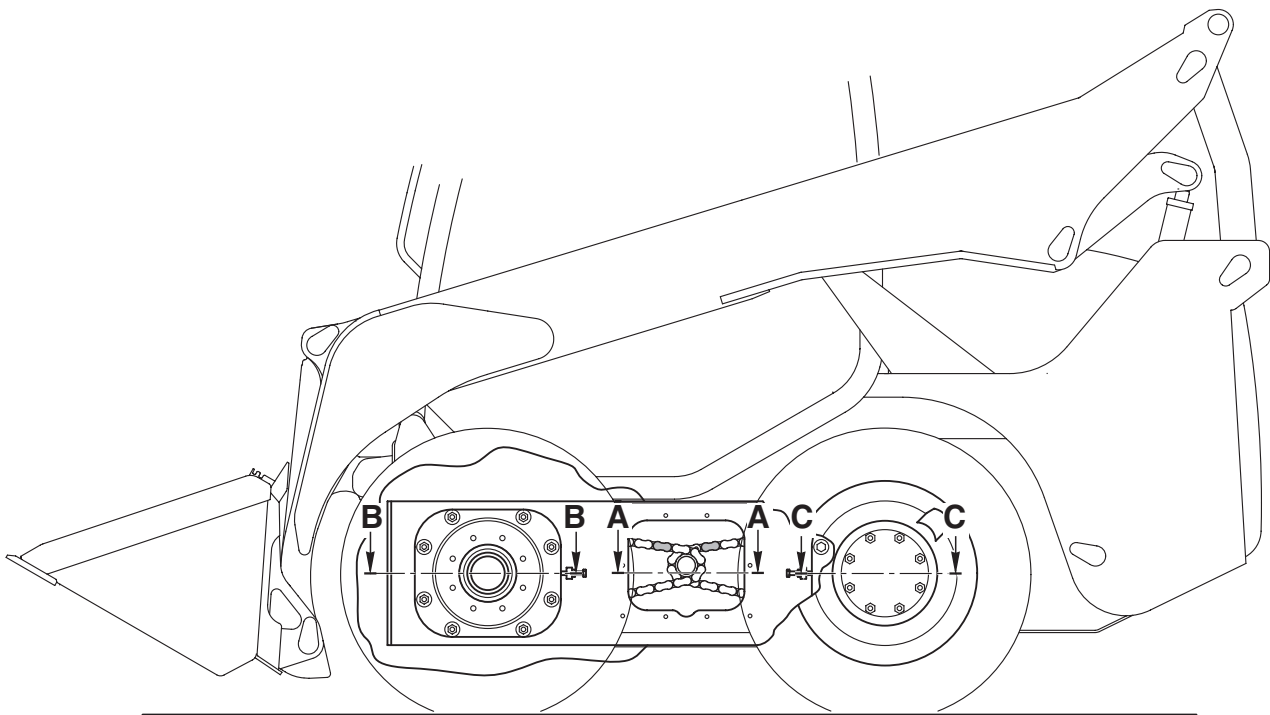
POWER TRAIN



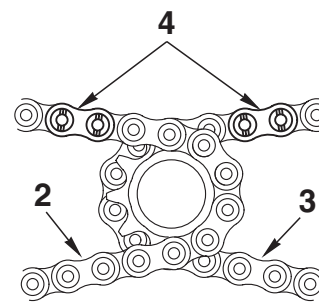
RKS03990

- | | |
|---------------------|-----------------------------|
| 1. Engine | 5. High-flow solenoid valve |
| 2. Hydraulic pump | 6. L.H. final drive |
| 3. Control valve | 7. R.H. final drive |
| 4. Solenoid valve | 8. Axle |
| 4a. Speed increment | |
| 4b. Servocontrol | |
| 4c. Parking brake | |

TRANSMISSION



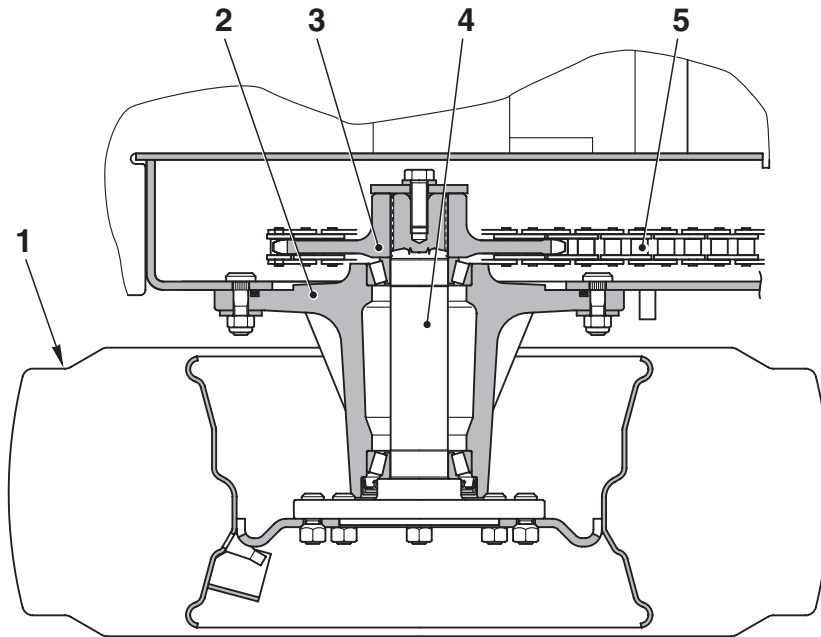
Sezione A - A



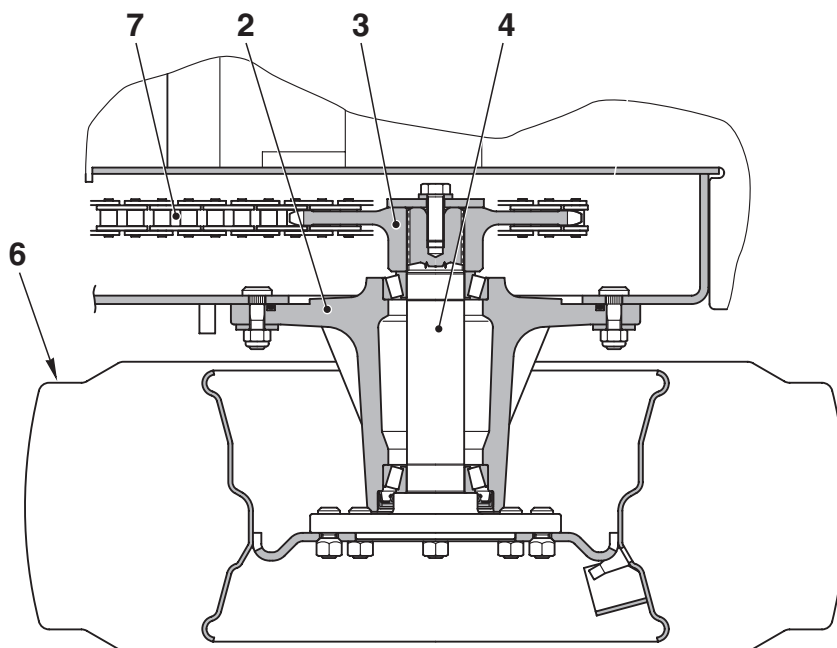
Vista X

RKS04000

- 1. L.H. final drive
- 2. Front trasmission chain
- 3. Rear trasmission chain
- 4. Master link



Section B - B

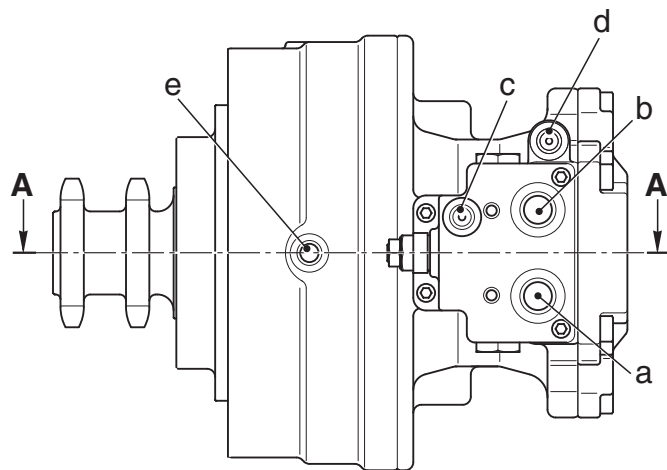
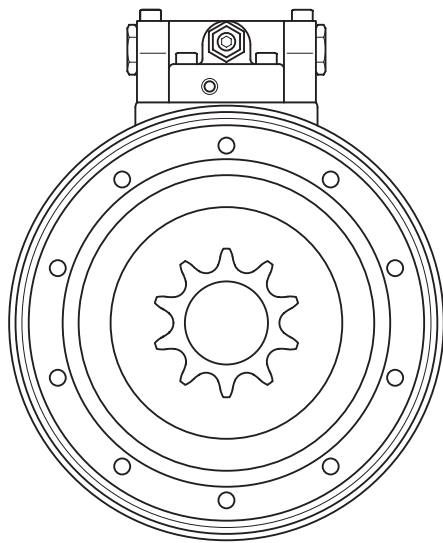
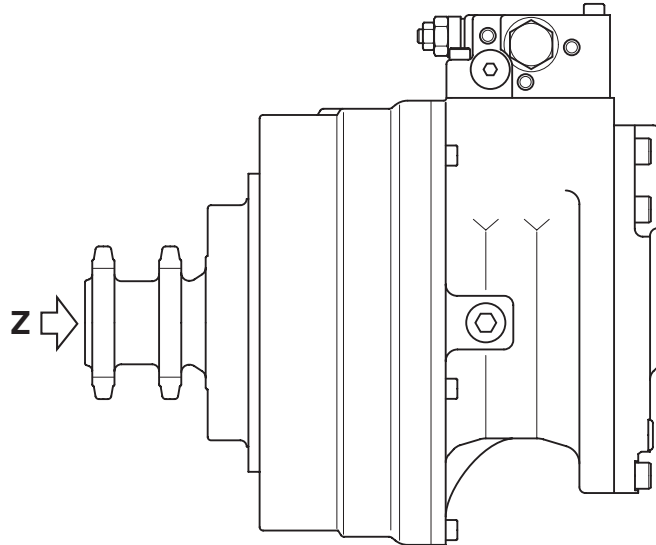
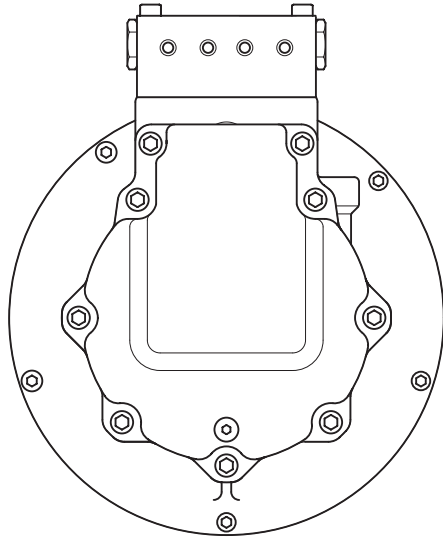
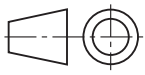


Section C - C

RKS01010

- 1. Front wheel
- 2. Axle housing
- 3. Sprocket
- 4. Shaft
- 5. Front trasmission chain
- 6. Rear wheel
- 7. Rear trasmission chain

FINAL DRIVE



View Z

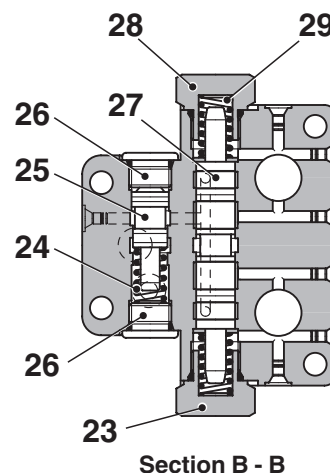
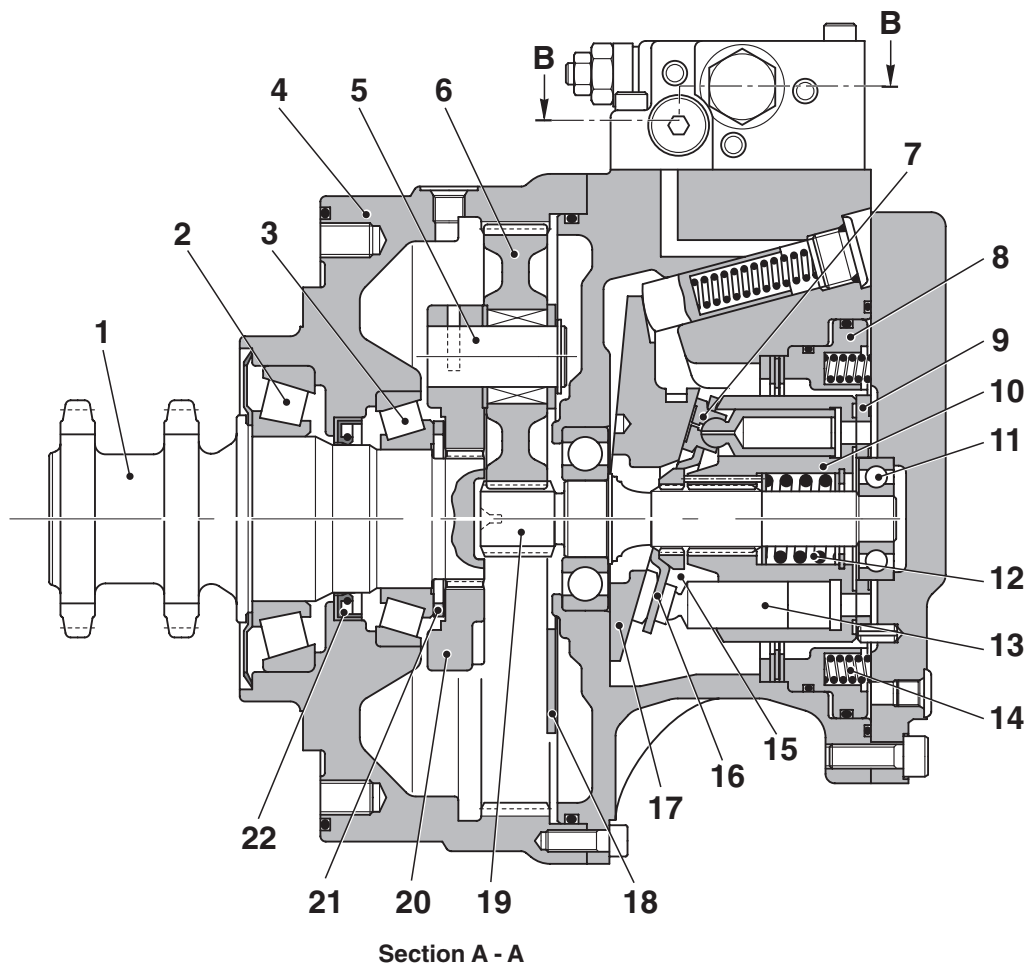
RKS01020

L.H. FINAL DRIVE

- a. A Port – To hydraulic pump (PA2 port)
- b. B Port – To hydraulic pump (PB2 port)
- c. PP1 Port – From solenoid valve group ST1(A Port) (2nd speed)
- d. PP2 Port – From solenoid valve group ST1 (C Port) (parking brake)
- e. DR Port – To hydraulic tank

R.H. FINAL DRIVE

- a. A Port – To hydraulic pump (PB1 port)
- b. B Port – To hydraulic pump (PA1 port)
- c. PP1 Port – From solenoid valve group ST1(A Port) (2nd speed)
- d. PP2 Port – From solenoid valve group ST1 (C Port) (parking brake)
- e. DR Port – To hydraulic tank



RKS01031

- | | | | |
|-----------------|--------------------|-----------------|------------|
| 1. Shaft | 9. Plate | 17. Swash plate | 25. Spool |
| 2. Bearing | 10. Cylinder block | 18. Plate | 26. Plug |
| 3. Bearing | 11. Bearing | 19. Shaft | 27. Spool |
| 4. Body | 12. Spring | 20. Flange | 28. Plug |
| 5. Pin | 13. Piston | 21. Collar | 29. Spring |
| 6. Gear | 14. Brake spring | 22. Gasket | |
| 7. Shoe | 15. Bushing | 23. Plug | |
| 8. Brake piston | 16. Retainer plate | 24. Spring | |

DESCRIPTION

The final drive motor consists of:

1. 2-speed hydraulic motor
2. Selector valve
3. Reduction gearing

1. HYDRAULIC MOTOR

Function

The hydraulic motor is of the axial piston type, and converts hydraulic energy supplied by the pump into rotary motion.

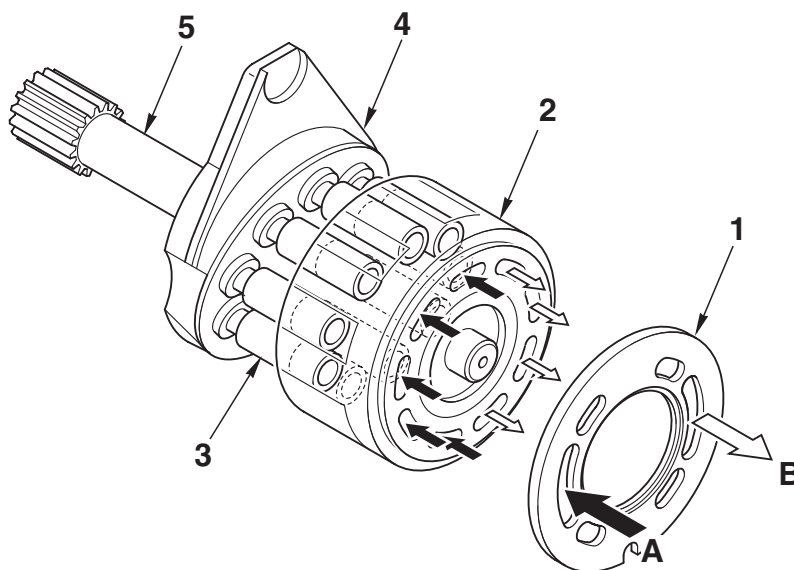
Operation

The hydraulic oil arriving from the selector valve is sent on to the valve plate (1). When the oil is sent to port "A" of the valve, it flows into the corresponding port on the cylinder block (2) and presses against the pistons (3).

This pressure is converted into rotary motion by a swash plate (4) and hence transmitted to the shaft (5). The shaft and the cylinder block have been integrated into one piece by means of splined toothing.

The return oil is sent to the pump through port "B".

Rotation in the opposite direction is achieved by sending the oil to port "B" instead of to port "A"..



RKS01050

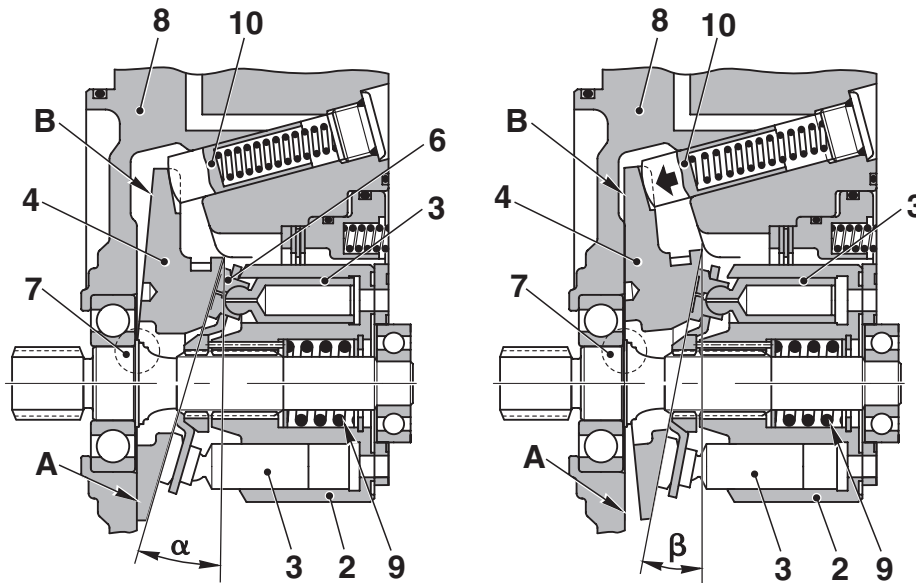
Varying the displacement

The swash plate (4), which has two surfaces "A" and "B" on the side opposite the sliding side for the shoes (6), is supported by two bearings (7) attached to the body of the motor (8).

The position of the bearings is eccentric with respect to the axis of the shaft and when running at low speed the surface "A" remains in contact with the body of the motor through the pressure exerted by the pistons (3) and by the force of a spring (9) mounted in the cylinder block (2).

The angle of the swash plate is α .

When an increase in speed is demanded, the oil is sent under pressure to the command piston (10). The command piston (10) moves to the left (←) until the surface "B" makes contact with the housing and the angle of the swash plate becomes β (the displacement of the motor is reduced).

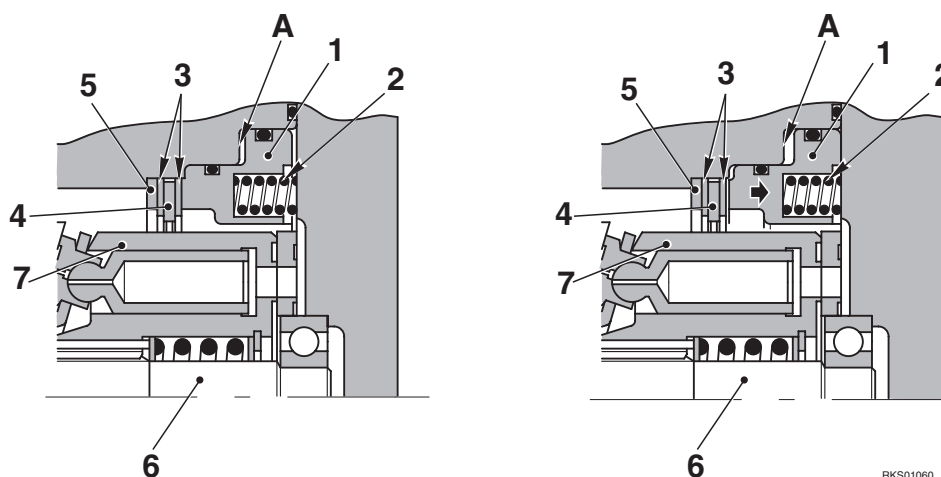


RKS01040

Brake

The hydraulic motor is equipped with a negative brake.

- When the motor is at a standstill, or when the operator applies the brake, the braking piston (1) is pushed to the left (←) by the force of the springs (2). The friction disk (3), which has been integrated with the cylinder block by means of semicircular grooves, is compressed between steel disks (4) and (5), which are integrated with the housing, and is thus blocked. The drive shaft (6) can therefore no longer turn.
- When the motor is running and the operator disengages the brake, oil is sent under pressure to the chamber “A”. The force exerted by the oil is greater than the force of the springs (2) and the piston (1) is therefore pushed to the right (→) thus releasing the friction disk (3) and permitting rotation of the cylinder block (7) (and also of the drive shaft).



RKS01060

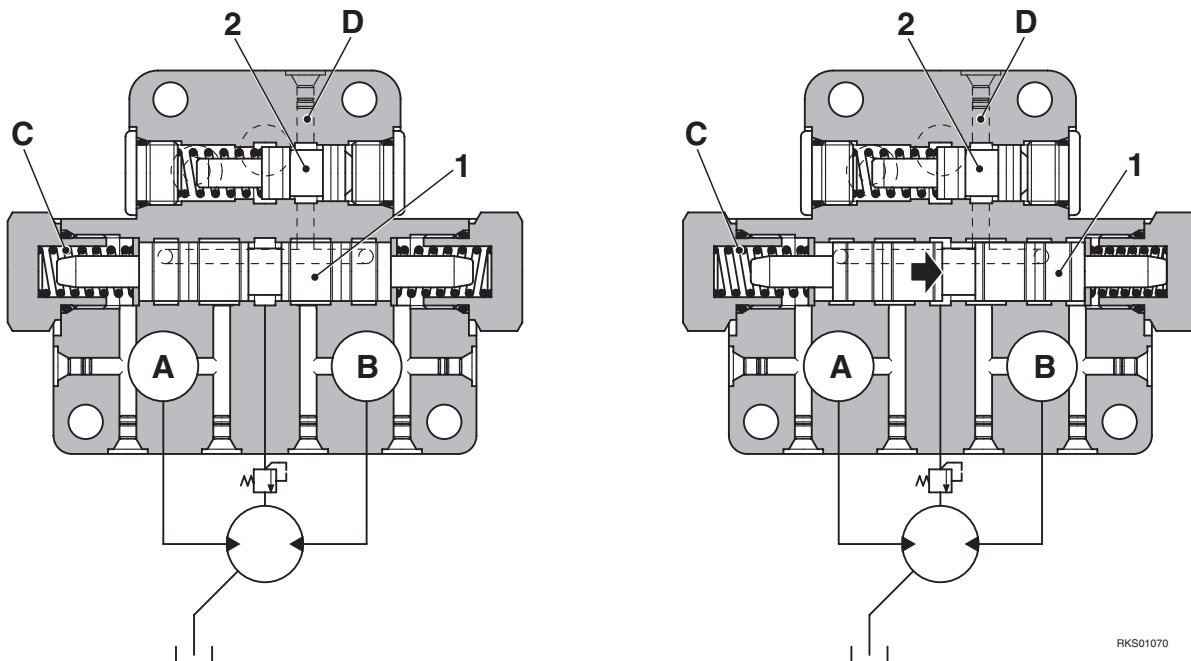
2. FLUSHING RELIEF VALVE

When the oil is sent under pressure to the “A” port, the oil that activated the motor returns to the pump through the “B” port.

The pressurised oil sent to the “A” port is also introduced into the chamber “C”. It now pushes the selector valve (1) to the right (→). This opens communication between the “B” port and the oil gallery “D”, which is connected to the overpressure limitation valve (2).

If the pressure present at port “B” exceeds the calibration value of the overpressure limitation valve (2), this valve will open and discharge the excess oil into the reduction gears.

The valve also functions in the same way when the pressurised oil is sent to the “B” port. The only difference is that the selector valve moves to the left (←), and the oil gallery “D” communicates with the “A” port.



RKS01070

3. REDUCTION GEARING

Function

This final drive motor is equipped with a one-stage epicycloidal reduction gear that converts the high rotation speed and low torque of the hydraulic motor into low speed and high torque at the swing pinion.

Operating principle

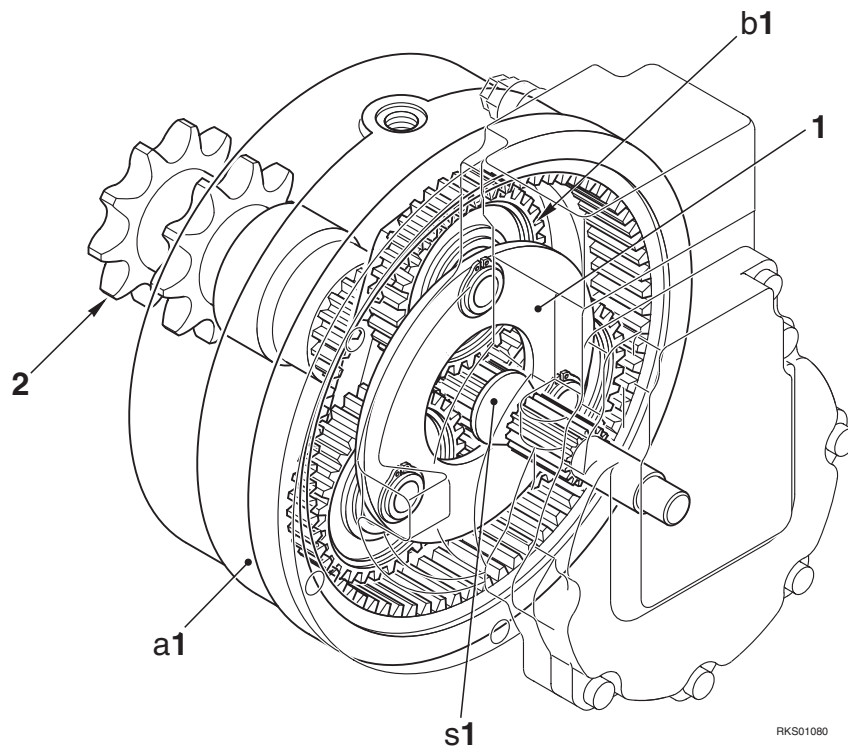
The rotary movement of the output shaft of the motor is transmitted to the gear (s1) and hence to the bevel gears (b1) which are integrated with the planetary gear (1).

Since the gear (a1) is fixed with respect to the output shaft of the hydraulic motor, the planetary gear is obliged to turn, moving with it the output shaft (2) of the reduction gearing (connected to the planetary gear by means of grooved toothing). The reduction ratio of the rotation speed is described by the formula:

$$R = \frac{Zs1}{(Zs1 + Za1)}$$

Zs1= number of sun gear teeth

Za1= number of ring gear teeth





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