

TOYOTA REPAIR MANUAL

MODEL FJ

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CHASSIS FRAME

CHASSIS WHEEL

SPRING

TUBULAR TYPE SHOCK ABSORBER

CHASSIS FRAME

CHASSIS FRAME

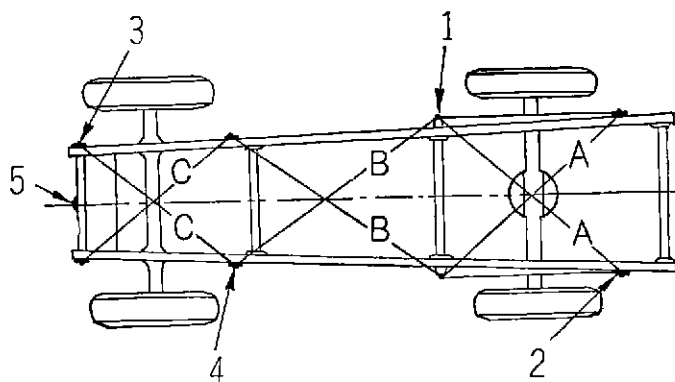
The frame on the Toyota Land Cruiser has been designed for riding comfort and strength, and consists of channel section side members and cross members of steel tubing which are specially suited for torsional strength. These members are assembled with rivets and electric welding making the frame light with maximum strength especially against deformation from twisting.

The side members in order to allow ample axle clearance and to lower the center of gravity are provided with kick-ups over the rear axle.

FRAME ALIGNMENT AND ITS CORRECTION

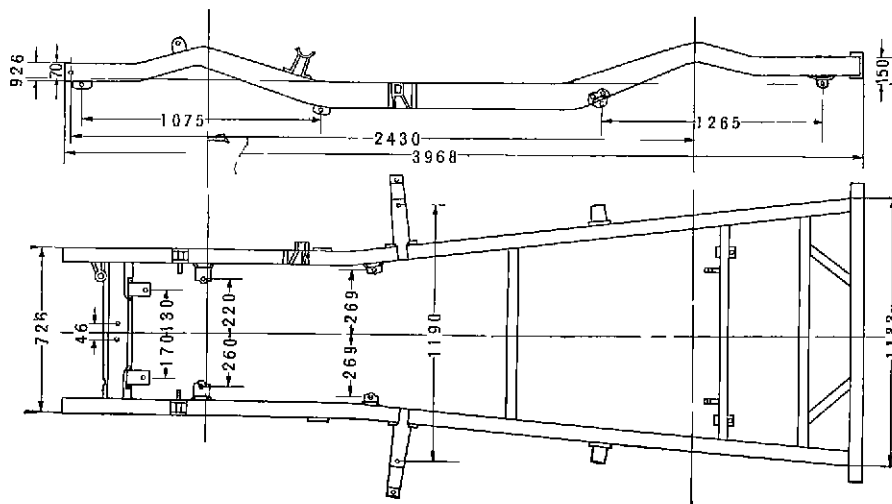
For the frame to be in alignment, the left and right sides should be symmetrical about the center line. To check alignment, first place the vehicle on a clean and level floor and apply brakes to prevent any movement. After this, lower a plumb bob from the points necessary for alignment and mark the spots where the plumb bob touches the floor. Then remove the vehicle and check alignment of the marked points with reference to the centerline. The diagonal distances should be within 6 mm.

Measuring Frame Alignment



- 1 Rear spring front hanger
- 2 Rear spring hanger
- 3 Front spring front hanger
- 4 Front spring rear hanger
- 5 Chassis center-line

When a vehicle has been subjected to abnormal shock such as collision, usually there will always be a little change in the above alignment so that when such cases arise, the vehicle should be checked immediately and necessary corrections made



CHASSIS WHEEL

The front wheels revolve while supporting the weight of the front part of the vehicle and when necessity arises, serve as a part of the steering mechanism to change the running direction of the vehicle

The rear wheels support the weight of the rear part of the vehicle and under normal running conditions, receives its rotating motion from the engine through the rear axles to propel the vehicle, being the so-called driving wheels. All four wheels are of the same size

REMOVING AND INSTALLING WHEELS

1. Wheels should be installed properly bearing in mind that there will be no danger of the wheels becoming loose while running

2. The hub nuts and hub bolts used in installing the wheels are of two types, those for the right side and those for the left side. Those for the right side are stamped with the letter R and those for the left side with letter L. When installing, care should be taken not to interchange these bolts

3. When installing or removing wheels, the vehicle should be jacked up so that the bottom face of the tire is not touching the ground.

4. Care should be taken to see that the hub nuts are uniformly tight.

Tire Specifications

Recommended Tire Size	6.00-16	6 ply Balloon tire
Recommended Inflation		
Normal Road Conditions	27 lbs	
Rough or Mountainous	22 "	
Sandy or Muddy	15 "	

REMOVING, REPAIRING, AND INSTALLING TIRE AND TUBES

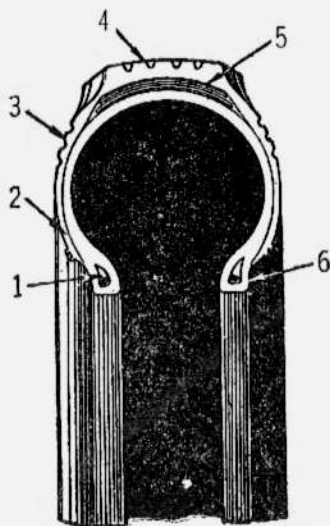
When a puncture occurs in the tire, it is necessary that the wheel be removed from the vehicle and the tire and tube disassembled from the wheel rim after which the cause of the puncture be detected and necessary repairs to the tire or tube be made. In this connection, care should be taken to use the correct equipment or proper tire lever in order to prevent damaging the tire bead and tube

1. After the tire and tube are removed from the rim, the following inspection and repairs are made.

a. All rust on the wheel rim is completely removed.

- b. Any deformation or damages on the wheel rim should be repaired at once or the wheel replaced.
 - c. Any dirt or rust on the tire bead and flap should be thoroughly cleaned off.
 - d. Check and remove cause for puncture and repair puncture damage on tire and tube.
2. The following precautions should be observed in installing tire and tube to rim.
- a. The tire flap should always be inserted taking care to place the center of the flap in the middle between the beads.
 - b. The inner surface of the tire should be well dried and sprinkled with pumice or mica powder.
 - c. The tube should be carefully inserted to prevent wrinkling and the valve correctly positioned so that no unnecessary force will fall on the valve.
 - d. The tube should never be inserted while still wet.

Tire



- | | |
|-------------|-----------|
| ① Bead Wire | ⑤ Carcass |
| ② Flipper | ⑥ Bead |
| ③ Shoulder | |
| ④ Tread | |

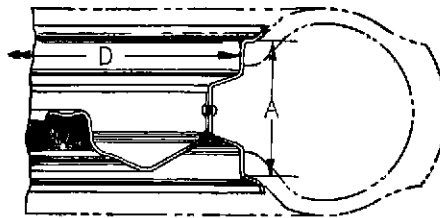
INSTRUCTIONS ON TIRE MAINTENANCE

1. The following instructions should be strictly observed while driving the vehicle.
 - a. Absolutely avoid overloading.
 - b. Avoid sudden starting and quick stopping except when absolutely necessary.
 - c. Avoid overspeeding and lower speed considerably before making sharp turns.
 - d. Avoid rough roads but when necessary, travel at slow speed.
 - e. When tire heats up abnormally while running, stop vehicle to cool tire and check for cause of overheating.
 - f. When a puncture occurs in the tire, stop the vehicle immediately. Never keep on running.

2. The following checkup and servicing should be made before and after running the vehicle.

- a. Check tire inflation.
 - b. Check for air leaks in tire.
 - c. Check for and retighten loose hub nuts.
 - d. Clean dirt and oil adhering to tires and rims, remove any nail, glass, stones and other objects sticking into the treads.
 - e. Check for damages in tire and rim.
 - f. Check inner surface of tire every 3,000 to 4,000 kms, checking for damages and other abnormal conditions
 - g. Note front wheel alignment and correct when possible
3. Precautions to be observed when the vehicle is not to be used for a long period of time
- a. It is preferable that the wheels be removed and stored in a cool dark place.
 - b. If not possible, supports should be used to raise the tires at least 50 mm above the ground and the tire inflation decreased.
 - c. Fires should be absolutely prohibited and, oil and copper objects should not be placed in contact.

Wheel size



A = 114.5 mm (Rim Width) 4.5"
D = 406.6 mm (Rim Diameter) 16"

SPRING

The Toyota Land Cruiser is equipped with semi-elliptic type leaf springs of silicon-manganese steel at front and rear of chassis. These springs have been made wide with long span and few number of leaves with the object of decreasing the friction between the leaves, improving riding comfort, and making the springs lighter.

Spring eye bushing of natural rubber has been provided at the shackle pin and hanger pin parts. The purpose of these natural rubber bushings are to absorb the spring deflections through deformation of natural rubber.

Specifications

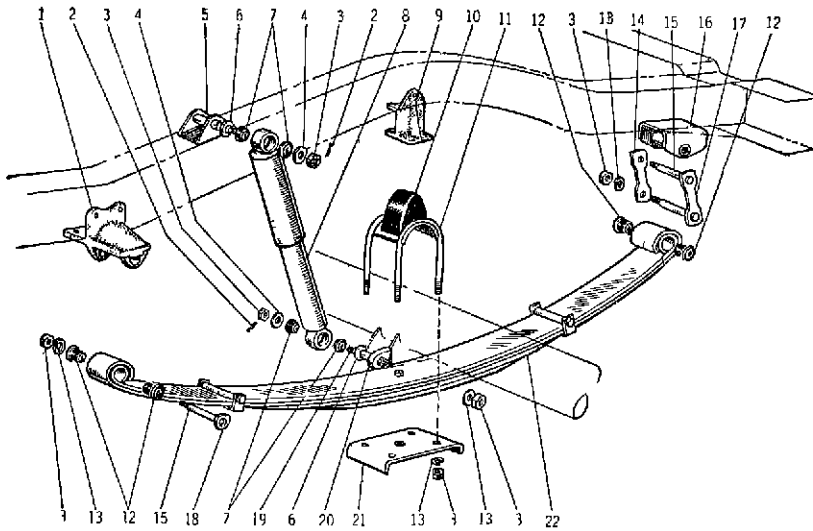
Front Spring

Type	Semi-elliptic leaf spring
Material	Silicon-manganese steel
Leaf Width	70 mm
Thickness	6 mm
No. of Leaves	6
Spring Eye Diameter	25 mm
Span	1100 mm

Rear Spring

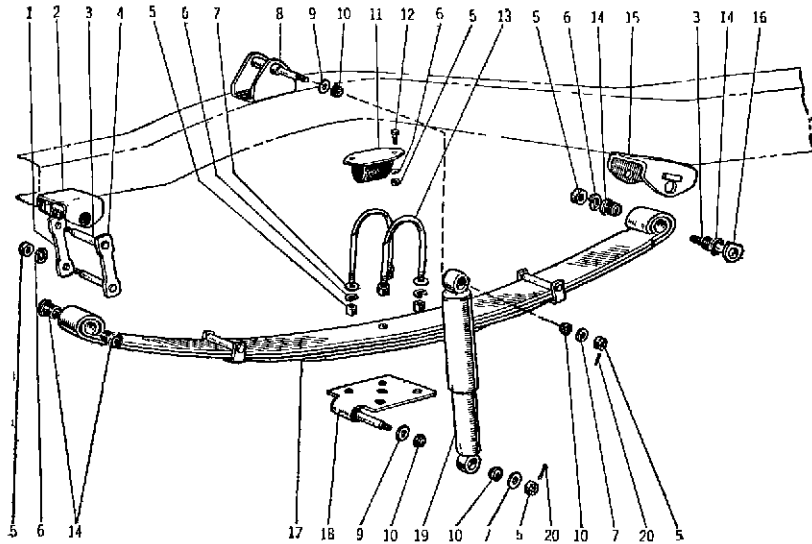
Type	Semi-elliptic leaf spring
Material	Silicon-manganese steel
Leaf Width	70 mm
Thickness	7 mm (for FJ 25) 7 mm × 6 leaves } (For FJ 28) 11 mm × 3 leaves }
No. of Leaves	7 (For FJ 25) 9 (For FJ 28)
Spring Eye Diameter	25 mm
Span	1300 mm

Front Spring



- | | |
|--------------------------------|----------------------|
| ① Shackle | ⑪ Cushion Rubber |
| ② Hanger | ⑫ Bolt |
| ③ Hanger and Shackle Pin | ⑬ U Bolt |
| ④ Shackle Plate | ⑭ Spring Eye Bushing |
| ⑤ Nut | ⑮ Rear Hanger |
| ⑥ Spring Washer | ⑯ Spring Support End |
| ⑦ Plate Washer | ⑰ Front Spring |
| ⑧ Shock Absorber Upper Bracket | ⑱ U Bolt Seat |
| ⑨ Support Bolt Washer | ⑲ Shock Absorber |
| ⑩ Pivot Pin Bushing | ⑳ Cotter Pin |

Rear Spring



- | | |
|--------------------------------|--------------------------|
| ① Front Hanger | ⑫ Spring Eye Bushing |
| ② Cotter Pin | ⑬ Spring Washer |
| ③ Nut | ⑭ Shackle |
| ④ Plate Washer | ⑮ Hanger and Shackle Pin |
| ⑤ Shock Absorber Upper Bracket | ⑯ Hanger |
| ⑥ Support Bolt Washer | ⑰ Shackle Plate |
| ⑦ Pivot Pin Bushing | ⑱ Spring Support End |
| ⑧ Shock Absorber | ⑲ Pivot Pin |
| ⑨ Cushion Stopper | ⑳ Pivot Arm |
| ⑩ Cushion Rubber | ㉑ U Bolt Seat |
| ⑪ Spring U Bolt | ㉒ Rear Spring |

FRONT SPRING

The rear end of the front spring is directly connected by the shackle pin to the front spring rear hanger riveted on to the frame. The front end is connected through the shackle and shackle plate to the front spring hanger riveted on to the frame. The center part of the spring is attached to the spring seat welded on to the lower side of the front axle housing. This attachment is made with 2 U bolts on each side and U-bolt seat, and tightened with spring washers and nuts. The cushion rubber is attached to the bottom side of the frame with 2 bolts. The lower side eye of the shock absorber attaches on to the spring seat and fastened through the pivot pin bushing and plate washer with a nut. This nut is prevented from turning with a cotter pin.

Removing Front Spring

The following method is used to remove the front spring.

1. Jack up the vehicle at the front axle and place stands under the frame.
2. Disconnect front shock absorber at lower eye connection

Pull out cotter pin from pivot pin welded on to front spring U-bolt seat. Unscrew nut and take out thrust plate and pivot pin, and disconnect front shock absorber lower eye.

3. Unscrew nuts from U-bolts mounting spring to axle. Remove U-bolts and at same time lower jack and free front axle assembly.

4. Unscrew front spring shackle nut and remove shackle. Lightly tap shackle pin on shackle plate and pull out shackle plate

5. Unscrew front spring rear hanger shackle pin nut and by removing shackle pin, the front spring assembly can be removed.

REAR SPRING

The front end of the rear spring is directly connected by the shackle pin to the rear spring front hanger riveted on to the frame. The rear end is connected through the shackle and shackle plate to the front spring hanger riveted on to the frame. The center part of the spring supports the rear axle housing at its spring seat part and holds it down with cushion rubber and U-bolts.

Removing Rear Spring

The following method is used to remove the rear spring.

1. Jack up the vehicle and place stands under the frame to stabilize the vehicle

2. Unscrew nuts from U-bolts mounting rear axle housing. Remove U-bolts and cushion rubber, and at same time jack up rear axle to free the springs.

3. Remove front and rear shackle pins in same manner as that for front springs and the rear spring assembly can then be removed.

DISASSEMBLING SPRING

To remove center bolt from spring, hold down spring leaves in press or vise and unscrew center bolt nut. Then tap out center bolt.

INSPECTING SPRING PARTS

1. Check for wear in shackle pin and eye bushing and if found badly worn, replace with new parts.
2. Worn or deformed spring center bolt should be replaced.
3. Broken or cracked spring leaves should be replaced.

ASSEMBLING SPRING

The procedures for disassembling and removing springs are followed in reverse order when reassembling.

1. In assembling spring leaves, grease each spring leaf and after aligning center bolt holes, insert center bolt and tighten securely. Then fasten clamps to complete the spring assembly.

2. Install spring to frame and install shackle pin and shackle.

At this time, the eye bushing is inserted into the spring eye. When assembling shackle pin, the lock nut should be tightened in position such that deformation of eye bushing due to spring deflection will be taken into consideration. Thus, at this time, this lock nut is only tightened temporarily.

3. Check to see that the springs are correctly positioned on the front and rear axle spring seats and that the heads of the center bolts are properly fitting into the seat holes.

4. Install U-bolt and screw on the four nuts, taking care to tighten them alternately and uniformly, and making sure that the bolts are on with uniform tightness.

5. Finally tighten shackle pin lock nut.

SPRING MAINTENANCE INSTRUCTIONS

From the construction of the spring it can be seen that they support the total weight of the vehicle in addition to constantly absorbing the road shocks while the vehicle is running. With the purpose of preventing damage to the springs and preserving its performance, their frequent inspection should never be neglected.

The following instructions should be observed

- I. Absolutely avoid overloading.

The maximum load capacity is specified at 1,000 kgs.

2. Main parts to be checked and greased.

The spring U-bolt nuts should be checked and retightened at least every 500 kms. However, when the vehicle is new, the spring shackles, U-bolts, and other fastenings should be checked and retightened every 300 kms.

The shackle pins should be greased through the nipples every 500 kms.

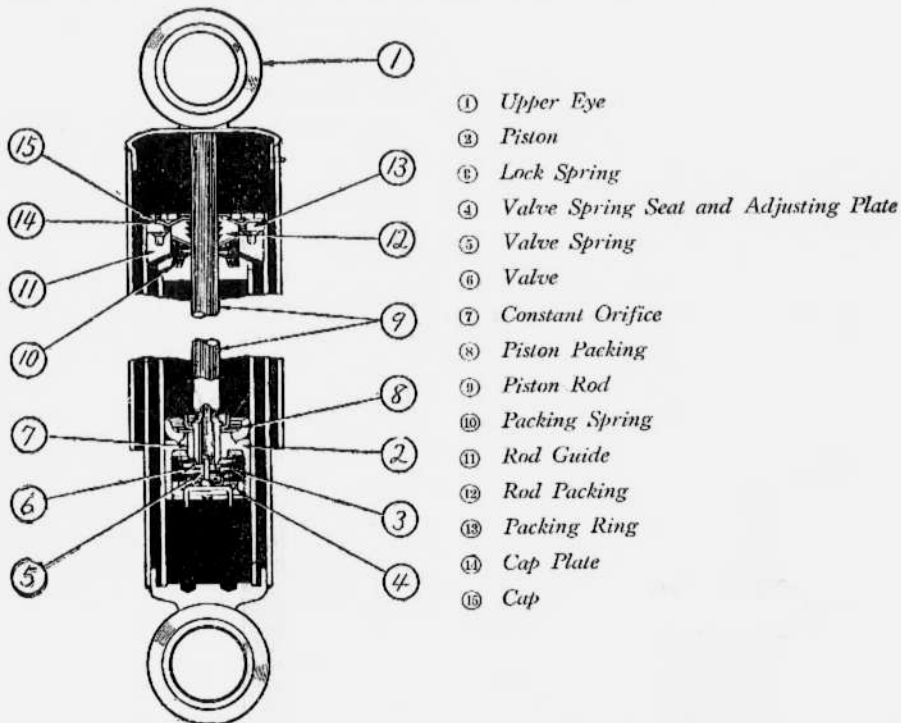
3. Weakened spring, loose clips, and other points should constantly be kept in mind when checking. When any broken spring leaf is found, the spring should be immediately disassembled and replacements made.

4. On exceedingly rough roads, the vehicle should always be run at very slow speed. Unnecessary quick starting or stopping should be avoided. The preservation of springs should always be kept in mind when running the vehicle.

TUBULAR TYPE SHOCK ABSORBER

CONSTRUCTION

A form of tubular type shock absorber is illustrated below.



The tubular type shock absorber can be divided into the following main parts.

1. Piston unit
2. Cylinder unit
3. Cap unit

The piston is provided with a check valve which is held down with the valve spring. By varying the strength of this valve spring, the absorbing resistance can be adjusted. The spring seat screws on to the inner side of the piston and by turning this seat, the strength of the valve spring can be adjusted.

The rod guide fits on the upper part of the cylinder and on top of this is the spring and piston rod packing to prevent the oil from leaking around the piston rod.

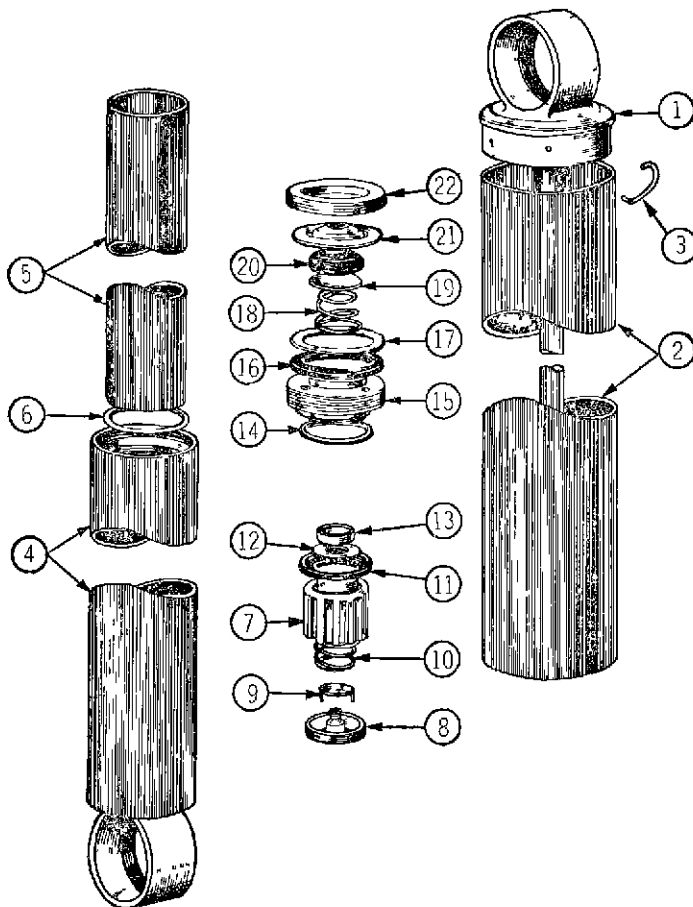
By turning the adjusting plate clockwise, the spring is strengthened to increase the absorbing power, and by turning the adjusting plate counter-clockwise, the

spring is weakened to decrease the absorbing power.

The rod packing is provided with triangular sectioned grooves which serves to facilitate oil removal when the rod is being pulled out. Around the upper surface of the rod guide is the packing ring which is held down by the cap seat and further screwed down by the cap. This prevents the oil inside the sleeve from leaking out of the outer side of the rod guide and cap to the outside.

The space between the pressure tube and sleeve serves as air chamber for the oil to run into when it escapes from inside the cylinder.

The piston rod is hard chrome plated to prevent friction with the packing.



Tubular Type Shock Absorber (Aiko Manufacture)

- | | | |
|------------------------------|-------------------------|------------------|
| ① Upper Eye and Piston Rod | ⑨ Adjusting Plate | ⑰ Packing Plate |
| ② Outer Shell | ⑩ Lock Spring | ⑱ Packing Spring |
| ③ Clip | ⑪ Piston Packing | ⑲ Packing Plate |
| ④ Sleeve | ⑫ Packing Washer | ⑳ Rod Packing |
| ⑤ Pressure Tube | ⑬ Stopper | ㉑ Cap Plate |
| ⑥ Pressure Tube Packing | ⑭ Pressure Tube Packing | ㉒ Cap |
| ⑦ Piston | ⑮ Rod Guide | |
| ⑧ Pressure Valve Spring Seat | ⑯ Packing Ring | |

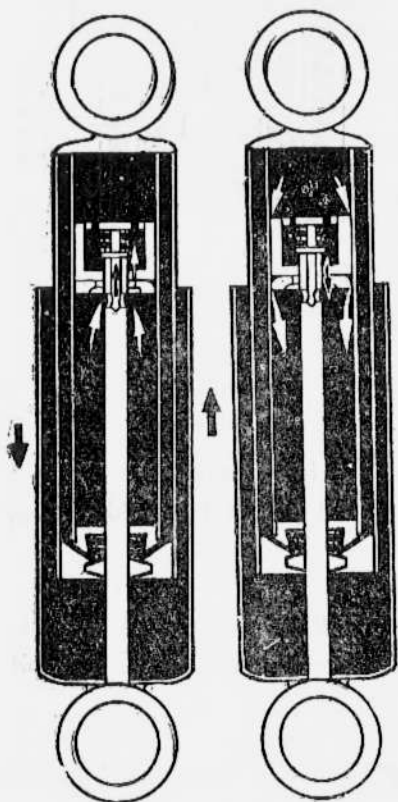
OPERATION

1. When Compressed

When compressed, the oil in the lower part of the piston passes freely between the pressure tube and rubber piston packing into the upper part of the piston and into the air chamber so that at this time there is practically no absorbing action.

2. When Extended

The oil in the upper part of the piston is compressed and tends to flow down into the lower part of piston. But since the piston packing is pressed down by the pressure tube and acts as a check valve, the oil being unable to flow through here, flows out through the constant orifice into the lower part of piston. As the piston travels further, the compression of the oil in upper part of piston increases until this oil pressure overcomes the force of the valve spring to open the valve and allow the oil to flow into the lower part of piston. The rise in oil pressure at upper part of piston acts as the absorbing force for the shock absorber. Consequently, the absorbing force of the shock absorber depends on the strength of valve spring holding down the valve.



DISASSEMBLY

For "Aiko" products, the disassembly procedure is as follows.

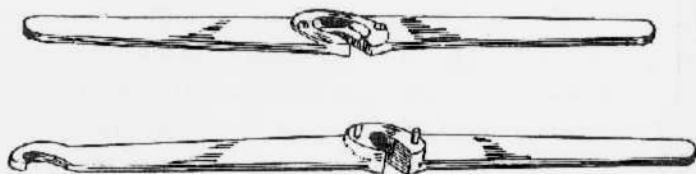
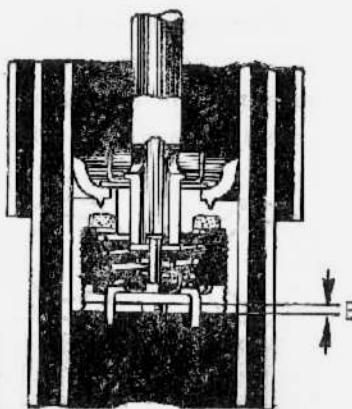
1. Place the lower eye in a vise and hold the assembly upright in vertical position.
2. Remove clip on upper part of outer shell and remove shell.
3. Remove cap by using shock absorber special tool (SST). By removing cap; cap seat and packing ring, packing ring seat, rod packing, cap plate, and packing spring can be taken out.
4. Remove rod guide using (SST).
5. By pulling piston rod out carefully, the piston can be pulled out.
6. Place the upper eye in the vise and hold the piston rod in vertical position.
7. Remove piston using (SST) (Finger part of SST).
8. When disassembling piston, measure and note the distance E shown in the figure. By turning adjusting plate in counterclockwise direction and removing piston cap, the pressure valve together with valve spring can be removed. By removing

piston, the piston packing and packing washer, stopper, etc., can be removed.

—NOTE—

a. On "Sugaba" and "Tokyo Kiki" products, the rod guide can be removed by removing cap. The outer shell cannot be removed so that the cap is removed by pulling shell out fully until the cap part shows up.

b. The tubular type shock absorber special tool (SST) are shown in the illustration.



ASSEMBLY

1. Wash all parts carefully before assembling.
2. Place upper eye in vise and hold piston rod in vertical position.
3. Place cap, cap seat, rod packing, packing plate, packing spring, packing ring, packing ring seat, piston rod guide into piston rod.

NOTE—

When placing rod packing into piston rod, care should be taken not to place it upside down. The deeper oil grooves should be on the upper side. Grease the oil grooves in rod packing before installing.

4. Place stopper, packing washer, and packing into rod and insert piston.

Care should be taken to see that the lip on the piston packing fits into the hollow part of the piston.

5. Insert lock spring, adjusting plate, and cap into piston and screw adjusting screw in fully and then unscrew back to the distance E determined during disassembly. Then rivet piston to piston rod and piston to adjusting screw.

6. Place lower eye in vise and hold upright. Then fill shock absorber oil to specified level

7. Insert piston carefully into cylinder.
8. Screw in piston rod guide and place packing ring seat and packing ring on top. At center part, place in order: spring, packing plate, and rod packing.
9. Hold down cap seat with packing ring and fasten down cap securely.
10. Finally install outer shell.
11. After assembly is completed, extend and compress fully to check if the stroke is smooth.

—NOTE—

When the shock absorber is disassembled, always make sure to check rubber packings, and replace those found defective

In washing rubber parts, always use wash oil. Never use gasoline or alcohol.

ADJUSTMENTS

By compressing the shock absorber fully, the finger on the adjusting plate will fit into the hole in oil tube cap so that by turning in clockwise direction, the valve spring will be strengthened to increase the absorbing force. Turning in opposite direction will weaken this force.

The shock absorber has already been adjusted accurately with tester so that care should be taken not to disturb this adjustment.

When disassembled the shock absorber should always be reassembled back to its former adjustment. As shown in the figure, the distance E should be measured during disassembly so that when reassembling, the adjusting plate can be screwed back to this former position E. In this manner, the absorbing force will be as it was before and there will be no necessity of adjustment.

TROUBLES AND ITS METHOD OF REPAIR

Trouble	Method of Repair
1. Oil leaks	Replace piston rod packing, replace packing ring, or retighten cap
Leaks at piston rod	
Leaks around cap	
2. Operation defective	After making repairs in (1), replenish shock absorber oil to specified level
Action defective due to oil leakage	
Action defective due to damaged piston packing	Replace piston packing
3. Produces noises	
Outer shell contacting spring	Hold upper eye in vise and repair with wooden mallet
Noise due to piston rod and packing	Grease oil grooves in rod packing

SHOCK ABSORBER OIL

The oil to be used in shock absorber should have small variations in viscosity due to temperature changes, be strongly acid resistant, and should be free from any danger of corroding metal and rubber parts.

TOYOTA MOTOR SALES CO., LTD.