

# Servicing

(For correct fluid usage, see **Figure 72**)

SERVICING SHOULD BE CARRIED OUT AT THE RECOMMENDED INTERVALS (refer to page 58) AND RECORDED IN THE MAINTENANCE SCHEDULE (**Appendix B**)

## Handling and disposal of SIBS Fluid

- Refer to SIBS<sup>®</sup> Fluid Material Safety Data Sheet (Appendix A) for handling instructions.
- SIBS<sup>®</sup> Fluid must be disposed of in accordance with all Regulatory and Environmental regulations.

## Replacing SIBS Fluid

Draining SIBS<sup>®</sup> Fluid

Remove the drain plug (see **Figure 68** and **Figure 69**) from a brake assembly and drain SIBS<sup>®</sup> Fluid into a drain pan, ready for disposal.

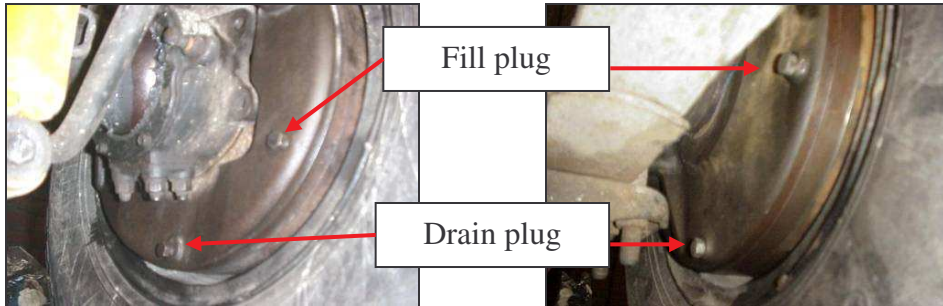
Filling SIBS<sup>®</sup> Fluid

### **WARNING**

The use of any fluid other than SIBS<sup>®</sup> Fluid will void the warranty and may cause brake failure resulting in injury or death.

The brakes must be drained and filled with new SIBS<sup>®</sup> Fluid if they remain totally immersed in water for lengthy periods.

Before refilling with SIBS<sup>®</sup> Fluid, ensure that the drain plug has been cleaned and fitted with new thread sealant tape. Remove the fill plug and fill the system with fresh SIBS<sup>®</sup> Fluid through this port using only SIBS<sup>®</sup> Fluid. Replace the fill plug when SIBS<sup>®</sup> Fluid begins overflowing out of the port

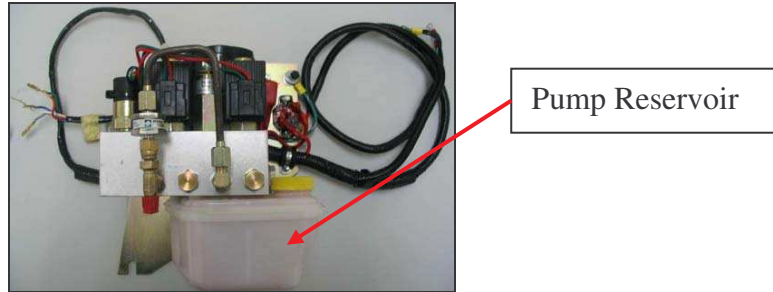
**FIGURE 68**

Front brake drain and filler plug locations

**FIGURE 69**

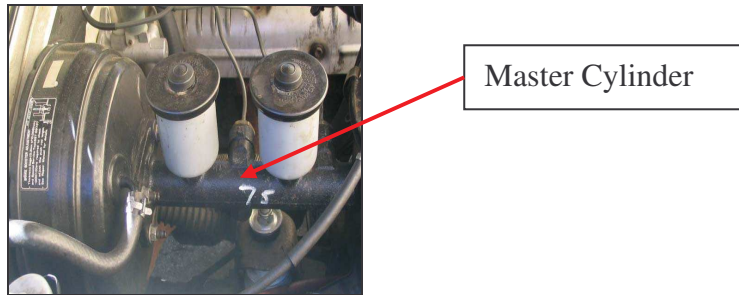
Rear brake drain and filler plug locations

Use only automatic Transmission Fluid (ATF, DEXRON II or III) in the Pump Reservoir.



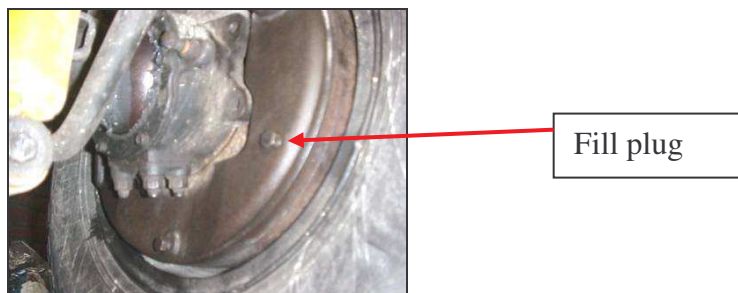
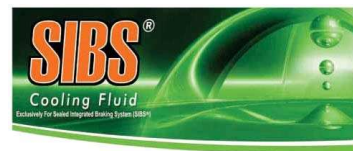
**FIGURE 70** Pump Reservoir

Use only DOT 3 Brake Fluids in the Master Cylinder.



**FIGURE 71** Master Cylinder

Use only Shell SIBS Fluid in the Brake Housings.



**FIGURE 72** Fill plug

## **SIBS<sup>®</sup> Fluid Volume in Brake Assemblies:**

- Each Front Assembly 1 – 1.2 litre
- Each Rear Assembly 1 – 1.2 litre

## **INITIAL SERVICE**

Drain and replace SIBS<sup>®</sup> Fluid, 500 km after initial installation.

## **WEEKLY SERVICE**

- Check SIBS<sup>®</sup> Fluid level at SIBS<sup>®</sup> oil level indicator plug on inner housings and top up as required with fresh SIBS<sup>®</sup> Fluid.
- Check brake fluid level in master cylinder and top up as required.
- Inspect brake housings for oil leaks.
- Replace wheels and check correct operation of service and EMMA<sup>™</sup> brakes.

## **MINOR SERVICE**

Minor Service Intervals:

Normal operating conditions	5,000 km
Extreme operating conditions	2,500 km

- Change the SIBS<sup>®</sup> Fluid in each brake assembly. Drain the SIBS<sup>®</sup> Fluid by unscrewing the drain plugs located in each inner housing.
- Replace SIBS<sup>®</sup> Fluid as described under Replacing SIBS<sup>®</sup> Fluid.
- Check that the rubber dust caps on the bleeder nipples have been refitted.
- Replace the wheels and check for correct operation of the service and EMMA<sup>™</sup> brakes.

## MAJOR SERVICE

20,000 km - FOR SEVERE TO EXTREME OPERATING CONDITIONS

50,000 km - FOR STANDARD OPERATING CONDITIONS

### Inspection / Maintenance Strip Down

All brake parts should be examined thoroughly and brake pads; rotors; piston brake fluid seals; and oil/dust seals replaced during reassembly, if required. With the fitting of new piston O-rings a slight binding of the brake may occur until seals have bedded. Therefore replacing seals on both side of the axle is recommended.

### Procedure

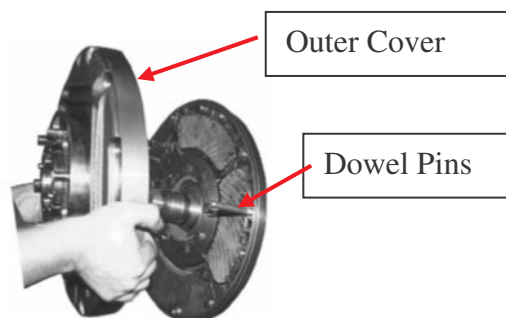
Refer to the Toyota Repair Manual for wheel bearing adjustment

- Remove the wheel.
- Clean the external surface of the brake prior to disassembly.
- Drain the SIBS® Fluid from the brake housing by removing the drain plugs from the inner housings.

#### **Front Brake Assembly Removal**

Refer to Section 5 for hub disassembly

- Remove the Toyota locking hubs.
- Remove the wheel bearing lock nuts and lock tabs.
- Remove the housing bolts around the outer edge of the brake housing outer cover and remove cover.



**FIGURE 73** Removing outer cover

### ***Rear Brake Assembly Removal***

Refer to Section 5 for hub disassembly

- Remove the Toyota axle shaft.
- Remove the bearing lock nuts and washer.
- **Release the EMMA™ park brake before loosening the outer housing bolts by first charging the system using the PECB in the vehicle cabin.**
- Remove the four blanking plugs and fit retractor bolts to hold the pistons in the OFF position.
- The PECB in the cabin can then be discharged and the ignition switched OFF.

### ***Removal of Outer Covers***

Remove the outer housing bolts and slide the outer housing away from the inner housing using the two special M10 locating bolts with heads removed (as used in the installation of SIBS® Braking System).

#### **NOTE**

Wheel hub, rotor, outer housing cover and wheel bearings slide off the spindle as a single unit. Remove brake pads from inner housing

#### **CAUTION**

When the rotor and pads are removed they must be marked carefully and returned to their original locations. Mismatching may cause loss of brake efficiency, accelerated wear and/or increased pedal stroke. **THE BRAKE PADS ARE DIRECTIONAL.** Treat brake pads carefully to avoid damaging the friction material.

**To Remove Service Pistons from Inner Housings:**

- Apply a bar clamp on the rubber brake hoses to stop fluid loss.
- Loosen the bleeder nipples.
- Remove the 53.7 mm service pistons (front) and 60 mm pistons (rear).
- Clean and inspect all components.
- Replace the brake pads and bleed again (refer to Section 5 page 44).

**DETAILED PARTS INSPECTION FOR SERVICING**

**Brake Pads**

***Brake pads replacement:***

**Front Wheel**

Original thickness 14.0 mm

Replace if < 11.0 mm

**Rear Wheel**

Original thickness 14.0 mm

Replace if < 13.0 mm

Brake pads should be free of damage, distortion and/or blocked grooves.

Before reusing brake pads, it is recommended to lightly 'buff' the surface of the pads with #240 grit wet-and-dry sand paper. This will help ensure consistent brake performance.

**WARNING**

Thickness of rear brake pads is critical. Brake pads below replacement thickness will result in increased travel of EMMA™ piston and reduced braking force.

**Rotor**

Inspect the spline for damage or wear.

Before replacing the rotor, lightly 'buff' both friction surfaces of the rotor using #240 grit wet-and-dry sand paper. This will help ensure consistent brake performance.

## Service Piston Seals

There are two machined grooves in the service pistons, the larger groove holding the EPDM O-ring, which acts as the high pressure seal against brake fluid. The smaller groove holds the Viton O-ring, which acts as a wiper seal preventing the SIBS® Fluid coming into contact with the EPDM O-ring.

- Check the O-rings for damage and wear.
- Replace damaged O-rings.

Ensure that the larger EPDM O-ring is nearest to the pressure side, i.e. away from the pads.

### *To replace piston*

- Ensure the service piston bore is clean and free of debris.
- Lubricate both O-rings with clean Silicone Grease to assist fitment.
  - Ensure that the Viton O-ring remains free of brake fluid, wiping off if necessary.
  - Ensure that the EPDM O-ring remains free of SIBS fluid.
- Place the piston over the bore with the EPDM O-ring at the bottom.
- Apply pressure to the piston until it slides into position (gently rock the piston if necessary), ensuring the O-rings are not damaged. Open the bleeder valves if necessary. The pistons should rest slightly below the surface of the pad recess once installed.

**FIGURE 74**

Front service piston, EPDM  
O-ring and Viton Wiper O-ring

**FIGURE 75**

Front service piston, EPDM  
O-ring and Viton Wiper O-ring

**Scotseal** (Outer housing seal)  
Replace Scotseal if leaking or damaged.

**FIGURE 76** Scotseal

**Inner Hub Seal**

The SIBS® hub uses standard Toyota wheel bearings and hub seals. Replace wheel bearings if worn or damaged. The inner seal should always be replaced during assembly (see **Figure 77**) - Refer to Toyota Land Cruiser Manual.



**FIGURE 77** Inner hub and seal

**NOTE**

The wheel bearing inner hub seal is essential to seal the SIBS® brake units for effective operation. Any bearing grease or differential oil which mixes with the SIBS® Fluid may reduce braking efficiency. During assembly, the inner hub seal must always be replaced.

Check CV joint grease is not diluted by SIBS® Fluid by removing the plug in the CV joint housing and using a thin screwdriver to remove a sample of grease. If SIBS® Fluid is present, replace wheel bearing seal and CV joint seal.

**Inner Housing Gasket**

Check for damage to gasket and replace if necessary.

**EMMA™ Filter**

The FILTER INLINE (02-6007) [or FILTER ELEMENT (01-5071) in more recent systems] of the EMMA™ manifold should be changed at regular intervals. Safe Effect recommends changing every 20,000km in normal operating conditions or every 10,000km in sever operating conditions; or as determined by site conditions.

Refer to page 24 of this manual and the Appendix for location of the FILTER INLINE or FILTER ELEMENT on the EMMA manifold. For more information refer to Technical Bulletin TBN-017 which can be downloaded from the web page.

### **EMMA™ Park Brake Inspection**

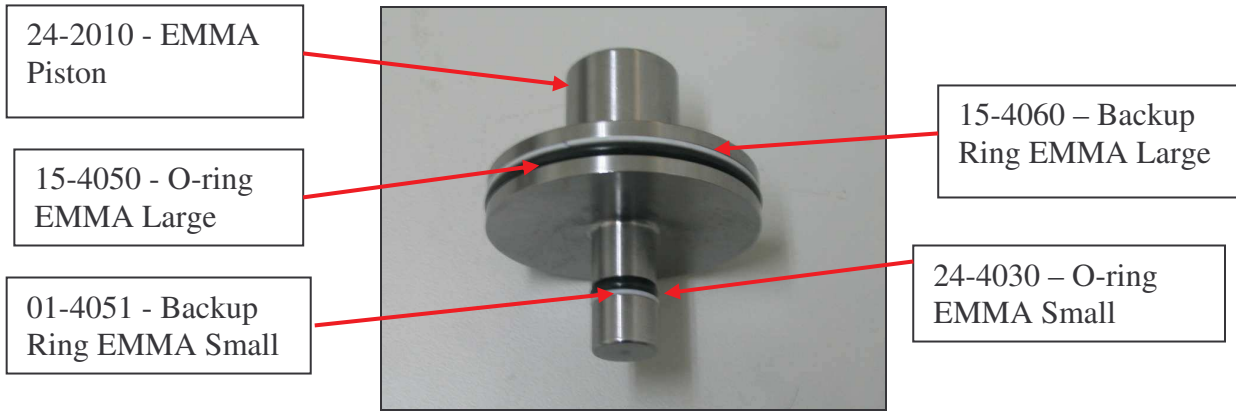
The EMMA™ park brake is located on each of inner rear housing.

#### Removal of EMMA™ Spring Cover

- Ensure that the retractor bolts are installed and tight in the spring covers (compressing the EMMA springs).
- Remove the outer spring cover bolts by undoing slowly, in sequence.
- Once all ten bolts are removed the retractor bolts can be wound out in sequence two full turns at a time (relieving tension on EMMA springs).
- Lift off the spring cover then disc springs and check for distortion or wear.
- Push out the EMMA™ park brake pistons and check O-ring seal for damage or wear.

Assembly is the reverse of the above procedure. The spring cover retaining bolts should be tightened evenly to 61Nm (45 lb-ft).

## EMMA Piston O-rings and Back Up Ring



**FIGURE 78**  
EMMA Piston O-rings and backup ring assembled

The O-rings and backup rings must be installed as shown in **Figure 78**.

## EMMA Piston

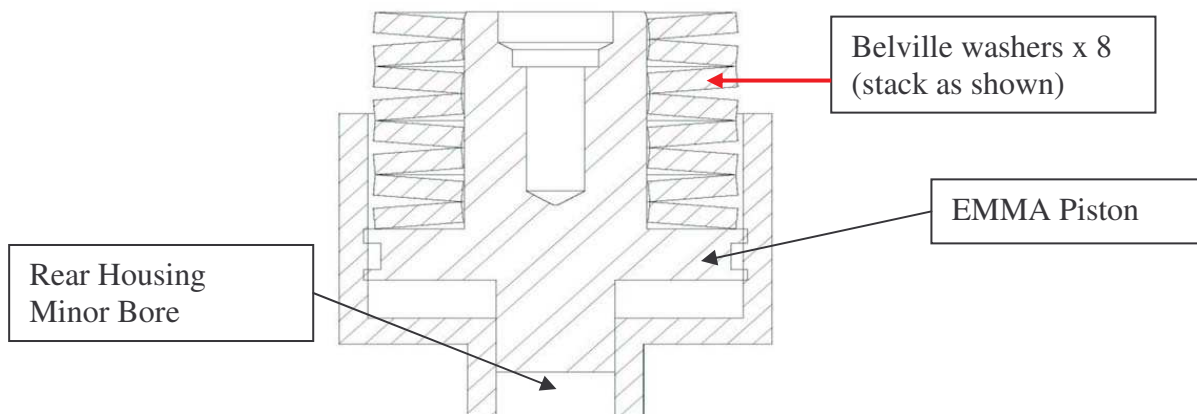


**FIGURE 79** Rear inner housing



**FIGURE 80** EMMA piston installation

When all the seals are installed, the EMMA™ piston can be reinstalled carefully in the housing (see **Figure 78** and **Figure 80**), ensuring the backup rings do not shift from their positions during installation, as this will cause them to foul on the edge of their respective grooves and bores. Use a light smear of silicone grease to lubricate the O-rings.



**FIGURE 81** EMMA arrangement