1. Revision History

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<td>29 Jul 2015</td>
<td>J. Leighton</td>
<td>Sections 5, 7, 8, 10, 11, 13 and 17 added. Sections 12, 14, 15, 16 and 19 updated.</td>
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2. Table of Contents

1. Revision History ....................................................................................................................................................................... 2
2. Table of Contents ..................................................................................................................................................................... 3
3. Important Information ............................................................................................................................................................ 4
4. Terminology ............................................................................................................................................................................. 5
5. Exploded Views & Parts Lists - Rear Brake Assembly .............................................................................................................. 6
6. Exploded Views & Parts Lists - Front Brake Assembly ........................................................................................................... 10
7. Wiring Diagram ...................................................................................................................................................................... 13
8. Installation – Rear Brakes ...................................................................................................................................................... 15
9. Installation – Front Brakes ..................................................................................................................................................... 21
10. Installation – Hydraulic System ............................................................................................................................................. 28
11. Installation – Electrical System ............................................................................................................................................... 31
12. Pre-Service Inspection ........................................................................................................................................................... 36
13. Controller Setup ..................................................................................................................................................................... 39
14. Service Schedule .................................................................................................................................................................... 40
15. Pre-Start Check ...................................................................................................................................................................... 41
16. Minor Service ......................................................................................................................................................................... 42
17. Major Service – Rear .............................................................................................................................................................. 44
18. Major Service – Front ............................................................................................................................................................ 52
19. Troubleshooting ..................................................................................................................................................................... 55
3. Important Information

This manual applies to the fourth generation Sealed Integrated Braking System (SIBS® 4) for the Toyota HiLux. The manual details how to install the SIBS® 4 system correctly to ensure optimum safety and performance. All information contained in this manual is based on the latest SIBS® product information available at the time of publication.

This manual should be read in conjunction with the appropriate Toyota vehicle manual for further information on removal and installation of any standard Toyota components.

While every effort has been made to address all aspects of installation and servicing, please advise Advanced Braking of any omissions or suggestions on how this manual may be improved.

Advanced Braking Pty Ltd reserves the right to change the manual at any time without prior notice.

The most up to date version of the manual can be obtained by contacting the ABT Customer Service Manager.

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### Terminology

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<td>DPS</td>
<td>Door proximity system</td>
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<td>Brakes automatically applied in an emergency</td>
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7. Wiring Diagram
8. **Installation – Rear Brakes**

1. Ensure all OEM Toyota rear brake equipment has been removed from the vehicle:
   a. Remove both rear brake assemblies.
   b. Remove the two hydraulic brake lines across the rear axle.
   c. Remove the handbrake lever and handbrake cable.

2. Clean the axle flange to remove any grease, dirt and oil. If the flange is damaged or corroded it must be cleaned thoroughly with abrasive paper.

![Figure 1: Prepare axle flange.](image1)

3. Fit a new O-ring seal to the axle flange

![Figure 2: Fit new O-ring seal to axle flange.](image2)

4. Inspect the oil seal inside the axle tube for signs of damage or wear. Replace if required.
5. Fit the circlip into the groove in the axle shaft.

6. Assemble the ABS pulse wheel and collar onto the axle shafts. The trigger wheel should be pressed up to the circlip.

7. Insert the axle shaft into the axle tube taking care not to damage the internal oil seal. Ensure that the shaft is engaged fully within the differential spider gear and that the ABS trigger wheel runs correctly in line with the sensor.

8. Using a suitable lifting hoist, remove the SIBS® 4 wheel-end assembly from its packaging.

9. Each brake unit is stamped with its corresponding position on the vehicle and must be installed accordingly:
   a. LH = Left Hand
   b. RH = Right Hand

10. Remove the 4x brake mounting nuts and washers.

11. Fit the SIBS® 4 brake unit over the stub axle. Align the mounting holes and locate the housing evenly and firmly against the axle flange.
12. Fit the 4x brake mounting nuts that were previously removed.

13. Torque the brake mounting nuts to 70 Nm in a diagonal pattern. Repeat this procedure twice.
14. Fit the axial compression O-ring to the groove located inboard of the half shaft spline.

![Figure 7: Fit O-ring to groove on axle shaft.](image)

15. Fit a new gasket to the wheel bearing end cap.

16. Fit the axle drive flange to the spline at the outer end of the axle half shaft and fit the retaining circlip. An M8 bolt may be screwed into the end of the axle and pulled to preload the O-ring whilst the circlip is fitted.

17. Fit the tapered collets, spring washers and M8 retaining nuts; torque to 33 Nm.

![Figure 8: Fit the axle drive flange.](image)

18. Fit the hub cap and secure with 3x screws; torque to 5 Nm.

19. Remove the 4x retractor bolts from the spring cover.
20. Fit the pad wear indicator to the lowest piston:
   a. Screw the pad wear indicator piston into the lowest piston thread and torque to 10 Nm.
   b. Fit the stainless steel gland fitting over the piston and screw this into the spring cover.
   c. Fit the stainless steel protective cover and fibre washer to the gland fitting.

![Figure 9: Pad wear indicator install in spring cover.](image)

21. Fit 3x supplied tapered plugs to seal the remaining holes in the spring cover. The hex sockets may be filled with silicon to aid future removal.

![Figure 10: SIBS® brake unit.](image)

22. Remove the SIBS® cooling fluid fill plug.

23. Fill the SIBS® 4 brake unit with new SIBS® cooling fluid and refit the fill plug with a new copper washer. Approximately 1 litre of SIBS® cooling fluid is required per brake unit.

24. Repeat for the opposing brake unit.
25. Fit the expansion chambers:
   a. There is one expansion chamber per brake unit.
   b. Mount the expansion chambers as high as possible in a protected location on the vehicle. ABT recommends mounting between the cab and the tray.
   c. Secure using the supplied mounting hardware.

26. Run lengths of breather hose between the expansion chambers and their corresponding brake units.
   a. Route the breather hose from the brake units, along the axle to the diff centre, up to the tray and then forward to the back of the cab.
   b. Route the hose away from the exhaust and any moving components. Allow extra length for axle articulation.
   c. Protect areas of the hose that may abrade using spiral guard.
   d. Ensure SIBS® fluid can easily drain back into the brake units.
   e. Secure the hose using supplied P-clips.
9. **Installation – Front Brakes**

1. Ensure all OEM Toyota front brake equipment has been removed from the vehicle:
   
   a. Remove the front ABS sensors.
   b. Remove the front brake assemblies.
   c. Remove the front steering knuckles.

2. Each brake unit is stamped with its corresponding position on the vehicle and must be installed accordingly.
   
   a. FLH = Front Left Hand
   b. FRH = Front Right Hand
3. Install the suspension upper arm and secure with the nut; torque to 110 Nm and lock using the cotter pin.

![Figure 15: Install suspension upper arm.](image)

4. Slide the axle into the housing ensuring the splines are properly aligned and engaged.

![Figure 16: Slide axle into housing.](image)
5. Install the suspension lower arm and secure with 2x bolts; torque to 160 Nm and lock using the cotter pins.

6. Install the tie rod end and secure with the nut; torque to 91 Nm and lock using the cotter pin.
7. Install the front stabiliser link and secure with the nut; torque to 70 Nm.

![Front stabiliser link](image1)

Figure 19: Install front stabiliser link.

8. Install the hub nut; torque to 235 Nm.

9. Install the adjusting cap and lock using the cotter pin.

![Hub nut, adjusting cap and cotter pin](image2)

Figure 20: Install hub nut and adjusting cap.

10. Install the front axle hub grease cap.
11. Connect the upgraded hydraulic hoses to the original mounting points and to the SiBS® front brake using the new banjo bolts and sealing washers provided; torque to 20 Nm.

![Figure 21: Install upgraded brake hoses.]

12. Install the ABS sensor and secure using the bolt; torque to 10 Nm.

13. Connect the 2x clamps; torque to 8 Nm.

14. Install the speed sensor wire harness to the steering knuckle with the bolt; torque to 13 Nm.

![Figure 22: Install ABS sensor.]

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25
15. Fill the cavity behind the V-lip seal with a high temperature bearing grease (Castrol LMX recommended) via the grease nipple located on the hub face. Do not over-grease the V-lip cavity.

![Figure 23: Grease V-seal cavity.](image)

16. Remove the SIBS® cooling fluid fill plug.

17. Fill the SIBS® 4 brake unit with new SIBS® cooling fluid and refit the fill plug with a new copper washer. Approximately 1 litre of SIBS® cooling fluid is required per brake unit.

18. Repeat for the opposing wheel-end.

19. Mount the expansion chambers above the wheel-ends at suitable locations within the engine bay.

20. Run a length of breather hose from the bottom barb of the expansion chambers down to the barb fitting on each brake unit. Ensure there are no bends or kinks. Ensure the wheel is able to turn from lock to lock without any interference.

![Figure 24: Mount the expansion chamber in the engine bay.](image)
Figure 25: Breather barb on inner housing.
10. Installation – Hydraulic System

1. Mount the SIBS® 4 pump enclosure in a suitable location on the vehicle.
   a. On single-cabs mount the pump behind the driver’s seat using the supplied bracket.
   b. On dual-cabs mount the pump under the tray behind the rear right wheel using the supplied bracket.
   c. Drill the vehicle body as required and mount the SIBS® pump using provided mounting hardware.

![Figure 26: SIBS® 4 pump enclosure.](image)

2. Mount the park/emergency brake tee-union on the top of the rear differential.

3. Connect one end of the park/emergency brake hydraulic hose to the bulkhead fitting at the rear of the pump enclosure.

4. Route the other end of the hydraulic hose down to the tee-union on the rear axle and connect. Secure the hose along the chassis using supplied P-clips.
5. Fit the rear RH service brake line.
   a. Connect one end of the RH service brake line to the rear axle tee-union and the other end to the inlet on the RH brake unit.
   b. Secure the brake line using the OEM P-clip.

6. Fit the rear RH park/emergency brake hydraulic hose.
   a. Connect one end of the RH park/emergency brake hydraulic hose to the tee-union on the rear axle.
   b. Connect the other end to the inlet on the RH brake unit.

Figure 27: Brake lines routed to rear RH brake unit (facing front of vehicle).
7. Fit the rear LH service brake line.
   a. Connect one end of the LH service brake line to the rear axle tee-union and the other end to the inlet on the LH brake unit.
   b. Secure the brake line using the OEM P-clips.

8. Fit the rear LH park/emergency brake hydraulic hose.
   a. Connect one end of the LH park/emergency brake hydraulic hose to the tee-union on the rear axle.
   b. Route the hydraulic hose across the rear axle and connect to the inlet on the LH brake unit.
   c. Use the supplied bracket to route the hose around the damper.
   d. Secure the hydraulic hose along the rear axle using P-clips. Ensure the hose will not contact any moving suspension components.

Figure 28: Brake lines routed to rear LH brake unit (facing front of vehicle).
11. Installation – Electrical System

1. Isolate the vehicle battery.

2. Do not test the control system functions until the system is fully installed as this may confuse the control unit while learning – details on control unit setup can be found in section 13.

3. Mount the control unit to the dash:
   a. Remove the vehicle radio.
   b. Mount the SIBS® control unit on the dash using the provided bracket. Position so that bracket is central on the dash and aligned with the vehicle axis. 4x holes will need to be drilled.
   c. For LH drive vehicles the control unit bracket can be reversed so that it is always facing the vehicle operator.

   Figure 29: SIBS® 4 control unit mounted on dash.

4. Fit the SIBS® cabin harness:
   a. Remove the glove box, seats and vinyl floor mats.
   b. Connect cabin harness branch to the rear of the control unit by passing up through the dash. A hole will need to be drilled in the dash to achieve this.
   c. Route the harness down behind the dash to the passenger side of the transmission tunnel.
   d. Route the cabin harness along the transmission tunnel and connect to the pump enclosure. Some vehicles may require an extension harness to reach the pump enclosure, this should be provided with the kit.
   e. Secure the harness where necessary using P-clips.
5. Fit the vehicle interface harness:
   a. Remove the shroud around the instrument cluster by removing the screw at the top.
   b. Remove the vehicle instrument cluster by removing 3x retaining screws and disconnecting 2x multi-plugs at the rear.
   c. Connect the Deutsch end of the vehicle interface harness to the 6 pin connector on the SIBS® cabin harness located behind the radio.
   d. Route the harness toward the cavity at the rear of the instrument cluster.
   e. Identify the 40-pin connector protruding from the top left side of the instrument cluster.
f. Connect the vehicle interface harness between the white 40-pin connector and the connector and the rear of the instrument cluster.

Figure 32: Connect the vehicle interface harness between the instrument cluster and 40-pin white OEM plug.

6. Fit the OEM door harness (optional):
   a. The OEM door harness is part of the vehicle interface harness – simply connect the additional 3-pin Deutsch connector to the SIBS® cabin harness behind the radio.

7. Fit the engine bay harness:
   a. Connect the engine bay harness to the 2x 2-pin connectors on the cabin harness located beside the passenger foot well.
   b. Route the engine bay harness through the grommet in the passenger foot well and into the engine bay.
   c. Route the engine bay harness through the engine bay and connect the red wires to the positive battery terminal via the eyelet.
   d. Connect the black wire to a vehicle earth point via the eyelet.
   e. Secure the relay using the vehicle battery bracket.
   f. Secure the harness where necessary using P-clips.
8. Fit the door proximity harness (optional):
   a. Connect the door proxy harness to the 3 pin connector on the cabin harness (the OEM door connector may need to be unplugged first).
   b. Dependent on how many doors have been specified will affect the number of proximity switches included in the harness.
   c. Drill Ø12mm holes in the door pillars to mount the proximity switches. Suggested location is 100mm below the door hinge mounting bolt and 25mm from the edge of the door seal.

Figure 33: Proximity switch mounting location on A-pillar.

Figure 34: Drill A-pillar to mount proximity switch.
d. Secure the proximity switch to the door pillar such that there is a 1.0 mm gap between the tip of the proximity switch and door frame when the door is closed.

![Figure 35: Secure proximity switch with locknuts and route harness.]

e. Run the extensions and connect to the proximity switches.

f. For every proximity switch to be added, an additional Y-split harness must be installed.

9. Replace the instrument cluster, radio, glove box, seats, mats and all vehicle trim.
12. Pre-Service Inspection

1. Install wheels and torque all wheel nuts progressively and in sequence to 105 Nm. Ensure each bolt is torqued twice.

2. Top up all reservoirs with the specified fluids.
   a. Use DOT 3 brake fluid for the brake master cylinder (service system).
   b. Use ATF Dexron III for the SIBS® pump reservoir (park/emergency system).

3. Ensure the battery is in good condition – this is critical to ensure correct programming of the control unit.

4. Reconnect the vehicle battery to power the vehicle and SIBS® system.
5. **Bleed the service brake system:**
   a. Connect a clear vinyl tube onto the service brake bleed nipple and the other into a clean container of brake fluid.
   b. Slowly pump the brake pedal several times.
   c. While an assistant presses on the brake pedal, loosen the bleed nipple until fluid runs out then close the nipple.
   d. Repeat this process until there are no more air bubbles in the fluid. Ensure the master cylinder reservoir is kept topped up during the procedure.
   e. The service brake system should be bled in the following sequence:
      i. LPSV (this is the highest point apart from the master cylinder in the system).
      ii. 2x bleed nipples on rear left hand brake (wheel end with the longest hydraulic line).
      iii. 2x bleed nipples on rear right hand brake.
      iv. 1x bleed nipple on front left hand brake.
      v. 1x bleed nipple on front right hand brake.

![Figure 37: Service brake bleed screws for front brake (left) and rear brake (right).](image)
6. Bleed the park/emergency brake system:
   a. Twist and release the red E-stop button on the control unit.
   b. If the control system detects air in the system on first release, it will enter bleed mode – this is indicated by the brake status light flashing green – system pressure will be limited to 100 psi.
   c. With the E-stop released, thoroughly bleed the brake system by opening and closing the park/emergency system bleed nipples until the fluid runs through clearly with no air bubbles. Ensure the pump reservoir is topped up regularly during the procedure.
   d. Once the system is bled, apply and then release the park/emergency brake again – if the system has been sufficiently bled then the brake status light should be solid green with the brake is released.

   Figure 38: Park/emergency brake bleed screws on rear brake.

7. Affix the SIBS® caution label to the inside top corner of the windshield on the driver’s side.

8. Complete a vehicle pre-start check.

9. If the vehicle is to be used on public roads it will require approval for road use.
   a. New and unregistered vehicles can be fitted with a second stage manufacturer plate.
   b. Used and already registered vehicles can be fitted with an aftermarket modification plate.
   c. Please contact ABT customer service for details regarding SIBS® equipped vehicles requiring approval.
13. Controller Setup

1. Ensure the battery is fully charged and in good working condition before connecting the SIBS® controller.

2. Activate all connected interlocks and check function:
   
   a. To activate the door interlock – open and close a vehicle door.
   
   b. To activate the seat belt interlock – connect and disconnect the driver’s seatbelt.
   
   c. To activate the stall interlock – switch the ignition off, wait for 5 seconds, then start the engine, run for 10 seconds and then switch the engine off again.
   
   d. The corresponding warning light on the control unit should display when each interlock is activated (note: interlock warning lights are only displayed when ignition is on).

3. Set the HSI speed threshold:
   
   a. After releasing the brake for the first time the green HSI light will begin flashing – this indicates the HSI speed threshold needs to be set.
   
   b. The HSI system overrides the door, stall and seatbelt interlocks when the vehicle is travelling at speeds above the HSI threshold – this is designed to prevent unintended brake application at high speeds.
   
   c. Start the engine, release the brakes and accelerate the vehicle up to the desired HSI threshold speed (ABT recommends 40 km/h).
   
   d. While maintaining this speed, press and hold the grey button on the control unit for 3 seconds – the control unit will beep twice to confirm the speed has been accepted.
   
   e. If HSI is not required, simply complete the above procedure with the vehicle is stationary.

![Figure 39: SIBS® control unit warning lights](image)
14. Service Schedule

The following table shows the recommended service intervals for SIBS® 4 brake systems fitted to vehicles being operated in a harsh mining environment. ABT recommends each site undertake a review of the service intervals and adjust to suit their specific conditions.

<table>
<thead>
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<th>Frequency</th>
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<tr>
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<td>Minor Service</td>
</tr>
<tr>
<td>Major Service: Rear</td>
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<td>Major Service: Front</td>
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<thead>
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<tbody>
<tr>
<td>Daily</td>
</tr>
<tr>
<td>Monthly or every 5,000 km (whichever occurs first)</td>
</tr>
<tr>
<td>When rear brake pad wear reaches minimum or every 2 years (whichever occurs first)</td>
</tr>
<tr>
<td>When front brake pad wear reaches minimum or every 2 years (whichever occurs first)</td>
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The pre-start check involves a quick check of the fluid levels and confirms proper brake system operation.

The minor service involves a general system inspection and replacement of the SIBS® cooling fluid in the wheel-ends.

The major service is conducted to replace worn brake pads and as a preventative maintenance activity to ensure continued reliable operation of the SIBS® brake. During the major service new seals are fitted throughout the brake and any worn components are replaced.
15. **Pre-Start Check**

1. Check brake master cylinder reservoir level. If low, top up with DOT3 brake fluid and check system for leaks.

2. Check SIBS® pump reservoir level. If low, top up with ATF Dexron III and check system for leaks.

3. With the doors closed, engine running and driver’s seat belt connected, press the E-Stop button:
   a. The brake status light on the SIBS® control unit should be solid red.
   b. The park brake should be applied.

4. Twist and release the E-Stop button:
   a. The brake status light should flash red momentarily and then change to solid green.
   b. The park brake should now be released.

5. Check the park/emergency brake applies when:
   a. The E-Stop is pressed.
   b. The ignition is switched to the ‘ACC’ position.
   c. The door is opened (door ajar warning light should display on control unit).
   d. The driver seatbelt is released (seatbelt warning light should display on control unit).
   e. The engine is stalled (low oil pressure warning light should display on control unit).

6. Check the service brake (foot brake) firmly applies the brake.

7. Drive the vehicle at 10 km/h. Press the E-Stop button. The vehicle must stop within 5 metres or within 3 seconds.
16. **Minor Service**

1. Check brake units for leaks.
2. Check SIBS® pump for leaks.
3. Check hydraulic lines for leaks or damage.
4. Check the breather hose for cracks or damage.
5. Check the expansion chamber filler breather caps are clear.
6. Check all electrical connectors and wiring for damage.
7. Check rear brake pad wear:
   a. Apply the park brake.
   b. Remove the protective cap on the pad wear indicator (found on the spring cover).
   c. The plunger should project out from the gland fitting.
   d. The distance the plunger projects shows the remaining brake pad wear available.

![Figure 40: Rear pad wear indicator schematic.](image-url)
8. Check front brake pad wear (if applicable):
   a. Apply the service brake.
   b. Remove the protective cap on the pad wear indicator.
   c. Push the plunger into the brake until it stops.
   d. The plunger should project out of the gland fitting.
   e. The distance the plunger projects shows the remaining brake pad wear available.

9. If the brake pads have worn beyond the wear limit then a major service must be completed.

10. Drain and discard the SIBS® cooling fluid from each wheel-end brake.
    a. At least 800 mL of SIBS® cooling fluid should be found in each wheel-end. Check for leaks if this amount is not found.
    b. The SIBS® oil should drain freely from the brake. If it comes out in a “glug, glug” fashion ensure there is no blockage in the SIBS® breather line.
    c. Dispose of used SIBS® cooling fluid responsibly in accordance with regulatory and environmental legislation.

11. Refit the drain plug with a new sealing washer.

12. Refill the wheel-end up to the level plug (fill to spill). Approximately 1 litre of SIBS® cooling fluid is required per brake unit.

13. Conduct a “vehicle pre-start check”.

---

Figure 41: Front pad wear indicator schematic.
17. Major Service – Rear

1. Remove the rear wheels.
2. Remove the ABS sensor from the brake housing.
3. Remove the 3x tapered plugs and 1x pad wear indicator from the spring cover.
4. Fit 4x retractor bolts into the spring cover and torque to 80 Nm.
5. Disconnect the service brake line, the park/emergency brake hydraulic line and the breather line from the brake.
6. Remove the hub cap.
7. Remove the axle drive flange by removing the 8x nuts and collets. Discard the gasket.
8. Remove the 4 nuts that hold the brake onto the axle.
9. Lift the brake clear from the axle using a suitable lifting hoist.
10. Remove the hub lock nut, plate and outer wheel bearing.
11. Stand the brake assembly to be serviced on a clean bench.
12. Remove and discard 12x housing bolts on opposite sides of the brake housing.
13. Carefully separate the inner and outer housings using guide pins to assist. 2x guide pins may assist with disassembly. The outer housing, hub, rotor and outer pads should remain as one assembly.

![Figure 42: Separate inner and outer housings.](image-url)
14. Sit the outer housing, rotor and hub assembly face down on the hub studs.

15. Remove the rotor from the outer assembly, clean and inspect.
   a. Inspect the rotor and hub splines for wear. Check for movement between the rotor and hub. If there is movement between the splines of the mating components the rotor should be replaced.
   b. Inspect the rotor friction surface. If there are signs of scouring covering more than 50% of the surface the rotor should be replaced.
   c. Measure the thickness of the friction surface using a micrometre at four evenly spaced position around the rotor. If thickness is below 14.0 mm the rotor should be replaced.

16. Remove and discard the inner and outer brake pads.

17. Remove the hub from the outer housing and clean.

18. Remove all seals from the hub and discard.
19. Remove the bearings from the hub, clean and inspect.
   a. If bearings show any sign of wear they should be replaced.
   b. Grease the bearings with a high temperature bearing grease (Castrol LMX recommended).
   c. Install the inner bearing into the hub. Set the outer bearing aside for installation later.
20. Inspect all hub studs, dowel pins and grease nipple. Replace if showing any signs of thread damage or corrosion.
21. Pack the hub with a high temperature bearing grease (Castrol LMX recommended).
22. Lightly lubricate new hub seals with silicone grease and fit to hub.
23. Remove the housing O-ring from the inner housing and discard.
24. Remove the service pistons from the inner housing.
25. Remove the O-rings from the service pistons and discard.
26. Clean and inspect the service pistons, replace if there is any signs of wear or scuffing.
27. Apply a light smear of silicone grease (Parker Super O Lube recommended) to the new primary and wiper O-rings and fit them to the service pistons.

![Figure 45: Rear service piston and seals.](image)

28. Remove the 4x bleed nipples. Clean, inspect and replace if required.
29. Remove the service link pipe. Clean, inspect and replace if required.
30. Remove and discard the stub axle oil seal.
31. Clean the inside of the inner housing with parts cleaner. Clean the piston bores thoroughly.
32. Inspect the mounting studs. Replace if showing signs of damage or corrosion. If replacing studs:
   a. Ensure the mating parts of the housing and stub axle are clean and free of debris.
   b. Apply a light smear of Loctite® 515™ on the mating surface of the stub axle and under the head of each stud as it is pushed into place.
   c. Using spacers, attach 4x mounting nuts and tighten to 15 Nm.
33. Clean the stub axle and spindle to remove any grease, dirt and gasket remains. If the flange is damaged or corroded it must be cleaned thoroughly with abrasive paper.
34. Check the condition of the wheel bearing seal running surface. If the surface shows signs of degradation (e.g. corrosion or wear) repair using a speed-sleeve.

35. Remove the 10x spring cover bolts and discard.

36. Loosen the 4x retractor bolts progressively and in sequence no more than 3x full turns at a time until completely removed. Retain the retractor bolts for later use.

37. Remove the spring cover.

38. Remove and discard spring cover gasket.

39. Remove the disc springs and inspect each one for signs of excessive wear or cracking. If there are any cracked springs then all 24x springs must be replaced.

40. Remove the park/emergency pistons. A slide hammer may assist with removal.

41. Remove and discard all park/emergency piston O-rings and back-up washers.

42. Clean the park/emergency piston bores and the spring cover.

43. Clean the park/emergency pistons thoroughly and inspect. If there are signs of pitting and corrosion in the O-ring grooves the pistons should be replaced.

44. Apply a light smear of silicone grease (Parker Super O Lube recommended) to the new Viton and Nitrile O-rings and fit these to the pistons along with the back-up washers.

45. Refit the park/emergency pistons in the inner housing.

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Figure 46: Park/emergency brake piston with seals installed.
46. Lubricate all disc springs with a high pressure grease (Castrol LMM recommended) and reinstall on the park/emergency pistons. There is 6x springs per piston all stacked in series.

![Figure 47: Disc springs installed on park/emergency brake piston.]

47. Install a new spring cover gasket and refit spring cover.

48. Install 10x spring cover bolts finger-tight.

49. Reinstall the retractor bolts and torque to 80 Nm.

50. Install and torque all spring cover bolts progressively and in sequence (one full turn at a time) to ensure that the spring cover does not distort or crack, torque to 60 Nm. Ensure each bolt is torqued twice.

![Figure 48: Spring cover bolt torque sequence.]
51. Insert the service pistons (primary O-ring first) into the piston bores. Apply pressure to the piston until it slides fully into place.

![Figure 49: Rear service piston with seals installed.](image)

52. Remove the cassette seal from the outer housing and discard.
53. Clean the outer housing and inspect for damage or wear.
54. Install a new cassette seal into the outer housing.
55. Push the outer housing onto the hub.
56. Install the outer brake pads in the outer housing ensuring correct orientation.
57. Install the rotor onto the hub spline ensuring correct orientation.
58. Fit a new housing O-ring into the groove around the circumference of the inner housing.
59. Install the inner brake pads in the inner housing ensuring correct orientation.
60. Carefully fit the outer housing, hub and rotor assembly to the inner housing. 2x guide pins may assist with fitment.
61. Fit the 12x M10 bolts and torque to 50 Nm in sequence. Ensure each bolt is torqued twice.

![Figure 50: Housing bolt torque sequence.](image)
62. Fit the outer bearing, locking plate and hub lock-nut onto the stub axle. Do not torque yet.
63. Remove and discard the sealing O-ring from the axle flange.
64. Ensure the axle flange face is clean. If showing any signs of damage or corrosion the surface should be buffed.
65. Apply a light smear of silicone grease (Parker Super O Lube recommended) to the new axle flange O-rings and fit them to the axle flange.
66. Each brake unit is stamped with its corresponding position on the vehicle and must be installed accordingly:
   a. LH = Left Hand
   b. RH = Right Hand
67. Using a suitable lifting hoist, fit the SIBS® 4 brake unit to the axle flange. Align the mounting holes and locate the housing evenly and firmly against the axle flange.
68. Fit the 4x brake mounting nuts and washers that were previously removed.
69. Torque the brake mounting nuts to 60 Nm in a diagonal pattern. Repeat this procedure twice.
70. Torque and adjust the hub nut to Toyota specifications.
71. Fill the cavity behind the V-lip seal with a high temperature bearing grease (Castrol LMX recommended) via the grease nipple located on the hub face. Do not over-grease the V-lip cavity.
72. Fit a new stub axle oil seal and top up the differential oil as required.
73. Fit a new drive flange gasket and re-install the drive flange. Secure using the tapered collets, spring washers and M8 retaining nuts; torque to 33 Nm.
74. Fit the circlip to the groove in the end of the axle.
75. Fit the hub cap using 3x fasteners.
76. Remove the 4x retractor bolts from the spring cover.
77. Fit the pad wear indicator to the lowest piston:
   a. Screw the pad wear indicator piston into the lowest piston thread and torque to 10 Nm.
   b. Fit the stainless steel gland fitting over the piston and screw this into the spring cover.
   c. Fit the stainless steel protective cover and fibre washer to the gland fitting.
   d. Fit 3x supplied tapered plugs to seal the remaining holes in the spring cover. The hex sockets may be filled with silicon to aid future removal.
78. Remove the SIBS® cooling fluid fill plug.
79. Fill the SIBS® 4 brake unit with new SIBS® cooling fluid and refit the fill plug with a new copper washer. Approximately 1 litre of SIBS® cooling fluid is required per brake unit.
80. Repeat for the opposing brake unit.
81. Inspect all the park/emergency brake hydraulic hoses and replace as required.
82. Replace all rear breather hoses.
83. Flush the pump reservoir with new ATF Dexron III and then fill to level window.
84. Prime the SIBS® pump by running intermittently (no more than 10 seconds at a time) until full hydraulic pressure is reached and the motor stops running automatically.
   a. To run the pump and release the EMMA™ brake, twist the red pushbutton on the control unit clockwise.
b. To release hydraulic pressure and engage the EMMA™ brake, press the red operator pushbutton.

c. While performing this priming process, ensure the EMMA™ reservoir is constantly topped up to prevent the pump from running dry.

85. Bleed the park/emergency brake system using the bleed screws on the rear brakes.

86. Remove any clamps on the rear service line.

87. Flush the master cylinder with DOT 3 brake fluid.

88. Bleed the rear service brake system of air.

89. Check that there are no leaks from the system.

90. Install wheels and torque all wheel nuts progressively and in sequence to 105 Nm. Ensure each bolt is torqued twice.

91. Conduct a “vehicle pre-start check”.

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18. Major Service – Front

1. Remove the front wheels.
2. Drain and discard the SIBS® cooling fluid from the front wheel-ends.
3. Remove the ABS sensor from the brake housing (if applicable).
4. Remove the hub cap.
5. Remove the 6x socket head cap screws inside the hub.
6. Remove the outer hub section from the brake assembly.
7. Remove and discard all 12x housing screws.
8. Carefully remove the outer housing, outer pads and rotor as one unit. 2x guide pins may assist with removal.
9. Remove the rotor from the outer assembly, clean and inspect.
   a. Inspect the rotor and hub splines for wear. Check for movement between the rotor and hub. If there is movement between the splines of the mating components the rotor should be replaced.
   b. Inspect the rotor friction surface. If there are signs of scouring covering more than 50% of the surface the rotor should be replaced.
   c. Measure the thickness of the friction surface using a micrometre at four evenly spaced position around the rotor. If thickness is below 14.0 mm the rotor should be replaced.

10. Remove and discard the inner and outer brake pads.
11. Remove the hub from the outer housing and clean.
12. Remove all seals from the hub and discard.
13. Inspect all hub studs and grease nipple. Replace if showing any signs of thread damage or corrosion.
14. Lightly lubricate new hub seals with silicone grease and fit to hub.
15. Remove the housing O-ring from the inner housing and discard.
16. Remove the service pistons from the inner housing.
17. Remove the O-rings and back-up washers from the service pistons and discard.
18. Clean and inspect the service pistons, replace if there is any signs of wear or scuffing.

19. Apply a light smear of silicone grease (Parker Super O Lube recommended) to the new primary and wiper O-rings and fit them to the pistons.

20. Fit the backup washers to the service pistons.

21. Remove and discard the bleed nipples and caps.

22. Fit new bleed nipples and bleed nipple caps; torque to 15 Nm.

23. Clean the inside of the inner housing with parts cleaner. Clean the piston bores thoroughly.

24. Insert the service pistons (primary O-ring first) into the piston bores. Apply pressure to the piston until it slides fully into place.

25. Remove the cassette seal from the outer housing and discard.

26. Clean the outer housing and inspect for damage or wear.

27. Install a new cassette seal into the outer housing.
28. Push the outer housing onto the outer hub.
29. Install the outer brake pads in the outer housing ensuring correct orientation.
30. Install the rotor onto the hub spline ensuring correct orientation.
31. Fit a new housing O-ring into the groove around the circumference of the inner housing.
32. Install the inner brake pads in the inner housing ensuring correct orientation.
33. Carefully fit the outer housing, hub and rotor assembly to the inner housing on the vehicle. 2x guide pins may assist with fitment.
34. Install the 6x socket head cap screws and torque to 60 Nm. Ensure each bolt is torqued twice.
35. Fit the new 12x M10 housing bolts and torque to 50 Nm in sequence. Ensure each bolt is torqued twice.

![Figure 54: Housing bolt torque sequence.](image)

36. Fit the hub nut, adjusting cap and cotter pin as described in the Toyota manual.
37. Fill the cavity behind the V-lip seal with a high temperature bearing grease (Castrol LMX recommended) via the grease nipple located on the hub face. Do not over-grease the V-lip cavity.
38. Remove the SIBS® cooling fluid fill plug.
39. Refit the magnetic drain plug to the inner housing with a new sealing washer.
40. Fill the SIBS® 4 brake unit with new SIBS® cooling fluid and refit the fill plug with a new sealing washer. Approximately 1 litre of SIBS® cooling fluid is required per brake unit.
41. Replace the sealing washers on the banjo bolt connection on the inner housing.
42. Repeat for the opposing wheel-end.
43. Bleed the front service brake system of air.
44. Check that there are no leaks from the system.
45. Install wheels and torque all wheel nuts progressively and in sequence to 105 Nm. Ensure each bolt is torqued twice.
46. Replace all front breather hoses.
47. Conduct a ‘vehicle pre-start check’.
19. Troubleshooting

1. Problem
   a. Possible cause
      i. Solution

2. Fault light on control unit flashing.
   a. 2x flashes then rest – low battery fault (below 11V)
      i. Charge vehicle battery
      ii. Fault will self-clear when battery voltage is above 11V
   b. 3x flashes then rest – control unit PCB too hot
      i. Remove any sources of heat that could be causing the control unit to overheat
      ii. Fault will self-clear when the PCB temperature drops below a certain level.
   c. 4x flashes then rest - park/emergency brake took too long to release – operation aborted.
      i. Check pump reservoir level is not too low. If low check system for leaks.
      ii. Possible air in system causing slow release. Bleed park/emergency brake system.
      iii. Pump motor has is too hot and has lost effectiveness – allow to cool to ambient.
      iv. Cycle ignition to clear the fault from the control unit.
   d. 5x flashes then rest – pump relay fault
      i. Ensure wiring is not causing a short or open circuit to pump relay.
      ii. Check pump relay for correct function – replace if required.
      iii. Cycle ignition to clear the fault from the control unit.
   e. 6x flashes then rest – dump valve fault
      i. Ensure wiring is not causing a short or open circuit to dump valve.
      ii. Check dump valve for correct function – replace if required.
      iii. Cycle ignition to clear the fault from the control unit.
   f. 7x flashes then rest – diff lock solenoid fault
      i. Diff lock not fitted for LandCruiser – check for interference with 6 pin connector behind radio.
      ii. Cycle ignition to clear the fault from the control unit.
   g. 8x flashes then rest – pressure sensor fault
      i. Ensure wiring is not causing a short or open circuit to pressure sensor.
      ii. Check pressure sensor for correct function – replace if required.
      iii. Cycle ignition to clear the fault from the control unit.
3. ATF warning light on control unit on.
   a. Vehicle parked on steep incline causing sensor to read incorrect fluid level.
      i. Park vehicle on flat surface and check ATF warning light if off.
   b. Low fluid level in SIBS® pump reservoir.
      i. Top up reservoir with ATF Dexron III and check system for leaks.

4. Brake status LED is solid green and control unit is not responding.
   a. Control unit is in ‘SIBS® 3’ mode.
      i. Conduct a master reset of the control unit by holding the manual release button and cycling the E-stop button 3 times within 5 seconds. All lights on the control unit will flash once to confirm reset was successful and all settings have been cleared.

5. Brake pedal soft/spongy
   a. Air in the service brake system
      i. Bleed the brakes
   b. Brake rotors binding on splines
      i. Crimp off brake hoses to isolate offending brake.
      ii. Strip wheel end & inspect.

   a. Pads and rotor surface glazed.
      i. Change SIBS® cooling fluid and perform dry deglaze procedure if required.
   b. SIBS® oil contaminated with brake fluid, ATF or grease.
      i. Remedy any leaks then change SIBS® cooling fluid and perform dry deglaze procedure if required.
   c. Vacuum system leak.
      i. Inspect vacuum hoses, connections and booster for leaks.

7. Pedal goes slowly to floor with light application.
   a. Master cylinder bypassing internally.
      i. Strip and inspect. Replace cylinder or install overhaul kit.
   b. Leak in brake lines/hoses or fittings.
      i. Inspect brake lines and hoses for leaks.
      ii. Ensure stainless fittings and bleed nipples are seated correctly. Tighten or replace as required.
   c. Brake seals bypassing internally.
      i. Strip brake and inspect service piston seals. Replace with new piston seal kit.
8. Brakes drag/brakes not fully releasing after operation.
   a. Booster/master cylinder out of adjustment.
      i. Adjust booster output pushrod.
   b. EMMA™ piston seals bypassing or service piston seals contaminated & swollen preventing them from retracting.
      i. Locate which wheel end is affected (which wheel is dragging) or inspect rear brakes for ATF leakage around rear of spring cover.
      ii. Strip brake, inspect components. Replace seals as required.
   c. Insufficient hydraulic pressure to release EMMA™ brake.
      i. Place vehicle on hoist and release EMMA™ brake. Check to see if one or both wheels are dragging.
      ii. If both sides: Carryout pressure check in EMMA™ circuit, should be 850psi, if pressure is insufficient change pressure switch. If pressure still low, EMMA™ pump may be at fault.
      iii. If only on one side: strip wheel-end & inspect.

9. Vehicle pulls to one side during braking.
   a. Generally due to reduced effectiveness in one brake (brake steer). Vehicle will pull to the side with the more effective front brake. Usually caused by front brake issue.
      i. If running OEM front brakes refer to Toyota manual.
      ii. If running SIBS® front brakes check seized or sticking service pistons.
      iii. Strip wheel ends and inspect service pistons & seals.
      iv. Note: service brake seals can deteriorate (swell) if outer Viton seal fails allowing SIBS® cooling fluid to come in contact with brake seal. Replace seals.
   b. SIBS® oil contaminated with brake fluid, ATF or grease.
      i. Remedy any leaks then change SIBS® cooling fluid and perform dry deglaze procedure if required.

10. Brakes shudder as vehicle slows to a stop.
    a. Old/overused SIBS® oil.
       i. Change SIBS® cooling fluid.
    b. Brakes are cold.
       i. Complete 3x medium/hard stops to warm brake.
       ii. If shudder persists after more than first three brake applications, change SIBS® cooling fluid and perform dry deglaze procedure if required.

11. SIBS® park/emergency brake applies unexpectedly.
    a. Faulty wiring causing intermittent loss of continuity.
       i. Inspect/test 12 volt ignition switched & 12 volt constant supply. Ensure all connections are clean, secure and free of corrosion.
       ii. Check door switches.
       iii. Check seatbelt switches.
       iv. Check oil-pressure switches.
12. SIBS® park/emergency brake is poor. Brake not holding on inclines.
   a. Brake pads and/or rotor worn.
      i. Check pad wear indicators. If pads below wear limit conduct a major service.

13. SIBS® park/emergency brake slow to apply
   a. Brake pads worn.
      i. Check pad wear indicators. If pads below wear limit conduct a major service.
   b. SIBS® relief valve set too high.
      i. Adjust to desired application speed by loosening locknut and turning adjusting screw out. Adjust ½ turn at a time & test.

14. SIBS® pump runs intermittently during service (brake status light flashes red and beeps occasionally).
   a. Minor leak in park/emergency brake system
      i. Check all hydraulic hoses and connections for signs of leaking ATF.
      ii. Strip brake and check emergency/park brake piston seals and bores. Replace as required.

15. Pump does not run (SIBS® park/emergency brake does not release).
   a. Check interlocks are not preventing brake release
      i. Close all doors, fasten driver’s seatbelt, start vehicle engine.
   b. Loss of power to SIBS® control unit (indicated by lack of brake status LED).
      i. Check all fuses. If blown identify cause and repair.
   c. Loss of power to SIBS® pump.
      i. Check all fuses. If blown identify cause and repair.
      ii. Check function of relay mounted at vehicle battery. Replace if required.
      iii. Check for continuity of wiring from battery to pump motor and relay to control unit.
   d. Faulty pump motor.
      i. Replace pump motor.