

Driveline (05.00)

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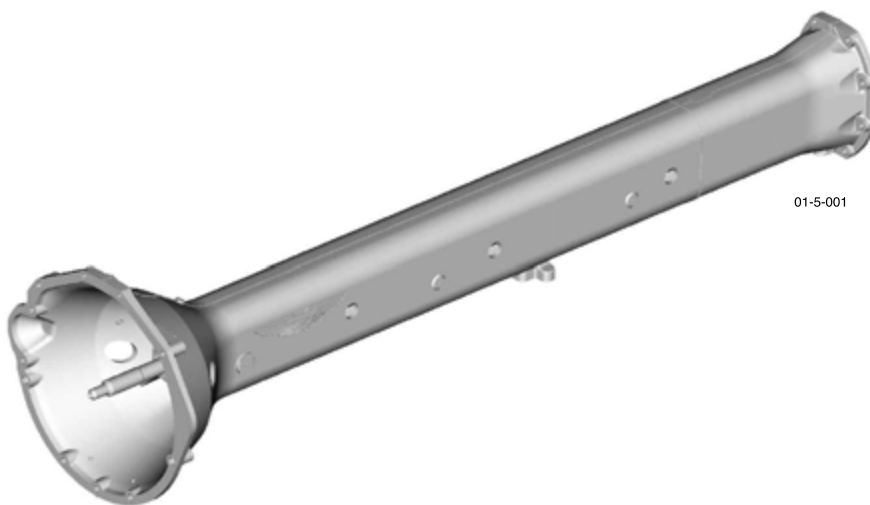
Driveline (05.00)

Driveshaft (05.01)

Description

The driveshaft consists of a torque tube assembly, incorporating a carbon fibre propshaft, transferring engine power to the gearbox.

The torque tube acts as a structural support between the engine and transmission through the powertrain maintaining NVH (Noise, Vibration & Harshness) and crash worthiness.



Specifications

Torque Figures

Description		Nm.	lb. / ft.
Torque Tube (front)	M10	43-57 (Nominal 50.5 ±15%)	32-42.5
Torque Tube (rear)		43-57 (Nominal 50.5 ±15%)	32-42.5
Exhaust Manifold		18-22	13.5-16.5
Starter Motor		50	37

Maintenance

Propeller Shaft-Renew

Repair Operation Time (ROT)	
Item	Code
Propeller Shaft-Renew	05.01.AB

Removal

1. Disconnect vehicle battery.
2. Raise vehicle on ramp.

Caution

On a two post ramp, ensure the vehicle is 'strapped' to the ramp.

3. Remove transaxle (see Workshop Manual procedure 07.03.AA Manual or 07.03.BA Sportshift - Transaxle Assembly - Remove for Access and Refit).
4. Lower lifter supporting torque tube.
5. Remove large circlip and with assistance, remove propshaft from torque tube

Installation

1. Clean propeller shaft assembly, circlip and mating faces.
2. With assistance, install propshaft into torque tube, install circlip.

3. Raise lifter supporting torque tube to enable installation of transaxle.
4. Install transaxle (see Workshop Manual procedure 07.03.AA Manual or 07.03.BA Sportshift - Transaxle Assembly - Remove for Access and Refit).
5. Lower vehicle on ramp.
6. Connect vehicle battery.

Propshaft Cam Sensor-Sportshift-Renew-Sportshift Only

Repair Operation Time (ROT)	
Item	Code
Propshaft Cam Sensor-Sportshift-Renew	05.01.AC

Removal

1. Disconnect vehicle battery.

Warning

Always disconnect the battery earth (- ve) terminal first.

2. Raise vehicle on ramp.

Warning

When raising the vehicle on a 'two post' ramp, ensure that the rear end of the vehicle is securely strapped to the ramp. Failure to strap the rear of the vehicle down may lead to the vehicle falling off the ramp.

Caution

When using a 'two post' vehicle ramp, remove the screws that secure the rear section of the wheel arch liner to body. Hold back the rear section of the wheel arch liner to correctly position the foot of the vehicle lift.

3. Remove exhaust system (see Workshop Manual procedure 09.00.NB Exhaust System - Excluding Manifold/DownPipes - Renew).
4. Disconnect multiplug between propshaft speed sensor and transmission harness.

- Remove bolt securing propshaft speed sensor to torque tube and remove sensor.

Installation

- Install propshaft speed sensor to torque tube and secure with bolt.
- Connect multiplug between propshaft speed sensor and transmission harness.
- Install exhaust system (see Workshop Manual procedure 09.00.NB Exhaust System - Excluding Manifold/DownPipes - Renew)
- Lower vehicle on ramp.
- Connect vehicle battery.

Warning

Always connect the battery earth (+ ve) terminal first.

Torque Tube-Renew

Repair Operation Time (ROT)	
Item	Code
Torque Tube-Renew	05.01.BB

Removal

- Disconnect vehicle battery.
- Raise vehicle on ramp.

Caution

On a two post ramp, ensure the vehicle is 'strapped' to the ramp.

Warning

The torque tube is heavy. To avoid personal injury or damage to the torque tube, torque tube removal / installation is a two person operation.

- Remove torque tube assembly (see Workshop Manual procedure 05.01.CA Torque Tube - Remove for Access and Refit).
- Sportshift only** - Remove grommet sealing clutch bleed pipe to torque tube.
- Release clips and remove bleed and supply pipes from slave cylinder. Install clips in union.

Caution

Plug pipe connection to prevent ingress of moisture or dirt.

- Sportshift only** - Remove grommet sealing clutch pipe to torque tube.
- Manual only** - Loosen and remove pipe adaptors (x2) from slave cylinder.
- Sportshift only** - Release clip, disconnect clutch pipe from slave cylinder adaptor.
- Sportshift only** - Release clip securing transmission harness to clutch pipe mounting bracket.
- Sportshift only** - Release clips (x4) securing clutch pipe to transmission harness.
- Sportshift only** - Remove clutch pipe from torque tube.
- Sportshift only** - Disconnect multiplug between clutch position sensor and transmission harness.

- Sportshift only** - Release clip securing clutch position sensor harness to top of torque tube.
- Sportshift only** - Release clips (x2) securing clutch position sensor harness to side of torque tube.
- Sportshift only** - Remove bolts (x2) securing clutch position sensor to slave cylinder and remove sensor.
- Remove bolts (x2), securing slave cylinder to torque tube.
- Remove bolts (x2), securing slave cylinder to torque tube.
- Remove slave cylinder, collect spacer.
- Sportshift only** - Disconnect multiplug between propshaft speed sensor and transmission harness.
- Sportshift only** - Remove bolt securing propshaft speed sensor to torque tube and remove sensor.
- Sportshift only** - Release clips (x5) securing transmission harness to torque tube.
- Remove exhaust mountings (bolts x4) (see Fig. 1).

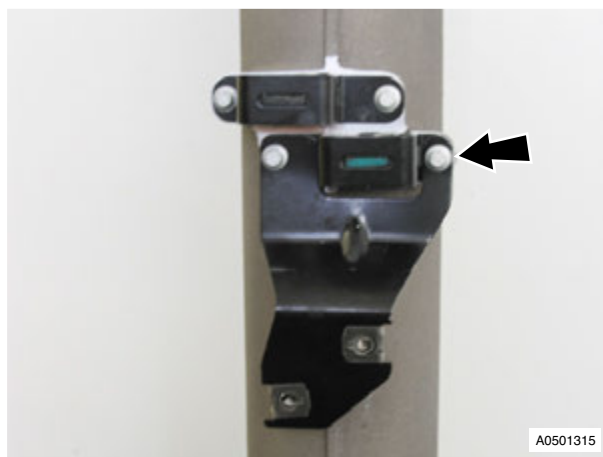


Fig. 1

Installation

- Install exhaust mountings (bolts x4) (torque).
- Clean slave cylinder, spacer and pipe adaptors.
- Sportshift only** - Secure transmission harness to torque tube using clips.
- Sportshift only** - Secure propshaft speed sensor to torque tube using bolt.
- Sportshift only** - Connect multiplug between propshaft speed sensor and transmission harness.
- Install spacer and slave cylinder, install and torque tighten bolts (x2).
- Sportshift only** - Secure clutch position sensor to slave cylinder using bolts.
- Sportshift only** - Secure clutch position sensor harness to side of torque tube using clips.
- Sportshift only** - Secure clutch position sensor harness to top of torque tube using clip.
- Sportshift only** - Connect multiplug between clutch position sensor and transmission harness.



11. **Sportshift only** - Install clutch pipe to torque tube.
12. **Sportshift only** - Secure clutch pipe to transmission harness using clips.
13. **Sportshift only** - Secure transmission harness to clutch pipe mounting bracket using clip.
14. Install pipe adaptors (x2) in slave cylinder.
15. **Sportshift only** - Install grommet sealing clutch pipe to torque tube.
16. **Sportshift only** - Install clip and refit bleed pipe to slave cylinder adaptor.
17. **Sportshift only** - Install grommet sealing clutch bleed pipe to torque tube.
18. **Manual only** - Install bleed and supply pipes onto slave cylinder adaptors (x2), secure with clips.

Warning

The torque tube is heavy. To avoid personal injury or damage to the torque tube, torque tube removal / installation is a two person operation.

19. Install torque tube assembly (see Workshop Manual procedure 05.01.CA Torque Tube - Remove for Access and Refit).
20. Bleed clutch (see Workshop Manual procedure 08.00.AF - Manual, 08.00.AE - Sportshift - Clutch Hydraulic System - Bleed).

Caution

Clutch fluid must not be allowed to contact vehicle paint work. Remove spilt clutch fluid from paint work by rinsing away with running water.

21. Lower vehicle on ramp.
22. Connect vehicle battery.

Torque Tube & Prop Shaft Assembly-Renew-Manual Vehicles Only

Repair Operation Time (ROT)	
Item	Code
Torque Tube & Prop Shaft Assembly-Renew-Manual Vehicles Only	05.01.BC

Removal

1. Disconnect vehicle battery.
2. Raise vehicle on ramp.
3. Remove torque tube assembly (see Workshop Manual procedure 05.01.CA Torque Tube - Remove for Access & Refit).
4. Release clips and remove bleed and supply pipes from slave cylinder.
5. Install clips in union.
6. Loosen and remove pipe adaptors (x2) from slave cylinder.
7. Remove bolts (x2), securing slave cylinder to torque tube.
8. Remove slave cylinder and collect spacer.
9. Remove exhaust mountings (bolts x4).

Installation

1. Install exhaust mountings (bolts x4) (torque).
2. Clean slave cylinder, spacer and pipe adaptors.
3. Install spacer and slave cylinder, install and torque tighten bolts (x2).
4. Install pipe adaptors (x2) in slave cylinder.
5. Install bleed and supply pipes onto slave cylinder adaptors (x2), secure with clips.
6. Install torque tube assembly (see Workshop Manual procedure 05.01.CA Torque Tube - Remove for Access & Refit).
7. Bleed clutch (see Workshop Manual procedure 08.00.AF Clutch Hydraulic System - Bleed).
8. Lower vehicle on ramp.
9. Connect vehicle battery.

Torque Tube & Prop Shaft Assembly-Renew-Sportshift Vehicles Only

Repair Operation Time (ROT)	
Item	Code
Torque Tube & Prop Shaft Assembly-Renew-Sportshift Vehicles Only	05.01.BC

Removal

1. Disconnect vehicle battery.
2. Raise vehicle on ramp.
3. Remove torque tube assembly (see Workshop Manual procedure 05.01.CA Torque Tube - Remove for Access & Refit).
4. Remove grommet sealing clutch bleed pipe to torque tube.
5. Release clip, disconnect bleed pipe from slave cylinder adaptor and remove pipe.
6. Remove grommet sealing clutch pipe to torque tube.
7. Release clip, disconnect clutch pipe from slave cylinder adaptor.
8. Release clip securing transmission harness to clutch pipe mounting bracket.
9. Release clips (x4) securing clutch pipe to transmission harness.
10. Remove clutch pipe from torque tube.
11. Disconnect multiplug between clutch position sensor and transmission harness.
12. Release clip securing clutch position sensor harness to top of torque tube.
13. Release clips (x2) securing clutch position sensor harness to side of torque tube.
14. Remove bolts (x2) securing clutch position sensor to slave cylinder and remove sensor.
15. Remove bolts (x2), securing slave cylinder to torque tube.
16. Remove slave cylinder and collect spacer.
17. Disconnect multiplug between propshaft speed sensor and transmission harness.

18. Remove bolt securing propshaft speed sensor to torque tube and remove sensor.
19. Release clips (x5) securing transmission harness to torque tube.
20. Remove bolts (x4) securing exhaust mountings to torque tube.

Installation

1. Secure exhaust mountings to torque tube using bolts.
2. Secure transmission harness to torque tube using clips.
3. Secure propshaft speed sensor to torque tube using bolt.
4. Connect multiplug between propshaft speed sensor and transmission harness.
5. Install slave cylinder and spacer to torque tube.
6. Secure slave cylinder to torque tube using bolts.
7. Secure clutch position sensor to slave cylinder using bolts.
8. Secure clutch position sensor harness to side of torque tube using clips.
9. Secure clutch position sensor harness to top of torque tube using clip.
10. Connect multiplug between clutch position sensor and transmission harness.
11. Install clutch pipe to torque tube.
12. Secure clutch pipe to transmission harness using clips.
13. Secure transmission harness to clutch pipe mounting bracket using clip.
14. Install clip and install clutch pipe to slave cylinder adaptor.
15. Install grommet sealing clutch pipe to torque tube.
16. Install clip and refit bleed pipe to slave cylinder adaptor.
17. Install grommet sealing clutch bleed pipe to torque tube.
18. Install torque tube assembly (see Workshop Manual procedure 05.01.CA Torque Tube - Remove for Access & Refit).
19. Connect vehicle battery.
20. Bleed clutch hydraulics (see Workshop Manual procedure 08.00.AE Clutch Hydraulic System - Sportshift - Bleed).
21. Lower vehicle on ramp.

Torque Tube-Remove for Access/Refit

Repair Operation Time (ROT)	
Item	Code
Torque Tube-Remove/Refit	05.01.CA

Remove

1. Disconnect vehicle battery.
2. Raise vehicle on ramp.

Caution

On a two post ramp, ensure the vehicle is 'strapped' to the ramp.

Warning

The torque tube is heavy. To avoid personal injury or damage to the torque tube, torque tube removal / installation is a two person operation.

3. Remove transaxle (see Workshop Manual procedure 07.03.AA Transaxle Assembly - Manual - Remove for Access and Refit).
4. Remove LH exhaust manifold (see Workshop Manual procedure 09.00.CB Manifold - Exhaust - LH - Renew).
5. Allow torque tube to lower until engine is balanced.
6. Remove large circlip using special tool (see Fig. 1).



Fig. 1

7. With assistance, remove propshaft from torque tube (see Fig. 2).



Fig. 2

8. **Manual Only** - Open clutch hydraulics bleed nipple and with suitable container below, press clutch pedal fully and retain pedal in that position. Tighten bleed nipple (see Fig. 3).



Fig. 3

Place suitable absorbent material around the affected area to absorb any possible clutch fluid spillage.

9. **Manual Only** - Disconnect the clutch slave cylinder supply pipe at the flexible pipe union and cap pipes (see Fig. 4)



Fig. 4

10. With assistance, support torque tube and remove bolts (x16) that secure torque tube to engine (see Fig. 5).

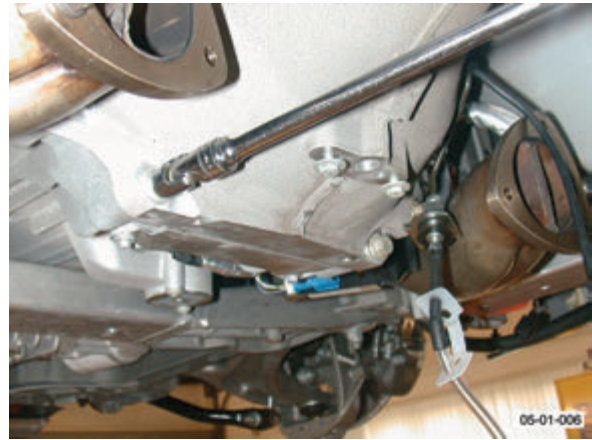


Fig. 5

11. Remove torque tube (see Fig. 6).



Fig. 6

Warning

The torque tube is heavy. To avoid personal injury or damage to the torque tube, torque tube removal / installation is a two person operation.

Installation

1. Clean torque tube and mating face on engine.
2. With assistance, install and align torque tube to engine.

Warning

The torque tube is heavy. To avoid personal injury or damage to the torque tube, torque tube removal / installation is a two person operation.

3. Install and torque tighten bolts (x16) using a cross-over sequence to ensure even face loading.
4. With assistance, install propshaft into torque tube and install circlip.
5. **Manual Only** - Remove pipe caps and reconnect clutch hydraulics (clean up fluid loss).

6. Manual Only - Bleed clutch hydraulics.**Caution**

Clutch fluid must not be allowed to contact vehicle paint work. Remove spilt clutch fluid from the paint work by rinsing away with running water.

7. Install LH exhaust manifold (see Workshop Manual 09.00.CB Manifold - Exhaust - LH - Renew).
8. Install transaxle (see Workshop Manual 07.03.AA Transaxle Assembly - Manual - Remove for Access and Refit).
9. Lower vehicle on ramp.
10. Connect vehicle battery.

RH/LH Drive Shaft Assembly-Renew

Repair Operation Time (ROT)		
Item	Code	
Drive Shaft Assembly-Renew	RH	05.05.BB
Drive Shaft Assembly-Renew	LH	05.05.AB

Removal

1. Raise vehicle on ramp.
2. Remove road wheel(s).
3. Remove rear undertray (see Workshop Manual procedure 01.02.PB Undertray - Rear - Renew).
4. With assistance, remove drive shaft nut.

Drive shaft nut will be very tight.

5. Remove and discard Allen bolts (x6), collect plates (x3), drive shaft to differential.

Allen bolts will be tight to remove due to thread lock coating.

6. Release drive shaft from rear hub, remove drive shaft.

Installation

1. Clean drive shaft and mating faces on differential flange and rear hub.
2. Install drive shaft in rear hub, align to differential flange.
3. Apply thread lock to new Allen bolt threads.

New Allen bolts should have a thread lock coating.

4. Clean and install plates (x3), Allen bolts (x6), tighten bolts.
5. Install drive shaft nut. With assistance, tighten nut.
6. Install rear undertray (see Workshop Manual procedure 01.02.PB Undertray - Rear - Renew).
7. Install road wheel(s).
8. Lower vehicle on ramp.



Driveline (05.00)

Halfshafts (05.05)**Specifications**

Torque Figures		
Description	Nm.	lb./ft
Halfshaft nut	300	221.5
Halfshaft to differential	70	52



Brake System (06.00)

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Maintenance

Front Brake Disc Set - Renew

Repair Operation Time (ROT)	
Item	Code
Front Brake Disc Set - Renew	06.03.AA

Removal

WARNING
BRAKE FLUID IS POISONOUS.
DO NOT DRINK THE BRAKE FLUID OR LET IT TOUCH YOUR SKIN OR EYES. IF YOU GET BRAKE FLUID IN YOUR MOUTH, GET MEDICAL AID IMMEDIATELY. FLUSH ALL BRAKE FLUID FROM YOUR EYES OR SKIN WITH WATER AND GET MEDICAL AID.

WARNING
DO NOT USE COMPRESSED AIR TO REMOVE BRAKE PAD DUST. THE DUST CAN BE DANGEROUS. ALWAYS USE A VACUUM BRUSH OR THE RECOMMENDED BRAKE CLEANER TO REMOVE BRAKE PAD DUST.

WARNING
BRAKE FLUID IS HYGROSCOPIC. IF KEPT IN OPENED CONTAINERS IT WILL ABSORB WATER VAPOUR. ONLY USE BRAKE FLUID FROM NEW CONTAINERS WHEN YOU FILL THE BRAKE FLUID RESERVOIR.

CAUTION
DO NOT LET BRAKE FLUID TOUCH THE VEHICLE PAINT WORK. IF YOU DO THE PAINTWORK CAN BE DAMAGED. FLUSH ALL SPILLED BRAKE FLUID FROM THE PAINTWORK WITH WATER.

Place an absorbent cloth around the brake fluid reservoir filler neck to absorb any possible brake fluid spillage.

1. Raise the vehicle and make it safe.
2. Remove the road wheels.
3. Remove the pad wear sensors.

To remove the brake caliper easier, retract the caliper pistons. When you retract the caliper pistons the brake fluid reservoir can overflow.

4. Remove the dust caps from the bleed nipples.
5. Install a bleed bottle.
6. Loosen the bleed nipples.
7. Push the pistons into calipers and tighten the bleed nipples.
8. Remove the bleed bottle.
9. Install the dust caps on the bleed screws.
10. Remove the brake pad retaining pins and anti-rattle springs.
11. Remove the two caliper attachment bolts from each caliper.
12. Use a cable tie to hold each caliper away.
13. Remove the two disc attachment screws and the two discs.

Installation

1. Clean the two hubs.

2. Install the two discs.
3. Install and torque two attachment screws into each disc.

WARNING
ALWAYS INSTALL NEW BOLTS WHEN YOU INSTALL THE BRAKE CALIPER. IF YOU DO NOT THE BOLTS CAN BREAK AND CAUSE FAILURE OF THE BRAKE.

4. Put each caliper in position and attach it with two new bolts.
5. Torque the caliper attachment bolts.
6. Clean the calipers, pins, shims and springs.
7. Apply anti-seize compound to the pads, pins and shims.
8. Install the pads and shims into the caliper.

When you install new brake pads, install a new brake pad wear sensor.

9. Install the pad retaining pins and springs into the calipers.
10. Install the pad wear sensors.
11. Operate the brake pedal four times.
12. Fill the brake fluid reservoir to the correct level.
13. Install the road wheels.
14. Lower the vehicle.

WARNING
BEFORE YOU DRIVE THE VEHICLE, OPERATE THE FOOT BRAKE PEDAL 2 OR 3 TIMES TO MAKE SURE THAT THE FOOT BRAKE OPERATES CORRECTLY. YOU MUST OPERATE BRAKE CALIPER PISTONS TO CLOSE THE SPACE BETWEEN THE BRAKE PADS AND THE DISC.



Front Caliper-Renew

Installation

Repair Operation Time (ROT)		
Item		Code
Front caliper-Renew	Right	06.03.AB
Front caliper-Renew	Left	06.03.AC

Removal

WARNING BRAKE FLUID IS POISONOUS.

DO NOT DRINK THE BRAKE FLUID OR LET IT TOUCH YOUR SKIN OR EYES. IF YOU GET BRAKE FLUID IN YOUR MOUTH, GET MEDICAL AID IMMEDIATELY. FLUSH ALL BRAKE FLUID FROM YOUR EYES OR SKIN WITH WATER AND GET MEDICAL AID.

WARNING
DO NOT USE COMPRESSED AIR TO REMOVE BRAKE PAD DUST. THE DUST CAN BE DANGEROUS. ALWAYS USE A VACUUM BRUSH OR THE RECOMMENDED BRAKE CLEANER TO REMOVE BRAKE PAD DUST.

WARNING
BRAKE FLUID IS HYGROSCOPIC. IF KEPT IN OPENED CONTAINERS IT WILL ABSORB WATER VAPOUR. USE ONLY BRAKE FLUID FROM FRESHLY OPENED CONTAINERS WHEN TOPPING-UP THE BRAKE FLUID RESERVOIR.

CAUTION
DO NOT LET BRAKE FLUID TOUCH THE VEHICLE PAINT WORK. IF YOU DO THE PAINTWORK CAN BE DAMAGED. FLUSH ALL SPILLED BRAKE FLUID FROM THE PAINTWORK WITH WATER.

Place an absorbent cloth around the brake fluid reservoir filler neck to absorb spilled brake fluid.

1. Raise the vehicle and make it safe.
2. Remove the road wheel.
3. Remove the pad wear sensor.

To remove the brake caliper easier, retract the caliper pistons. When you retract the caliper pistons the brake fluid reservoir can overflow.

4. Move the caliper pistons into to the caliper to release the pads.
5. Remove the brake pad retaining pins and anti-rattle spring.
6. Remove the pads and shims from the caliper.
7. Disconnect the brake hose.
8. Install sealing plugs into the open brake-pipe port of the caliper and the hose to prevent contamination.
9. Remove and discard the two caliper attachment bolts.
10. Remove the caliper.

WARNING
DO NOT USE COMPRESSED AIR TO REMOVE BRAKE PAD DUST. THE DUST CAN BE DANGEROUS. ALWAYS USE A VACUUM BRUSH OR THE RECOMMENDED BRAKE CLEANER TO REMOVE BRAKE PAD DUST.

1. Clean the pads, pins, shims and the spring.

WARNING
ALWAYS INSTALL NEW BOLTS WHEN YOU INSTALL THE BRAKE CALIPER. IF YOU DO NOT THE BOLTS CAN BREAK AND CAUSE FAILURE OF THE BRAKE.

2. Install a new caliper and attach it with two new bolts.
3. Torque the two caliper attachment bolts.
4. Apply anti-seize compound to the pads, pins and shims.
5. Install the pads and shims into the caliper.

When you install new brake pads, install a new brake pad wear sensor.

6. Install the pad retaining pins and spring into the caliper.
7. Remove the sealing plug from the brake-pipe port.

CAUTION
MAKE SURE THAT THE ALIGNMENT LINE ON THE BRAKE HOSE STAYS IN A STRAIGHT LINE. IF THE ALIGNMENT LINE IS NOT STRAIGHT, THE BRAKE HOSE IS TWISTED. THIS CAN CAUSE IT TO FAIL.

CAUTION
ON LEFT AND RIGHT CALIPERS, THE BRAKE HOSE MUST GO TOWARDS THE FRONT OF THE CAR.

- 7.1 Loosely install the brake hose union into the caliper.
- 7.2 Make sure that the brake hose alignment line is straight. Adjust the hose if necessary.
- 7.3 Install the alignment tool (206-100).



- 7.4 Use the tool to align the hose and tighten the union to **22 Nm**.
- 7.5 Do a check of the hose alignment again. If the hose is not correctly aligned, loosen the union and adjust the hose. Tighten the union to **22 Nm**.
8. Install the pad wear sensor.
9. Remove the dust cap from the bleed nipple.
10. Install the bleed bottle.
11. Fill the brake fluid reservoir to the correct level.
12. With the aid of one more person, bleed the brake caliper.
13. Remove the bleed bottle.

14. Install the dust cap for the bleed nipple.
15. Fill the brake fluid reservoir to the correct level.
16. Install road wheel.
17. Lower the vehicle.

WARNING

BEFORE YOU DRIVE THE VEHICLE, OPERATE THE FOOT BRAKE PEDAL 2 OR 3 TIMES TO MAKE SURE THAT THE FOOT BRAKE OPERATES CORRECTLY. YOU MUST OPERATE BRAKE CALIPER PISTONS TO CLOSE THE SPACE BETWEEN THE BRAKE PADS AND THE DISC.

Front Pad Kit - Renew

Repair Operation Time (ROT)	
Item	Code
Front Pad Kit - Renew	06.03.AD

Removal**WARNING**

BRAKE FLUID IS POISONOUS. DO NOT DRINK THE BRAKE FLUID OR LET IT TOUCH YOUR SKIN OR EYES. IF YOU GET BRAKE FLUID IN YOUR MOUTH, GET MEDICAL AID IMMEDIATELY. FLUSH ALL BRAKE FLUID FROM YOUR EYES OR SKIN WITH WATER AND GET MEDICAL AID.

WARNING

BRAKE FLUID IS HYGROSCOPIC. IF KEPT IN OPENED CONTAINERS IT WILL ABSORB WATER VAPOUR. USE ONLY BRAKE FLUID FROM FRESHLY OPENED CONTAINERS WHEN TOPPING-UP THE BRAKE FLUID RESERVOIR.

CAUTION

DO NOT LET BRAKE FLUID TOUCH THE VEHICLE PAINT WORK. IF YOU DO THE PAINTWORK CAN BE DAMAGED. FLUSH ALL SPILLED BRAKE FLUID FROM THE PAINTWORK WITH WATER.

Place an absorbent cloth around the brake fluid reservoir filler neck to absorb spilled brake fluid.

1. Raise the vehicle and make it safe.
2. Remove the road wheels.
3. Remove the pad wear sensors.

To remove the brake caliper easier, retract the caliper pistons. When you retract the caliper pistons the brake fluid reservoir can overflow.

4. Remove the dust caps from the bleed nipples .
5. Install a bleed bottle onto each bleed nipple.
6. Loosen the bleed nipples and push pistons into calipers.
7. Tighten bleed nipples.
8. Remove the bleed bottles.
9. Install the dust caps onto the bleed nipples.
10. Remove the brake pad retaining pins and anti-rattle springs.
11. Remove the pads and shims from the calipers.

Installation**WARNING**

DO NOT USE COMPRESSED AIR TO REMOVE BRAKE PAD DUST. THE DUST CAN BE DANGEROUS. ALWAYS USE A VACUUM BRUSH OR THE RECOMMENDED BRAKE CLEANER TO REMOVE BRAKE PAD DUST.

1. Clean the calipers, pins, shims and the springs.
2. Apply anti-seize compound to the pads, pins and shims.
3. Install the pads and shims into the caliper.

When you install new brake pads, install a new brake pad wear sensor.

4. Install the pad retaining pins and springs into the calipers.
5. Install the pad wear sensors.
6. Operate the brake pedal four times.
7. Fill the brake fluid reservoir to the correct level.
8. Install the road wheels.
9. Lower the vehicle.

Front Brake Hose Assembly - Renew

Repair Operation Time (ROT)		
Item		Code
Front Brake Hose Assembly-Renew	Right	06.03.AE
Front Brake Hose Assembly-Renew	Left	06.03.AF

Removal

1. Raise the vehicle and make it safe.
2. Remove the applicable road wheel.
3. Remove the dust cap from the bleed nipple.
4. Install a bleed bottle onto the applicable caliper.
5. Open the bleed nipple.
6. Push the brake pedal approximately 60 mm and hold it with a support.
7. Tighten the bleed nipple.
8. Remove the bleed bottle.
9. Install the dust cap on the bleed nipple.
10. Disconnect the brake hose union from the caliper.
11. Install sealing plugs in the open ports.
12. Remove the brake pipe union from the hose.
13. Remove the M6 screw that attaches the hose bracket to the body.
14. Remove the hose.

Installation

1. Put the hose in position.
2. Install and torque the M6 screw that attaches the hose bracket to the body.
3. Install and torque the brake pipe union onto the hose.



4. Remove the sealing plugs from the port in the caliper and the hose.

CAUTION

MAKE SURE THAT THE ALIGNMENT LINE ON THE BRAKE HOSE STAYS IN A STRAIGHT LINE. IF THE ALIGNMENT LINE IS NOT STRAIGHT, THE BRAKE HOSE IS TWISTED. THIS CAN CAUSE IT TO FAIL.

CAUTION

ON LEFT AND RIGHT CALIPERS, THE BRAKE HOSE MUST GO TOWARDS THE FRONT OF THE CAR.

- 4.1 Loosely install the brake hose union into the caliper.
- 4.2 Make sure that the brake hose alignment line is straight. Adjust the hose if necessary.
- 4.3 Install the alignment tool (206-100).

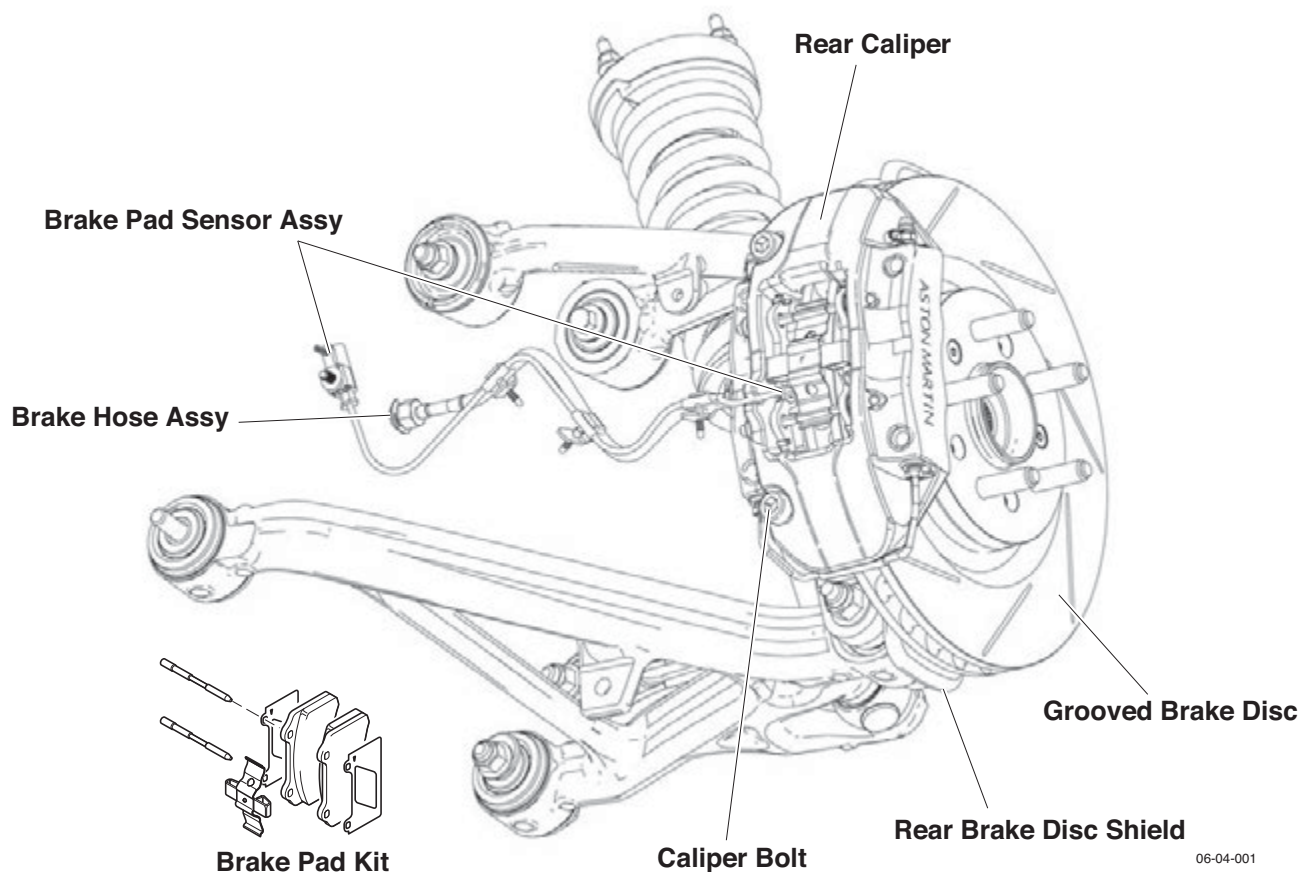


- 4.4 Use the tool to align the hose and tighten the union to **22 Nm**.
- 4.5 Do a check of the hose alignment again. If the hose is not correctly aligned, loosen the union and adjust the hose. Tighten the union to **22 Nm**.
5. Remove the pedal support.
6. Fill the brake fluid reservoir to the correct level.
7. Get the aid of one more person and bleed the brake caliper.
8. Remove the bleed bottle.
9. Install the bleed nipple dust cap.
10. Clean all spilled brake fluid.
11. Fill the brake fluid reservoir to the correct level.
12. Install the road wheel.
13. Lower the vehicle.

Brake system (06.00)

Rear Disc Brakes (06.04)

Description



06-04-001

The rear, four piston, brake caliper is bolted directly to the vertical link by two bolts. The caliper is a monobloc assembly. The steel brake discs are ventilated and grooved. They are secured to the hub by two retaining bolts.

Specifications

Oils/Greases	
Brake Fluid	Castrol Response Super DOT 4 (Not silicon based brake fluid)
Brake discs	
Brake disc initial thickness	28.0 mm
Brake disc Min. thickness	26.0 mm
Brake Disc 'Runout'	<70 mm measured @ 2 mm in from the brake disc edge.
Brake pads	
Minimum lining thickness	2.5

Torque Figures

Description	Nm.	lb. / ft.
Brake hose unions	22	16.5
Service brake Caliper to Vertical Link	20 + 66°-70°	15 + 66°-70°
Handbrake Caliper to Vertical Link	15 + 90°-94°	11.5 + 90°-94°



Maintenance

Rear Brake Disc Set-Renew

Repair Operation Time (ROT)	
Item	Code
Rear Brake Disc Set-Renew	06.04.AA

Removal

WARNING
AVOID SKIN / EYE CONTACT OR INGESTION OF BRAKE FLUID. IF SKIN OR EYES ARE SPLASHED WITH BRAKE FLUID, RINSE THE AFFECTED AREA IMMEDIATELY WITH PLENTY OF WATER AND OBTAIN MEDICAL ATTENTION. IF BRAKE FLUID IS INGESTED, OBTAIN IMMEDIATE MEDICAL ATTENTION.

WARNING
BRAKE FLUID IS HYGROSCOPIC. IF KEPT IN OPENED CONTAINERS IT WILL ABSORB WATER VAPOUR. USE ONLY BRAKE FLUID FROM FRESHLY OPENED CONTAINER.

Caution
Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

Place an absorbent cloth around the brake fluid reservoir filler neck to absorb any possible brake fluid spillage.

1. Raise vehicle on ramp.
2. Remove road wheel/s
3. Remove pad wear sensors.

To allow easier removal of the brake Caliper, retract the Caliper pistons. Retracting the Caliper pistons may cause the brake fluid reservoir to overflow.

4. Remove bleed nipple dust caps.
5. Fit bleed bottle.
6. Loosen bleed nipples, push pistons into Calipers, tighten bleed nipples.
7. Remove bleed bottle.
8. Fit bleed screw dust caps.
9. Remove brake pad retaining pins and anti-rattle springs.
10. Remove Caliper bolts (x4) and tie Caliper aside.
11. Remove handbrake Caliper bolts (x4) and tie Calipers aside.
12. Remove retaining screws (x4) and discs.

Installation

WARNING
ALWAYS USE A VACUUM BRUSH OR AQUEOUS BRAKE CLEANER TO REMOVE BRAKE DUST. NEVER USE COMPRESSED AIR.

1. Clean hubs.
2. Install discs and retaining screws.
3. Install Calipers and retaining bolts.
4. Install handbrake Calipers (bolts x4).
5. Clean components (Calipers, pins, shims, springs)

6. Apply anti-seize compound to pads, pins and shims.
7. Install pads and shims to Caliper.

When installing new brake pads, install a new brake pad wear sensor.

8. Install retaining pad pins and springs to Calipers.
9. Install pad wear sensors.
10. Pump brake pedal.
11. Top-up brake fluid.
12. Install road wheel/s
13. Lower vehicle on ramp.

WARNING
BEFORE MOVING OFF, PUMP THE FOOT BRAKE 2 OR 3 TIMES TO ENSURE THE FOOT BRAKE WORKS CORRECTLY. BRAKE CALIPER PISTONS MAY REQUIRE TRAVEL TO CONTACT THE BRAKE PADS AND DISC.

RH/LH Rear Caliper-Renew

Repair Operation Time (ROT)	
Item	Code
Rear Caliper-Renew	RH 06.04.AB
Rear Caliper-Renew	LH 06.04.AC

Removal

WARNING
AVOID SKIN / EYE CONTACT OR INGESTION OF BRAKE FLUID. IF SKIN OR EYES ARE SPLASHED WITH BRAKE FLUID, RINSE THE AFFECTED AREA IMMEDIATELY WITH PLENTY OF WATER AND OBTAIN MEDICAL ATTENTION. IF BRAKE FLUID IS INGESTED, OBTAIN IMMEDIATE MEDICAL ATTENTION.

WARNING
BRAKE FLUID IS HYGROSCOPIC. IF KEPT IN OPENED CONTAINERS IT WILL ABSORB WATER VAPOUR. USE ONLY BRAKE FLUID FROM FRESHLY OPENED CONTAINER.

Caution
Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

Place an absorbent cloth around the brake fluid reservoir filler neck to absorb any possible brake fluid spillage.

1. Raise vehicle on ramp.
2. Remove road wheel/s
3. Remove pad wear sensor.
4. Ease Caliper pistons to release pads.
5. Remove brake pad retaining pins and anti-rattle spring.
6. Remove pads and shims from Caliper.
7. Remove brake hose (cap and plug open orifices).
8. Remove Caliper bolts (x2) and Caliper.

Installation

WARNING
ALWAYS USE A VACUUM BRUSH OR AQUEOUS BRAKE CLEANER TO REMOVE BRAKE DUST. NEVER USE COMPRESSED AIR.

1. Clean components (pads, pins, shims, spring)
2. Install new Caliper and secure bolts (x2) (torque).
3. Apply anti-seize compound to pads, pins and shims.
4. Install pads and shims to Caliper.

When installing new brake pads, install a new brake pad wear sensor.

5. Install retaining pins and spring to Caliper.
6. Install brake pipe (torque).
7. Install pad wear sensor.
8. Remove bleed nipple dust cap.
9. Fit bleed bottle.
10. Top-up brake fluid.
11. Bleed brake Caliper with assistance.

When bleeding a brake Caliper, always bleed the inner bleed screw first, followed by the outer bleed screw, then bleed the inner bleed screw once again.

12. Install bleed nipple dust caps.
13. Remove bleed bottle.
14. Top-up brake fluid.
15. Install road wheel/s
16. Lower vehicle on ramp.

WARNING
BEFORE MOVING OFF, PUMP THE FOOT BRAKE 2 OR 3 TIMES TO ENSURE THE FOOT BRAKE WORKS CORRECTLY. BRAKE CALIPER PISTONS MAY REQUIRE TRAVEL TO CONTACT THE BRAKE PADS AND DISC.

Rear Pad Kit-Renew

Repair Operation Time (ROT)	
Item	Code
Rear Pad Kit-Renew	06.04.AD

Removal

WARNING
AVOID SKIN / EYE CONTACT OR INGESTION OF BRAKE FLUID. IF SKIN OR EYES ARE SPLASHED WITH BRAKE FLUID, RINSE THE AFFECTED AREA IMMEDIATELY WITH PLENTY OF WATER AND OBTAIN MEDICAL ATTENTION. IF BRAKE FLUID IS INGESTED, OBTAIN IMMEDIATE MEDICAL ATTENTION.

WARNING
BRAKE FLUID IS HYGROSCOPIC. IF KEPT IN OPENED CONTAINERS IT WILL ABSORB WATER VAPOUR. USE ONLY BRAKE FLUID FROM FRESHLY OPENED CONTAINER.

Caution
Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

Place an absorbent cloth around the brake fluid reservoir filler neck to absorb any possible brake fluid spillage.

1. Raise vehicle on ramp.
2. Remove road wheel/s
3. Remove pad wear sensors.
4. Remove bleed nipple dust caps.
5. Fit bleed bottle.
6. Loosen bleed nipples, push pistons into Calipers, tighten bleed nipples.
7. Remove bleed bottle.
8. Fit bleed nipple dust caps
9. Remove brake pad retaining pins and anti-rattle springs.
10. Remove pads and shims from Calipers.

Installation

WARNING
ALWAYS USE A VACUUM BRUSH OR AQUEOUS BRAKE CLEANER TO REMOVE BRAKE DUST. NEVER USE COMPRESSED AIR.

1. Clean components (Calipers, pins, shims, springs)
2. Apply anti-seize compound to pads, pins and shims.
3. Install pads and shims to Caliper.

When installing new brake pads, install a new brake pad wear sensor.

4. Install retaining pad pins and springs to Calipers
5. Install pad wear sensors.
6. Pump brake pedal.
7. Top-up brake fluid.
8. Install road wheel/s
9. Lower vehicle on ramp.

WARNING
BEFORE MOVING OFF, PUMP THE FOOT BRAKE 2 OR 3 TIMES TO ENSURE THE FOOT BRAKE WORKS CORRECTLY. BRAKE CALIPER PISTONS MAY REQUIRE TRAVEL TO CONTACT THE BRAKE PADS AND DISC.



Rear Brake Hose Assembly-Renew

Repair Operation Time (ROT)		
Item	Code	
Rear Brake Hose Assembly-Renew	RH	06.04.AE
Rear Brake Hose Assembly-Renew	LH	06.04-AF

7. Remove bleed bottle.
8. Fit bleed nipple dust caps.
9. Clean off excess fluid.
10. Top-up brake fluid.
11. Install road wheel/s
12. Lower vehicle on ramp.

Removal

WARNING
AVOID SKIN / EYE CONTACT OR INGESTION OF BRAKE FLUID. IF SKIN OR EYES ARE SPLASHED WITH BRAKE FLUID, RINSE THE AFFECTED AREA IMMEDIATELY WITH PLENTY OF WATER AND OBTAIN MEDICAL ATTENTION. IF BRAKE FLUID IS INGESTED, OBTAIN IMMEDIATE MEDICAL ATTENTION.

WARNING
BRAKE FLUID IS HYGROSCOPIC. IF KEPT IN OPENED CONTAINERS IT WILL ABSORB WATER VAPOUR. USE ONLY BRAKE FLUID FROM FRESHLY OPENED CONTAINERS WHEN TOPPING-UP THE BRAKE FLUID RESERVOIR.

Caution
Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

Place an absorbent cloth around the brake fluid reservoir filler neck to absorb any possible brake fluid spillage.

1. Raise vehicle on ramp.
2. Remove road wheel/s
3. Remove bleed nipple dust caps.
4. Fit bleed bottle to RHR/LHR Caliper, open bleed nipples (x1).
5. Fit bleed bottle to RHF/LHF Caliper, open bleed nipples (x1).
6. Depress brake pedal >60 mm and secure with support.
7. Tighten RHF/LHR bleed nipple, remove bleed bottle and fit dust cap.
8. Tighten RHR/LHR bleed nipple, remove bleed bottle.
9. Remove clips (x3) wear indicator harness to brake hose.

Caution
Always plug pipe ends to prevent ingress of dirt or moisture into the system.

10. Remove brake hose from Caliper (cap and plug open orifices).
11. Remove brake union from hose.
12. Remove hose C-clip and remove hose.

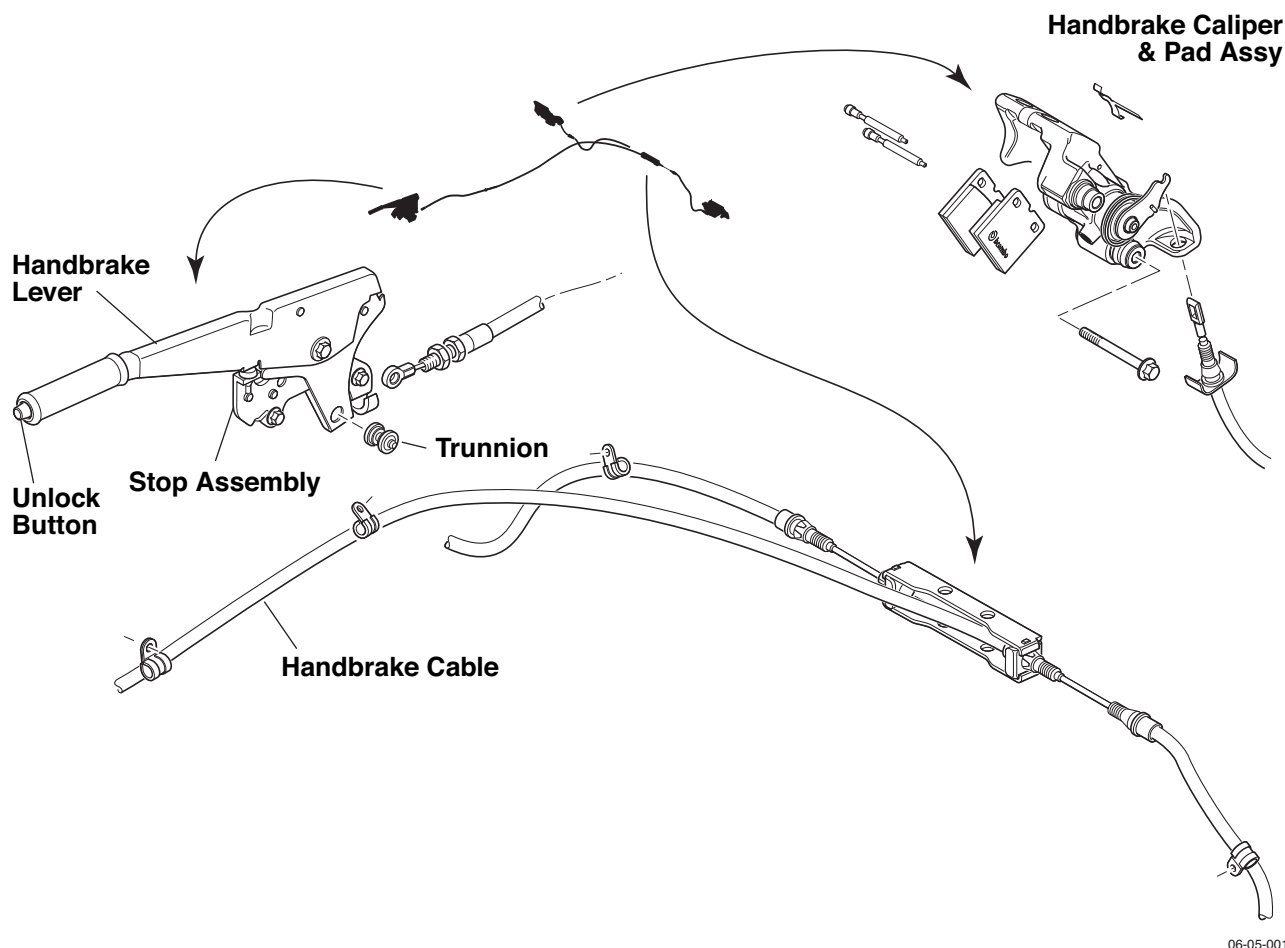
Installation

1. Install hose C-clip and hose.
2. Install brake union to hose (torque).
3. Install brake pipe to Caliper (torque) using alignment tool (206-100).
4. Remove pedal support.
5. Top-up brake fluid.
6. Bleed brake Caliper with assistance.

Brake Systems (06.00)

Hand Brake (06.05)

Description



The handbrake control lever is located on the outside of the drivers seat and brakes the rear road wheels through a cable system and two mechanical handbrake Calipers. Handbrake pads are applied by the mechanical brake Calipers (x2), one acting on each rear road wheel brake disc. The Calipers are bolted to the vertical links. Return springs on each Caliper retract the pads when the parking brake is released.

Wear in the parking brake pads is compensated for automatically by a mechanism within the calipers. Cable stretch is compensated by cable adjusters.

A handbrake switch is wired normally closed. The switch is held open whilst the handbrake is 'off' and closes when the handbrake is applied. The handbrake warning lamp on the instrument panel is illuminated when the handbrake is applied.

Specifications

Brake pads

Minimum lining thickness	2mm
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Torque Figures

Description	Nm.	lb. / ft.
Brake Caliper to Vertical Link	15 + 92°	11.5 + 92°

Maintenance

RH/LH Handbrake Caliper-Renew

Repair Operation Time (ROT)		
Item	Code	
Handbrake Caliper-Renew	RH	06.05.AB
Handbrake Caliper-Renew	LH	06.05.BB

Removal

1. Raise vehicle on ramp.
2. Remove road wheel/s.
3. Ensure handbrake lever is fully released.
4. Release handbrake adjustment (both sides).
5. Release inner cable eyelet from lever, compress ring clip (special tool) and remove cable (see Fig. 1).

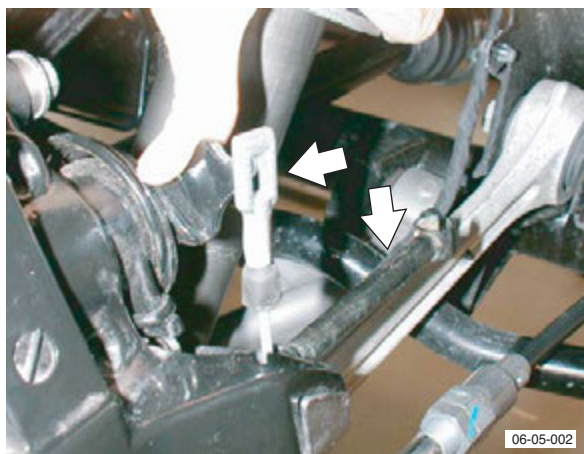


Fig. 1

WARNING
ALWAYS USE A VACUUM BRUSH OR AQUEOUS BRAKE CLEANER TO REMOVE BRAKE DUST. NEVER USE COMPRESSED AIR.

6. Remove brake pad retaining pins and anti-rattle spring.
7. Remove pads and shims from Caliper.
8. Remove Caliper bolts (x2) and Caliper.

Installation

1. Clean pads, pins and spring.
2. Install new Caliper, secure bolts (x2) and tighten.
3. Apply anti-seize compound to pads, pins and shims.
4. Install pads into Caliper.
5. Install retaining pins and spring to Caliper.
6. Operate lever on Caliper until pads contact disc.
7. Install cable to Caliper.

8. Adjust handbrake cable (see Workshop Manual procedure 06.05.DC Handbrake Cable Assembly - Renew).

WARNING
BEFORE MOVING OFF, OPERATE THE HANDBRAKE 2 OR 3 TIMES TO ENSURE THE HANDBRAKE WORKS CORRECTLY. HANDBRAKE CALIPER PISTONS MAY REQUIRE TRAVEL TO CONTACT THE BRAKE PADS AND DISC.

9. Install road wheel/s.
10. Lower vehicle on ramp.

Handbrake Lever Assembly-Renew

Repair Operation Time (ROT)	
Item	Code
Handbrake Lever Assembly-Renew	06.05.CB

Removal

1. Remove driver's seat (see Workshop Manual procedure 01.10.AB Seat Assembly - Front - LH - Remove for Access and Refit).
2. Raise vehicle on ramp.
3. Remove road wheel/s.
4. Release handbrake adjustment (both sides).
5. Remove warning light switch Lucar connection.
6. Remove handbrake lever bracket (4 x bolts).
7. Remove clevis pin and clip from lever.

Installation

1. Install cable to lever.
2. Install lever to body (bolts x4) and tighten.
3. Connect warning light switch Lucar connection.
4. Install driver's seat (see Workshop Manual procedure 01.10.AB Seat Assembly - Front - LH - Remove for Access and Refit).
5. Adjust handbrake cable (see Workshop Manual procedure 06.05.DC Handbrake Cable Assembly - Renew).

Handbrake Pad Set-Renew

Repair Operation Time (ROT)	
Item	Code
Handbrake Pad Set-Renew	06.05.DB

Removal

1. Raise vehicle on ramp.
2. Remove road wheel/s.
3. Ensure handbrake lever is fully released.
4. Release handbrake adjustment (both sides).
5. Remove brake pad retaining pins and anti-rattle spring.
6. Remove pads from Caliper.

WARNING
ALWAYS USE A VACUUM BRUSH OR AQUEOUS BRAKE CLEANER TO REMOVE BRAKE DUST. NEVER USE COMPRESSED AIR.

- Remove Calipers bolts (x4) and move Caliper aside.

Installation

- Clean pins, springs, Caliper slide pins and pistons.
- Retract pistons into Calipers.

Always replace handbrake pads in axle sets.

- Install Calipers and bolts (x2) to knuckles and tighten.
- Apply anti-seize compound to pads, pins, and slide pins.
- Install pads into Caliper.
- Install retaining pins and springs to Caliper.

WARNING
BEFORE MOVING OFF, OPERATE THE HANDBRAKE 2 OR 3 TIMES TO ENSURE THE HANDBRAKE WORKS CORRECTLY. HANDBRAKE CALIPER PISTONS MAY REQUIRE TRAVEL TO CONTACT THE BRAKE PADS AND DISC.

- Operate lever on Caliper until pads contact discs.
- Adjust handbrake cable (see Workshop Manual procedure 06.05.DC Handbrake Cable Assembly - Renew).
- Install road wheel/s.
- Lower vehicle on ramp.

Handbrake Cable Assembly-Adjust

Repair Operation Time (ROT)	
Item	Code
Handbrake Cable Assembly-Adjust	06.05.DC

- Ensure handbrake is fully released.
- Raise vehicle on ramp.
- Check condition of handbrake cable.
- Release handbrake cable adjustment (both sides).
- Adjust cable equally at each Caliper to achieve 4 clicks at lever.
- Check handbrake is not binding.
- Lower vehicle on ramp.
- Ensure warning light is off when handbrake lever is released.
- Ensure for correct operation of handbrake.

Handbrake Cable Assembly-Vehicle Set-Renew

Repair Operation Time (ROT)	
Item	Code
Handbrake Cable Assembly-Renew	06.05.DD

Removal

- Remove driver's seat (see Workshop Manual procedure 01.10.AB Seat Assembly - Front - LH - Remove for Access and Refit).
- Raise vehicle on ramp.

- Remove road wheel/s.

WARNING
TO AVOID PERSONAL INJURY, I.E. SEVERE BURNS TO THE SKIN, ALLOW EXHAUST SYSTEM TO COOL DOWN BEFORE REMOVING EXHAUST SYSTEM COMPONENTS.

- Remove exhaust rear silencer box (see Workshop Manual procedure 09.00.KB Silencer and Bypass Valve Assembly - Renew).
- Remove rear heat shield bolts (x4) and clips (x2).
- Release cable adjustments (both sides).

Caution
Do Not attempt to disconnect the handbrake cables from the equaliser unit.

- Remove handbrake bracket to access clevis pin and clip and disconnect from lever (see Workshop Manual procedure 06.05.CB Handbrake Lever Assembly - Renew).
- Unclip cable in the cabin.
- Remove screws (x4) from cable clips and unclip grommet from body clip (see Fig. 1).



Fig. 1

- Withdraw cable from body.
- Release inner cable eyelets from Caliper levers, compress ring clip and remove cable (see Fig. 2).

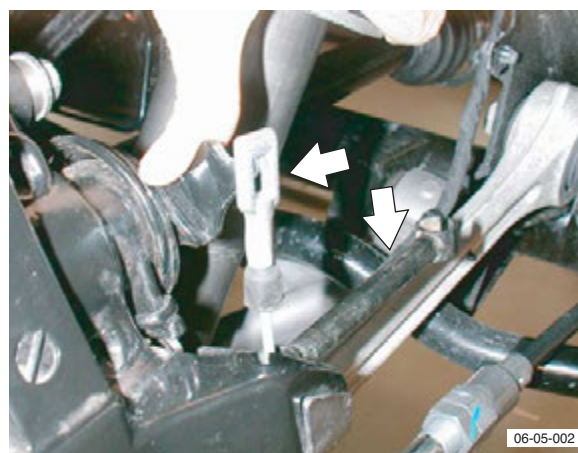


Fig. 2



12. Remove cable from subframe.

Installation

1. Install cable into body.

Ensure that the handbrake lever is fully released.

2. Connect cable to handbrake lever and install handbrake lever (see Workshop Manual procedure 06.05.CB Handbrake Lever Assembly - Renew).
3. Clip cable in cabin
4. Install cable to subframe (bolts x4).
5. Install heat shield bolts (x4) and clips (x2).
6. Install exhaust rear silencer box (see Workshop Manual procedure 09.00.KB Silencer and Bypass Valve Assembly - Renew).
7. Install cable to Calipers.
8. Install driver's seat (see Workshop Manual procedure 01.10.AB Seat Assembly - Front - LH - Remove for Access and Refit).
9. Adjust handbrake cable (see Workshop Manual procedure 06.05.DC Handbrake Cable Assembly - Renew).

WARNING
BEFORE MOVING OFF, OPERATE THE HANDBRAKE 2 OR 3 TIMES TO ENSURE THE HANDBRAKE WORKS CORRECTLY. HANDBRAKE CALIPER PISTONS MAY REQUIRE TRAVEL TO CONTACT THE BRAKE PADS AND DISC.

10. Install road wheel/s.

11. Lower vehicle on ramp.

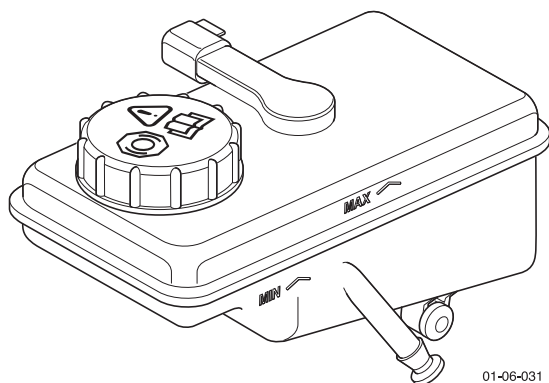
If the handbrake pads are binding, a squeal will be emitted from the rear brakes.

Brake System (06.00)

Brake Actuation System (06.06)

Description

Tandem Master Cylinder



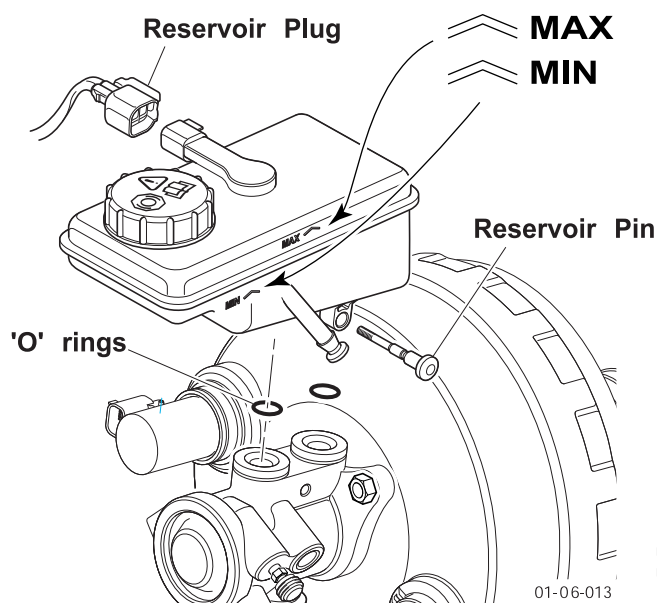
The short-stroke tandem master-cylinder controls two separate brake circuits which are jointly activated by the brake pedal. In the event of a major leak in one system, the other will still function. The two systems are supplied by a common brake fluid reservoir.

A pressure sensor attached to the master-cylinder provides the ABS / DSC module with brake pressure information. This information informs the system how hard the driver is braking and is used as an aid for the ABS / DSC to achieve accurate brake pressure control.

Brake Fluid Reservoir

The brake fluid reservoir is mounted directly on the tandem master cylinder and secured with a pin. Two stub pipes, on the base of the reservoir, locate into the primary and secondary chambers of the tandem master cylinder.

An integral fluid-level switch is incorporated in the reservoir. If the brake fluid level is low, the brake warning lamp in the Driver Information Module (DIM) will illuminate and 'LOW BRAKE FLUID' will be displayed in the message center right.



Specifications

Oils/Greases

Brake Fluid Castrol Response Super Dot 4

Torque Figures

Description	Nm.
Master Cylinder Mount	25 (+/- 4)
Brake Pipe Unions	17
Brake fluid reservoir securing pin	4
Pressure Sensor	35 (+/- 2)



Maintenance

Pedal Box Assembly - Renew

Repair Operation Time (ROT)	
Item	Code
Pedal Box Assembly-Renew	06.06.AB

1. Remove front seat (see Workshop Manual procedure 01.10.AB Seat Assembly - Front - RH - Remove for Access and Refit).
2. Disconnect multiplug from stop lamp switch (see Fig. 1).

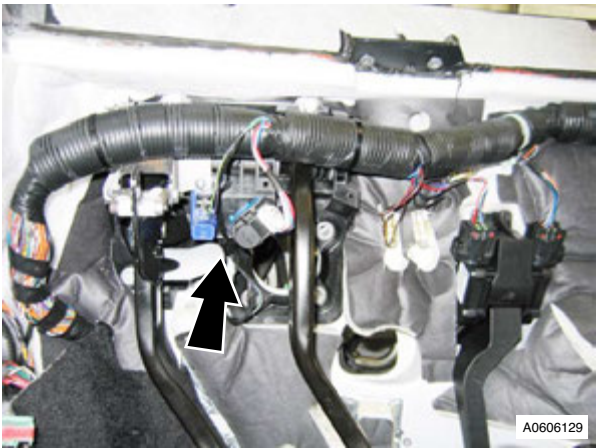


Fig. 1

3. Remove clip clevis pin from brake pedal. Collect wavy washer.
4. Remove clip clevis pin from clutch pedal.
5. Remove nuts (x2) securing clutch master cylinder to pedal box.
6. Remove nuts (x4) securing brake booster assembly to pedal box.
7. Release main harness clips (x2) from pedal box.
8. Remove bolts (x3) securing pedal box to bulkhead.
9. Remove pedal box assembly.
10. Remove stop lamp switch.
11. Remove and discard O-ring seal from clutch master cylinder.

Installation

1. Install new O-ring seal to clutch master cylinder.
2. Install stop lamp switch in pedal box.
3. Install pedal box assembly, install bolts (x3). Do not torque tighten at this stage.
4. Position brake booster, install and torque tighten nuts (x4).
5. Torque tighten pedal box bolts (x3).
6. Position clutch master cylinder, install and torque tighten nuts (x2).
7. Secure main harness to pedal box with clips (x2)

8. Install brake pedal clevis pin, wavy washer and retaining clip.
9. Install clutch pedal clevis pin, and retaining clip.
10. Connect multiplug to stop lamp switch.
11. Install front seat (see Workshop Manual procedure 01.10.AB Seat Assembly - Front - RH - Remove for Access and Refit).

RHD-Brake Master Cylinder Assembly-Renew

Repair Operation Time (ROT)	
Item	Code
Brake Master Cylinder Assembly-Renew	RHD 06.06.EB

Removal

WARNING
AVOID SKIN / EYE CONTACT OR INGESTION OF BRAKE FLUID. IF SKIN OR EYES ARE SPLASHED WITH BRAKE FLUID, RINSE THE AFFECTED AREA IMMEDIATELY WITH PLENTY OF WATER AND OBTAIN MEDICAL ATTENTION. IF BRAKE FLUID IS INGESTED, OBTAIN IMMEDIATE MEDICAL ATTENTION.

WARNING
BRAKE FLUID IS HYGROSCOPIC. IF KEPT IN OPENED CONTAINERS IT WILL ABSORB WATER VAPOUR. USE ONLY BRAKE FLUID FROM FRESHLY OPENED CONTAINERS WHEN TOPPING-UP THE BRAKE FLUID RESERVOIR.

Caution
Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

1. Remove reservoir cap.
2. Remove fluid in reservoir (syringe).

Place an absorbent cloth around the brake fluid reservoir filler neck to absorb any possible brake fluid spillage.

3. Position cloth to absorb spillage.
4. Disconnect level indicator multiplug.
5. Disconnect pressure sensor multiplug.

Caution
Always plug pipe ends to prevent ingress of dirt or moisture into the system.

6. Remove clutch cylinder feed pipe.
7. Remove brake pipe union (x2).
8. Remove master cylinder from servo (nuts x2).

Installation

1. Install O-ring.
2. Install master cylinder to servo (nuts x 2) (torque).
3. Install clutch cylinder feed pipe.
4. Connect pressure switch multiplug.
5. Install brake pipe unions (x2 torque).
6. Connect level indicator multiplug.

7. Fill reservoir.
8. Bleed Brakes (see Workshop Manual procedure 06.06.AD Pad Kit - Manual Brake and Clutch Pedal - Renew).

LHD-Brake Master Cylinder Assembly-Renew

Repair Operation Time (ROT)	
Item	Code
Brake Master Cylinder Assembly-Renew	LHD 06.07.EA

Removal

1. Remove corner cross brace.
2. Move expansion tank aside for access (bolt x1, nut x1, hose clips x2, multiplug x1).

WARNING
AVOID SKIN / EYE CONTACT OR INGESTION OF BRAKE FLUID. IF SKIN OR EYES ARE SPLASHED WITH BRAKE FLUID, RINSE THE AFFECTED AREA IMMEDIATELY WITH PLENTY OF WATER AND OBTAIN MEDICAL ATTENTION. IF BRAKE FLUID IS INGESTED, OBTAIN IMMEDIATE MEDICAL ATTENTION.

WARNING
BRAKE FLUID IS HYGROSCOPIC. IF KEPT IN OPENED CONTAINERS IT WILL ABSORB WATER VAPOUR. USE ONLY BRAKE FLUID FROM FRESHLY OPENED CONTAINERS WHEN TOPPING-UP THE BRAKE FLUID RESERVOIR.

Caution
Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

Caution
Always plug pipe ends to prevent ingress of dirt or moisture into the system.

3. Disconnect clutch reservoir feed pipe.
4. Disconnect multiplugs (x2).
5. Disconnect brake pipes from master cylinder (move aside).
6. Remove reservoir holding screw for access to master cylinder retaining nut.
7. Remove master cylinder from booster (nuts x2).

Installation

1. On new master cylinder - Remove reservoir holding screw for access to master cylinder retaining nut.
2. Install master cylinder to booster (nuts x2).
3. Install reservoir holding screw for access to master cylinder retaining nut.
4. Connect brake pipes to master cylinder.
5. Connect clutch reservoir feed pipe.

6. Connect multiplugs (x2).
7. Install expansion tank aside (bolt x1, nut x1, hose clips x2, multiplug x1).
8. Install corner cross brace (torque) (only fully tighten when vehicle on level floor).
9. Bleed Brakes (see Workshop Manual procedure 06.06.AD Pad Kit - Manual Brake and Clutch Pedal - Renew).
10. Top-up coolant.

Clutch Master Cylinder Assembly-Renew

Repair Operation Time (ROT)	
Item	Code
Clutch Master Cylinder Assembly-Renew	06.06.AE

Removal

WARNING
AVOID SKIN / EYE CONTACT OR INGESTION OF BRAKE FLUID. IF SKIN OR EYES ARE SPLASHED WITH BRAKE FLUID, RINSE THE AFFECTED AREA IMMEDIATELY WITH PLENTY OF WATER AND OBTAIN MEDICAL ATTENTION. IF BRAKE FLUID IS INGESTED, OBTAIN IMMEDIATE MEDICAL ATTENTION.

WARNING
BRAKE FLUID IS HYGROSCOPIC. IF KEPT IN OPENED CONTAINERS IT WILL ABSORB WATER VAPOUR. USE ONLY BRAKE FLUID FROM FRESHLY OPENED CONTAINERS WHEN TOPPING-UP THE BRAKE FLUID RESERVOIR.

Caution
Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

1. Move drivers seat fully rearward.
2. Remove clevis pin and clip.
3. Remove cylinder securing nuts (x2).

Place an absorbent cloth around the brake fluid reservoir filler neck to absorb any possible brake fluid spillage.

4. Remove fluid (syringe) from brake master cylinder to below clutch level.
5. Remove corner cross brace.
6. Move expansion tank aside for access (bolt x1, nut x1, hose clips x2, multiplug x1).

Caution
Always plug pipe ends to prevent ingress of dirt or moisture into the system.

7. Disconnect clutch reservoir feed pipe.
8. Disconnect clutch pipe quick fit (pull clip back) and move aside.
9. Remove cylinder assembly.
10. Remove and discard O-ring seal from master cylinder.
11. Split components
12. Remove pipe from cylinder (mark position).



13. Re-fit components
14. Install pipe to cylinder.

Installation

1. Install new O-ring seal on master cylinder.
2. Install cylinder assembly.
3. Connect pipe to master cylinder (quickfit).
4. Connect clutch reservoir feed pipe.
5. Install expansion tank aside (bolt x1, nut x1, hose clips x2, multiplug x1).
6. Install corner cross brace (torque) (only fully tighten when vehicle on level floor).
7. Install cylinder retaining nuts (x2) (torque).
8. Install clevis pin and clip.
9. Bleed clutch system (see Workshop Manual procedure 08.00.AF - Clutch Hydraulic System - Bleed).
10. Top-up coolant.

RH/LH Front Caliper Hose Assembly-Renew

Repair Operation Time (ROT)		
Item	Code	
Front Caliper Hose Assembly-Renew	RH	06.06.BA
Front Caliper Hose Assembly-Renew	LH	06.06.BB

Removal

WARNING
AVOID SKIN / EYE CONTACT OR INGESTION OF BRAKE FLUID. IF SKIN OR EYES ARE SPLASHED WITH BRAKE FLUID, RINSE THE AFFECTED AREA IMMEDIATELY WITH PLENTY OF WATER AND OBTAIN MEDICAL ATTENTION. IF BRAKE FLUID IS INGESTED, OBTAIN IMMEDIATE MEDICAL ATTENTION.

WARNING
BRAKE FLUID IS HYGROSCOPIC. IF KEPT IN OPENED CONTAINERS IT WILL ABSORB WATER VAPOUR. USE ONLY BRAKE FLUID FROM FRESHLY OPENED CONTAINERS WHEN TOPPING-UP THE BRAKE FLUID RESERVOIR.

Caution
Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

1. Raise vehicle on ramp.
2. Remove road wheel(s).
3. Remove RH/LH front wheel arch liner (see Workshop Manual procedure 01.02.FB/01.02.GB Wheel Arch Liner - Front - RH/LH - Renew).
4. Remove bleed nipple dust caps.
5. Position bleed container, connect bleed hose to RHR/LHR Caliper, open bleed nipples (x1).
6. Position bleed container, connect bleed hose to RHF/LHF Caliper, open bleed nipples (x1).
7. Depress brake pedal >60 mm and secure with support.

8. Tighten RHR/LHR bleed nipple, disconnect bleed hose, remove bleed container and fit dust cap.
9. Tighten RHF/LHF bleed nipple, disconnect bleed hose, remove bleed container and fit dust cap.

Caution
Always plug pipe ends to prevent ingress of dirt or moisture into the system.

10. Loosen and disconnect RH/LH front brake tube union from in line connector (see Fig. 1 - RHS shown).



Fig. 1

11. Loosen and disconnect RH/LH front brake tube union from hose connection.
12. Release brake tube from clips (x2), remove brake tube.

Installation

1. Install brake tube, connect unions, secure brake tube in clips (x2), torque tighten unions.
2. Install RH/LH front wheel arch liner (see Workshop Manual procedure 01.02.FB/01.02.GB Wheel Arch Liner - Front - RH/LH - Renew).
3. Remove pedal support.
4. Top-up brake fluid.
5. Bleed brake Caliper with assistance.
6. Remove bleed bottle.
7. Install bleed nipple dust caps.
8. Clean off excess fluid.
9. Top-up brake fluid.
10. Install road wheel(s).
11. Lower vehicle on ramp.

RH/LH Rear Brake Caliper Tube Assembly-Renew

Repair Operation Time (ROT)

Item	Code
Rear Brake Caliper Tube Assembly-Renew	06.06.BD
Rear Brake Caliper Tube Assembly-Renew	06.06.BE

Removal

WARNING
AVOID SKIN / EYE CONTACT OR INGESTION OF BRAKE FLUID. IF SKIN OR EYES ARE SPLASHED WITH BRAKE FLUID, RINSE THE AFFECTED AREA IMMEDIATELY WITH PLENTY OF WATER AND OBTAIN MEDICAL ATTENTION. IF BRAKE FLUID IS INGESTED, OBTAIN IMMEDIATE MEDICAL ATTENTION.

WARNING
BRAKE FLUID IS HYGROSCOPIC. IF KEPT IN OPENED CONTAINERS IT WILL ABSORB WATER VAPOUR. USE ONLY BRAKE FLUID FROM FRESHLY OPENED CONTAINERS WHEN TOPPING-UP THE BRAKE FLUID RESERVOIR.

Caution
Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

1. Raise vehicle on ramp.
2. Remove road wheel(s).
3. Remove bleed nipple dust caps.
4. Fit bleed bottle to RHR/LHR Caliper, open bleed nipples (x1).
5. Fit bleed bottle to RHF/LHF Caliper, open bleed nipples (x1).
6. Depress brake pedal >60 mm and secure with support.
7. Tighten RHF bleed nipple, remove bleed bottle and fit dust cap.
8. Tighten RHR/LHR bleed nipple, remove bleed bottle.
9. Remove screws (x5) securing LH/RH rear wheel arch liner to body.

10. Ease wheel arch liner downwards to access brake tube union (see Fig. 1 - RHS shown).



Fig. 1

Caution
Always plug pipe ends to prevent ingress of dirt or moisture into the system.

11. Loosen and disconnect brake tube unions from LH/RH in line connection and RH brake hose connection (see Fig. 2- LHS shown).

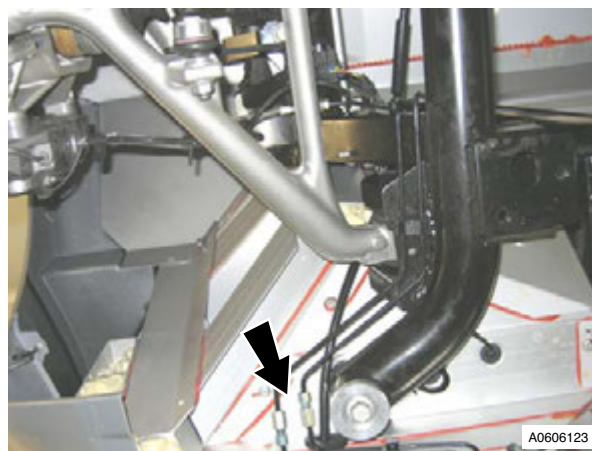


Fig. 2

12. Release brake tube from clips (x5) on subframe.
13. Manoeuvre and remove brake tube.

Installation

1. Install brake tube, connect unions (x2), secure brake tube in clips (x5). Torque tighten unions.
2. Position wheel arch liner, install and tighten screws (x5).
3. Remove pedal support.

Caution
Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

4. Top-up brake fluid.
5. Bleed brake Caliper with assistance.



6. Remove bleed bottle.
7. Fit bleed nipple dust caps.
8. Clean off excess fluid.
9. Top-up brake fluid.
10. Install road wheel/s
11. Lower vehicle on ramp.

Brake Master Cylinder to Modulator
Secondary Tube Assembly-Renew

Repair Operation Time (ROT)		
Item	Code	
Brake Master Cylinder to Modulator Secondary Tube Assembly-Renew	LHD	06.06.BF
Brake Master Cylinder to Modulator Primary Tube Assembly-Renew	RHD	06.06.CF

Removal

WARNING
AVOID SKIN / EYE CONTACT OR INGESTION OF BRAKE FLUID. IF SKIN OR EYES ARE SPLASHED WITH BRAKE FLUID, RINSE THE AFFECTED AREA IMMEDIATELY WITH PLENTY OF WATER AND OBTAIN MEDICAL ATTENTION. IF BRAKE FLUID IS INGESTED, OBTAIN IMMEDIATE MEDICAL ATTENTION.

WARNING
BRAKE FLUID IS HYGROSCOPIC. IF KEPT IN OPENED CONTAINERS IT WILL ABSORB WATER VAPOUR. USE ONLY BRAKE FLUID FROM FRESHLY OPENED CONTAINERS WHEN TOPPING-UP THE BRAKE FLUID RESERVOIR.

Caution
Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

1. Raise vehicle on ramp.
2. Remove road wheel(s).
3. Remove LH front wheel arch liner (see Workshop Manual procedure 01.02.FB/01.02.BC Wheel Arch Liner - Front - LH - Renew).
4. Remove bleed nipple dust caps.
5. Position bleed container, connect bleed hose to LHR Caliper, open bleed nipples (x1).
6. Position bleed container, connect bleed hose to LHF Caliper, open bleed nipples (x1).
7. Depress brake pedal >60 mm and secure with support.
8. Tighten LHR bleed nipple, disconnect bleed hose, remove bleed container and fit dust cap.
9. Tighten LHF bleed nipple, disconnect bleed hose, remove bleed container and fit dust cap.

Caution
Always plug pipe ends to prevent ingress of dirt or moisture into the system.

10. Loosen and disconnect brake tube union from modulator (see Fig. 1).



Fig. 1

11. Loosen and disconnect brake tube union from master cylinder.
12. Remove brake tube.

Installation

1. Install brake tube, connect and torque tighten unions.
2. Install LH front wheel arch liner (see Workshop Manual procedure 01.02.FB/01.02.BC Wheel Arch Liner - Front - LH - Renew).
3. Remove pedal support.
4. Top-up brake fluid.
5. Brake bleed (see Workshop Manual procedure 06.07.DD Brake Hydraulic System - Flush/Refill/Bleed).
6. Install road wheel(s).
7. Lower vehicle on ramp.

Brake Master Cylinder to Modulator Primary Tube Assembly-Renew

Repair Operation Time (ROT)		
Item	Code	
Brake Master Cylinder to Modulator Primary Tube Assembly-Renew	LHD	06.06.BG
Brake Master Cylinder to Modulator Primary Tube Assembly-Renew	RHD	06.06.CG

Removal

WARNING
AVOID SKIN / EYE CONTACT OR INGESTION OF BRAKE FLUID. IF SKIN OR EYES ARE SPLASHED WITH BRAKE FLUID, RINSE THE AFFECTED AREA IMMEDIATELY WITH PLENTY OF WATER AND OBTAIN MEDICAL ATTENTION. IF BRAKE FLUID IS INGESTED, OBTAIN IMMEDIATE MEDICAL ATTENTION.

WARNING
BRAKE FLUID IS HYGROSCOPIC. IF KEPT IN OPENED CONTAINERS IT WILL ABSORB WATER VAPOUR. USE ONLY BRAKE FLUID FROM FRESHLY OPENED CONTAINERS WHEN TOPPING-UP THE BRAKE FLUID RESERVOIR.

Caution
Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

1. Raise vehicle on ramp.
2. Remove road wheel(s).
3. Remove LH front wheel arch liner (see Workshop Manual procedure 01.02.FB/01.02.BC Wheel Arch Liner - Front - LH - Renew).
4. Remove bleed nipple dust caps.
5. Position bleed container, connect bleed hose to LHR Caliper, open bleed nipples (x1).
6. Position bleed container, connect bleed hose to LHF Caliper, open bleed nipples (x1).
7. Depress brake pedal >60 mm and secure with support.
8. Tighten LHR bleed nipple, disconnect bleed hose, remove bleed container and fit dust cap.
9. Tighten LHF bleed nipple, disconnect bleed hose, remove bleed container and fit dust cap.

Caution
Always plug pipe ends to prevent ingress of dirt or moisture into the system.

10. Loosen and disconnect brake tube union from modulator (see Fig. 1).



Fig. 1

11. Loosen and disconnect brake tube union from master cylinder.
12. Remove brake tube.

Installation

1. Install brake tube, connect and torque tighten unions.
2. Install LH front wheel arch liner (see Workshop Manual procedure 01.02.FB/01.02.BC Wheel Arch Liner - Front - LH - Renew).
3. Remove pedal support.
4. Top-up brake fluid.
5. Brake bleed (see Workshop Manual procedure 06.07.DD Brake Hydraulic System - Flush/Refill/Bleed).
6. Install road wheel(s).
7. Lower vehicle on ramp.



Rear Wheel Brake Front to Rear Tube Assembly-Renew

Repair Operation Time (ROT)		
Item	Code	
Rear Wheel Brake Front to Rear Tube Assembly-Renew	RH	06.06.BH
Rear Wheel Brake Front to Rear Tube Assembly-Renew	LH	06.06.BJ

Removal

WARNING
AVOID SKIN / EYE CONTACT OR INGESTION OF BRAKE FLUID. IF SKIN OR EYES ARE SPLASHED WITH BRAKE FLUID, RINSE THE AFFECTED AREA IMMEDIATELY WITH PLENTY OF WATER AND OBTAIN MEDICAL ATTENTION. IF BRAKE FLUID IS INGESTED, OBTAIN IMMEDIATE MEDICAL ATTENTION.

WARNING
BRAKE FLUID IS HYGROSCOPIC. IF KEPT IN OPENED CONTAINERS IT WILL ABSORB WATER VAPOUR. USE ONLY BRAKE FLUID FROM FRESHLY OPENED CONTAINERS WHEN TOPPING-UP THE BRAKE FLUID RESERVOIR.

Caution
Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

1. Raise vehicle on ramp.
2. Remove RH/LH front and rear road wheel(s).
3. Remove RH/LH front wheel arch liner (see Workshop Manual procedure 01.02.FB/01.02.GB Wheel Arch Liner - Front - LH - Renew).
4. Remove bleed nipple dust caps.
5. Position bleed container, connect bleed hose to RHR/ LHR Caliper, open bleed nipples (x1).
6. Position bleed container, connect bleed hose to RHF/ LHR Caliper, open bleed nipples (x1).
7. Depress brake pedal >60 mm and secure with support.
8. Tighten RHR/LHR bleed nipple, disconnect bleed hose, remove bleed container and fit dust cap.
9. Tighten RHF/LHF bleed nipple, disconnect bleed hose, remove bleed container and fit dust cap.
10. Remove screws (x5) securing RH/LH rear wheel arch liner to body.
11. Ease wheel arch liner downwards to access brake tube rear in line connection.

Caution
Always plug pipe ends to prevent ingress of dirt or moisture into the system.

12. Loosen and disconnect RH/LH rear brake tube union from front line connection (see Fig. 1).

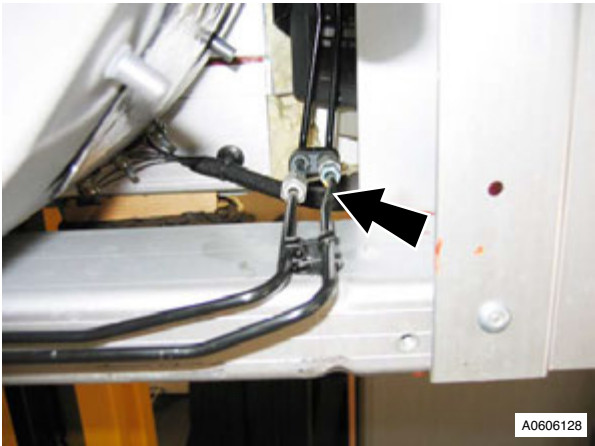


Fig. 1

13. Loosen and disconnect RH/LH brake tube union from rear in line connection (see Fig. 2).

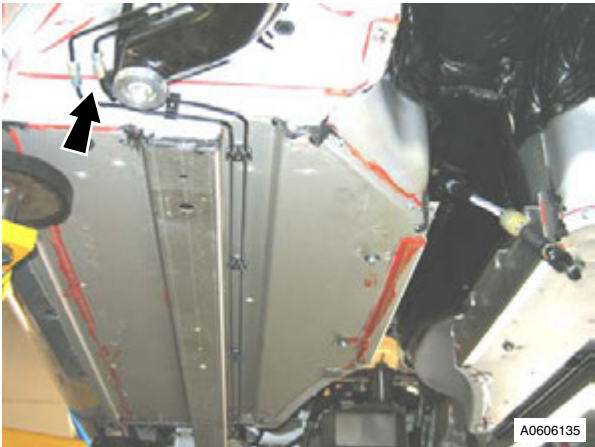


Fig. 2

14. Release brake tube from clips (x6), remove brake tube.

Installation

1. Install brake tube, connect unions, secure brake tube in clips (x6), torque tighten unions.
2. Position LH/RH rear wheel arch liner, install and tighten screws (x5).
3. Install RH/LH front wheel arch liner (see Workshop Manual procedure 01.02.FB/01.02.GB Wheel Arch Liner - Front - LH/RH - Renew).
4. Remove pedal support.
5. Top-up brake fluid.
6. Bleed brake Caliper with assistance.
7. Remove bleed bottle.
8. Install bleed nipple dust caps.
9. Clean off excess fluid.
10. Top-up brake fluid.
11. Install road wheel(s).

12. Lower vehicle on ramp.

RH Front Caliper to Modulator Tube Assembly-Renew

Repair Operation Time (ROT)		
Item		Code
Front Caliper to Modulator Tube Assembly-Renew	RH	06.06.BK

Removal

WARNING
AVOID SKIN / EYE CONTACT OR INGESTION OF BRAKE FLUID. IF SKIN OR EYES ARE SPLASHED WITH BRAKE FLUID, RINSE THE AFFECTED AREA IMMEDIATELY WITH PLENTY OF WATER AND OBTAIN MEDICAL ATTENTION. IF BRAKE FLUID IS INGESTED, OBTAIN IMMEDIATE MEDICAL ATTENTION.

WARNING
BRAKE FLUID IS HYGROSCOPIC. IF KEPT IN OPENED CONTAINERS IT WILL ABSORB WATER VAPOUR. USE ONLY BRAKE FLUID FROM FRESHLY OPENED CONTAINERS WHEN TOPPING-UP THE BRAKE FLUID RESERVOIR..

Caution
Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

1. Remove Bulkhead heatsheild (see Workshop Manual procedure 02.06.BC Heatshield - Bulkhead - Renew).
2. Remove bleed nipple dust caps.
3. Position bleed container, connect bleed hose to RHR Caliper, open bleed nipples (x1).
4. Position bleed container, connect bleed hose to RHF Caliper, open bleed nipples (x1).
5. Depress brake pedal >60 mm and secure with support.
6. Tighten RHR bleed nipple, disconnect bleed hose, remove bleed container and fit dust cap.
7. Tighten RHF bleed nipple, disconnect bleed hose, remove bleed container and fit dust cap.

8. Disconnect RH front brake tube union from modulator (see Fig. 1).



Fig. 1

Caution
Always plug pipe ends to prevent ingress of dirt or moisture into the system.

9. Disconnect RH front brake tube union from front brake tube in-line connection (see Fig. 2).



Fig. 2



10. Release brake tube from clips (x4), remove brake tube (see Fig. 3).



Fig. 3

Installation

1. Install brake tube, connect unions, secure brake tube in clips (x4), torque tighten unions.
2. Remove pedal support.
3. Top-up brake fluid.
4. Bleed brake Caliper with assistance.
5. Remove bleed bottle.
6. Install bleed nipple dust caps.
7. Clean off excess fluid.
8. Top-up brake fluid.
9. Install Bulkhead heatsheild (see Workshop Manual procedure 02.06.BC Heatshield - Bulkhead - Renew).

Rear Wheel Brake Tube Assembly-Renew

Repair Operation Time (ROT)		
Item	Code	
Rear Wheel Brake Tube Assembly-Renew	RH	06.06.BL
Rear Wheel Brake Tube Assembly-Renew	LH	06.06.BM

Removal

WARNING
AVOID SKIN / EYE CONTACT OR INGESTION OF BRAKE FLUID. IF SKIN OR EYES ARE SPLASHED WITH BRAKE FLUID, RINSE THE AFFECTED AREA IMMEDIATELY WITH PLENTY OF WATER AND OBTAIN MEDICAL ATTENTION. IF BRAKE FLUID IS INGESTED, OBTAIN IMMEDIATE MEDICAL ATTENTION.

WARNING
BRAKE FLUID IS HYGROSCOPIC. IF KEPT IN OPENED CONTAINERS IT WILL ABSORB WATER VAPOUR. USE ONLY BRAKE FLUID FROM FRESHLY OPENED CONTAINERS WHEN TOPPING-UP THE BRAKE FLUID RESERVOIR.

Caution
Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

1. Raise vehicle on ramp.
2. Remove road wheel(s).
3. Remove LH/RH front wheel arch liner (see Workshop Manual procedure 01.02.FB/01.02.GB Wheel Arch Liner - Front - LH/RH - Renew).
4. Remove bleed nipple dust caps.
5. Position bleed container, connect bleed hose to RHR/ LHR Caliper, open bleed nipples (x1).
6. Position bleed container, connect bleed hose to RHF/ LHF Caliper, open bleed nipples (x1).
7. Depress brake pedal >60 mm and secure with support.
8. Tighten RHR/LHR bleed nipple, disconnect bleed hose, remove bleed container and fit dust cap.
9. Tighten RHF/LHF bleed nipple, disconnect bleed hose, remove bleed container and fit dust cap.

Caution
Always plug pipe ends to prevent ingress of dirt or moisture into the system.

10. Loosen and disconnect RH/LH rear brake tube union from modulator (see Fig. 1).



Fig. 1

11. Loosen and disconnect RH/LH brake tube union from in line connection (see Fig. 2). **Removal**

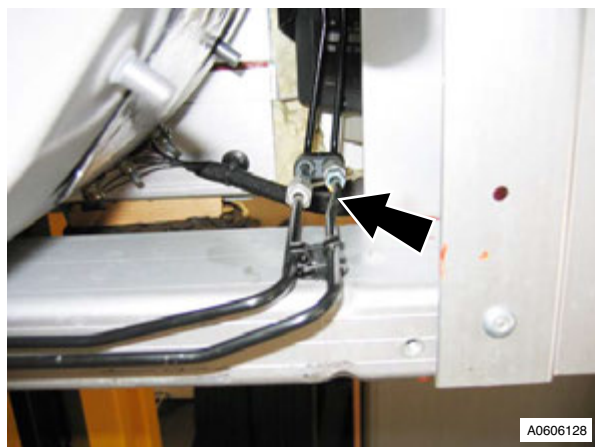


Fig. 2

12. Release brake tube from clips (x2), remove brake tube.

Installation

1. Install brake tube, connect unions, secure brake tube in clips (x2), torque tighten unions.
2. Install LH/RH front wheel arch liner (see Workshop Manual procedure 01.02.FB/01.02.GB Wheel Arch Liner - Front - LH - Renew)
3. Remove pedal support.
4. Top-up brake fluid.
5. Bleed brake Caliper with assistance.
6. Remove bleed bottle.
7. Install bleed nipple dust caps.
8. Clean off excess fluid.
9. Top-up brake fluid.
10. Install road wheel(s).
11. Lower vehicle on ramp.

Dynamic Stability Control Module-Renew

Repair Operation Time (ROT)	
Item	Code
Dynamic Stability Control Module-Renew	06.06.EA

WARNING
AVOID SKIN / EYE CONTACT OR INGESTION OF BRAKE FLUID. IF SKIN OR EYES ARE SPLASHED WITH BRAKE FLUID, RINSE THE AFFECTED AREA IMMEDIATELY WITH PLENTY OF WATER AND OBTAIN MEDICAL ATTENTION. IF BRAKE FLUID IS INGESTED, OBTAIN IMMEDIATE MEDICAL ATTENTION.

WARNING
BRAKE FLUID IS HYGROSCOPIC. IF KEPT IN OPENED CONTAINERS IT WILL ABSORB WATER VAPOUR. USE ONLY BRAKE FLUID FROM FRESHLY OPENED CONTAINERS WHEN TOPPING-UP THE BRAKE FLUID RESERVOIR.

Caution
Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

1. Raise vehicle on ramp.
2. Disconnect vehicle battery.
3. Remove road wheel(s).
4. Remove bleed nipple dust caps.
5. Position bleed container, connect bleed hose to LHR Caliper, open bleed nipples (x1).
6. Position bleed container, connect bleed hose to LHF Caliper, open bleed nipples (x1).
7. Depress brake pedal >60 mm and secure with support.
8. Tighten LHR bleed nipple, disconnect bleed hose, remove bleed container and fit dust cap.
9. Tighten LHF bleed nipple, disconnect bleed hose, remove bleed container and fit dust cap.
10. Remove LH front wheel arch liner (see Workshop Manual procedure 01.02.FB Wheel Arch Liner - Front - LH - Renew).
11. Disconnect modulator multiplug.

Caution
Always plug pipe ends to prevent ingress of dirt or moisture into the system.

12. Mark brake pipe unions for assembly purposes. Loosen and disconnect brake pipe unions (x6) from modulator. Plug modulator and pipe connections.
13. Remove Torx bolts (x3) securing modulator mounting bracket to body. Remove modulator.
14. Remove Torx bolts (x3) securing modulator to mounting bracket. Collect mounting bracket from modulator.

Installation

1. Install modulator to mounting bracket, install and torque tighten Torx bolts (x3).
2. Install modulator to body, install and torque tighten Torx bolts (x3).
3. Remove plugs. Install and torque tighten brake unions (x6) to modulator.
4. Connect modulator multiplug.



-
5. Install wheel arch liner. (see Workshop Manual procedure 01.02.FB Wheel Arch Liner - Front - LH - Renew).
 6. Bleed braking system (see Workshop Manual procedure 06.07.DD Brake Hydraulic System - Flush/Refill/Bleed).
 7. Install road wheel/s.
 8. Lower vehicle on ramp.



ASTON MARTIN

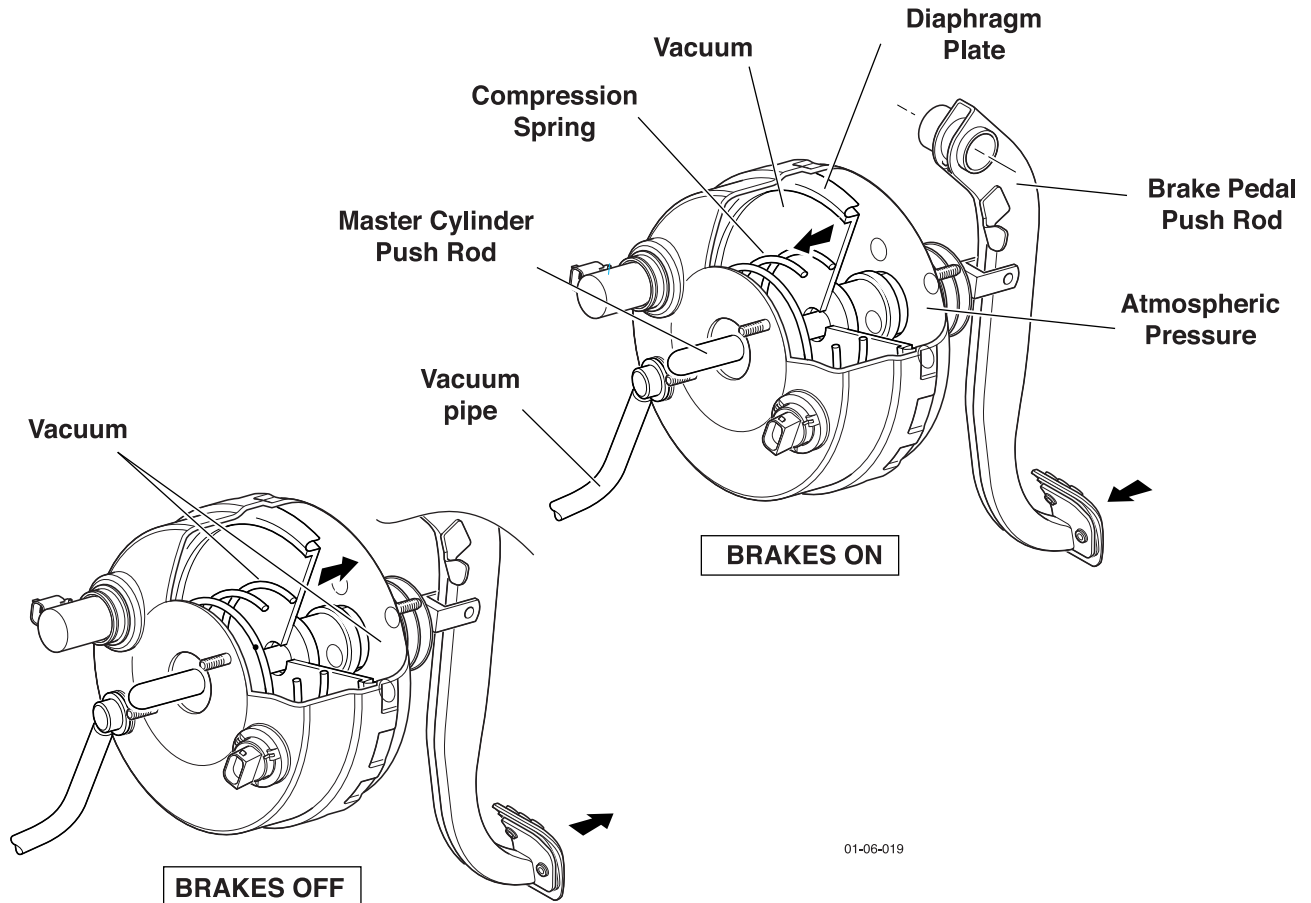
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Brake System (06.00)

Power Brake System (06.07)

Brake Booster



The brake booster comprises a chamber divided by a diaphragm plate and is secured to the brake pedal housing.

As the brake pedal is pressed, a poppet valve opens allowing atmospheric pressure into the drivers side of the diaphragm. Atmospheric pressure builds up on the drivers side of the diaphragm and pushes against the partial vacuum on the other side. This additional force boosts the applied brake pedal force up to 6.5 times.

When the brake pedal is released, the poppet valve closes. The pressure on the diaphragm reduces and the compression spring returns the diaphragm to the release position.

Emergency Brake Assist

In an emergency braking situation, a driver presses down on the brake pedal much faster than in normal braking conditions, but often without sufficient force. The initial application of the brake pedal is a reflex reaction. After the initial application, many drivers do not brake hard enough because of concerns that they might cause the vehicle to skid. To aid the driver, the panic brake assist (PBA) intervenes in bringing the vehicle to a halt, sooner and in a controlled manner, in emergency braking situation. The PBA system monitors the speed of brake pedal activation, and at a calibrated pedal activation speed, the PBA provides maximum brake force and makes full use of the ABS.

PBA is controlled by the ABS/DSC module, which monitors a travel sensor attached to the internal vacuum diaphragm of the brake booster. The sensor determines the position of the diaphragm and the speed of the diaphragm movement. If the sensor's signal indicates an emergency braking situation, the

ABS/DSC module will open an electric solenoid on the brake booster. The solenoid directs atmospheric pressure into the rear of the brake booster, causing the booster diaphragm to move forward to fully apply the brakes. PBA takes full benefit of ABS to stop the vehicle in a controlled manner and in the shortest distance possible. When the brake pedal is released the ABS/DSC module instantly releases the brakes.



Specifications

Torque Figures		
Description	Nm.	lb. / ft.
Brake Booster Mount	21-24	15.5-18

Maintenance

Brake Booster-RHD-Renew

Repair Operation Time (ROT)	
Item	Code
Brake Booster-Renew	06.07.AB

Removal

WARNING
AVOID SKIN / EYE CONTACT OR INGESTION OF BRAKE FLUID. IF SKIN OR EYES ARE SPLASHED WITH BRAKE FLUID, RINSE THE AFFECTED AREA IMMEDIATELY WITH PLENTY OF WATER AND OBTAIN MEDICAL ATTENTION. IF BRAKE FLUID IS INGESTED, OBTAIN IMMEDIATE MEDICAL ATTENTION.

WARNING
BRAKE FLUID IS HYGROSCOPIC. IF KEPT IN OPENED CONTAINERS IT WILL ABSORB WATER VAPOUR. USE ONLY BRAKE FLUID FROM FRESHLY OPENED CONTAINERS WHEN TOPPING-UP THE BRAKE FLUID RESERVOIR.

Caution
Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

1. Remove brake master cylinder (see Workshop Manual procedure 06.06.EB Brake Master Cylinder Assembly Renew).
2. Remove oil dipstick.
3. Remove vacuum hose.
4. Disconnect multiplugs (x2).
5. Remove pedal cover.
6. Remove clevis pin and clip.
7. Remove servo securing nuts (x4).
8. Remove servo assembly.
9. Remove brake light switch.

Installation

After installing a new brake booster, a new brake light switch, mounted on the brake pedal block, must be installed.

1. Install brake light switch.
2. Install servo assembly.
3. Install servo retaining nuts (x4) (torque).
4. Install clevis pin and clip.
5. Install pedal cover.
6. Connect multiplugs (x2).
7. Install vacuum hose.
8. Install dipstick.

9. Install brake master cylinder (see Workshop Manual procedure 06.06.EB Brake Master Cylinder Assembly Renew).

Brake Booster-LHD-Renew

Repair Operation Time (ROT)	
Item	Code
Brake Booster-Renew	06.07.AC

Removal

WARNING
AVOID SKIN / EYE CONTACT OR INGESTION OF BRAKE FLUID. IF SKIN OR EYES ARE SPLASHED WITH BRAKE FLUID, RINSE THE AFFECTED AREA IMMEDIATELY WITH PLENTY OF WATER AND OBTAIN MEDICAL ATTENTION. IF BRAKE FLUID IS INGESTED, OBTAIN IMMEDIATE MEDICAL ATTENTION.

WARNING
BRAKE FLUID IS HYGROSCOPIC. IF KEPT IN OPENED CONTAINERS IT WILL ABSORB WATER VAPOUR. USE ONLY BRAKE FLUID FROM FRESHLY OPENED CONTAINERS WHEN TOPPING-UP THE BRAKE FLUID RESERVOIR.

Caution
Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

1. Move drivers seat fully rearward.
2. Remove clevis pin and clip.
3. Remove booster securing nuts (x4).
4. Remove corner cross brace.
5. Move expansion tank aside for access (bolt x1, nut x1, hose clips x2, multiplug x1).
6. Remove vacuum hose move aside.
7. Remove bolts (x2) from clutch pipe bracket and move aside.

Caution
Always plug pipe ends to prevent ingress of dirt or moisture into the system.

8. Disconnect clutch reservoir feed pipe.
9. Disconnect multiplugs (x4).

Caution
Always plug pipe ends to prevent ingress of dirt or moisture into the system.

10. Disconnect brake pipes from master cylinder (move aside).
11. Remove booster assembly.
12. Split components.
13. Remove reservoir securing screw (for access to securing nut).
14. Remove master cylinder from booster (nuts x2).
15. Re-fit components.
16. Install master cylinder to booster (nuts x2).
17. Install reservoir securing screw.

Installation

1. Install booster assembly.
2. Connect brake pipes to master cylinder.
3. Install bolts (x2) clutch pipe bracket.
4. Connect clutch reservoir feed pipe.
5. Connect multiplugs (x4).
6. Install vacuum hose.
7. Install expansion tank aside (bolt x1, nut x1, hose clips x2, multiplug x1).
8. Install corner cross brace (torque) (only fully tighten when vehicle on level floor).
9. Install servo retaining nuts (x4) (torque).
10. Install clevis pin and clip.
11. Bleed Brakes (see Workshop Manual procedure 06.06.AD Pad Kit - Manual Brake and Clutch Pedal - Renew).
12. Top-up coolant.

Brake Fluid Reservoir-Renew

Repair Operation Time (ROT)	
Item	Code
Brake Fluid Reservoir-Renew	LHD 06.07.DA
Brake Fluid Reservoir-Renew	RHD 06.07.DH

Removal

WARNING
AVOID SKIN / EYE CONTACT OR INGESTION OF BRAKE FLUID. IF SKIN OR EYES ARE SPLASHED WITH BRAKE FLUID, RINSE THE AFFECTED AREA IMMEDIATELY WITH PLENTY OF WATER AND OBTAIN MEDICAL ATTENTION. IF BRAKE FLUID IS INGESTED, OBTAIN IMMEDIATE MEDICAL ATTENTION.

WARNING
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Caution
Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

1. Remove corner cross brace.
2. Move expansion tank aside for access (bolt x1, nut x1, hose clips x2, multiplug x1).

Caution
Always plug pipe ends to prevent ingress of dirt or moisture into the system.

3. Disconnect clutch reservoir feed pipe.
4. Disconnect multiplugs (x2).

Caution
Always plug pipe ends to prevent ingress of dirt or moisture into the system.

5. Disconnect brake pipes from master cylinder (move aside).
6. Remove reservoir holding screw for access to master cylinder retaining nut.
7. Remove master cylinder from booster (nuts x2).
8. Remove reservoir from master cylinder.

Installation

1. Fit new seals and install reservoir to master cylinder.
2. Install master cylinder to booster (nuts x2).
3. Install reservoir holding screw for access to master cylinder retaining nut
4. Connect brake pipes to master cylinder.
5. Connect clutch reservoir feed pipe.
6. Connect multiplugs (x2).
7. Install expansion tank aside (bolt x1, nut x1, hose clips x2, multiplug x1).
8. Install corner cross brace (torque) (only fully tighten when vehicle on level floor).
9. Bleed Brakes (see Workshop Manual procedure 06.07.DD Brake Hydraulic System - Flush/Refill/Bleed).
10. Top-up coolant.

Brake Bleeding - AMDS

Repair Operation Time (ROT)	
Item	Code
Brake Bleeding with AMDS	06.07.DD

WARNING
BRAKE FLUID IS POISONOUS. DO NOT DRINK THE BRAKE FLUID OR LET IT TOUCH YOUR SKIN OR EYES. IF YOU GET BRAKE FLUID IN YOUR MOUTH, GET MEDICAL AID IMMEDIATELY. FLUSH ALL BRAKE FLUID FROM YOUR EYES OR SKIN WITH WATER AND GET MEDICAL AID.

Caution
Do not let brake fluid touch the vehicle paint work. If you do the paintwork can be damaged. Flush all spilled brake fluid from the paintwork with water.

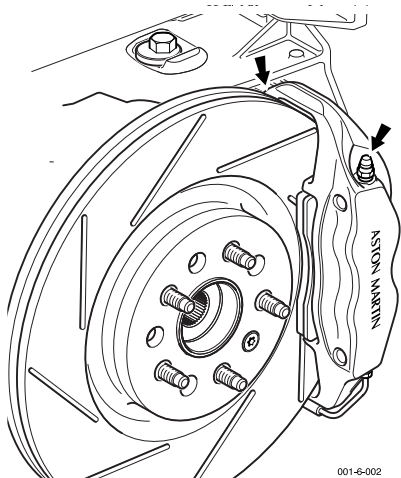
Use the AMDS to bleed the brakes if you are bleeding the brake system after you replaced a major component, for example: a modulator or a master cylinder or when filling from empty.

If you are bleeding a caliper, you can use a manual brake-bleed procedure.

1. Connect the AMDS.



2. Clean each caliper around the bleed screws.
Remove the dust caps.



WARNING

Brake fluid that contains water can affect the performance of the brakes and cause corrosion in the brake system. If you keep brake fluid in open containers, it will absorb water vapour. Use only brake fluid from new containers when you top-up the brake fluid reservoir..

3. Prepare a bleed tube and a bottle that contains a small quantity of clean brake fluid.
4. If necessary, top up the brake fluid reservoir with brake fluid from a new container.
5. Switch on the AMDS and load the 'Anti-lock braking diagnostics' software.

When you bleed a brake caliper, always bleed the inner bleed screw first, followed by the outer bleed screw, then bleed the inner bleed screw again.

6. Select 'Brake Bleed' and follow the AMDS instructions.

**Brake Master Cylinder and Vacuum
Booster-Renew**

Repair Operation Time (ROT)	
Item	Code
Brake Master Cylinder and Vacuum Booster-Renew	LHD 06.07.DE
Brake Master Cylinder and Vacuum Booster-Renew	RHD 06.07.DG

Removal

WARNING

Avoid skin / eye contact or ingestion of brake fluid. If skin or eyes are splashed with brake fluid, rinse the affected area immediately with plenty of water and obtain medical attention. If brake fluid is ingested, obtain immediate medical attention.

WARNING

Brake fluid is hygroscopic. If kept in opened containers it will absorb water vapour. Use only brake fluid from freshly opened containers when topping-up the brake fluid reservoir.

Caution

Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

1. Move drivers seat fully rearward.
2. Remove clevis pin and clip.
3. Remove booster securing nuts (x4).
4. Remove corner cross brace.
5. Move expansion tank aside for access (bolt x1, nut x1, hose clips x2, multiplug x1).
6. Remove vacuum hose move aside.
7. Remove bolts (x2) from clutch pipe bracket and move aside.

Caution

Always plug pipe ends to prevent ingress of dirt or moisture into the system.

8. Disconnect clutch reservoir feed pipe.
9. Disconnect multiplugs (x4).

Caution

Always plug pipe ends to prevent ingress of dirt or moisture into the system.

10. Disconnect brake pipes from master cylinder (move aside).
11. Remove booster assembly.

Installation

1. Install booster assembly.
2. Connect brake pipes to master cylinder.
3. Install bolts (x2) clutch pipe bracket.
4. Connect clutch reservoir feed pipe.
5. Connect multiplugs (x4).
6. Install vacuum hose.
7. Install expansion tank aside (bolt x1, nut x1, hose clips x2, multiplug x1).
8. Install corner cross brace (torque) (only fully tighten when vehicle on level floor).
9. Install servo retaining nuts (x4) (torque).
10. Install clevis pin and clip.
11. Bleed Brakes (see Workshop Manual procedure 06.07.DD Brake Hydraulic System - Flush/Refill/Bleed).

12. Top-up coolant.

Brake Master Cylinder-Renew

Repair Operation Time (ROT)	
Item	Code
Brake Master Cylinder-Renew	LHD 06.07.EA
Brake Master Cylinder-Renew	RHD 06.07.EB

Removal

WARNING
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WARNING
BRAKE FLUID IS HYGROSCOPIC. IF KEPT IN OPENED CONTAINERS IT WILL ABSORB WATER VAPOUR. USE ONLY BRAKE FLUID FROM FRESHLY OPENED CONTAINERS WHEN TOPPING-UP THE BRAKE FLUID RESERVOIR.

Caution
Brake fluid must not be allowed to contact the vehicle paint work. Remove spilt brake fluid from the paint work by rinsing away with running water.

1. Remove corner cross brace.
2. Move expansion tank aside for access (bolt x1, nut x1, hose clips x2, multiplug x1).

Caution
Always plug pipe ends to prevent ingress of dirt or moisture into the system.

3. Disconnect clutch reservoir feed pipe.
4. Disconnect multiplugs (x2).

Caution
Always plug pipe ends to prevent ingress of dirt or moisture into the system.

5. Disconnect brake pipes from master cylinder (move aside).
6. Remove reservoir holding screw for access to master cylinder retaining nut.
7. Remove master cylinder from booster (nuts x2).

Installation

1. On new master cylinder - Remove reservoir holding screw for access to master cylinder retaining nut
2. Install master cylinder to booster (nuts x2).
3. Install reservoir holding screw for access to master cylinder retaining nut
4. Connect brake pipes to master cylinder.
5. Connect clutch reservoir feed pipe.
6. Connect multiplugs (x2).
7. Install expansion tank aside (bolt x1, nut x1, hose clips x2, multiplug x1).

8. Install corner cross brace (torque) (only fully tighten when vehicle on level floor).
9. Bleed Brakes (see Workshop Manual procedure 006.07.DD Brake Hydraulic System - Flush/Refill/Bleed).
10. Top-up coolant.



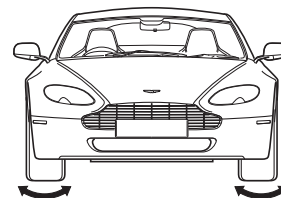
ASTON MARTIN

Brake system (06.00)

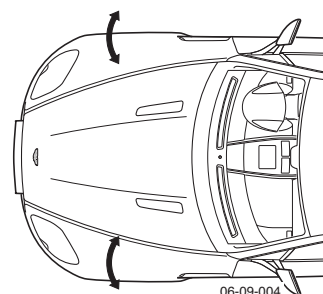
Anti-lock Braking System (ABS) (06.09)

The anti-lock braking system (ABS) is a four-channel system having independent inputs from all four-wheel speed sensors.

The ABS module, monitors signals from the sensors to calculate, brake slip and the acceleration / deceleration of individual wheels. When the brake pedal is depressed, and the ABS module detects incipient wheel lock-up from the incoming signals, it triggers the re-circulation pump inside the module's hydraulic modulator, and the solenoid valves for the wheel(s) concerned. Brake pressure, is then modulated to increase / decrease or remain constant at the wheel(s) concerned until wheel lock-up is eliminated. The ABS provides self-diagnosis and any malfunction within the system will be indicated to the driver by the illumination of the brake warning light and 'ABS FAULT' displayed in the message centre right. Should a fault develop within the ABS, the brake system will operate conventionally and with the same standard of performance as a vehicle not equipped with ABS.



Steering Motion



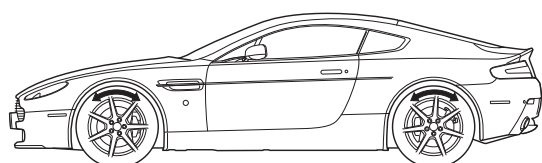
06-09-004

Dynamic Stability Control

Dynamic Stability Control (DSC) is a closed-loop system designed to enhance driving safety by improving vehicle handling when the tyres are at the limits of their grip capabilities. This is achieved through instantaneous, electronically controlled, reduction of engine torque and strategic application of the brakes at individual wheels.

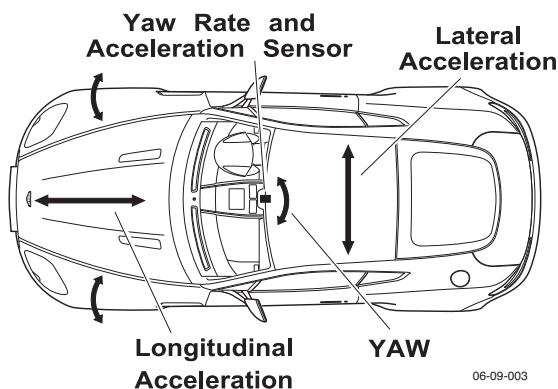
By using the principle that by controlling the brakes individually it is possible, to an extent, to steer the vehicle.

This principle can be used to enhance driving safety by correcting the vehicle's yaw moment (turning force), when the vehicle fails to follow the driver's steering inputs.



Wheel Roll

Wheel Roll



06-09-003

Concept

Satisfactory handling is determined according to whether a vehicle maintains a path, which accurately reflects the driver's input (steering wheel angle) while at the same time remaining stable.

The ABS / DSC module measures the vehicle's motion using the sensors below and processes the information to maintain vehicle control and stability within its ultimate control limits, which are determined by the physical limits set by the tyre's grip.

Wheel speed sensors - Longitudinal acceleration.

lateral acceleration sensor - Lateral acceleration.

Yaw rate sensor - Yaw rate, defined as the rotation around the vertical axis.

When there is insufficient tyre grip for the driving situation (for example, the driver has entered a corner too fast) the DSC will maintain stability and optimise the cornering and stopping performance, but cannot always prevent the vehicle from running wide.

Driver demand is measured by using the steering wheel angle sensor and vehicle speed to calculate the optimum yaw rate. This is compared to the actual measured yaw-rate and a yaw-rate calculated from the lateral acceleration and the vehicle speed. If the deviation between these measurements is too great, an understeer or oversteer correction is made.

The first step in this process is to determine how the vehicle should respond to driver demand (ideal response) and how it actually does respond (actual response). Hydraulic control valves can then be activated to generate brake pressure and / or engine torque reduction can be used to maintain the



difference between the ideal and actual response within a tolerance band. This directly influences the forces on the tires to generate a corrective yaw moment to reduce the side forces of the tires where appropriate

System Overview

The DSC system embraces capabilities far beyond that of ABS, or ABS and traction control combined, while relying on the components of these systems. It also incorporates these additional sensors for measuring the vehicle's motion and brake system pressure:

Yaw rate sensor - located centrally on the transmission tunnel.

Lateral acceleration sensor - integrated with the yaw rate sensor.

Steering angle sensor - located on the upper steering column.

Pressure transducer - located on master cylinder.

The ABS / DSC module supports data exchange with other vehicle electronic systems via the CAN network; the module also enables diagnostic interrogation using WDS.

The following components register driver demand and the ABS / DSC module processes their signals as a basis for defining an ideal response:

PCM - position of accelerator pedal.

Brake master cylinder pressure transducer - driver's braking effort.

Steering angle sensor - position of steering wheel.

There are many supplementary parameters also included in the processing calculations these include the coefficient of friction and vehicle speed. The ABS / DSC module monitors these factors based on signals transmitted by the sensors for:

- Wheel speed
- Lateral acceleration
- Brake pressure
- Yaw rate

Using these parameters, the function of the ABS / DSC module is to determine the current vehicle status based on the yaw-rate signal and the slip as estimated by the ABS / DSC module. It then maintains the vehicle response within a tolerance of the 'normal' behaviour, which is easily controlled by the driver.

In order to generate the desired yaw behaviour the ABS / DSC module controls the selected wheels using the ABS hydraulic system and engine control system. In the event of engine intervention, the ABS / DSC module calculates the torque which should be supplied by the engine to the wheels, and relays this request signal to the PCM which implements the torque request.

The PCM receives signals from the DSC system via the CAN bus and reduces engine torque as follows:

- The throttle is positioned to provide the requested engine target torque.

- During the transient phase of torque reduction caused by mechanical and combustion delays, other alternative torque reduction methods are used to provide a quicker response.
- The ignition is retarded and / or the fuel is cut-off at the injectors at selected cylinders.
- Ignition and fuelling are reinstated when the engine torque reaches the requested value

Operation Summary

- DSC is switched 'ON' when the engine is started
- When the system is operating, the DSC light in the instrument cluster will flash, at the rate of twice a second
- DSC can be switched 'OFF / ON' by pressing the DSC switch
- The DSC light in the instrument cluster will illuminate continuously when the system is switched 'Off'.
- 'DSC OFF' will be displayed in the message centre right to indicate the system has been switched 'OFF'
- A malfunction in the traction control system will be indicated to the driver by the following:
 - The DSC light in the instrument cluster will illuminate continuously
 - The message 'DSC NOT AVAILABLE' will be displayed in the message centre right
- If vehicle speed control is engaged it will automatically disengage when traction control is operating.

Traction Control

Traction control is a function of DSC, and is operated in association with DSC. Traction control prevents excessive wheel-spin at standing starts, or during acceleration. Wheel-spin is usually caused by excessive use of the accelerator pedal, or slippery, loose or bumpy road surfaces. To prevent excessive wheel-spin and maintain vehicle stability such situations are overcome by the intervention of the traction control system by:

- Braking the driven-wheel when it starts to slip
- And / or adapting the engine torque to a level corresponding to the traction available on the road surface.

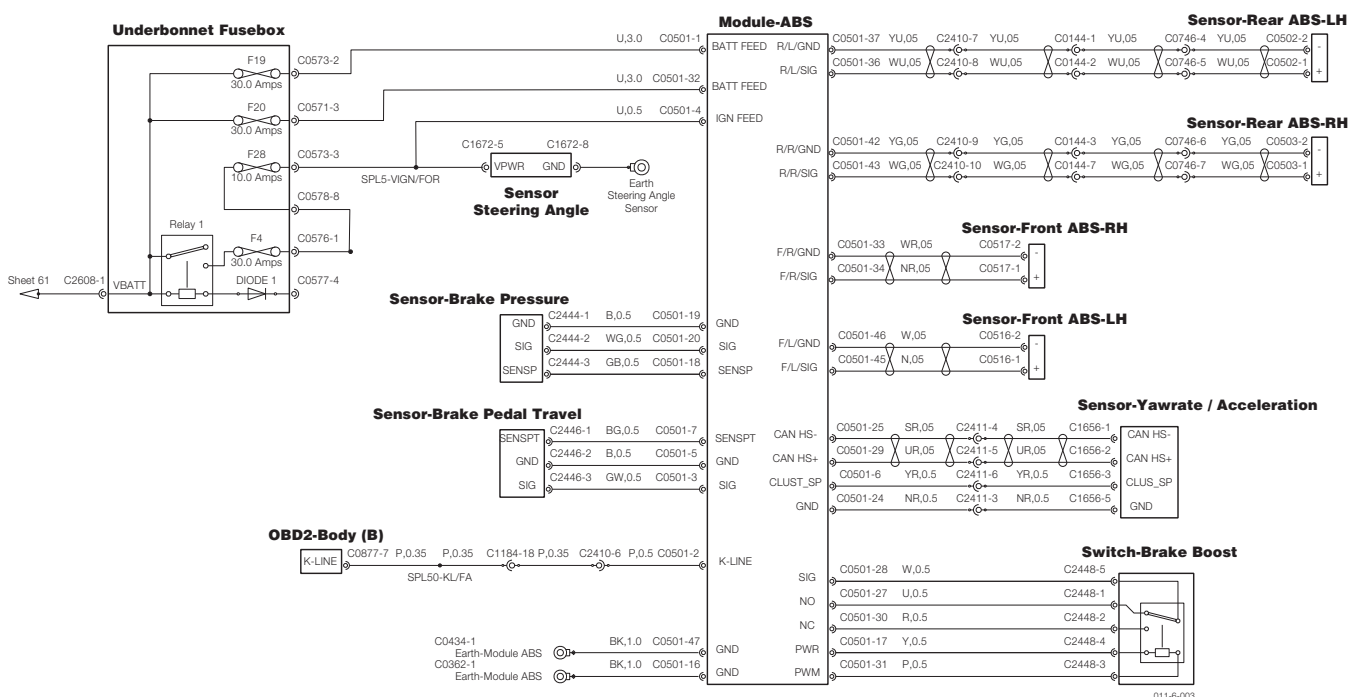
Functional Description

Traction control uses the ABS electronic and mechanical / hydraulic hardware with additional valves to control the braking pressure at the calipers. An engine interface also enables the engine to respond to torque reduction requests from the traction control. As with ABS, the signals from the wheel-speed sensors are supplied to the ABS module, where they are used to calculate the wheel-slip of the individual wheels. Traction control intervention is initiated if the slip at one of the wheels is excessive.

Engine Intervention

In the event of wheel-slip the ABS / DSC module calculates the torque, which should be applied by the engine to reduce the wheel-slip (this torque does not exceed driver demand). Engine torque reduction is then requested from the PCM via the CAN bus. The PCM, in response to these signals, reduces engine torque by controlling the ignition and fuelling. A traction control gearshift pattern is automatically selected within the automatic transmission software whenever traction control is active.

ABS / DSC Circuit



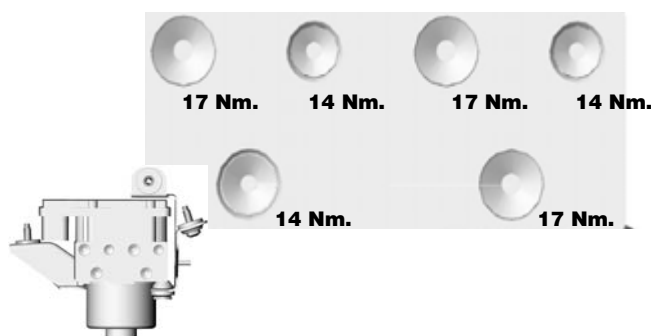
Specifications

Oils/Greases

Brake Fluid Castrol Response Super Dot 4

Torque Figures

Description	Nm.	lb. / ft.
Modulator to Bracket	5	4
Modulator / Bracket to body	9	7
Brake hose unions	17	13
	14	10.5



Brake Intervention

This function operates by increasing the pressure in the brake caliper of the slipping wheel, by closing the separation valve and the inlet valve of the non-slipping wheel and running the modulator pump. This takes fluid from the fluid reservoir via the non-actuated master cylinder and pressurizes the brake caliper. The pressure is modulated at the caliper via the inlet and outlet valves to achieve the desired wheel-slip target to maximize traction.

Maintenance

ABS Modulator - Remove and Install

Repair Operation Time (ROT)	
Item	Code
ABS Modulator - Remove and Install	06.09.AA

Remove

WARNING
BRAKE FLUID IS POISONOUS.
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WARNING
HYDRAULIC FLUID ABSORBS WATER VAPOUR. ONLY USE BRAKE FLUID FROM NEW CONTAINERS WHEN YOU FILL THE BRAKE FLUID RESERVOIR. IF YOU DO NOT, IN THE FLUID CAN CAUSE THE PERFORMANCE OF THE BRAKES TO DECREASE.

Caution
Do not let brake fluid touch the vehicle paint work. If you do the paintwork can be damaged. Flush all spilled brake fluid from the paintwork with water.

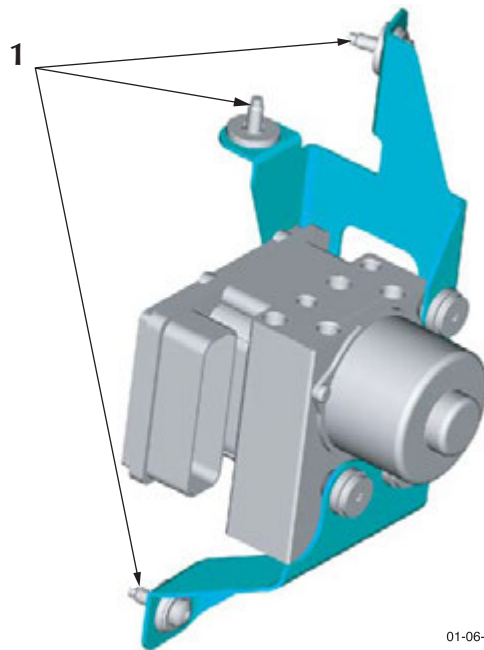
Note: Put absorbent cloth around the brake fluid reservoir filler neck to absorb spilled brake fluid.

1. Disconnect the vehicle battery.
2. Raise the vehicle and make it safe.
3. Remove the four road wheels.
4. Remove the dust caps from the four brake caliper bleed nipples .
5. Put a container in position under the rear left-side caliper to collect brake fluid.
6. Connect a bleed hose to rear left-side caliper.
7. Open the bleed nipple.
8. Put a container in position under the front left-side caliper to collect brake fluid.
9. Connect a bleed hose to front left-side caliper
10. Open the bleed nipple.
11. Operate the brake pedal more than 60 mm and install a pedal clamp to hold it.
12. Tighten the two bleed nipples.
13. Disconnect the two bleed hoses.
14. Remove the two fluid containers.
15. Install the two dust caps.
16. Remove the five or six screws that attach the rear half of the front left wheelarch liner.
17. Remove the self-tapping screw that attaches the rear of the wheelarch liner into the wheelarch.
18. Move the wheel arch liner to get access.

19. Disconnect the electrical connector from the modulator.

Caution
Seal all pipe ends and open ports to prevent contamination.

20. Put a label on each brake pipe union for the assembly procedure.
21. Loosen and disconnect the six brake pipe unions from the modulator. Install plugs into the modulator and the pipe connections.
22. Remove the three M8 Torx-head screws (1) that attach the modulator mounting bracket to the body.



01-06-026

23. Remove the modulator.
24. Remove the three M6 Torx-head bolts that attach the modulator to the mounting bracket. Remove the mounting bracket from the modulator.

Installation

1. Install the modulator onto the mounting bracket.
2. Install and torque the three M6 Torx-head bolts.
3. Install the modulator to the body.
4. Install and torque the three M8 Torx-head screws.
5. Remove the sealing plugs.
6. Install and torque the six brake unions to the modulator.
7. Connect the electrical connector to the modulator.
8. Put the wheel arch liner back in the correct position.
9. Install the self-tapping screw that attaches the rear of the wheelarch liner into the wheelarch.
10. Install the five or six screws to attach the wheel arch liner.
11. Bleed the braking system (Refer to 'Brake Bleeding - AMDS', page 6-7-3).
12. Install the road wheels.

13. Lower the vehicle.

WARNING
BEFORE YOU DRIVE THE VEHICLE, OPERATE THE FOOT BRAKE PEDAL 2 OR 3 TIMES TO MAKE SURE THAT THE FOOT BRAKE OPERATES CORRECTLY. YOU MUST OPERATE BRAKE CALIPER PISTONS TO CLOSE THE SPACE BETWEEN THE BRAKE PADS AND THE DISC.

