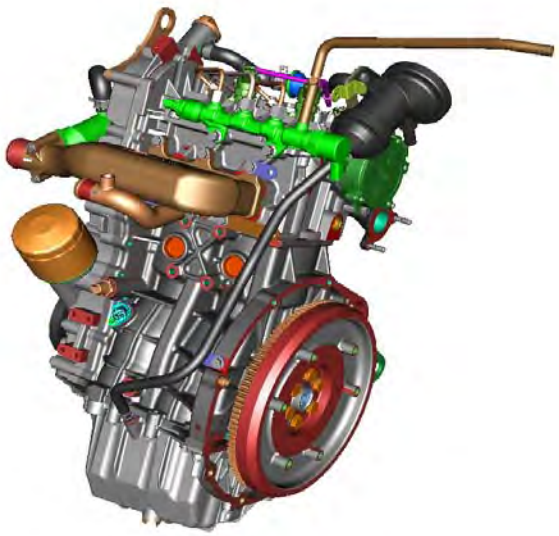
Main Contents…

ENGINE

BS III

BS IV



A belt rib begins separating from the joined strands. If left unattended, the cover will often separate, causing the belt to loosen.

Uneven rib wear

Belt shows damage to the side with the possibility of breaks in the tensile cord or rough edged ribs. A thumping noise may also be heard when running.

Misalignment

Sidewalls of the belt may appear glazed or the edge cord may become frayed and ribs removed. A noise may result. In severe cases, the belt can jump off the pulley.

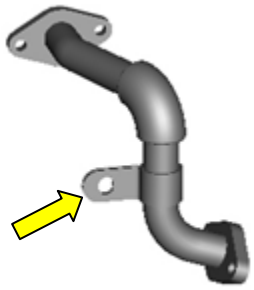
Chunk-out

Pieces or chunks of rubber material have broken off from the belt. When chunk-out has occurred, a belt can fall at any moment

Gravel penetration

Small pinholes are visible on the backside of the belt. Bumps may be visible and the fabric around the holes can be frayed.

Piling



4. Remove the EGR pipe.
5. Remove the two gaskets, one each at exhaust manifold end and EGR valve end.

INSTALLATION

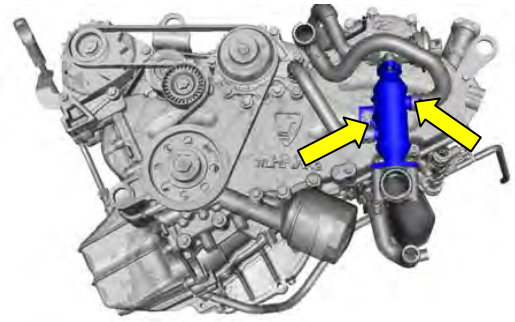
> **NOTE**
>
> Access for installation is the same as that for removal

1. Install the two new gaskets one each at EGR valve end and at exhaust manifold end.
2. Install the EGR pipe and tighten the four mounting bolts, two each at EGR valve end and at exhaust manifold end, to **25 Nm**
3. Install the clamp mounting from the front cover to the EGR pipe
4. Start the engine and check for any exhaust gas leak.
5. Fit the co-driver seat back in its position.

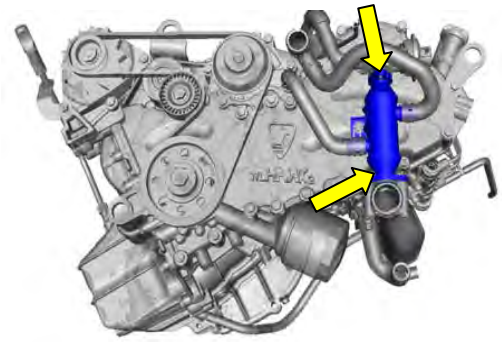
> **⚠CAUTION**
>
> - *Always replace with new gaskets whenever EGR pipe is removed and re-assembled.*
> - *Use recommended rust removing solution if EGR pipe mounting bolts are found jammed.*

EGR Cooler (Applicable for BSIV)

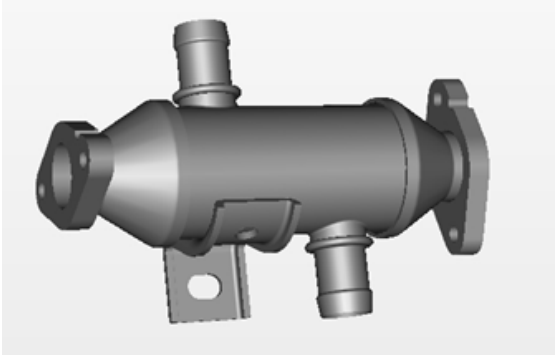
1. Release the co-driver seat locks and hang the co-driver seat assembly.
2. Remove the coolant hoses from the EGR cooler.

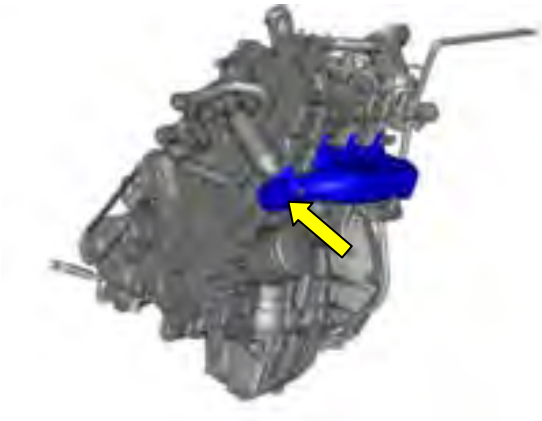


3. Remove the four mounting bolts two each at the EGR valve end and at intake manifold end.

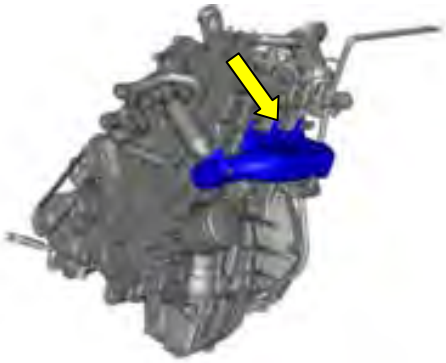


4. Remove the EGR cooler.

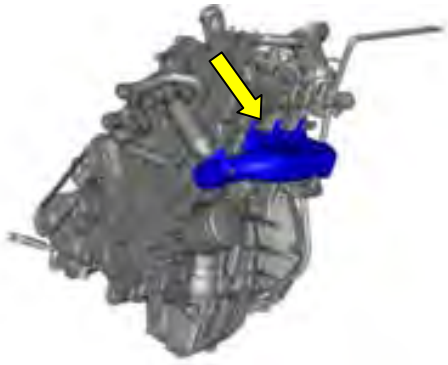




3. Loosen and remove the two mounting bolts of the EGR cooler on the intake manifold.
4. Remove the gasket.
5. Remove the five mounting bolts of the intake manifold on the cylinder head.



6. Remove the intake manifold.
7. Remove the gasket.



INSTALLATION

NOTE

Access for installation is the same as that for removal

1. Refit new intake manifold gasket.
2. Install the intake manifold and tighten the mounting bolts to **25 Nm**
3. Refit new EGR valve gasket.
4. Install the two mounting bolts that fasten the EGR valve and intake manifold to **25 Nm**
5. Install the coolant hose on the intake manifold and tighten the clip.
6. Connect the coolant temperature sensor connector.
7. Top up the coolant and check the coolant level
8. Start the engine and check for any coolant or smoke leaks.

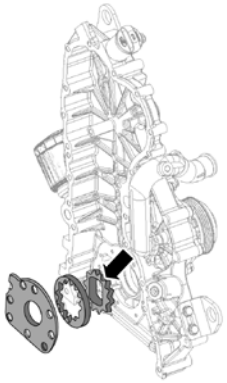
EXHAUST MANIFOLD (BS III Model)

REMOVAL

1. Release the driver seat locks and hang the driver seat assembly.

   Get the access through the driver seat opening

2. Loosen and remove the three nuts of the exhaust pipe mounted on the exhaust manifold.



3. Remove the pump retainer plate.
4. Remove the external gear.
5. Remove the internal gear.

INSTALLATION

NOTE

Access for installation is the same as that for removal

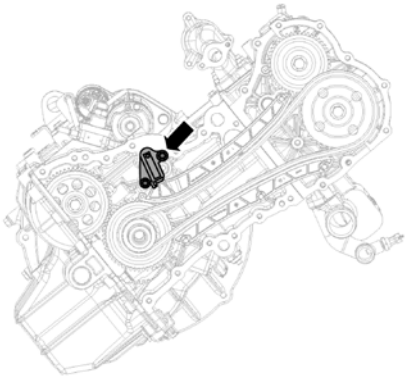
1. Install the internal gear and external gear of the oil pump
2. Install the retainer plate and tighten the mounting bolts
3. Install the front cover assembly.
4. Start the engine and check and confirm that the engine oil pressure is normal

CHAIN ASSEMBLY

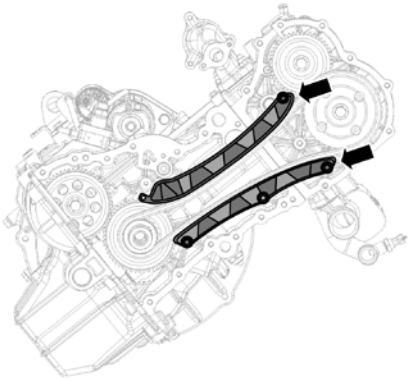
REMOVAL

Get the access from below the vehicle

1. Raise the vehicle with suitable support
2. Remove the engine front cover.
3. Remove the hydraulic tensioner.



4. Remove the circlips and remove the remove the chain guides.



5. Loosen the cam sprocket mounting bolt
6. Remove the chain assembly

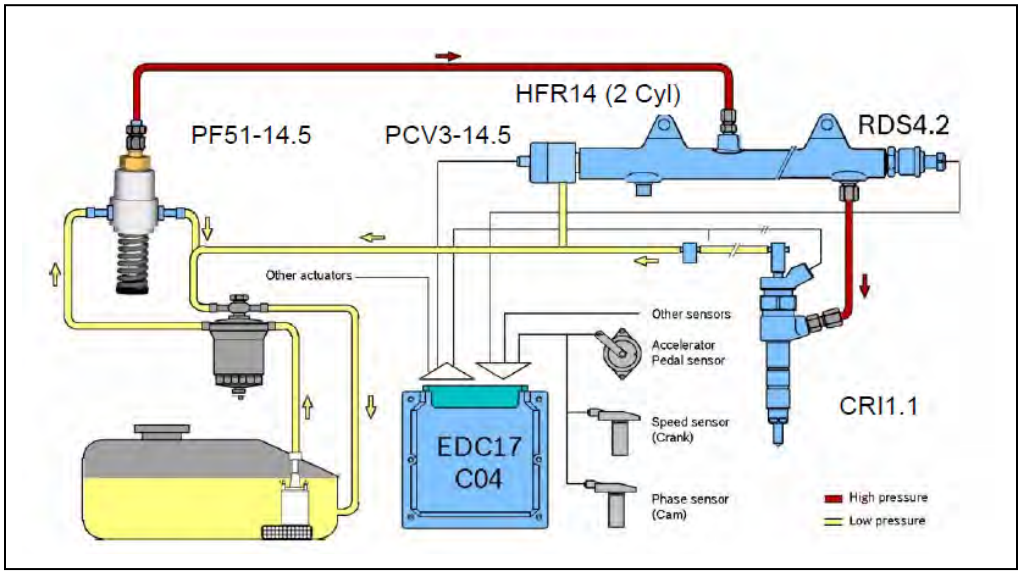
INSTALLATION

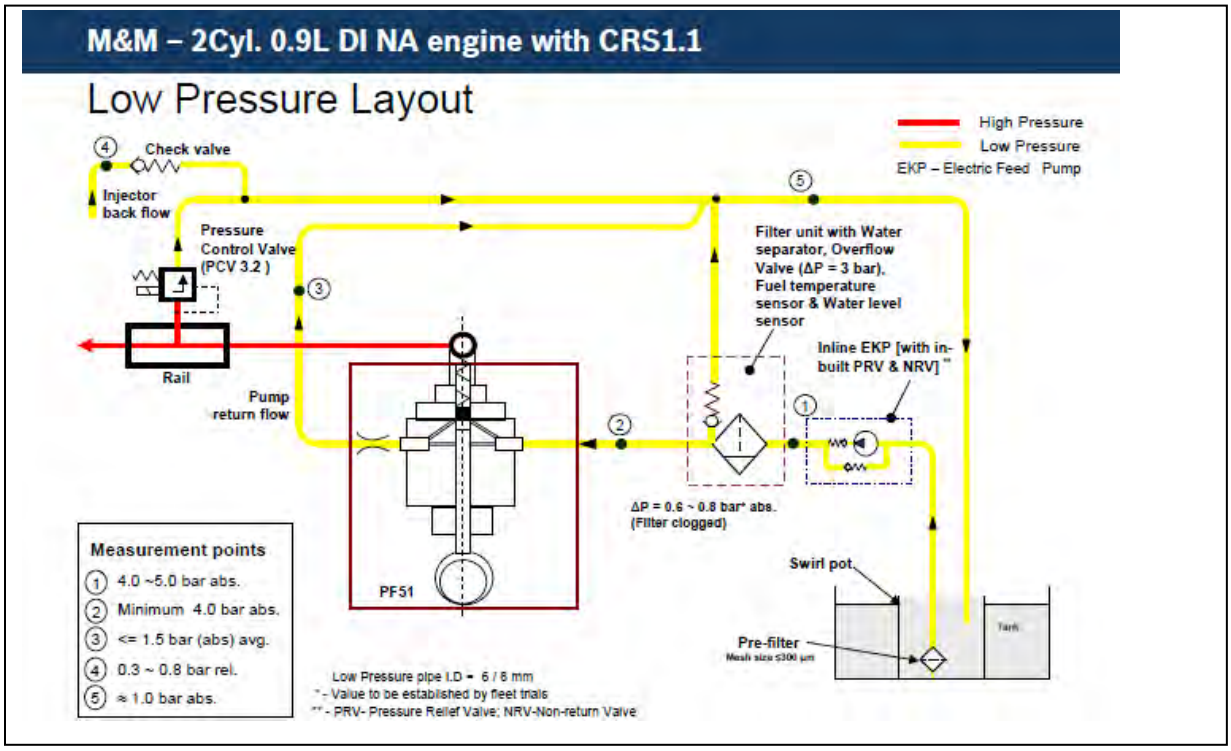
NOTE
Access for installation is the same as that for removal

1. Install the chain assembly
2. Tighten the cam sprocket mounting bolt to **85-95 Nm**
3. Install the chain guides on both the sides and fix the circlips

OPERATION, DIAGNOS.IS AND TROUBLE SHOOTING

FUEL SYSTEM





	7. Gas leak between EGR pipe joints 8. EGR pipe leak. 9. Fuels supply line kink creating restriction. 10. Compression leak. 11. Jammed piston rings 12. Check CR system	6. Replace gaskets. 7. Change the gasket or the hose. 8. Replace the pipe. 9. Remove the restriction. 10. Check compression. 11. Replace piston rings. 12. Refer the diagnos.tic manual
Noisy engine & high smoke (White/ Grey)	Cylinder head gasket defective. Worn out or damaged valve seats. Leaking injector holder	1. Replace the cylinder head gasket. 2. Lap the valve seats or regrind. 3. Tighten the injector holder.
Black smoke.	1. Air intake restricted. 2. Defective injectors 3. EGR valve stuck open 4. Restricted exhaust system. 5. Gas leak between exhaust manifold & cylinder head. 6. Worn out rings, parent bore & valves. 7. Improper vacuum connection for EGR valve	1. Check for hoses, replace air cleaner element. 2. Check injectors. 3. Check the EGR valve 4. Remove restriction or replace parts. 5. Replace manifold gasket or parts. 6. Overhaul engine. 7. Check & correct
Excessive oil consumption	1. Clogged air filter element. 2. Restriction in crankcase breather. 3. Damaged oil separator 4. Worn out rings, liners, and valves. 5. External oil leaks 6. Leakages through inlet manifold mounting face allowing dust entry. 7. Bend/kink in any of the oil return pipe's/vacuum hose	1. Replace element. 2. Locate & remove restriction. 3. Check the crankcase ventilation & rectify. 4. Replace the oil separator 5. Overhaul engine. 6. Stop the external oil leakages. 7. Change the manifold gasket or replace the manifold. 8. Remove the bend or kinks.
Blue smoke.	1. Clogged air filter element. 2. Excess oil. 3. Wear in valve seal. 4. Wear in piston rings & liner.	1. Replace element. 2. Locate & remove restriction. 3. Locate the leaks, change hose or clamp if required. Correct the oil level. 4. Check the valve stem seals, replace if required. 5. Check the compression pressure, replace rings & liners.
White smoke.	1. Improper timing 2. Defective cylinder head gasket. 3. Restriction in fuel supply	1. Check sprockets & chain for wear. Rectify 2. Replace the cylinder head gasket. 3. Remove the restrictions.

A noisy gearshift operation can be due to clutch not getting disengaged completely.

4. CLUTCH HOUSING MISALIGNMENT

The clutch housing has to be aligned with the engine so that the input shaft is aligned with the crankshaft. Absence of this alignment results in clutch noise, incomplete release of the clutch plate. It can normally be judged by uneven wear of the finger and pilot bearing. In severe case it can also damage the splines of the input shaft and clutch hubs well as the clutch splines

Normally the clutch housing misalignment is a result of:

- Incorrect seating on the engine/transmission.
- Missing alignment dowel holes.
- Loose or missing mounting bolt.
- Mounting surfaces that are damaged/ not parallel.

5. CLUTCH NOISES

Squeals and growls usually are caused by worn or seized bearings. Chirping noises are most often caused by vibration somewhere in the clutch actuator mechanism.

Causes of internal clutch noise include:

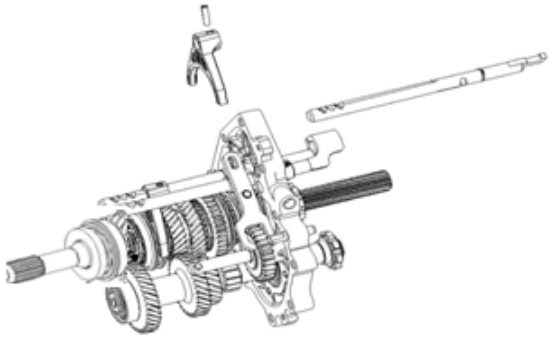
- Worn or defective input shaft bearing;
- Defective or misaligned release bearing;
- Worn, misaligned or improperly lubricated pilot bearing/bushing;
- Worn, bent or improperly lubricated release fork;
- Worn input shaft;
- Improper disc installation;
- Misalignment;
- Damaged bearing retainer;
- Loose flywheel bolts; or
- Damaged disc splines.

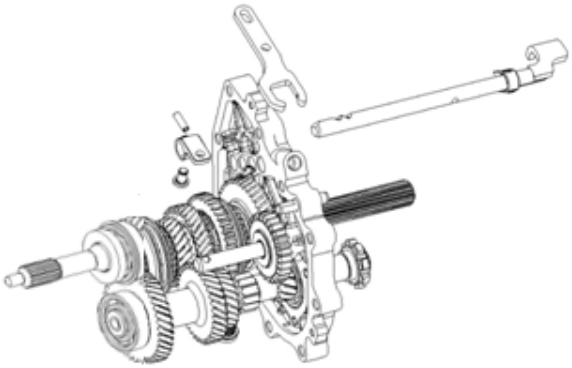
Possible external causes of clutch noise include:

- Incorrect release system adjustment;
- Worn driveshaft components;
- Worn engine or transmission mounts; Broken damaged clutch cable
- Worn or improperly lubricated clutch pedal components.

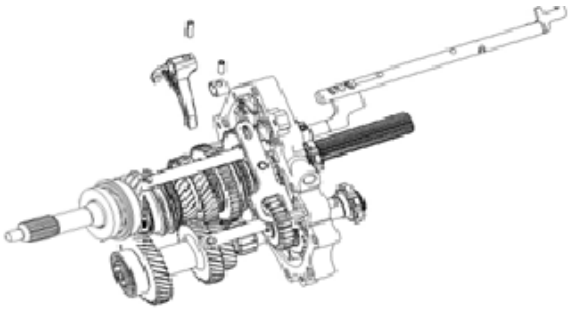
To find out what is causing the noise, set the parking brake, place the vehicle in neutral and start the engine.

- If you hear growling or grinding noises when the clutch is engaged, the cause is the transmission input shaft bearing.
- A squealing sound that occurs when the clutch pedal is depressed and held is usually caused by a bad pilot bearing or bushing.





17. Remove the roll pins of 3rd-4rth fork , 3rd-4th bush of the shift rail .Remove the 3rd-4th shift rail , bush and fork



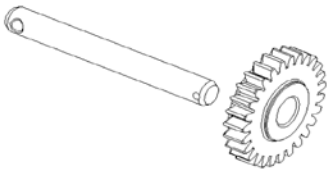
18. Remove the interlocking pin from the 3rd- 4th rail

19. Remove the reverse lever circlip and remove the reverse lever.

20. Remove the roll pin of the reverse shift rail assembly and remove the reverse shift rail

21. Remove the interlock balls from the intermediate plate.

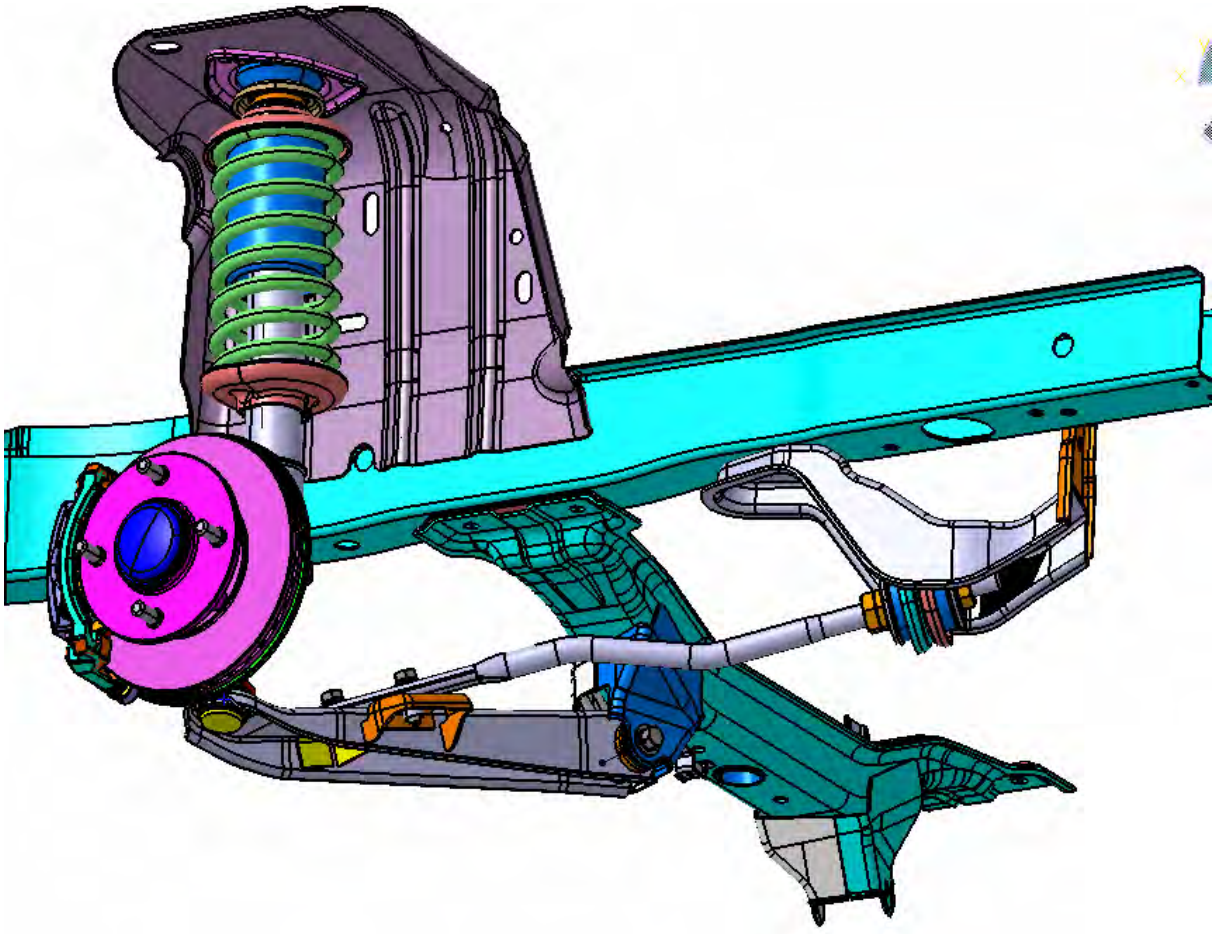
22. Remove the idler gear and idler gear shaft



23. Loosen and remove the mounting bolts of rear bearing retainer plate from the intermediate plate.

24. Remove the rear bearing retainer plate.

FRONT SUSPENSION



2. Push the top end of the shock absorber down and pull up four or five times

3. Movement in each stroke should be smooth and even.

4. In case of abnormal performance or failure, replace the shock absorber.

NOTE

Shock absorbers are neither refillable nor adjustable.

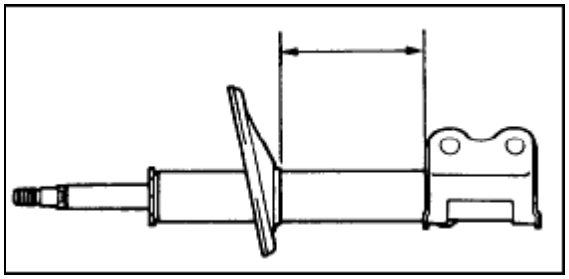
⚠CAUTION

The shock absorber bushings do not require any type of lubrication. Do not lubricate to arrest bushing noise or squeal. Grease and mineral oil based lubricants will deteriorate the bushings.

NOTE

While disposing the failed shock absorber, follow the below mentioned disposal procedure:

- *Fully extend the shock absorber rod*
- *Using a drill, make a hole in the cylinder position as shown to discharge oil from the cylinder*



MCPHERSON STRUT

ASSEMBLY

1. Install bump stop (4) on the piston rod.

2. Install coil spring (2) to the shock absorber. Ensure to position the lower end of the coil spring into the bottom spring seat of the shock absorber.

3. Using spring clamps, compress the coil spring

4. Install dust cover (3) on coil spring

5. Install spring seat upper (5) on coil spring

6. Install strut bearing (6) and bearing top seat (7)

7. Install rubber dampener (8) into the top plate assembly (9) and cup (10) as shown below

8. Install the top plate strut assembly (with rubber dampener and cup) with the hole facing towards outside of the vehicle.

DESCRIPTION AND OPERATION

BRAKE SYSTEM

The brake system is used to reduce vehicle speed and control the vehicle by applying force against the direction of rotation of the road wheels.

This vehicle is equipped with vacuum assisted hydraulic braking system. Brake system transfers the pedal effort applied by the driver on the brake pedal to the brakes at each wheel through pressure in hydraulic system. Brake system is assisted by vacuum brake booster that multiplies the pedal force and applies to the hydraulic system. Parking brake operates on the rear wheels and is engaged or disengaged using a hand operated control lever.

This brake system is of 'H' split type with front disc brakes and rear drum brakes. The front disc brakes are with single pot calipers and ventilated rotor with angular vanes. Because of angular vanes design, LHS and RHS rotors are different and are not interchangeable. The rear drum brakes are with self-adjusting mechanism that would automatically adjust the gap between brake liner and brake drum depending on wear of brake liner and drum. In an effort to support the cause for reducing environmental pollution, both front disc pads and the rear brake liners are made of non-asbestos material.

BRAKE LINES

Brake lines have combination of steel tubes and rubber hoses. These tubes and hoses carry pressurized brake fluid from Tandem Master cylinder to wheel cylinders while brake application and return the fluid back to Tandem Master cylinder on brake release.

FRONT DISC BRAKES AND CALIPERS

The Disc Brake consists of a carrier and caliper body. The carrier is mounted on the knuckle by means of two bolts and the caliper housing slides on two guide pins also called as sliding pins which are fixed on the carrier. Two pads, one on the piston side and other on the opposite side facing each other are guided over the anti rattle springs that are fitted on the carrier slot.

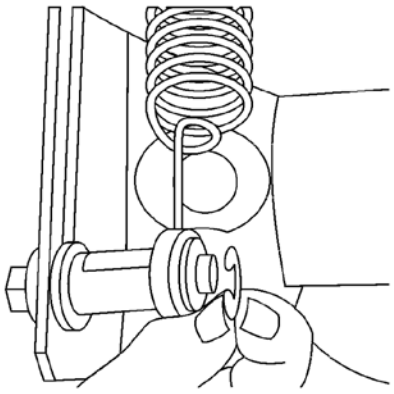
The sliding pins are well protected from dirt, water entry and corrosion by means of boot, guide pin and thereby avoiding improper sliding load caused due to dust entry. The bore of the caliper housing accommodates a piston and a piston seal. The seal is fitted in the groove in the bore and the piston slides through the seal with certain amount of interference. Dust or water entry inside the bore is protected by boot and piston.

When the brakes are applied, the hydraulic pressure from the master cylinder makes the caliper piston to move forward and thereby the piston side pad moves forward, until it touches the rotating disc face.

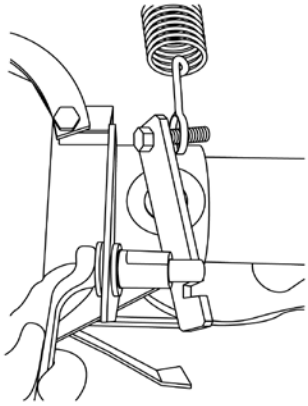
PROCEDURE FOR FITTING AND SETTING THE LSPV VALVE

Mount the LSPV valve on the bracket in the chassis. Fit all the hydraulic connections

1. Remove the clip. Remove the Washer



2. Slide the control spring out from the bolt. Put the projecting pin of the tool in the eye of the spring & allow the tool to hang freely.



3. Loosen the nut the M8 Hex Nut (Use 12 Ring Spanner) during removal hold the other end with 14 Spanner & move the bolt in such a way that the bolt is aligned & enters in the slot on the tool.
4. Retighten the nut in such a way that the bolt is in the correct position as indicated by the tool.
5. Remove the tool
6. Pull down the spring and locate the eye in the bolt. Ensure that the spring is sitting properly in its position. Fit the washer & the 'e' clip.

⚠CAUTION

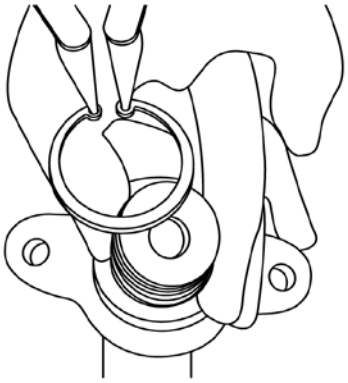
Never lubricate pad seating areas; it may lead to jamming of pads.
After assembly of pads, apply brake pedal 5 to 6 times in static condition so that the pads align properly.
Avoid heavy and continuous braking during road test and during initial 200 kms of run after fitting new pads so that the new pads bed in properly

REMOVAL AND INSTALLATION

FRONT DISC BRAKES AND CALIPERS

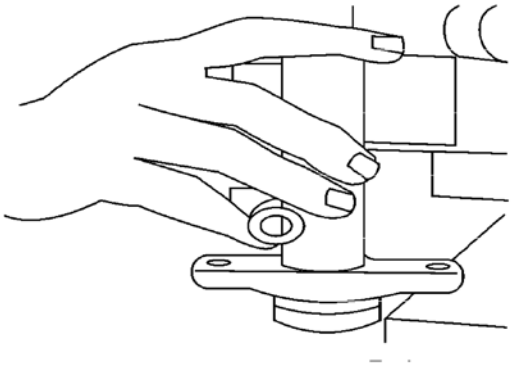
PRE REMOVAL STEPS

8. Due to the spring force, after removing circlip, Primary Piston Assembly would come out of

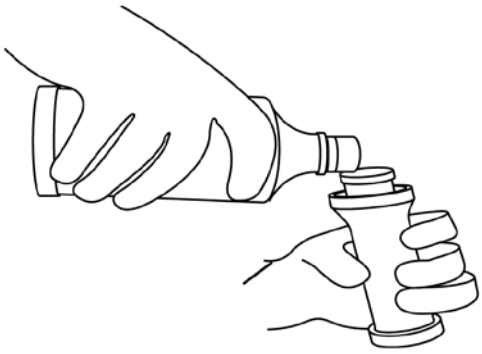


master cylinder.

9. Remove the Secondary Piston Assembly by tapping the TMC at flange, gently on a wooden block



10. Clean the Master Cylinder body and internal parts with fresh brake fluid and ensure these parts are kept in a clean tray or on a clean sheet of paper



⚠CAUTION

Discard all used rubber parts. Never use any mineral oil base fluids like Kerosene, Diesel, Petrol, Thinner etc. for cleaning of the Brake Aggregates and their child parts.
Ensure visually that the inlet ports (compensatory ports and inlet ports) are clear. Do not poke these holes with sharp objects. Clean them only with dry compressed air.

⚠CAUTION

If contamination is observed in the removed seals (seals would have swollen and the size would have enlarged compared to the new seals) check all rubber parts in the brake system including rear wheel cylinder seals, front caliper seals and the front and rear rubber hoses for swelling, if swelling is observed must be discarded and the entire system to be flushed with new brake fluid.

INSPECTION OF TMC AND INTERNAL PARTS

Examine visually, bore for the TMC, for scoring, ridging, wear or pitting. In absence of these, the TMC can be rebuilt with the genuine spare parts kit. If in case of slightest doubt on the bore condition, like deep groves or score marks in the bore then it should