General Information

Introduction

This workshop manual is designed to assist technicians to repair and maintain FUSO vehicles. Even before when a technician proceed to repair or maintain the vehicle or any of the aggregate it is important to know safety related aspects and information to perform the activity. This section of shop manual provides an insight about various safety signs used and general information on removal and installation, disassembly and assembly, inspection, adjustment and trouble shooting.

Important Instructions

Individuals who undertake repairs should have essential skills or training. Any repairs related to safety or critical items such as the steering, brakes, suspension or the supplementary restraint system should be carried out by a FUSO dealer/ certified technician only. Following correct service methods and repair procedures are essential for the safe, reliable operation of all motor vehicles as well as the personal safety of the individual while carrying out the work. This manual cannot possibly predict all such variations and offer warnings or cautions as to each. Deviation from the instructions provided in this manual could lead to personal injury or damage to the vehicle.

Notice

"NOTICE" is used to highlight information that are important to the technician to properly complete the service procedure.

CAUTION

"CAUTION" used with safety alert symbol indicates a potentially hazardous situation which if not avoided may result in minor or moderate injury.

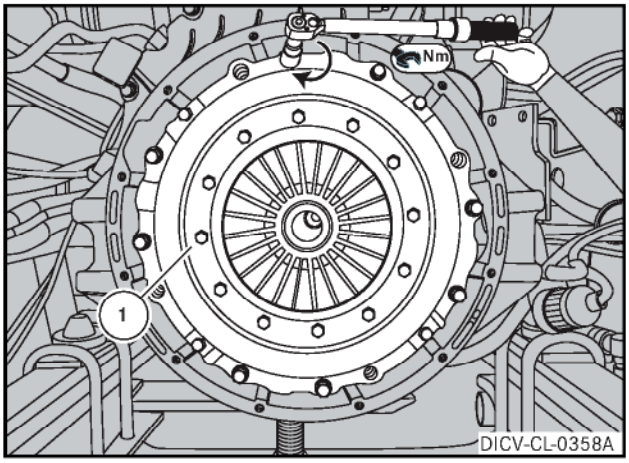
WARNING

"WARNING" indicates a potentially hazardous situation which if not avoided could result in death or serious injury.

The danger, warning, caution and notice are included wherever it is required. Anyone using the service procedures or tools must make sure that neither personal safety nor vehicle safety is compromised.

Illustration Callout and Indicator Line

Callouts and Indicator lines are inserted into an illustration, when some details or part needs to be emphasized with action.



Contents in the manual

This manual contains the procedures for performing the required service operations. The procedures are separated into the following important topics.

- Model and Serial Descriptions
- Technical Specification
- Construction Details

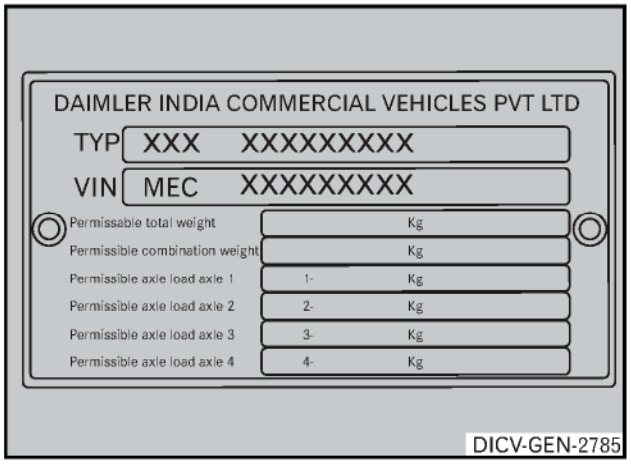
Product Information

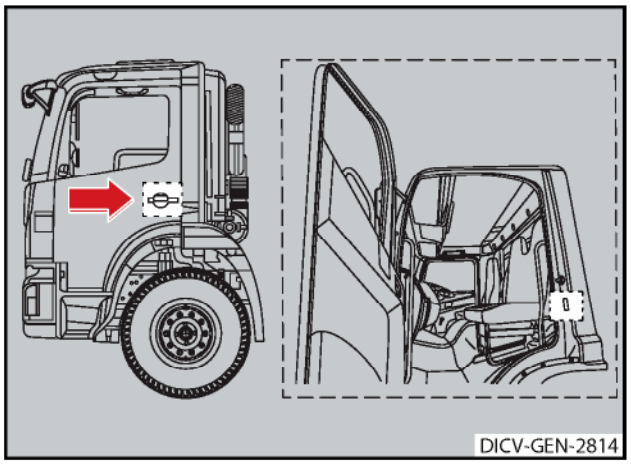
Vehicle Identification

Vehicle Identification Number

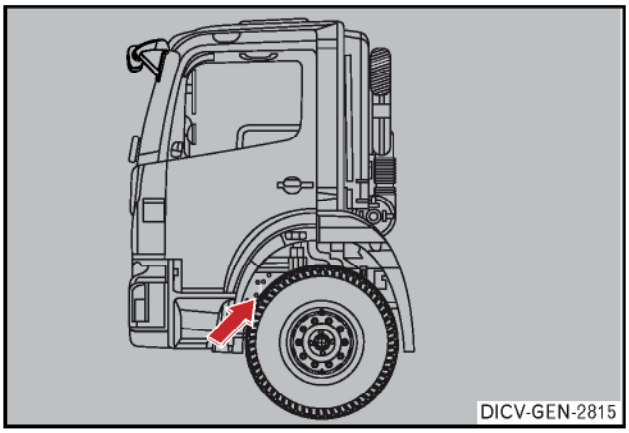
The VIN - Vehicle Identification Number is fixed in all vehicles. The VIN is unique for every vehicle.

VIN plate is fitted on the closing pillar of the codriver door.

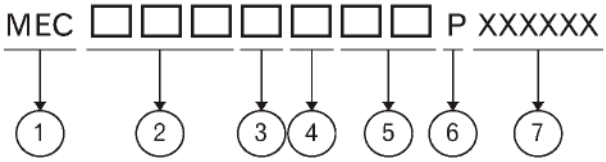




The VIN is also punched on the left side of the frame which can be viewed from the gap between the front left side tyre and mudguard.



How to read Vehicle Identification Number (VIN)

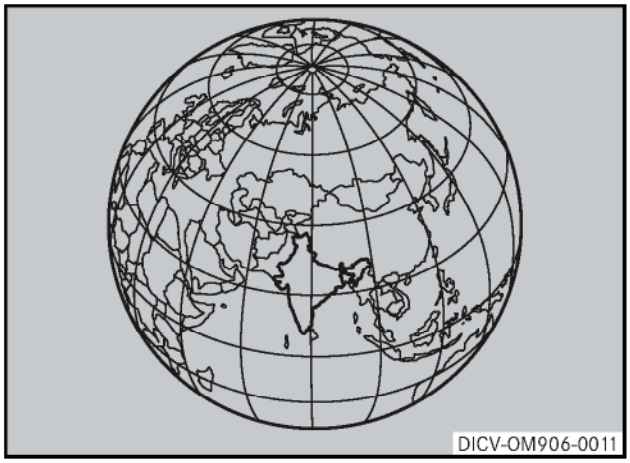


1	WMI (World Manufacturer Identifier) code
2	Model
	241:FJX3WK2L 6 x 4 Wheelbase 4950 mm
3	Engine type & power
	2: 6S20, 205 kW
4	Type of drive
	B: Right-hand drive R: Left-hand drive
5	Month/ Year of manufacturing
6	Plant code
7	Vehicle serial number

Environmental Safety and Disposal Procedure

Introduction

Environmental safety should be considered before disposing any waste component in order to avoid land/air/water pollution and health hazards. The aggregates should be operated, serviced and repaired in environmental friendly responsible manner.



The procedures associated with aggregates maintenance and repair, may cause physical or health hazards and other risks to environment. Precautions should be strictly followed to avoid these hazards.

Environment Care During Operation

The components have been designed and incorporated with certain features considering the environmental care, to ensure environmental compatibility throughout their life cycle.

The following conditions should be adhered during vehicle operation, in order to avoid polluting the environment.

- Do not keep the engine in idle state for long duration.
- During initial warm up of engine ensure that the engine is not in idle speed more than 2 to 3 minutes.
- Switch off the engine during long waiting periods imposed by operations.
- Strictly follow the practical guidance given to the truck operators and drivers, in order to reduce fuel consumption and emission of gases.
- The coolants are biodegradable substances, so carefully dispose the coolants according to waste water disposal regulations.

Environment Care During Service

The technicians can contribute to the environmental protection by handling or maintaining the components in a proactive manner during service and repair.

Ensure that the used components are disposed under the condition of not affecting the environment, surroundings and human beings. It is the responsibility of the end user to identify the hazardous material by reading the label on each product, and to ensure appropriate and legally acceptable method of disposal.

- The technicians must be aware of environmental hazards before overhauling aggregates.
- Carefully dismantle the aggregates after lubricant or coolant draining process, and dispose the waste according to local or government rules and regulations.
- Clean the aggregates in a designated washing area. Carefully dispose empty packaging and used cleaning materials in environmentally responsible manner.
- Do not dispose the parts such as battery, used gaskets, oil containers (empty or with used oil), etc. that are replaceable in the course of regular maintenance, along with the house hold waste.
- Do not use food or beverage container to drain the oil. Failure to follow the instruction may mislead someone to drink the oil by mistake.
- Remove the filter and drain the fuel/oil for 24-hours to ensure that the fuel has been completely removed.
- Spilled Adblue can be flushed away with sufficient water into the sewage system without any problems due to its good biodegradability..

Lubricating System

Item	Description
Engine oil Capacity (max.) Litres	26.30
Engine Oil Filter Capacity (max.) Litres	1
Engine Oil Grade	SAE 15W40
Oil Pressure at Engine Operating Temperature and Low Idle, min. Bar	0.5

Auxiliaries

Item	Description
Alternator - Output Voltage V	28
Starter Motor - Voltage V	24
Starter Motor - Rating Kw	4
Air Compressor cc	318/water cooled
Electrical System V	24

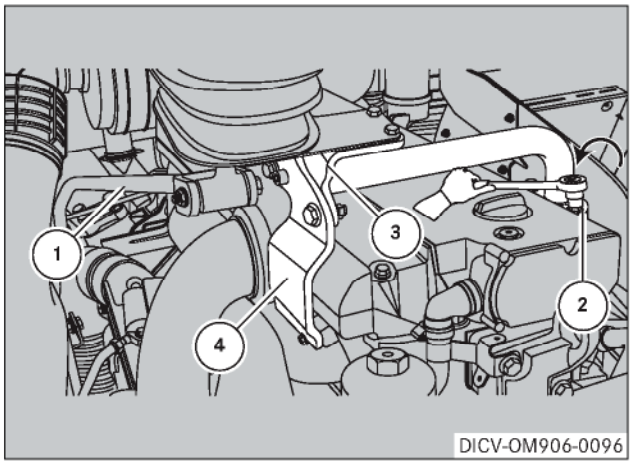
Clutch

Item	Description
Clutch Cover Assembly Clutch type	Dry - Single plate, Hydraulic actuated control with servo assistance
Clutch diameter mm	395
Clutch Disc Facing material	Organic
Facing thickness mm	10.6
Friction contact surface area cm^2	1545
Actuation Actuation type	Hydraulic operated with Pneumatic assistance (Fork operated)
Fluid tank capacity ml	400
Oil Grade	DOT 3
Master cylinder size mm	26.125/35

33. Remove shift linkage (1) from the shift lever and from the transmission. ***(Refer Removal and Refitment of Transmission Assembly from Vehicle)***

34. Remove gear shift lever support bracket on the LHS (2) from the engine using 16mm hexagonal socket and ratchet and on the RHS (3) using 10mm hexagonal socket and ratchet.

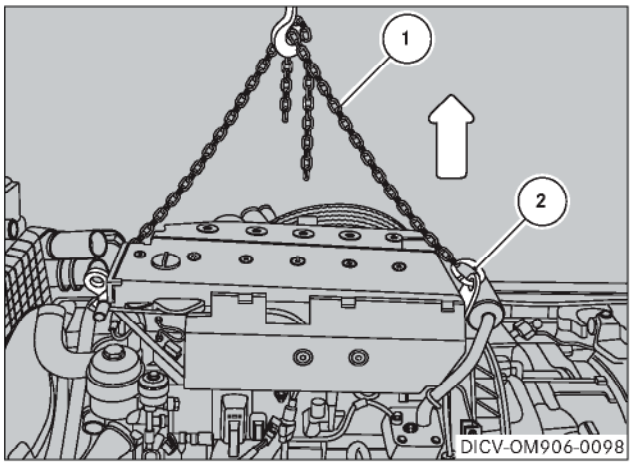
35. Remove gear shift lever bracket (4) along with shift lever assembly by removing the mounting bolt and nut using a 14mm hexagonal socket and ratchet.



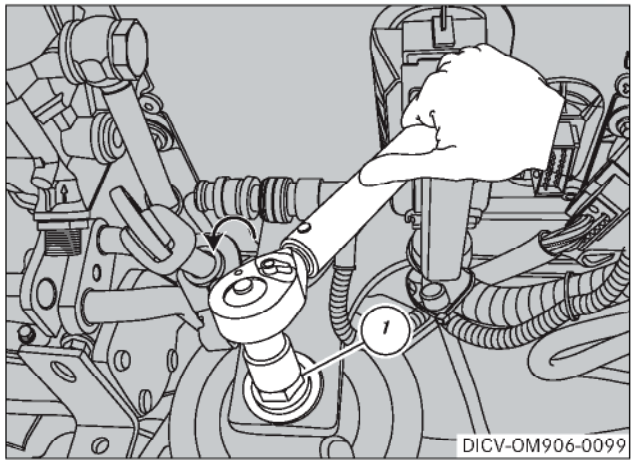
36. Insert chain sling (1) to the engine lifting eye (2).

CAUTION

Ensure the chain sling is properly secured to the lifting eye in the engine.



37. Remove engine mounting bolts (1) from both LHS and RHS of the vehicle using 24mm hexagonal socket and ratchet.

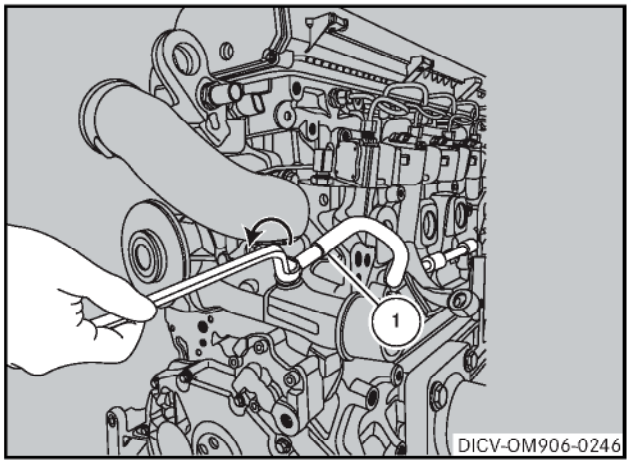


38. Lift engine with clutch cover assembly from the vehicle and place it gently over a stand.

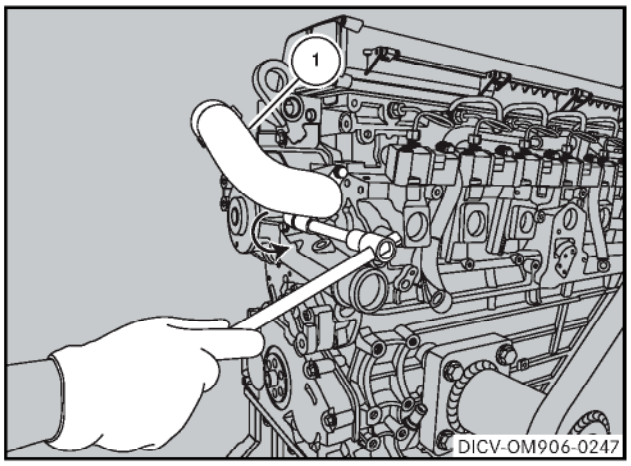
WARNING

Follow caution while lifting the engine using the chain sling to avoid damage to the engine.

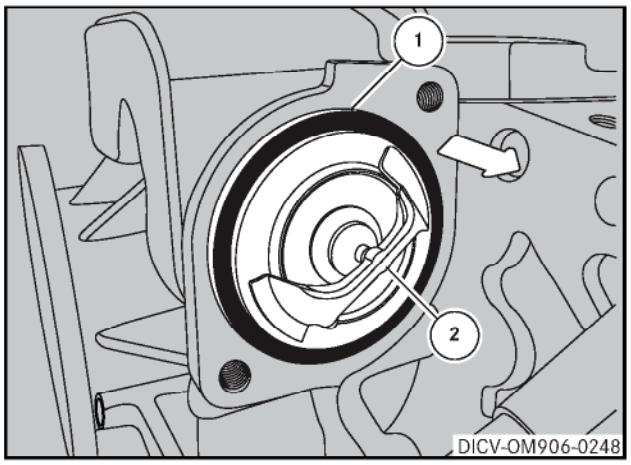
55. Remove coolant outlet hose (1) from air compressor, using 20mm ring spanner from water pump inlet pipe.



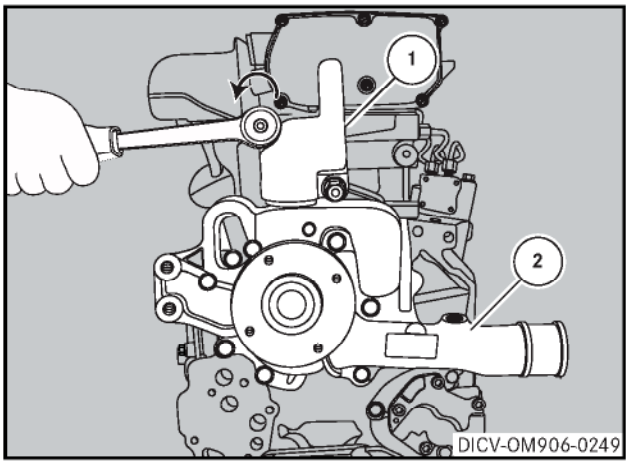
56. Remove coolant outlet pipe (1) from water pump to radiator, by removing the bolts using 13mm hexagonal socket and ratchet from the water pump assembly.



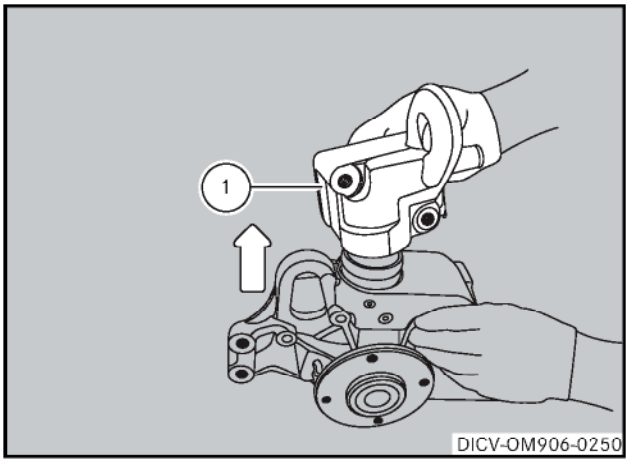
57. Remove thermostat O-ring (1) and thermostat (2) from water pump assembly.



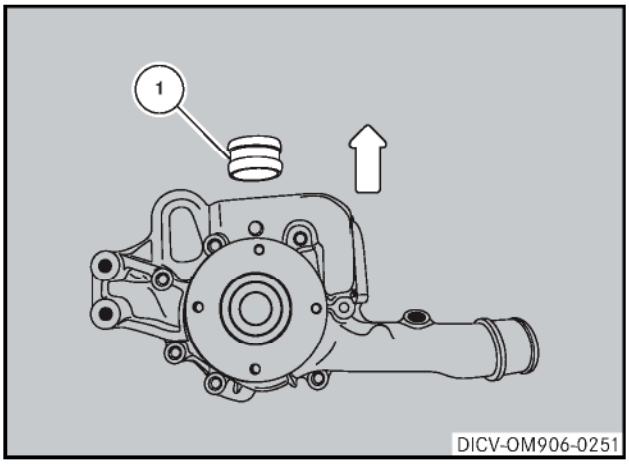
58. Remove the connecting piece (1) and water pump assembly (2) with gasket from cylinder head, by removing the bolts using 16mm and 13mm hexagonal socket and ratchet.



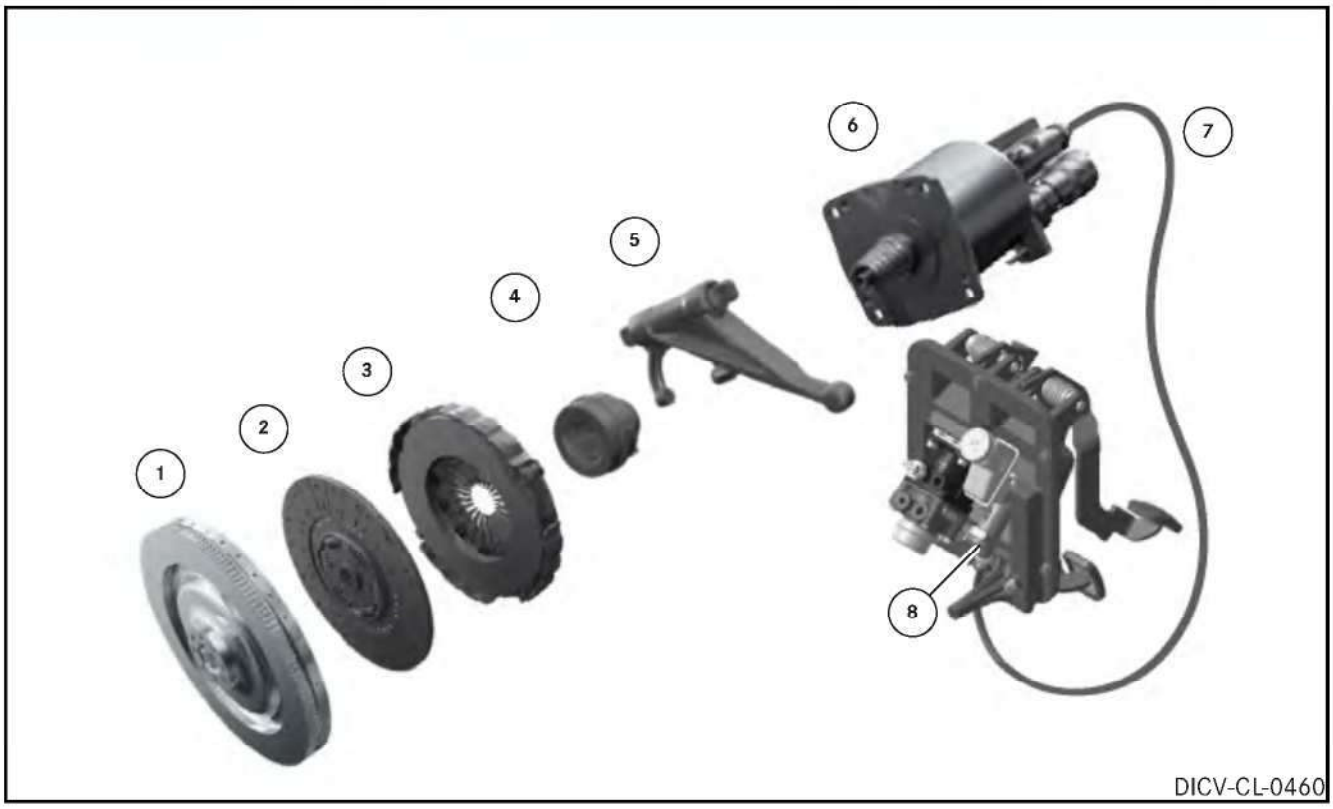
59. Remove the connecting piece (1) from the water pump assembly.



60. Remove rubber adapter (1) from water pump assembly.



3.2 Construction Details



1. Assembly flywheel
2. Clutch disc assembly
3. Clutch over assembly (Clutch pressure plate)
4. Release bearing assembly
5. Release fork and pivot pin
6. Clutch booster
7. Flexible hydraulic hose
8. Clutch master cylinder

Assembly Flywheel

Assembly flywheel acts as a energy storage device. It is mounted to engine and always rotates along with engine crankshaft. The flywheel is having friction face and clutch mounting holes. The friction face provides mounting face to clutch disc assembly. The clutch cover assembly is mounted to the flywheel through the bolts.

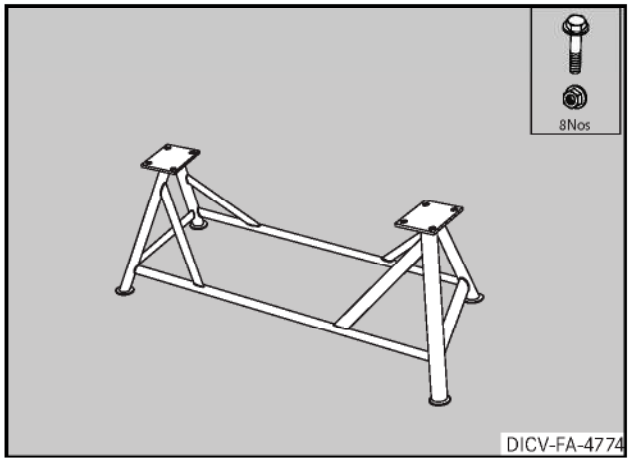
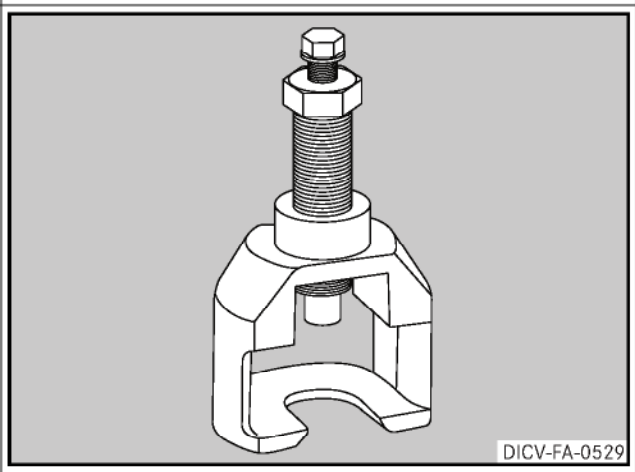
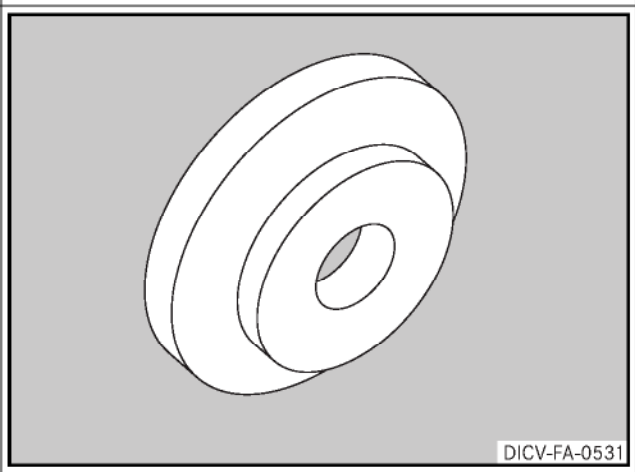
Clutch Disc Assembly

The clutch disc assembly has two sided friction linings and damper set with splined hub. The friction lining has contact interface with flywheel friction face and clutch pressure plate with clamping pressure. The splines are connected to the input shaft (drive shaft) of transmission.

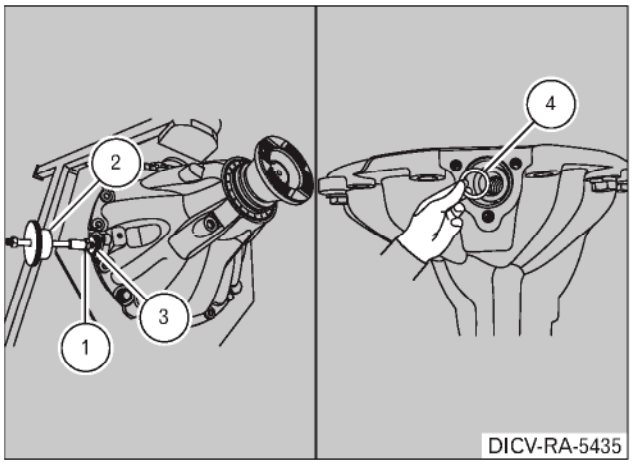
Clutch Cover Assembly (Clutch Pressure Plate)

The clutch cover assembly is the assembly of pressure plate, clutch cover, straps, fulcrum rivets and diaphragm spring. The clutch cover assembly is mounted to the flywheel through clutch mounting bolts. The pressure plate ensures engine torque is transferred through clutch plate to the transmission input shaft. The clutch pressure plate is made up of high quality cast iron to reduce wear on the friction surface. It is designed with sufficient mass to absorb the heat generated during clutch engagement. The drive straps provide lift during disengagement. The diaphragm spring applies the spring pressure on the friction lining of clutch disc assembly through pressure plate. The diaphragm spring fingers have contact with release bearing.

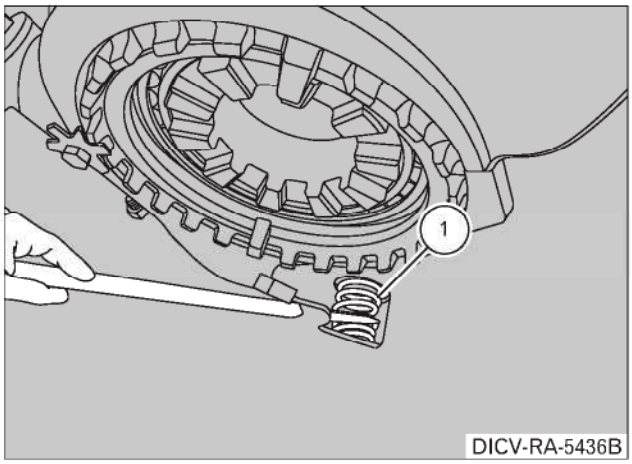
Special Tools

S.No	Description	Part No	Image	Usage
1	**Front axle work stand**	**MX914601 (W090 589 12 31 00)**		Stand required for front axle overhauling/ major repair
2	**Puller - tie rod and drag link**	**MH064531 (W625 589 00 35 00)**		Puller for tie rod and drag link with grease spindle
3	**Pressure plate**	**MX906858 (W090 589 00 25 00)**		To assemble radial seal to knuckle

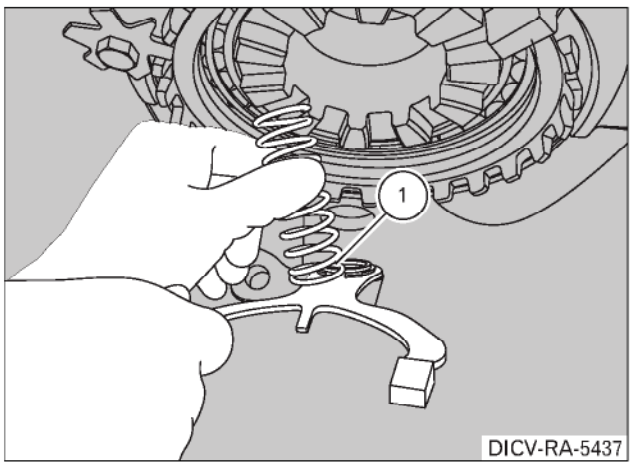
8. Install and tighten **special tool threaded insert MX906869** (1) **and impact extractor – small MX906867** (2) to the piston and remove piston (3) and shim (4) from drive head assembly.



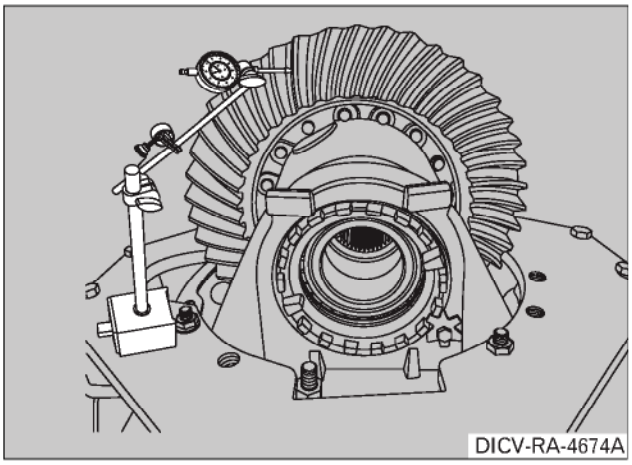
9. Using screw driver to press the spring (1).



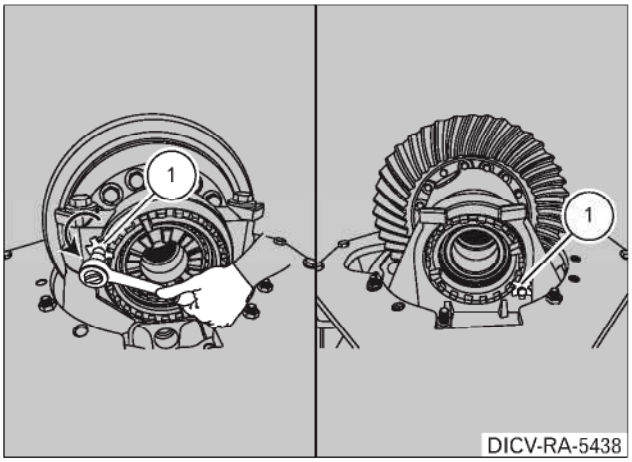
10. Remove the fork and spring (1) from drive head assembly.



11. Check black lash using dial gauge tolerance limit 0.20mm to 0.38mm. Check the tooth contact pattern ***(refer checking the tooth contact pattern procedure).***



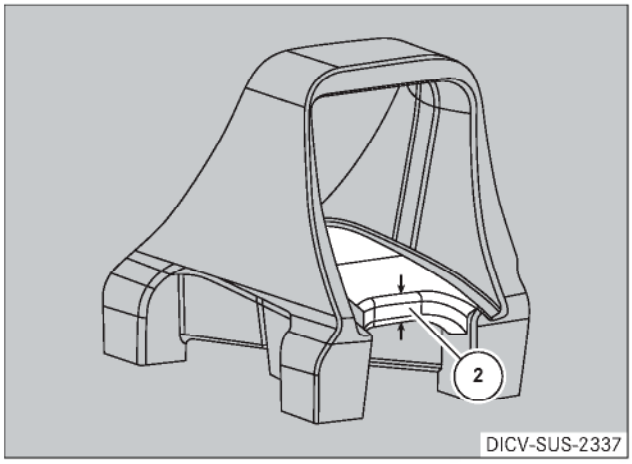
12. Remove adjusting nut retainer plate bolts (1) from both sides bearing cap using 13mm hexagonal socket and ratchet.

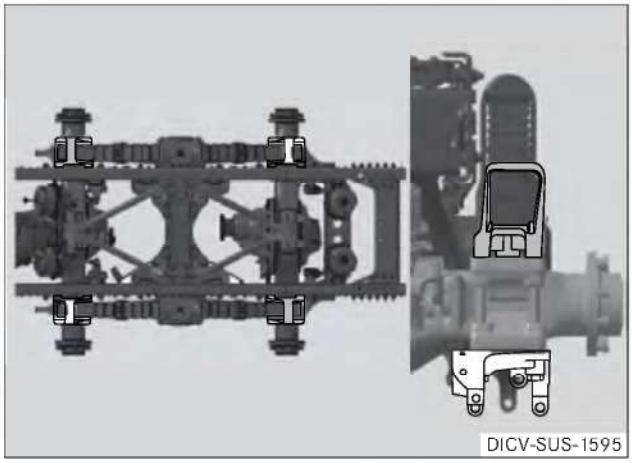


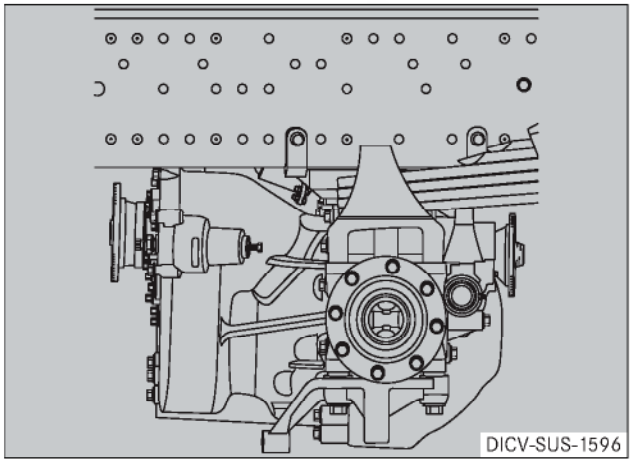
3. Install spring seat to the rear fwd axle and rear rwd axle.

Notice

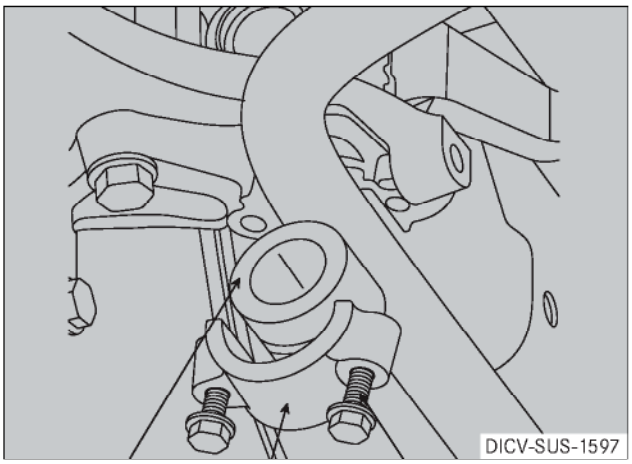
While mounting ensure that the straight portion of the bracket should face towards the frame side and cut mark on the bracket face towards out side.



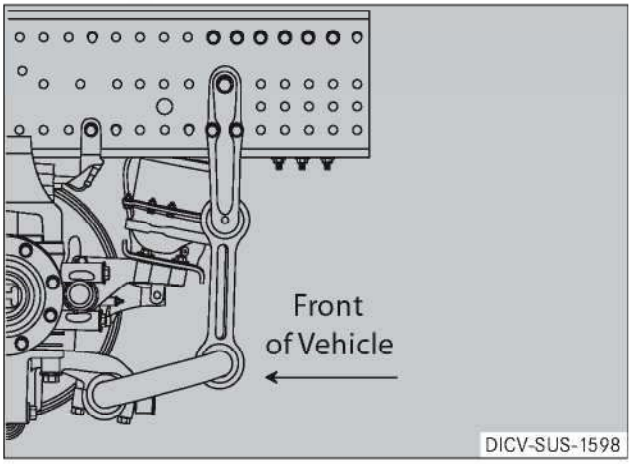




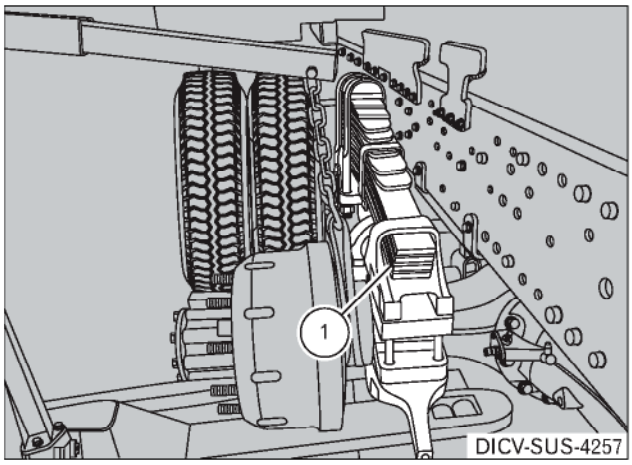
4. Fix the anti roll bar brackets on both sides (LHS & RHS) to the tandem axle and tighten the bolts using 30mm hexagonal socket and torque wrench. Set torque to 540 Nm.



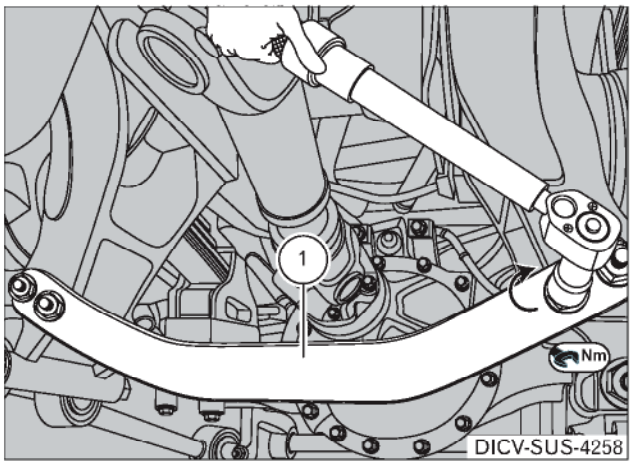
5. Install anti roll bar to both sides bracket on rear rearward axle by tightening the bolts using 18mm hexagonal socket and torque wrench. Set torque to 92Nm.



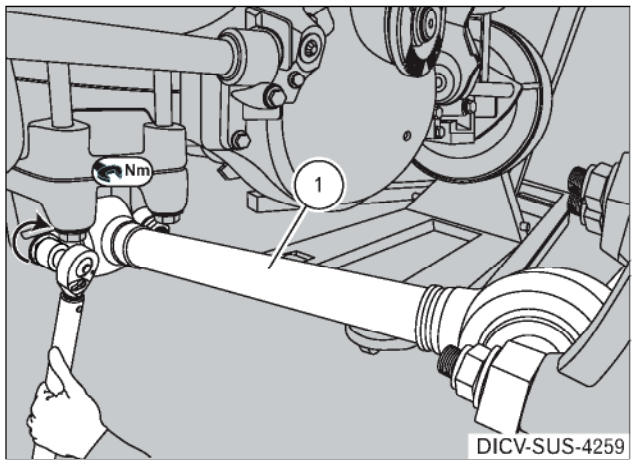
9. Install the spring seat R.H.S (1) and link bracket (2) to the RT2 axle housing by tightening the bolts using 30 mm hexagonal socket and torque wrench. Set torque to 460Nm.



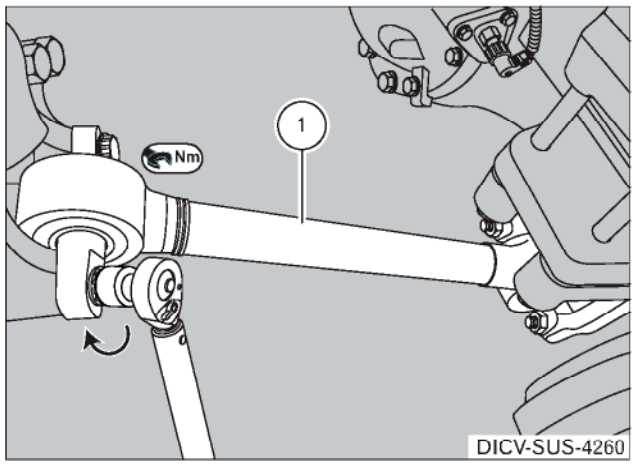
10. Attach the rear cross member (1) to the trunnion ends by tightening the bolts and nuts using 30 mm hexagonal socket and wrench. Set torque value of 420± 90 Nm.



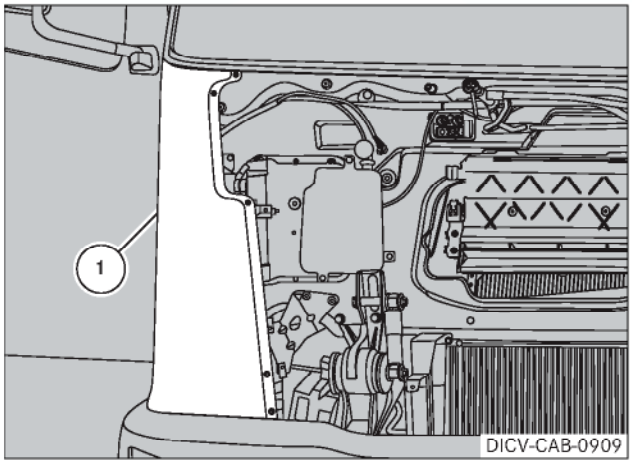
11. Attach the torque rod (1) to RT1 axle spring bracket by tightening the bolts and nuts using 30 mm hexagonal socket and wrench. Set torque value of 560 Nm.



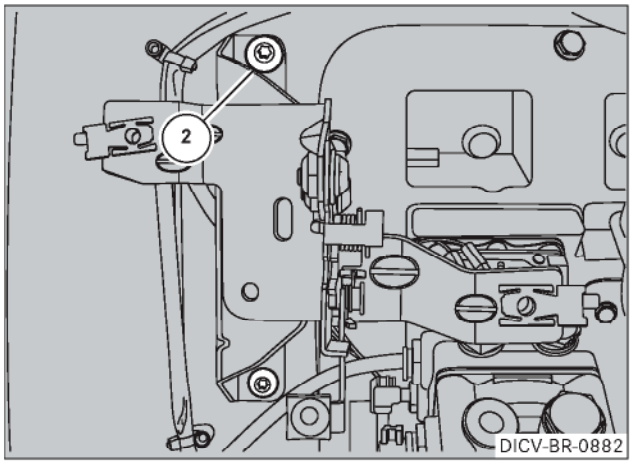
12. Attach the torque rod (1) to the trunnion bracket and RT2 axle spring bracket by tightening the bolts and nuts using 30 mm hexagonal socket and torque wrench. Set torque value of 560 Nm.



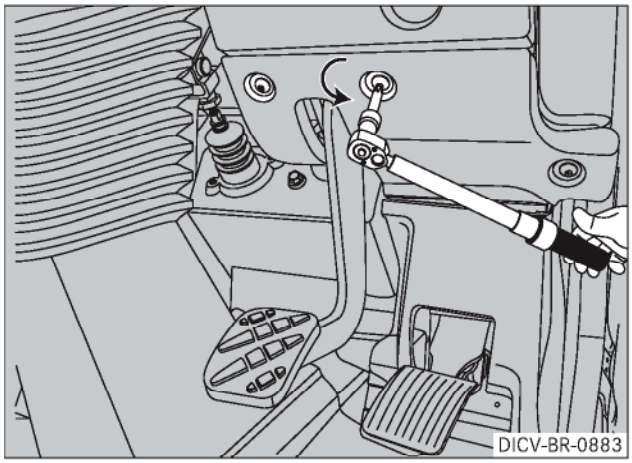
4. Remove cabin RHS side grill cover mounting screws (1) using T-30, T-25 and T-20 socket and ratchet.



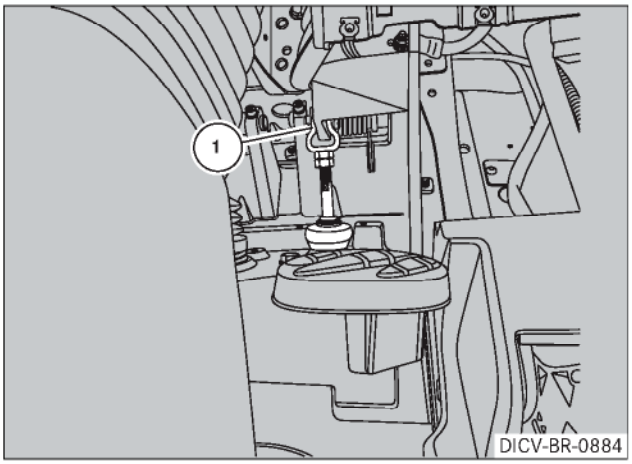
5. Remove RHS front lid latch mounting bolts (2) using T-45 socket and ratchet.



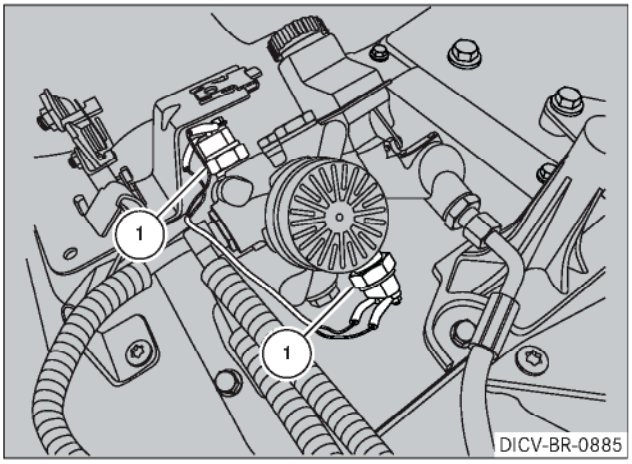
6. Remove brake pedal cover mounting screws (1) using T-20 socket and ratchet.



7. Remove brake pedal clives pin (1) using cutting plier and screw driver.

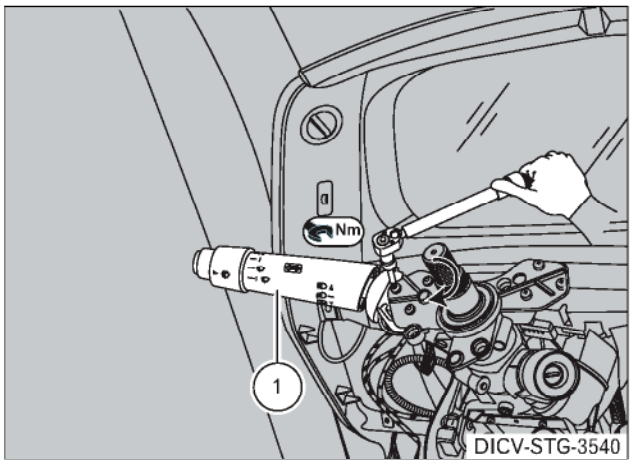


8. Remove dual brake valve electrical connectors (1) using 7mm open-end spanner.

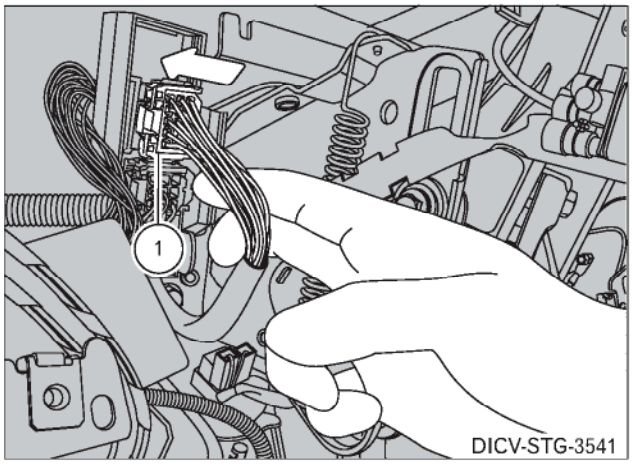


9. Remove 22 port hose from dual brake valve using 24mm open-end spanner.
10. Remove 12 port hose from dual brake valve using 24mm open-end spanner.
11. Remove 21 port hose from dual brake valve using 24mm open-end spanner.

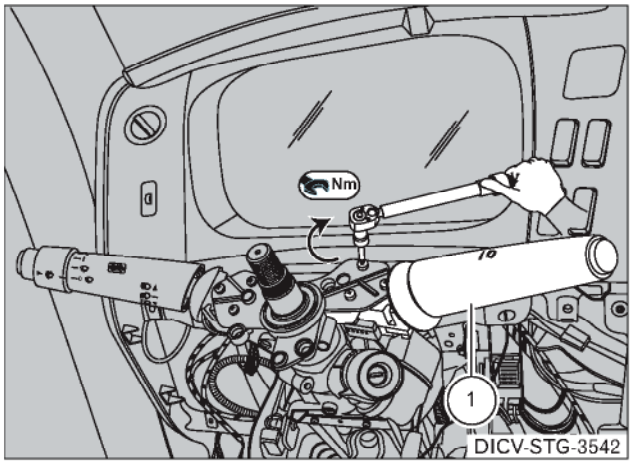
7. Install combination switch (1) on steering column by tightening the screws using T-25 torx socket and torque wrench. Set torque to 2±0.4Nm.



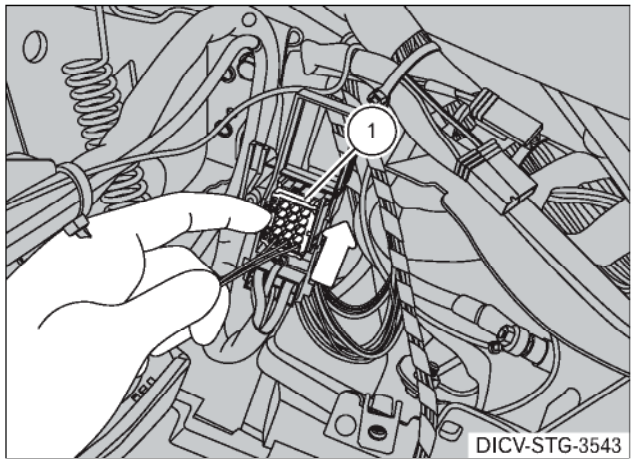
8. Connect the electrical connection (1) of combination switch.



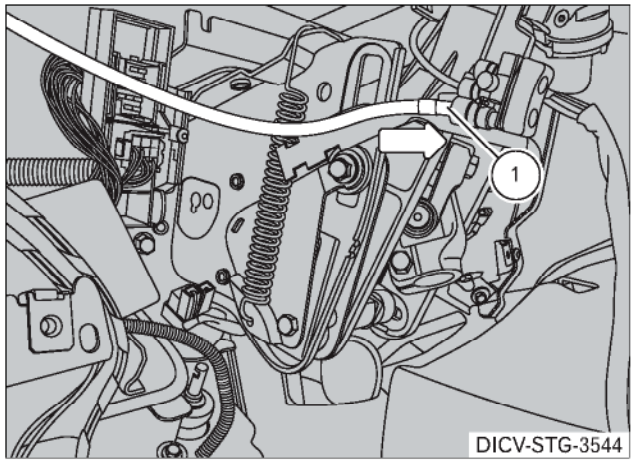
9. Install stack switch (1) on steering column by tightening the screws using T-25 torx socket and torque wrench. Set torque to 2±0.4Nm.



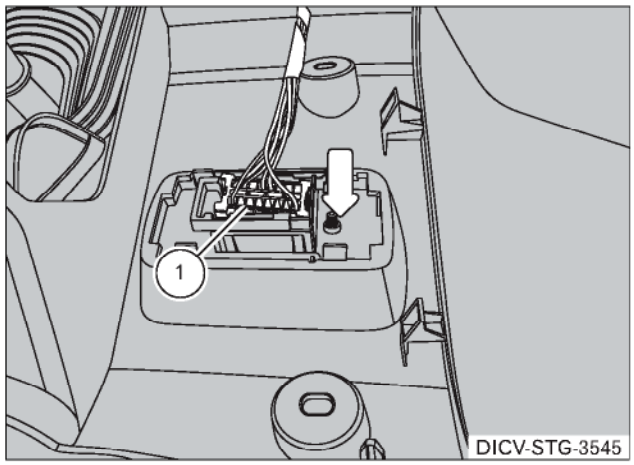
10. Connect the electrical connection (1) of stack switch.



11. Install pneumatic hose connection (1) of steering tilting system to the steering column.

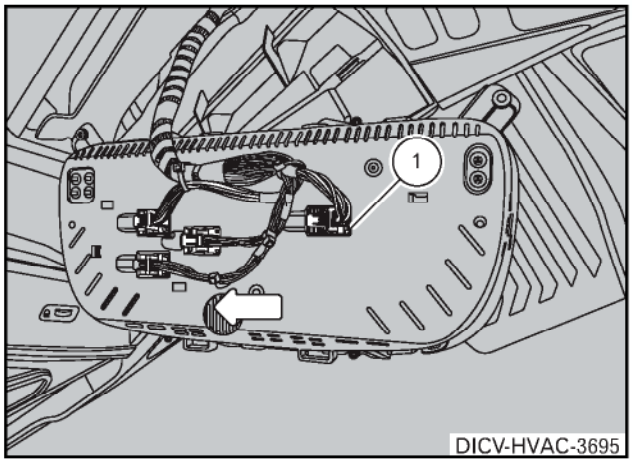


12. Connect the electrical connectors of OBD (1) and head light adjustment (2) behind RHS dashboard cover.

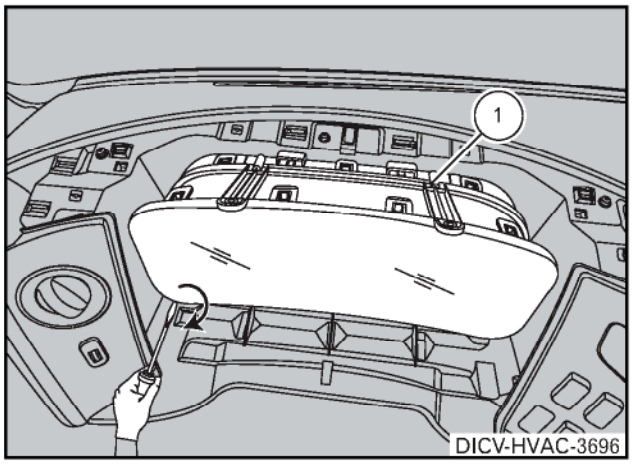


Service Procedure

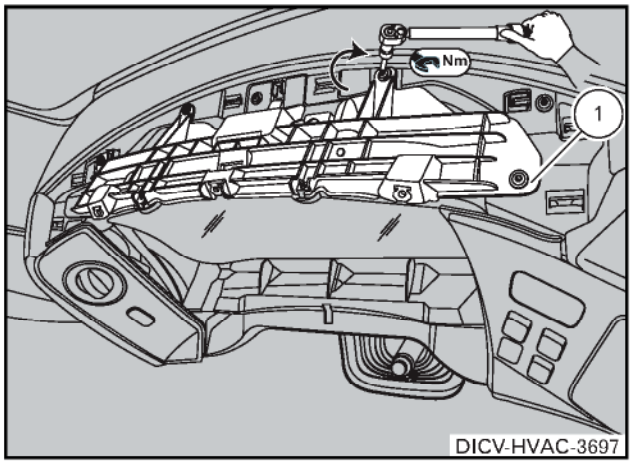
37. Connect instrument cluster electrical connector (1).



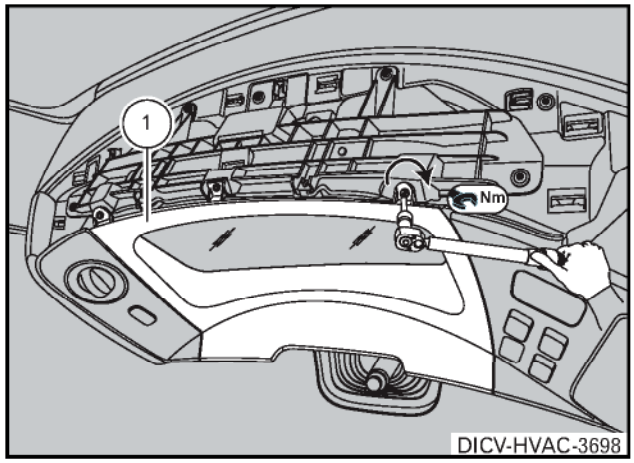
38. Install instrument cluster (1) to dash board and tighten the mounting screws using T-20 socket and torque wrench. Set torque to 2±4Nm.



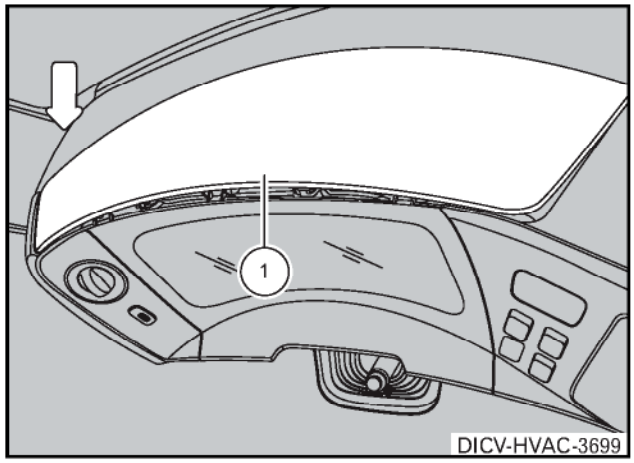
39. Install cluster top cover (1) and tighten the mounting screws using T20 socket and torque wrench. Set torque to 2±4Nm.



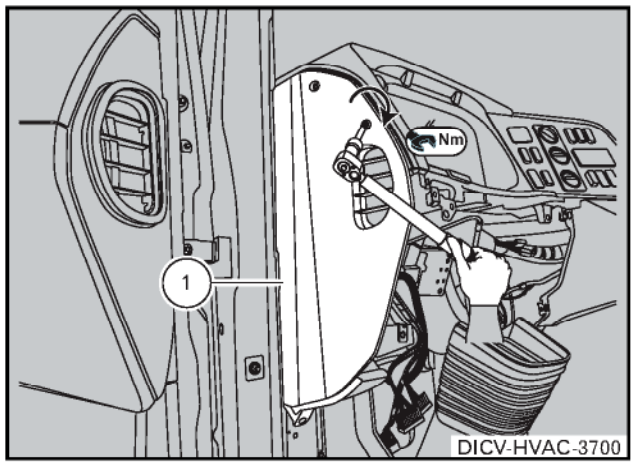
40. Install the instrument cluster cover (1) and tighten the mounting screw using T30 socket and torque wrench. Set torque to 3±0.4Nm.



41. Install cluster top trim (1) to dash board.



42. Install LHS side cover (1) and tighten the mounting screws using T-20 socket and torque wrench. Set torque to 2±0.4Nm.



14.2.2 HVAC System Removal and Refitment Proceedure

Prior Removal

1. Park the vehicle on a level surface.
2. Turn off the engine.
3. Engage parking brake.
4. Disconnect battery terminals.
5. Chock the wheels to avoid the vehicle from rolling.

Tool Required

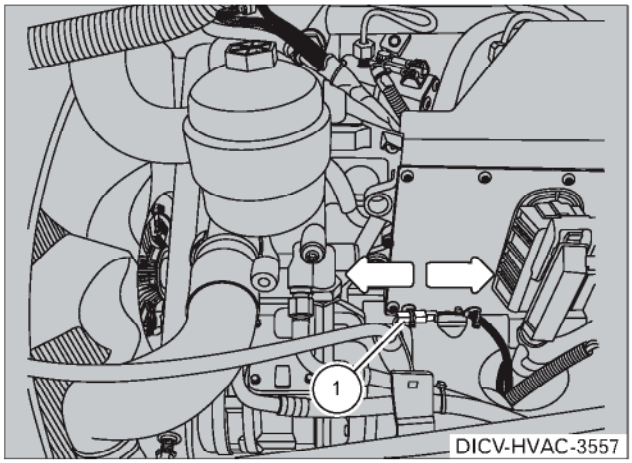
Tool Name	Specification
Open-end spanner	16mm,12mm,10mm.
Hexagonal socket	22mm
Torx socket	T-45, T-30.
Torque wrench	50-200Nm

Removal Procedure

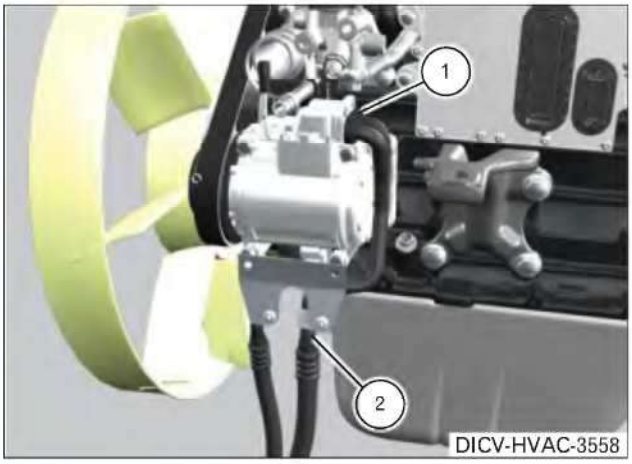
1. Remove the AC compressor electrical connector (1).

Notice

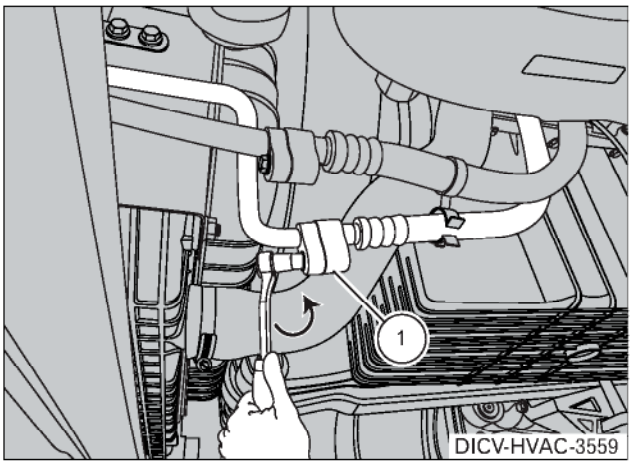
The AC refrigerant gas needs to be recovered before removing any pipes related to the HVAC.



2. Remove the high pressure pipe and low pressure pipe (1) mounting bolt from AC compressor using 6mm allen key.
3. Remove the AC compressor high pressure pipe and low pressure pipe clamp (2) mounting bolts from AC compressor bracket using10mm hexagonal socket and ratchet.



4. Remove the high pressure pipe joint (1) mounting bolt from high pressure pipe using 10mm hexagonal socket and ratchet.



Service Procedure