
DRIVELINE & AXLE

09

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FRONT AXLE

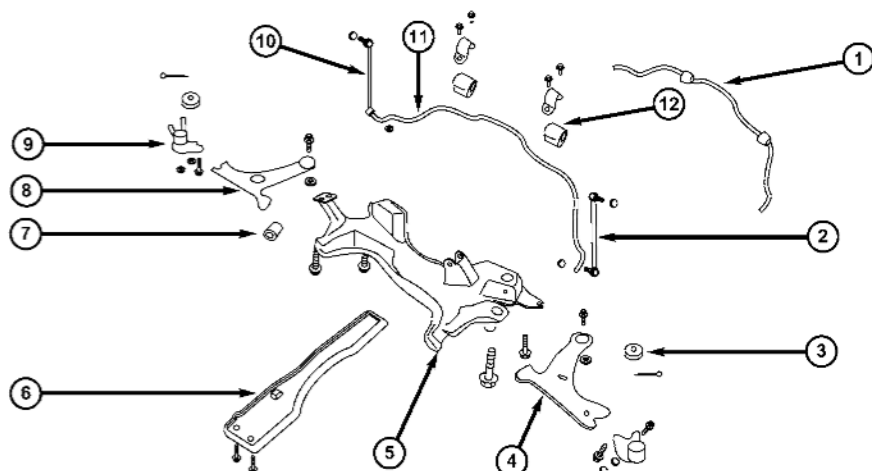
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GENERAL INFORMATION

Description

Front Axle



Itsm090004

1 - Front Stabilizer Bar
2 - Right Front Stabilizer Bar Link
3 - Rear Rubber Bushing
4 - Right Control Arm
5 - Sub-Frame Assembly
6 - Longitudinal Beam

7 - Front Rubber Bushing
8 - Left Control Arm
9 - Control Arm Knuckle Pin
10 - Left Front Stabilizer Bar Link
11 - Stabilizer Bar
12 - Rubber Support

This vehicle is equipped with unequal length half shafts, consisting of short left and long right half shafts. The half shafts consist of a fixed Constant Velocity (CV) joint at the outboard end connected by a solid shaft to a plunging CV joint on the inboard end. The inner CV joint has a splined end and is attached to the transaxle and is retained with a snap ring. The outer joint has a splined connection to the wheel hub and is retained with a lock nut.

For further information on the front axle assembly see Front Sub-Frame Assembly Description & Operation in Section 10 Suspension.

Operation

The front axle transmits torque from the transaxle to the wheels. In order to allow vertical and horizontal movement of the wheels, the axle shafts have plunging CV joints on the inboard ends of the axle shafts.

Specifications

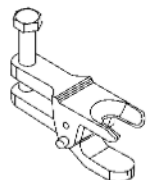
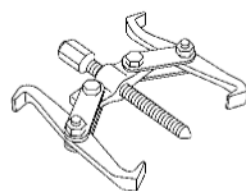
Torque Specifications

DESCRIPTION	TORQUE (N·m)
Front Stabilizer Bar to Stabilizer Bar Link Nuts	40 - 50
Control Arm Knuckle Pin With Knuckle Assembly	110 - 130
Control Arm to Sub-Frame Bolt	170 - 190
Stabilizer Bar Link to Lower Suspension Lever	40 - 50

GENERAL INFORMATION

DESCRIPTION	TORQUE (N·m)
Right and Left Front Drive Shaft Nuts	260 - 280
Control Arm Knuckle Pin With Control Arm	140 - 160
Front Connecting Rod and Front Shock Absorber	40 - 50
Stabilizer Bar Clamp to Sub-Frame	22 - 28
Rear Rubber Buffer Assembly to Vehicle Body	22 - 28
Front Axle Hub Nut	135
Front Suspension Strut to Vehicle Body	45 - 55
Front Suspension And Bracket	75 - 85
Lower Sub-Frame Insert to Suspension Bolt	110 - 130
Longitudinal Beam to Vehicle (Front) Body Bolt	74 - 86
Upper Link to Trailing Arm Bolt	100 - 120
One On Each Side To Connect Upper Link With Rear Sub-Frame	80 - 101
One On Each Side To Connect Lower Control Arm With Trailing Arm	100 - 120
Steering Knuckle and Suspension Strut	110 - 130
Soft Gasket and Bracket of Front Suspension	75 - 85
Tie Rod to Steering Knuckle Nut	35 - 45
Sub-Frame and Gasket Of Vehicle (Front) Body	170 - 190
Sub-Frame and Longitudinal Beam Assembly Bolts	75 - 85
Steering Gear to Sub-Frame Bolts	75 - 85
Wheel Mounting Nut	110

Special Tools

Ball Joint Separator CH-10002	 besm020086
Bearing Puller	 besm090009

DIAGNOSIS & TESTING

Vehicle Inspection

Inspect the following for leaks or damage:

- Check for grease in the vicinity of the inboard tripod joint and outboard CV joint.
- Check the inner or outer joint seal boot or seal boot clamp for damage.

Noise Or Vibration On Turns

A clicking noise or a vibration in turns could be caused by one of the following conditions:

- Damaged outer CV joint or damaged CV seal boot or seal boot clamps.
- Damaged inner CV joint or damaged CV seal boot or seal boot clamps.
- Noise may also be caused by another component of the vehicle coming in contact with the half shafts.

NOTE :

If the CV seal boot is damaged, this will result in the loss and/or contamination of the joint grease, resulting in inadequate lubrication of the joint.

Clunking Noise During Acceleration

This noise may be a result of one of the following conditions:

- A torn seal boot on the inner or outer joint of the half shaft assembly.
- A loose or missing clamp on the inner or outer joint of the half shaft assembly.
- A damaged or worn half shaft CV joint.

Shudder Or Vibration During Acceleration

This problem could be a result of:

- A worn or damaged half shaft inner tripod joint.
- Improper wheel alignment.

Vibration At High Speeds

This problem could be a result of:

- Foreign material (mud, etc.) packed on the backside of the wheel(s).
- Out of balance tires or wheels.
- Improper tire or wheel runout.

ON-VEHICLE SERVICE

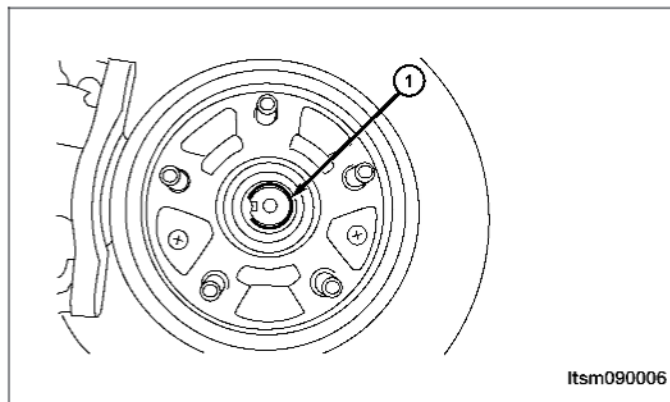
Front Hub and Bearing

Removal & Installation

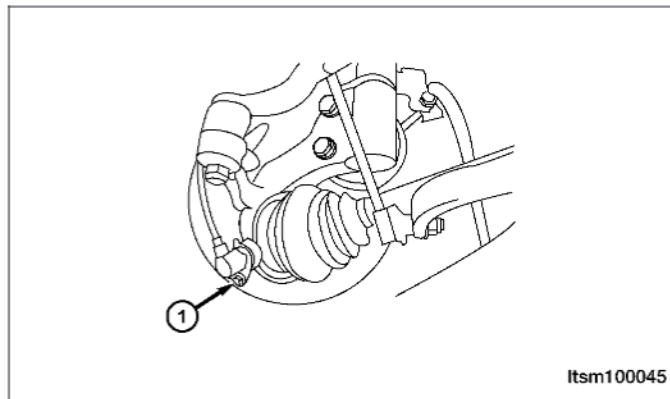
NOTE :

The following special tools are required to perform the repair procedure:

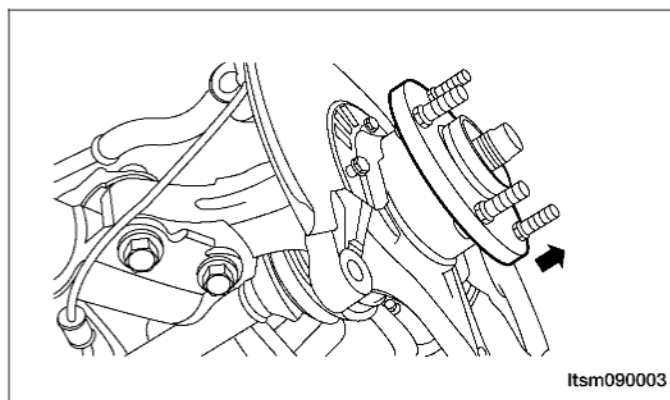
- Bearing Puller
- 1. Raise and support the vehicle.
- 2. Remove the wheel mounting nuts and the tire and wheel assembly.
(Tighten: Wheel mounting nuts to 110 N·m)
- 3. Remove the front axle hub nut (1) from the front knuckle.
(Tighten: Front axle hub nut to 135 N·m)



- 4. Remove the front brake rotor (See Front Brake Rotor Removal & Installation in Section 12 Brakes).
- 5. Remove the wheel speed sensor mounting bolt (1), then remove the wheel speed sensor.



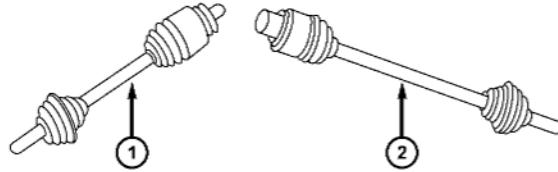
- 6. Using the bearing puller, remove the wheel hub bearing from the knuckle.



- 7. Installation is in the reverse order of removal.

Front Axle Shaft

Removal & Installation

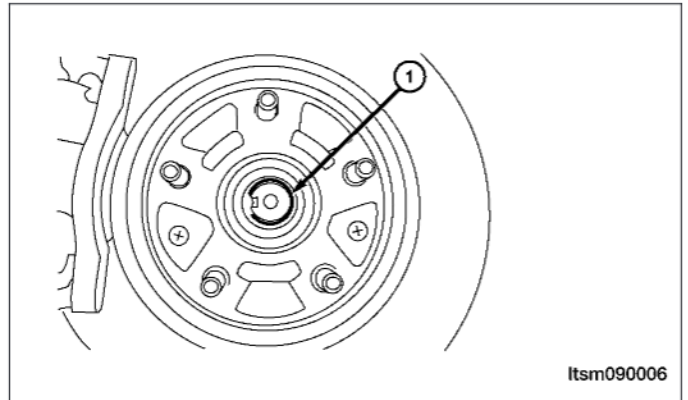


Itsm090002

1 - Left Half Shaft

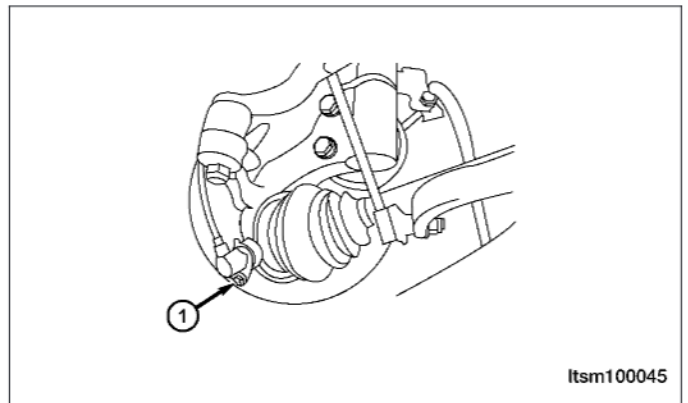
2 - Right Half Shaft

1. Raise and support the vehicle.
2. Remove the wheel mounting nuts and the tire and wheel assembly.
(Tighten: Wheel mounting nuts to 110 N·m)
3. Remove the front axle hub nut (1) from the front knuckle.
(Tighten: Front axle hub nut to 135 N·m)



Itsm090006

4. Remove the wheel speed sensor bolt (1), then remove wheel speed sensor.



Itsm100045

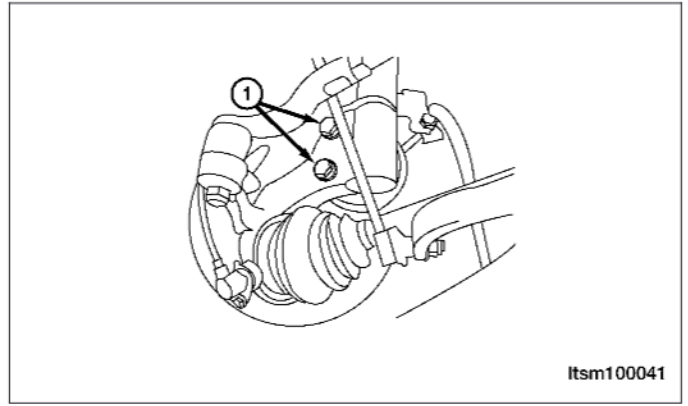
5. Remove the brake caliper adapter to steering knuckle mounting bolts.
(Tighten: Brake caliper adapter mounting bolts to 85 N·m)
6. Remove the brake caliper adapter (with the brake caliper still attached).

7. Remove the bolts (1) connecting the steering knuckle to the front strut assembly.

CAUTION:

When removing the front axle shaft, do not subject the constant velocity joint to an excessive angle. Also, be careful not to excessively extend the slide joint.

8. Remove the front axle shaft from the transaxle using a suitable tool.
9. Installation is in the reverse order of removal.

**Installation Notes:**

- Rotate the joint up/down, left/right, and in axial direction, check for any rough movement or significant looseness.
- Check boot for cracks or other damage, and for grease leakage.
- If damaged, disassemble axle shaft to verify damage, and repair or replace as necessary.

REAR AXLE

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DIAGNOSIS & TESTING

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ON-VEHICLE SERVICE

Rear Hub and Bearing

Removal & Installation

Rear Axle Assembly (4x4)

Description

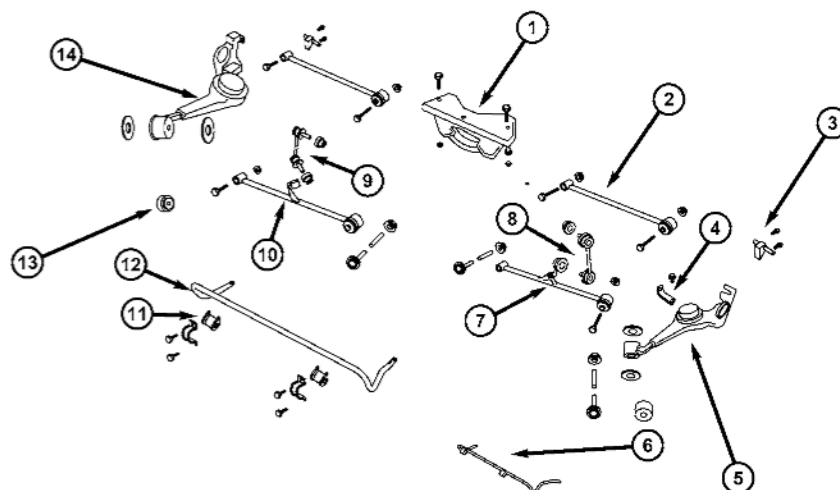
Operation

Removal & Installation

GENERAL INFORMATION

Description

Rear Axle



Itsm090005

1 - Rear Sub-Frame Assembly
2 - Rear Suspension Upper Link
3 - Left Rear Shock Absorber Mounting Bracket
4 - Left Brake Line Bracket
5 - Left Rear Trailing Arm
6 - Rear Stabilizer Bar
7 - Left Rear Lower Control Arm

8 - Left and Right Stabilizer Bar Links
9 - Right Rear Connecting Rod
10 - Right Rear Lower Control Arm
11 - Rubber Support Seat
12 - Rear Stabilizer Bar
13 - Rubber Bushing
14 - Right Rear Trailing Arm

The rear axle utilizes an independent design. This suspension system incorporates a separate wheel knuckle for each wheel and allows the wheels to react to road imperfections independent of each other. This independent action offers improved isolation from the effects of jounce and rebound.

The rear axle consists of the following components:

- Wheel Hub
- Wheel Studs
- Wheel Bearing
- Rear Trailing Arm

For further information on the rear axle assembly see Rear Suspension Description & Operation in Section 10 Suspension.

Operation

The rear axle utilizes a sealed wheel bearing housed in the rear knuckle assembly.

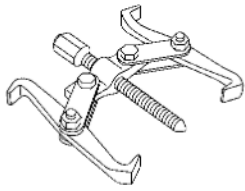
GENERAL INFORMATION

Specifications

Torque Specifications

DESCRIPTION	TORQUE (N·m)
Rear Stabilizer Bar Link	40 - 50
Rear Shock Absorber to Mounting Bracket Bolts	40 - 50
Rear Axle Front Suspension to Rear Driving Axle Bolts	75 - 85
Rear Axle Front Suspension to Rear Sub-Frame Bolts	115 - 125
Left and Right Rear Half-Shaft to Disc Brake Nut	260 - 270
Left and Right Rear Half-Shaft to Axle Output Flange Bolts	40
Intermediate Drive Shaft to Rear Axle Flange Bolts	59 - 71
Rear Axle Rear Suspension Mount Assembly to Rear Axle Bolt	75 - 85
Rear Axle Rear Suspension Mount to Vehicle Body Bolt	75 - 85
Rear Rubber Buffer to Vehicle Body Bolts	22 - 28
Upper Link to Rear Sub-Frame Bolts	100 - 120
Lower Control Arm to Rear Sub-Frame Bolts	100 - 120
Rear Trailing Arm to Vehicle Body Bolts	140 - 160
Rear Suspension to Bracket Bolts	115 - 125
Rear Suspension, Longitudinal Beam of Engine to Sub-Frame Bolts	75 - 85
Rear Stabilizer Bar Clamp to Vehicle Body Bolts	22 - 28
Rear Trailing Arm to Vehicle Body Bolts	140 - 160
Rear Cover of Control Arm to Sub-Frame Bolts	170 - 190
Soft Gasket to Bracket Of Rear Suspension Bolts	110 - 130
Sub-Frame And Gasket Of Vehicle (Rear) Body Bolts	170 - 190
Wheel Mounting Nut	110

Special Tools

Bearing Puller	 besm090009
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DIAGNOSIS & TESTING

Vehicle Inspection

Inspect the rear axle for the following:

- Check the rear axle for loose bearings.
- Check the rear axle hub for any damage or excessive runout.

Shudder Or Vibration During Acceleration

This problem could be a result of:

- A worn or damaged half shaft inner tripod joint (4x4).
- Improper wheel alignment.

Vehicle Inspection

Inspect the following for leaks or damage:

- Check for grease in the vicinity of the inboard tripod joint and outboard CV joint (4x4).
- Check the inner or outer joint seal boot or seal boot clamp for damage (4x4).

Noise Or Vibration On Turns

A clicking noise or a vibration in turns could be caused by one of the following conditions:

- Damaged outer CV joint or damaged CV seal boot or seal boot clamps (4x4).
- Damaged inner CV joint or damaged CV seal boot or seal boot clamps (4x4).
- Noise may also be caused by another component of the vehicle coming in contact with the half shafts (4x4).

NOTE :

If the CV seal boot is damaged, this will result in the loss and/or contamination of the joint grease, resulting in inadequate lubrication of the joint.

Clunking Noise During Acceleration

This noise may be a result of one of the following conditions:

- A torn seal boot on the inner or outer joint of the half shaft assembly (4x4).
- A loose or missing clamp on the inner or outer joint of the half shaft assembly (4x4).
- A damaged or worn half shaft CV joint (4x4).

Shudder Or Vibration During Acceleration

This problem could be a result of:

- A worn or damaged half shaft inner tripod joint (4x4).
- Improper wheel alignment.

Vibration At High Speeds

This problem could be a result of:

- Foreign material (mud, etc.) packed on the backside of the wheel(s).
- Out of balance tires or wheels.
- Improper tire or wheel runout.

Visual Inspection For Fluid Leaks (4x4)

This problem could be a result of:

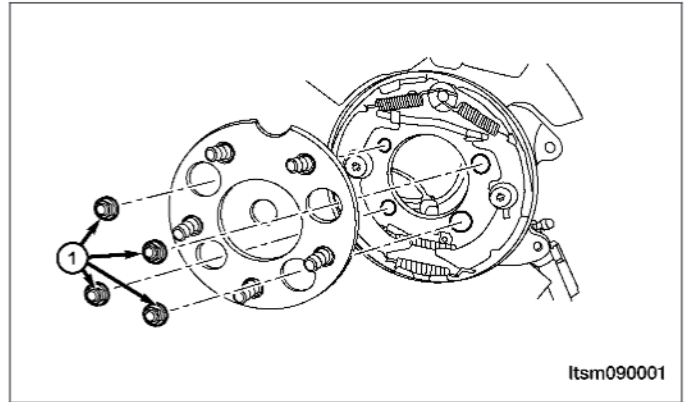
- Where seals are used: There should be no appearance of fluid leakage or abnormal abrasions.
- Where sealant is applied: There should be no appearance of fluid leakage or fluid seepage.
- Where attaching bolts are used, fluid-fill and fluid-draining plugs are used: There should be no appearance of fluid leakage, fluid seepage or loose bolts.
- The housing: There should be no appearance of fluid leakage or fluid seepage.

ON-VEHICLE SERVICE

Rear Hub and Bearing

Removal & Installation

1. Raise and support the vehicle.
2. Remove the wheel mounting nuts and the tire and wheel assembly.
(Tighten: Wheel mounting nuts to 110 N·m)
3. Disconnect the ABS wheel speed sensor electrical connector.
4. While an assistant applies the brakes (to keep the hub from rotating), remove the hub nut from the axle half shaft.
(Tighten: Hub nut to 135 N·m)
5. Remove the rear brake rotor (See Rear Brake Rotor Removal & Installation in Section 12 Brakes).
6. Remove the hub and bearing mounting nuts (1).
(Tighten: Hub and bearing mounting nuts to 65 N·m)

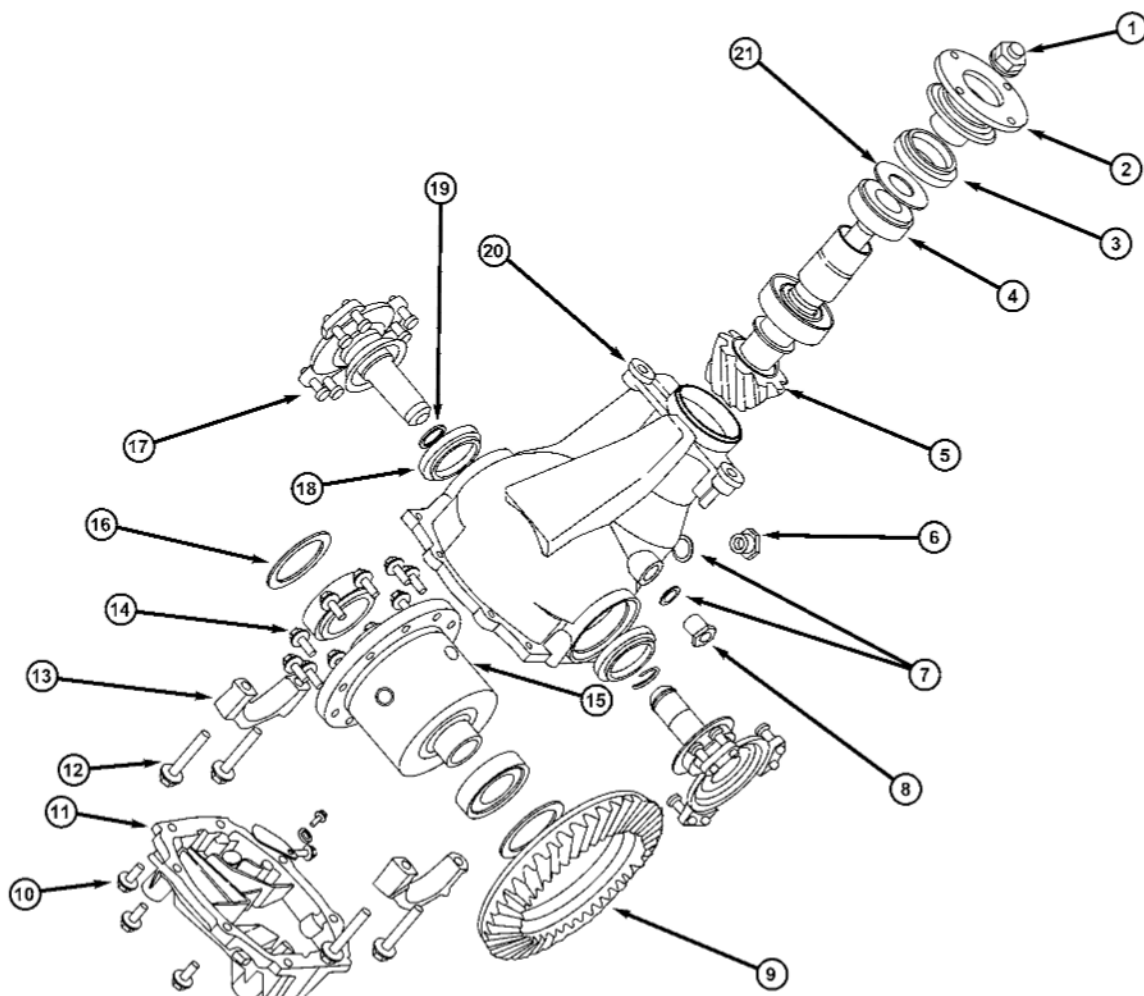


7. Take out the rear hub and bearing.
8. Installation is in the reverse order of the removal.

Rear Axle Assembly (4x4)

Description

Rear axle is mounted on the rear sub-frame assembly.



Itsm160009

1 - Drive Pinion Lock Nut

2 - Companion Flange

3 - Side Fluid Seal

4 - Drive Pinion Front Bearing

5 - Drive Pinion

6 - Fluid-Filling Bolt

7 - Washer

8 - Fluid-Limiting Bolt

9 - Drive Gear

10 - Carrier Cover Bolts

11 - Carrier Cover

12 - Bearing Cap Bolts

13 - Bearing Cap

14 - Differential Assembly

15 - Differential Bolts

16 - Washer

17 - Driven Gear Connecting Bolts

18 - Driven Gear Side Fluid Seal

19 - Driven Gear Washer

20 - Rear Axle Cover

21 - Drive Pinion Washer

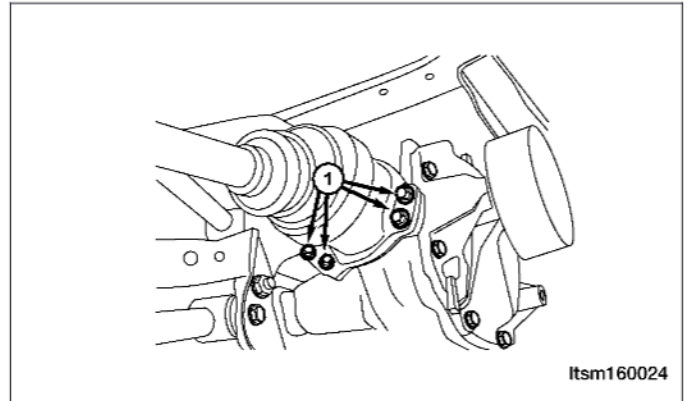


Operation

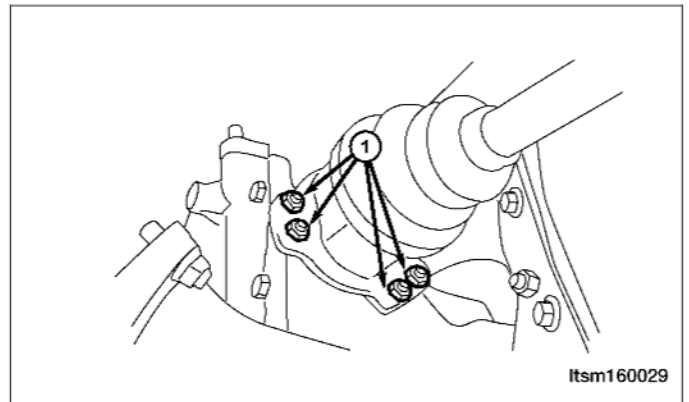
The axle receives power from the transaxle through the rear intermediate drive shaft. The drive shaft is connected to the pinion gear which rotates the differential through the gear mesh with the ring gear bolted to the differential case. The engine power is transmitted to the axle shafts through the pinion mate and side gears.

Removal & Installation

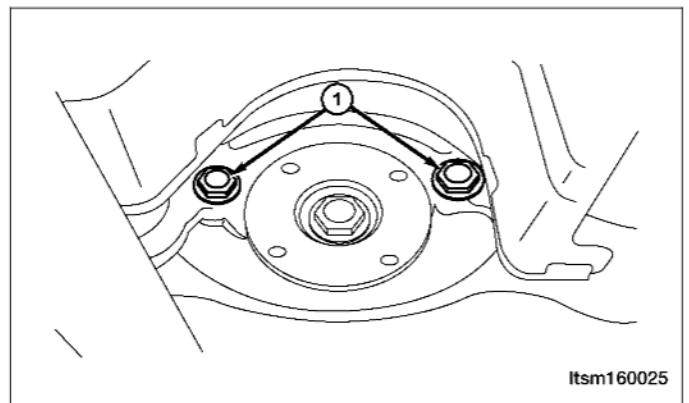
1. Drain the differential gear fluid.
2. Remove the rear intermediate drive shaft to rear axle flange bolts.
(Tighten: Rear intermediate drive shaft to rear axle flange bolts to 65 ± 6 N·m)
3. Remove the bolts (1) from the left rear half shaft to the rear axle output flange.
(Tighten: Rear half shaft to rear axle output flange bolts to 40 N·m)
4. Remove the left rear half shaft.



5. Remove the bolts (1) from the right rear half shaft to the rear axle output flange.
(Tighten: Rear half shaft to rear axle output flange bolts to 40 N·m)
6. Remove the right rear half shaft.

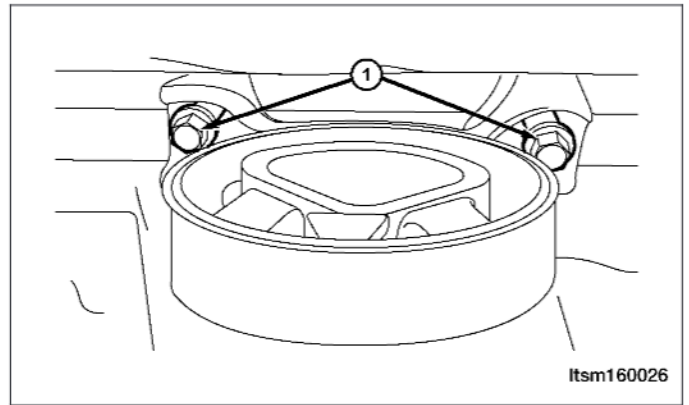


7. Remove the mounting bolts (1) to the rear axle differential housing.
(Tighten: Mounting bolts to the rear axle differential housing to 40 N·m)



ON-VEHICLE SERVICE

8. Remove the bolts (1) from the rear axle housing mounts and the body.
(Tighten: Rear axle housing mount bolts to 70 N·m)



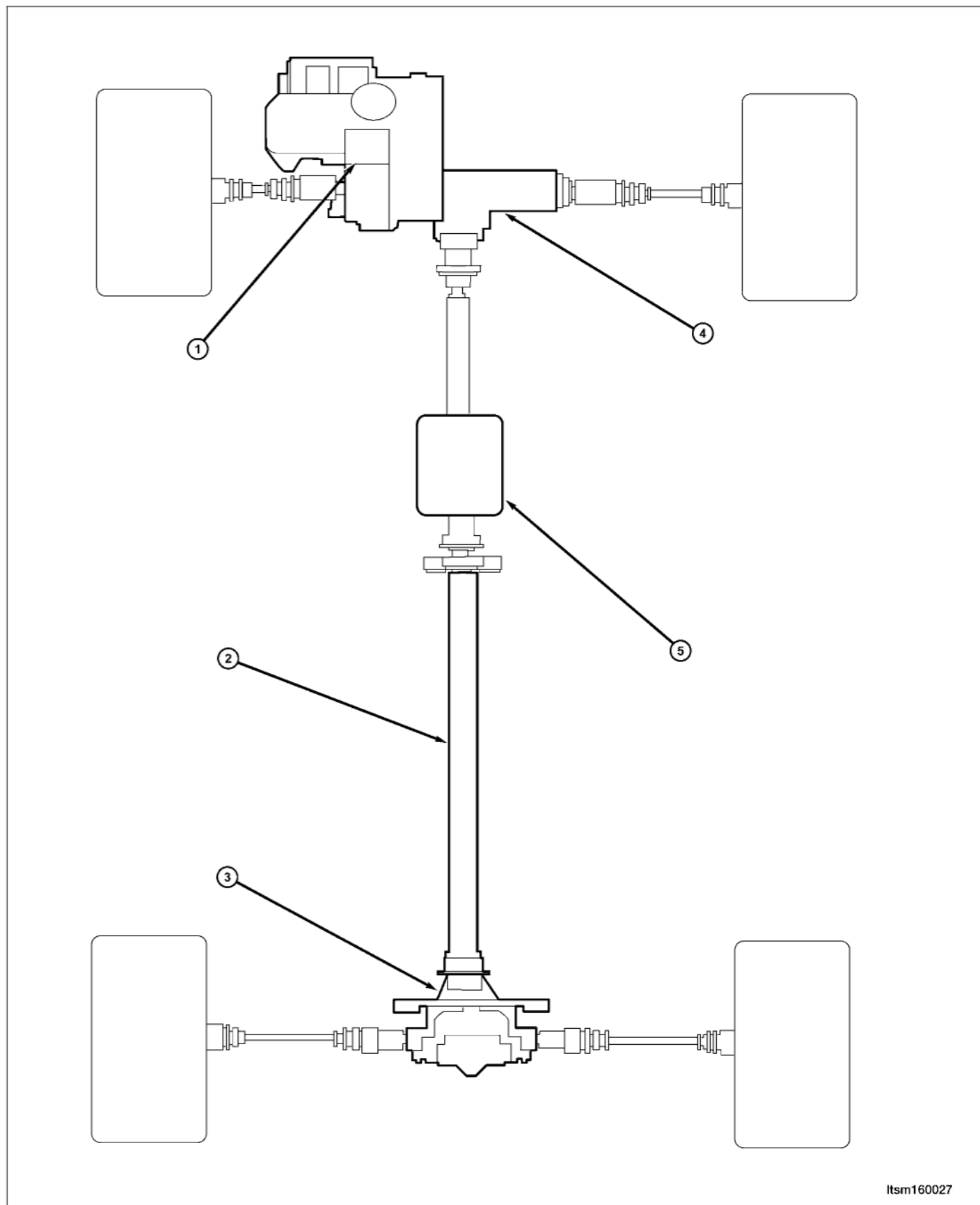
9. Remove the rear axle housing assembly from the vehicle.
10. Installation is in the reverse order of removal.

INTERACTIVE TORQUE MANAGEMENT (ITM) SYSTEM (4X4)

GENERAL INFORMATION	09-17	Operation	09-21
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Specification	09-18	Interactive Torque Management (ITM)	
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		Description	09-23
		Operation	09-23
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Interactive Torque Management (ITM)			
Controller	09-21		
Description	09-21		

GENERAL INFORMATION

Description



GENERAL INFORMATION

1 - Transaxle
2 - Drive Line
3 - Rear Axle

4 - Power Transfer
5 - ITM Controller

The Tiggo 4WD is the first 4WD vehicle produced by Chery. The 4WD system is equipped with a QR523T transaxle manufactured by Chery.

An active torque transfer system is used, and an interactive torque management system (ITM) is equipped to make it possible to intelligently distribute the drive force for the front wheels and rear wheels according to different road conditions. For example, on a smooth road, the vehicle utilizes front-wheel drive. When road conditions worsen, the ITM will automatically switch to 4WD. The use of ITM allows the Tiggo vehicle to be more economical and more efficient than the common 4WD system.

Operation

The intelligent 4WD system is controlled by an interactive torque management system (ITM) module. The ITM module communicates with the Engine Control Module (ECM) and the Antilock Brake System (ABS) controller through the CAN network. The ITM module collects data from sensors on the vehicle body to determine the condition of the drive wheels. Based on the sensor inputs, the ITM module controls the ITM controller. The ITM controller will then distribute a portion of the torque to the rear drive axle as needed. The ITM controller works as an electromagnetic clutch. Different torque can be transferred by changing the electric current of the ITM controller. The ITM controller will be able to distribute the torque of the front drive axle and the rear drive axle at different ratios according to the various dynamic conditions of the vehicle.

Specification

Transaxle Specifications

MODEL	TYPE	DISTANCE BETWEEN CENTERS (mm)	MAX INPUT TORQUE (N·m)	GEAR / SPEED RATIO						
				1st	2nd	3rd	4th	5th	Reverse	Final Drive
QR523T	Front- Wheel Drive Transaxle	78	195	3.583	1.947	1.379	1.303	0.821	3.364	4.3125

GENERAL INFORMATION

Torque Specifications

DESCRIPTION	TORQUE (N·m)
Bow Beam to Plate Bolts	60 ± 5
Front Intermediate Shaft to ITM Controller Bolts	70 ± 7
ITM Bracket to Bow Beam Bolts	60 ± 5
ITM Control Module Bolts	9 ± 1
Transaxle to Transfer Case Bolts	80
Rear Intermediate Shaft to ITM Controller Bolts	39 ± 3
Rear Intermediate Shaft to Rear Differential Bolts	65 ± 6
Transfer Case Fluid-Limiting Bolt	40 ± 3
Transfer Case Fluid Fill Bolt	40 ± 3
Transfer Case Fluid Drain Bolt	40 ± 3
Transfer Case Front Housing Bolt	35
Transfer Case Rear Housing Bolts	40
Transfer Case Right Bearing Seat Bolt	35
Transfer Case Vent Bolt	18 ± 3

Fluid Specifications

NAME	TYPE	QUANTITY	MAINTENANCE TERM
Transaxle Gear Fluid	GL-4 75w-90	2.2 Liters	1 year / 30,000 km
Transfer Case Gear Fluid	GL-5 80w-90	0.8 Liters	50,000 km
Rear Final Drive Gear Fluid	Hypoid 85w-90	0.8 Liters	50,000 km

Transfer Case Specifications

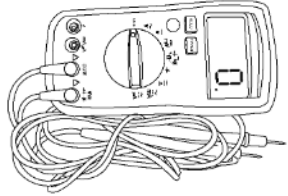
Differential Assembly	Side Gear	Type of Gear	Straight bevel gear
		Number of Gears	14
	Planetary Gear	Type of Gear	Straight bevel gear
		Number of Gears	10
Hypoid G Gear	Drive Gear	Number of Gears	41
	Driven Gear	Number of Gears	14

ITM Control Module Electronic Signals

SIGNALS	MODE OF PROVISION	SIGNAL SOURCE
Signals Of The Four Wheel Speed	CAN	Wheel Speed Sensor
Vehicle Speed Signals	CAN	Vehicle Speed Sensor
Acceleration Signals	CAN	G Sensor
Engine Speed Signals	CAN	Crankshaft Position Sensor
Throttle Position Signals	CAN	Throttle Position Sensor
Steering Wheel Angle Signals	Simulated	ITM Module
Ignition Switch Signals	Direct	Ignition Switch



Special Tools

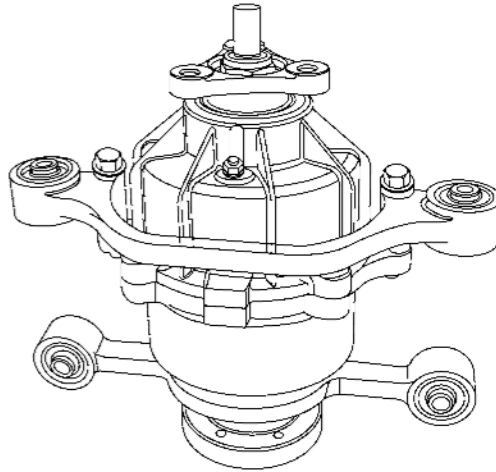
Diagnostic Scan Tool X-431	 Diagram of the Diagnostic Scan Tool X-431, showing the device and its associated cables. besm030001
Digital Multimeter Fluke 15B & 17B	 Diagram of the Digital Multimeter Fluke 15B & 17B, showing the device and its associated cables. besm030002

ON-VEHICLE SERVICE

Interactive Torque Management (ITM) Controller

Description

The ITM Controller is mounted between the front and rear intermediate drive shafts.



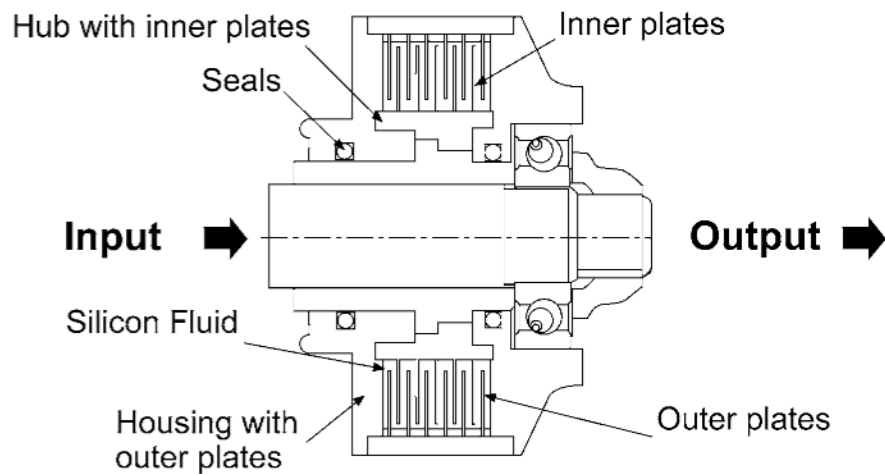
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NOTE :

Under normal vehicle usage, the ITM Controller requires no maintenance

Operation

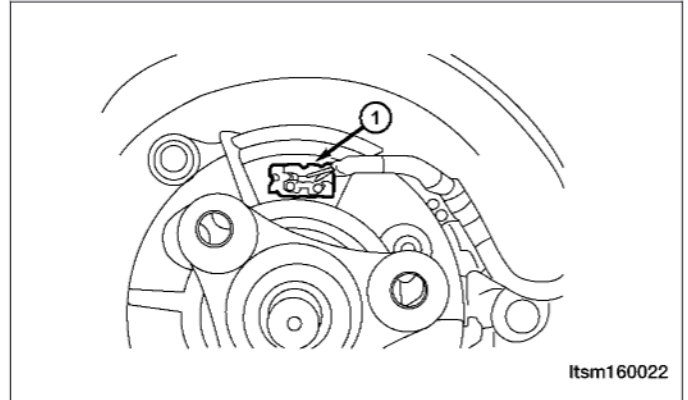
The ITM Controller transfers the torque output from the transaxle to the rear drive axle.



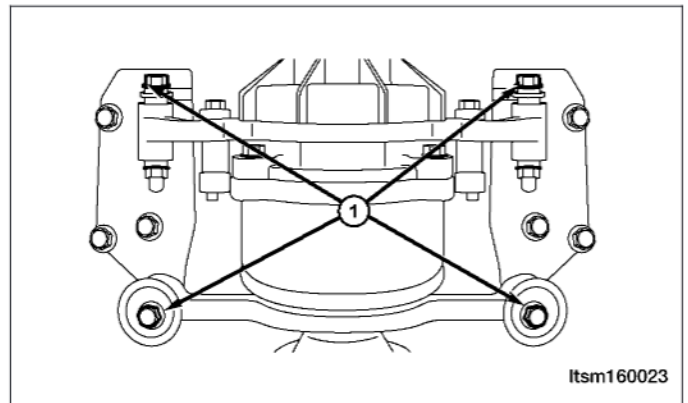
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Removal & Installation

1. Raise and support the vehicle.
2. Remove the front intermediate drive shaft (See Front Intermediate Drive Shaft Removal & Installation in Section 09 Driveline & Axle).
3. Remove the rear intermediate drive shaft (See Rear Intermediate Drive Shaft Removal & Installation in Section 09 Driveline & Axle).
4. Remove the ITM Controller electrical connector (1).



5. Remove the ITM Controller mounting bracket bolts (1).
(Tighten: ITM Controller mounting bracket bolts to 60 ± 5 N·m)



6. Remove the ITM Controller assembly.

NOTE :

The ITM Controller assembly is a precision component, be careful to avoid dropping or mis-handling the ITM Controller during removal.

7. Installation is in the reverse order of removal.

Interactive Torque Management (ITM) Control Module

Description

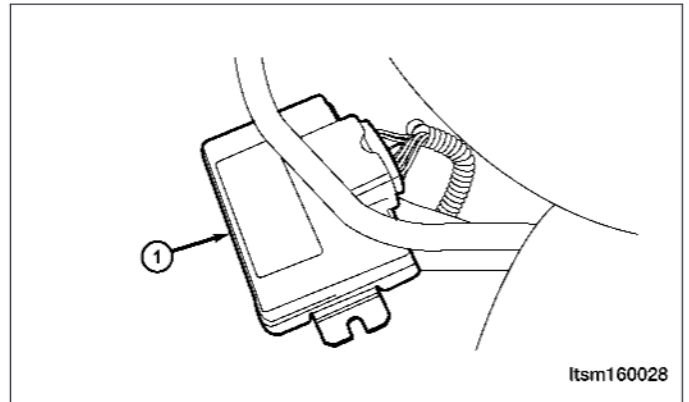
The ITM control module is located under the driver seat.

Operation

The ITM control module collects signals from the Engine Control Module (ECM) and Antilock Brake System (ABS) controller, judges the vehicle driving state, controls the working electric current of the ITM controller and distributes the torque of the front axle and the rear axle intelligently according to such signals.

Removal & Installation

1. Disconnect the negative battery cable.
2. Adjust the left front seat fully backward.
3. Remove the ITM control module mounting bolts.
4. Remove the ITM control module electrical connector.
5. Remove the ITM control module (1).
6. Installation is in the reverse order of removal.



DRIVE SHAFT (4X4)

GENERAL INFORMATION

Description	09-25	Shudder Or Vibration During Acceleration	09-26
Operation	09-25	Vibration At High Speeds	09-26
Specifications	09-25		

DIAGNOSIS & TESTING

Vehicle Inspection	09-26		
Shudder Or Vibration During Acceleration	09-26		
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ON-VEHICLE SERVICE

Front Intermediate Drive Shaft	09-27
Removal & Installation	09-27
Rear Intermediate Drive Shaft	09-27
Removal & Installation	09-27

GENERAL INFORMATION

Description

The drive shafts for the 4x4 are separated into the front intermediate drive shaft and the rear intermediate drive shaft. The front intermediate drive shaft is installed between the transfer case and the Interactive Torque Management (ITM) controller. The rear intermediate drive shaft is installed between the ITM controller and the rear axle.

Operation

The drive shafts transfer the torque from the transaxle to the rear axle.

Specifications

Torque Specifications

DESCRIPTION	TORQUE (N·m)
Front Intermediate Drive Shaft to ITM Controller Bolts	70 ± 7
Rear Intermediate Drive Shaft to ITM Controller Bolts	39 ± 3
Rear Intermediate Drive Shaft to Body Bolts	60 ± 5
Rear Intermediate Drive Shaft to Rear Axle Flange	65 ± 6

DIAGNOSIS & TESTING

Vehicle Inspection

Inspect the drive shaft for the following:

- Check the drive shaft for loose bearings.
- Check the drive shaft for any damage or excessive runout.

Shudder Or Vibration During Acceleration

This problem could be a result of:

- A worn or damaged drive shaft joint.
- Improper wheel alignment.

Clunking Noise During Acceleration

This noise may be a result of one of the following conditions:

- A worn drive shaft assembly.
- A loose drive shaft assembly.
- A damaged or worn drive shaft joint.

Shudder Or Vibration During Acceleration

This problem could be a result of:

- A worn or damaged drive shaft joint.
- Improper wheel alignment.

Vibration At High Speeds

This problem could be a result of:

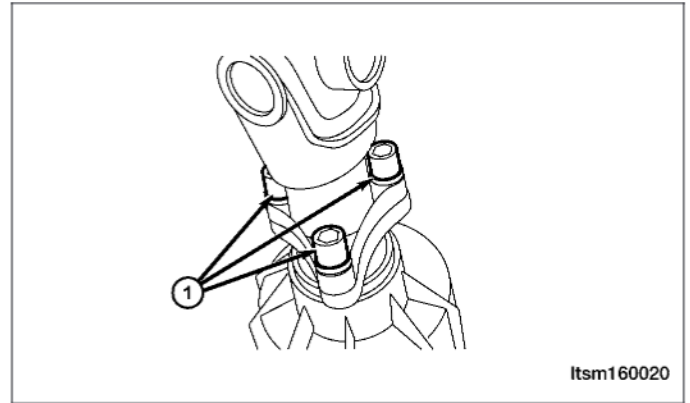
- Foreign material (mud, etc.) packed on the backside of the wheel(s).
- Out of balance tires or wheels.
- Improper tire or wheel runout.

ON-VEHICLE SERVICE

Front Intermediate Drive Shaft

Removal & Installation

1. Remove the bolts (1) between the front intermediate drive shaft and the ITM Controller input shaft.
(Tighten: Front intermediate drive shaft and ITM controller bolts to 70 ± 7 N·m)

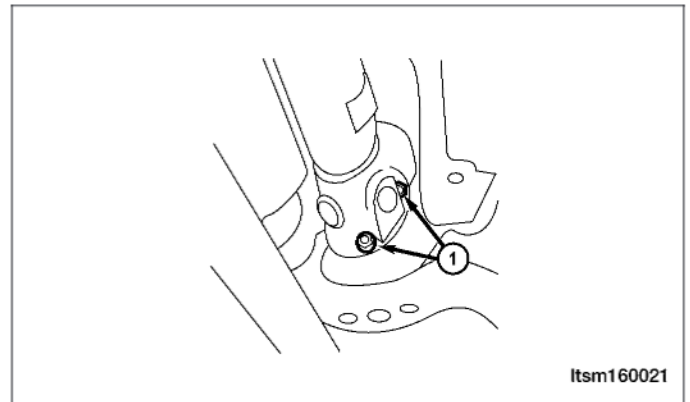


2. Installation is in the reverse order of removal.

Rear Intermediate Drive Shaft

Removal & Installation

1. Remove the bolts between the rear intermediate drive shaft and the ITM Controller output shaft.
(Tighten: Rear intermediate drive shaft and ITM controller bolts to 39 ± 3 N·m)
2. Remove the bolts between the intermediate drive shaft bracket and the vehicle body, and then remove the bracket.
(Tighten: Rear intermediate drive shaft to body bolts to 60 ± 5 N·m)
3. Remove the bolts (1) between the rear intermediate drive shaft and the rear axle flange, and remove the rear intermediate drive shaft.
(Tighten: Rear intermediate drive shaft and rear axle flange bolts to 65 ± 6 N·m)



4. Installation is in the reverse order of removal.