05 - Driving system

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Front suspension

Technical specifications

General specifications

Name		Specification	
Front wheel alignment parameters	Front wheel toe	-2±2mm (total)	-1±1mm (single side)
		- 0°16′ ± 16′(total)	-0°8′ ± 8′(single side)
	Front wheel outer incination angle	-0°42′±48′ (no load)	
	Kingpin caster angle	-2°44′±30′(no load)	
	Kingpin outer inclination angle	-11°2′ ±30′(no load)	
Rear wheel alignment parameters	Rear wheel toe	-0.8±2mm (total)	-0.42±1mm (single side)
		-0°6′ 43″± 16′(total)	-0°3′ 22″±8′(single side)
		-0°42′ ± 30′(adjustable)	

Torque Specifications

Name	Torque range	
	Metric (Nm)	British (Lb-ft)
Front vibration absorber upper and bodywork connection	60	44
Front vibration absorber and brake connection	210	154
Fix the stabilizer bar and stabilizer bar connecting rod	60	44
Fixing front stabilizer bar press plate	23	17
Bolt, A front sub-frame and bodywork connection	180	133
Resonator and front sub-frame connection	60	44
Ball pin and steering knuckle connection	100	74
Reinforced plate and front sub-frame connection	75	55

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Precautions

Precautions

1. Do not remove the steering knuckles and other parts which are not subjected to overhaul.
2. In the operation, must avoid dirt the parts and prevent foreign body entered into the parts.
3. Clean the disassembled parts with the gasoline except the rubber parts and weather them dry or wipe with the paper.
4. After the suspension parts is repaired, be sure to check the wheel alignment.
5. The oil will shorten the service life of rubber bushing. Must clean the spilled oil completely.
6. The one-off parts should not be reused.
7. Check the parts carefully before repairing or replacing them.
8. After installation, must check the specified torques of all fasteners.
9. Plug the brake oil pipe with the rubber cap to prevent the brake fluid leak when removing the pipe.
10. When installing the suspension or rubber bushing, must eventually tighten then under the conditions of the tires are grounded and there is no-load on the vehicle.

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Preparation

Special Maintenance Tools

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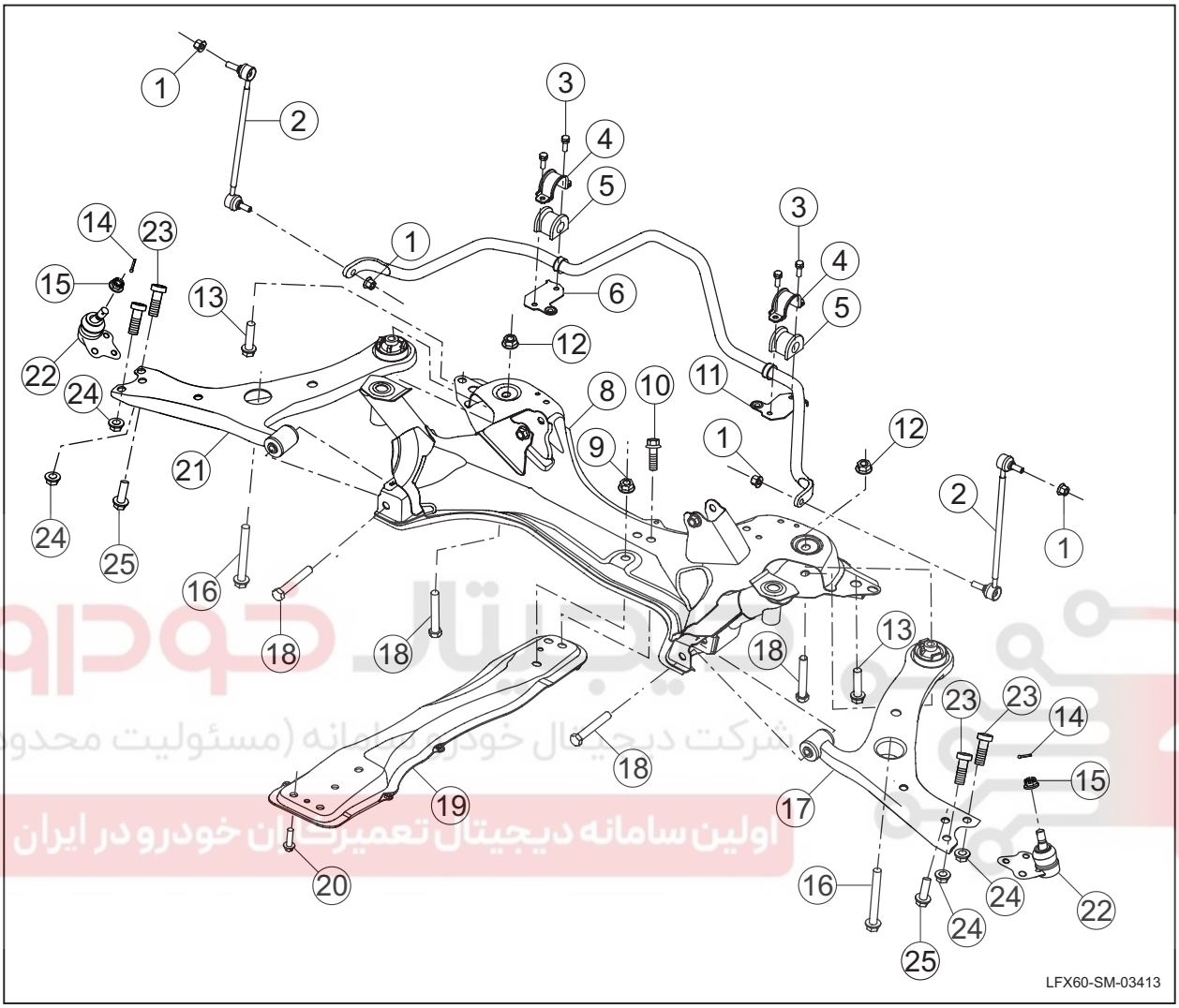
Structure and installation location

Part exploded view

Front suspension



No.	Part name
1	Hex flange nut
2	Connecting rod assembly for front transverse stabilizer bar
3	Hexagon head bolt and taper elastic washer assembly
4	Front lateral stabilizer bar buffer block upper right pressing plate
5	Buffer sleeve for front transverse stabilizer bar
6	Front lateral stabilizer bar buffer block upper right pressing plate
7	Front lateral stabilizer bar components
8	Front deputy frame assembly
9	Hex flange nut

No.	Part name
13	Hexagon flange bolt
14	Cotter pin
15	Slotted nut with hexagon flange
16	Hexagon flange bolt
17	Left front swing arm assembly
18	Hexagon flange bolt
19	Reinforced plate assembly
20	Hexagon flange bolt
21	Right front swing arm assembly
22	Ball pin assembly

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No.	Part name
10	Hexagon flange bolt
11	Front stabilizer bar bumping block lower left press plate
12	Hex flange nut

No.	Part name
23	Bolt
24	Hex flange nut
25	Hexagon flange bolt

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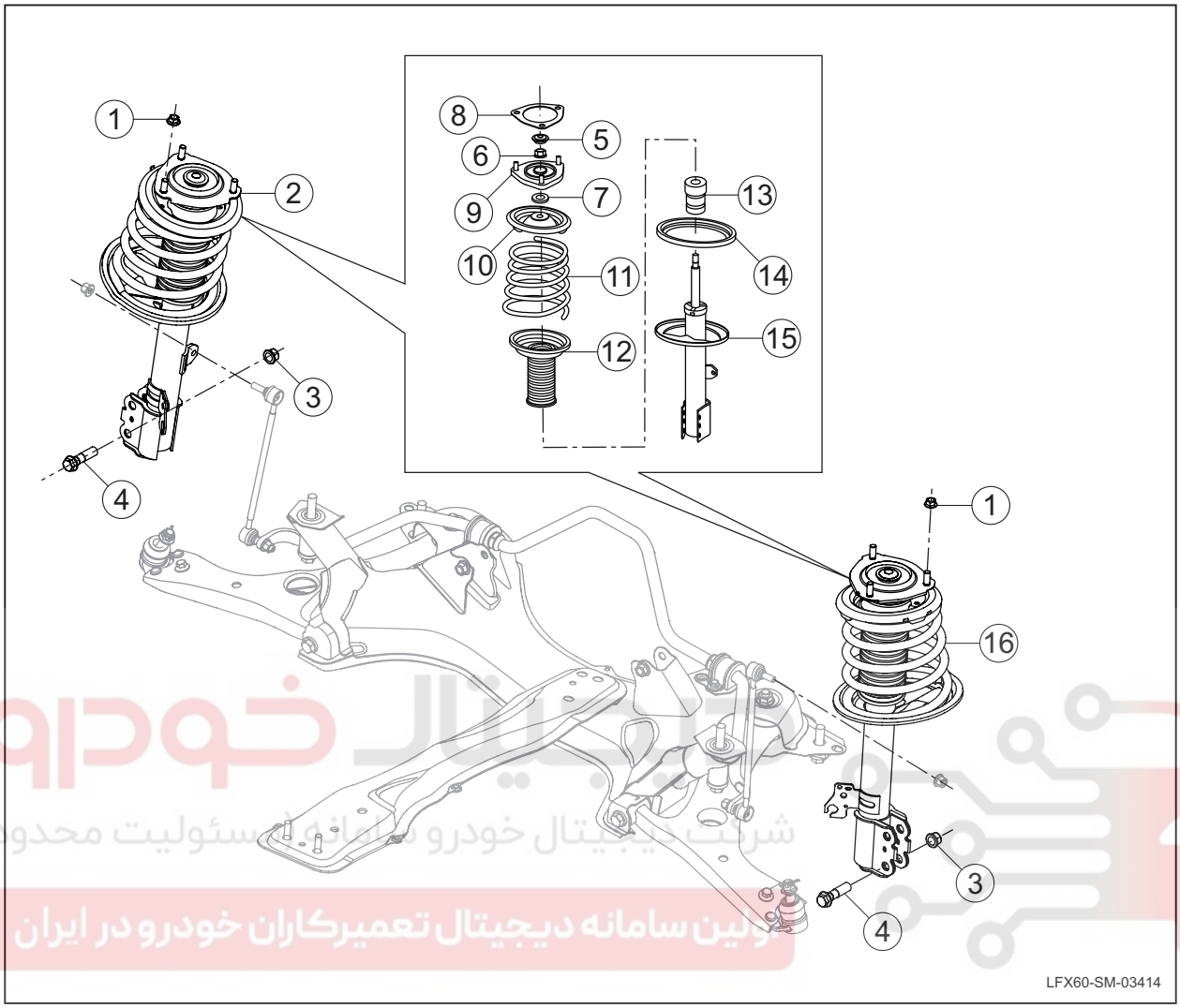
Front vibration absorber



No.	Part name
1	Hex flange nut
2	Right front shock absorber and spring assembly
3	Hex flange nut
4	Hexagon flange bolt
5	Front vibration absorber upper support seat plug
6	All-metal hexagon flange lock nut
7	Bearing oil seal
8	Front vibration absorber upper support seat gasket

No.	Part name
9	Front strut upper mounting support assembly
10	Front spring upper support seat assembly
11	Front spring
12	Vibration absorber dust boot
13	Front limiting bumping block
14	Front spring lower washer
15	Front vibration absorber assembly
16	Front right vibration absorber assembly

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General Inspection

Inspection of front vibration absorber

1. Lift the vehicle. **Refer to the vehicle lift and support.**
2. Check the vibration absorber for the following abnormal conditions.

- Front vibration absorber fastener looseness.
- Front vibration absorber oil leak.
- Front vibration absorber deformation.
- Front vibration absorber rubber seat aging, wear.
- Front vibration absorber plane bearing wear and abnormal noise.

Note:

The oil film (exudation) is allowed to occur on the front and rear vibration control system. Oil impregnate means the thick oil film accumulates on the outside of the vibration absorber shell.It is noted due to the abundant dust it absorbs.The oil impregnate is normal for the vibration absorber and it need not be replaced.The oil leak means the entire vibration control system suspension is covered by the oil while the oil drops onto the ground.The vibration absorber should be replaced.

3. Remove the front vibration absorber. **Refer to the replacement of front vibration absorber assembly.**
4. Measure the front vibration absorber length in free state.
5. Clamp the vibration absorber lower end union link to the bench clamp, pull the vibration damping rod for several time and there should be stable resistance. The upward resistance should be higher than the downward resistance. If the resistance is instable or there is no resistance, it indicates the vibration absorber is oil absent or the valve parts are damaged and should be replaced.
6. The vibration absorber should be replaced due to the inside oil starvation or valve part damage.

Note:

When removing the vibration absorber dust boot/stopper, prevent the excessive pushing of the vibration absorber push rod in the compression process so as to avoid the vibration absorber internal damage.

Place the vibration absorber on the jaw vice vertically and compress it.The compression action should be smooth and consistent.

The following conditions are abnormal.

- Vibration absorber piston rod and oil storage cylinder seizing.
- Vibration absorber oil leak.
- Vibration absorber tick tone.
- Vibration absorber return fault after installation.
- Noise (the slight swish is normal).
- With the vibration absorber push rod fully extended, the vibration absorber piston rod present swing relative to the vibration absorber shell.

Check the front swing arm and swing arm ball head

1. Lift the vehicle. **Refer to the vehicle lift and support.**
2. Check the front swing arm for evident deformation or impact.
3. Check the front swing arm ball head dust boot and front swing arm rubber bushing for evident damage.
4. Measure the steering torque of front swing arm ball head with the measuring tool.

Check the front stabilizer bar and connecting rod

1. Lift the vehicle. **Refer to the vehicle lift and support.**
2. Check the front stabilizer bar and connecting rod for the following abnormal conditions.

- Check the front stabilizer bar and connecting rod for evident deformation or impact.
- Check the front stabilizer bar and connecting rod fasteners for looseness.
- Check the stabilizer bar bushing for abnormal wear.
- Check the stabilizer bar connecting rod ball head for abnormal wear.

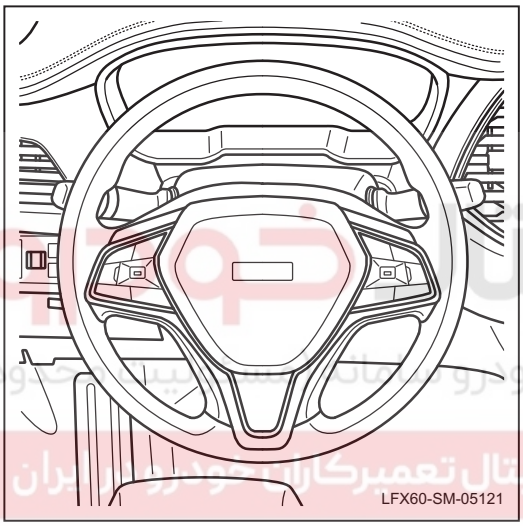
Toe-in adjustment procedure

ⓘ Note:

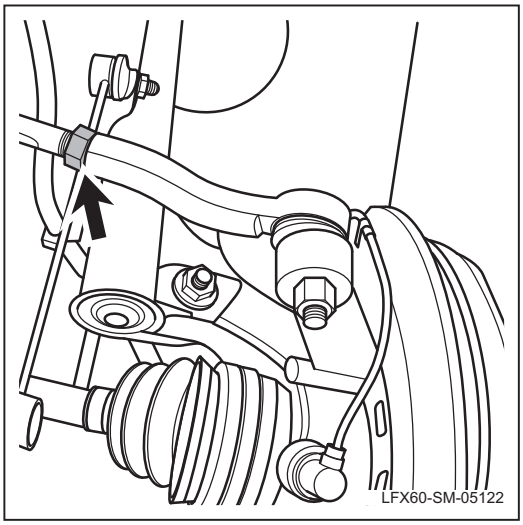
The toe-in adjustment should be made on the wheel alignment testing equipment. Check the following items before the adjustment.

- Check the tire pressure.
- Check the suspension and ensure the suspension system is in the normal position when the vehicle is pressed.
- Check the steering system components.
- Ensure the vehicle is under the kerb weight, the spare tire, jack and other driver's tools are complete and take out the rest tools or goods.

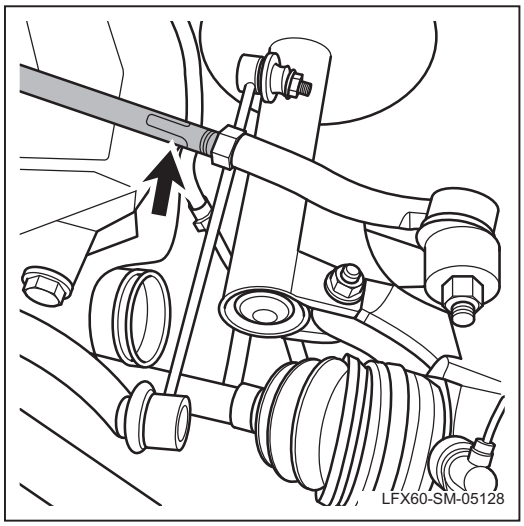
1. Turn the steering wheel to the straight drive position and lock it.



2. Unscrew the lock nuts at both ends of the outside link ball head.



3. Rotate the inside link counterclockwise or clockwise according to the measurement until the toe-in is acceptable.



ⓘ Note:

The adjustment volume at both sides (in the opposite direction) should be the same and the link difference should not exceed 3mm.

4. Tighten the lock nuts at both sides and check the toe-in.
5. Repeat the above operation until the toe-in is acceptable.

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Operating Principle

System description

The primary objective of the vehicle engineering is to ensure the steering and suspension system safe and reliable and allow the sufficient strength for each component to withstand and absorb the extreme impact.The steering system and front/rear suspension system must maintain the definite geometrical relationship with the bodywork.The steering system and suspension system require the front wheels to return automatically so as to minimize the front wheel rolling resistance and road frictional force and consequently enable the driver to control the vehicle direction with ease.The comprehensive wheel alignment inspection includes measuring the front/rear wheel toe-in angle and camber angle.The wheel alignment can ensure all the 4 wheels can rotate in the same direction accurately.After the geometrical positioning, the optimal fuel economical efficiency and tire life can be achieved and the steering performance can be optimized.

Front vibration absorber

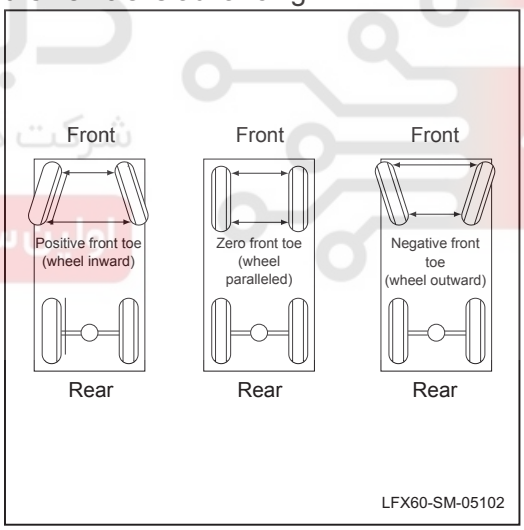
The suspension system elastic elements can generate the vibration due to the impact.To enhance the riding comfort, the suspension system elastic elements are connected with vibration absorber in parallel. The vibration absorber is mainly designed to restrain the elastic element oscillation upon rebounding after the absorption of shocks and the impact from the road surface. When passing the rough road, though the elastic element can filtrate the road vibration, the reciprocation of the elastic element self cannot be avoided. The vibration absorber is designed to restrain such motion. If the vibration absorber is too soft, the bodywork will jump up and down; if the vibration absorber is too hard, the oversize resistance will interfere with the normal operation of the elastic elements. During the suspension system refitting, the hard vibration absorber should match the hard spring, while the spring hardness related to the vehicle weight closely. Therefore, the heavy vehicle employs the harder vibration absorber in general.

Front stabilizer bar and stabilizer bar connecting rod

The front stabilizer bar is the torsion bar spring made of spring steel and installed to the vehicle front end in the transverse direction. The rod middle is connected to the front sub-frame through the rubber bushing while the both ends are connected to the front vibration absorber through the stabilizer bar to reduce the vehicle transverse side-tipping and enhance the smoothness.The front stabilizer bar is in fact a transverse torsion bar spring.In terms of function, it is a special elastic element.If the bodywork only presents the vertical motion, the deformation of suspension of both sides is the same and the front stabilizer bar does not work. In the case of vehicle turning, the bodywork will tilt, the suspension run-out of both sides is different and the outside suspension will forward press the front stabilizer bar to result in the distortion while the stabilizer bar elastic force will prevent the wheel uplifting and consequently maintain the bodywork balanced and stable in the traverse position.

Toe-in

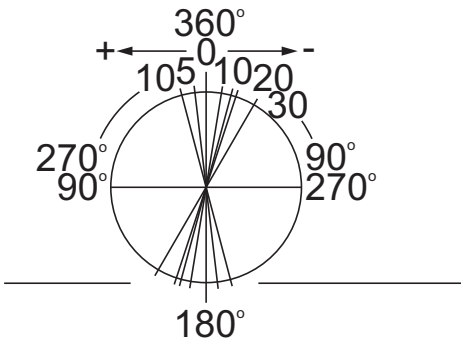
The toe-in is the distance between the left and right tire center lines measured at the same axle shaft height viewed from the vehicle front. The difference the wheel front end distance to the rear end distance is the toe-in angle.If the front end distance is larger than the rear end distance, the toe-in is negative; otherwise, the toe-in is positive.The toe-in can counteract the tiny deviation of the wheel support system when the vehicle rolls forward.The specified toe-in angle is the setting value for toe-in of 0° when the vehicle is advancing.



The incorrect toe-in will result in the abnormal wear of tires and reduce the fuel economical efficiency.Since the steering and suspension system components wear increases along with the vehicle driving, the toe-in should be adjusted to compensate such wear.

Kingpin caster angle

The caster angle is the pitch or castor of the steering axis top point deviation from the vertical plane when viewed from the vehicle side.The castor is positive (+) while the pitch is negative (-).The caster angle impacts the vehicle linear stability at the high speed running and wheel alignment function.



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Outer inclination angle

The camber angle is the angle of tire top deviation from the vertical plane when viewed from the vehicle front end.The camber angle is positive (+) in the case of outward tire inclination; the camber angle is negative (-) in the case of inward tire inclination.The camber angle is the angle deviation from the vertical plane and it impacts the direction control and tire wear.If the positive camber angle is too large, the rapid wear of outside tire shoulder will occur; if the negative camber angle is too large, the rapid wear of inside tire shoulder will occur. The camber angle of this vehicle cannot be adjusted.

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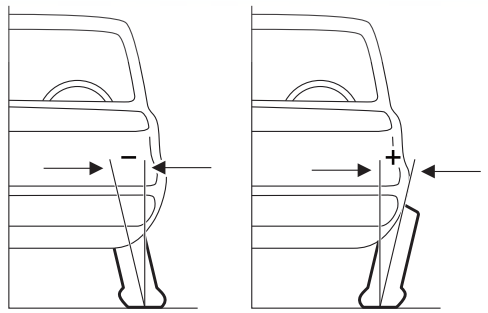

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Diagnostic Information and Procedures

Diagnosis Instructions

Before the front suspension system fault diagnosis, learn about the operating principle of front suspension system fisrt.This helps to determine the correct fault diagnosis procedures and whether the conditions described by the customer are the nomral operation.

The front suspension system fault diagnosis must start from the inspection of front suspension system.Instruct the maintenance man to take the next logic procedures and complete the fault diagnosis.Comprehend and correctly use the diagnostic flow chart to shorten the diagnosis time and avoid the misjudgement.

Visual Check

1. Confirm the problem raised by the customer.
2. Check the evident mechanical faults.

Visual inspection table

Mechanical
• Front suspension fastener • Front swing arm • Front swing arm ball head • Vibration absorber • Front stabilizer bar • Stabilizing connecting rod • Rubber bushing • Front deputy frame

3. Solve the problem finding before the next step inspection.
4. If the observed or raised problem is the evident and the cause has been found, ensure to fix this fault before proceeding with the next step.
5. If no problem is found through the visual check, confirm the fault and refer to the fault symptom list.

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List of fault symptoms

Symptom	Possible point of failure	Recommended Measures
Different height of bodywork side to side	• Wheel and tire, tire pressure • Front vibration absorber • Rear vibration absorber • Front swing arm and front swing arm ball head	**Refer to: Diagnosis flow for different height of bodywork side to side**
Wheel tread error	• Front suspension component • Rear suspension component • Front wheel bearing • Incorrect wheel alignment	**Refer to: Diagnosis flow for wheel tread error**
Abnormal front tire wear	• Incorrect wheel alignment • Wheel and tire, tire pressure • Front wheel bearing • Front suspension component	**Refer to: Diagnosis flow for abnormal front tire wear**
Bodywork swing while running	• Wheel and tire • Front wheel bearing • Rear suspension component • Front suspension component • Steering system	**Refer to: Diagnosis flow for bodywork swing while running**
Front suspension noise	• Front suspension component fastener looseness • Front vibration absorber and rubber seat • Vibration absorber plane bearing • Front swing arm and front swing arm ball head • Front stabilizer bar and rubber gasket • Front stabilizer bar link rod and rubber gasket • Front wheel bearing	**Refer to: Diagnosis flow for front suspension noise**

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Symptom	Possible point of failure	Recommended Measures
Symptom Riding comfort (the front suspension too soft or too hard)	• Wheel and tire, abnormal tire pressure • Check the front vibration absorber • Rear vibration absorber • Rear helical spring	**Refer to: Diagnosis flow for riding comfort (the rear suspension too soft or too hard)**

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Diagnosis flow for different height of bodywork side to side

Test condition	Details/results/measures
1. Check the wheel, tire and tire pressure.	
	A. Check the wheel and tire specification. B. Check whether the tire pressure is normal. Is it OK after checking? →**Yes** To step 2. →**No** Adjust the tire pressure or replace the wheel and tire. **Refer to: Replacement of the wheel.**
2.Check the front vibration absorber.	
	A. Check the front vibration absorber for oil leak. B. Check the vibration absorber rubber seat for abnormal wear. C. Check the vibration absorber spring for damage. Is it OK after checking? →**Yes** To step 3. →**No** Replace the vibration absorber damaged components.
3. Check the rear vibration absorber.	
	A. Check the rear vibration absorber for oil leak. B. Check the rear helical spring for damage. Is it OK after checking? →**Yes** To step 4. →**No** Replace the rear vibration absorber. **Refer to: Replacement of the rear vibration absorber.** Replace the rear helical spring. **Refer to: Replacement of the rear helical spring.**
4. Check the front swing arm.	
	A. Check the front swing arm for deformation. B. Check the front swing arm rubber bushing for wear. Is it OK after checking? →**Yes** To step 5. →**No** Replace the front swing arm. **Refer to: Replacement of the front swing arm.**

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Test condition	Details/results/measures
5.Vibration absorber working stand test	
	A. Lift the vehicle. B. Remove the vibration absorber. C. Carry out the vibration absorber working stand test. Refer to: Vibration absorber working stand test Is it OK after checking? →**Yes** Repair other suspension components. →**No** Replace the vibration absorber. **Refer to: Replacement of the front vibration absorber assembly.** **Refer to: Replacement of the rear vibration absorber.**

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Diagnosis flow for wheel tread error

Test condition	Details/results/measures
1. Check the front suspension components.	
	A. Lift the vehicle. B. Check the front suspension components for damage. Is it OK after checking? →**Yes** To step 2. →**No** Repair or replace the damaged components.
2. Check the rear suspension components.	
	A. Check the rear suspension components for damage. Is it OK after checking? →**Yes** To step 3. →**No** Repair or replace the damaged components.
3. Wheel alignment.	
	A. Carry out the wheel alignment. Confirm the fault is solved

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Diagnosis flow for abnormal tire wear

Test condition	Details/results/measures
1. Check the wheel, tire and tire pressure.	
	A. Check the wheel and tire specification. B. Check whether the tire pressure is normal. Is it OK after checking? →**Yes** To step 2. →**No** Adjust the tire pressure or replace the wheel and tire. Refer to: Replacement of the wheel.
2. Check the wheel balance.	
	A. Lift the vehicle. B. Remove the wheel. **Refer to: Replacement of the wheel.** C. Check the wheel dynamic balance on the balancing machine. Is it OK after checking? →**Yes** To step 3. →**No** Balance the wheel.
3. Check the front suspension components.	
	A. Check the front suspension fasteners for looseness. B. Check the front suspension components for damage. Is it OK after checking? →**Yes** To step 4. →**No** Repair or replace the damaged components.
4. Check the rear suspension components.	
	A. Check the rear suspension fasteners for looseness. B. Check the rear suspension components for damage. Is it OK after checking? →**Yes** To step 5. →**No** Repair or replace the damaged components.
5. Wheel alignment.	
	A. Check the rear suspension components for damage. Is it OK after checking? →**Yes** To step 3. →**No** Repair or replace the damaged components.

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Diagnosis flow for front suspension noise

Note:

Before the front suspension noise diagnosis and repair, determine the tire, exhaust system, interior/exterior trims, rear suspension, steering system, clutch and transmission propeller shaft are free of abnormal noise.

Test condition	Details/results/measures
1. Check the front suspension fasteners for looseness.	
	A. Lift the vehicle. B. Check the front suspension fasteners for looseness. Is it OK after checking? →**Yes** To step 2. →**No** Tighten or replace the front suspension fasteners.
2. Check the front vibration absorber.	
	A. Check the front vibration absorber for leak. B. Check the rubber seat for aging and wear. C. Check the front vibration absorber plane bearing for abnormal noise. Is it OK after checking? →**Yes** To step 3. →**No** Replace the front vibration absorber. **Refer to: Replacement of the front vibration absorber assembly.**
3. Check the front swing arm and front swing arm ball head.	
	A. Check the front swing arm rubber bushing for excessive wear. B. Check the front swing arm ball head for damage. Is it OK after checking? →**Yes** To step 4. →**No** Replace the front swing arm or front swing arm ball head. **Refer to: Replacement of the front swing arm assembly.**

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Test condition	Details/results/measures
4. Check the front stabilizer bar and rubber bushing.	
	A. Check the front stabilizer bar fasteners for looseness. B. Check the front stabilizer bar rubber bushing for aging and wear. Is it OK after checking? →**Yes** To step 5. →**No** Replace the front stabilizer bar or rubber bushing. **Refer to:Replacement of front stabilizer bar**
5. Check the stabilizer bar connecting rod.	
	A. Check the stabilizer bar connecting rod fasteners for looseness. B. Check the stabilizer bar link rod ball head for wear clearance. Is it OK after checking? →**Yes** To step 6. →**No** Replace the front stabilizer bar connecting rod. **Refer to: Replacement of connecting rod assembly**
6. Check the front wheel bearing.	
	A. Seize the wheel bottom and top and shake it forcibly to check the bearing for excessive looseness. B. Rotate the front wheel and check the working conditions. Is it OK after checking? →**Yes** To step 7. →**No** Replace the front wheel bearing.
7. Check the other noise.	
	A. Check the other noise. B. Carry out trial run. Confirm the fault is eliminated

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Diagnosis flow for abnormal driving trace (unable to maintain linear driving)

Test condition	Details/results/measures
1. Check the wheel, tire and tire pressure.	
	A. Check the wheel and tire specification. B. Check whether the tire pressure is normal. Is it OK after checking? →**Yes** To step 2. →**No** Adjust the tire pressure or replace the wheel and tire. **Refer to: Replacement of the wheel.**
2. Check the front wheel bearing.	
	A. Check the front wheel bearing for looseness or excessive wear. Is it OK after checking? →**Yes** To step 3. →**No** Replace the front wheel bearing.
3.Check the steering system.	
	A. Check the steering system fasteners for looseness. B. Check the steering system components for damage. Is it OK after checking? →**Yes** To step 4. →**No** Repair or replace the damaged components.
4. Check the front suspension components.	
	A. Check the front suspension fasteners for looseness. B. Check the front suspension components for damage. Is it OK after checking? →**Yes** To step 5. →**No** Repair or replace the damaged components.

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Test condition	Details/results/measures
5. Check the rear suspension components.	
	A. Check the rear suspension fasteners for looseness. B. Check the rear suspension components for damage. Is it OK after checking? →**Yes** To step 6. →**No** Repair or replace the damaged components.
6. Wheel alignment.	
	A. Carry out the wheel alignment. B. Carry out trial run. Confirm that the fault has been ruled out.

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Diagnosis flow for vibration upon driving

Test condition	Details/results/measures
1. Check the wheel, tire and tire pressure.	
	A. Check the wheel and tire specification. B. Check whether the tire pressure is normal. Is it OK after checking? →**Yes** To step 2. →**No** Adjust the tire pressure or replace the wheel and tire. **Refer to: Replacement of the wheel.**
2. Check the front wheel bearing.	
	A. Seize the wheel bottom and top and shake it forcibly to check the bearing for excessive looseness. B. Rotate the front wheel and check the wheel bearing working conditions. Is it OK after checking? →**Yes** To step 3. →**No** Replace the front wheel bearing.
3. Check the rear wheel bearing.	
	A. Seize the wheel bottom and top and shake it forcibly to check the bearing for excessive looseness. B. Rotate the rear wheel and check the wheel bearing working conditions. Is it OK after checking? →**Yes** To step 4. →**No** Replace the rear wheel bearing.
4. Check the front suspension components.	
	A. Check the front suspension fasteners for looseness. B. Check the front suspension components for damage. Is it OK after checking? →**Yes** To step 5. →**No** Repair or replace the damaged components.

دیجیتال خودرو سامانه (مسئولیت محدود)
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Test condition	Details/results/measures
5. Check the rear suspension components.	
	A. Check the rear suspension fasteners for looseness. B. Check the rear suspension components for damage. Is it OK after checking? →**Yes** To step 6. →**No** **Repair or replace the damaged components.**
6. Check the steering system components.	
	A. Check the steering system fasteners for looseness. B. Check the steering system components for damage. Is it OK after checking? →**Yes** To step 7. →**No** Repair or replace the damaged components.
7. Wheel alignment.	
	A. Carry out the wheel alignment. B. Carry out trial run. Confirm that the fault has been ruled out.

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Diagnosis flow for riding comfort (the rear suspension too soft or too hard)

Test condition	Details/results/measures
1. Check the wheel, tire and tire pressure.	
	A. Check the wheel and tire specification. B. Check whether the tire pressure is normal. Is it OK after checking? →**Yes** To step 2. →**No** Adjust the tire pressure or replace the wheel and tire. **Refer to: Replacement of the wheel.**
2. Check the front vibration absorber.	
	A. Lift the vehicle. B. Check the front vibration absorber for oil leak. C. Check the front vibration absorber spring for deformation and fracture. Is it OK after checking? →**Yes** To step 3. →**No** Replace the front vibration absorber assembly. **Refer to: Replacement of the front vibration absorber assembly.**
3. Check the rear vibration absorber.	
	A. Check the rear vibration absorber for oil leak. Is it OK after checking? →**Yes** To step 4. →**No** Replace the rear vibration absorber. **Refer to: Replacement of the rear vibration absorber.**
4. Check the rear helical spring.	
	A. Check the rear suspension fasteners for looseness. B. Check the rear suspension components for damage. Is it OK after checking? →**Yes** To step 6. →**No** Repair or replace the damaged components.

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Test condition	Details/results/measures
5. Vibration absorber working stand test.	
	A. Lift the vehicle. B. Remove the vibration absorber. C. Carry out the vibration absorber working stand test. Is it OK after checking? →**Yes** Repair other suspension components. →**No** Replace the vibration absorber. **Refer to: Replacement of the front vibration absorber assembly.** **Refer to: Replacement of the rear vibration absorber.**

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Removal and Installation

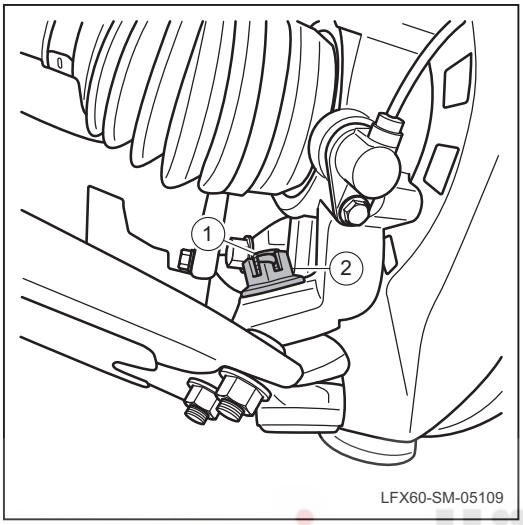
Replacement of front swing arm assembly

Removal

1. Remove the front swing arm assembly.

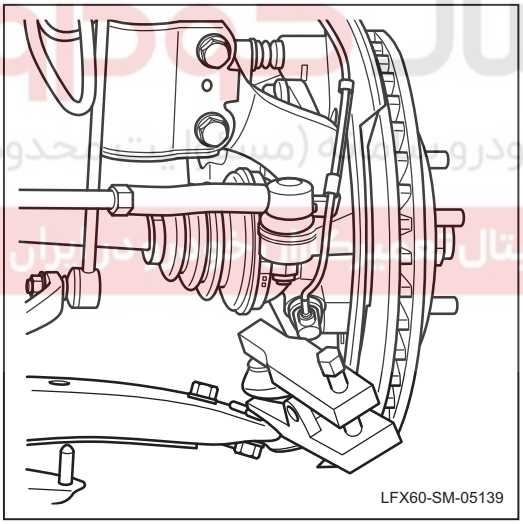
(a). Lift the vehicle. Refer to the vehicle lift and support.

(b). Remove the front wheel. Refer to the replacement of wheel.



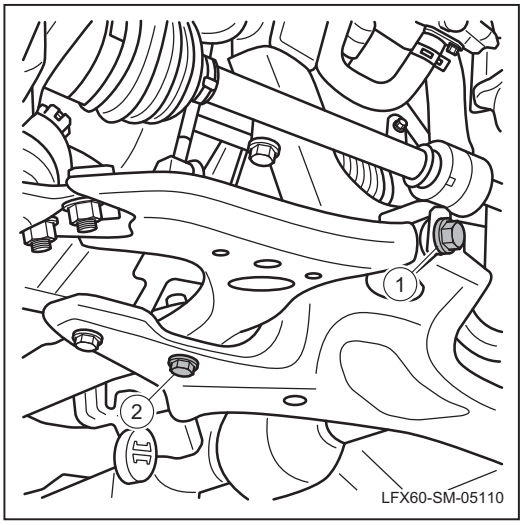
(c). Remove the front swing arm ball head ball pin 1.

(d). Remove the front swing arm ball head fixing nut 2.



(e). Disconnect the front swing arm ball head and front steering knuckle with the ball head puller.

شرکت دیجیتال خودرو
اولین سامانه دیجیتال



(f). Remove the front swing arm assembly fixing bolt 1.
Torque: 180Nm
(g). Remove the front swing arm assembly fixing bolt 2.
Torque: 180Nm
(h). Take down the front swing arm assembly.

Installation

1. Install the front swing arm assembly.

(a). The installation sequence is the reverse of the disassembly order.

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شرکت دیجیتال خودرو سامانه (مسئولیت محدود)
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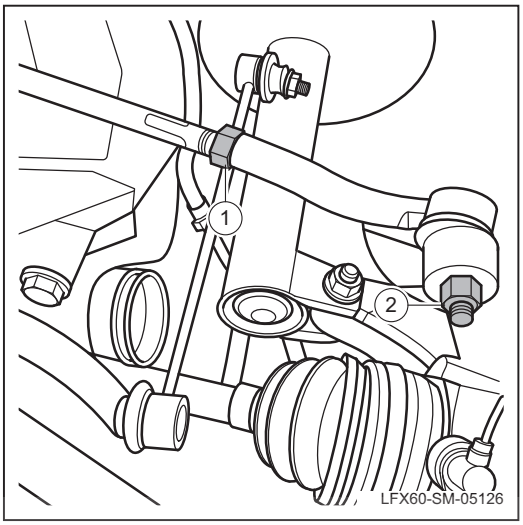
Replacement of steering tie rod outside ball head

Removal

1. Removal the steering tie rod outside ball head.

(a). Lift the vehicle. **Refer to the vehicle lift and support.**

(b). Remove the front wheel. **Refer to the replacement of wheel.**



(c). Unscrew the lock nut 1 of the outside link ball head.

(d). Remove the fixing nut 2 of steering tie rod outside ball head.

(e). Disconnect the steering tie rod outside ball head with the ball head puller.

(f). Remove the steering tie rod outside ball head.

Installation

1. Install the steering tie rod outside ball head.

(a). The installation sequence is the reverse of the disassembly order.

Note:

After replacing the outside link ball head, carry out the wheel alignment.

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اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

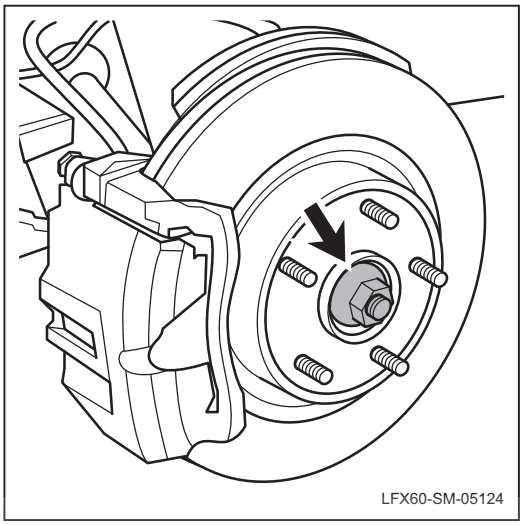
Replacement of front wheel steering knuckle

Removal

1. Remove the front wheel steering knuckle.

(a). Lift the vehicle. **Refer to the vehicle lift and support.**

(b). Remove the front wheel. **Refer to the replacement of wheel.**

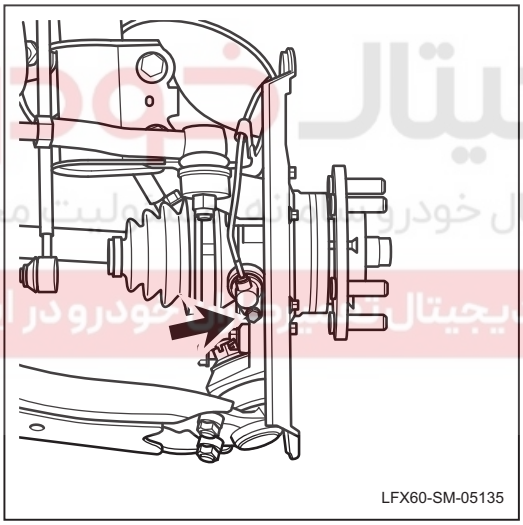

LFX60-SM-05124

(c). Depress the brake pedal and remove the propeller shaft connecting nut.

Torque: 280Nm

(d). Remove the brake tongs.Refer to the replacement of front brake tongs.

(e). Remove the front brake disc.Refer to the replacement of front brake disc.


LFX60-SM-05135

(f). Remove the wheel speed sensor.

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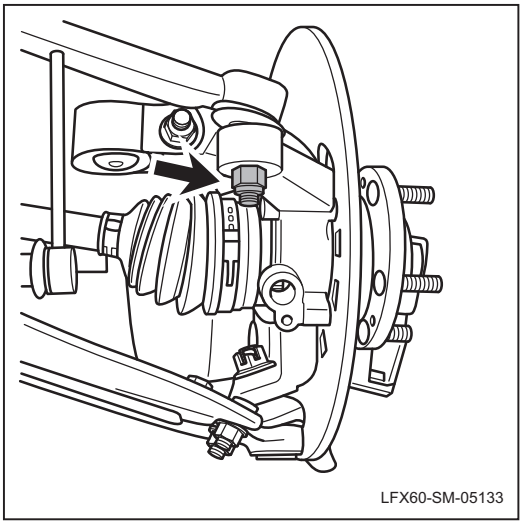
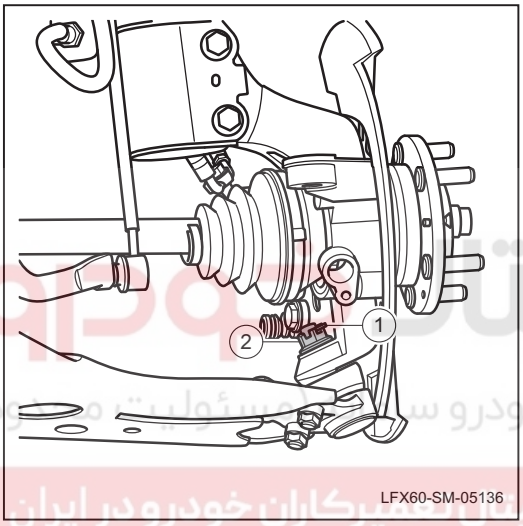

LFX60-SM-05133

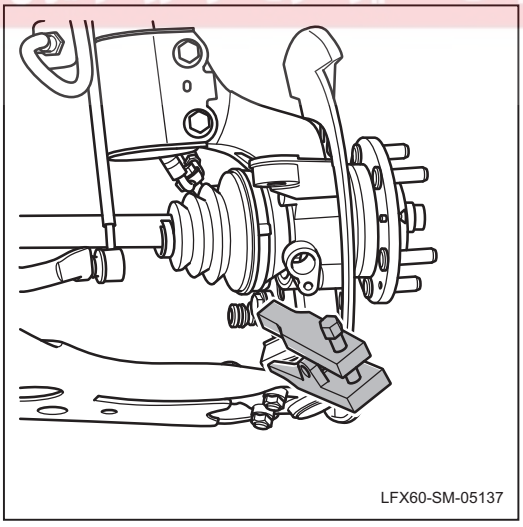
(g). Remove the fixing nut of steering tie rod outside ball head.

(h). Disconnect the steering tie rod outside ball head with the ball head puller.



LFX60-SM-05136

(i). Remove the front swing arm ball head ball pin 1 and fixing nut 2.


LFX60-SM-05137

(j). Disconnect the front swing arm ball head with the ball head puller.

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)
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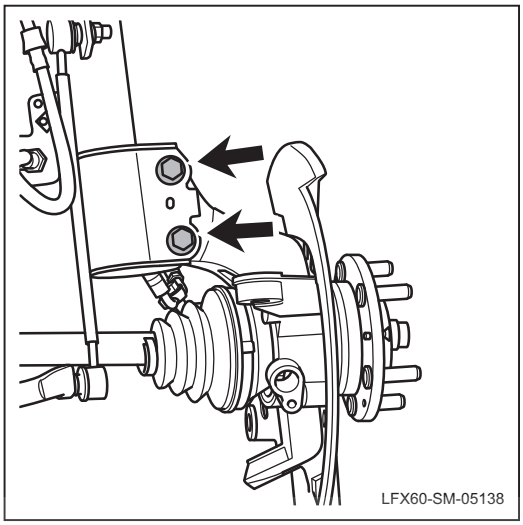
Replacement of front wheel steering knuckle

Removal

1. Remove the front wheel steering knuckle.

(a). Lift the vehicle. **Refer to the vehicle lift and support.**

(b). Remove the front wheel. **Refer to the replacement of wheel.**



(k). Remove the fixing bolt of vibration absorber and steering knuckle.

Torque: 210Nm

(l). Take down the front wheel steering knuckle.

Installation

1. Install the front wheel steering knuckle.

(a). The installation sequence is the reverse of the disassembly order.

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شرکت دیجیتال خودرو سامانه (مسئولیت محدود)
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Replacement of front stabilizer bar

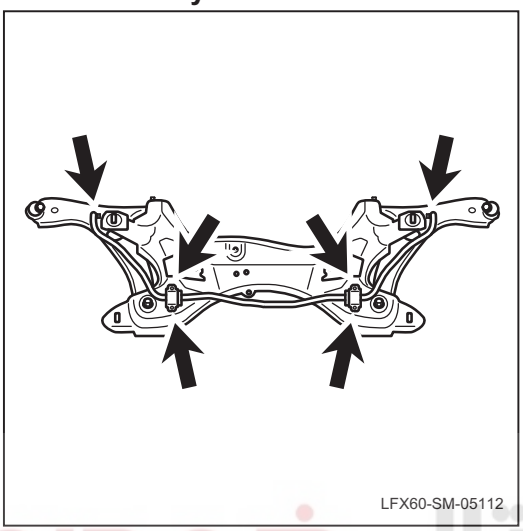
Removal

1. Remove the front stabilizer bar.

(a). Lift the vehicle. **Refer to the vehicle lift and support.**

(b). Remove the front wheel. **Refer to the replacement of wheel.**

(c). Remove the front sub-frame assembly. **Refer to the replacement of front sub-frame assembly.**



(d). Remove the front stabilizer bar fixing bolt and take down the front stabilizer bar.

Installation

1. Install the front stabilizer bar.

(a). The installation sequence is the reverse of the disassembly order.

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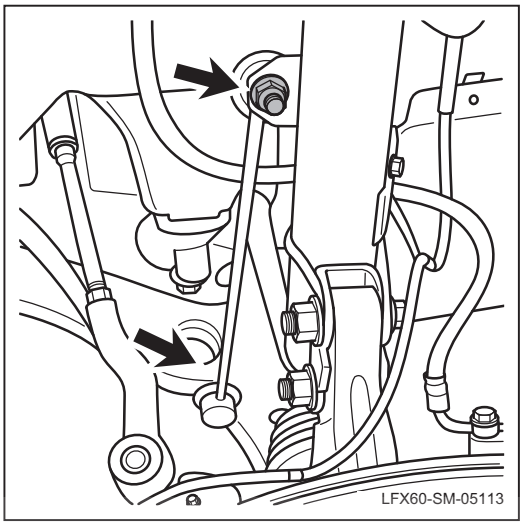
Replacement of front stabilizer bar connecting rod assembly

Removal

1. Remove the front stabilizer bar connecting rod assembly.

(a). Lift the vehicle. **Refer to the vehicle lift and support.**

(b). Remove the front wheel. **Refer to the replacement of wheel.**



(c). Remove the fixing nut of front stabilizer bar connecting rod.

Torque: 60Nm

(d). Take down the front stabilizer bar connecting rod assembly.

Installation

1. Install the front stabilizer bar connecting rod assembly.

(a). The installation sequence is the reverse of the disassembly order.

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Replacement of front vibration absorber assembly

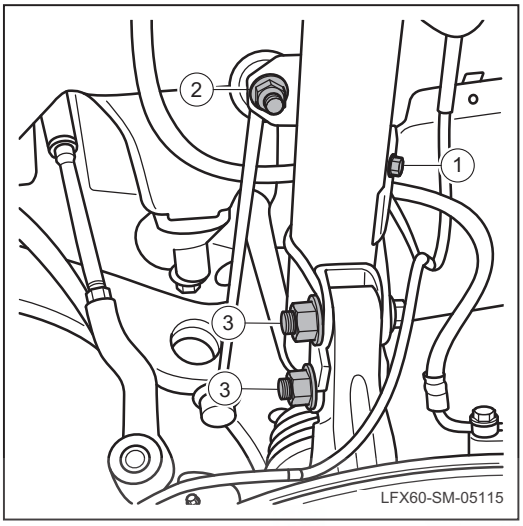
Removal

1. Remove the front vibration absorber assembly.

(a). Remove the upper fixing nut of front vibration absorber assembly.

(b). Lift the vehicle. **Refer to the vehicle lift and support.**

(c). Remove the front wheel. **Refer to the replacement of wheel.**



(d). Remove the fixing bolt 1 of the front wheel speed sensor harness.

(e). Remove the front brake fluid pipe fixing clip.

(f). Remove the fixing nut 2 of front stabilizer bar connecting rod.

(g). Remove the fixing nut assembly 3 of front vibration absorber assembly and front steering knuckle.

Torque: 210Nm

(h). Take down the front vibration absorber assembly.

1. Install the front vibration absorber assembly.

(a). The installation sequence is the reverse of the disassembly order.

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شرکت دیجیتال خودرو سامانه (مسئولیت محدود)
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

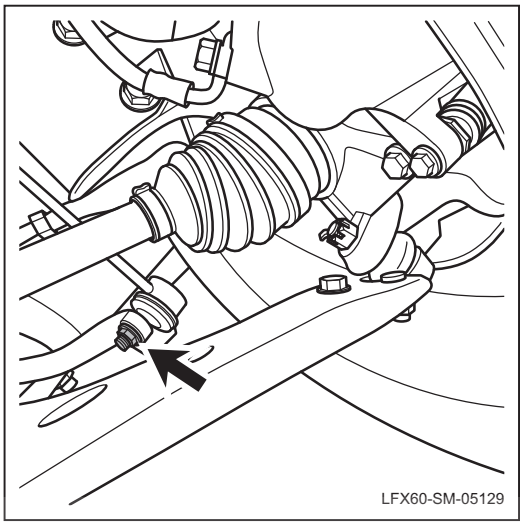
Replacement of front sub-frame assembly

Removal

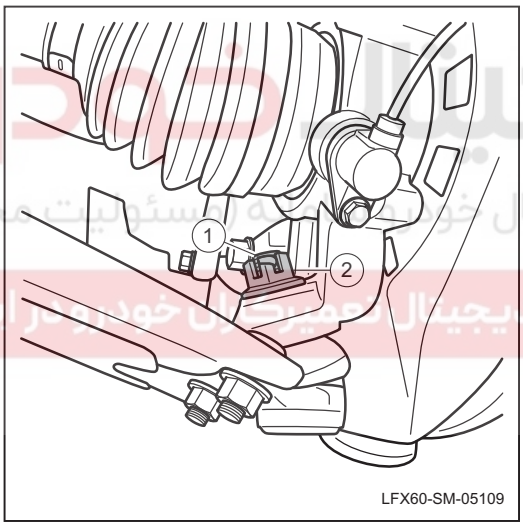
1. Remove the front sub-frame assembly.

(a). Lift the vehicle. **Refer to the vehicle lift and support.**

(b). Remove the front wheel. **Refer to the replacement of wheel.**



(c). Remove the lower fixing nut of front stabilizer bar connecting rod.



(d). Remove the front swing arm ball head ball pin 1.

(e). Remove the front swing arm ball head fixing nut 2.

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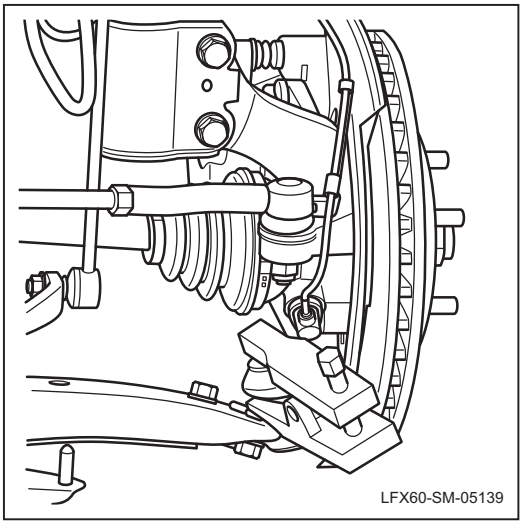
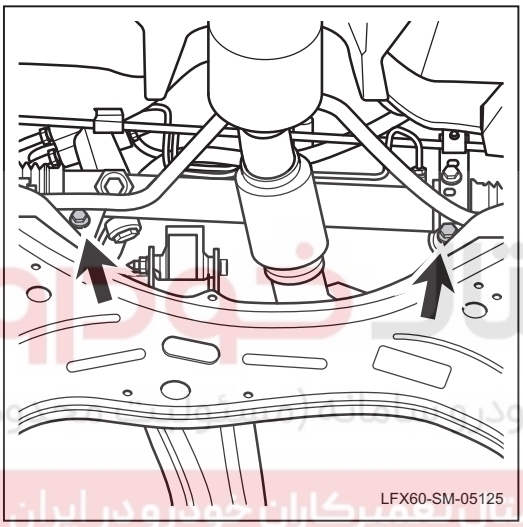
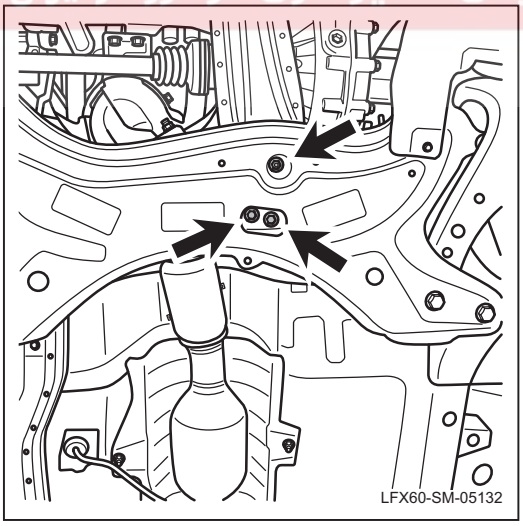
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



(f). Disconnect the front swing arm ball head and front steering knuckle with the ball head puller.



(g). Remove the steering gear fixing bolts.
Torque: 90Nm



(h). Remove the 2 fixing bolts and 1 fixing nut of transmission rear mounting.

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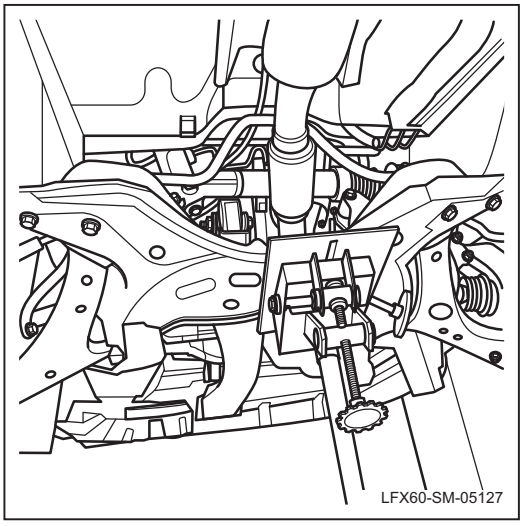
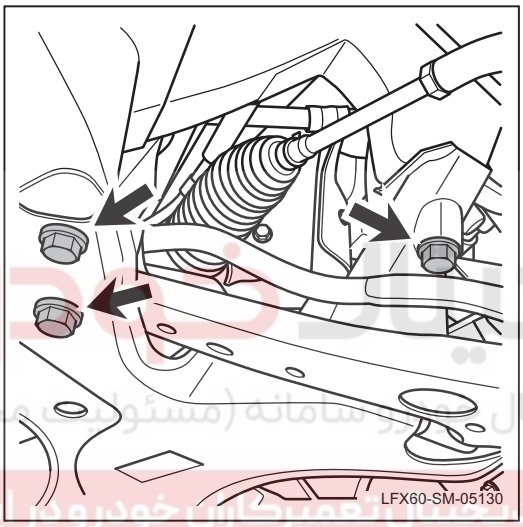
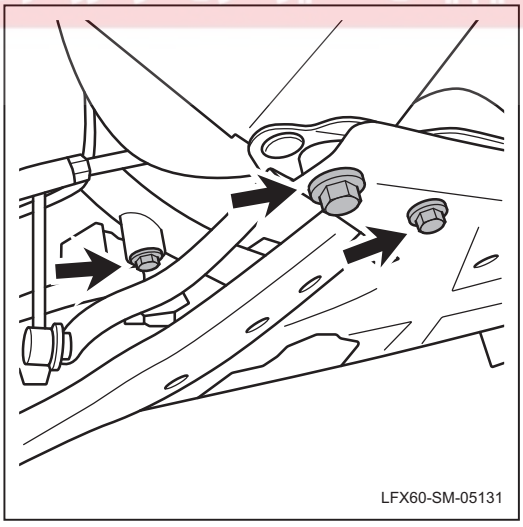


(i). Support the front sub-frame assembly with the jack.



(j). Remove the front sub-frame assembly right fixing bolt.

Torque: 180Nm



(k). Remove the front sub-frame assembly left fixing bolt.

Torque: 180Nm

(l). Slowly set down the jack and take down the front sub-frame assembly.

Installation

1. Install the front sub-frame assembly.

(a). The installation sequence is the reverse of the disassembly order.

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05 - Driving system

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شرکت دیجیتال خودرو سامانه (مسئولیت محدود)
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Rear suspension

Technical specifications

General specifications

Name		Specification	
Front wheel alignment parameters	Front wheel toe	-2±2mm (total)	-1±1mm (single side)
		- 0°16′ ± 16′(total)	-0°8′ ± 8′(single side)
	Front wheel outer incination angle	-0°42′±48′ (no load)	
	Kingpin caster angle	-2°44′±30′(no load)	
	Kingpin outer inclination angle	-11°2′ ±30′(no load)	
Rear wheel alignment parameters	Rear wheel toe	-0.8±2mm (total)	-0.42±1mm (single side)
		-0°6′ 43″± 16′(total)	-0°3′ 22″±8′(single side)
	Rear wheel toe	-0°42′ ± 30′(adjustable)	

Torque Specifications

Name	Torque range	
	Metric(Nm)	British (Lb-ft)
Rear sub-frame front section and bodywork connection	90	66
Upper and lower cross arm and rear longitudinal arm connection	90	66
Rear sub-frame and upper cross arm connection	90	66
Rear longitudinal arm and bodywork connection (eccentric bolt)	90	66
Rear sub-frame and lower swing arm connection	120	89
Fixing rear stopper support assembly	23	17
Rear stabilizer bar fixing plate connection	23	17
Rear vibration absorber bracket and rear longitudinal arm	70	52
Vibration absorber mounting bracket and longitudinal arm connection	60	44
Rear vibration absorber upper and bodywork connection	70	52
Fix the stabilizer bar and stabilizer bar connecting rod	60	44

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Precautions

Precautions

1. Do not remove the steering knuckles and other parts which are not subjected to overhaul.
2. In the operation, must avoid dirt the parts and prevent foreign body entered into the parts.
3. Clean the disassembled parts with the gasoline except the rubber parts and weather them dry or wipe with the paper.
4. After the suspension parts is repaired, be sure to check the wheel alignment.
5. The oil will shorten the service life of rubber bushing. Must clean the spilled oil completely.
6. The one-off parts should not be reused.
7. Check the parts carefully before repairing or replacing them.
8. After installation, must check the specified torques of all fasteners.
9. Plug the brake oil pipe with the rubber cap to prevent the brake fluid leak when removing the pipe.
10. When installing the suspension or rubber bushing, must eventually tighten then under the conditions of the tires are grounded and there is no-load on the vehicle.

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

Preparation

Special Maintenance Tools

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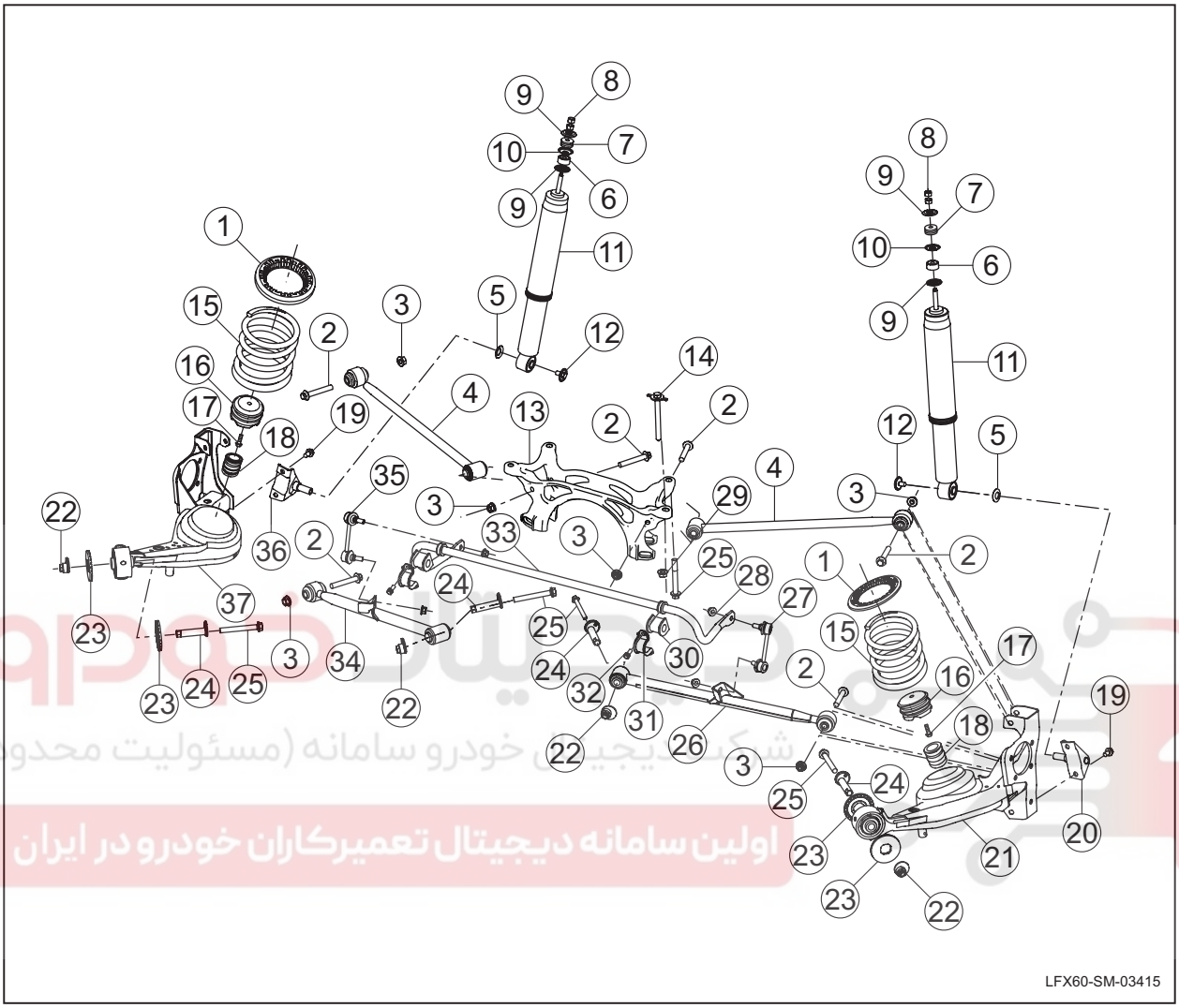
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

Structure and installation location

Part exploded view

Rear suspension



No.	Part name
1	Spring upper pad
2	Hexagon flange bolt
3	Hex flange nut
4	Rear suspension and front upper transverse arm assembly
5	Rear vibration absorber lower mounting gasket II
6	Crash pad
7	Crash pad II
8	Hex flange nut
9	Upper mounting gasket
10	Upper mounting gasket II

No.	Part name
20	Rear vibration absorber left mounting bracket assembly
21	Rear suspension front left lower longitudinal arm assembly
22	Eccentric sleeve
23	Crash pad
24	Eccentric shaft
25	Hexagon flange bolt
26	Rear suspension front left lower cross arm assembly
27	Rear stabilizer bar left connecting rod assembly
28	Hex flange nut
29	Hex flange nut

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No.	Part name
11	Rear shock absorber assembly (RR)
12	Rear vibration absorber lower mounting bolt
13	Rear sub-frame assembly
14	Rear sub-frame front mounting bolt assembly
15	Rear spring assembly
16	Rear stopper support assembly
17	Hexagon head bolt and spring washer assembly
18	Rear stopper
19	Hexagon flange bolt

No.	Part name
30	Buffer sleeve of rear transverse stabilizer bar
31	Rear stabilizer bar bumping block upper left press plate
32	Hexagon head bolt and spring washer assembly
33	Rear transverse stabilizer bar assembly.
34	Rear suspension front right lower cross arm assembly
35	Rear stabilizer bar right connecting rod assembly
36	Rear vibration absorber right mounting bracket assembly
37	Rear suspension front right lower longitudinal arm assembly

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General Inspection

Inspection of rear vibration absorber

1. Lift the vehicle. **Refer to the vehicle lift and support.**
2. Check the rear vibration absorber for the following abnormal conditions.

- Rear vibration absorber fixing bolt looseness.
- Rear vibration absorber deformation.
- Rear vibration absorber bushing aging, wear.
- Rear vibration absorber leak.

ⓘ Note:

The oil film (exudation) is allowed to occur on the front and rear vibration control system.Oil impregnate means the thick oil film accumulates on the outside of the vibration absorber shell.It is noted due to the abundant dust it absorbs.The oil impregnate is normal for the vibration absorber and it need not be replaced.The oil leak means the entire vibration control system suspension is covered by the oil while the oil drops onto the ground.The vibration absorber should be replaced.

3. Remove the rear vibration absorber. Refer to the replacement of rear vibration absorber.
4. Measure the rear vibration absorber length in free state.
5. Clamp the vibration absorber lower end union link to the bench clamp, pull the vibration damping rod for several time and there should be stable resistance. The upward resistance should be higher than the downward resistance. If the resistance is instable or there is no resistance, it indicates the vibration absorber is oil absent or the valve parts are damaged and should be replaced.

Vibration absorber working sta4

The vibration absorber is full of compressed gas inside and at full length when not limited.If not, it indicates the vibration absorber is damaged and must be replaced.Check the total length of the vibration control system.If the total length is not reached, it means a certain component is unacceptable and the vibration control system should be replaced.

Place the vibration absorber on the jaw vice vertically and compress it.The compression action should be smooth and consistent.

The following conditions are abnormal.

- Vibration absorber piston rod and oil storage cylinder seizing.
- Vibration absorber oil leak.
- Vibration absorber tick tone.
- Vibration absorber return fault after installation.
- Noise (the slight swish is normal).
- With the vibration absorber push rod fully extended, the vibration absorber piston rod present swing relative to the vibration absorber shell.

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Operating Principle

System description

This vehicle adopts the independent rear suspension system, which are featured with the following advantages: simple suspension structure, light in weight, low assembly working hours.low space occupation, spring vibration damping system easy to lay out and facilitating the control of wheel motion ratio relative to the spring damping and low toe-in and tread change in the suspension motion.In the case of lateral force, the camber angle change is low, the linear stability is excellent and the rear tire wear is low, which can maintain the vehicle riding comfort and control stability.The rear suspension system mainly consists of the rear longitudinal arm assembly, rear helical spring, rear vibration absorber and rear bumping block.

Part instructions

Rear vibration absorber

The suspension system elastic elements can generate the vibration due to the impact.To enhance the riding comfort, the suspension system elastic elements are connected with vibration absorber in parallel.The vibration absorber is mainly designed to restrain the elastic element oscillation upon rebounding after the absorption of shocks and the impact from the road surface.When passing the rough road, though the elastic element can filtrate the road vibration, the reciprocation of the elastic element self cannot be avoided. The vibration absorber is designed to restrain such motion. If the vibration absorber is too soft, the bodywork will jump up and down; if the vibration absorber is too hard, the oversize resistance will interfere with the normal operation of the elastic elements. During the suspension system refitting, the hard vibration absorber should match the hard spring, while the spring hardness related to the vehicle weight closely. Therefore, the heavy vehicle employs the harder vibration absorber in general.

Rear helical spring

The rear helical spring is the main elastic element of the rear suspension system.It can filtrate the vibration from the road through the compression deformation of helical spring when the vehicle is running on the rough road.As one of the main components of rear suspension system, it constitutes the intact suspension system together with other components to enhance the vehicle riding comfort.

Diagnostic Information and Procedures

Diagnosis Instructions

Before the rear suspension system fault diagnosis, learn about the operating principle of rear suspension system fisrt.This helps to determine the correct fault diagnosis procedures and whether the conditions described by the customer are the nomral operation.

The rear suspension system fault diagnosis must start from the inspection of rear suspension system.Instruct the maintenance man to take the next logic procedures and complete the fault diagnosis. Comprehend and correctly use the diagnostic flow chart to shorten the diagnosis time and avoid the misjudgement.

Visual Inspection

1. Confirm the problem raised by the customer.
2. Check the evident mechanical faults.

Visual inspection table

Mechanical
• Rear suspension fastener • Rear vibration absorber • Rear helical spring • Rear vibration absorber base • Longitudinal arm bushing

3. Solve the problem finding before the next step inspection.
4. If the observed or raised problem is the evident and the cause has been found, ensure to fix this fault before proceeding with the next step.
5. If no problem is found through the visual check, confirm the fault and refer to the fault symptom list.

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List of fault symptoms

Symptom	Possible point of failure	Recommended Measures
Rear suspension noise while running	• Rear suspension fastener looseness • Rear vibration absorber • Longitudinal arm bushing • Rear helical spring support assembly	**Refer to: Diagnosis flow for rear suspension noise while running**
Riding comfort (the rear suspension too soft or too hard) diagnosis flow	• Wheel and tire, abnormal tire pressure • Rear vibration absorber • Rear helical spring	**Refer to: Riding comfort (the rear suspension too soft or too hard) diagnosis flow**

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Diagnosis flow for rear suspension noise while running

ⓘ Note:

Before the rear suspension noise diagnosis and repair, determine the tire, exhaust system, interior/exterior trims, front suspension, steering system, clutch, transmission propeller shaft and wheel bearing are free of abnormal noise.

Test condition	Details/results/measures
1. Check the wheel, tire and tire pressure.	
	A. Lift the vehicle. B. Check the rear suspension fasteners for looseness. Is it OK after checking? →**Yes** To step 2. →**No** **Refer to: Reinstall or replace the fasteners.**
2. Check the rear helical spring support assembly.	
	A. Check the rear helical spring support assembly for shift or excessive wear. Is it OK after checking? →**Yes** To step 3. →**No** Replace the rear helical spring support assembly.
3. Check the rear longitudinal arm bushing.	
	A. Check the rear longitudinal arm bushing for wear and damage. Is it OK after checking? →**Yes** To step 4. →**No** Replace the rear longitudinal arm bushing.
4. Check the rear vibration absorber.	
	A. Check the rear vibration absorber for oil leak etc. B. Check the rear vibration absorber bumping block and the dust boot for damage. C.Remove the rear vibration absorber. **Refer to: Replacement of the rear vibration absorber.** D. Carry out the vibration absorber working stand test. **Refer to: Vibration absorber working stand test** Is it OK after checking? →**Yes** To step 5. →**No** Replace the damaged components.

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Test condition	Details/results/measures
5. Check the other noise.	
	A. Check the other noise. Refer to: Noise, vibration and harshness B. Carry out trial run. Confirm that the fault has been ruled out.

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Riding comfort (the rear suspension too soft or too hard) diagnosis flow

Test condition	Details/results/measures
1. Check the wheel, tire and tire pressure.	
	A. Check the wheel and tire specification. B. Check whether the tire pressure is normal. Is it OK after checking? →**Yes** To step 2. →**No** Adjust the tire pressure or replace the wheel and tire. **Refer to: Replacement of the wheel.**
2. Check the rear vibration absorber.	
	A. Check the rear vibration absorber for oil leak etc. B. Remove the rear vibration absorber. **Refer to: Replacement of the rear vibration absorber.** C. Carry out the vibration absorber working stand test. Refer to: Vibration absorber working stand test Is it OK after checking? →**Yes** To step 3. →**No** **Refer to: the replacement of rear vibration absorber.**
3.Replace the rear helical spring.	
	A. Replace the rear helical spring. **Refer to: Replacement of the rear helical spring.** B. Carry out trial run. Confirm that the fault has been ruled out.

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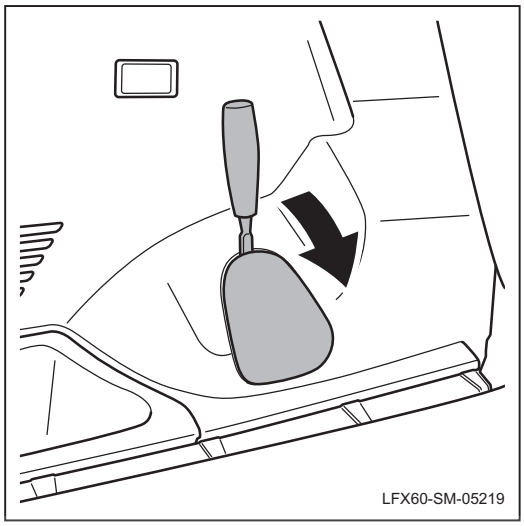
Removal and Installation

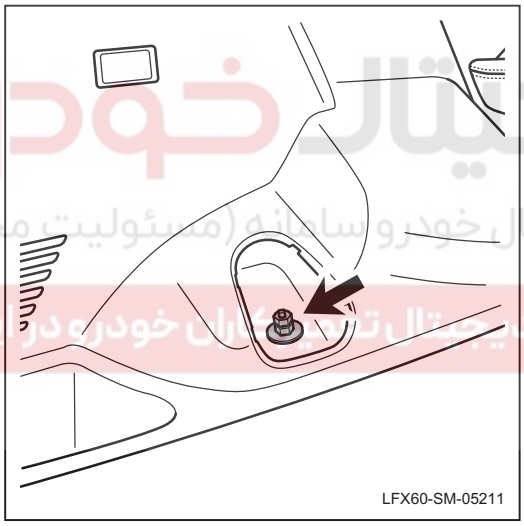
Replacement of rear vibration absorber

Removal

1. Remove the rear vibration absorber.



(a). Pry off the decorative cover plate.



(b). Remove the rear vibration absorber upper end fixing nut.

(c). Lift the vehicle. **Refer to the vehicle lift and support.**

(d). Remove the rear wheel. **Refer to the replacement of wheel.**

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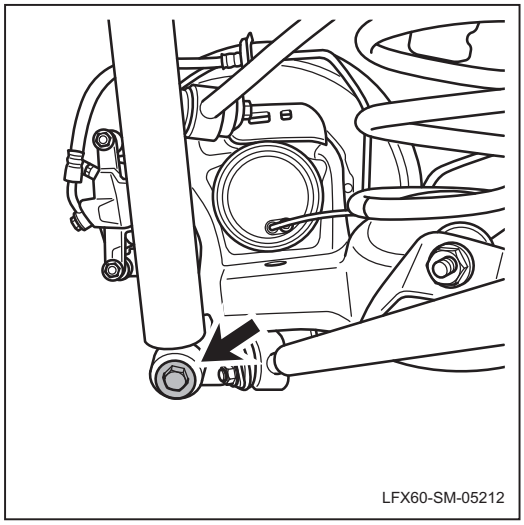


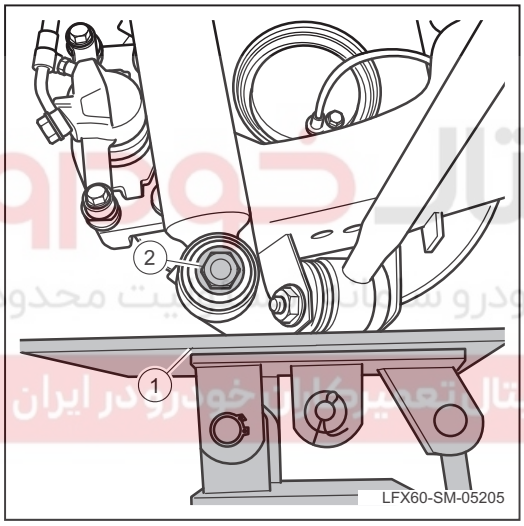
(e). Remove the vibration absorber lower end fixing bolt.

(f). ake down the vibration absorber.

Installation

1. Install the rear vibration absorber.

(a). The installation sequence is the reverse of the disassembly order.



(a). Support the rear suspension with the jack 1.

(b). Install the rear vibration absorber and tighten the bolt 2.

Torque: 60Nm

(c). Install the rear vibration absorber upper end fixing nut.

(d). Install the rear wheel.Refer to the replacement of wheel.

(e). Lower the vehicle.Refer to the vehicle lift and support.

Note:

When using the jack, ensure the bearing point is in the middle position of jack to prevent the jack sliding and causing injury.

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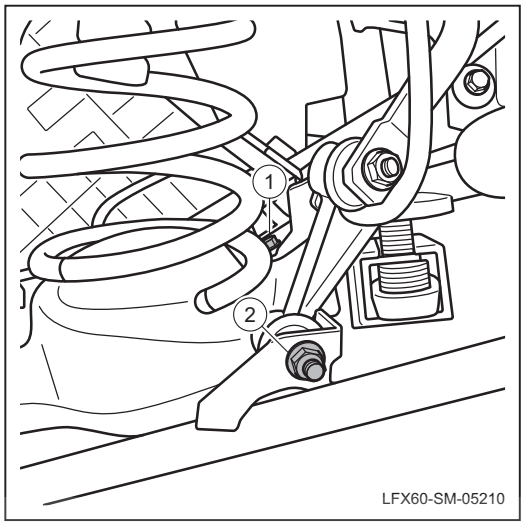
Replacement of rear helical spring

Removal

1. Remove the rear helical spring.

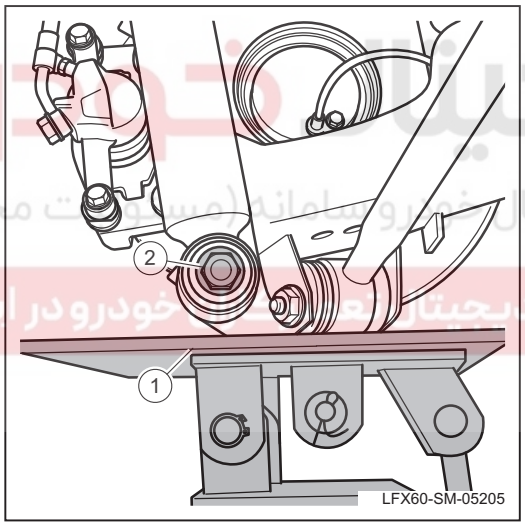
(a). Lift the vehicle. **Refer to the vehicle lift and support.**

(b). Remove the rear wheel. Refer to the replacement of wheel.



(c). Remove the rear brake hose fixing bolt 1.

(d). Remove the fixing bolt 2 of rear stabilizer bar connecting rod.



(e). Support the rear suspension with the jack 1.

(f). Remove the rear vibration absorber bolt 2.

(g). Slowly lower the jack and take out the helical spring from the lower end.

Note:

When using the jack, ensure the bearing point is in the middle position of jack to prevent the jack sliding and causing injury.

Installation

1. Install the rear vibration absorber.

(a). The installation sequence is the reverse of the disassembly order.

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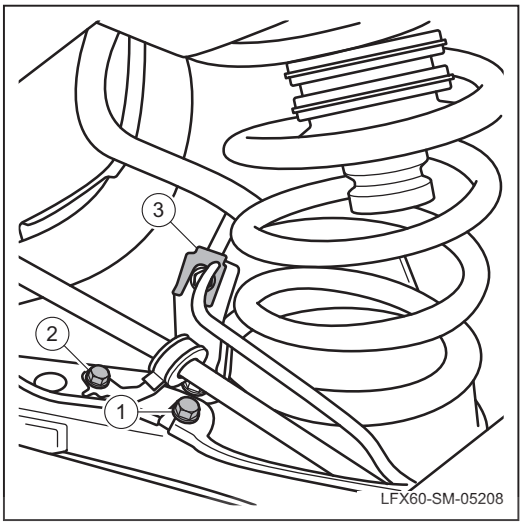
Replacement of longitudinal arm

Removal

1. Remove the longitudinal arm.

(a). Lift the vehicle. **Refer to the vehicle lift and support.**

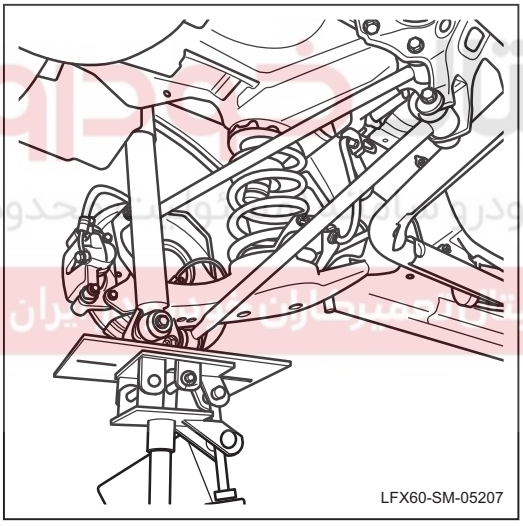
(b). Remove the rear wheel. **Refer to the replacement of wheel.**



(c). Remove the wheel speed sensor harness fixing bolt 1.

(d). Remove the hand brake cable tube fixing bolt 2.

(e). Remove the brake hose fixing bolt 3.

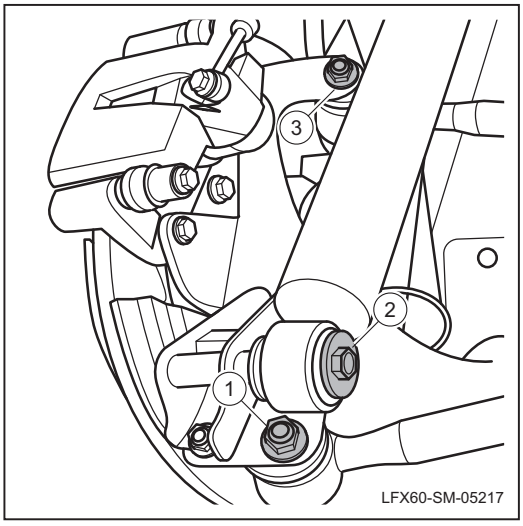


(f). Support the rear suspension with the jack.

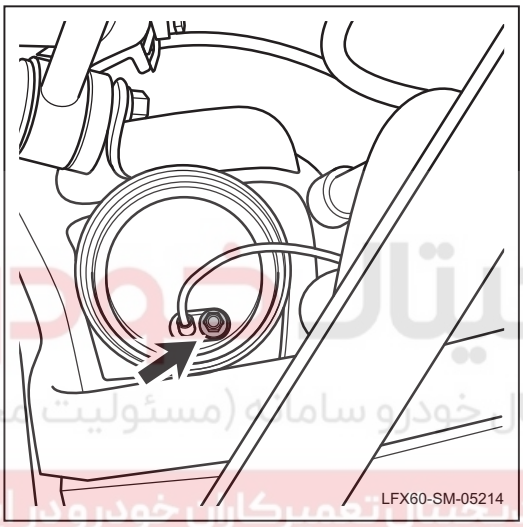
Installation

1. Install the rear vibration absorber.

(a). The installation sequence is the reverse of the disassembly order.



(g). Remove the rear left lower cross arm fixing bolt 1.
(h). Remove the vibration absorber lower end bolt 2.
(i). Remove the rear left upper cross arm fixing bolt 3.



(j). Remove the wheel speed sensor fixing bolt and take it down.
(k). Remove the rear brake tongs. **Refer to: the replacement of rear brake tongs.**
(l). Remove the brake disc. **Refer to: the replacement of rear brake disc.**

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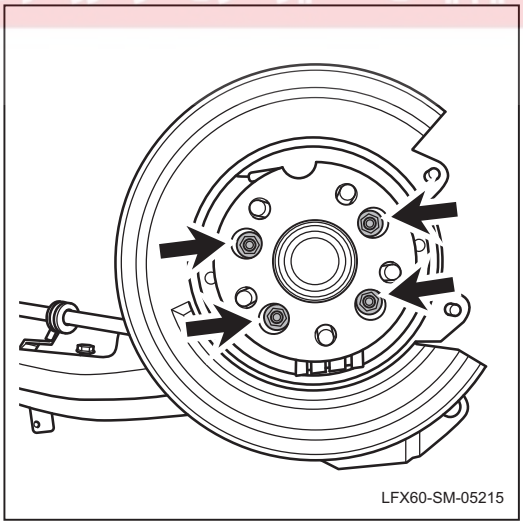
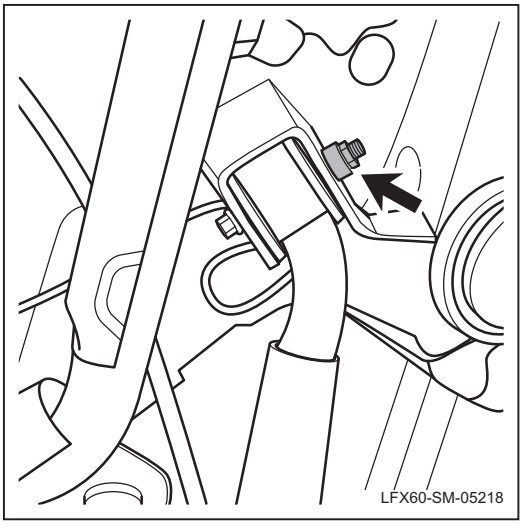
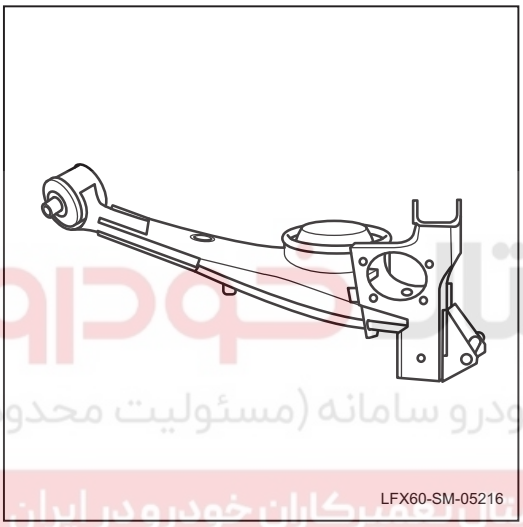


(m). Remove the 4 fixing bolts connecting the longitudinal arm and hub.



(n). Remove the longitudinal arm front fixing bolt.



(o). Slowly set down the jack and take down the longitudinal arm.

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Installation

1. Install the longitudinal arm.

(a). The installation sequence is the reverse of the disassembly order.

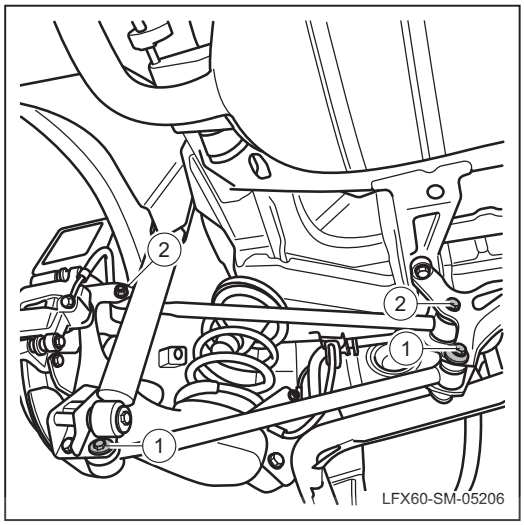
Replacement of rear suspension assembly

Removal

1. Remove the rear suspension assembly.

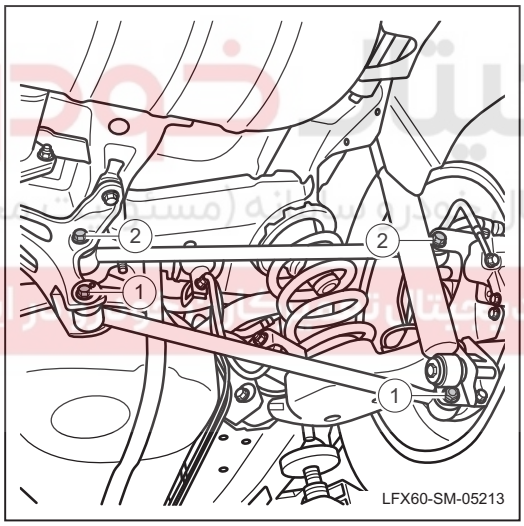
(a). Lift the vehicle. **Refer to: the vehicle lift and support.**

(b). Remove the rear left and rear right wheels. **Refer to: the replacement of wheel.**



(c). Remove the rear left lower cross arm fixing bolt assembly 1.

(d). Remove the rear left upper cross arm fixing bolt assembly 2.



(e). Remove the rear right lower cross arm fixing bolt assembly 1.

(f). Remove the rear right upper cross arm fixing bolt assembly 2.

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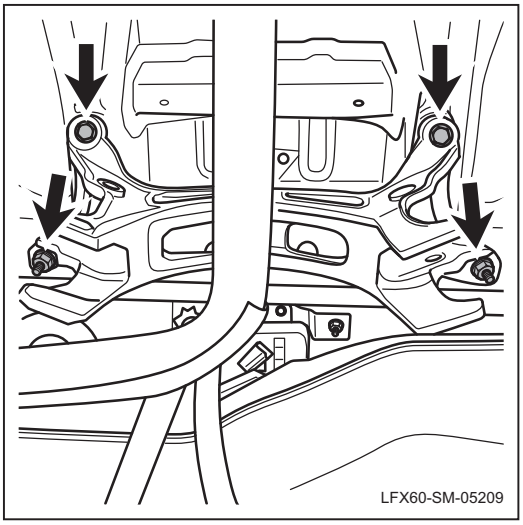

(g). Remove the 4 fixing bolts of the rear suspension.
(h). Take down the rear suspension assembly.

Installation

1. Install the rear suspension assembly.

(a). The installation sequence is the reverse of the disassembly order.

ⓘ Note:

After removing the rear suspension, carry out the wheel alignment.

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