

Suspension System - General Information -

Coil Spring Suspension

Item	Specification
Type:	
Front	Independent with single rate coil spring, twin tube damper and high stress anti-roll bar
Rear	Independent with dual rated coil spring, twin tube damper and anti-roll bar

Air Spring Suspension

Item	Specification
Type	Independent with twin tube damper, anti-roll bars and air springs with multiple, driver selectable ride heights - Standard, off-road and access.

Steering Geometry - Front



CAUTION: When checking or adjusting front or rear steering geometry, the vehicle must either have a full fuel tank or have sufficient weight placed in the vehicle's load space to give the equivalent weight of a full fuel tank. The weight must be evenly distributed at the front and the right hand side of the load space. The fuel tank capacity is 86.3 litres (18.9 Imperial gallons) (22.7 US gallons). Depending on the amount of fuel in the tank, calculate the amount of weight which must be added:

- 1 litre of fuel weighs 0.8 kg (1.7 pounds)
- 1 Imperial gallon of fuel weighs 3.6 kg (8.0 pounds)
- 1 US gallon of fuel weighs 3.0 kg (6.7 pounds)

Suspension at Standard Ride Height	Coil Spring Suspension	Dynamic (Air) Suspension
LHD		
LH Camber	-9' ± 45' (-0.15° ± 0.75°)	-9' ± 45' (-0.15° ± 0.75°)
RH Camber	-30' ± 45' (-0.5° ± 0.75°)	-30' ± 45' (-0.5° ± 0.75°)
Cross Camber	21' ± 45' (-0.35° ± 0.75°)	21' ± 45' (-0.35° ± 0.75°)
LH Castor	3°52' ± 45' (3.86° ± 0.75°)	3°52' ± 45' (3.86° ± 0.75°)
RH Castor	4°10' ± 45' (4.17° ± 0.75°)	4°10' ± 45' (4.17° ± 0.75°)
Castor Balance	-19' ± 45' (0.31° ± 0.75°)	-19' ± 45' (0.31° ± 0.75°)
Total Toe	10' ± 12' (0.16° ± 0.20°)	10' ± 12' (0.16° ± 0.20°)
RHD		
LH Camber	-30' ± 45' (-0.5° ± 0.75°)	-30' ± 45' (-0.5° ± 0.75°)
RH Camber	-30' ± 45' (-0.5° ± 0.75°)	-30' ± 45' (-0.5° ± 0.75°)
Cross Camber	0' ± 45' (0.0° ± 0.75°)	0' ± 45' (0.0° ± 0.75°)
LH Castor	4°1' ± 45' (4.02° ± 0.75°)	4°1' ± 45' (4.02° ± 0.75°)
RH Castor	4°1' ± 45' (4.02° ± 0.75°)	4°1' ± 45' (4.02° ± 0.75°)
Castor Balance	0' ± 45' (0.0° ± 0.75°)	0' ± 45' (0.0° ± 0.75°)
Total Toe	10' ± 12' (0.16° ± 0.20°)	10' ± 12' (0.16° ± 0.20°)

Steering Geometry - Rear

Suspension at Standard Ride Height	Coil Spring Suspension	Dynamic (Air) Suspension
LH Camber	-30' ± 45' (-0.5° ± 0.75°)	-45' ± 45' (-0.75° ± 0.75°)
RH Camber	-30' ± 45' (-0.5° ± 0.75°)	-45' ± 45' (-0.75° ± 0.75°)
LH Toe	7' ± 6' (0.12° ± 0.10°)	7' ± 6' (0.12° ± 0.10°)
RH Toe	7' ± 6' (0.12° ± 0.10°)	7' ± 6' (0.12° ± 0.10°)
Thrust Angle	0' ± 8' (0° ± 0.14°)	0' ± 8' (0° ± 0.14°)
Total Toe	14' ± 8' (0.24° ± 0.14°)	14' ± 8' (0.24° ± 0.14°)

Suspension System - General Information - Suspension System

Diagnosis and Testing

Principle of Operation

For a detailed description of the Suspension System and operation, refer to the relevant Description and Operation section of the workshop manual. REFER to:

[Front Suspension](#) (204-01 Front Suspension, Description and Operation),
[Rear Suspension](#) (204-02 Rear Suspension, Description and Operation).

Inspection and Verification



WARNING: Before carrying out a road test, make sure the vehicle is safe to do so. Failure to follow this instruction may result in personal injury.



CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault and may also cause additional faults in the vehicle being checked and/or the donor vehicle.

• **NOTE:** Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

1. 1. Gather as much information from the driver as possible and verify the customer concern by carrying out a road test, as closely as possible reproducing the conditions under which the fault occurs.
2. 2. Visually inspect for obvious signs of mechanical damage.

Visual Inspection

Mechanical	
● Tire pressures ● Damaged wheels or tires ● Wheel bearing(s) ● Loose or damaged front or rear suspension components ● Loose, damaged or missing suspension fastener(s) ● Damaged or leaking air suspension components ● Worn or damaged suspension bushing(s) ● Loose, worn or damaged steering system components ● Damaged axle components ● Damaged Chassis	

3. 3. If an obvious cause for an observed or reported condition is found, correct the cause (if possible) before proceeding to the symptom chart.
4. 4. If the cause is not visually evident, verify the symptom and refer to the Symptom Chart, alternatively check for Diagnostic Trouble Codes (DTCs) and refer to the DTC Index.

Symptom Chart

Symptom	Possible Causes	Action
Crabbing	● Incorrect rear thrust angle ● Front or rear suspension components	Check the rear alignment. REFER to: Four-Wheel Alignment (204-00 Suspension System - General Information, General Procedures). Check the front and rear suspension for signs of damage or wear.
Drift/Pull/Wander	● Tire pressures ● Uneven tire wear ● Damaged steering components ● Wheel alignment ● Brake drag ● Unevenly loaded or overloaded vehicle	Check and adjust the tire pressures (see visual inspection). Check for uneven tire wear, investigate the cause and rectify as necessary. Check the steering for wear/damage. Check and adjust the wheel alignment as necessary. Check for binding brakes, rectify as necessary. Advise the driver of the load issues.
Front bottoming or riding low	● Damaged suspension components ● Air spring fault	Check the suspension components for damage. Check the dynamic suspension. REFER to: Vehicle Dynamic Suspension (204-05 Vehicle Dynamic Suspension, Diagnosis and Testing).
Uneven tire wear	● Incorrect tire pressure (rapid center rib or inner and outer edge wear) ● Incorrect front or rear toe (rapid inner or outer edge wear) ● Incorrect camber (rapid inner or outer edge wear) ● Tires out of balance	Check and adjust the tire pressures (see visual inspection). Check and adjust the wheel alignment as necessary. REFER to: Four-Wheel Alignment (204-00 Suspension System - General Information, General Procedures). Balance the wheels and tires as necessary.

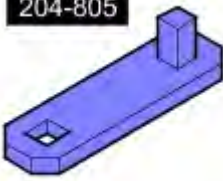
Symptom	Possible Causes	Action
	(tires cupped or dished)	
Harsh ride	● Damaged suspension components ● Air spring fault	Check the suspension components for damage. Check the dynamic suspension. REFER to: Vehicle Dynamic Suspension (204-05 Vehicle Dynamic Suspension, Diagnosis and Testing).
Shimmy or wheel tramp	● Wheels/tires ● Loose wheel nut(s) ● Loose front suspension fasteners ● Front wheel bearing(s) fault ● Worn or damaged suspension component bushing ● Loose, worn or damaged ball joint(s) ● Loose, worn or damaged steering components ● Front wheel alignment	Check the wheels and tires for condition and balance. Check and tighten the wheel nuts and suspension fasteners to specification. Check the front wheel bearings, suspension bushings, ball joints and steering components for wear or damage. Check and adjust the wheel alignment as necessary. REFER to: Four-Wheel Alignment (204-00 Suspension System - General Information, General Procedures).
Poor return ability of the steering (self-centering)	● Steering column ● Ball joints ● Steering components	Check the steering column universal joints, etc. Check the ball joints and other steering components
Sway or roll	● Loose front or rear stabilizer bar ● Worn lower suspension arm stabilizer bar insulators ● Air spring fault	Check the stabilizer bar security and condition. Rectify as necessary. Check the function of the active stabilization system (where installed). REFER to: Ride and Handling Optimization (204-06 Ride and Handling Optimization, Diagnosis and Testing). Check the air springs. REFER to: Vehicle Dynamic Suspension (204-05 Vehicle Dynamic Suspension, Diagnosis and Testing).
Vehicle leans to one side	● Front or rear suspension components ● Air spring fault	Check the front and rear suspension. Check the air springs. REFER to: Vehicle Dynamic Suspension (204-05 Vehicle Dynamic Suspension, Diagnosis and Testing).

DTC Index

For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00.

Suspension System - General Information - Four-Wheel Alignment

General Procedures

Special Tool(s)	
 204-805 E137184	204-805

• CAUTIONS:

-  Make sure the vehicle is on a flat level surface.
-  Make sure the tire pressures are within specification.
-  Make sure that only the manufacturers' recommended four wheel alignment equipment is used.
-  Make sure the vehicles fuel tank is full, if not distribute extra weight evenly over the fuel tank area to represent a full tank of fuel.
-  Make sure there are no heavy objects in the vehicle.
-  Make sure the air suspension is set to NORMAL ride height.
-  Make sure the steering is in the straight ahead position.
-  Make sure the slip plates (turntables) are free to move before adjusting the geometry.

• NOTE: This procedure can be used for vehicles with either air or coil spring suspension.

1. Check the tie rod ends, suspension joints, wheel bearings and wheels and tires for damage, wear and free play.

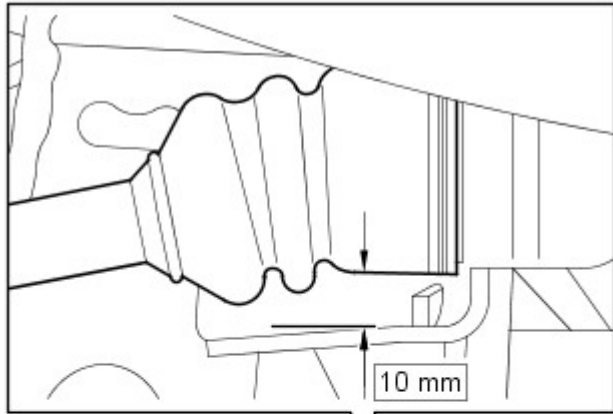
- Adjust or repair any worn, damaged or incorrectly adjusted components.

2. Check and adjust tire pressures.
3. Position the vehicle on a calibrated, level, vehicle lift.
4. Release the vehicle parking brake.
5. Vehicles with dynamic suspension: Using the approved diagnostic tool, check the air suspension control module for fault codes and clear as required.
6. Vehicles with dynamic suspension: Using the diagnostic tool, set vehicle to 'Geometry Set Mode', using the instructions below. Putting the vehicle into this mode will make sure that the ride heights are controlled more accurately.
 1. Select the 'Configuration' tab
 2. Select 'Set up and Configure'.
 3. Select 'Air Suspension'.
 4. Select 'Suspension Geometry Set Up'.
 5. Select 'Tight Tolerance Mode'.
 6. Follow the on-screen instructions until the set up process has finished.

7. NOTE: If rear camber adjustment is required, loosen the rear camber adjustment bolts enough to allow adjustment before starting any other wheel alignment adjustments. Do not fully loosen the rear camber adjustment bolts.

Using only four wheel alignment equipment approved by Land

Over, check and adjust the wheel alignment.

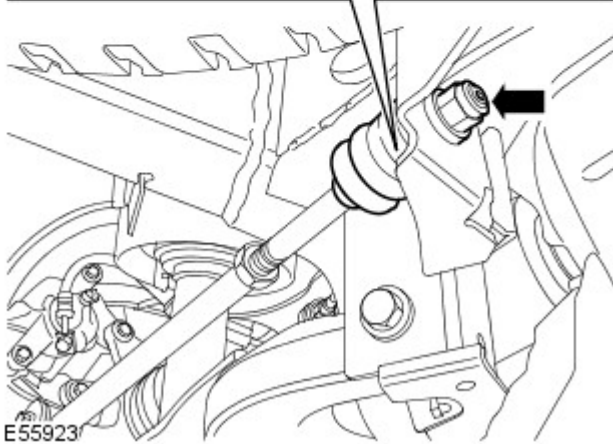


8. ⚠ CAUTION: Make sure the toe link anti-rotation tang is fully seated in the integrated body frame before tightening the toe link retaining nut. Failure to follow this instruction will result in damage to the toe link or integrated body frame.

• **NOTE:** This step is only required if the toe links have been removed or replaced.

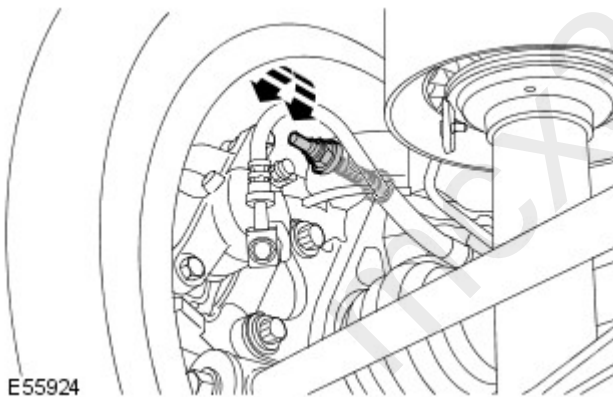
Adjust the rear bump steer.

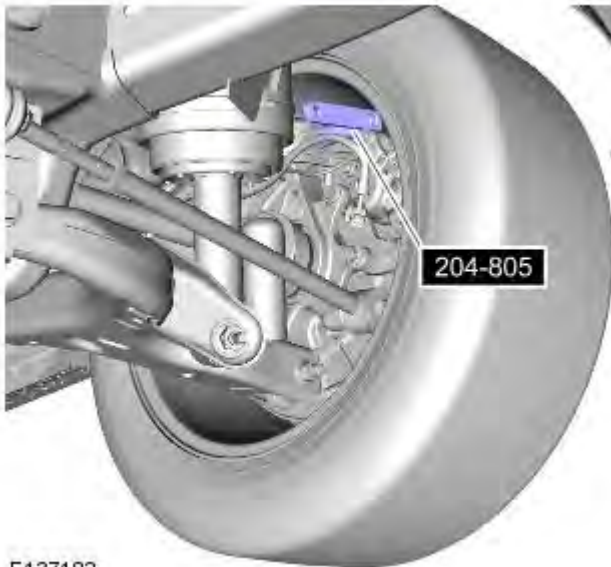
- Loosen the toe link inner ball joint retaining nut.
- Set the gap, between the underside of the toe link rubber boot and the integrated body frame bracket, to 10 mm (0.473 in).
- Tighten the toe link inner ball joint retaining nut to 133 Nm (98 lb.ft)
- Repeat the above procedure for the other side.



9. Adjust the rear camber.

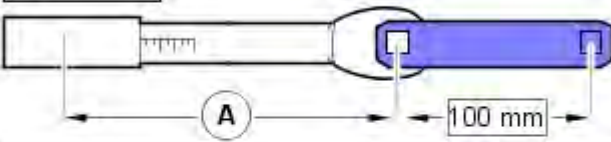
- Loosen the rear camber adjusting bolts.
- Rotate the rear camber adjusting bolt until the correct value is obtained.
- Repeat the above procedure for the other side.
- Tighten the rear camber adjusting bolts.





E137182

10. Install the special tool and a suitable socket to the rear camber adjusting bolt retaining nut.



E137185

11. NOTE: The torque wrench must be installed in a direct line with the special tool, as shown.

- NOTE: Calculate the torque wrench setting using the formula below.

- NOTE: Key to letters:

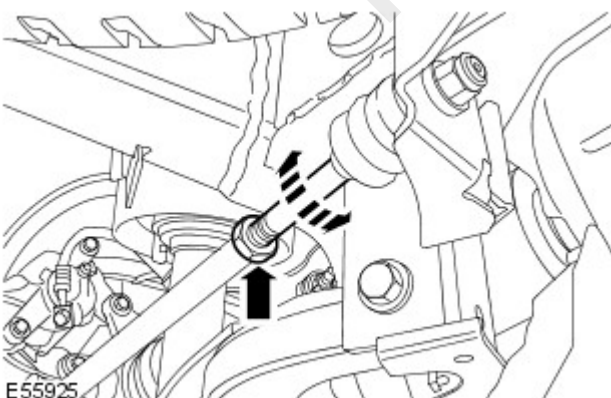
- A = Effective length of the torque wrench, measured in mm.

Formula:

- Torque wrench setting (Nm) = $(133 \times A) / (A + 100)$

Using the special tool, a suitable extension bar and a torque wrench, fully tighten the camber adjusting bolt retaining nut.

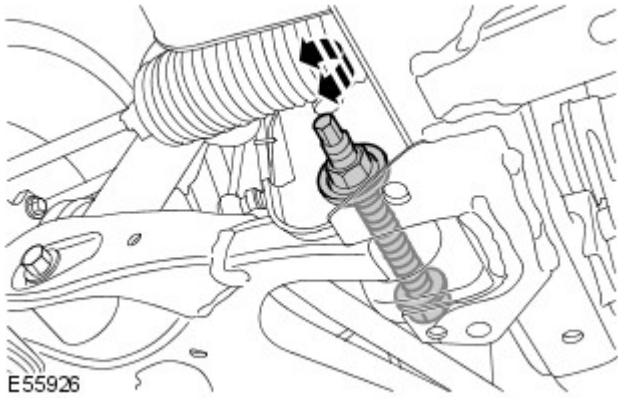
- Use the torque wrench setting calculated above.
- Repeat the above procedure for the other side.



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12. Adjust the rear toe.

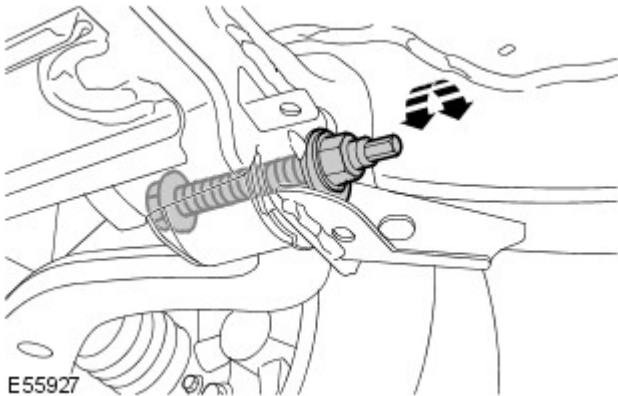
- Loosen the toe link adjustment locking nut.
- Rotate the toe link inner ball joint until the correct rear toe value is obtained.
- Tighten the toe link adjustment locking nut to 130 Nm (96 lb.ft).
- Repeat the above procedure for the other side.
- Repeat the rear toe measurement.



13. ⚠ CAUTION: Make sure the slip plates (turntables) are free to move before adjusting the geometry.

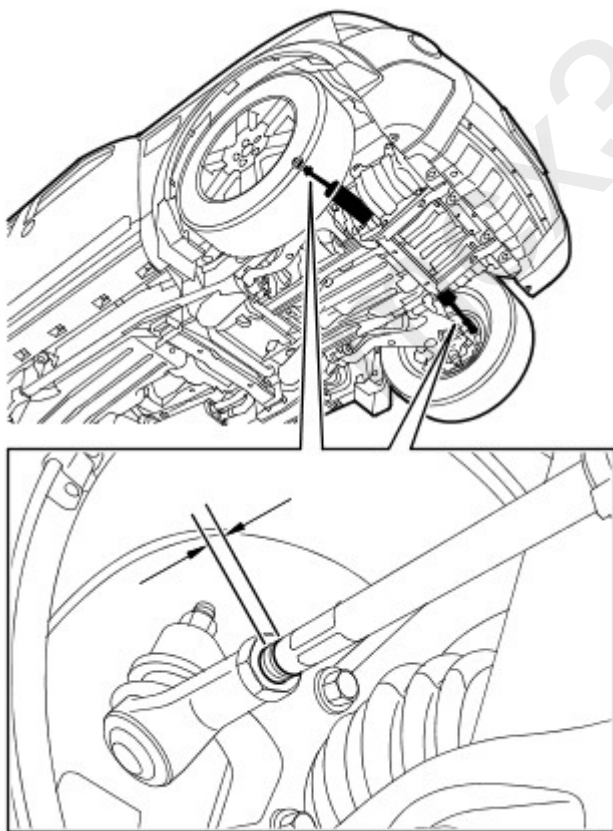
Adjust the front camber.

- Loosen the lower arm front camber adjusting bolt.
- Rotate the front camber adjusting bolt until the correct value is obtained.
- Tighten the lower arm front camber adjusting bolt to 275 Nm (203 lb.ft).
- Repeat the above procedure for the other side.



14. Adjust the front castor.

- Loosen the lower arm rear castor adjusting bolt.
- Rotate the castor adjusting bolt until the correct value is obtained.
- Tighten the lower arm rear castor adjusting bolt.
- Repeat the above procedure for the other side.
- Repeat the castor measurement.
- Repeat the above procedure until both castors achieve the correct value.
- Tighten the lower arm rear castor adjusting bolts to 275 Nm (203 lb.ft).



15. Align the steering to straight ahead.

- Measure the length of the exposed thread on each track rod.
- If the exposed thread lengths differ by more than two millimetres:
- Stage one: Loosen one track rod end locking nut.
- Stage two: Rotate the track rod until the lengths of the exposed threads on both track rods are equal.
- Stage three: Tighten the track rod end locking nut.
- Stage four: Rotate the steering wheel until both front toe measurements are equal.



16. Adjust the front toe.

- Loosen the track rod end locking nuts.
- Rotate the track rods to adjust each individual front toe to the correct value.
- Tighten the track rod end locking nuts to 53 Nm (39 lb.ft).

17. Vehicles with dynamic suspension: Using the diagnostic tool, return the vehicle to 'Normal Mode'.

1. Select the 'Configuration' tab
2. Select 'Set up and Configure'.
3. Select 'Air Suspension'.
4. Select 'Suspension Geometry Set Up'.
5. Select 'Normal Mode'.
6. Follow the on-screen instructions until the normal mode process has finished.

18. Calibrate the steering angle sensor using the diagnostic tool.

Suspension System - General Information - Front Wheel Bearing and Wheel Hub Runout Check

General Procedures

- NOTE: Some variation in the illustrations may occur, but the essential information is always correct.
- NOTE: LH illustration shown, RH is similar.

1.  **WARNING:** Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

2. Remove the road wheel.

3. CAUTIONS:



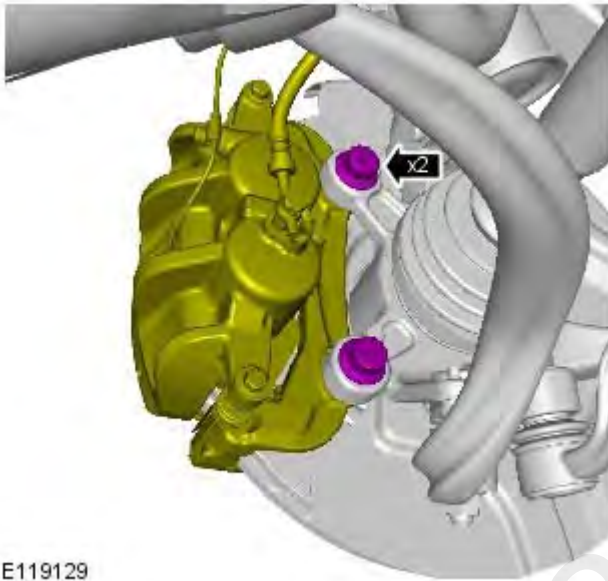
Do not allow the brake caliper to hang on the brake hose.



LH side: Do not allow the brake caliper to hang on the brake pad wear warning sensor lead.

- NOTE: Models with standard brakes shown, models with high performance brakes similar.

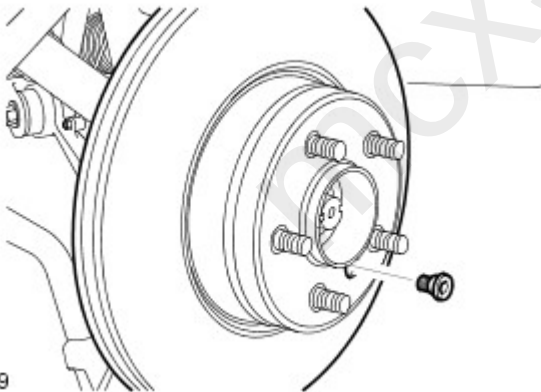
Release the brake caliper and tie aside.



E119129

4. Remove the front brake disc.

- Remove the Allen screw.



E61629

5. Thoroughly clean the hub mounting face.



6. Using special tool (100-053) mount a Dial Test Indicator (DTI) to and secure to the backplate using the upper backplate fixing.

7.  **CAUTION:** Make sure the DTI is positioned clear of the wheel studs.

Position the DTI probe on the outer edge of the hub face.

8. Zero the DTI and rotate the hub one complete revolution to measure hub runout.
9. Remove the DTI.
10. Install the brake disc.
 - Tighten the Torx screw to 35 Nm (26 lb.ft).
11. Install the brake caliper and tighten the bolts. TORQUE: 275 Nm
12. Install the road wheel and tighten nuts to 140Nm (103 lb-ft).
13. Repeat the above procedure on the opposite side.
14. Depress the brake pedal several times to set brake pads.
15. Lower the vehicle.