

General Description

FRONT SUSPENSION

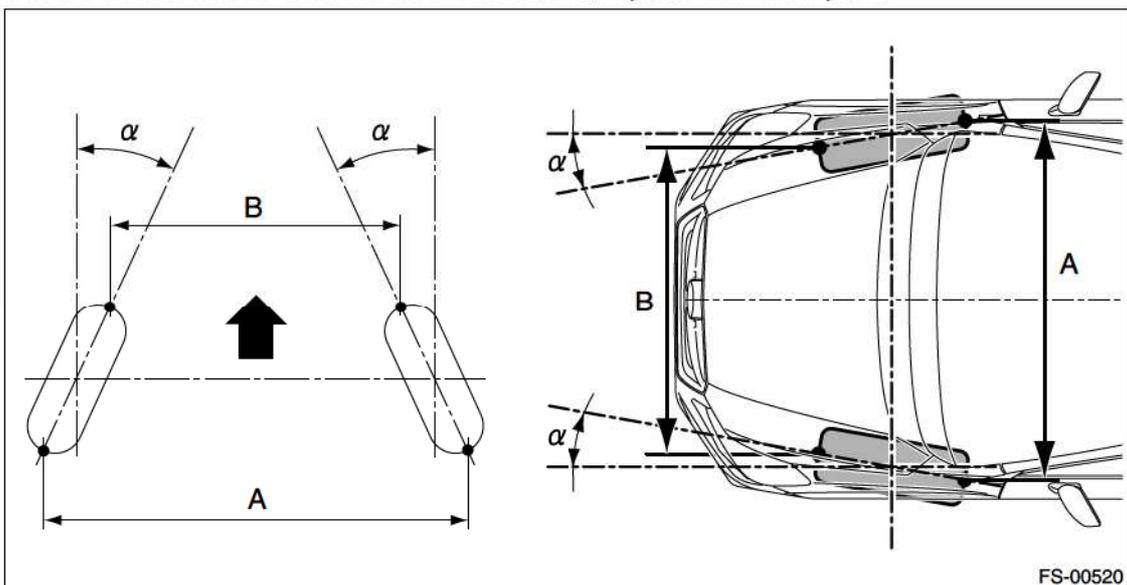
1. General Description

A: SPECIFICATION

Tire size		Standard vehicle height model	SPORT model	XV model	
		P195/65R15 P205/55R16 P205/50R17	P205/50R17	P225/55R17	
Front	Wheel arch height (Tolerance: $+12\text{ mm}$ -24 mm ($+0.47\text{ in}$ -0.94 in)) mm (in)	387 (15.24)	392 (15.43)	452 (17.8)	
	Camber (Tolerance: $\pm 0^{\circ}45'$ Differences between RH and LH: 45' or less)	$-0^{\circ}20'$	$-0^{\circ}15'$	$0^{\circ}10'$	
	Caster (Referential Value)	$6^{\circ}00'$	$5^{\circ}58'$		
	Steering angle (Tolerance: $\pm 1.5^{\circ}$)	Inner wheel	38.3°		$38.5^{\circ} \pm 1.5^{\circ}$
		Outer wheel	33.7°		$34.0^{\circ} \pm 1.5^{\circ}$
	Toe-in mm (in)	0 ± 3 (0 ± 0.12) Toe angle (sum of both wheels): $0^{\circ} \pm 0^{\circ}12'$		0 ± 3 (0 ± 0.12) Toe angle (sum of both wheels): $0^{\circ} \pm 0^{\circ}10'$	
Kingpin angle (Referential Value)	$13^{\circ}51'$	$13^{\circ}44'$	$13^{\circ}06'$		
Rear	Wheel arch height (Tolerance: $+12\text{ mm}$ -24 mm ($+0.47\text{ in}$ -0.94 in)) mm (in)	368 (14.49)	371 (14.61)	450 (17.72)	
	Camber (Tolerance: $\pm 0^{\circ}45'$ Differences between RH and LH: 45' or less)	$-1^{\circ}20'$	$-1^{\circ}15'$	$-0^{\circ}20'$	
	Toe-in mm (in)	IN 3 ± 3 (IN 0.12 ± 0.12) Toe angle (sum of both wheels): IN $0^{\circ}12' \pm 12'$		IN 3 ± 3 (IN 0.12 ± 0.12) Toe angle (sum of both wheels): IN $0^{\circ}10' \pm 10'$	
	Thrust angle (Tolerance: $0^{\circ}00' \pm 30'$)	$0^{\circ}00'$			

NOTE:

- Front toe-in, rear toe-in and front camber can be adjusted. Adjust if the value of toe-in or camber exceeds the tolerance range of the specification chart.
- Other items except for front toe-in, rear toe-in and front camber that are described in the specification chart cannot be adjusted. If other items exceed the tolerance range of the specification chart, check the suspension parts and connections for deformation. If defective, replace with new parts.



A – B = Positive: Toe-in, Negative: Toe-out

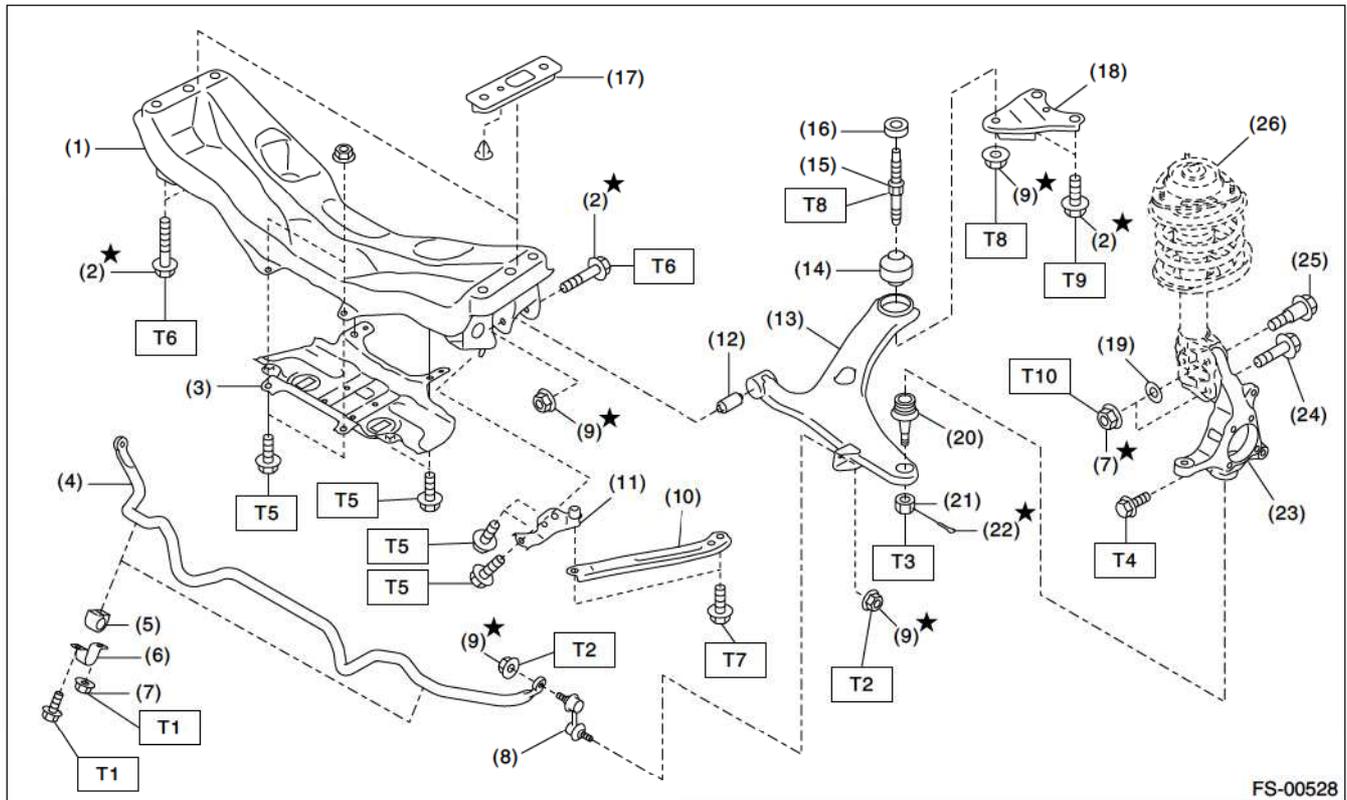
α = Individual toe angles

General Description

FRONT SUSPENSION

B: COMPONENT

1. FRONT SUSPENSION



FS-00528

- | | |
|--|---------------------------------------|
| (1) Front crossmember ASSY | (14) Bushing rear - front arm |
| (2) Flange bolt | (15) Stud bolt |
| (3) Front crossmember support | (16) Stopper - front arm bushing rear |
| (4) Front stabilizer | (17) Adapter (XV model) |
| (5) Bushing - stabilizer | (18) Front arm rear plate |
| (6) Clamp - stabilizer bushing | (19) Adjusting washer |
| (7) Flange nut | (20) Ball joint ASSY |
| (8) Stabilizer link ASSY | (21) Castle nut |
| (9) Self-locking nut | (22) Cotter pin |
| (10) Front support | (23) Housing ASSY - front axle |
| (11) Support plate - front crossmember | (24) Flange bolt |
| (12) Bushing front - front arm | (25) Adjusting bolt |
| (13) Front arm ASSY | (26) Front strut ASSY |

Tightening torque: N-m (kgf-m, ft-lb)

T1: 25 (2.55, 18.4)

T2: Except for XV model: 38 (3.87, 28.0)

XV model: 60 (6.12, 44.3)

T3: 39 (3.98, 28.8)

T4: 50 (5.10, 36.9)

T5: 60 (6.12, 44.3)

T6: 95 (9.69, 70.1)

T7: 100 (10.20, 73.8)

T8: 110 (11.22, 81.1)

T9: 150 (15.30, 110.6)

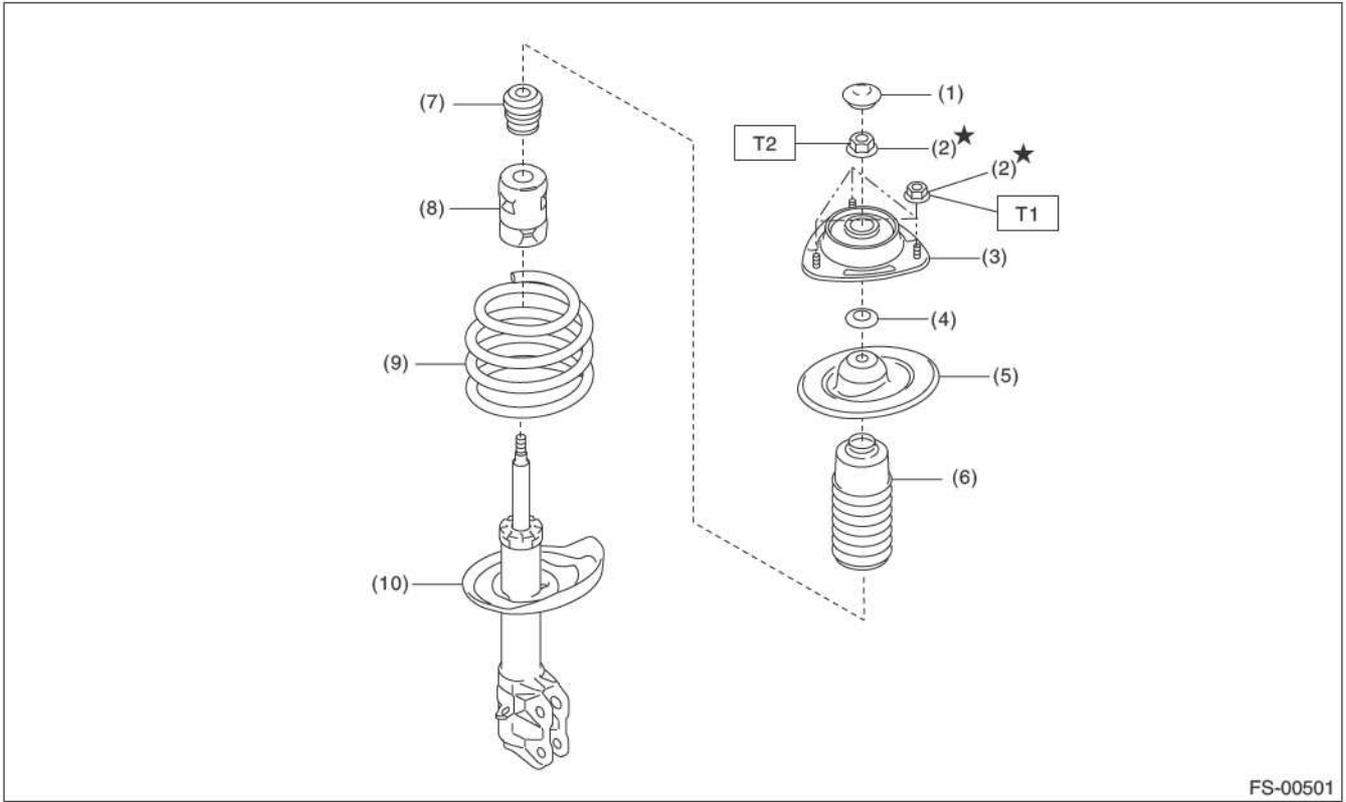
T10: 155 (15.81, 114.3)



General Description

FRONT SUSPENSION

2. FRONT STRUT



FS-00501

- | | |
|-----------------------------------|------------------------------|
| (1) Dust seal - front strut | (6) Dust cover - front strut |
| (2) Self-locking nut | (7) Helper - front strut |
| (3) Strut mount - front | (8) Dust cover inner |
| (4) Spacer - front strut | (9) Coil spring - front |
| (5) Spring seat - front strut UPR | (10) Strut COMPL - front |

Tightening torque: N-m (kgf-m, ft-lb)

T1: 20 (2.04, 14.8)

T2: 55 (5.61, 40.6)

General Description

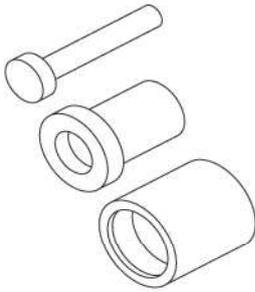
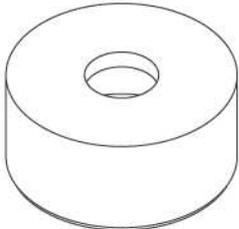
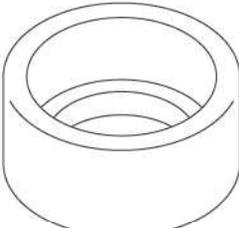
FRONT SUSPENSION

C: CAUTION

- Wear appropriate work clothing, including a helmet, protective goggles and protective shoes when performing any work.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- Use SUBARU genuine grease etc. or equivalent. Do not mix grease etc. of different grades or manufacturers.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or cloth between the part and the vise.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- When the suspension-related components have been replaced, perform "VDC sensor midpoint setting mode" of the VDC. <Ref. to VDC-19, VDC SENSOR MIDPOINT SETTING MODE, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

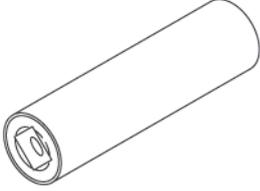
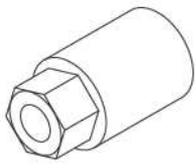
D: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-927680000</p>	927680000	INSTALLER & REMOVER SET	Used for replacing the bushing front - front arm of front arm assembly.
 <p style="text-align: center;">ST20299AG000</p>	20299AG000	REMOVER	<ul style="list-style-type: none"> • Used for replacing the bushing rear - front arm of front arm assembly. • Used together with BASE (20299AG010).
 <p style="text-align: center;">ST20299AG010</p>	20299AG010	BASE	<ul style="list-style-type: none"> • Used for replacing the bushing rear - front arm of front arm assembly. • Used together with REMOVER (20299AG000).

General Description

FRONT SUSPENSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST20299AG020</p>	20299AG020	STUD BOLT SOCKET	Used for removing and installing the stud bolt for front arm assembly installing portion.
 <p style="text-align: center;">ST20399AG000</p>	20399AG000	STRUT MOUNT SOCKET	Used for disassembling and assembling strut mount.

2. GENERAL TOOL

TOOL NAME	REMARKS
Alignment gauge	Used for measuring wheel alignment.
Alignment gauge adapter	Used for measuring wheel alignment.
Turning radius gauge	Used for measuring wheel alignment.
Toe-in gauge	Used for toe-in measurement.
Tie-rod ball joint puller	Used for disconnecting tie-rod end.
Dial gauge	Used for damper strut measurement.
Coil spring compressor	Used for strut assembly/disassembly.



2. Wheel Alignment

A: INSPECTION

Check the following items before performing the wheel alignment measurement.

- Tire inflation pressure
- Uneven wear of RH and LH tires, or difference of sizes
- Tire runout
- Excessive play and wear of ball joint
- Excessive play and wear of tie-rod end
- Excessive play of wheel bearing
- Right and left wheel base imbalance
- Deformation and excessive play of steering link
- Deformation and excessive play of suspension parts

Check, adjust and measure the wheel alignment in accordance with the following procedures.

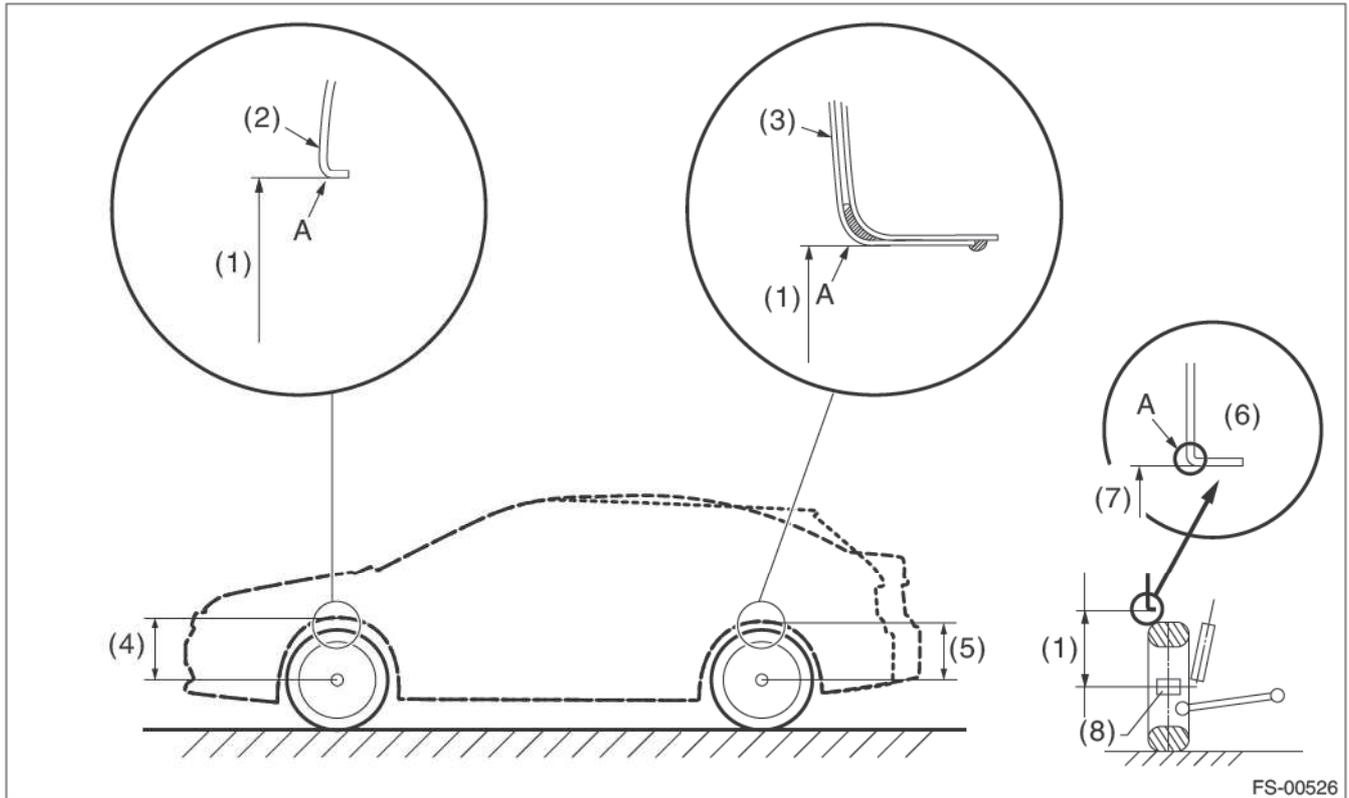
1	Wheel arch height (front and rear wheels)	Inspection: <Ref. to FS-11, REAR WHEEL TOE-IN, INSPECTION, Wheel Alignment.>
↓		
2	Camber (front and rear wheels)	Inspection: <Ref. to FS-9, CAMBER, INSPECTION, Wheel Alignment.> Adjustment: <Ref. to FS-12, FRONT CAMBER, ADJUSTMENT, Wheel Alignment.>
↓		
3	Caster (front wheel)	Inspection: <Ref. to FS-10, CASTER, INSPECTION, Wheel Alignment.>
↓		
4	Steering angle	Inspection: <Ref. to FS-11, FRONT WHEEL TOE-IN, INSPECTION, Wheel Alignment.> Adjustment: <Ref. to FS-14, STEERING ANGLE, ADJUSTMENT, Wheel Alignment.>
↓		
5	Front wheel toe-in	Inspection: <Ref. to FS-10, STEERING ANGLE, INSPECTION, Wheel Alignment.> Adjustment: <Ref. to FS-15, FRONT WHEEL TOE-IN, ADJUSTMENT, Wheel Alignment.>
↓		
6	Rear wheel toe-in	Inspection: <Ref. to FS-8, WHEEL ARCH HEIGHT, INSPECTION, Wheel Alignment.> Adjustment: <Ref. to FS-16, REAR WHEEL TOE-IN, ADJUSTMENT, Wheel Alignment.>
↓		
7	Thrust angle	Inspection: <Ref. to FS-12, THRUST ANGLE, INSPECTION, Wheel Alignment.> Adjustment: <Ref. to FS-18, THRUST ANGLE, ADJUSTMENT, Wheel Alignment.>

Wheel Alignment

FRONT SUSPENSION

1. WHEEL ARCH HEIGHT

- 1) Park the vehicle on a level surface.
- 2) Empty the vehicle so that it is at "curb weight". (Empty the luggage compartment, load the spare tire, jack and service tools, and fill up the fuel tank.)
- 3) Set the steering wheel in a straight-ahead position, and stabilize the suspension by moving the vehicle in a straight line for 5 m (16 ft) or more.
- 4) Suspend a thread from the wheel arch (point "A" in the figure below) and affix at a position directly above the center of wheel.
- 5) Measure the distance between the point "A" and the center of wheel.



FS-00526

- | | | |
|-----------------------|-----------------------------|--------------------------|
| (1) Wheel arch height | (4) Front wheel arch height | (7) Point of measurement |
| (2) Front fender | (5) Rear wheel arch height | (8) End of spindle |
| (3) Rear quarter | (6) Flange bend line | |

Wheel arch height specification mm (in) (Tolerance: +12 mm -24 mm (+0.47 in -0.94 in))			
Tire size	Standard vehicle height model	SPORT model	XV model
		P195/65R15 P205/55R16 P205/50R17	P205/50R17
Front	387 (15.24)	392 (15.43)	452 (17.8)
Rear	368 (14.49)	371 (14.61)	450 (17.72)

Wheel Alignment

FRONT SUSPENSION

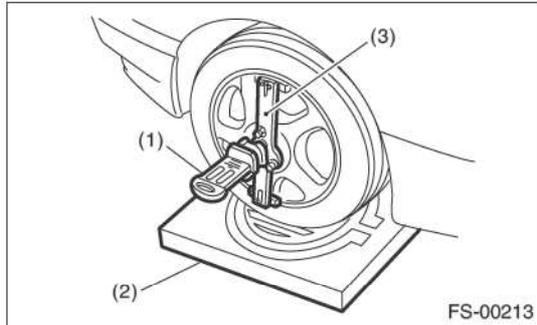
2. CAMBER

1) Place the front wheel on the turning radius gauge.

NOTE:

Make sure the ground contact surfaces of the front and rear wheels are at the same height.

2) Set the adapter into the center of wheel, and then set the wheel alignment gauge.



- (1) Alignment gauge
- (2) Turning radius gauge
- (3) Adapter

3) Measure the camber angle in accordance with the operation manual for wheel alignment gauge.

Tire size		Camber (Difference between RH and LH 45' or less)
Standard vehicle height model	P195/65R15 P205/55R16 P205/50R17	$-0^{\circ}20' \pm 0^{\circ}45'$
SPORT model	P205/50R17	$-0^{\circ}15' \pm 0^{\circ}45'$
XV model	P225/55R17	$0^{\circ}10'$

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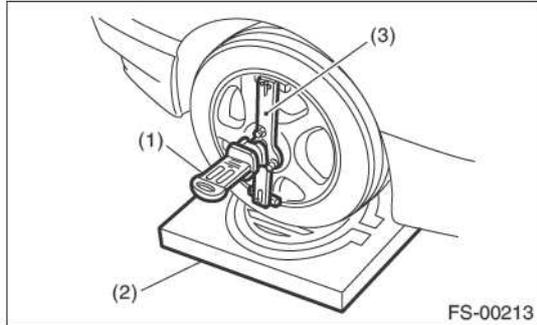


Wheel Alignment

FRONT SUSPENSION

3. CASTER

- 1) Place the front wheel on the turning radius gauge. Make sure the ground contact surfaces of the front and rear wheels are at the same height.
- 2) Set the adapter into the center of wheel, and then set the wheel alignment gauge.



- (1) Alignment gauge
- (2) Turning radius gauge
- (3) Adapter

- 3) Measure the caster angle in accordance with the operation manual for wheel alignment gauge.

Tire size	Caster
P195/65R15 P205/55R16 P205/50R17 ^{*1}	6°00'
P205/50R17 ^{*2} P225/55R17	5°58'

^{*1}: Except for SPORT model

^{*2}: SPORT model

4. STEERING ANGLE

- 1) Place the vehicle on turning radius gauge.
- 2) While depressing the brake pedal, turn the steering wheel fully to the left and right.
- 3) With the steering wheel held at each fully turned position, measure both the inner and outer wheel steering angles.

Tire size	Inner wheel	Outer wheel
P195/65R15 P205/55R16 P205/50R17	38.3°±1.5°	33.7°±1.5°
P225/55R17	38.5°±1.5°	34.0°±1.5°



5. FRONT WHEEL TOE-IN

Toe-in: Inspection value

$0 \pm 3 \text{ mm}$ ($0 \pm 0.12 \text{ in}$)

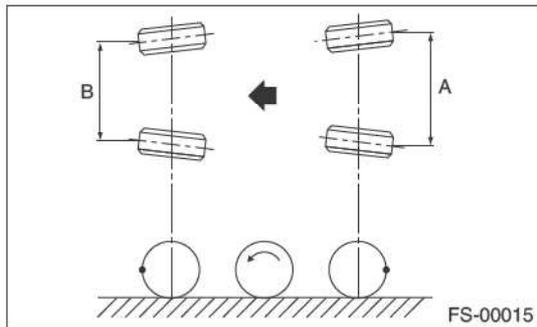
- 1) Set the toe-in gauge in the position at wheel axis center height behind the right and left front tires.
- 2) Place a mark at the center of both left and right tires, and measure distance "A" between the marks.
- 3) Move the vehicle forward to rotate the tires 180° .

NOTE:

Be sure to rotate the tires in the forward direction.

- 4) Measure the distance "B" between the left and right marks. Find toe-in using the following calculation:

$A - B = \text{Toe-in}$



6. REAR WHEEL TOE-IN

Refer to the FRONT WHEEL TOE-IN for rear toe-in inspection procedures. <Ref. to FS-11, FRONT WHEEL TOE-IN, INSPECTION, Wheel Alignment.>

Toe-in: Inspection value

$3 \pm 3 \text{ mm}$ ($0.12 \pm 0.12 \text{ in}$)



Wheel Alignment

FRONT SUSPENSION

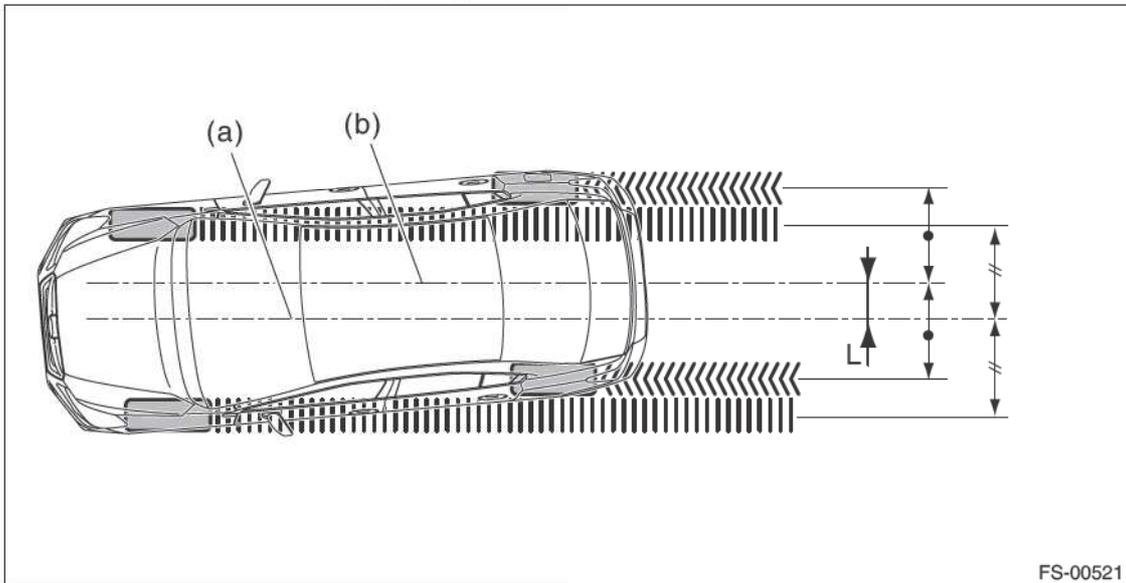
7. THRUST ANGLE

- 1) Park the vehicle on a level surface.
- 2) Move the vehicle 3 to 4 meters (10 to 13 feet) straight forward.
- 3) Draw the center of loci for both the front and rear axles.
- 4) Measure distance "L" between the center lines of the axle loci.

Thrust angle: Inspection value

$0^{\circ} \pm 30'$

Less than 30' when "L" is 23 mm (0.9 in) or less



(a) Center line of loci (front axle)

(b) Center line of loci (rear axle)

B: ADJUSTMENT

CAUTION:

When the wheel alignment has been adjusted, perform "VDC sensor midpoint setting mode" of the VDC. <Ref. to VDC-19, VDC SENSOR MIDPOINT SETTING MODE, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

1. FRONT CAMBER

- 1) Adjust the camber angle to the following value.

Tire size		Camber (Difference between RH and LH 45' or less)
Standard vehicle height model	P195/65R15 P205/55R16 P205/50R17	$-0^{\circ}20' \pm 0^{\circ}30'$
SPORT model	P205/50R17	$-0^{\circ}15' \pm 0^{\circ}30'$
XV model	P225/55R17	$0^{\circ}10' \pm 0^{\circ}30'$

- 2) Loosen the two flange nuts located at the front lower section of the strut.

NOTE:

When the adjusting bolt needs to be loosened or tightened, hold its head with a wrench and turn the flange nut.



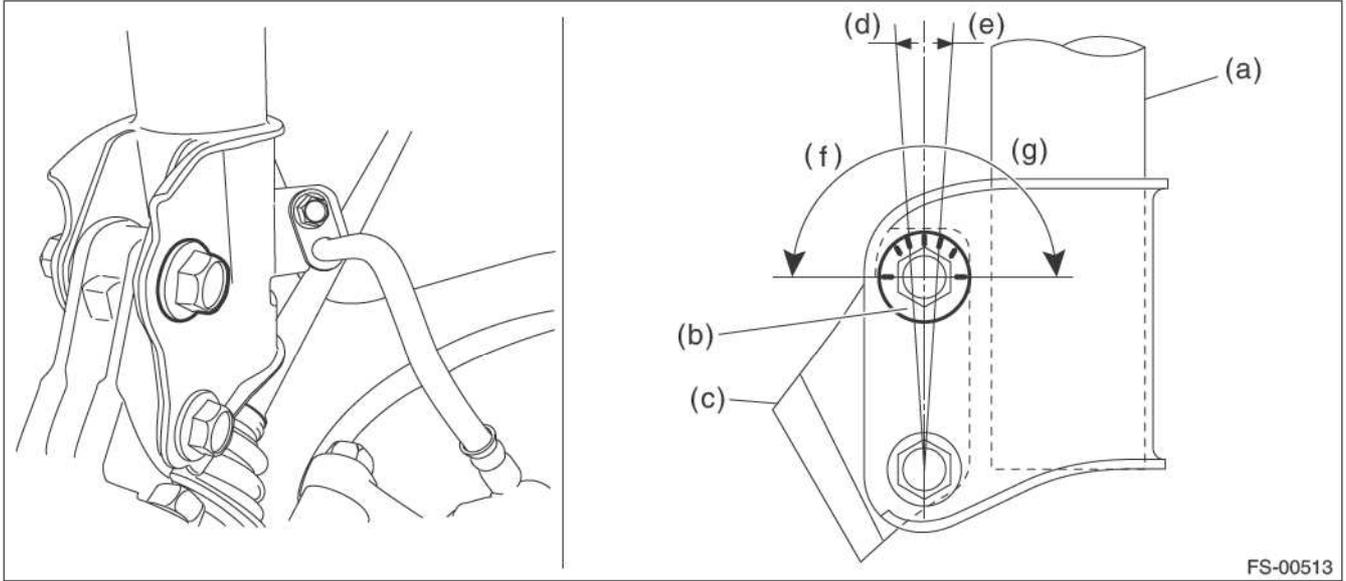
Wheel Alignment

FRONT SUSPENSION

3) Turn the camber adjusting bolt so that the camber is set at specification.

NOTE:

Moving the adjusting bolt by one scale changes the camber by approximately $0^{\circ}15'$.

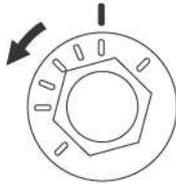


FS-00513

- (a) Strut ASSY
- (b) Adjusting bolt
- (c) Housing ASSY - front axle
- (d) Outer direction
- (e) Inner direction
- (f) Camber is increased.
- (g) Camber is decreased.

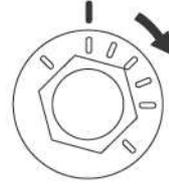
To increase camber.

Rotate the left side counterclockwise.



FS-00352

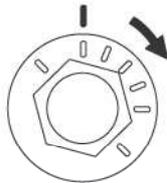
Rotate the right side clockwise.



FS-00353

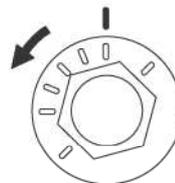
To decrease camber.

Rotate the left side clockwise.



FS-00353

Rotate the right side counterclockwise.



FS-00352

Wheel Alignment

FRONT SUSPENSION

4) Tighten two new flange nuts.

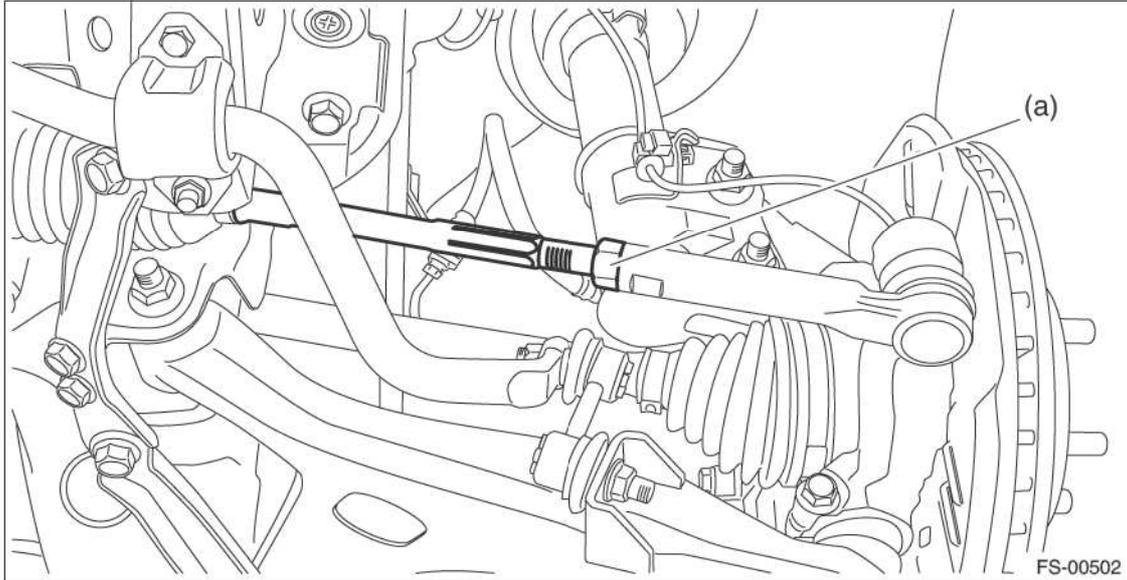
Tightening torque:

155 N·m (15.81 kgf-m, 114.3 ft-lb)

2. STEERING ANGLE

1) Adjust the steering angle of both inner and outer wheels.

(1) Loosen the steering tie-rod lock nut (a), and rotate the tie-rod.



(2) Turn the tie-rod to adjust the steering angle of both inner and outer wheels.

(3) Tighten the steering tie-rod lock nut (a).

Tightening torque:

85 N·m (8.67 kgf-m, 62.7 ft-lb)

NOTE:

Check and correct the tie-rod boot if twisted.

2) Check the toe-in. <Ref. to FS-10, STEERING ANGLE, INSPECTION, Wheel Alignment.>



Wheel Alignment

FRONT SUSPENSION

3. FRONT WHEEL TOE-IN

When adjusting the toe-in, adjust it to the following value. <Ref. to FS-14, STEERING ANGLE, ADJUSTMENT, Wheel Alignment.>

Toe-in: Adjustment value

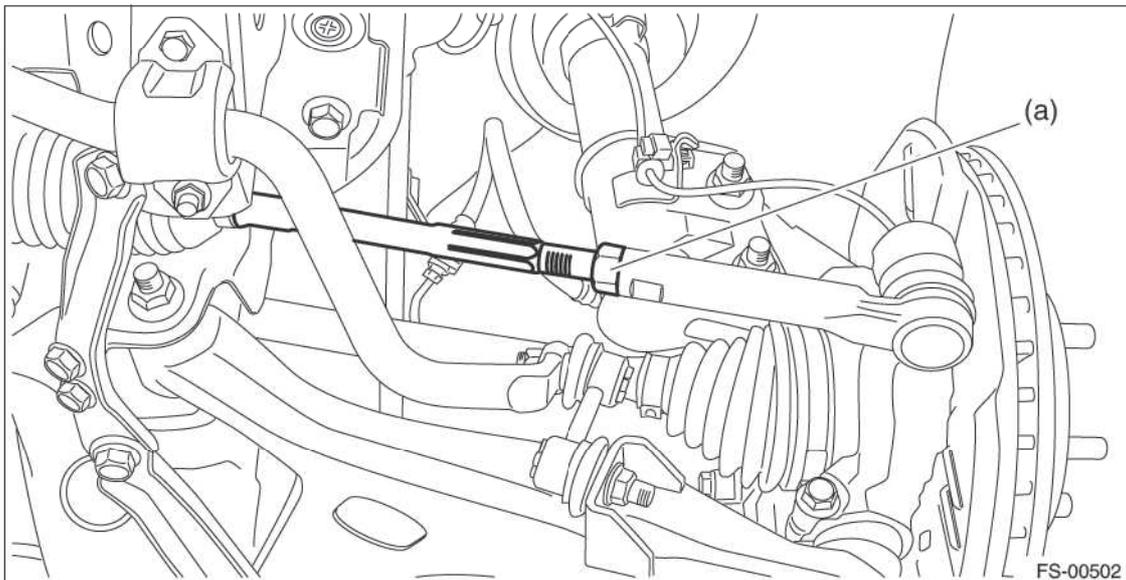
$0 \pm 2 \text{ mm}$ ($0 \pm 0.08 \text{ in}$)

- 1) Check that the left and right wheel steering angles are within specification.
- 2) Loosen the left and right side steering tie-rod lock nuts (a).
- 3) Turn the left and right tie-rods by equal amounts until the toe-in is at the specification.

NOTE:

Both the left and right tie-rods are right-hand threaded. To increase toe-in, turn both tie-rods clockwise by equal amount (viewing from the inside of vehicle).

- 4) Tighten the tie-rod lock nut (a).



Tightening torque:

$85 \text{ N}\cdot\text{m}$ ($8.67 \text{ kgf}\cdot\text{m}$, $62.7 \text{ ft}\cdot\text{lb}$)

- 5) Check and correct the tie-rod boot if twisted.



Wheel Alignment

FRONT SUSPENSION

4. REAR WHEEL TOE-IN

When adjusting, adjust it to the following value.

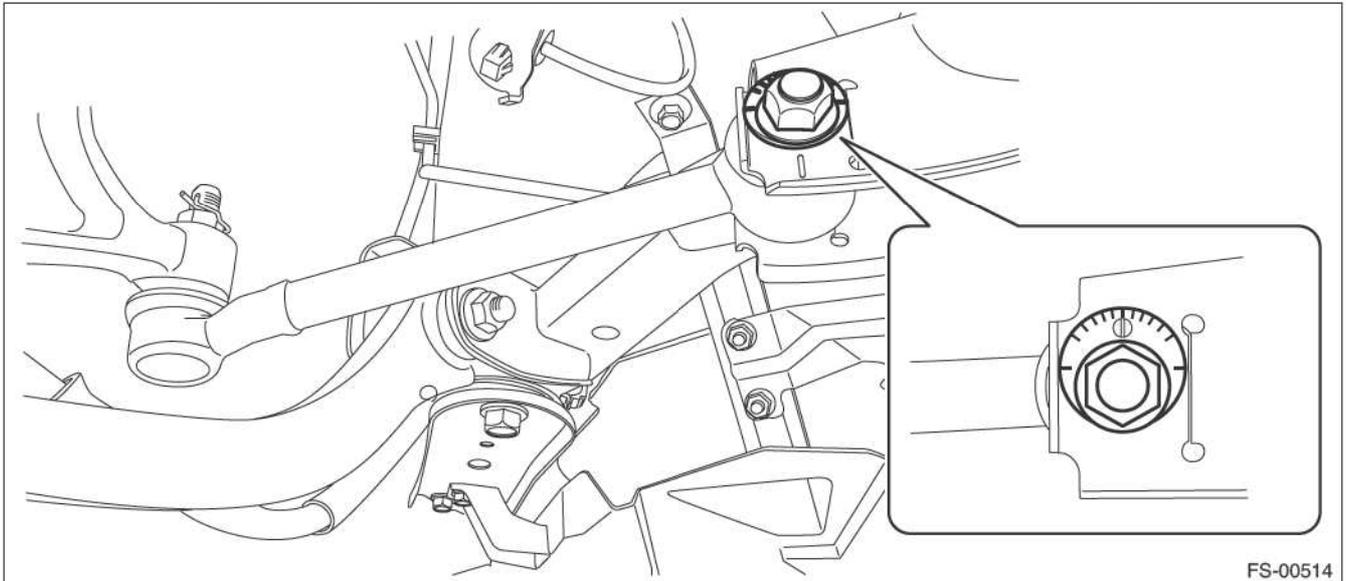
Toe-in: Adjustment value

$3 \pm 2 \text{ mm}$ ($0.12 \pm 0.08 \text{ in}$)

- 1) Loosen the self-locking nut for the lateral link assembly - front.

NOTE:

When loosening or tightening the adjusting bolt, hold the bolt head and turn the self-locking nut.



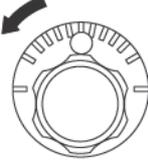
Wheel Alignment

FRONT SUSPENSION

2) Turn the adjusting bolt until toe-in is within the specification.

NOTE:

When the left and right wheels are adjusted for toe-in at the same time, the movement of one scale graduation changes toe-in by approx. 1.3 mm (0.05 in).

To increase toe-in.	
Rotate the left side clockwise.	Rotate the right side counterclockwise.
 FS-00018	 FS-00019

To decrease toe-in.	
Rotate the left side counterclockwise.	Rotate the right side clockwise.
 FS-00019	 FS-00018

3) Attach and tighten a new self-locking nut.

Tightening torque:

120 N·m (12.24 kgf-m, 88.5 ft-lb)

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Wheel Alignment

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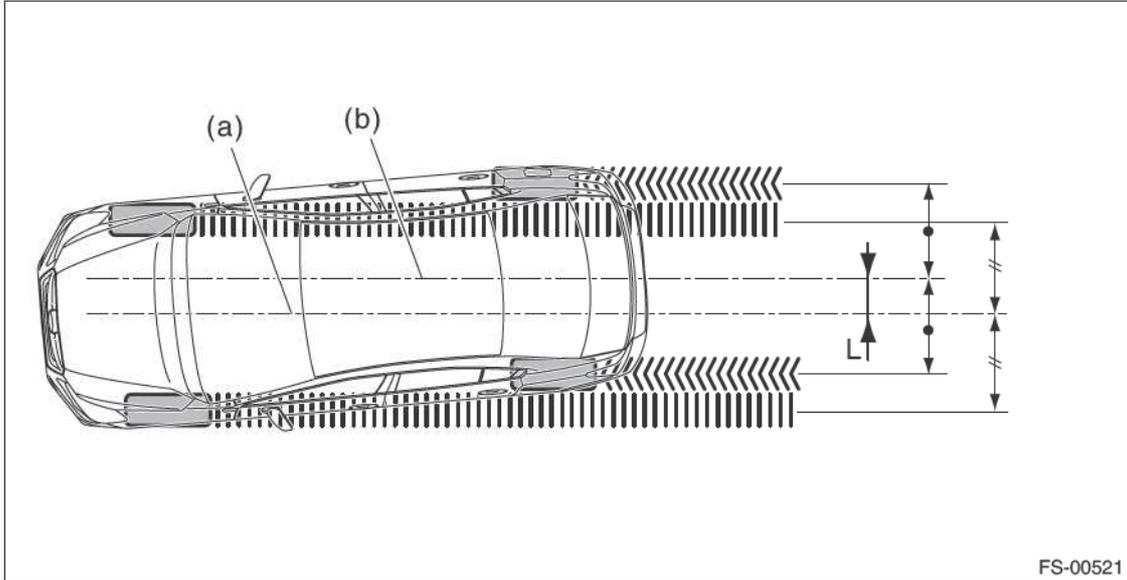
5. THRUST ANGLE

When adjusting, adjust it to the following value.

Thrust angle: Adjustment value

$0^{\circ} \pm 20'$

Less than 20' when "L" is 15 mm (0.6 in) or less



FS-00521

(a) Center line of loci (front axle)

(b) Center line of loci (rear axle)

- 1) Make thrust angle adjustments by turning the toe-in adjusting bolts of the rear suspension equally in the same direction.
- 2) When one rear wheel is adjusted in a toe-in direction, adjust the other rear wheel equally in toe-out direction, in order to make the thrust angle adjustment.



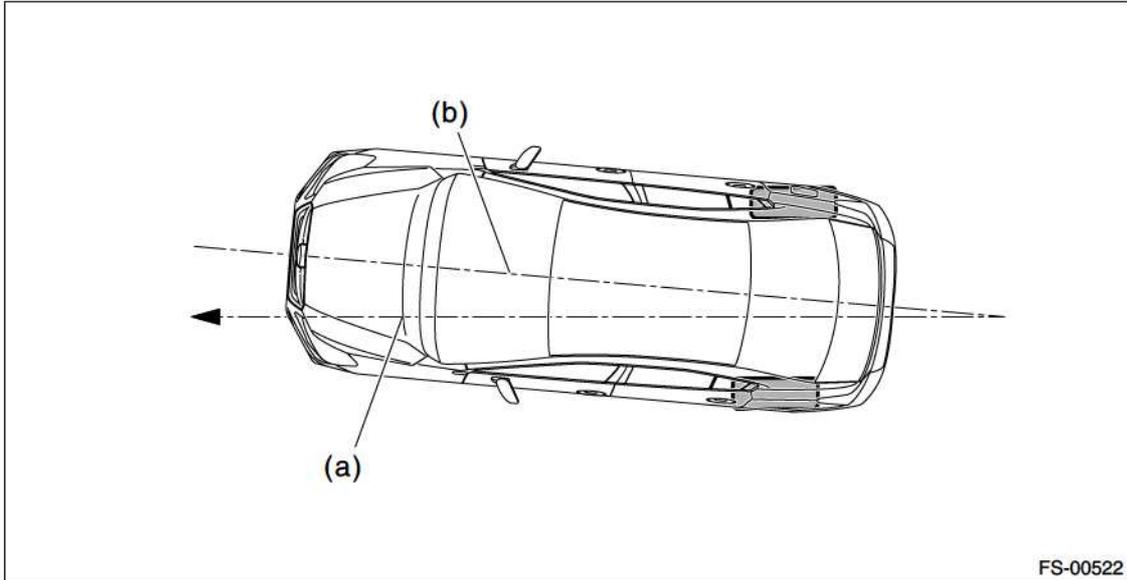
Wheel Alignment

FRONT SUSPENSION

3) When the left and right adjusting bolts are turned by one graduation, the thrust angle will change approx. 15'. ("L" is approx. 11 mm (0.43 in)).

NOTE:

Thrust angle is a mean value of left and right wheel toe angles in relation to the vehicle body center line. Vehicle is driven straight in the thrust angle direction while slanting in the oblique direction depending on the degree of the mean thrust angle.



FS-00522

(a) Thrust angle

(b) Body center line

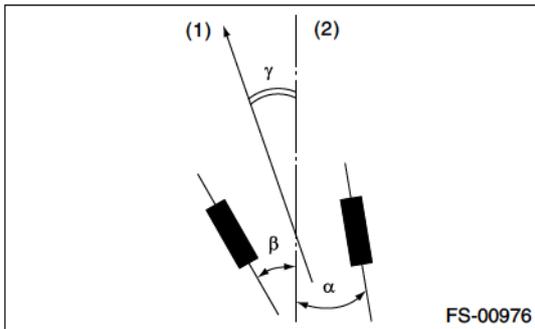
Thrust angle:

$$\gamma = (\alpha - \beta)/2$$

α : Rear RH wheel toe-in angle

β : Rear LH wheel toe-in angle

Substitute only the positive toe-in values from each wheel into α and β in the calculation.



FS-00976

(1) Front

(2) Body center line

