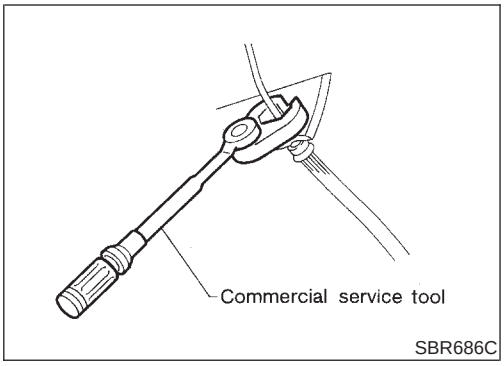
FRONT & REAR SUSPENSION

SECTION SU

CONTENTS

CONTENTS (Cont'd)



SBR686C

Precautions

PRECAUTIONS

NASU0001

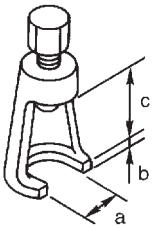
- **When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground. *Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.**
- **Use flare nut wrench when removing and installing brake tubes.**
- **After installing removed suspension parts, check wheel alignment and adjust if necessary.**
- **Always torque brake lines when installing.**

Preparation

SPECIAL SERVICE TOOLS

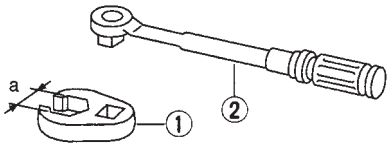
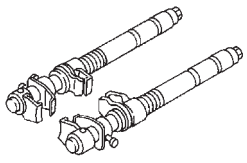
NASU0002

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
ST29020001 (J24319-01) Ball joint remover	 NT694	Removing tie-rod outer end and lower ball joint **a: 34 mm (1.34 in)** **b: 6.5 mm (0.256 in)** **c: 61.5 mm (2.421 in)**

COMMERCIAL SERVICE TOOLS

NASU0003

Tool name	Description	
1 Flare nut crowfoot 2 Torque wrench	 NT360	Removing and installing each brake piping **a: 10 mm (0.39 in)**
Spring compressor	 NT717	Removing and installing coil spring

Noise, Vibration and Harshness (NVH) Troubleshooting

=NASU0035

NVH TROUBLESHOOTING CHART

NASU0035S01

Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

		Reference page	SU-5, 38	SU-10, 40	—	—	—	SU-10, 40	SU-8	SU-13, 42	SU-8	—	—	—	—	—	—	PD-4	PD-4	AX-3	AX-3	Refer to SUSPENSION in this chart.	Refer to TIRES in this chart.	Refer to ROAD WHEEL in this chart.	BR-7	ST-6
		Possible Cause and SUSPECTED PARTS	Improper installation, looseness	Shock absorber deformation, damage or deflection	Bushing or mounting deterioration	Parts interference	Spring fatigue	Suspension looseness	Incorrect wheel alignment	Stabilizer bar fatigue	Out-of-round	Imbalance	Incorrect air pressure	Uneven tire wear	Deformation or damage	Non-uniformity	Incorrect tire size	PROPELLER SHAFT	DIFFERENTIAL	DRIVE SHAFT	AXLE	SUSPENSION	TIRES	ROAD WHEEL	BRAKES	STEERING
Symptom	SUSPENSION	Noise	×	×	×	×	×	×										×	×	×	×		×	×	×	×
		Shake	×	×	×	×		×										×		×	×		×	×	×	×
		Vibration	×	×	×	×	×											×		×	×		×			×
		Shimmy	×	×	×	×			×												×		×	×	×	×
		Judder	×	×	×																×		×	×	×	×
		Poor quality ride or handling	×	×	×	×	×		×	×											×		×	×		
	TIRES	Noise	×								×	×	×	×	×	×		×	×	×	×	×		×	×	×
		Shake	×								×	×	×	×	×		×	×		×	×	×		×	×	×
		Vibration											×				×	×		×	×	×				×
		Shimmy	×								×	×	×	×	×	×	×				×	×		×	×	×
		Judder	×								×	×	×	×	×		×				×	×		×	×	×
		Poor quality ride or handling	×								×	×	×	×	×		×				×	×		×		
	ROAD WHEEL	Noise	×								×	×			×			×	×	×	×	×	×		×	×
		Shake	×								×	×			×			×		×	×	×	×		×	×
		Shimmy, Judder	×								×	×			×						×	×	×		×	×
		Poor quality ride or handling	×								×	×			×						×	×	×			

×: Applicable

Components

NASU0004

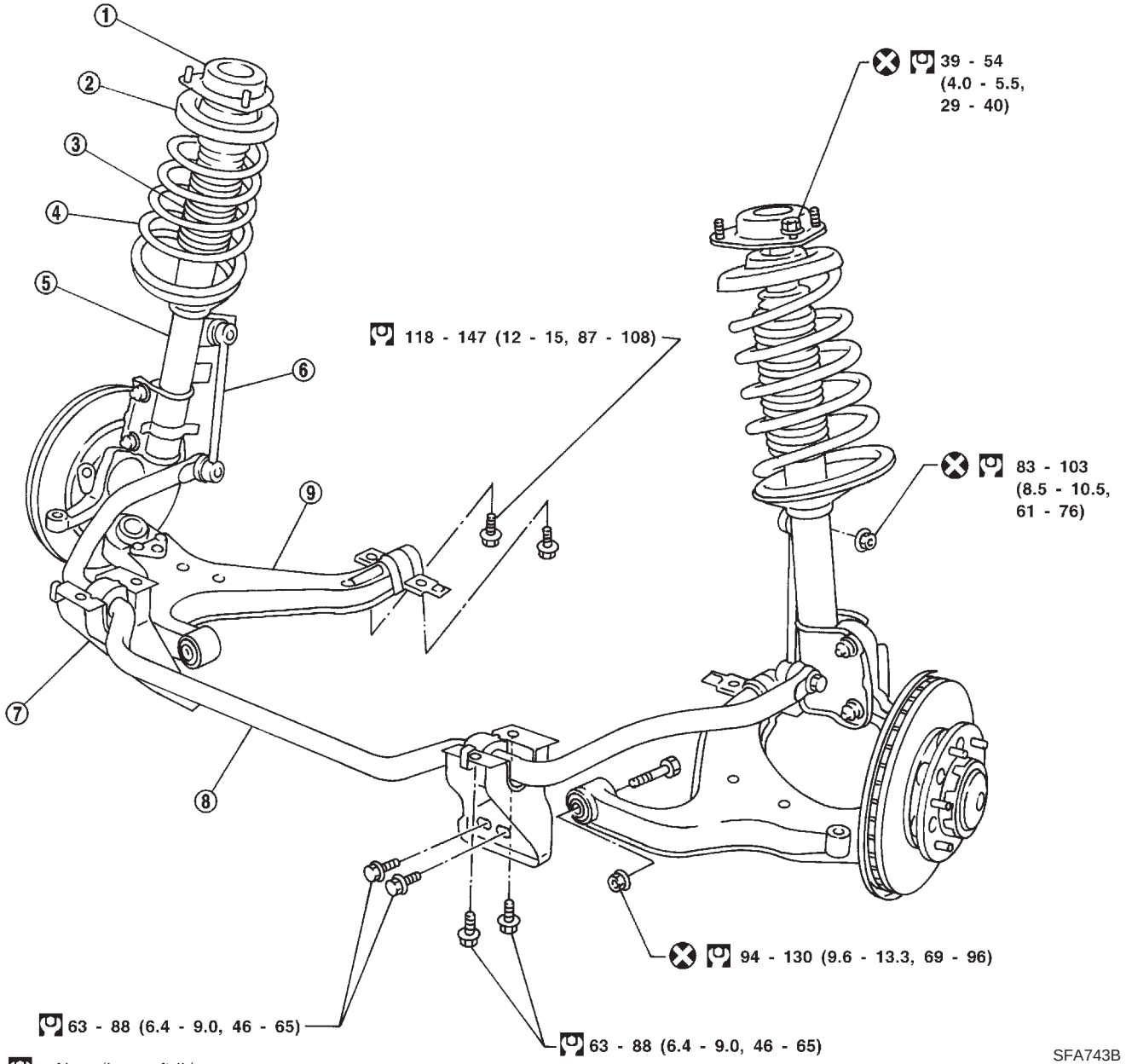
2WD

NASU0004S01

SEC. 400•401

When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground.

*** Fuel, radiator coolant and engine oil full.**
Spare tire, jack, hand tools and mats in designated positions.



SFA743B

1. Strut mounting insulator
2. Spring upper seat
3. Bound bumper
4. Coil spring
5. Strut assembly
6. Stabilizer connecting rod
7. Bracket
8. Stabilizer bar
9. Transverse link

Components (Cont'd)

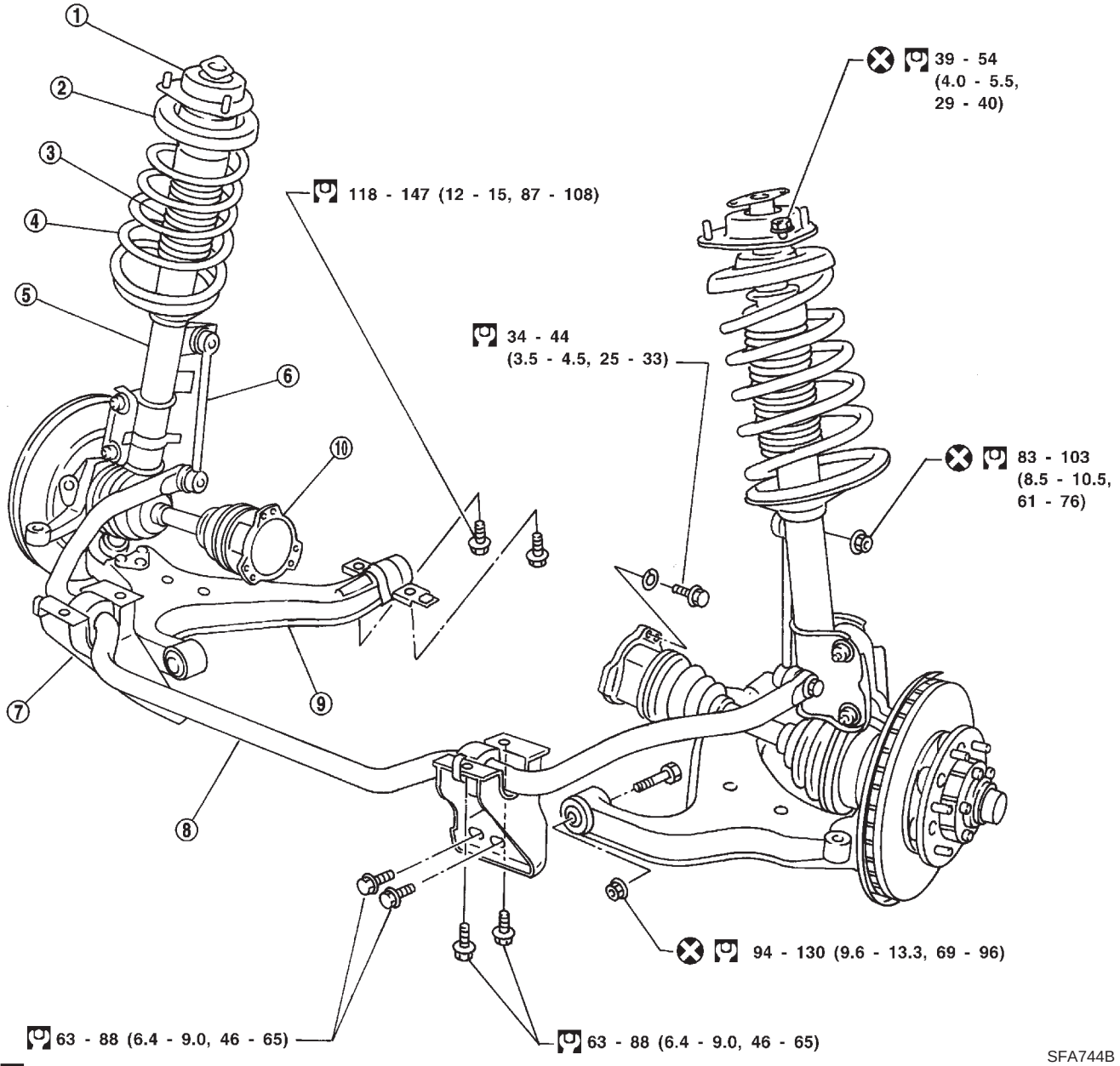
4WD

NASU0004S02

SEC. 391•400•401

When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground.

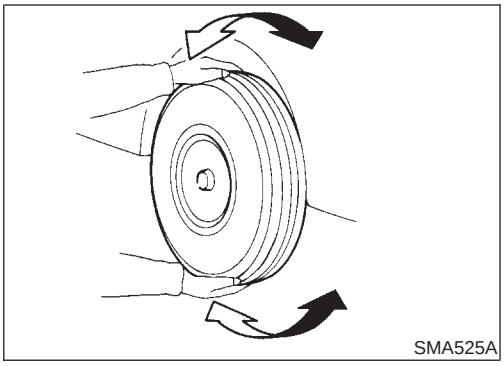
*** Fuel, radiator coolant and engine oil full.**
Spare tire, jack, hand tools and mats in designated positions.

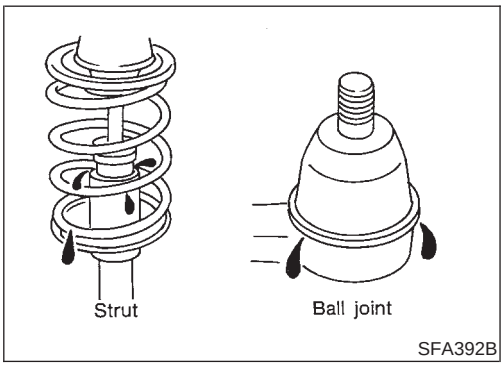


SFA744B

: N•m (kg-m, ft-lb)

1. Strut mounting insulator
2. Spring upper seat
3. Bound bumper
4. Coil spring
5. Strut assembly
6. Stabilizer connecting rod
7. Bracket
8. Stabilizer bar
9. Transverse link
10. Drive shaft


SMA525A



SFA392B

On-vehicle Service

FRONT SUSPENSION PARTS

NASU0005

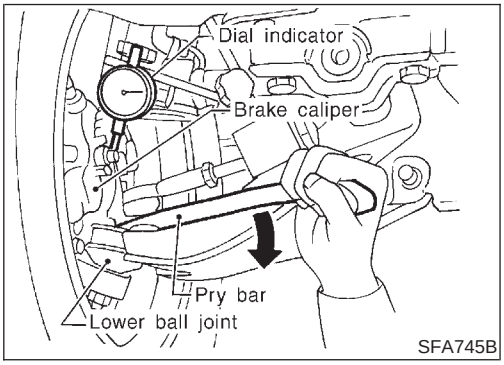
Check front axle and front suspension parts for excessive play, cracks, wear and other damage.

1. Shake each front wheel to check for excessive play.
2. Retighten all axle and suspensions nuts and bolts to the specified torque.

Tightening torque:
Refer to “Components”, SU-10.

3. Check strut (shock absorber) for oil leakage and other damage.
4. Check suspension ball joint for grease leakage and ball joint dust cover for cracks and other damage.
   If ball joint dust cover is cracked or damaged, replace ball joint assembly.
5. Check suspension ball joint end play.

a. Jack up front of vehicle and set the stands.
b. Clamp dial indicator onto transverse link and place indicator tip on lower edge of brake caliper.
c. Make sure front wheels are straight and brake pedal is depressed.

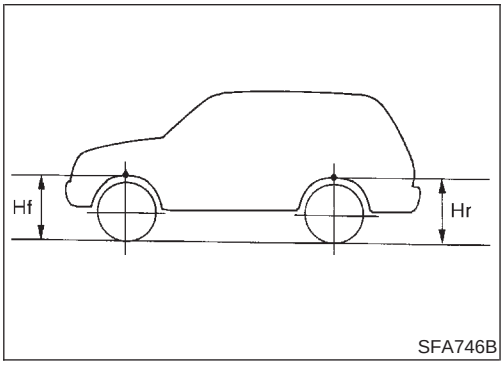


SFA745B

d. Place a pry bar between transverse link and knuckle.
e. While raising and releasing pry bar, observe maximum dial indicator value.

Vertical end play:
0 mm (0 in)

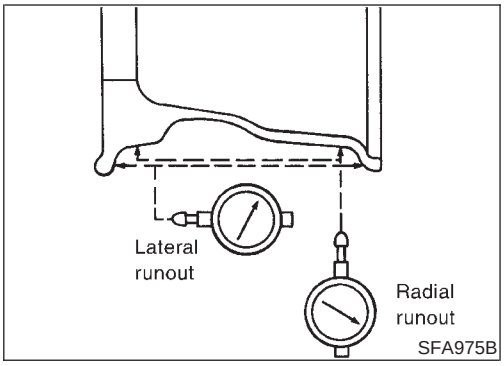
If ball joint vertical end play exists, remove lower ball joint assembly and recheck the ball joint. Refer to “Tranverse Link and Lower Ball Joint”, SU-14.



SFA746B

6. Check spring height from top of wheelarch to ground using the following procedure.

a. Park vehicle on a level surface with vehicle unladen*.
   *: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.
b. Check tires for proper inflation and wear (tread wear indicator must not be showing).
c. Bounce vehicle up and down several times and measure dimensions Hf and Hr. Refer to SDS, SU-35.
   Spring height is not adjustable. If out of specification, check for worn springs and suspension parts.



FRONT WHEEL ALIGNMENT

NASU0006

Before checking front wheel alignment, be sure to make a preliminary inspection (Unladen*).

*: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.

Preliminary Inspection

NASU0006S01

1. Check tires for wear and improper inflation.
2. Check wheels for deformation, cracks and other damage. If deformed, remove wheel and check wheel runout.

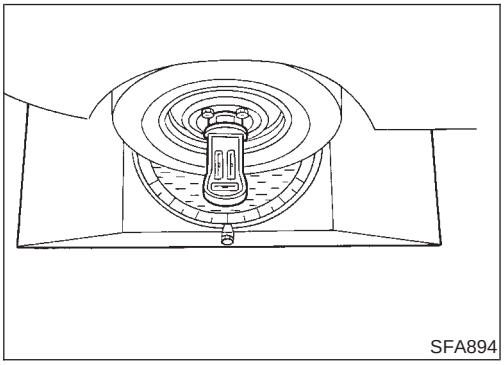
NOTE:

Measure both the inner and outer sides for the radial runout and lateral runout, and confirm the figures are within the standards.

Wheel runout (Dial indicator value):

Refer to SDS, SU-36.

3. Check front wheel bearings for looseness.
4. Check front suspension for looseness.
5. Check steering linkage for looseness.
6. Check that front shock absorbers work properly.
7. Check vehicle posture (Unladen).



Camber, Caster and Kingpin Inclination

NASU0006S02

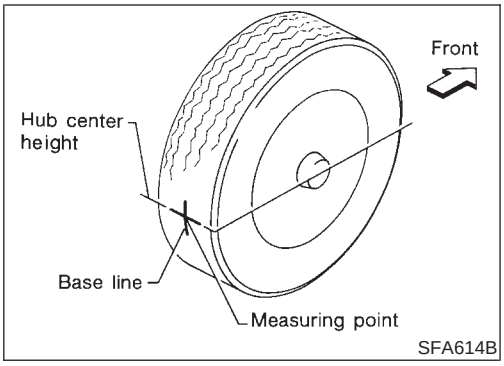
Camber, caster and kingpin inclination are preset at factory and cannot be adjusted.

1. Measure camber, caster and kingpin inclination of both right and left wheels with a suitable alignment gauge.

Camber, Caster and Kingpin inclination:

Refer to SDS, SU-34.

2. If camber, caster or kingpin inclination is not within specification, inspect front suspension parts. Replace damaged or worn out parts.



Toe-in

NASU0006S03

Measure toe-in using the following procedure.

WARNING:

- **Always perform the following procedure on a flat surface.**
- **Make sure that no person is in front of the vehicle before pushing it.**

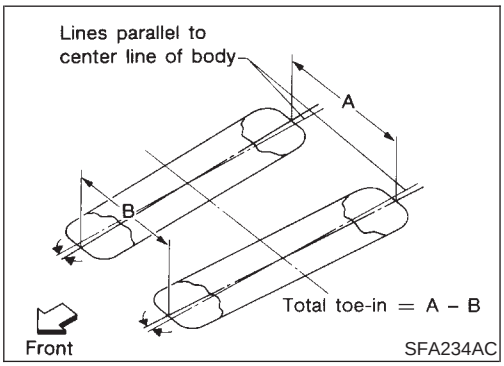
1. Bounce front of vehicle up and down to stabilize the posture.
2. Push the vehicle straight ahead about 5 m (16 ft).
3. Put a mark on base line of the tread (rear side) of both tires at the same height of hub center. This mark is a measuring point.
4. Measure distance "A" (rear side).
5. Push the vehicle slowly ahead to rotate the wheels 180 degrees (1/2 turn).

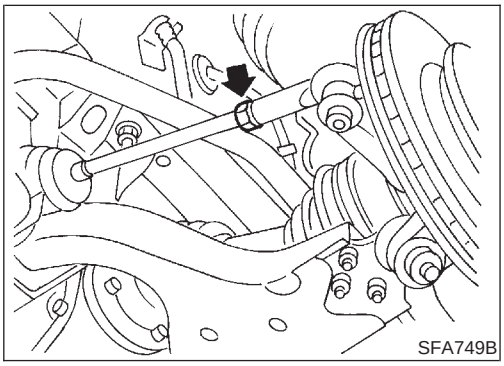
If the wheels have rotated more than 180 degrees (1/2 turn), try the above procedure again from the beginning. Never push vehicle backward.

6. Measure distance "B" (front side).

Total toe-in:

Refer to SDS, SU-34.





7. Adjust toe-in by varying the length of steering tie-rods.

a. Loosen lock nuts.

b. Adjust toe-in by screwing tie-rods in and out.

Make sure both tie-rods are the same length.

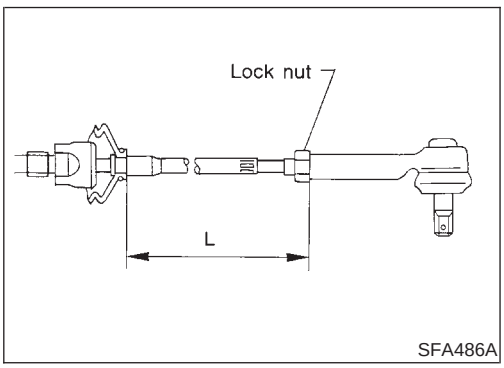
Standard length "L":

Refer to ST-33, "Steering Gear and Linkage".

c. Tighten lock nuts to specified torque.

Lock nut tightening torque:

Refer to ST-18, "POWER STEERING GEAR AND LINKAGE".



Front Wheel Turning Angle

NASU0006S04

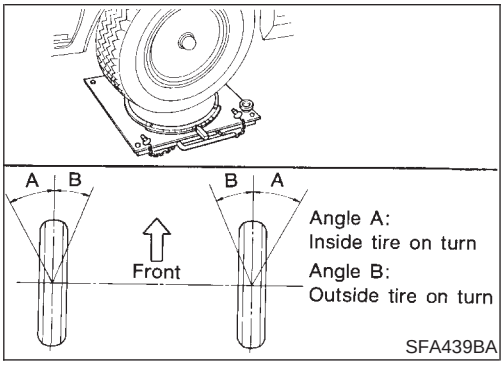
Turning angle is set by stroke length of steering gear rack and cannot be adjusted.

1. Set wheels in straight-ahead position. Then move vehicle forward until front wheels rest on turning radius gauge properly.
2. Rotate steering wheel all the way right and left; measure turning angle.

Do not hold the steering wheel on full lock for more than 15 seconds.

Wheel turning angle (Full turn):

Refer to SDS, SU-34.



Coil Spring and Strut Assembly

COMPONENTS

2WD

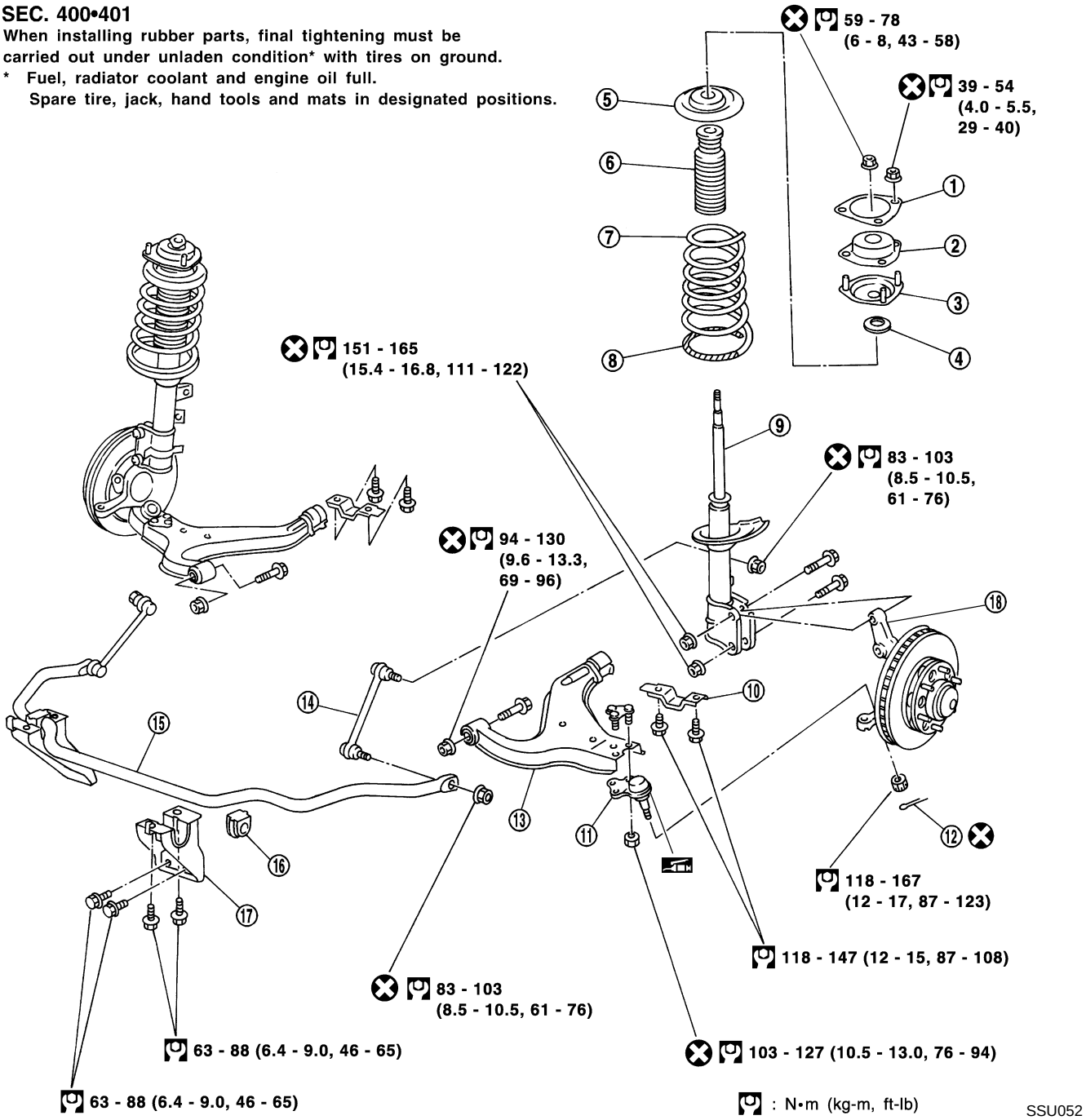
NASU0007

NASU0007S01

SEC. 400•401

When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground.

*** Fuel, radiator coolant and engine oil full.**
Spare tire, jack, hand tools and mats in designated positions.



SSU052

1. Spacer
2. Strut mounting insulator
3. Bracket
4. Strut mounting bearing
5. Spring upper seat
6. Bound bumper
7. Coil spring
8. (Polyurethane tube)
9. Strut assembly
10. Bracket
11. Lower ball joint assembly
12. Cotter pin
13. Transverse link
14. Stabilizer connecting rod
15. Stabilizer bar
16. Bushing
17. Bracket
18. Knuckle spindle

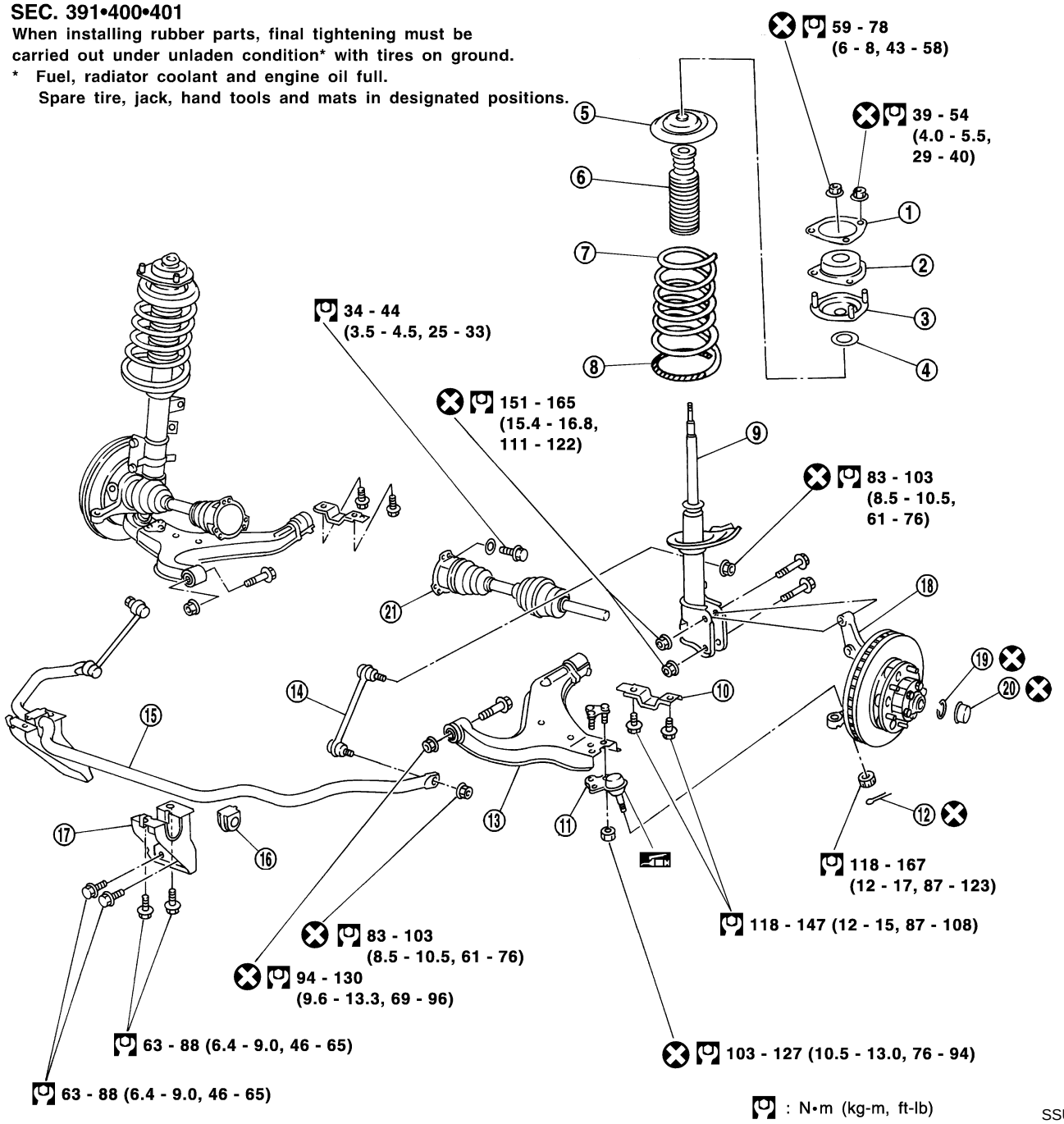
4WD

NASU0007S02

SEC. 391•400•401

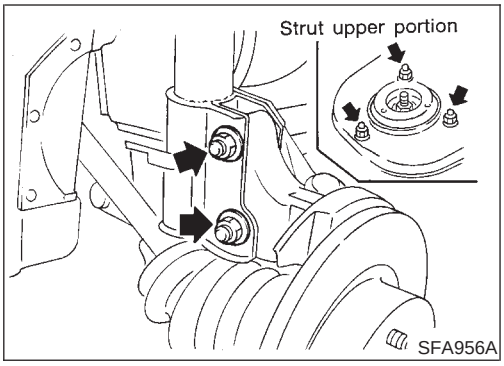
When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground.

*** Fuel, radiator coolant and engine oil full.**
Spare tire, jack, hand tools and mats in designated positions.



SSU053

1. Spacer
2. Strut mounting insulator
3. Bracket
4. Strut mounting bearing
5. Spring upper seat
6. Bound bumper
7. Coil spring
8. (Polyurethane tube)
9. Strut assembly
10. Bracket
11. Lower ball joint assembly
12. Cotter pin
13. Transverse link
14. Stabilizer connecting rod
15. Stabilizer bar
16. Bushing
17. Bracket
18. Knuckle spindle
19. Snap ring
20. Hub cap
21. Drive shaft

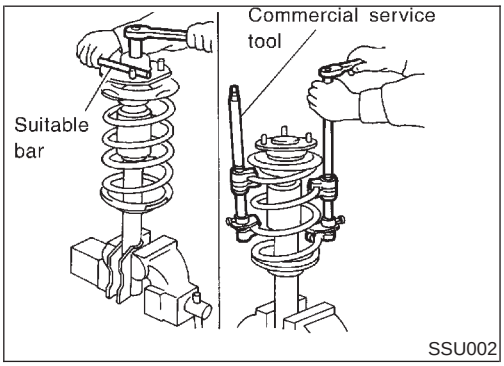


REMOVAL

NASU0008

1. Remove stabilizer connecting rod.
2. Remove strut assembly fixing bolts and nuts (to hood-ledge).

Do not remove piston rod lock nut on vehicle.



DISASSEMBLY

NASU0009

1. Set strut assembly on vise, then **loosen** piston rod lock nut.

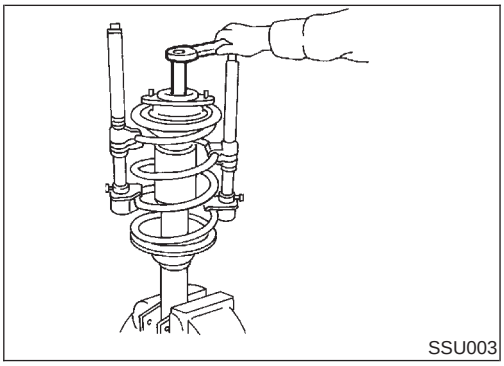
WARNING:

Do not remove piston rod lock nut at this time.

2. Compress spring with tool so that the strut mounting insulator can be turned by hand.

WARNING:

Make sure that the pawls of the two spring compressors are firmly hooked on the spring. The spring compressors must be tightened alternately so as not to tilt the spring.



3. Remove piston rod lock nut.

INSPECTION

NASU0010

Strut Assembly

NASU0010S01

- Check for smooth operation through a full stroke, both compression and extension.
- Check for oil leakage on welded and gland packing portion.
- Check piston rod for cracks, deformation and other damage.
- Replace if necessary.

Strut Mounting Insulator and Rubber Parts

NASU0010S02

- Check cemented rubber-to-metal portion for separation and cracks. Check rubber parts for deterioration.
- Replace if necessary.

Strut Mounting Bearing

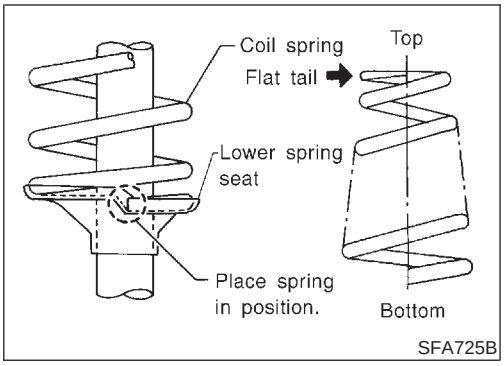
NASU0010S03

- Check thrust bearing parts for abnormal noise and excessive rattle in axial direction.
- Replace if necessary.

Coil Spring

NASU0010S04

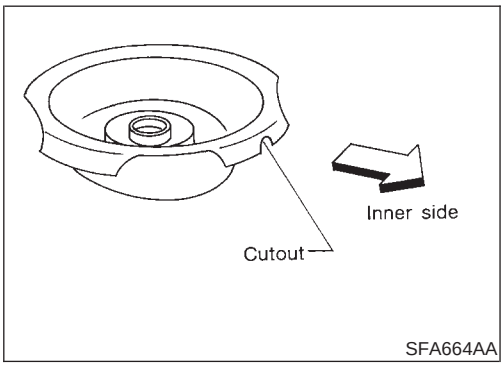
- Check for cracks, deformation and other damage. Replace if necessary.



ASSEMBLY

NASU0011

- When installing coil spring on strut, it must be positioned as shown in the figure at left.



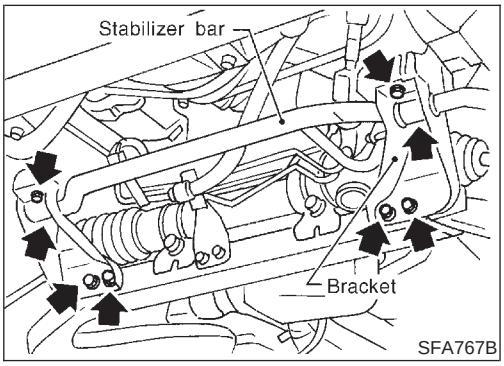
- Install upper spring seat with its cutout facing the inner side of vehicle.

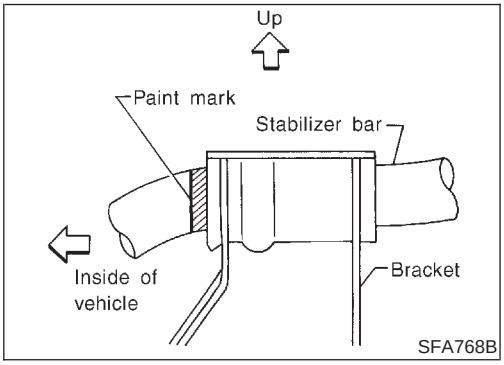
Stabilizer Bar

REMOVAL AND INSTALLATION

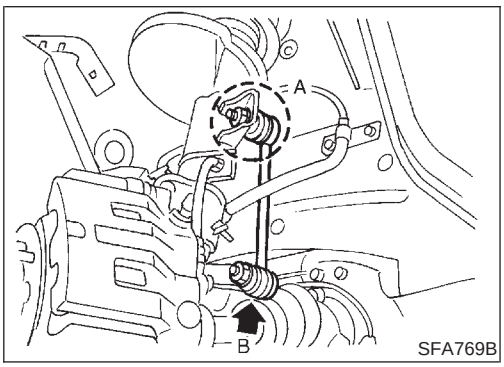
NASU0012

- Remove stabilizer bar and connecting rod.

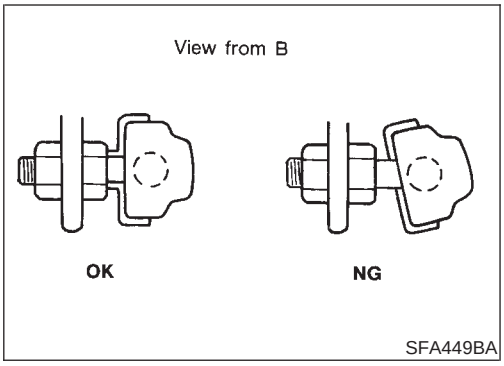




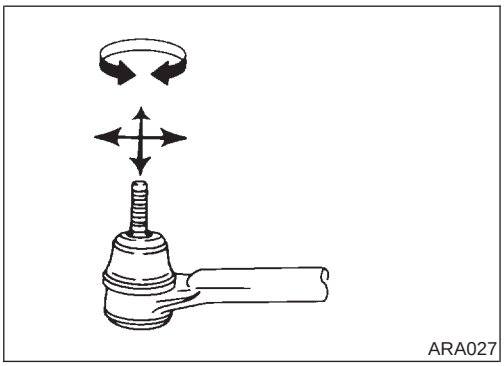
- When installing stabilizer, make sure that paint mark and bracket face in their correct directions.



- When removing and installing stabilizer bar fix portion A.



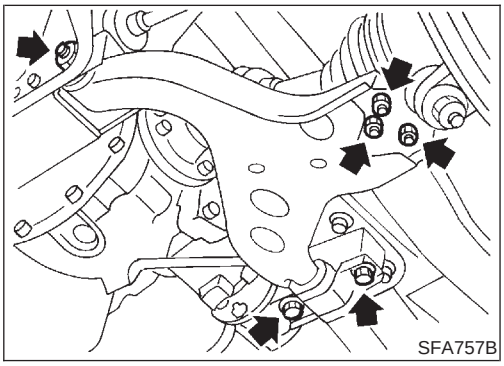
- Install stabilizer bar with ball joint socket properly placed.



INSPECTION

NASU0013

- Check stabilizer for deformation and cracks. Replace if necessary.
- Check rubber bushings for deterioration and cracks. Replace if necessary.
- Check ball joint can rotate in all directions. If movement is not smooth and free, replace stabilizer bar connecting rod.



Transverse Link and Lower Ball Joint

REMOVAL AND INSTALLATION

NASU0014

1. Separate drive shaft from knuckle. — 4WD — Refer to AX-12, "Drive Shaft".
2. Separate lower ball joint stud from knuckle.
3. Remove lower ball joint assembly from transverse link.
4. Remove transverse link.
5. During installation, final tightening must be carried out at curb weight with tires on ground.
6. After installation, check wheel alignment. Refer to "FRONT WHEEL ALIGNMENT", "On-vehicle Service", SU-8.

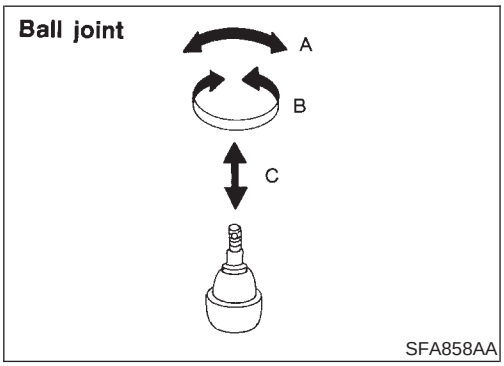
INSPECTION

=NASU0015

Transverse Link

NASU0015S01

- Check transverse link for damage, cracks and deformation. Replace it if necessary.
- Check rubber bushing for damage, cracks and deformation. Replace transverse link if necessary.



Lower Ball Joint

NASU0015S02

- Check ball joint for excessive play. Replace lower ball joint assembly if any of the following exists:

– Ball stud is worn.
– Joint is hard to swing.
– Play in axial direction is excessive.

Before checking, turn ball joint at least 10 revolutions so that ball joint is properly broken in.

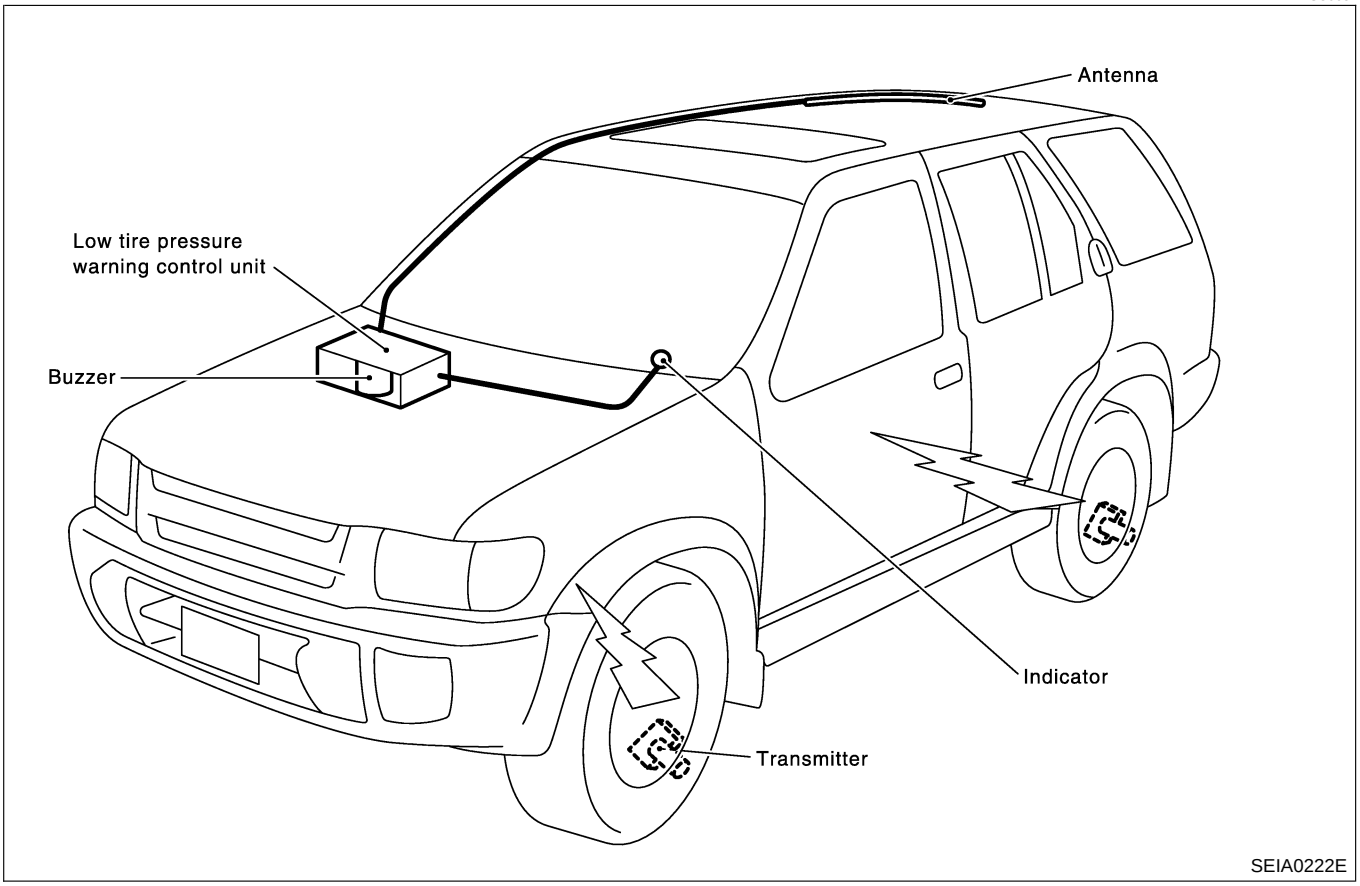
Swinging force "A":
(measuring point: cotter pin hole of ball stud)
Refer to SDS, SU-35.
Turning torque "B":
Refer to SDS, SU-35.
Vertical end play "C":
Refer to SDS, SU-35.

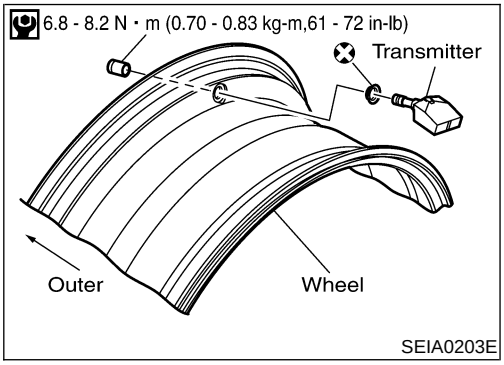
Check dust cover for damage. Replace it and cover clamp if necessary.

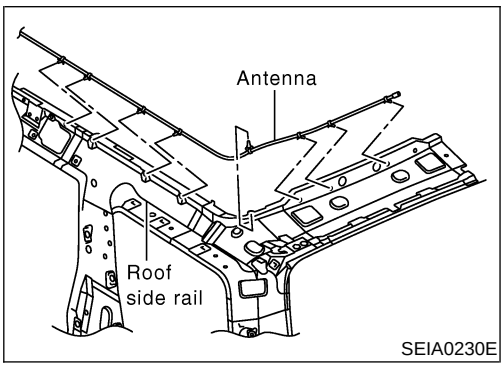
Low Tire Pressure Warning System

SYSTEM COMPONENTS

NASU0037







SYSTEM DESCRIPTION

NASU0038

Transmitter

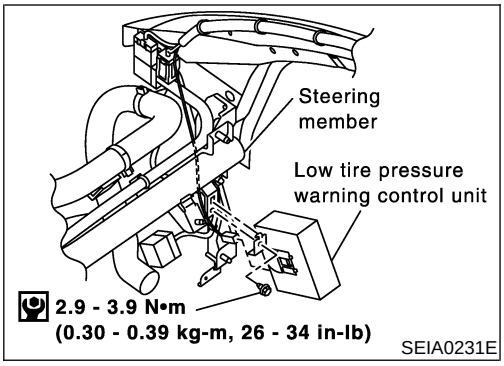
NASU0038S01

A sensor-transmitter integrated with a valve is installed on a wheel, and transmits a detected air pressure signal in the form of a radio wave.

Antenna

NASU0038S02

Receives the radio wave signal transmitted by the transmitter.



Low Tire Pressure Warning Control Unit

NASU0038S03

Reads the radio wave signal received by the antenna, and controls the warning lamp and the buzzer operations as shown below. It also has a judgement function to detect a system malfunction.

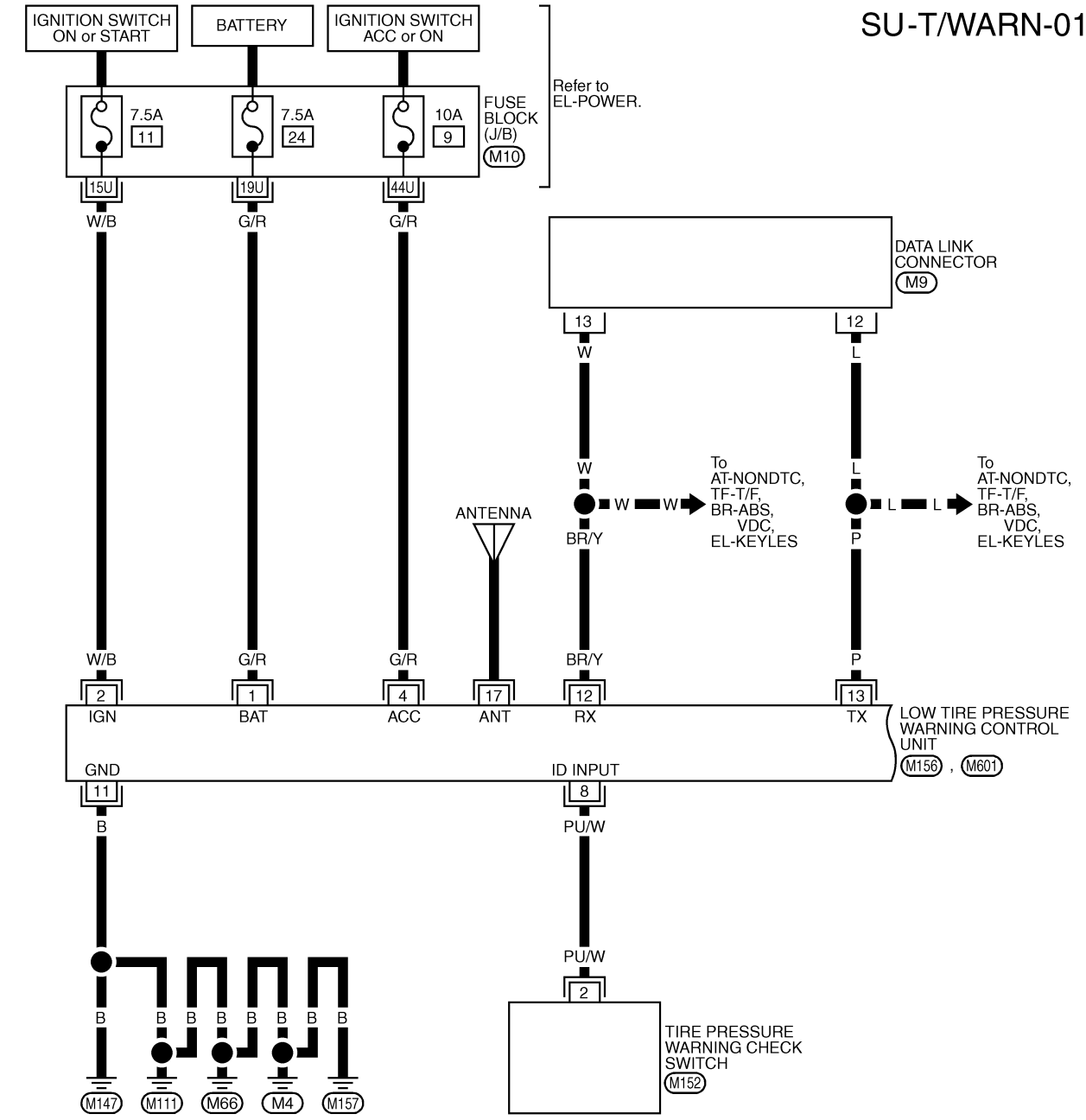
Condition	Warning lamp	Buzzer
Less than 170 kPa (1.7 kg/cm^2, 24 psi) [Flat tire]	ON	Sounds for 10 sec.
System malfunction	ON	OFF

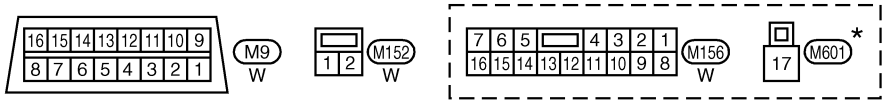
Trouble Diagnoses

WIRING DIAGRAM

NASU0039

SU-T/WARN-01



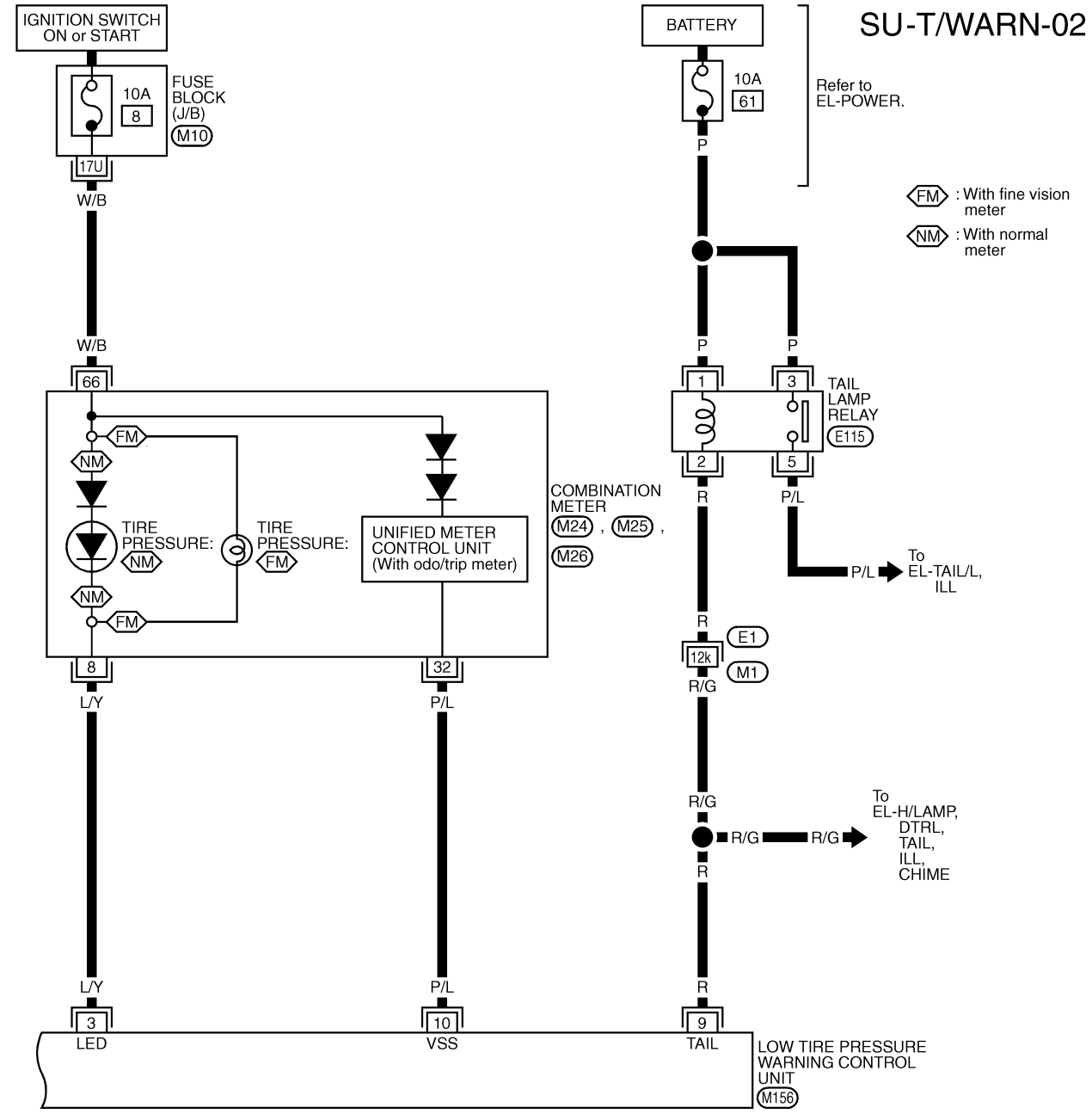


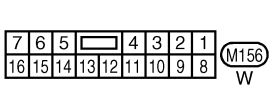
REFER TO THE FOLLOWING.
M10 - FUSE BLOCK-JUNCTION BOX (J/B)

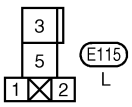
* : This connector is not shown in "HARNESS LAYOUT", EL section.

MSU003

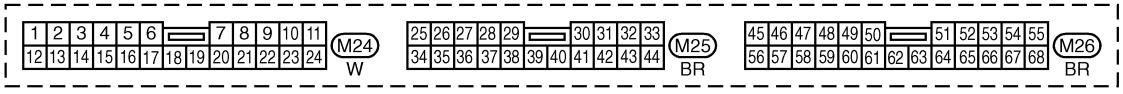
SU-T/WARN-02







REFER TO THE FOLLOWING.
E1 - SUPER MULTIPLE JUNCTION (SMJ)
M10 - FUSE BLOCK-JUNCTION BOX (J/B)

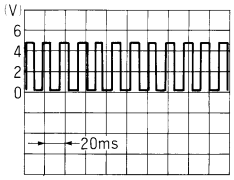


MSU004

LOW TIRE PRESSURE WARNING CONTROL UNIT INPUT/OUTPUT SIGNAL STANDARD

NASU0040

Standards using a circuit tester and oscilloscope

Measurement terminal		Measuring point	Standard value	
+	−			
1	Ground	Battery power supply	Always	Battery voltage (Approx. 12V)
2		Ignition switch ON or START	Ignition switch ON	Battery voltage (Approx. 12V)
3		Tire pressure warning lamp	Tire pressure warning lamp turns ON	Approx. 0V
			Tire pressure warning lamp turns OFF	Battery voltage (Approx. 12V)
4		Ignition switch ON or ACC	Ignition switch ON	Battery voltage (Approx. 12V)
8		Tire pressure warning check switch	Always	Approx. 5V
9		Tail lamp relay	Lighting switch in 1st position	Approx. 0V
			Lighting switch OFF	Approx. 12V
10		Vehicle speed signal (8-pulse)	Speed meter operated [When vehicle speed is approx. 40 km/h (25 MPH)]	 ELF1084D
11		GND	—	Approx. 0V
12		Data link connector (RX)	—	—
13		Data link connector (TX)	—	—
17		Antenna	—	—

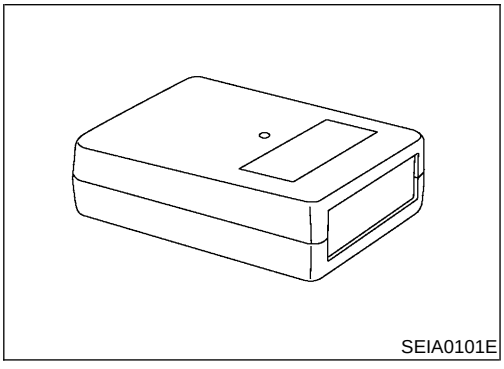
ID REGISTRATION PROCEDURE

NASU0041

ID Registration with Transmitter Activation Tool

NASU0041S01

1. Turn ignition switch "OFF".
2. Connect CONSULT-II to data link connector.
3. Start engine.
4. Touch "START", "AIR PRESSURE MONITOR", "WORK SUPPORT" and "ID REGIST".



SEIA0101E

5. With the transmitter activation tool (J-45295) pushed against the front-left transmitter, press the button then keep 5 seconds.

6. Register the IDs in order from FR LH, FR RH, RR RH, to RR LH. When ID registration of each wheel has been completed, a buzzer sounds and tail lamps blinks.

Activation tire position		Buzzer	Tail lamp	CONSULT-II
1	FR LH	Once	2 times flashing	"YET" ↓ "DONE"
2	FR RH	2 times		
3	RR RH	3 times		
4	RR LH	4 times		

7. After completing all ID registrations, press "END" to complete the procedure.

NOTE:
Be sure to register the IDs in order from FR LH, FR RH, RR RH, to RR LH, or the self-diagnostic results display will not function properly.

ID Registration without Transmitter Activation Tool

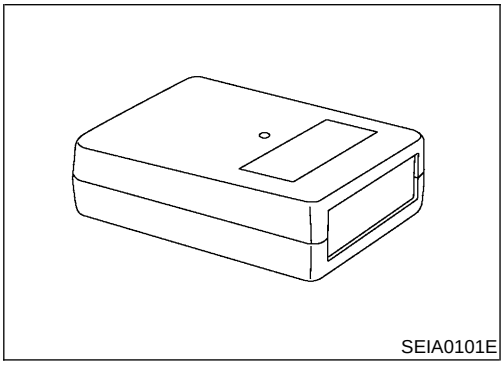
NASU0041S02

1. Turn ignition switch "OFF".
2. Connect CONSULT-II to data link connector.
3. Start engine.
4. Touch "START", "AIR PRESSURE MONITOR", "WORK" SUPPORT" and "ID REGIST".
5. Adjust the tire pressure to the values shown in the table below for ID registration, and drive the vehicle at 32 km/h (20 MPH) or more for a few minutes.

Tire position	Tire pressure kPa (kg/cm^2, psi)
Front-Left	250 (2.5, 36)
Front-Right	230 (2.3, 33)
Rear-Right	210 (2.1, 30)
Rear-Left	190 (1.9, 27)

6. After completing all ID registrations, press "END" to complete the procedure.

Activation tire position	CONSULT-II
Front LH	"YET" ↓ "DONE"
Front RH	
Rear LH	
Rear RH	


SEIA0101E

Transmitter Wake Up Operation

NASU0041S03

With Transmitter Activation Tool

NASU0041S0301

1. With the transmitter activation tool (J-45295) pushed against the front left transmitter, press the button for 5 seconds.

- When ignition switch is ON, then warning lamp blinks as in the follow diagram and transmitter wakes up.

2. Register the IDs in order from FR LH, FR RH, RR RH or RR LH. When wake up of each wheel has been completed, a tail lamp blinks.

Need to activate tire position	Warning lamp	Tail lamp
Front LH	Once (0.3 sec.)	2 times flashing
Front RH	2 times blinking	
Rear LH	3 times blinking	
Rear RH	4 times blinking	
All tires	Once (2.0 sec.)	

3. After completing wake up of all transmitters, make sure tire pressure warning lamp goes out.

SELF-DIAGNOSIS

=NASU0042

Description

NASU0042S01

During driving, the low tire pressure warning system receives the signal transmitted from the transmitter installed in each wheel, and gives alarms when the tire pressure becomes low. The control unit of this system has pressure judgement and trouble diagnosis functions.

Function

NASU0042S02

When the low tire pressure warning system detects low inflation pressure or another unusual symptom, the warning lamps in the combination meter comes on. To start the self-diagnostic results mode, ground the self-diagnostic (check) terminal. The malfunction location is indicated by the tail lamp flashing and the buzzer sounds.

CONSULT-II

NASU0042S03

CONSULT-II Application to Low Tire Pressure Warning System

NASU0042S0301

ITEM	SELF-DIAGNOSTIC RESULTS	DATA MONITOR
Front - Left transmitter	×	×
Front - Right transmitter	×	×
Rear - Left transmitter	×	×
Rear - Right transmitter	×	×
Warning lamp	—	×
Vehicle speed	—	×
Buzzer (in control unit)	—	×

×: Applicable

—: Not applicable

Trouble Diagnoses (Cont'd)

Self-Diagnostic Results Mode

=NASU0042S0302

Diagnostic item	Diagnostic item is detected when ···
FLAT - TIRE - FL FLAT - TIRE - FR FLAT - TIRE - RR FLAT - TIRE - RL	Front-left tire pressure drops to 200 kPa (2.0 kg/cm^2, 28 psi) or less Front-right tire pressure drops to 200 kPa (2.0 kg/cm^2, 28 psi) or less Rear-right tire pressure drops to 200 kPa (2.0 kg/cm^2, 28 psi) or less Rear-left tire pressure drops to 200 kPa (2.0 kg/cm^2 , 28 psi) or less
[NO-DATA] - FL [NO-DATA] - FR [NO-DATA] - RR [NO-DATA] - RL	Data from front-left transmitter cannot be received. Data from front-right transmitter cannot be received. Data from rear-right transmitter cannot be received. Data from rear-left transmitter cannot be received.
[CHECKSUM- ERR] - FL [CHECKSUM- ERR] - FR [CHECKSUM- ERR] - RR [CHECKSUM- ERR] - RL	Checksum data from front-left transmitter is malfunctioning. Checksum data from front-right transmitter is malfunctioning. Checksum data from rear-right transmitter is malfunctioning. Checksum data from rear-left transmitter is malfunctioning.
[PRESSDATA- ERR] - FL [PRESSDATA- ERR] - FR [PRESSDATA- ERR] - RR [PRESSDATA- ERR] - RL	Air pressure data from front-left transmitter is malfunctioning. Air pressure data from front-right transmitter is malfunctioning. Air pressure data from rear-right transmitter is malfunctioning. Air pressure data from rear-left transmitter is malfunctioning.
[CODE- ERR] - FL [CODE- ERR] - FR [CODE- ERR] - RR [CODE- ERR] - RL	Function code data from front-left transmitter is malfunctioning. Function code data from front-right transmitter is malfunctioning. Function code data from rear-right transmitter is malfunctioning. Function code data from rear-left transmitter is malfunctioning.
[BATT - VOLT - LOW] - FL [BATT - VOLT - LOW] - FR [BATT - VOLT - LOW] - RR [BATT - VOLT - LOW] - RL	Battery voltage of front-left transmitter drops. Battery voltage of front-right transmitter drops. Battery voltage of rear-right transmitter drops. Battery voltage of rear-left transmitter drops.
RECEIVER - ID - NO - REG	No ID registration has been made to the low tire pressure warning control unit.

NOTE:

Before performing the self-diagnosis, be sure to register the ID. Or, the actual malfunction location may be different from that displayed on CONSULT-II.

Data Monitor Mode

NASU0042S0303

MONITOR	CONDITION	SPECIFICATION
VHCL SPEED SE	Drive vehicle.	Vehicle speed (km/h or MPH)
AIR PRESS FL AIR PRESS FR AIR PRESS RR AIR PRESS RL	● Drive vehicle for a few minutes. or ● Ignition switch ON and activation tool is transmitting activate signals.	Tire pressure (kPa or Psi)
ID REGST FL ID REGST FR ID REGST RR ID REGST RL	Ignition switch ON	Registration ID: DONE No registration ID: YET
WARNING LAMP		Warning lamp on: ON Warning lamp off: OFF
BUZZER		Buzzer in low tire pressure warning control unit on: ON Buzzer in low tire pressure warning control unit off: OFF

NOTE:

Before performing the self-diagnosis, be sure to register the ID. Or, the actual malfunction location may be different from that displayed on CONSULT-II.

HOW TO PERFORM TROUBLE DIAGNOSIS FOR QUICK AND ACCURATE REPAIR

=NASU0043

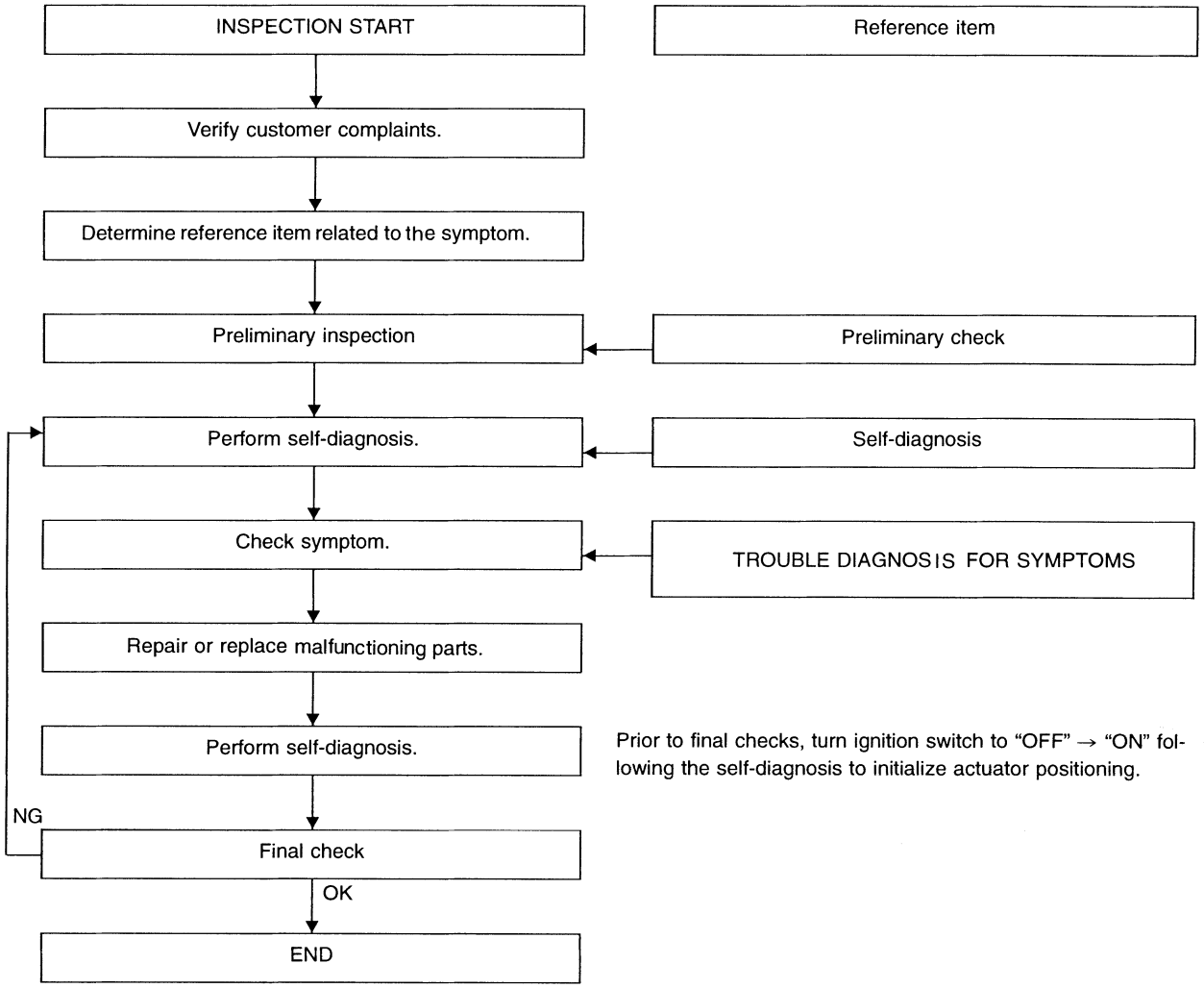
Introduction

NASU0043S01

- Before troubleshooting, verify customer complaints.
- If a vehicle problem is hard to reproduce, harnesses, harness connectors or terminals may often be malfunctioning. Hold and shake these parts by hand to make sure they are securely connected.
- When using a circuit tester to measure voltage or resistance of each circuit, be careful not to expand connector terminals.

Work Flow

NASU0043S02



SEIA0100E

PRELIMINARY CHECK

=NASU0044

BASIC INSPECTION

1	CHECK ALL TIRES PRESSURES	
• Check all tires pressures. **Tire pressure:** **210 kPa (2.1 kg/cm^2, 30 psi)**		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Adjust tire pressure to specified value.

2	CHECK WARNING LAMP ACTIVATION	
• Check warning lamp activation. • Does warning lamp activate for 1 second when ignition switch is turned "ON"?		
YES or NO		
YES	▶	Warning lamp turns off: GO TO 3.
NO	▶	Check fuse and combination meter. Then repair or replace malfunctioning parts.

3	CHECK CONNECTOR	
1. Disconnect low tire pressure warning control unit connector M156. 2. Check terminals for damage or loose connection.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace damaged parts.

4	CHECK TRANSMITTER ACTIVATION TOOL	
• Check transmitter tool battery.		
OK or NG		
OK	▶	Carry out self-diagnosis.
NG	▶	Replace transmitter activation tool battery.

MALFUNCTION CODE/SYMPTOM CHART

=NASU0045

Code/Symptom	Malfunction part	Reference page
15 16 17 18	Front-left tire pressure drops to 200 kPa (2.0 kg/cm^2, 28 psi) or less Front-right tire pressure drops to 200 kPa (2.0 kg/cm^2, 28 psi) or less Rear-right tire pressure drops to 200 kPa (2.0 kg/cm^2, 28 psi) or less Rear-left tire pressure drops to 200 kPa (2.0 kg/cm^2, 28 psi) or less	—
21 22 23 24	Transmitter no data (front - left) Transmitter no data (front - right) Transmitter no data (rear - right) Transmitter no data (rear - left)	SU-27
31 32 33 34	Transmitter checksum error (front - left) Transmitter checksum error (front - right) Transmitter checksum error (rear - right) Transmitter checksum error (rear - left)	SU-28
35 36 37 38	Transmitter pressure data error (front - left) Transmitter pressure data error (front - right) Transmitter pressure data error (rear - right) Transmitter pressure data error (rear - left)	SU-29
41 42 43 44	Transmitter function code error (front - left) Transmitter function code error (front - right) Transmitter function code error (rear - right) Transmitter function code error (rear - left)	SU-28
45 46 47 48	Transmitter battery voltage low (front - left) Transmitter battery voltage low (front - right) Transmitter battery voltage low (rear - right) Transmitter battery voltage low (rear - left)	SU-28
51	Low tire pressure warning control unit	SU-29
Warning lamp does not come on when ignition switch is turned on.	Fuse or combination meter Low tire pressure warning control unit connector or circuit Low tire pressure warning control unit	SU-30
Warning lamp stays on when ignition switch is turned on.	Fuse or combination meter Low tire pressure warning control unit connector or circuit Low tire pressure warning control unit	SU-31
Warning lamp blinks when ignition switch is turned on.	Low tire pressure warning control unit harness connector or circuit Low tire pressure warning control unit	SU-33
Tail lamp blinks when ignition switch is turned on.	Low tire pressure warning control unit harness connector or circuit Low tire pressure warning control unit	SU-34
ID registration cannot be operated.	Transmitter Antenna harness connector or circuit Antenna	SU-34

Trouble Diagnoses for Self-diagnostic Items

INSPECTION 1: TRANSMITTER OR TIRE PRESSURE WARNING CONTROL UNIT

NASU0046

Malfunction Code No. 21, 22, 23 or 24

NASU0046S01

1	CHECK CONTROL UNIT	
● Drive for several minutes. Check all tires' pressure with CONSULT-II "DATA MONITOR ITEM". **Are all tires' pressure displayed 0 kPa?**		
YES	▶	GO TO 2.
NO	▶	GO TO 3.

2	CHECK ANTENNA CONNECTOR	
● Check antenna and feeder connector M601 for damage or loose connections. **OK or NG**		
OK	▶	Replace control unit, then GO TO 3.
NG	▶	Repair or replace antenna or feeder connector.

3	ID REGISTRATION	
● Carry out ID registration of all transmitters. **Is there a tire that cannot register ID?**		
YES	▶	Replace transmitter of the tire, GO TO 5.
NO	▶	GO TO 4.

4	VEHICLE DRIVING	
● Drive at a speed of 40 km/h (25 MPH) or more for several minutes without stopping. Check all tires' pressure with CONSULT-II "DATA MONITOR ITEM" within 15 minutes after vehicle speed becomes 17 km/h (11 MPH). **Does "DATA MONITOR ITEM" display tire pressure as normal without any warning lamp?**		
YES	▶	INSPECTION END.
NO	▶	GO TO 5.

5	ID REGISTRATION AND VEHICLE DRIVING	
1. Carry out ID registration of all transmitters. 2. Drive at a speed of 40 km/h (25 MPH) or more for 3 minutes, and then drive the vehicle at any speed for 10 minutes. Then check all tires' pressure with CONSULT-II "DATA MONITOR ITEM" within 5 minutes. **Does "DATA MONITOR ITEM" display tire pressure as normal without any warning lamp?**		
YES	▶	INSPECTION END.
NG	▶	GO TO the inspection applicable to DTC.

INSPECTION 2: TRANSMITTER-1

NASU0056

Malfunction Code No. 31, 32, 33, 34, 41, 42, 43, 44, 45, 46, 47 or 48

NASU0056S01

1	ID REGISTRATION (CORRECTION OF TRANSMITTER LOCATION)	
1. Carry out ID registration of all transmitters. 2. Drive at a speed of 40 km/h (25 MPH) or more for 3 minutes, and then drive the vehicle at any speed for 10 minutes.		
	▶	GO TO 2.

2	REPLACE TRANSMITTER	
1. Check warning lamp for blink again, replace malfunctioning transmitter. 2. Carry out ID registration of all transmitters. **Can ID registration of all transmitters be completed?**		
YES	▶	GO TO 3.
NO	▶	GO TO Inspection 1.

3	VEHICLE DRIVING
● Drive at a speed of 40 km/h (25 MPH) or more for 3 minutes, and then drive the vehicle at any speed for 10 minutes. Then check all tires' pressure with CONSULT-II "DATA MONITOR ITEM" within 5 minutes. **Does "DATA MONITOR ITEM" display tire pressure as normal without any warning lamp?**	
YES ▶	INSPECTION END.
NO ▶	Replace malfunctioning transmitter, and perform "Step 3" again.

INSPECTION 3: TRANSMITTER-2
Malfunction Code No. 35, 36, 37 or 38

NASU0057

NASU0057S01

1	CHECK ALL TIRES' PRESSURE
● Check all tires' pressure. **Tire pressure:** **210 kPa (2.1 kg/m^2, 30 psi)** **Are there any tires' whose pressure is "64 psi" or more?**	
YES ▶	Adjust tire pressure to specified value.
NO ▶	GO TO 2.

2	VEHICLE DRIVING
1. Carry out ID registration of all transmitters. 2. Drive at a speed of 40 km/h (25 MPH) or more for several minutes without stopping. Check all tires' pressure with CONSULT-II "DATA MONITOR ITEM" within 15 minutes after vehicle speed becomes 17 km/h (11 MPH). **Replace transmitter with new one if "DATA MONITOR ITEM" displays 64 psi or more.**	
▶	Then GO TO 3.

3	ID REGISTRATION AND VEHICLE
1. Carry out ID registration of all transmitters. 2. Drive at a speed of 40 km/h (25 MPH) or more for 3 minutes, and then drive the vehicle at any speed for 10 minutes. Then check all tires' pressure with CONSULT-II "DATA MONITOR ITEM" within 5 minutes. **Does "DATA MONITOR ITEM" display tire pressure as normal without any warning lamp?**	
YES ▶	INSPECTION END.
NO ▶	GO TO the inspection applicable to DTC.

INSPECTION 4: LOW TIRE PRESSURE WARNING CONTROL UNIT
Malfunction Code No. 51

NASU0048

NASU0048S01

1	SELF-DIAGNOSIS
● Carry out self-diagnosis. **Does warning lamp still activate again?**	
YES ▶	Replace low tire pressure warning control unit.
NO ▶	INSPECTION END.

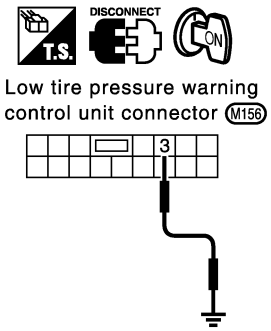
Trouble Diagnoses for Symptoms

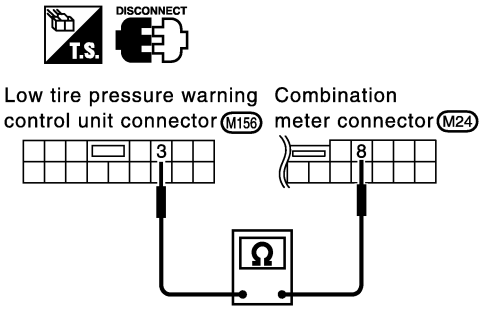
INSPECTION 1: WARNING LAMP DOES NOT COME ON WHEN IGNITION SWITCH IS TURNED ON.

NASU0049

DIAGNOSTIC PROCEDURE

1	CHECK COMBINATION METER OPERATION	
● Check combination meter operation. **OK or NG**		
OK	▶	GO TO 2.
NG	▶	Check combination meter.

2	CHECK WARNING LAMP	
1. Disconnect low tire pressure warning control unit connector M156. 2. Apply ground to low tire pressure warning control unit connector M156 terminal 3 (L/Y).  SEIA0232E **Does the warning lamp activate?**		
OK	▶	Replace low tire pressure warning control unit.
NG	▶	GO TO 3.

3	CHECK COMBINATION METER CIRCUIT	
● Check continuity between low tire pressure warning control unit connector M156 terminal 3 (L/Y) and combination meter connector M24 terminal 8 (L/Y). **3 (L/Y) - 8 (L/Y):** **Continuity should exist.**  SEIA0233E **OK or NG**		
OK	▶	Check combination meter.
NG	▶	Check harness for open or short between low tire pressure warning control unit and combination meter.

INSPECTION 2: WARNING LAMP STAYS ON WHEN IGNITION SWITCH IS TURNED ON.

NASU0050

DIAGNOSTIC PROCEDURE

1	CHECK CONNECTOR

1. Disconnect low tire pressure warning control unit connector M156.
2. Check terminal for damage or loose connections.

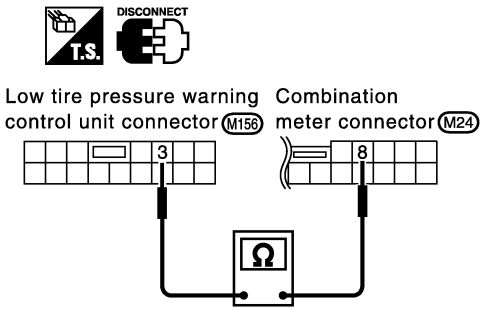
OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace damaged parts.

2	CHECK CIRCUIT

1. Disconnect combination meter connector M24 and low tire pressure warning control unit connector M156.
2. Check continuity between tire pressure warning control unit connector M156 terminal 3 (L/Y) and combination meter connector M24 terminal 8 (L/Y).

3 (L/Y) - 8 (L/Y):
Continuity should exist.



SEIA0233E

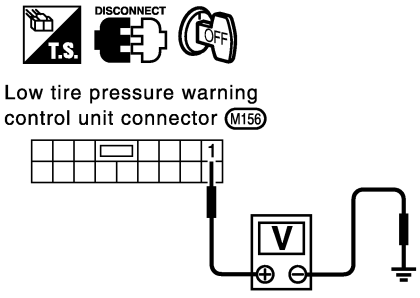
OK or NG

OK	▶	GO TO 3.
NG	▶	Check harness for open or short between low tire pressure warning control unit and combination meter.

3	CHECK POWER SUPPLY CIRCUIT 1

- Check voltage between low tire pressure warning control unit connector M156 terminal 1 (G/R) and ground.

1 (G/R) - Ground:
Battery voltage (Approx. 12V)



SEIA0234E

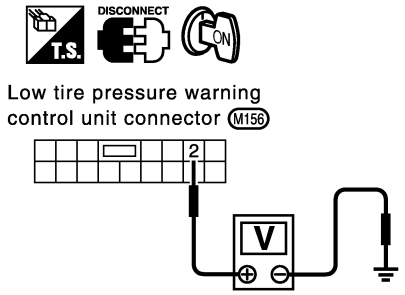
OK or NG

OK	▶	GO TO 4.
NG	▶	Check low tire pressure warning control unit power supply circuit for open or short.

4	CHECK POWER SUPPLY CIRCUIT 2

1. Turn ignition switch ON.
2. Check voltage between low tire pressure warning control unit connector M156 terminal 2 (W/B) and ground.

2 (W/B) - Ground:
Battery voltage (Approx. 12V)



SEIA0235E

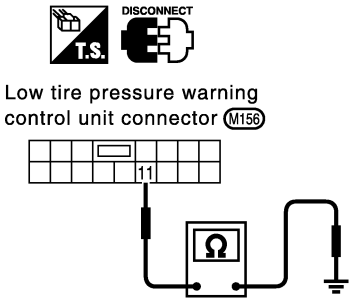
OK or NG

OK	▶	GO TO 5.
NG	▶	Check low tire pressure warning control unit power supply circuit for open or short.

5	CHECK GROUND CIRCUIT

1. Check continuity between low tire pressure warning control unit connector M156 terminal 11 (B) and ground.

11 (B) - Ground:
Continuity should exist.



SEIA0236E

OK or NG

OK	▶	Replace low tire pressure warning control unit.
NG	▶	Repair or replace low tire pressure warning control unit ground circuit.

INSPECTION 3: WARNING LAMP BLINKS WHEN IGNITION SWITCH IS TURNED ON.

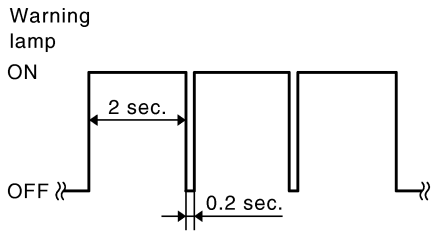
NASU0051

DIAGNOSTIC PROCEDURE

1	CHECK WARNING LAMP

If warning lamp blinks as below, the system is normal.
- This mode shows transmitter status is in OFF-mode.

Mode A



SEIA0347E

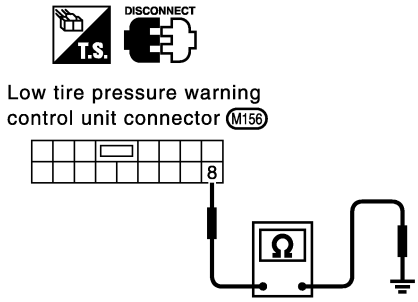
OK or NG

OK	▶	Carry out transmitter wake up operation.
NG	▶	GO TO 2.

2	CHECK CIRCUIT

1. Disconnect low tire pressure warning control unit connector M156.
2. Check continuity between low tire pressure warning control unit connector M156 terminal 8 (PU/W) and ground.

8 (PU/W) - Ground:
Continuity should not exist.



SEIA0237E

OK or NG

OK	▶	Replace low tire pressure warning control unit.
NG	▶	Repair or replace harness connector.

INSPECTION 4: TAIL LAMP BLINKS WHEN IGNITION SWITCH IS TURNED ON.

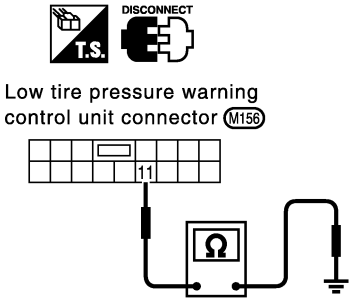
NASU0052

DIAGNOSTIC PROCEDURE

1	CHECK GROUND CIRCUIT

1. Disconnect low tire pressure warning control unit connector M156.
2. Check continuity between low tire pressure warning control unit connector M156 terminal 11 (B) and ground.

11 (B) - Ground:
Continuity should exist.



SEIA0236E

OK or NG

OK	▶	Replace low tire pressure warning control unit.
NG	▶	Repair or replace low tire pressure warning control unit ground circuit.

INSPECTION 5: ID REGISTRATION CANNOT BE COMPLETED.

NASU0053

DIAGNOSTIC PROCEDURE

1	ID REGISTRATION (ALL)

- Carry out ID registration of all transmitters.

Can ID registration of all transmitters be completed?

YES	▶	INSPECTION END.
NO	▶	Go To Inspection 1: Transmitter or Low Tire Pressure Warning Control Unit.

Service Data and Specifications (SDS)

GENERAL SPECIFICATIONS (FRONT)

NASU0016

Suspension type	Independent macpherson strut with coil spring
Strut type	Double-acting hydraulic
Stabilizer bar	Standard equipment

WHEEL ALIGNMENT (UNLADEN*1)

NASU0017

Unit: Degree minute (Decimal degree)

Applied model		All
Camber	Minimum	−0°35′ (−0.58°)
	Nominal	0°10′ (0.17°)
	Maximum	0°55′ (0.92°)
	Left and right difference	45′ (0.75°) or less
Caster	Minimum	2°15′ (2.25°)
	Nominal	3°00′ (3.00°)
	Maximum	3°45′ (3.75°)
	Left and right difference	45′ (0.75°) or less

Applied model				All
Kingpin inclination			Minimum	13°35′ (13.58°)
			Nominal	14°20′ (14.33°)
			Maximum	15°05′ (15.08°)
Total toe-in	Distance (A - B)		Minimum	1 mm (0.04 in)
			Nominal	2 mm (0.08 in)
			Maximum	3 mm (0.12 in)
	Angle (left plus right)		Minimum	5′ (0.08°)
			Nominal	10′ (0.17°)
			Maximum	15′ (0.25°)
Wheel turning angle	Full turn*2	Inside	Minimum	30°00′ (30.00°)
			Nominal	33°00′ (33.00°)
			Maximum	34°00′ (34.00°)
		Outside	Minimum	28°00′ (28.00°)
			Nominal	31°00′ (31.00°)
			Maximum	32°00′ (32.00°)

*1: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.

*2: On power steering models, wheel turning force (at circumference of steering wheel) of 98 to 147 N (10 to 15 kg, 22 to 33 lb) with engine idle.

LOWER BALL JOINT

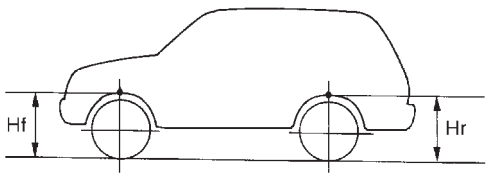
NASU0018

Swinging force "A" (Measuring point: cotter pin hole of ball stud)	7.8 - 76.5 N (0.8 - 7.8 kg, 1.8 - 17.2 lb)
Turning torque "B"	0.5 - 4.9 N·m (5 - 50 kg-cm, 4.3 - 43.4 in-lb)
Vertical end play "C"	0 mm (0 in)

WHEELARCH HEIGHT (UNLADEN*)

NASU0019

Unit: mm (in)



SFA746B

Applied model	2WD		4WD	
	P245/70 R16 tire P245/65 R17 tire	P255/65 R16 tire (With over fender)	P245/70 R16 tire P245/65 R17 tire	P255/65 R16 tire (With over fender)
Front (Hf)	840 (33.07)	840 (33.07)	837 (32.95)	824 (32.44)
Rear (Hr)	867 (34.13)	817 (32.17)	867 (34.13)	817 (32.17)

*: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.

Service Data and Specifications (SDS) (Cont'd)

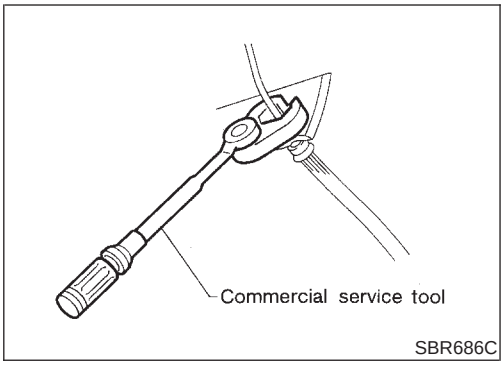
WHEEL RUNOUT AVERAGE*

NASU0020

Unit: mm (in)

Wheel type	Aluminum	Steel
Radial runout limit	0.3 (0.012)	0.8 (0.031)
Lateral runout limit	0.3 (0.012)	0.8 (0.031)

*: Wheel runout average = (Outside runout value + Inside runout value) x 0.5



SBR686C

Precautions

PRECAUTIONS

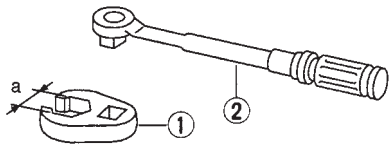
NASU0021

- **When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground. *Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.**
- **Use flare nut wrench when removing and installing brake tubes.**
- **After installing removed suspension parts, check wheel alignment and adjust if necessary.**
- **Always torque brake lines when installing.**

Preparation

COMMERCIAL SERVICE TOOLS

NASU0023

Tool name	Description	
1 Flare nut crowfoot 2 Torque wrench	 NT360	Removing and installing each brake piping **a: 10 mm (0.39 in)**

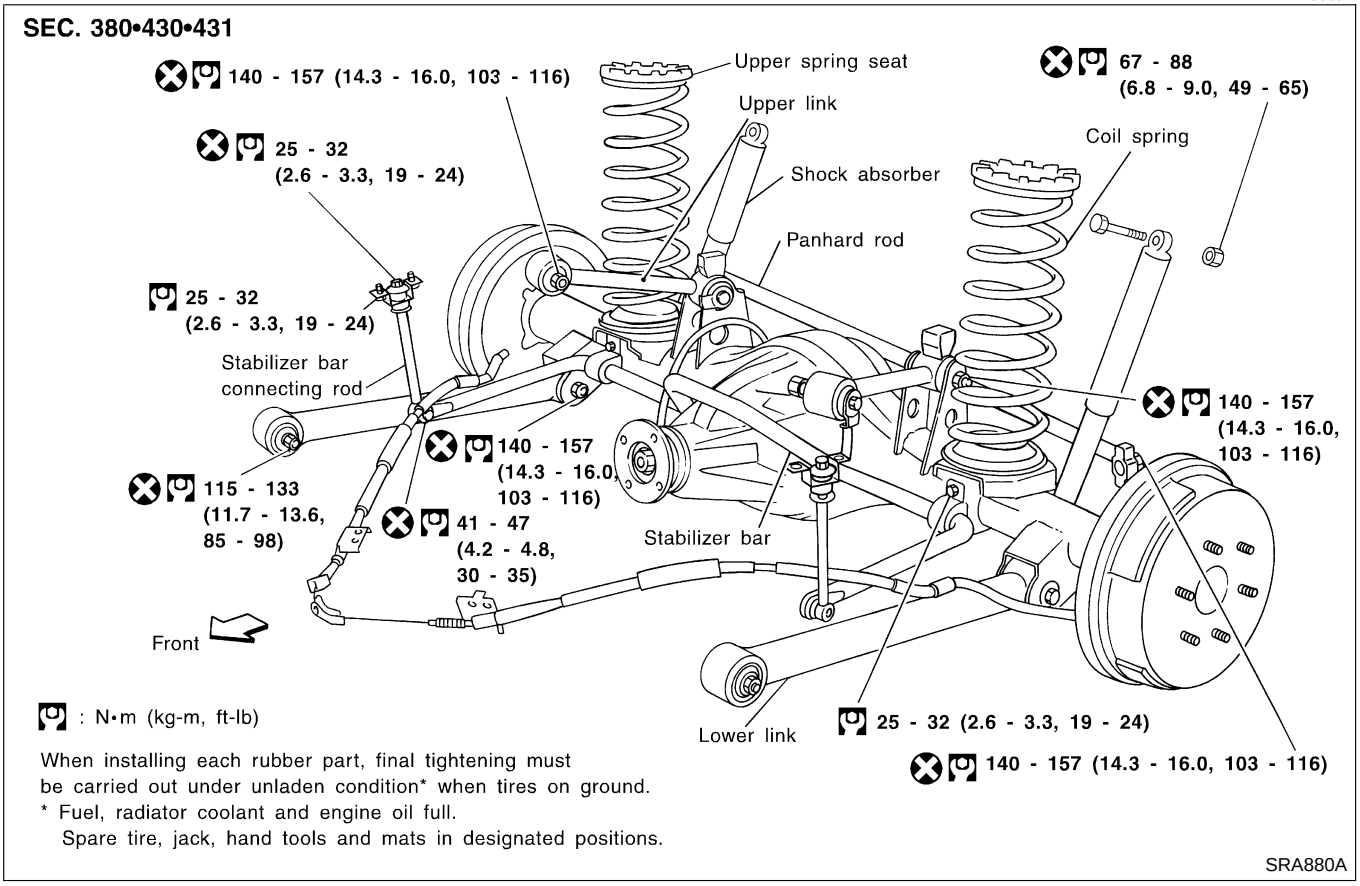
Noise, Vibration and Harshness (NVH) Troubleshooting

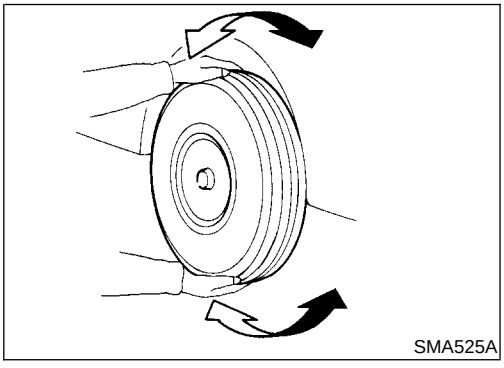
NASU0036

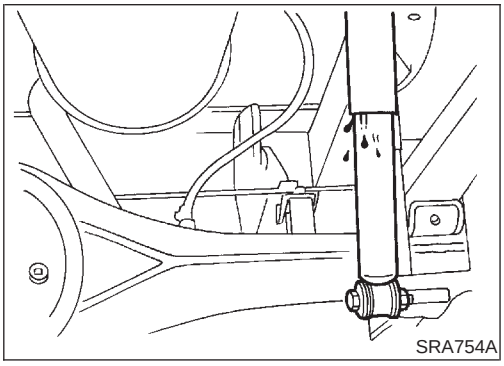
Refer to “Noise, Vibration and Harshness (NVH) Troubleshooting”, “FRONT SUSPENSION”, SU-4.

Components

NASU0024







On-vehicle Service

REAR SUSPENSION PARTS

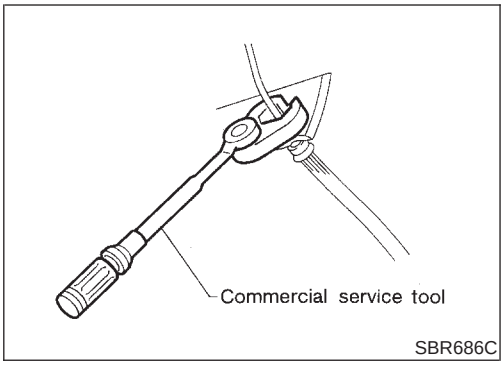
NASU0025

Check rear axle and rear suspension parts for excessive play, wear and damage.

1. Shake each rear wheel to check for excessive play.
2. Retighten all nuts and bolts to the specified torque.

   Tightening torque: Refer to “Coil Spring and Shock Absorber”, SU-40.

3. Check shock absorber for oil leakage and other damage.
4. Check shock absorber bushing for excessive wear and other damage.
5. Check wheelarch height. Refer to “On-vehicle Service”, “FRONT SUSPENSION”, SU-7.



SBR686C

Removal and Installation

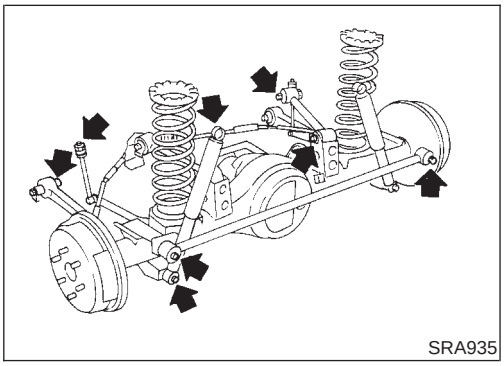
NASU0026

1. Support axle and suspension components with a suitable jack and block.
2. Disconnect brake hydraulic line and parking brake cables at back plates.

CAUTION:

- **Use flare nut wrench when removing and installing brake tubes.**
- **Before removing the rear suspension assembly, disconnect the ABS wheel sensor from the assembly. Then move it away from the rear suspension assembly. Failure to do so may result in damage to the sensor wires and the sensor becoming inoperative.**

3. Remove stabilizer bar from body.
4. Remove upper links and lower links from body.
5. Remove panhard rod from body.
6. Disconnect rear end of propeller shaft. Refer to PD-8, “Removal and Installation”.
7. Remove upper end nuts of shock absorber.


SRA935

Final tightening for rubber parts requires to be carried out under unladen condition with tires on ground.

Coil Spring and Shock Absorber

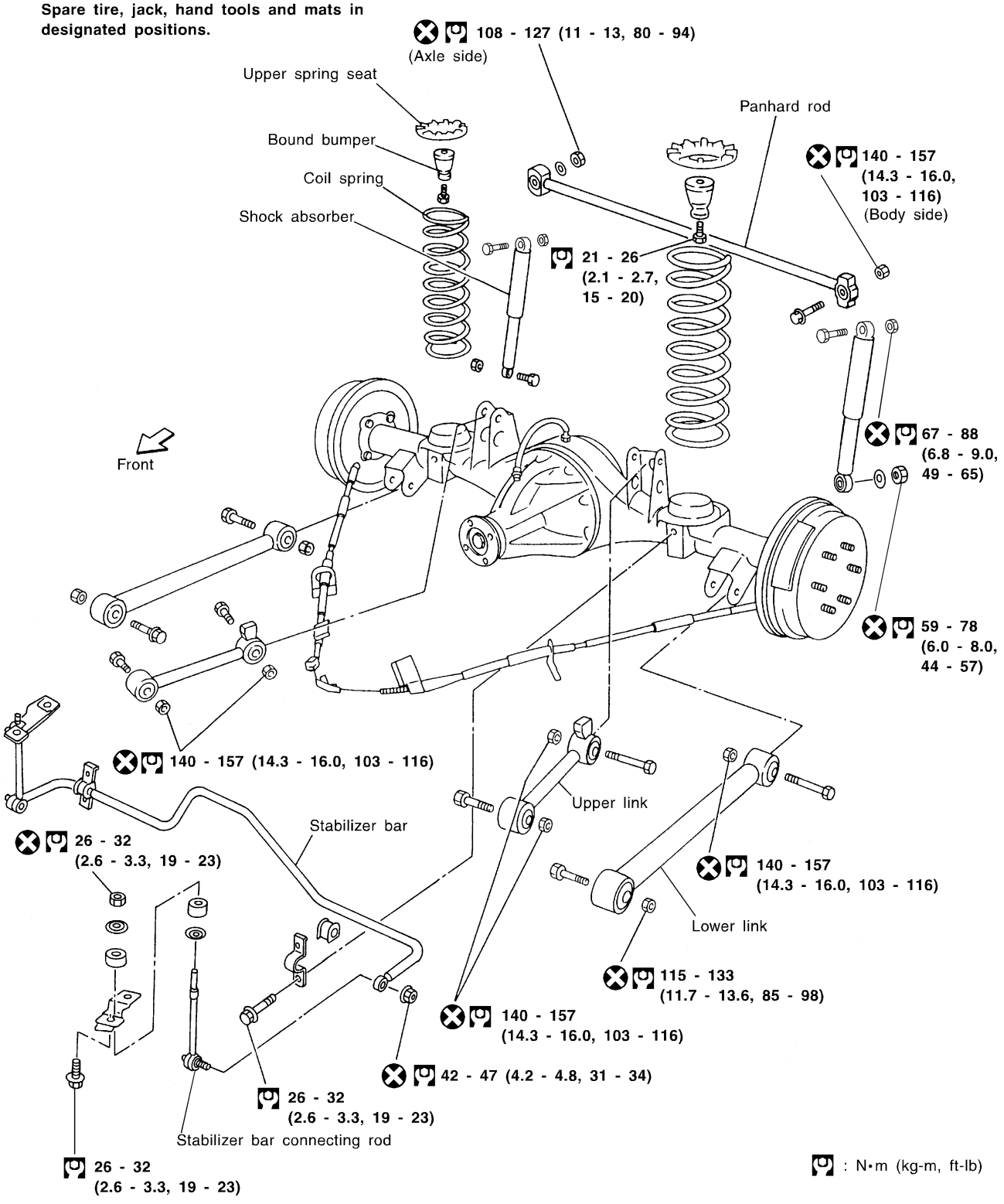
COMPONENTS

NASU0027

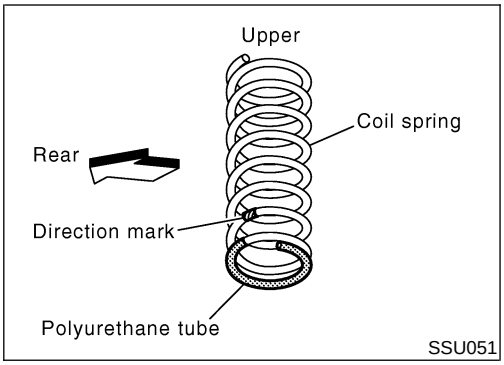
SEC. 380•430•431

When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground.

*** Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.**



SSU054



REMOVAL AND INSTALLATION

NASU0028

Refer to "Removal and Installation", "REAR SUSPENSION", SU-39.

When installing coil spring, pay attention to its direction.
Be sure spring rubber seat is not twisted and has not slipped off when installing coil spring.

INSPECTION

NASU0029

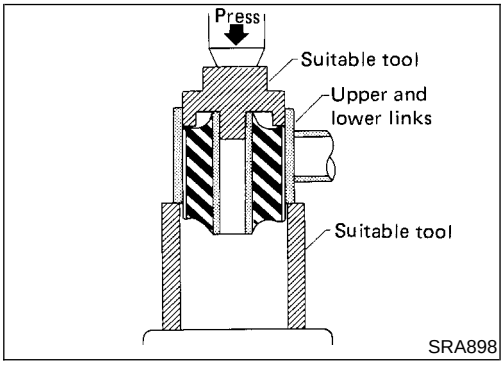
- Check coil spring for yield, deformation and cracks.
- Check shock absorber for oil leakage, cracks and deformation.
- Check all rubber parts for wear, cracks and deformation. Replace if necessary.

Upper Link, Lower Link and Panhard Rod

INSPECTION

NASU0030

Check for cracks, distortion and other damage. Replace if necessary.

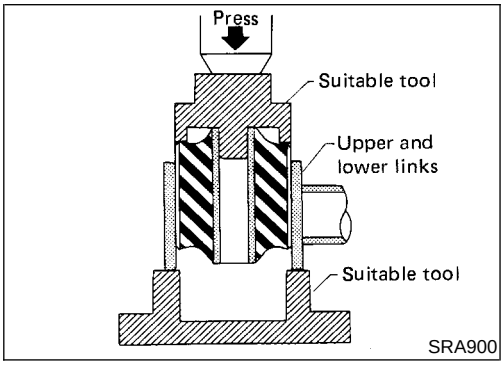


BUSHING REPLACEMENT

NASU0031

Check for cracks and other damage. Replace with suitable tool if necessary.

- Remove bushing with suitable tool.

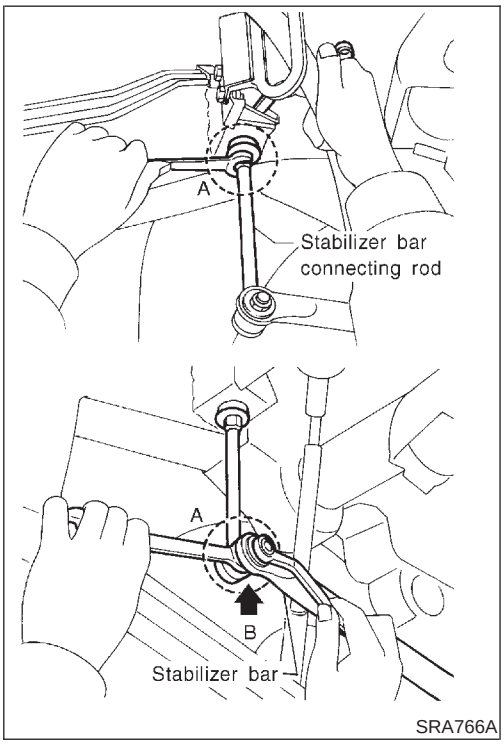


When installing bushing, apply a coat of 1% soapy water to outer wall of bushing.
Always install new bushing.
Do not tap end face of bushing directly with a hammer.

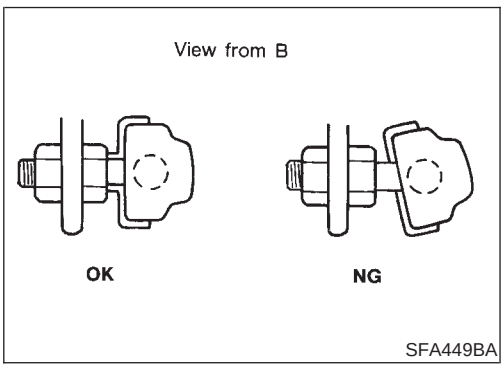
INSTALLATION

NASU0032

When installing each link, pay attention to direction of nuts and bolts.
When installing each rubber part, final tightening must be carried out under unladen condition with tires on ground.



SRA766A



SFA449BA

Stabilizer Bar

REMOVAL AND INSTALLATION

NASU0033

- When removing and installing stabilizer bar, fix portion A.
- Install stabilizer bar with ball joint socket properly placed.

Low Tire Pressure Warning System

NASU0055

Refer to "Tire Pressure Warning System", "FRONT SUSPENSION"

Service Data and Specifications (SDS)

GENERAL SPECIFICATIONS (REAR)

NASU0034

Suspension type	5-link type rigid with coil spring
Shock absorber type	Double-acting hydraulic
Stabilizer	Standard equipment

NOTES