

# STEERING SYSTEM

GI

MA

EM

LC

EF &  
EC

FE

CL

MT

AT

PD

FA

RA

BR

ST

RS

BT

HA

EL

IDX

# SECTION ST

## CONTENTS

<b>PRECAUTIONS AND PREPARATION</b> .....2	<b>POWER STEERING GEAR AND LINKAGE (Model PR26AE)</b> .....12	CL
Supplemental Restraint System (SRS) "AIR BAG".....2	Removal and Installation .....12	
Steering System .....2	Disassembly.....15	MT
Special Service Tools .....2	Inspection.....15	
Commercial Service Tools .....4	Assembly .....16	AT
CONSULT Program Card.....4	Adjustment.....21	
<b>ON-VEHICLE SERVICE</b> .....5	<b>POWER STEERING OIL PUMP</b> .....23	
Checking Steering Wheel Play.....5	Pre-disassembly Inspection.....23	PD
Checking Neutral Position on Steering Wheel.....5	Disassembly.....23	
Front Wheel Turning Angle.....5	Inspection.....24	
Checking Gear Housing Movement .....6	Assembly .....24	FA
Adjusting Rack Retainer .....6	<b>TWIN ORIFICE POWER STEERING SYSTEM</b> .....26	
Checking and Adjusting Drive Belts (For power steering).....6	Hydraulic Circuit.....26	
Checking Fluid Level .....6	Schematic .....26	RA
Checking Fluid Leakage.....7	Wiring Diagram .....27	
Bleeding Hydraulic System.....7	Trouble Diagnoses.....28	
Checking Steering Wheel Turning Force (For power steering) .....7	<b>SUPER HICAS SYSTEM</b> .....37	BR
Checking Hydraulic System.....8	HICAS Component Parts Location .....37	
<b>STEERING WHEEL AND STEERING COLUMN</b> .....9	System Diagram .....37	ST
Removal.....9	On-vehicle Service.....38	
Installation.....10	Repair of Component Parts.....40	
Disassembly and Assembly.....10	Trouble Diagnoses.....45	
Inspection.....11	<b>SERVICE DATA AND SPECIFICATIONS (SDS)</b> .....80	RS
	General Specifications.....80	
	Inspection and Adjustment .....80	BT

## PRECAUTIONS AND PREPARATION

### Supplemental Restraint System (SRS) "AIR BAG"

The Supplemental Restraint System "Air Bag", used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), sensors, a diagnosis unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safety is included in the **RS section** of this Service Manual.

**WARNING:**

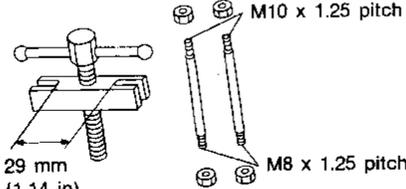
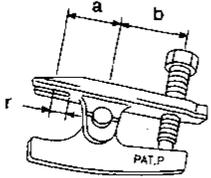
- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.
- All SRS electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS.

#### Steering System

- Before disassembly, thoroughly clean the outside of the unit.
- Disassembly should be done in a clean work area. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- Place disassembled parts in order, on a parts rack, for easier and proper assembly.
- Use nylon cloths or paper towels to clean the parts; common shop rags can leave lint that might interfere with their operation.
- Before inspection or reassembly, carefully clean all parts with a general purpose, non-flammable solvent.
- Before assembly, apply a coat of recommended ATF\* to hydraulic parts. Vaseline may be applied to O-rings and seals. Do not use any grease.
- Replace all gaskets, seals and O-rings. Avoid damaging O-rings, seals and gaskets during installation. Perform functional tests whenever designated.

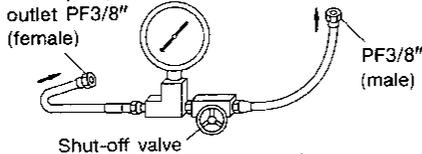
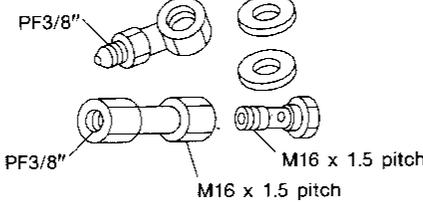
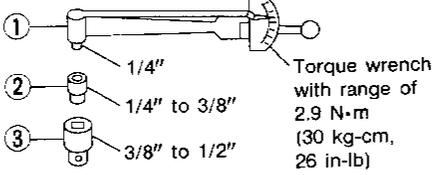
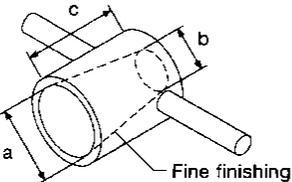
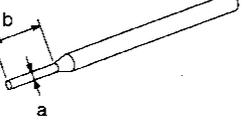
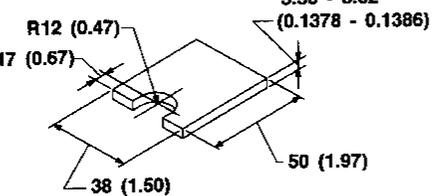
\*: Automatic transmission fluid

#### Special Service Tools

Tool number (Kent-Moore No.) Tool name	Description	
KV48100700 (J26364) Torque adapter	 NT169	Measuring pinion rotating torque
ST27180001 (J25726-A) Steering wheel puller	 NT544	Removing steering wheel
HT72750000 (J24319-01) Ball joint remover	 NT546	Removing ball joint  a: 32 mm (1.26 in) b: 70 mm (2.76 in) r: 11 mm (0.43 in) radius

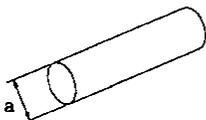
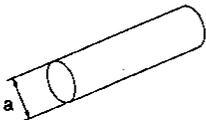
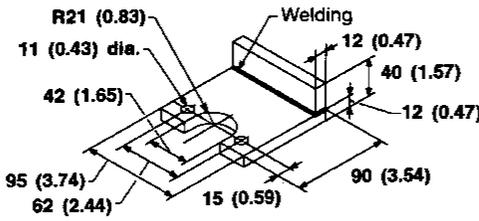
# PRECAUTIONS AND PREPARATION

## Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	
ST27091000 (J26357 and J26357-10) Pressure gauge	 <p>To oil pump outlet PF3/8" (female)</p> <p>To control valve PF3/8" (male)</p> <p>Shut-off valve</p>	GI MA EM
KV48102500 ( — ) Pressure gauge adapter	 <p>PF3/8"</p> <p>PF3/8"</p> <p>M16 x 1.5 pitch</p> <p>M16 x 1.5 pitch</p>	LC EF & EC FE
ST3127S000 (See J25765-A) ① GG91030000 (J25765-A) Torque wrench ② HT6294000 ( — ) Socket adapter ③ HT62900000 ( — ) Socket adapter	 <p>① 1/4"</p> <p>② 1/4" to 3/8"</p> <p>③ 3/8" to 1/2"</p> <p>Torque wrench with range of 2.9 N·m (30 kg·cm, 26 in·lb)</p>	CL MT AT PD
KV48104400 ( — ) Rack seal ring reformer	 <p>a</p> <p>b</p> <p>c</p> <p>Fine finishing</p>	FA RA
KV32101100 ( — ) Pin punch	 <p>b</p> <p>a</p>	BR <b>ST</b>
KV40106300 ( — ) Spacer	 <p>17 (0.67)</p> <p>R12 (0.47)</p> <p>38 (1.50)</p> <p>50 (1.97)</p> <p>3.50 - 3.52 (0.1378 - 0.1386)</p>	RS BT HA EL IDX

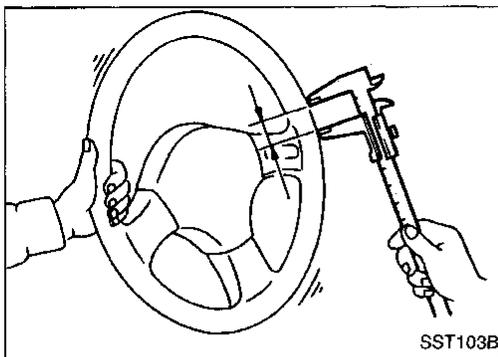
# PRECAUTIONS AND PREPARATION

## Commercial Service Tools

Tool name	Description	
Rear oil seal drift	 <p>NT063</p>	Installing rear oil seal  a: 28 mm (1.10 in) dia.
Pinion oil seal drift	 <p>NT063</p>	Installing pinion oil seal  a: 35 mm (1.38 in) dia.
Oil pump attachment	 <p>NT179</p>	Disassembling and assembling oil pump  Unit: mm (in)

### CONSULT Program Card

Use CONSULT program card "UE940" when CONSULT is used on SUPER HICAS system.

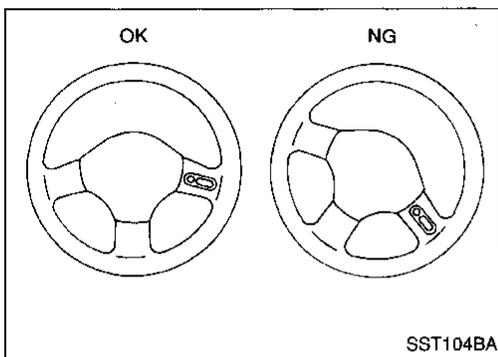


## Checking Steering Wheel Play

- With wheels in a straight-ahead position, check steering wheel play.

**Steering wheel play:**  
**35 mm (1.38 in) or less**

- If it is not within specification, check the following for loose or worn components.
  - Steering gear assembly
  - Steering column
  - Front suspension and axle



## Checking Neutral Position on Steering Wheel

### Pre-checking

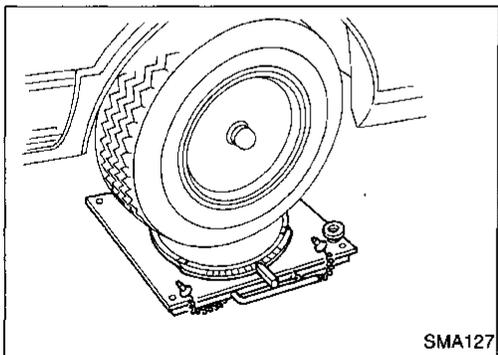
- Make sure that wheel alignment is correct.

**Wheel alignment:**  
**Refer to SDS in FA section.**

- Verify that the steering gear is centered before removing the steering wheel.

### Checking

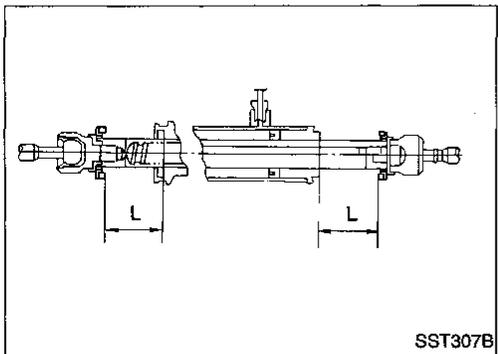
1. Check that the steering wheel is in the neutral position when driving straight ahead.
2. If it is not in the neutral position, remove the steering wheel and reinstall it correctly.
3. If the neutral position is between two teeth, loosen tie-rods lock nuts. Turn the tie-rods by the same amount in opposite directions on both left and right sides.



## Front Wheel Turning Angle

1. Rotate steering wheel all the way right and left; measure turning angle.

**Turning angle of full turns:**  
**Refer to SDS in FA section.**



2. If it is not within specification, check rack stroke.

**Rack stroke "L":**  
**Refer to SDS (ST-80).**

GI

MA

EM

LC

EF &  
EC

FE

CL

MT

AT

PD

FA

RA

BR

ST

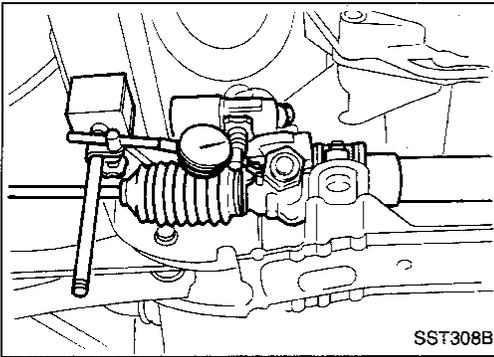
RS

BT

HA

EL

IDX

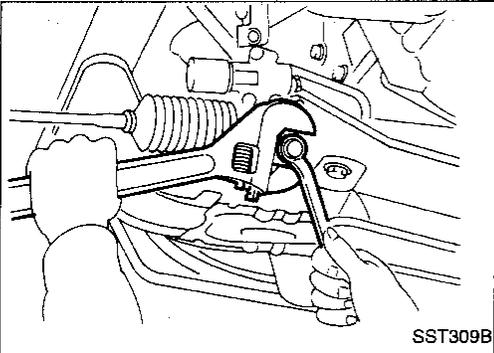


## Checking Gear Housing Movement

1. Check the movement of steering gear housing during stationary steering on a dry paved surface.
    - Apply a force of 49 N (5 kg, 11 lb) to steering wheel to check the gear housing movement.
- Turn off ignition key while checking.

**Movement of gear housing:**  
 $\pm 2 \text{ mm } (\pm 0.08 \text{ in})$  or less

2. If movement exceeds the limit, replace mount insulator after confirming proper installation of gear housing clamps.

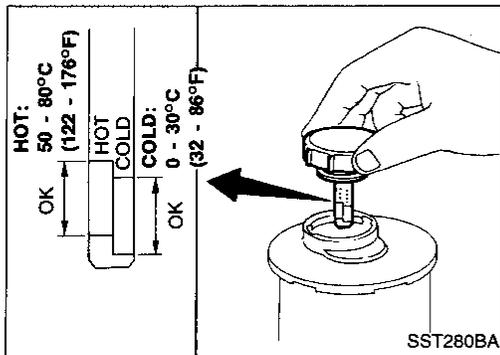


## Adjusting Rack Retainer

- Perform this driving test on a flat road.
1. Check whether vehicle moves in a straight line when steering wheel is released.
  2. Check whether steering wheel returns to neutral position when steering wheel is released from a slightly turned (approx. 20°) position.
- If any abnormality is found, correct it by resetting adjusting screw.

## Checking and Adjusting Drive Belts (For power steering)

Refer to Checking Drive Belts in MA section.



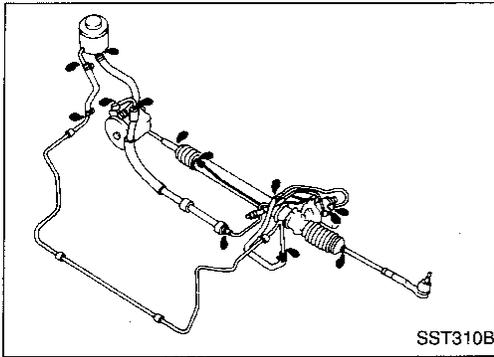
## Checking Fluid Level

Check fluid level.

Check fluid level with dipstick on reservoir cap. Use "HOT" range at fluid temperatures of 50 to 80°C (122 to 176°F). Use "COLD" range at fluid temperatures of 0 to 30°C (32 to 86°F).

### CAUTION:

- Do not overfill.
- Recommended fluid is Automatic Transmission Fluid "DEXRON™ II" type or equivalent.



## Checking Fluid Leakage

Check the lines for improper attachment and for leaks, cracks, damage, loose connections, chafing or deterioration.

1. Run engine at idle speed or 1,000 rpm.  
**Make sure temperature of fluid in reservoir tank rises to 60 to 80°C (140 to 176°F).**
2. Turn steering wheel right-to-left several times.
3. Hold steering wheel at each "lock" position for five seconds and carefully check for fluid leakage.

### CAUTION:

**Do not hold the steering wheel in a locked position for more than 15 seconds.**

4. If fluid leakage at connectors is noticed, loosen flare nut and then retighten.

**Do not overtighten connector as this can damage O-ring, washer and connector.**

## Bleeding Hydraulic System

1. Raise front end of vehicle until wheels clear ground.
2. Add fluid into oil tank to specified level. Meanwhile, quickly turn steering wheel fully to right and left and lightly touch steering stoppers.  
 Repeat steering wheel operation until fluid level no longer decreases.
3. Start engine.  
 Repeat step 2 above.
  - Incomplete air bleeding will cause the following to occur. When this happens, bleed air again.
    - a. Generation of air bubbles in reservoir tank
    - b. Generation of clicking noise in oil pump
    - c. Excessive buzzing in oil pump

Fluid noise may occur in the valve or oil pump. This is common when the vehicle is stationary or while turning the steering wheel slowly. This does not affect performance or durability of the system.

## Checking Steering Wheel Turning Force (For power steering)

1. Park vehicle on a level, dry surface and set parking brake.
2. Start engine.
3. Bring power steering fluid up to adequate operating temperature. [Make sure temperature of fluid is approximately 60 to 80°C (140 to 176°F).]

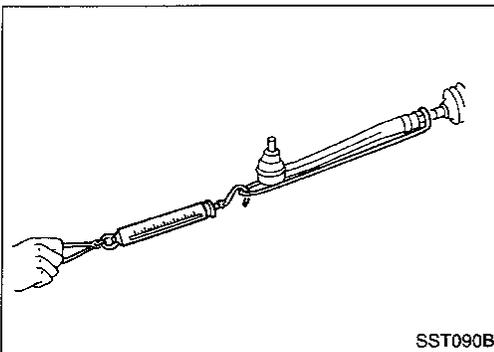
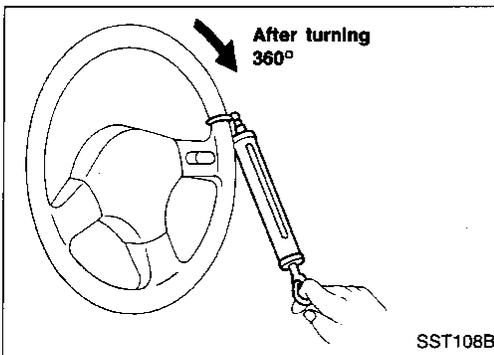
**Tires need to be inflated to normal pressure.**

4. Check steering wheel turning force when steering wheel has been turned 360° from the neutral position.

**Steering wheel turning force:**

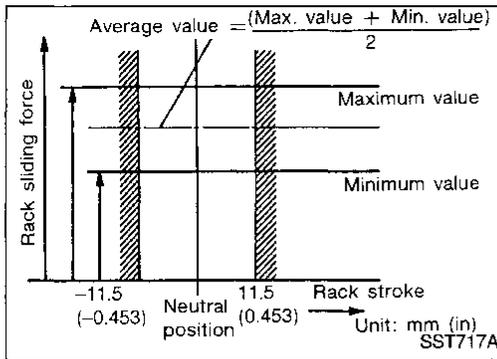
**39 N (4 kg, 9 lb) or less**

5. If steering wheel turning force is out of specification, check rack sliding force.
  - a. Disconnect steering column lower joint and knuckle arms from the gear.
  - b. Start and run engine at idle to make sure steering fluid has reached normal operating temperature.
  - c. While pulling tie-rod slowly in the ±11.5 mm (±0.453 in) range from the neutral position, make sure rack sliding force is within specification.



## ON-VEHICLE SERVICE

### Checking Steering Wheel Turning Force (For power steering) (Cont'd)



#### Average rack sliding force:

##### Without HICAS

206 - 265 N (21 - 27 kg, 46 - 60 lb)

##### With HICAS

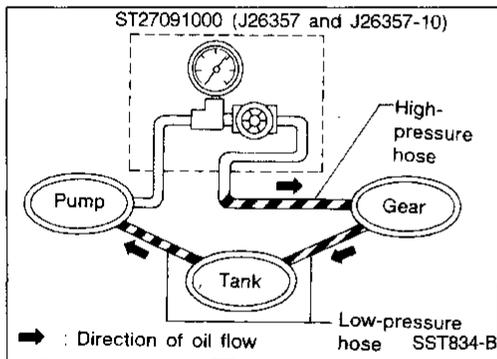
201 - 250 N (20.5 - 25.5 kg, 45.2 - 56.2 lb)

- d. Check sliding force outside above range.

#### Maximum rack sliding force:

Not more than 294 N (30 kg, 66 lb) beyond above value

6. If rack sliding force is not within specification, overhaul steering gear assembly.



### Checking Hydraulic System

Before starting, check belt tension, driving pulley and tire pressure.

1. Set Tool. Open shut-off valve. Then bleed air. (See "Bleeding Hydraulic System".)
2. Run engine.

Make sure temperature of fluid in tank rises to 60 to 80°C (140 to 176°F).

#### WARNING:

Warm up engine with shut-off valve fully opened. If engine is started with shut-off valve closed, fluid pressure in oil pump increases to maximum. This will raise oil temperature abnormally.

3. Check pressure with steering wheel fully turned to left and right positions with engine idling at 1,000 rpm.

#### CAUTION:

Do not hold the steering wheel in a locked position for more than 15 seconds.

#### Oil pump maximum standard pressure:

7,649 - 8,238 kPa (78 - 84 kg/cm<sup>2</sup>, 1,109 - 1,194 psi)

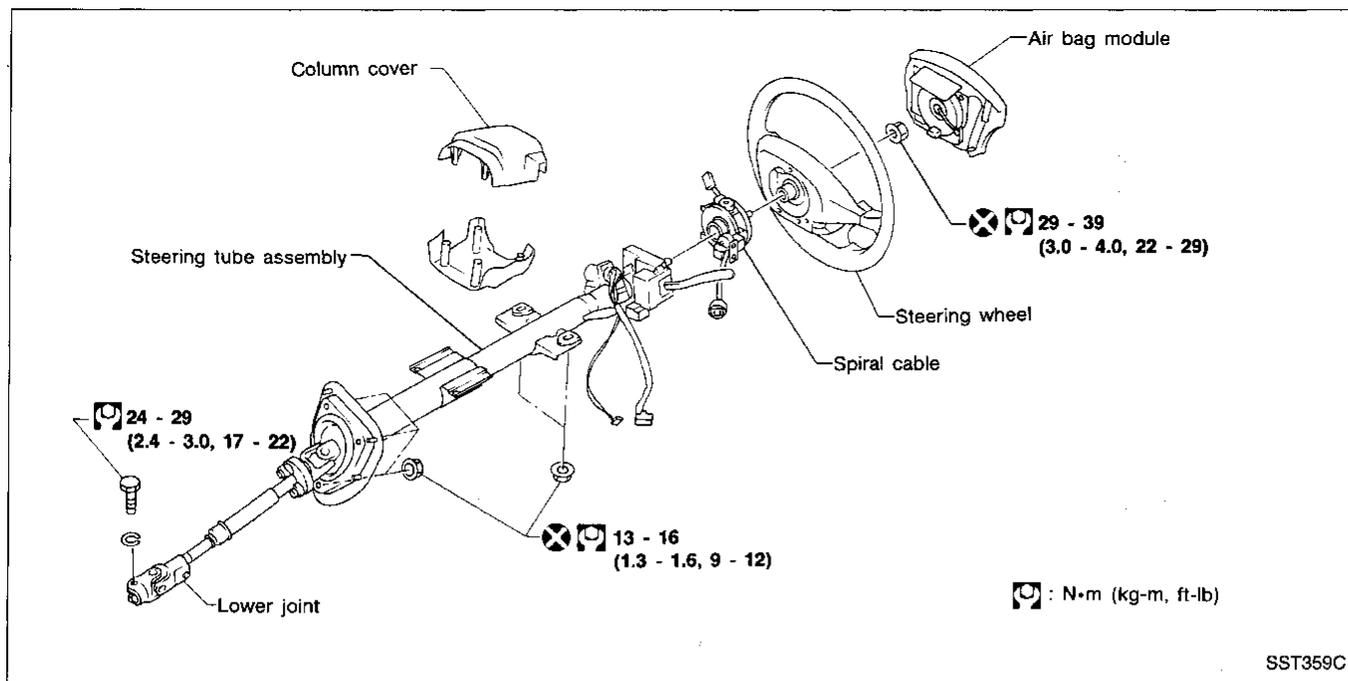
4. If oil pressure is below the standard pressure, slowly close shut-off valve and check pressure.
  - When pressure reaches standard pressure, gear is damaged.
  - When pressure remains below standard pressure, pump is damaged.

#### CAUTION:

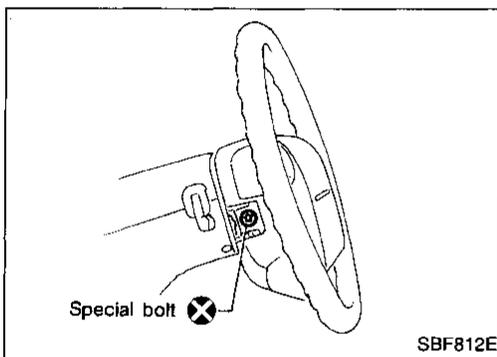
Do not close shut-off valve for more than 15 seconds.

5. If oil pressure is higher than standard pressure, check oil pump flow control valve.
6. After checking hydraulic system, remove Tool and add fluid as necessary. Then completely bleed air out of system.

# STEERING WHEEL AND STEERING COLUMN

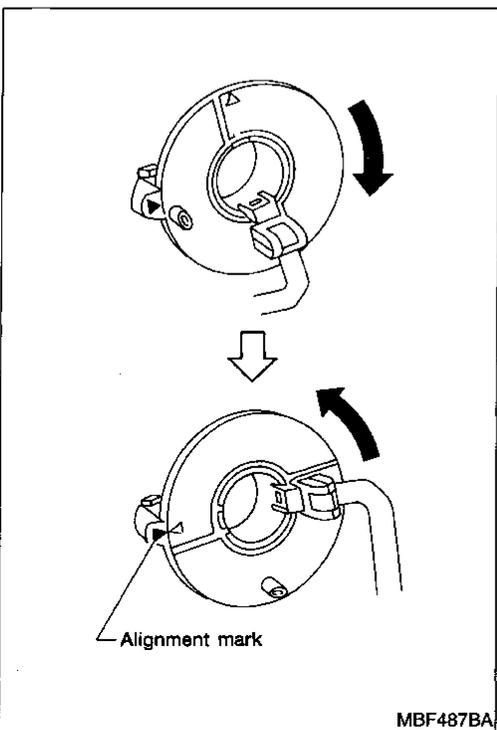


GI  
MA  
EM  
LC  
EF & EC  
FE  
CL  
MT  
AT  
PD  
FA  
RA  
BR  
ST  
RS  
BT  
HA  
EL  
IDX



## Removal STEERING WHEEL

- Remove air bag module and spiral cable. Refer to "Removal — Air Bag Module and Spiral Cable", "SUPPLEMENTAL RESTRAINT SYSTEM" in RS section.



- Align spiral cable correctly when installing steering wheel.
  - Set the front wheels in the straight-ahead position.
  - Make sure that the spiral cable is in the neutral position. The neutral position is detected by turning left 2.5 revolutions from the right end position. Align the two marks (X).

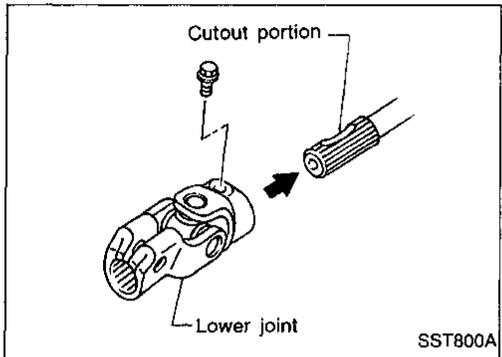
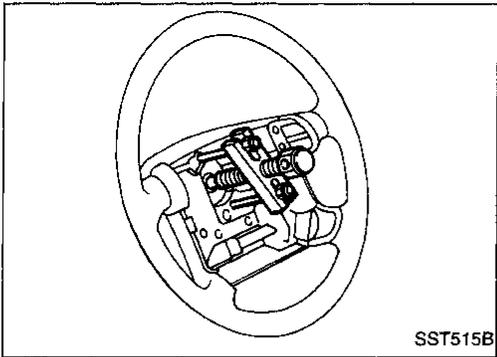
### CAUTION:

The spiral cable may snap due to steering operation if the cable is installed in an improper position. Also, with the steering linkage disconnected, the cable may snap by turning the steering wheel beyond the limited number of turns. (The spiral cable can be turned up to 2.5 turns from the neutral position to both the right and left.)

# STEERING WHEEL AND STEERING COLUMN

## Removal (Cont'd)

- Remove steering wheel with Tool.



## Installation

### STEERING COLUMN

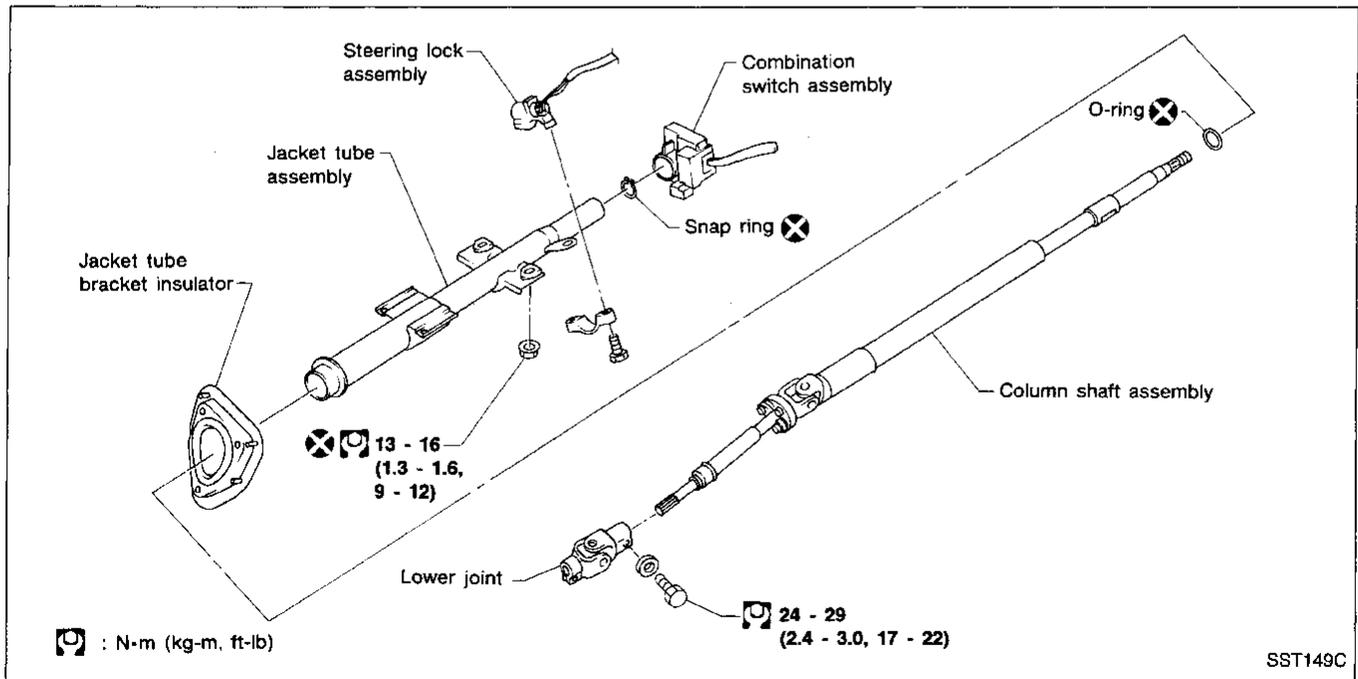
- When installing steering column, fingertighten all lower bracket and clamp retaining bolts; then tighten them securely. Do not apply undue stress to steering column.
- When attaching coupling joint, be sure tightening bolt faces cutout portion.

### CAUTION:

After installation, turn steering wheel to make sure it moves smoothly. Ensure the number of turns are the same from the straight forward position to left and right locks.

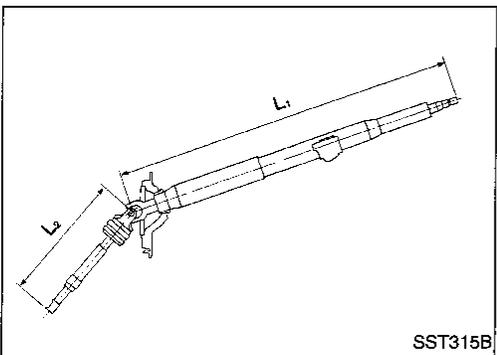
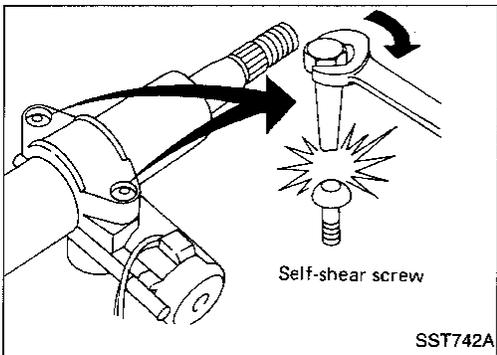
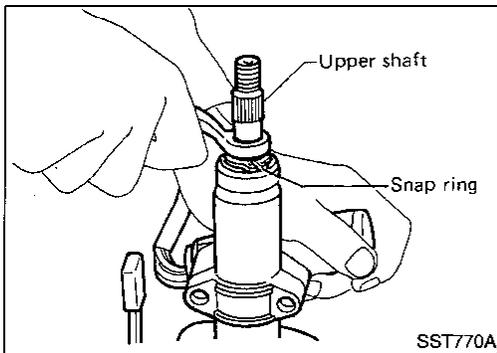
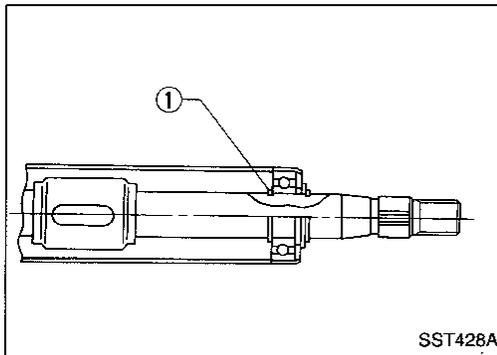
Be sure that the steering wheel is in a neutral position when driving straight ahead.

## Disassembly and Assembly



# STEERING WHEEL AND STEERING COLUMN

## Disassembly and Assembly (Cont'd)



- When disassembling and assembling, unlock steering lock with key.
- Install O-ring ① before inserting shaft into jacket tube. Ensure that rounded surface of snap ring faces toward bearing when snap ring is installed.

- Install snap ring on upper shaft with box wrench.

- Steering lock
  - a) Break self-shear type screws with a drill or other appropriate tool.
  - b) Install new self-shear type screws and then cut off self-shear type screw heads.

## Inspection

- When steering wheel does not turn smoothly, check the steering column as follows and replace damaged parts.
  - a. Check column bearings for damage or unevenness. Lubricate with recommended multi-purpose grease or replace steering column as an assembly, if necessary.
  - b. Check steering column lower shaft for deformation or breakage. Replace if necessary.
- When the vehicle is involved in a light collision, check steering column length "L<sub>1</sub>" and steering column lower shaft length "L<sub>2</sub>". If it is not within specifications, replace steering column as an assembly.

**Steering column length "L<sub>1</sub>":**

749.4 - 751.0 mm (29.50 - 29.57 in)

**Steering column lower shaft length "L<sub>2</sub>":**

280.6 - 282.2 mm (11.05 - 11.11 in)

GI

MA

EM

LC

EF &  
EC

FE

CL

MT

AT

PD

FA

RA

BR

ST

RS

BT

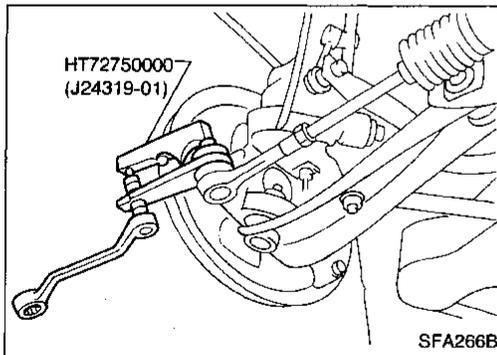
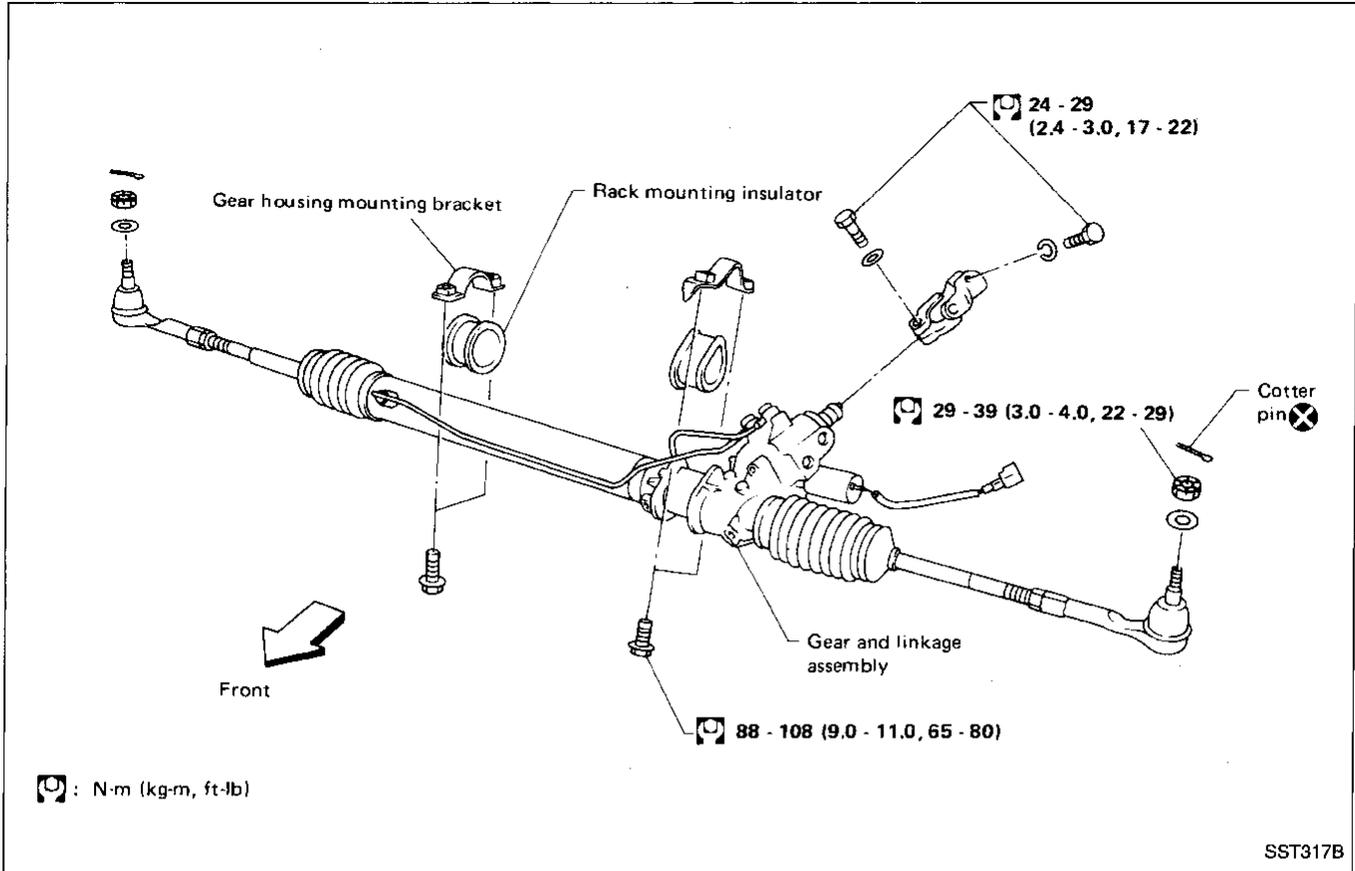
HA

EL

IDX

# POWER STEERING GEAR AND LINKAGE (Model PR26AE)

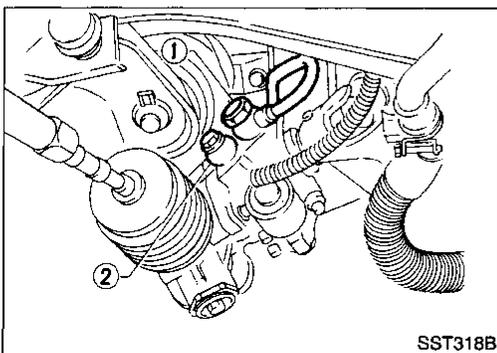
## Removal and Installation



### CAUTION:

The rotation of the spiral cable (SRS "Airbag" component part) is limited. If the steering gear must be removed, set the front wheels in the straight-ahead direction. Do not rotate the steering column while the steering gear is removed.

- Detach tie-rod outer sockets from knuckle arms with Tool.



- Install pipe connector.

① Low-pressure side

□ : 36 - 40 N-m (3.7 - 4.1 kg-m, 27 - 30 ft-lb)

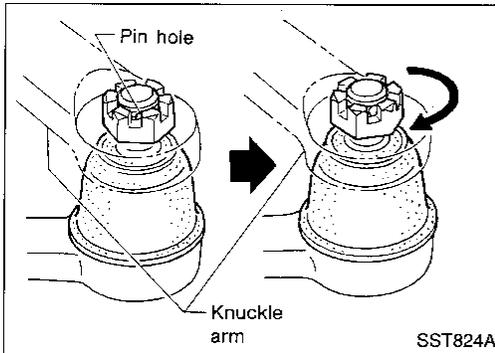
② High-pressure side

□ : 30 - 35 N-m (3.1 - 3.6 kg-m, 22 - 26 ft-lb)

# POWER STEERING GEAR AND LINKAGE (Model PR26AE)

## Removal and Installation (Cont'd)

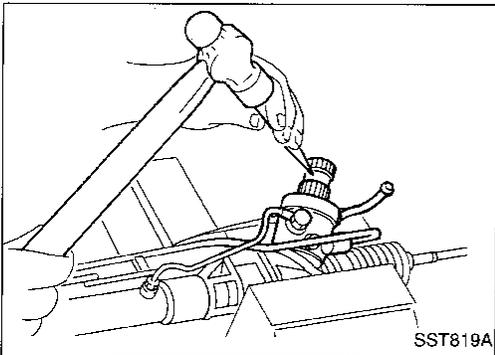
- Observe specified tightening torque when tightening high-pressure and low-pressure pipe connectors. Excessive tightening can damage threads or damaged connector O-ring.
- The O-ring in low-pressure pipe connector is larger than that in high-pressure connector. Take care to install the proper O-ring.



- Initially, tighten nut on tie-rod outer socket and knuckle arm to 29 to 39 N·m (3 to 4 kg-m, 22 to 29 ft-lb). Then tighten further to align nut groove with first pin hole so that cotter pin can be installed.

### CAUTION:

**Tightening torque must not exceed 49 N·m (5 kg-m, 36 ft-lb).**



- Before removing lower joint from gear, set gear in neutral (wheels in straight-ahead position). After removing lower joint, put matching mark on pinion shaft and pinion housing to record neutral position.
- To install, set left and right dust boots to equal deflection, and attach lower joint by aligning matchmarks of pinion shaft and pinion housing.

GI

MA

EM

LC

EF &  
EC

FE

CL

MT

AT

PD

FA

RA

BR

**ST**

RS

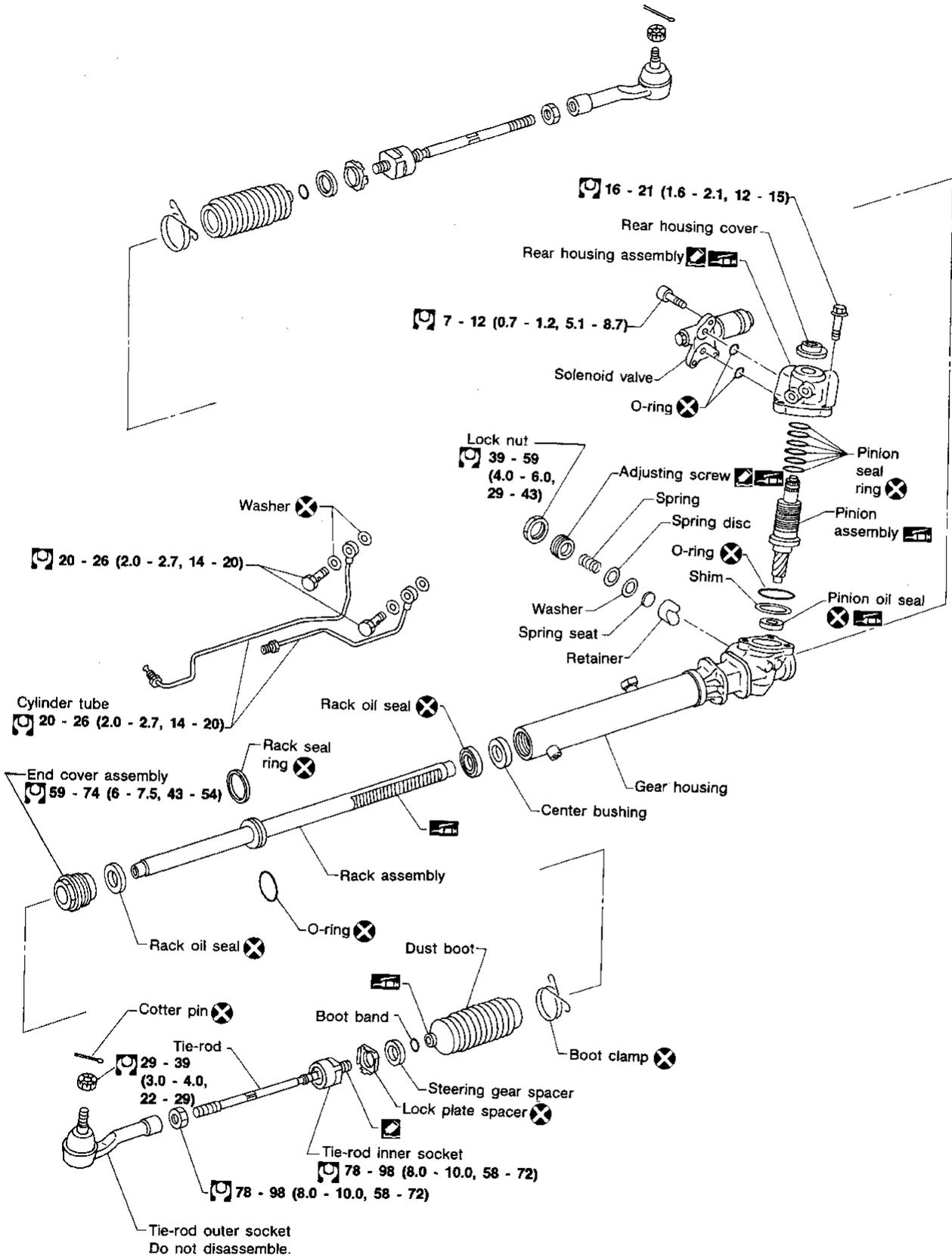
BT

HA

EL

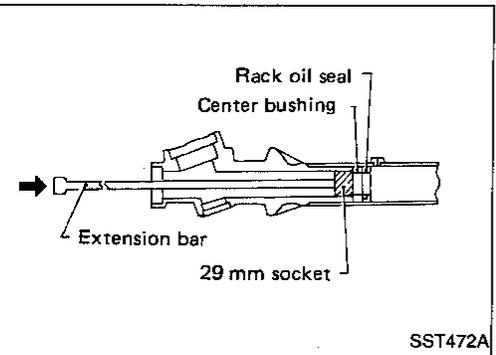
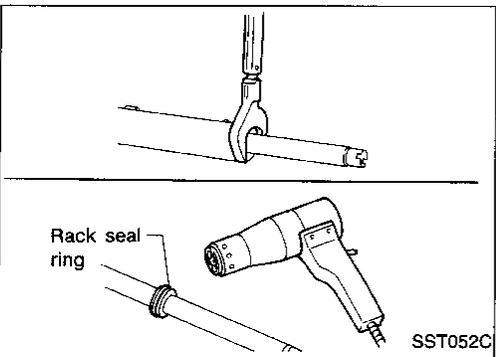
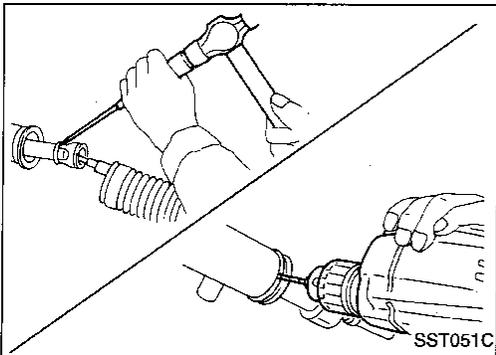
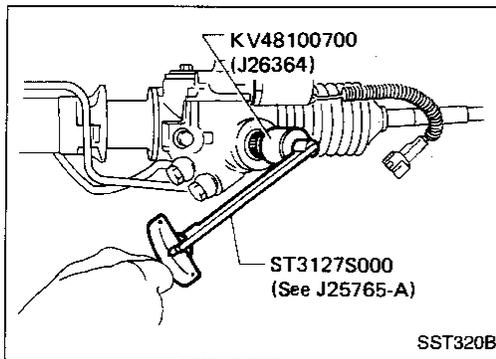
IDX

# POWER STEERING GEAR AND LINKAGE (Model PR26AE)



: N·m (kg-m, ft-lb)

# POWER STEERING GEAR AND LINKAGE (Model PR26AE)



## Disassembly

1. Prior to disassembling, measure pinion rotating torque. Record the pinion rotating torque as a reference.
  - Before measuring, disconnect cylinder tube and drain fluid.
  - Use soft jaws when holding steering gear housing. Handle gear housing carefully, as it is made of aluminum. Do not grip cylinder in a vise.
2. Remove pinion gear.
  - Be careful not to damage pinion gear when removing pinion seal ring.
3. Remove tie-rod outer sockets and boots.
4. Loosen tie-rod inner socket by prying up staked portion, and remove socket.
5. Remove retainer.
6. Remove pinion assembly.
7. Use a 2 to 2.5 mm (0.079 to 0.098 in) diameter drill to completely remove staked portion of gear housing end.

8. Remove gear housing end cover assembly with Tool.
  9. Draw out rack assembly.
  10. Remove rack seal ring.
    - Using a heat gun, heat rack seal to approximately 40°C (104°F).
    - Remove rack seal ring.
    - Replace rack seal ring and O-ring with new ones.
- Be careful not to damage rack.**

11. Remove center bushing and rack oil seal using tape wrapped socket and extension bar.
 

**Do not scratch inner surfaces of pinion housing.**

## Inspection

Thoroughly clean all parts in cleaning solvent or automatic transmission fluid "DEXRON™II" type or equivalent. Blow dry with compressed air, if available.

### BOOT

Check condition of boot. If cracked excessively, replace it.

### RACK

Thoroughly examine rack gear. If damaged, cracked or worn, replace it.

GI

MA

EM

LC

EF &  
EC

FE

CL

MT

AT

PD

FA

RA

BR

ST

RS

BT

HA

EL

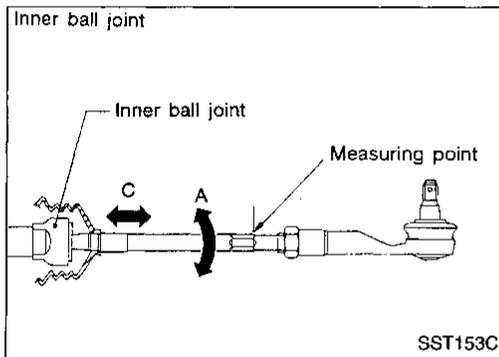
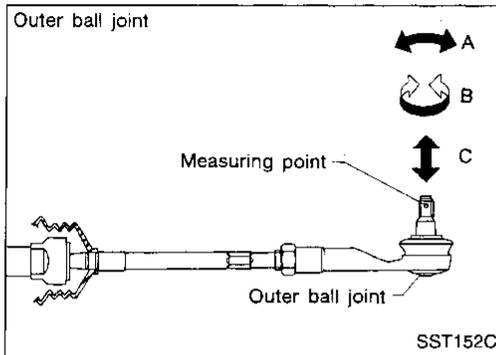
IDX

# POWER STEERING GEAR AND LINKAGE (Model PR26AE)

## Inspection (Cont'd)

### PINION ASSEMBLY

- Thoroughly examine pinion gear. If pinion gear is damaged, cracked or worn, replace it.
- Check that all bearings roll freely. Ensure that balls, rollers and races are not cracked, pitted or worn.



### TIE-ROD OUTER AND INNER SOCKETS

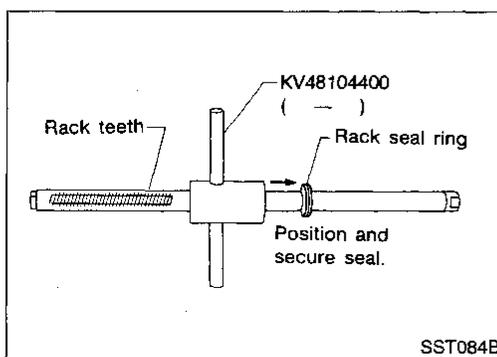
- Check ball joints for swinging force.  
**Tie-rod outer and inner ball joints swinging force "A":**  
**Refer to SDS (ST-80).**
- Check ball joint for rotating torque.  
**Tie-rod outer ball joint rotating torque "B":**  
**Refer to SDS (ST-80).**
- Check ball joints for axial end play.  
**Tie-rod outer and inner ball joints axial end play "C":**  
**Refer to SDS (ST-80).**
- Check condition of dust cover. If cracked excessively, replace outer tie-rod.

### CYLINDER TUBES

Check cylinder tubes for scratches or other damage. Replace if necessary.

### Assembly

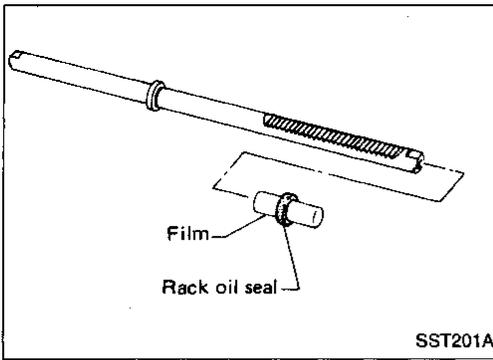
1. Using a heat gun, heat new teflon rack seal ring to approximately 40°C (104°F). Then place it onto rack.



- Using Tool, compress rack seal ring securely on rack.  
**Always insert the tool from the rack gear side.**

# POWER STEERING GEAR AND LINKAGE (Model PR26AE)

## Assembly (Cont'd)



2. Insert rack oil seal.
  - Place plastic film into rack oil seal to prevent damage by rack teeth.
  - Always remove plastic film after rack oil seal is positioned properly.
  - Make sure lips of rack oil seal face each other.

GI

MA

EM

LC

EF &  
EC

FE

CL

MT

AT

PD

FA

RA

BR

ST

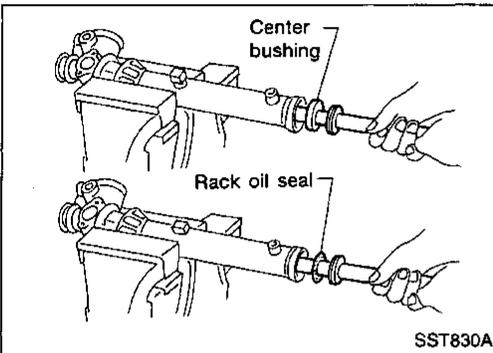
RS

BT

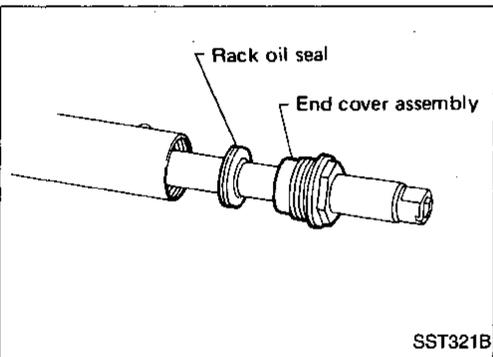
HA

EL

IDX



3. Install center bushing and rack oil seal with rack assembly.



4. Insert rack oil seal and end cover assembly to rack then tighten end cover assembly.

AT

PD

FA

RA

BR

ST

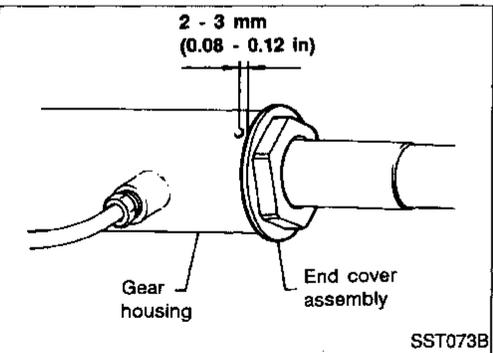
RS

BT

HA

EL

IDX



5. Fasten cylinder end cover assembly to gear housing by staking.

BR

ST

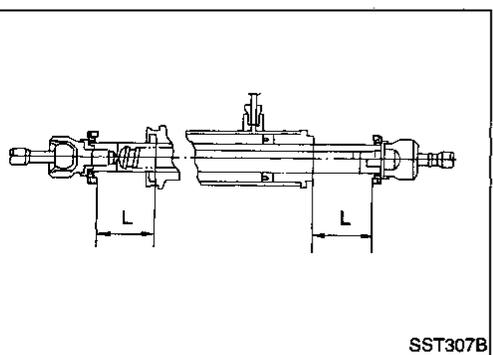
RS

BT

HA

EL

IDX



6. Set rack gear in neutral position.  
**Rack stroke "L":**  
**Refer to SDS (ST-80).**

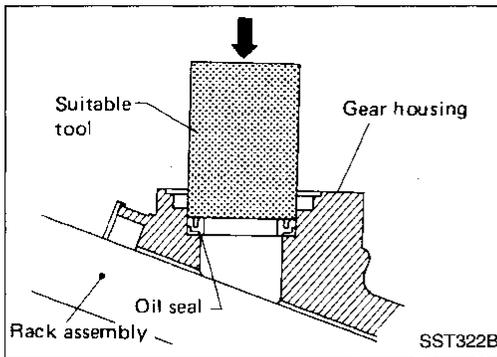
HA

EL

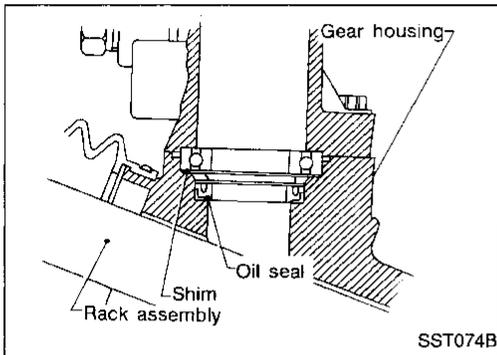
IDX

## POWER STEERING GEAR AND LINKAGE (Model PR26AE)

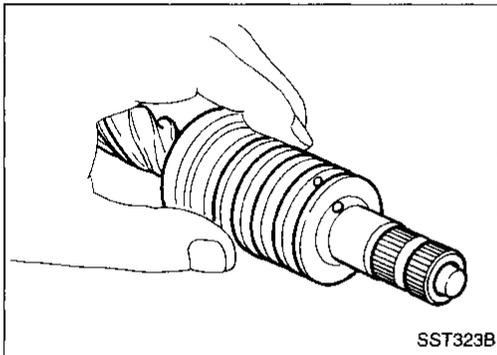
### Assembly (Cont'd)



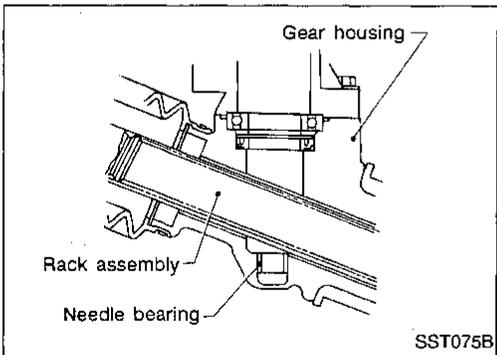
7. Coat seal lip of new pinion oil seal with multi-purpose grease. Install it into pinion housing of gear with a suitable tool.
  - Make sure lip of oil seal faces up when installed.



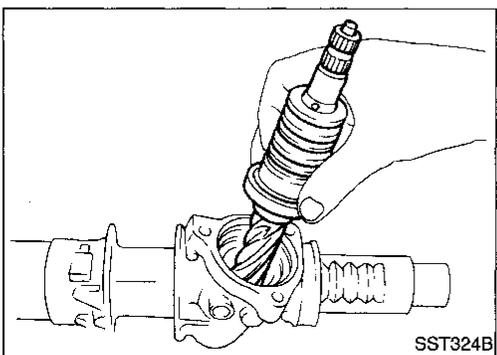
8. Install pinion bearing adjusting shim(s).
  - Whenever pinion assembly, gear housing and rear housing are disassembled, replace shim(s) with new ones. Always use the same number of shim(s) when replacing.



9. Install pinion seal ring on pinion gear assembly.
  - Using a heat gun, heat pinion seal ring to approximately 40°C (104°F) before installing it onto pinion gear assembly.
  - Make sure pinion seal ring is properly settled in valve groove.



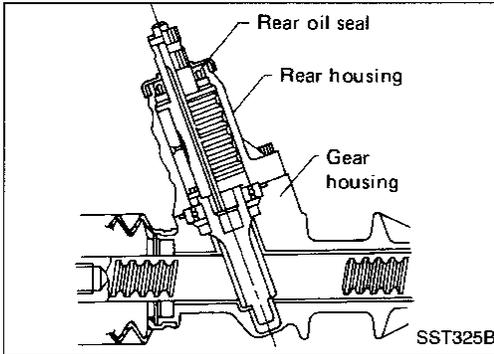
10. Apply a coat of multi-purpose grease to needle bearing roller and oil seal lip.



11. Install pinion assembly to pinion housing.  
**Be careful not to damage pinion oil seal.**

# POWER STEERING GEAR AND LINKAGE (Model PR26AE)

## Assembly (Cont'd)



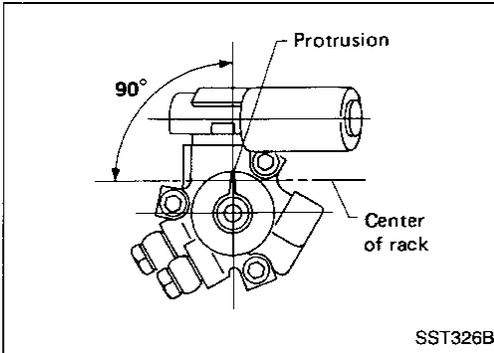
12. Apply a coat of multi-purpose grease to rear oil seal lip before installing rear housing.

GI

MA

EM

LC



13. Ensure that the rack is centered. Install rear cover cap so that protrusion of rear housing cover is positioned as shown in figure.

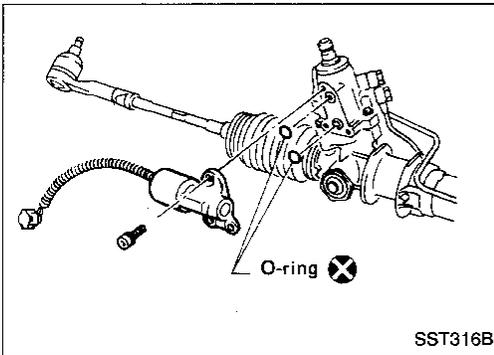
EF & EC

**Be careful not to damage worm ring and oil seal.**

FE

CL

MT



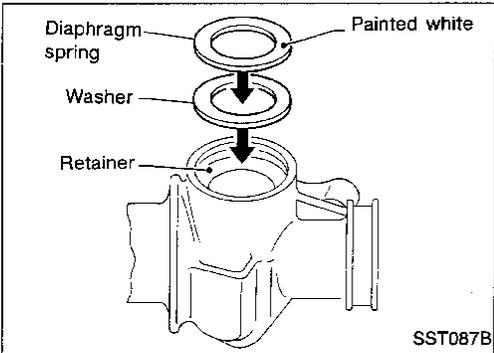
14. Install solenoid valve.

AT

PD

FA

RA



15. Install diaphragm spring at retainer.

- Always install retainer, spring washer and diaphragm spring in that order.
- Make sure convex end (painted white) of diaphragm spring faces outward when installing.

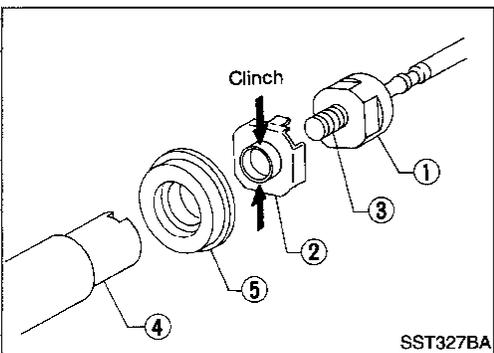
BR

ST

16. Install retainer spring and adjusting screw temporarily.

RS

BT



### CAUTION:

**Ensure steering gear spacer is installed with rubber side facing rack.**

- Attach lock plate ② to tie-rod inner socket ①.
- Insert steering gear spacer ⑤ to rack ④.
- Apply locking sealant to inner socket threads ③. Screw inner socket into rack ④ and tighten to specified torque.
- Clinch lock plate at two places.

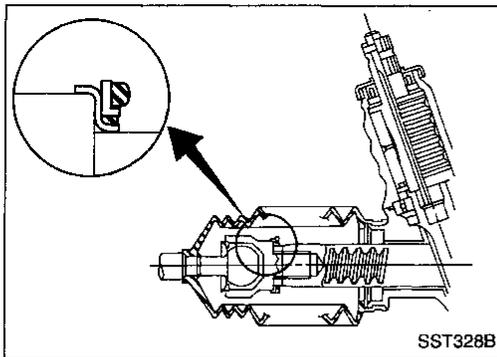
HA

EL

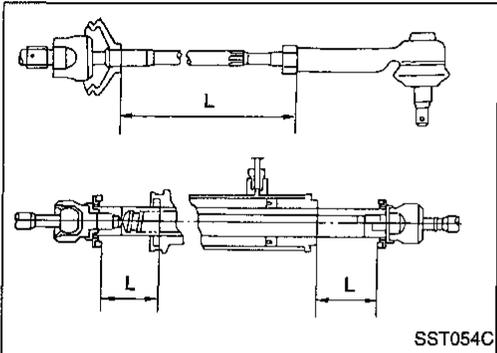
IDX

# POWER STEERING GEAR AND LINKAGE (Model PR26AE)

## Assembly (Cont'd)



17. Install steering gear spacer ⑤ to lock plate ②.



18. Tighten outer socket lock nut.

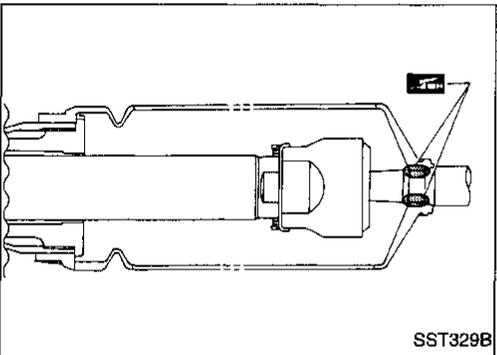
**Tie-rod length "L":**

**Refer to SDS (ST-80).**

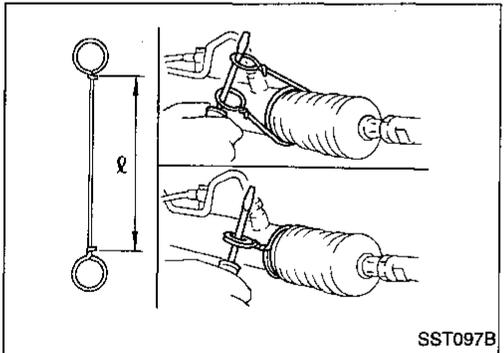
19. Measure rack stroke.

**Rack stroke "L":**

**Refer to SDS (ST-80).**

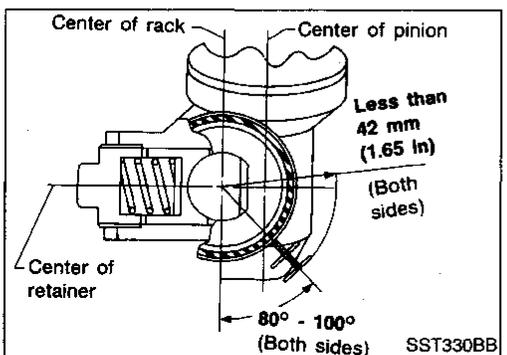


20. Before installing boot, coat the contact surfaces between boot and tie-rod with grease.



21. Install boot clamps.

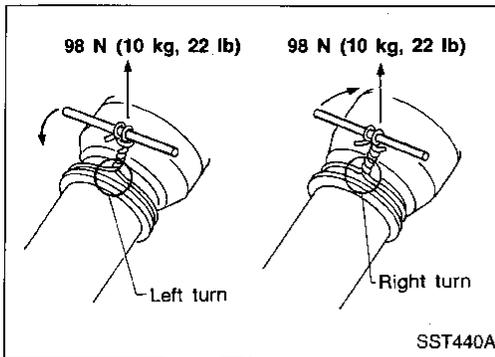
- To install, wrap boot clamp around boot groove twice. To tighten clamp, place a screwdriver through both rings. Twist rings 4 to 4-1/2 turns while pulling with a force of approx. 98 N (10 kg, 22 lb).



- Install boot clamp so that it is to the rear of the vehicle when gear housing is attached to the body. (This will prevent interference with other parts.)

# POWER STEERING GEAR AND LINKAGE (Model PR26AE)

## Assembly (Cont'd)



- Twist boot clamp in the direction shown in figure at left.

GI

MA

EM

LC

EF &  
EC

FE

CL

MT

AT

PD

FA

RA

BR

ST

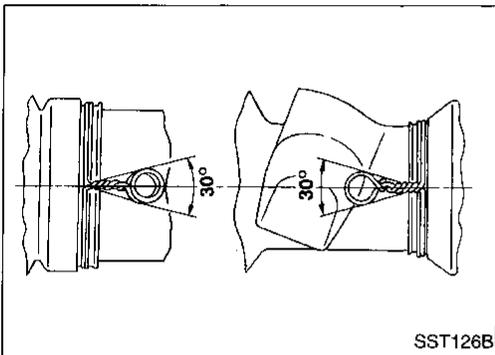
RS

BT

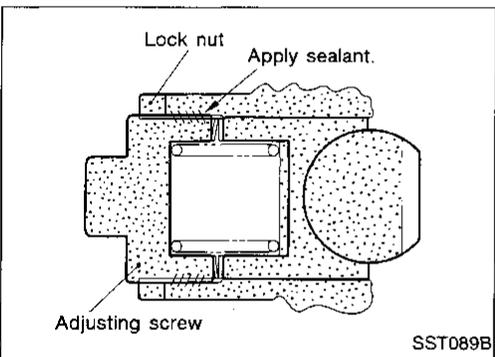
HA

EL

IDX



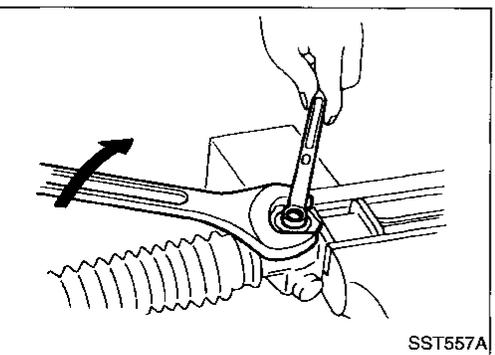
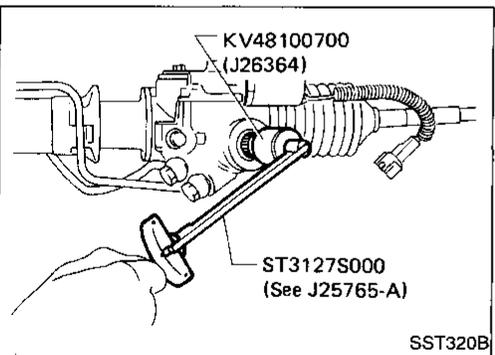
- After twisting boot clamp, bend twisted and diagonally so it does not contact boot.



## Adjustment

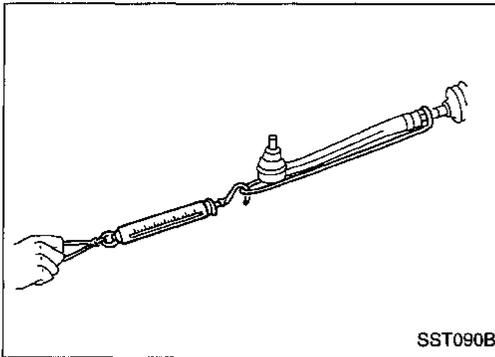
Adjust pinion rotating torque as follows:

1. Set gears to Neutral without fluid in the gear.
2. Coat the adjusting screw with locking sealant and screw it in.
3. Lightly tighten lock nut.
4. Tighten adjusting screw to a torque of 4.9 to 5.9 N·m (50 to 60 kg-cm, 43 to 52 in-lb).
5. Loosen adjusting screw, then retighten it to 0.05 to 0.20 N·m (0.5 to 2 kg-cm, 0.43 to 1.74 in-lb).
6. Move rack over its entire stroke several times.
7. Measure pinion rotating torque within the range of 180° from neutral position.  
Stop the gear at the point of maximum torque.
8. Loosen adjusting screw, then retighten it to 4.9 N·m (50 kg-cm, 43 in-lb).
9. Loosen adjusting screw by 60° to 100°.
10. Prevent adjusting screw from turning, and tighten lock nut to specified torque.



## POWER STEERING GEAR AND LINKAGE (Model PR26AE)

### Adjustment (Cont'd)



11. Check rack sliding force on vehicle as follows:
  - a. Install steering gear onto vehicle, but do not connect tie-rod to knuckle arm.
  - b. Connect all piping and fill with steering fluid.
  - c. Start engine and bleed air completely.
  - d. Disconnect steering column lower joint from the gear.
  - e. Keep engine at idle and make sure steering fluid has reached normal operating temperature.
  - f. Pull tie-rod slowly to move it from neutral position to  $\pm 11.5$  mm ( $\pm 0.453$  in) at speed of 3.5 mm (0.138 in)/s. Check that rack sliding force is within specification.

#### Average rack sliding force:

##### Without HICAS

206 - 265 N (21 - 27 kg, 46 - 60 lb)

##### With HICAS

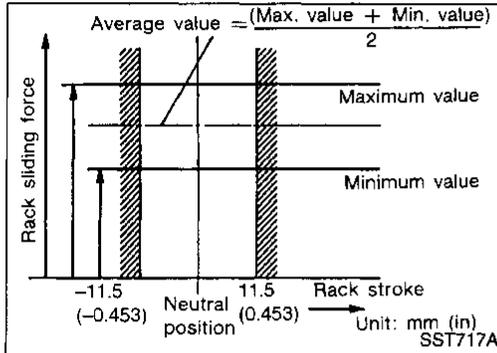
201 - 250 N (20.5 - 25.5 kg, 45.2 - 56.2 lb)

- g. Check sliding force outside above range.

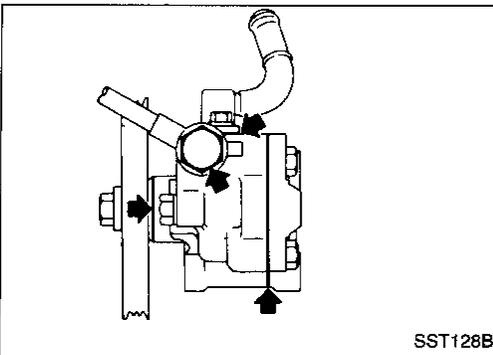
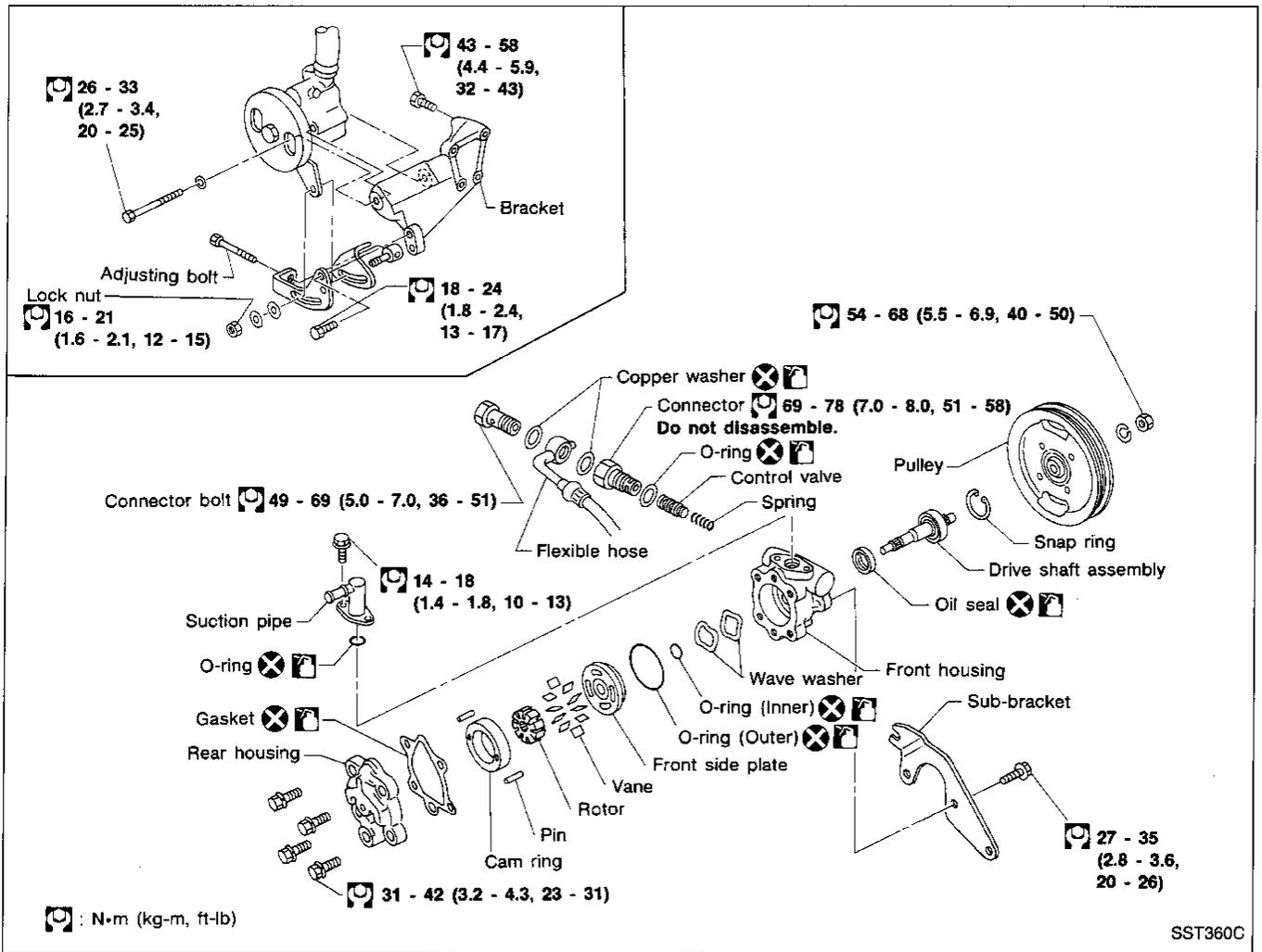
#### Maximum rack sliding force:

Not more than 294 N (30 kg, 66 lb) beyond above value

- If rack sliding force is not within specification, readjust by repeating adjustment procedure from the beginning.
- If rack sliding force is still out of specification after readjustment, gear assembly needs to be replaced.



# POWER STEERING OIL PUMP



## Pre-disassembly Inspection

Disassemble the power steering oil pump only if the following items are found.

- Oil leak from any point shown in the figure.
- Deformed or damaged pulley.
- Poor performance

## Disassembly

### CAUTION:

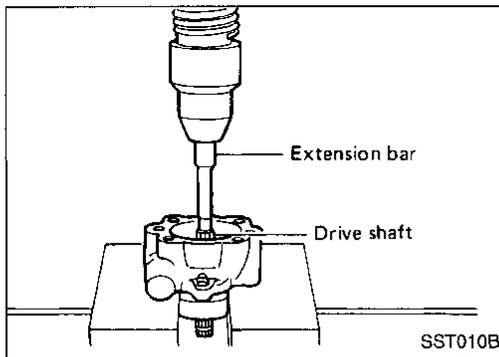
- Parts which can be disassembled are strictly limited. Never disassemble parts other than those specified.
- Disassemble in as clean a place as possible.
- Clean your hands before disassembly.
- Do not use rags; use nylon cloths or paper towels.
- Follow the procedures and cautions in the Service Manual.
- When disassembling and reassembling, do not let foreign matter enter or contact the parts.

# POWER STEERING OIL PUMP

## Disassembly (Cont'd)

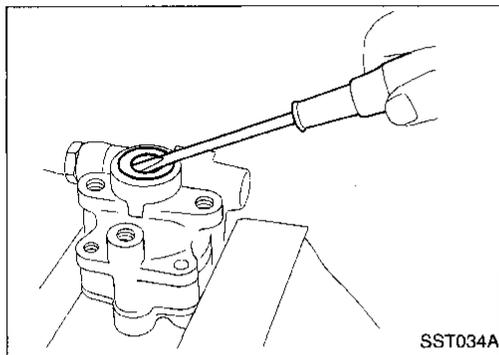
- Remove snap ring, then draw drive shaft out.

**Be careful not to drop drive shaft.**



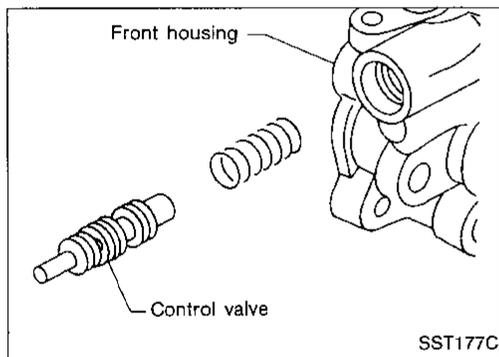
- Remove oil seal.

**Be careful not to damage front housing.**



- Remove connector.

**Be careful not to drop control valve.**



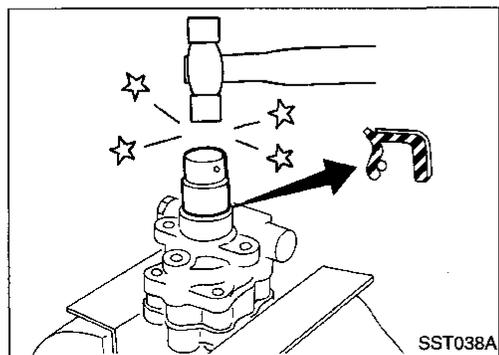
## Inspection

Inspect each component part for wear, deformation, scratches, and cracks. If damage is found, replace the part.

## Assembly

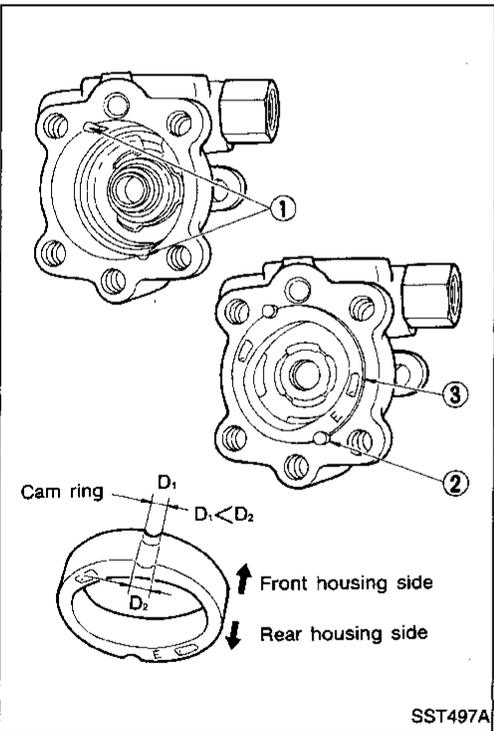
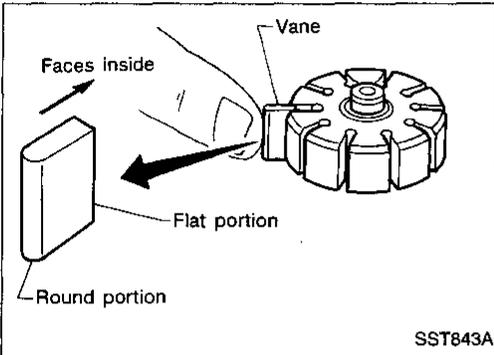
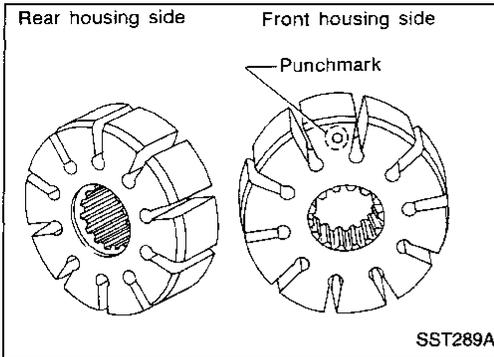
Assemble oil pump, noting the following instructions.

- Make sure O-rings and oil seal are properly installed.
- Always install new O-rings and oil seal.
- Be careful of oil seal direction.
- Cam ring, rotor and vanes must be replaced as a set if necessary.
- Coat each part with ATF when assembling.



# POWER STEERING OIL PUMP

## Assembly (Cont'd)



- Pay attention to rotor direction.

- When assembling vanes to rotor, rounded surfaces of vanes must face cam ring side.

- Insert pin ② into pin groove ① of front housing and front side plate. Then install cam ring ③ as shown at left.

GI

MA

EM

LC

EF &  
EC

FE

CL

MT

AT

PD

FA

RA

BR

ST

RS

BT

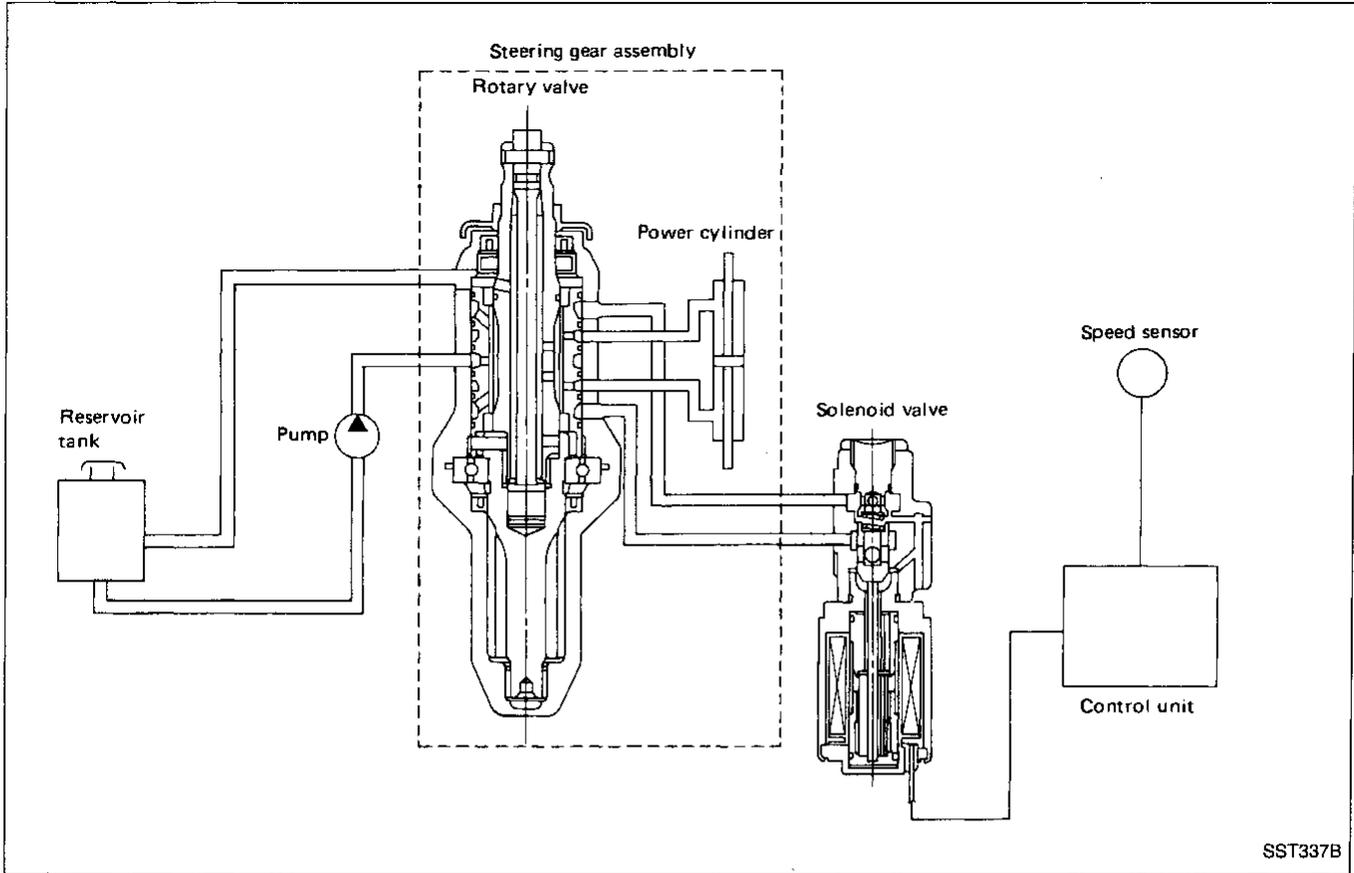
HA

EL

IDX

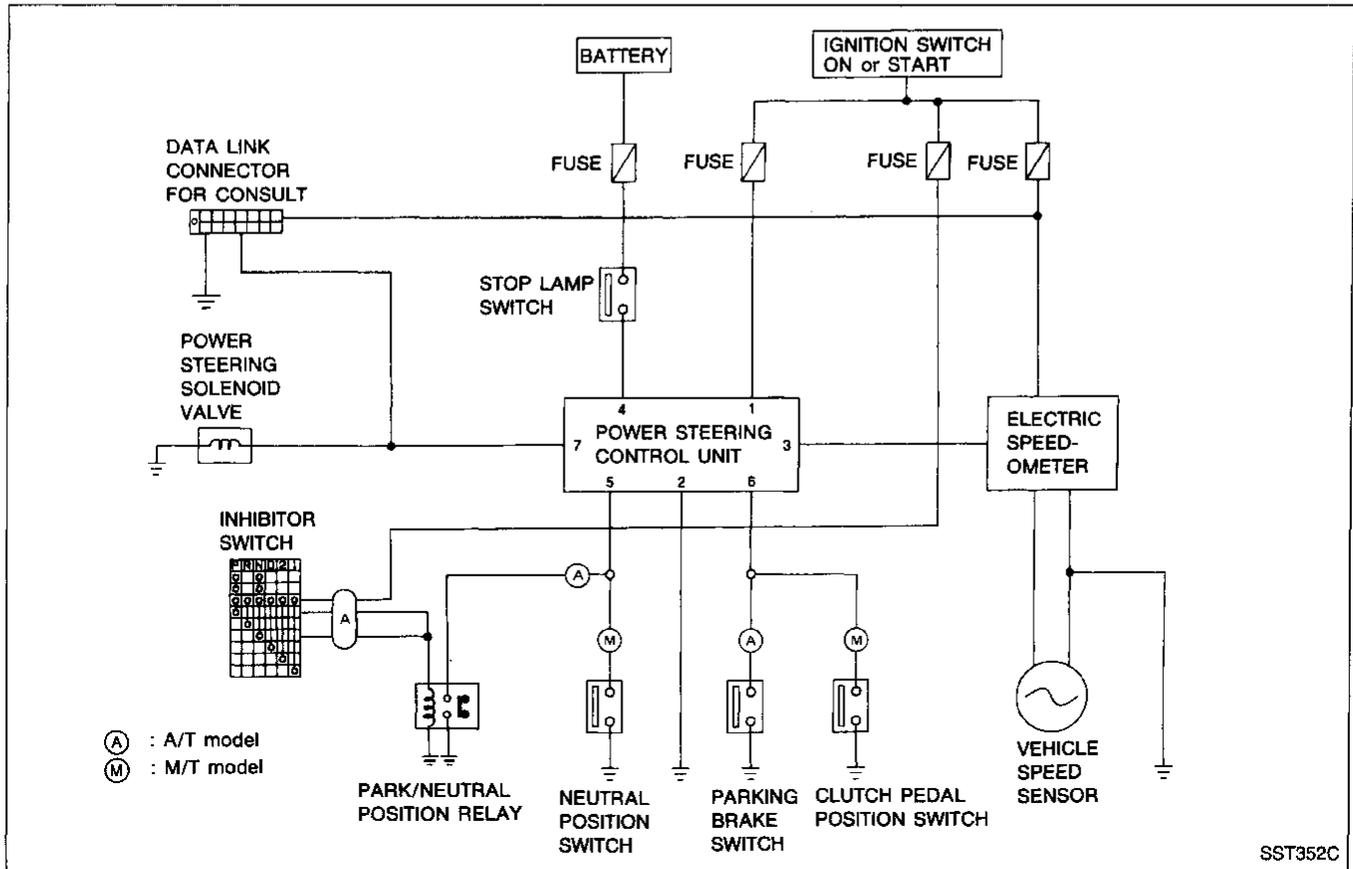
# TWIN ORIFICE POWER STEERING SYSTEM

## Hydraulic Circuit



SST337B

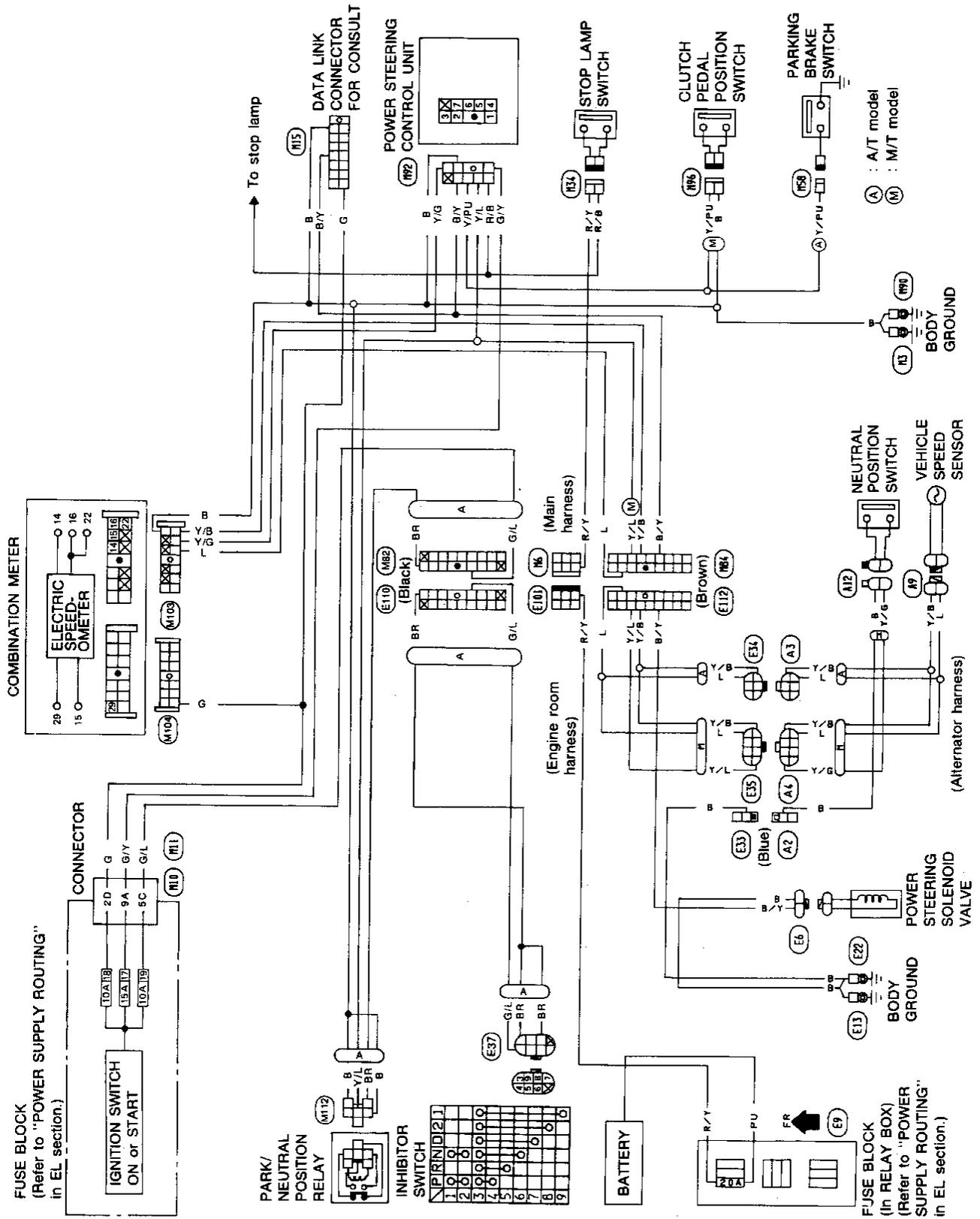
## Schematic



SST352C

# TWIN ORIFICE POWER STEERING SYSTEM

## Wiring Diagram



## Trouble Diagnoses

### PRECAUTIONS

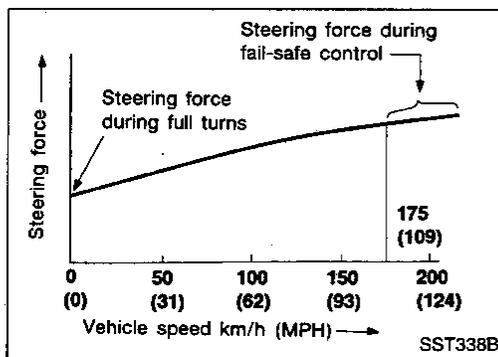
Before diagnosing the power steering system, ensure that:

#### Vehicle stopped

- Power steering components (gears, oil pump, pipes, etc.) are free from leakage, and that oil level is correct.
- Tires are inflated to specified pressure and are of specified size, and that steering wheel is a genuine Nissan part.
- Wheel alignment is adjusted properly.
- Suspension utilizes the original design, and is free of modifications which increase vehicle weight.

#### Vehicle in operation

- Understand the trouble symptoms.
- Engine is operating properly.



### Preliminary knowledge helpful in conducting diagnoses

The power steering system is a twin orifice type, which uses a vehicle-speed sensing, electronic control design. Valve sensitivity is controlled in response to vehicle speed to achieve optimum steering effort. When a vehicle-speed signal is not entered into the power steering control unit for approximately 10 seconds during normal operation (see NOTE below), a fail-safe system activates to maintain the steering effort at a level similar to that experienced during high-speed operation.

More precisely, if a foot-brake signal, parking-brake signal and/or transmission position signal (N or P-range signal on automatic transmission models and a neutral or clutch signal on manual transmission models) are not entered, the power steering system is held in a "fail-safe" control state. When this happens, a symptom referred to as "heavy steering during stationary turns" sometimes occurs.

#### NOTE:

Normal operation refers to a driving condition in which:

##### A/T models

- Brake pedal is released.
- Parking brake lever is released.
- Shift lever is in any position other than "P" or "N".

##### M/T models

- Shift lever is set in any position other than "Neutral" position.
- Clutch pedal is released.

# TWIN ORIFICE POWER STEERING SYSTEM

## Trouble Diagnoses (Cont'd)

### DIAGNOSTIC PROCEDURE 1

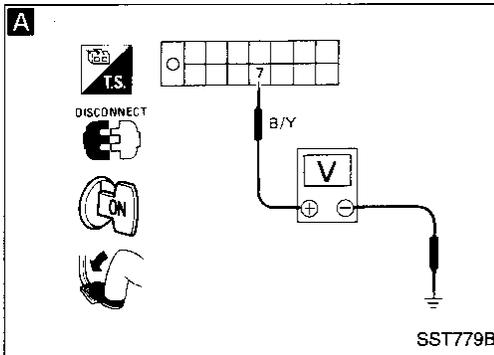
#### SYMPTOM:

Heavy steering operation during stationary turns

GI  
MA  
EM  
LC  
EF &  
EC  
FE  
CL  
MT  
AT  
PD  
FA  
RA  
BR  
ST  
RS  
BT  
HA  
EL  
IDX

START

1) CHECK STOP LAMP SIGNAL.  
Turn ignition switch "ON" (with engine OFF), release foot brake pedal and parking brake lever.  
Set shift lever to any position except "P" and "N" on automatic transmission models or set shift lever to any position except "N" on manual transmission models, and ensure clutch pedal is released.



Depress brake pedal and check voltage between solenoid valve terminals of data link connector for CONSULT.

**Voltage:**  
**4.4 - 6.6V (constant)**

Yes → Go to 2) on page ST-31.

No

Does terminal voltage drop to 1 - 1.5V range approx. 10 seconds after ignition switch is turned ON?

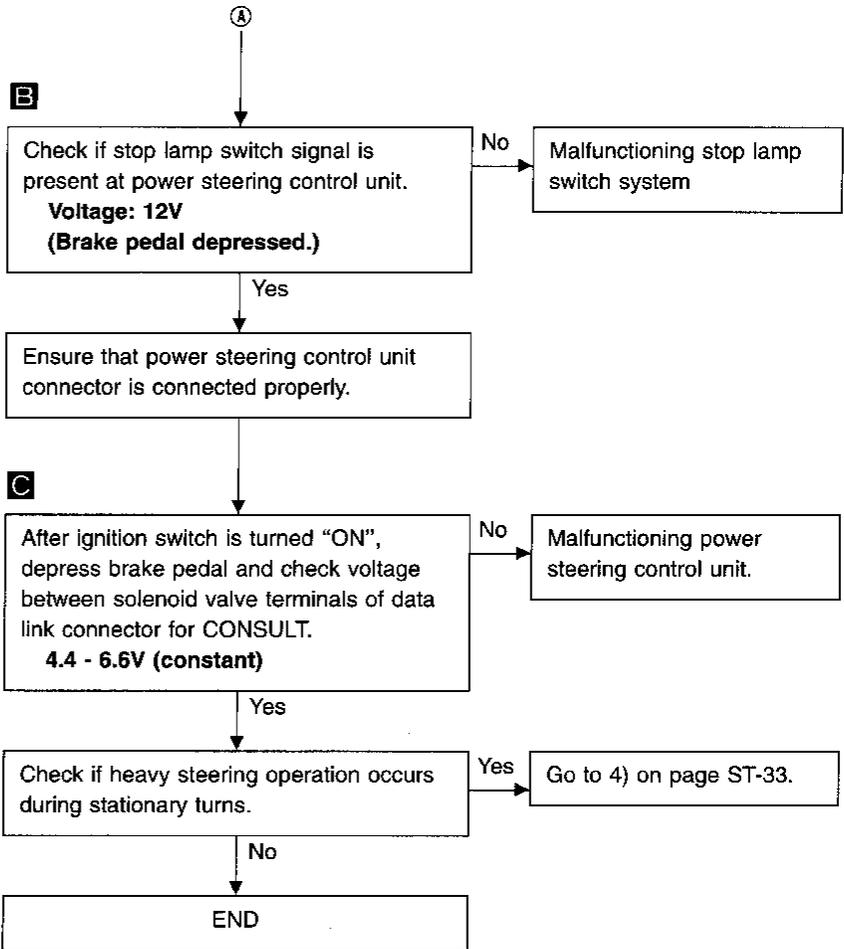
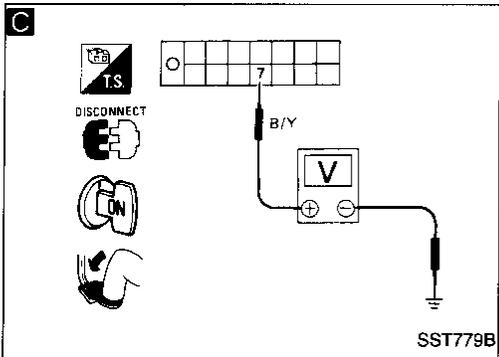
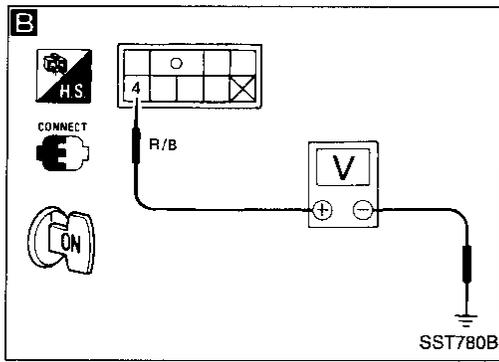
No → Go to 5) on page ST-33.

Yes

Ⓐ

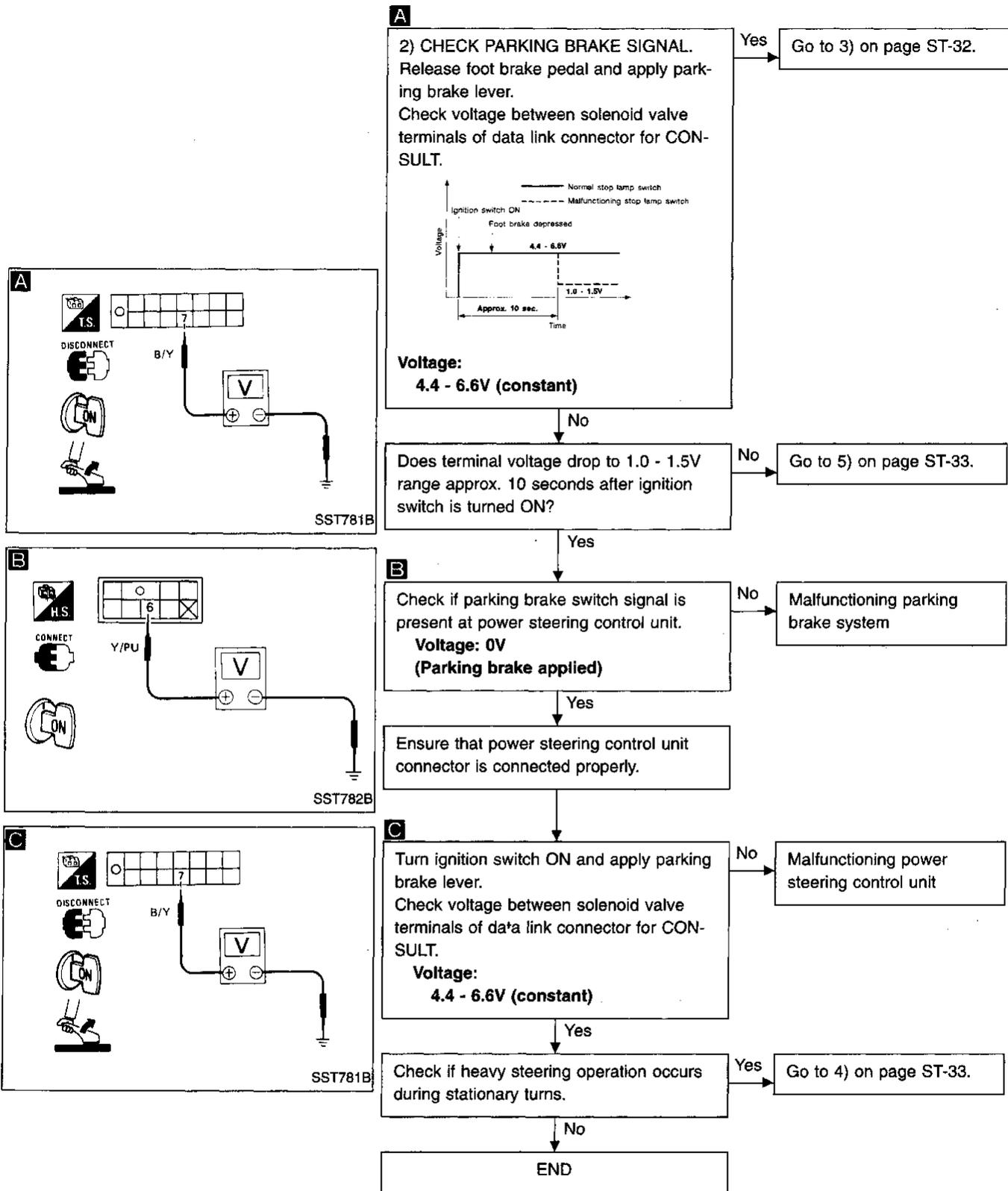
# TWIN ORIFICE POWER STEERING SYSTEM

## Trouble Diagnoses (Cont'd)



# TWIN ORIFICE POWER STEERING SYSTEM

## Trouble Diagnoses (Cont'd)



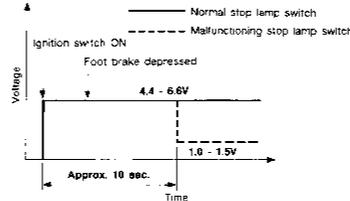
GI  
MA  
EM  
LC  
EF & EC  
FE  
CL  
MT  
AT  
PD  
FA  
RA  
BR  
ST  
RS  
BT  
HA  
EL  
IDX

# TWIN ORIFICE POWER STEERING SYSTEM

## Trouble Diagnoses (Cont'd)

**A**

3) CHECK NEUTRAL POSITION SIGNAL.  
Release parking brake lever.  
Move shift lever to Neutral position (A/T and M/T models). Check voltage between solenoid valve terminals of data link connector for CONSULT.

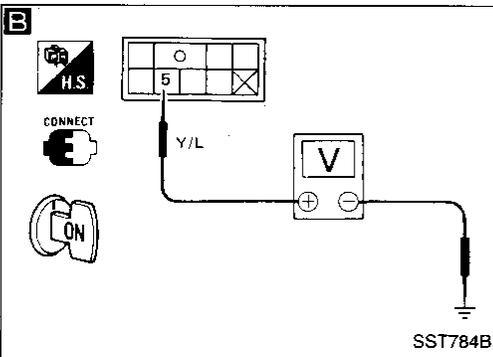
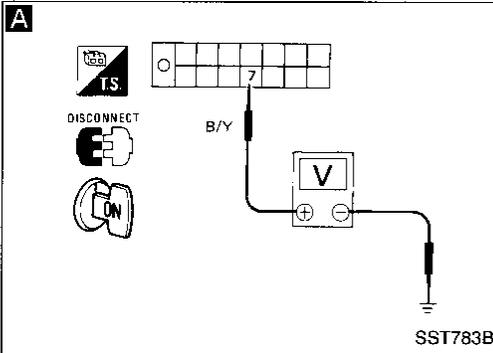


**Voltage:**  
4.4 - 6.6V (constant)

Yes → Depress clutch pedal (M/T model) and move shift lever to "P" position (A/T model).  
No → Check voltage between solenoid valve terminals at data link connector for CONSULT.  
**Voltage:**  
4.4 - 6.6V (constant)

Yes → Go to 4) on page ST-33.

No → Check if terminal voltage drops to 1.0 - 1.5V range approx. 10 seconds after ignition switch is turned ON.  
No → Go to 5) on page ST-33.

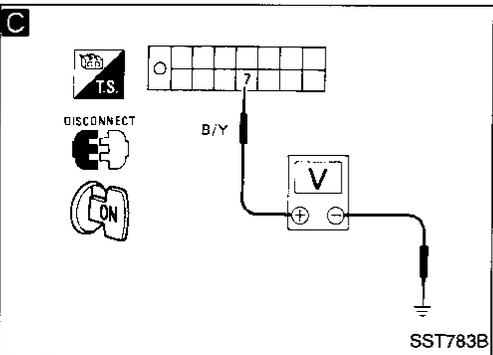


**B**

Check if position switch signal is present at power steering control unit.  
**Voltage: 0V**  
(Position switch is ON.)

No → Malfunctioning position switch system

Yes → Ensure that power steering control unit connector is connected properly.



**C**

Turn ignition switch ON, depress clutch pedal (M/T model) or move shift lever to "P" position (A/T model).  
Check voltage between solenoid valve terminals of data link connector for CONSULT.  
**Voltage:**  
4.4 - 6.6V (constant)

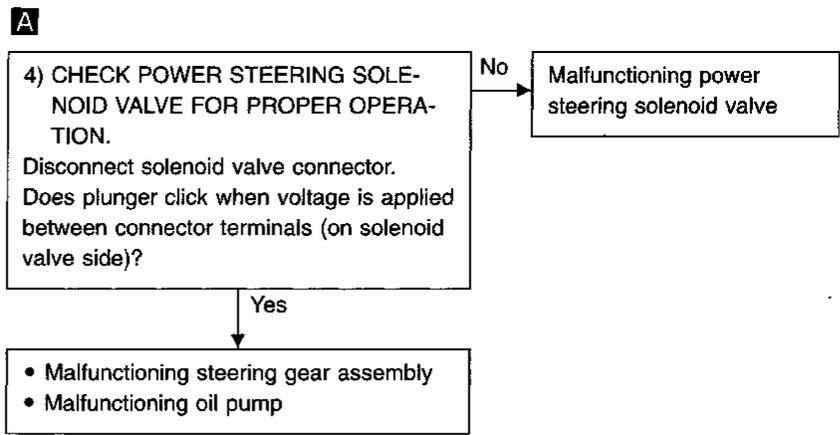
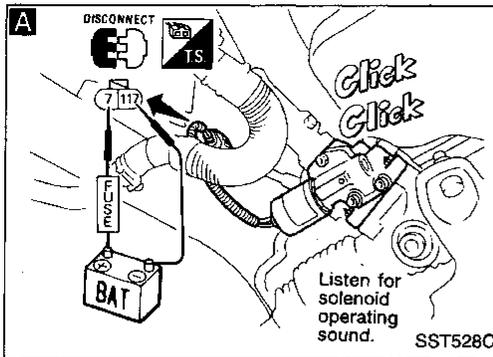
No → Malfunctioning power steering control unit

Yes → Check if heavy steering operation occurs during stationary turns.  
Yes → Go to 1) on page ST-29.

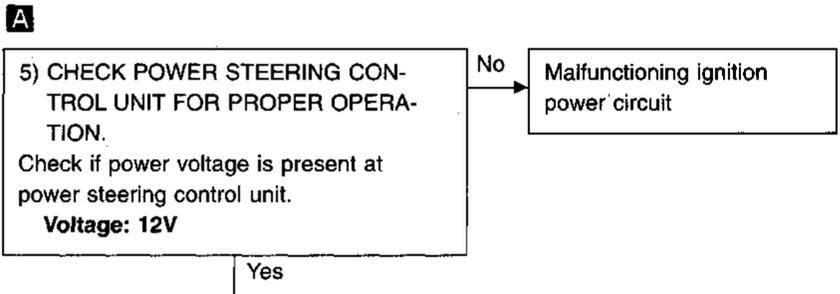
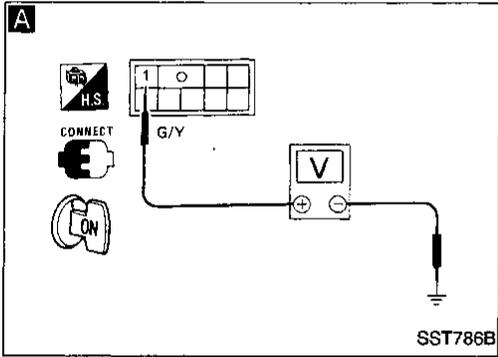
No → END

# TWIN ORIFICE POWER STEERING SYSTEM

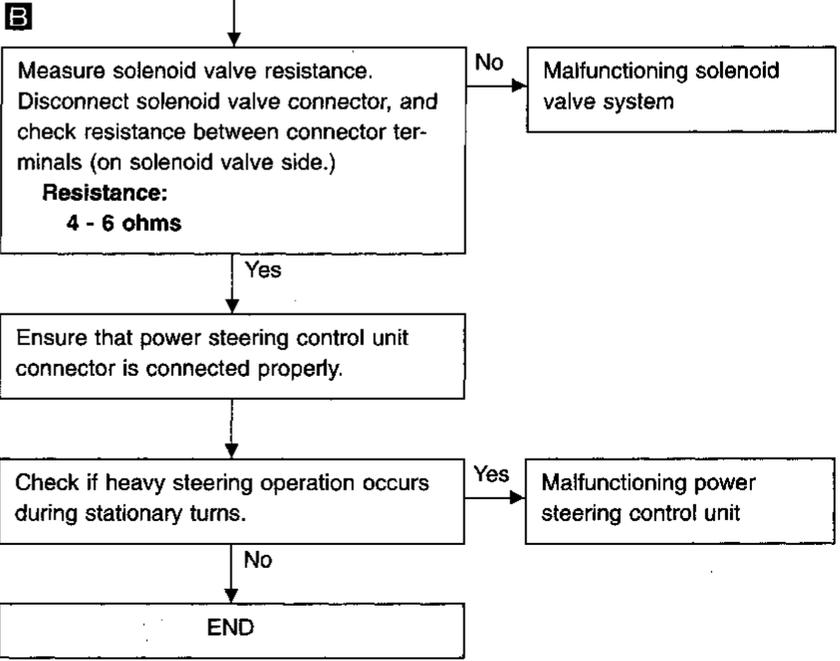
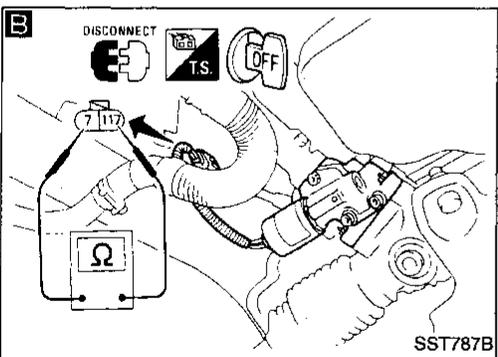
## Trouble Diagnoses (Cont'd)



GI  
MA  
EM  
LC  
EF & EC  
FE  
CL  
MT



AT  
PD  
FA  
RA



BR  
ST  
RS  
BT  
HA  
EL

IDX

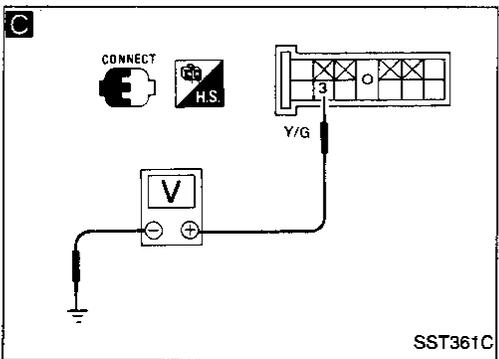
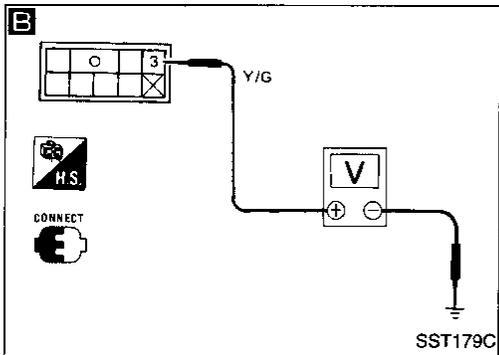
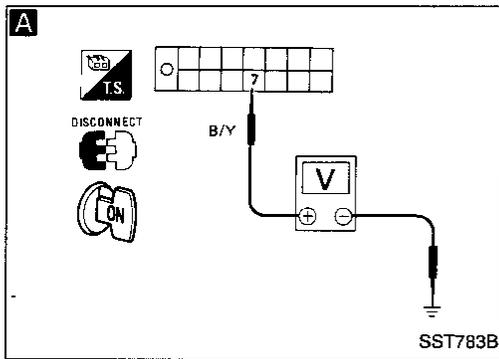
# TWIN ORIFICE POWER STEERING SYSTEM

## Trouble Diagnoses (Cont'd)

### DIAGNOSTIC PROCEDURE 2

#### SYMPTOM:

**Light steering operation during high-speed driving**



Raise rear wheels off ground and start engine.

**A** Check voltage between solenoid valve terminals of data link connector for CONSULT while driving vehicle from 0 to 100 km/h (0 to 62 MPH).  
**Voltage:**  
**0 km/h (0 MPH):**  
 4.4 - 6.6V  
**100 km/h (62 MPH):**  
 1.8 - 2.8V

**No** Check speedometer for proper operation.  
**NG** Malfunctioning vehicle speed sensor or speedometer

**OK** Check ASCD and vehicle speed-sensing door lock for proper operation.

**C** Check if vehicle speed signal is present at speedometer. Disconnect speedometer from vehicle to facilitate work. Reconnect wiring. Measure voltage between speedometer terminals while driving vehicle at very slow speeds.  
**1V (Min.) and 5V (Max.) are alternately repeated**

**OK** Check if vehicle speed signal is present at power steering control unit. While driving at very slow speeds, connect power steering unit connector. Measure terminal voltage.  
**1V (Min.) and 5V (Max.) are alternately repeated**

**No** Malfunctioning speedometer

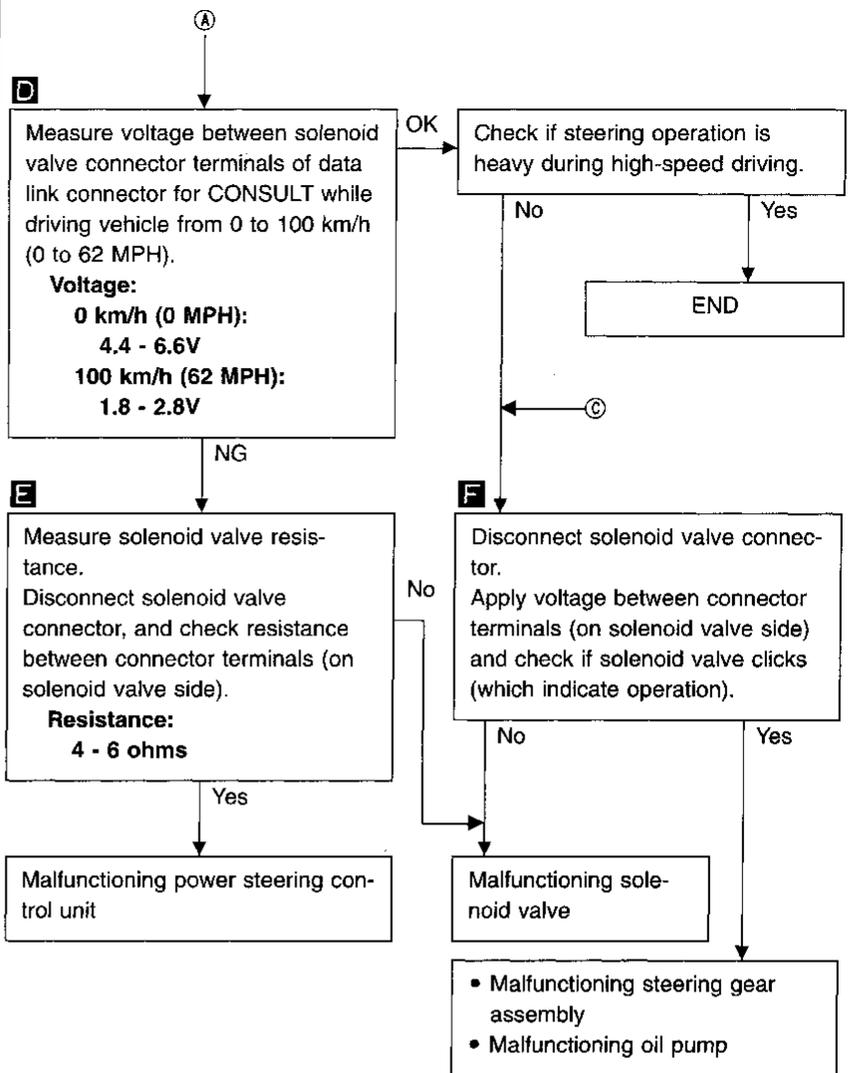
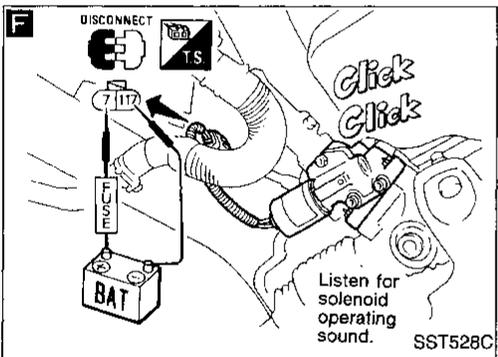
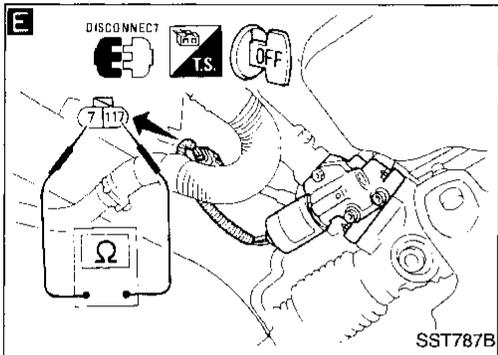
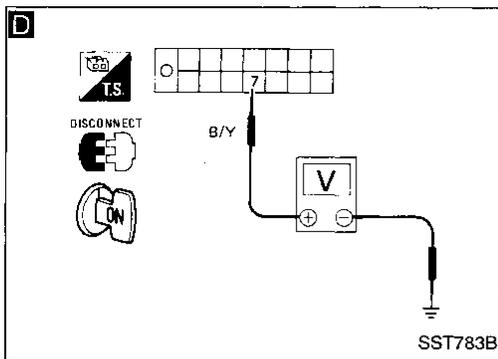
**Yes** Ensure that power steering control unit connector is connected properly.

**Yes** Improper connection between speedometer and power steering control unit

Ⓐ

# TWIN ORIFICE POWER STEERING SYSTEM

## Trouble Diagnoses (Cont'd)



GI  
MA  
EM  
LC  
EF & EC  
FE  
CL  
MT  
AT  
PD  
FA  
RA  
BR  
ST  
RS  
BT  
HA  
EL  
IDX

# TWIN ORIFICE POWER STEERING SYSTEM

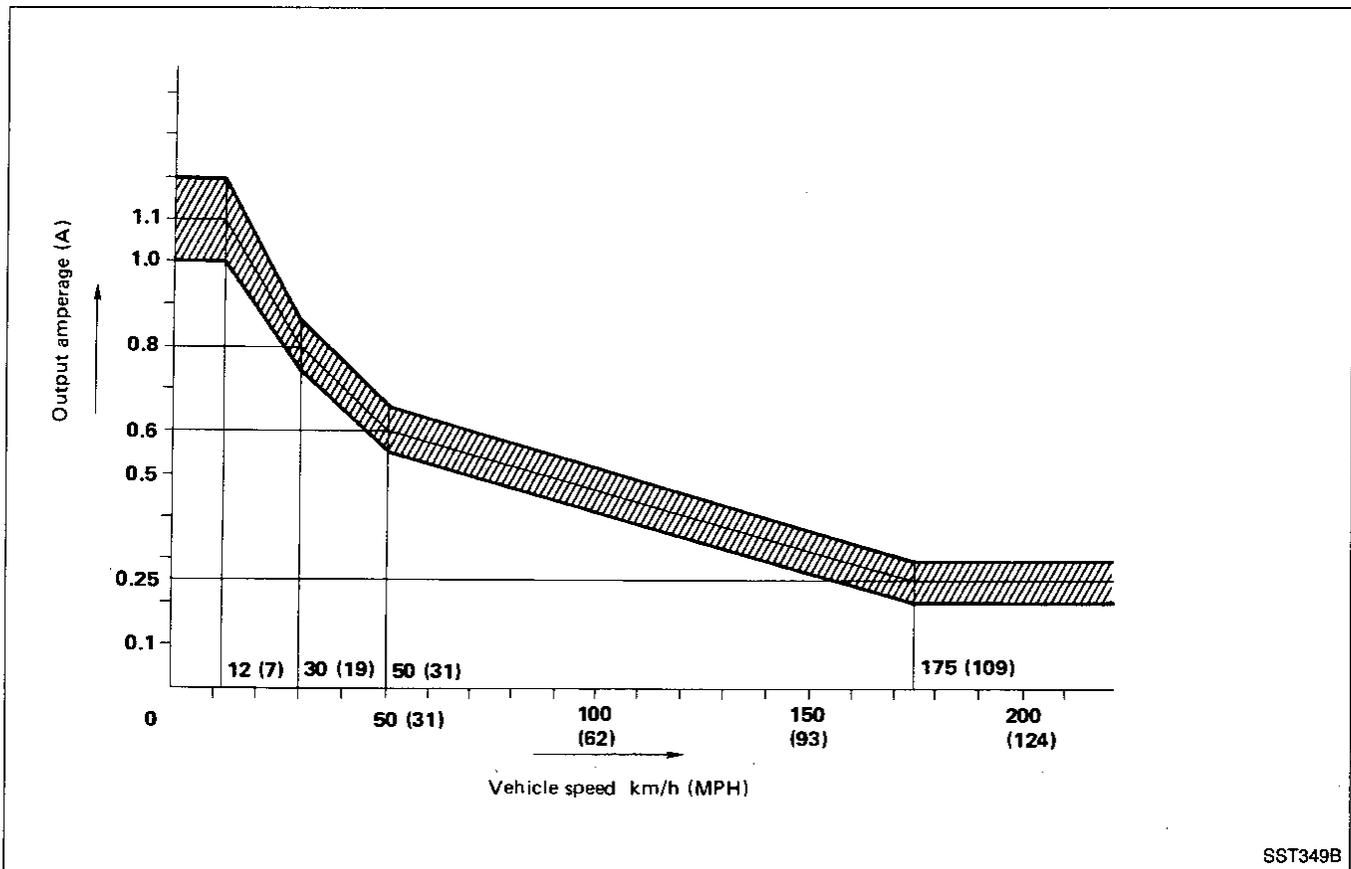
## Trouble Diagnoses (Cont'd)

### CONTROL UNIT INSPECTION TABLE

The standard values (voltage), measured with an analog tester in contact with the control unit terminal, are shown below:

Terminal No.	Application	Standard value
1	Power	Approx. 12V
2	Ground	0V
3	Vehicle speed sensor input	1 volt (min.) and 5 volts (max.) are alternately repeated when vehicle is driven at very slow speeds.
4	Stop lamp switch input	Pressed: Approx. 12V Released: 0V
5	Neutral switch input	0V (clutch engaged and shift lever in "N" position) ... M/T models 0V (selector lever in "N" or "P" position) ... A/T models 4 - 5V (except for the above)
6	Parking brake switch input	Applied: 0V Released: Approx. 12V
7	Power steering solenoid valve output	0 km/h (0 MPH) 4.4 - 6.6V 100 km/h (62 MPH) 1.8 - 2.8V Fail-safe 1.0 - 1.5V

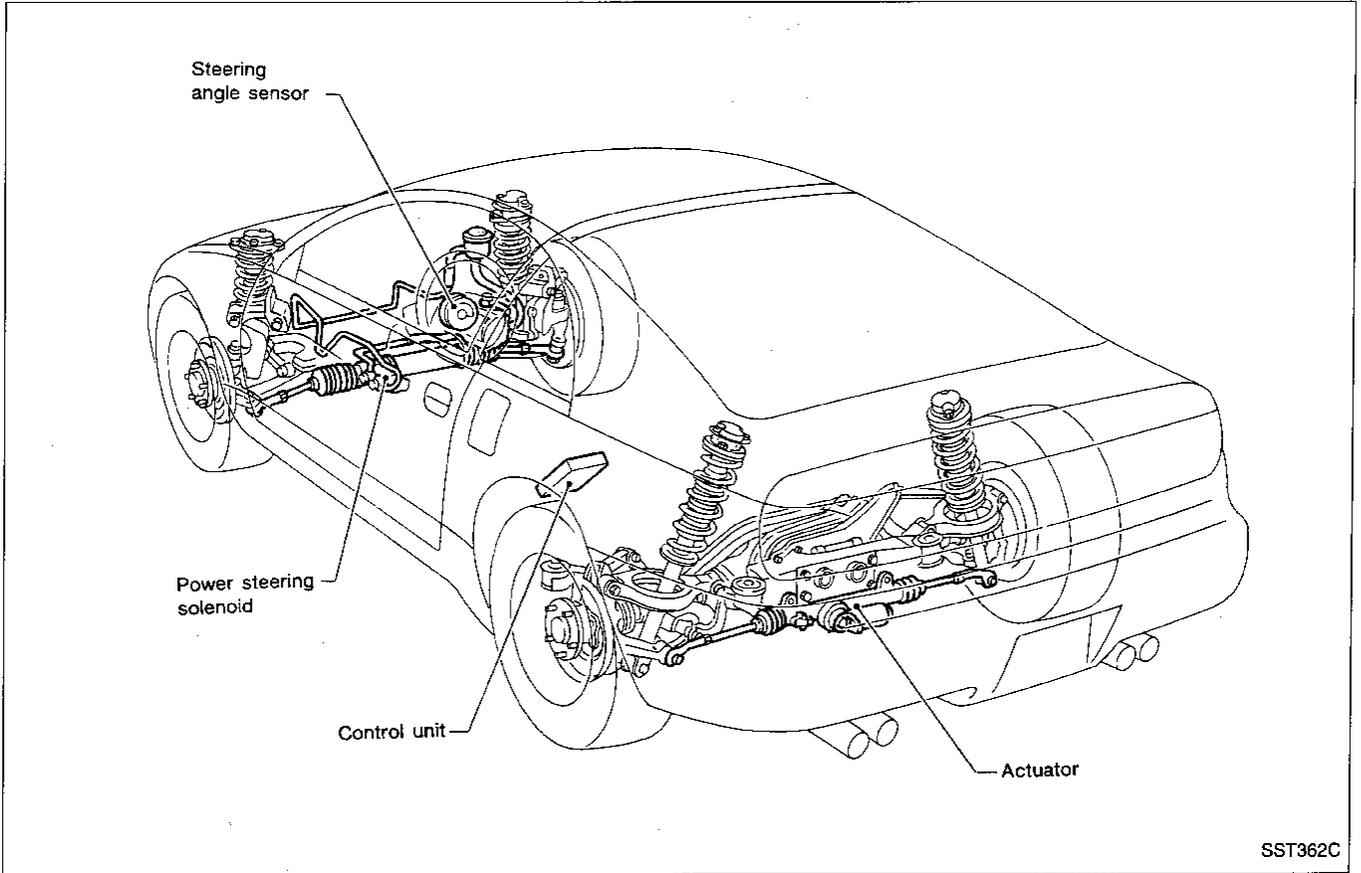
### PERFORMANCE OF CONTROLLER



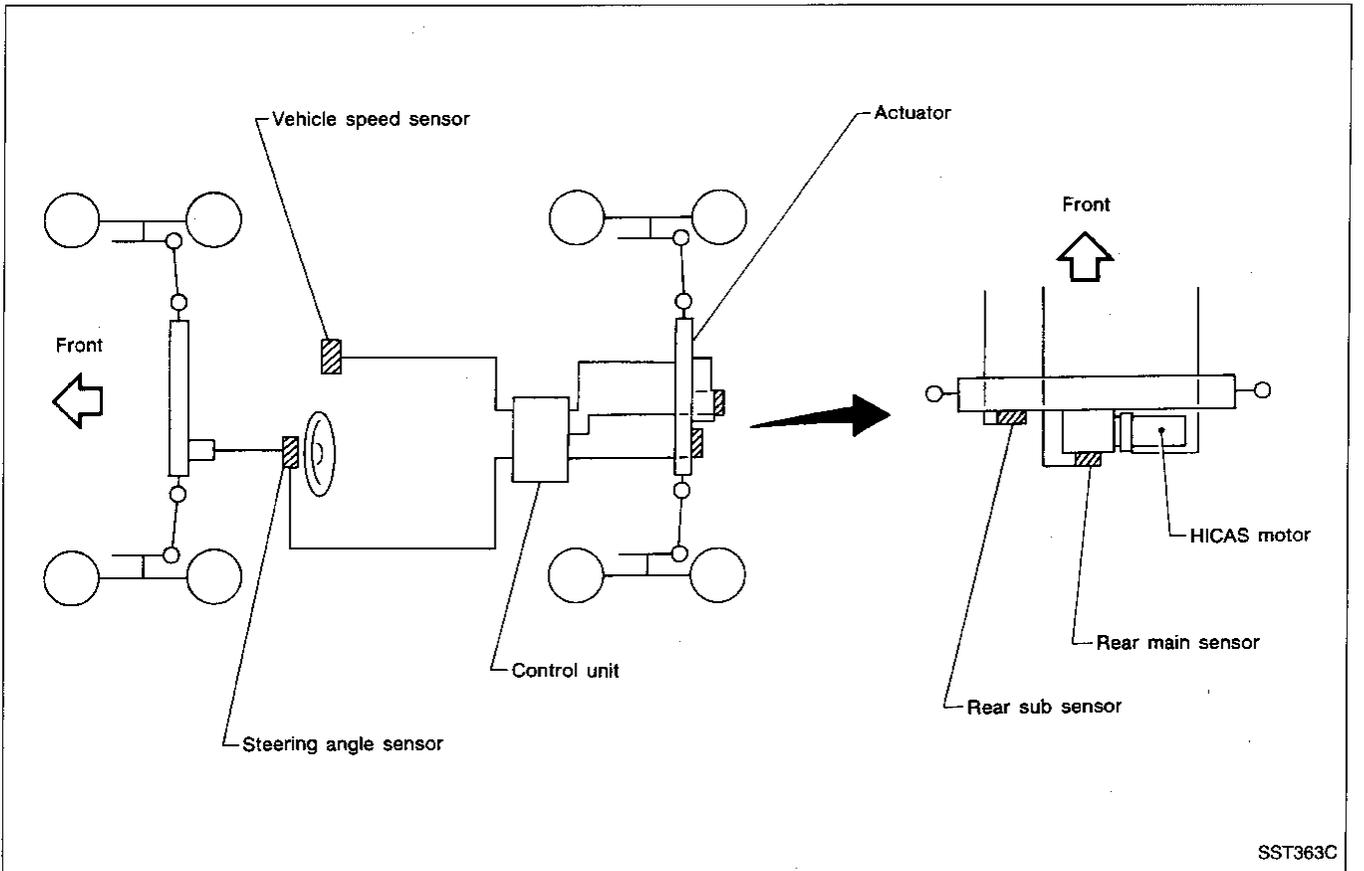
SST349B

# SUPER HICAS SYSTEM

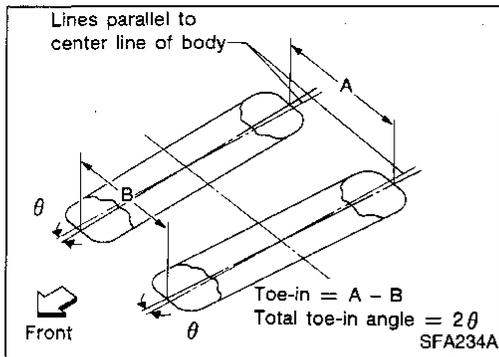
## HICAS Component Parts Location



## System Diagram



GI  
MA  
EM  
LC  
EF &  
EC  
FE  
CL  
MT  
AT  
PD  
FA  
RA  
BR  
ST  
RS  
BT  
HA  
EL  
IDX



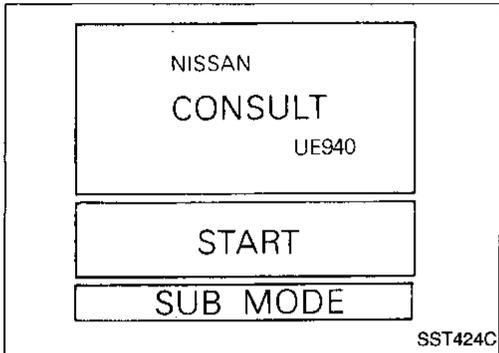
## On-vehicle Service

### MEASURING REAR TOE-IN

Measure distance "A" and "B" at the same height as hub center.

Toe-in:

Refer to SDS in RA section.



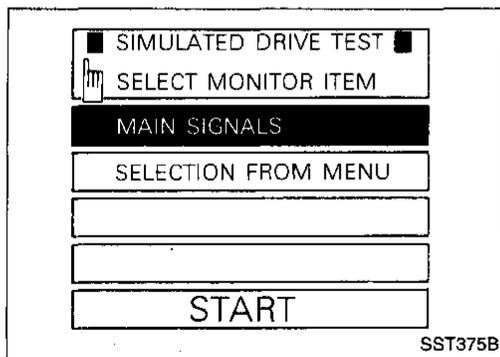
## INSPECTION OF HICAS SYSTEM OPERATION

### CAUTION:

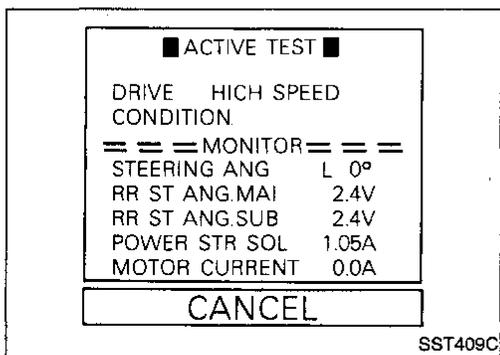
- Ensure that shift lever is set to "P" position (A/T model) or "Neutral" position (M/T model) before checking HICAS system operation.
- Use CONSULT program card "UE940" when CONSULT is used.

When CONSULT is used:

1. Have a helper sit in the driver's compartment and raise vehicle. (Use a two-pole lift or a center pole lift so that the four wheels are free to rotate.)
2. Connect CONSULT unit to data link connector for CONSULT and start engine.
3. Touch "START" on CONSULT display.
4. Touch "HICAS", "ACTIVE TEST" and "SIMULATED DRIVE" in that order.



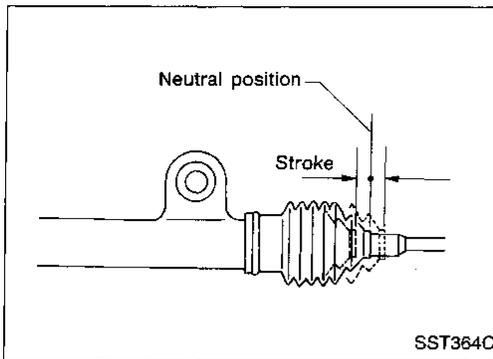
5. Touch "START" when MAIN SIGNALS display is reversed.



6. Touch "START".

# SUPER HICAS SYSTEM

## On-vehicle Service (Cont'd)



7. Operate engine, and turn steering wheel more than 180° in one direction from the neutral position. Measure extension value of one actuator rod and retraction value of the other. Then, turn steering wheel 180° in the other direction from the neutral position, and measure extension value of one cylinder rod and retraction value of the other. Determine strokes of respective actuator by adding (measured) extension and retraction values.

Measure rod strokes in as short a period of time as possible.

### Specifications:

When turned to the right

3 mm (0.12 in)

When turned to the left

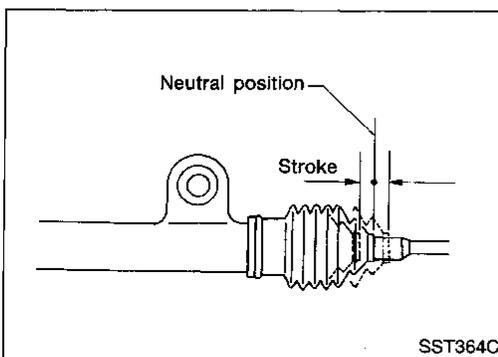
3 mm (0.12 in)

Total stroke

6 mm (0.24 in)

When CONSULT is not used: 

1. Have a helper sit in the driver's compartment and raise vehicle. (Use a 2-pole lift or a center pole lift so that the four wheels are free to rotate.)
2. Set HICAS system in self-diagnosis mode.
  - (1) Turn ignition switch "OFF".
  - (2) Set shift lever to "P" position (A/T model), or "Neutral" position (M/T model).
  - (3) Turn ignition switch "ON".
  - (4) Immediately start engine.
  - (5) Turn steering wheel from left to right (at least 20° from the neutral position) 5 times or more, then depress foot brake pedal at least 5 times all within 10 seconds after ignition switch has been turned "ON".
3. Turn steering wheel to a point approximately 30° from the neutral position, then set steering wheel back to the neutral position and check to ensure that rear wheels turn to the left and right alternately.
4. Operate engine, and turn steering wheel more than 180° in one direction from the neutral position. Measure extension value of one actuator rod and retraction value of the other. Then, turn steering wheel 180° in the other direction from the neutral position, and measure extension value of one cylinder rod and retraction value of the other. Determine strokes of respective actuator by adding (measured) extension and retraction values.



Measure rod strokes in as short a period of time as possible.

### Specifications:

When turned to the right

3 mm (0.12 in)

When turned to the left

3 mm (0.12 in)

Total stroke

6 mm (0.24 in)

GI

MA

EM

LC

EF &

EC

FE

CL

MT

AT

PD

FA

RA

BR

ST

RS

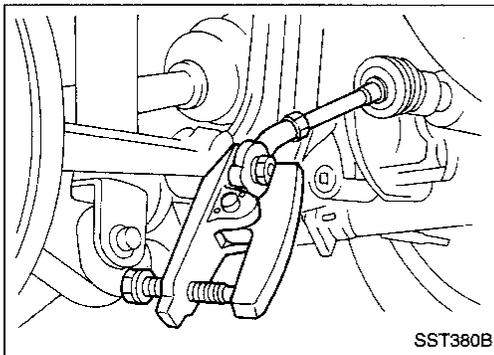
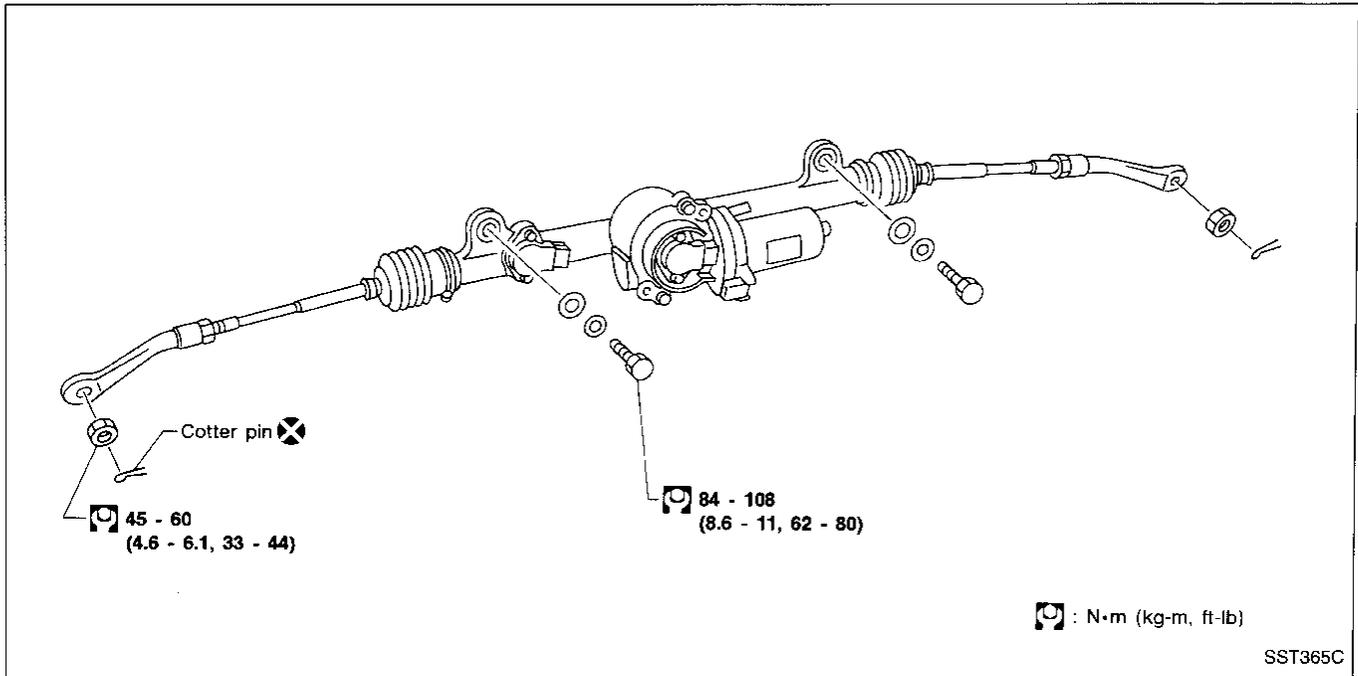
BT

HA

EL

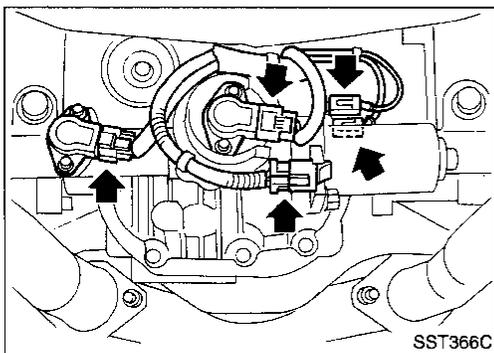
IDX

## Repair of Component Parts ACTUATOR



### Removal

- Detach actuator lower links from axle housing sockets with Tool.



- Disconnect harness connectors and remove actuator.

### CAUTION:

Remove one side of rear tire and draw out actuator through the space where tire is removed.

# SUPER HICAS SYSTEM

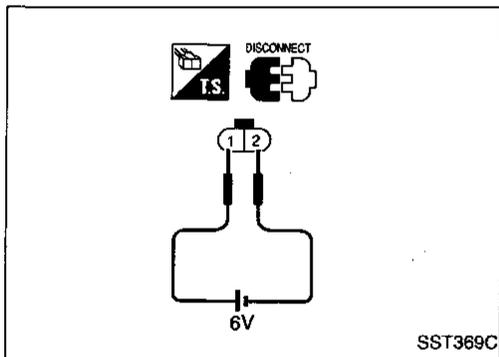
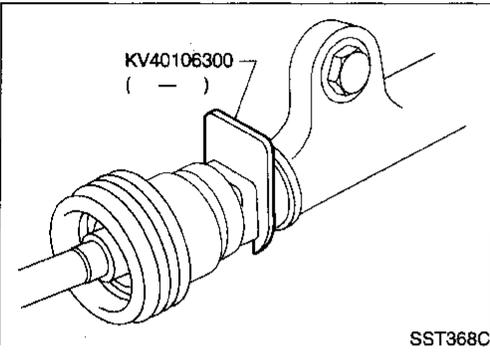
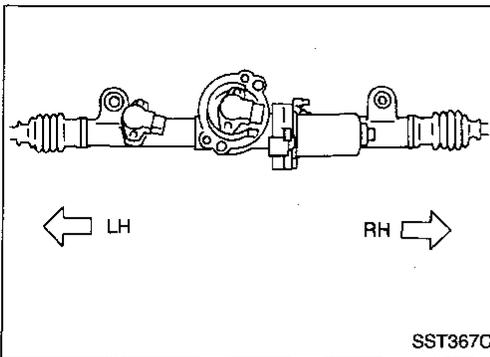
## Repair of Component Parts (Cont'd)

### Installation

1. Before installing actuator on suspension member, wipe actuator bracket and mating surface of suspension member. Using the left side of the bracket as a reference point, locate the right side (oblong hole side) and install actuator.

### CAUTION:

- To prevent entry of foreign particles, clean harness connectors using dry compressed air.
2. Install actuator and harness connectors.



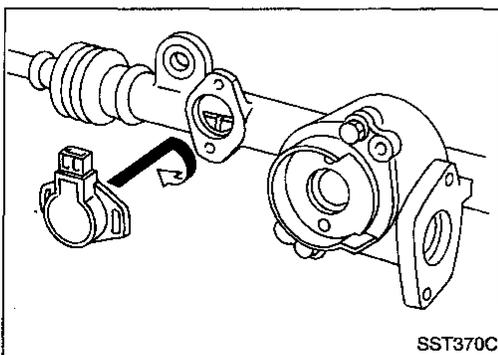
3. If sensors were removed, perform the following operations:
  - (1) Remove inner side boot clamp of either boot, and set Tool between actuator and inner socket as shown at left.

- (2) Remove sensor connectors, then remove sensors.
- (3) Remove HICAS motor connector, and set ignition switch to ON.
- (4) Connect 6V source (four 1.5V dry cells connected in series) to HICAS motor, and actuate motor in the direction that will cause the Tool to clamp, thereby setting rack in neutral. Alternate method: Remove HICAS motor, and move rack using a screwdriver.

### CAUTION:

Never apply 12V (battery voltage) to HICAS motor.

If positive voltage is applied to HICAS motor connector terminal ①, rack will move to the right. If positive voltage is applied to terminal ②, rack will move to the left.



- (5) Install each sensor together with a new O-ring, and tighten temporarily with mounting screw.

### CAUTION:

Install each sensor as shown at left so that sensor pawl will engage with actuator pawl.

- (6) Install harness connector.

GI

MA

EM

LC

EF &  
EC

FE

CL

MT

AT

PD

FA

RA

BR

ST

RS

BT

HA

EL

IDX

# SUPER HICAS SYSTEM

## Repair of Component Parts (Cont'd)

(7) Adjust each sensor to the reference value.

 Read sensor data on data monitor.

### CAUTION:

**"FAILURE" will be displayed during data monitoring. This will not interfere with this operation.**

 Read data by applying circuit tester leads to sensor connector.

**Front steering angle (degree):**

**L-0, R-0**

**Rear main sensor (V):**

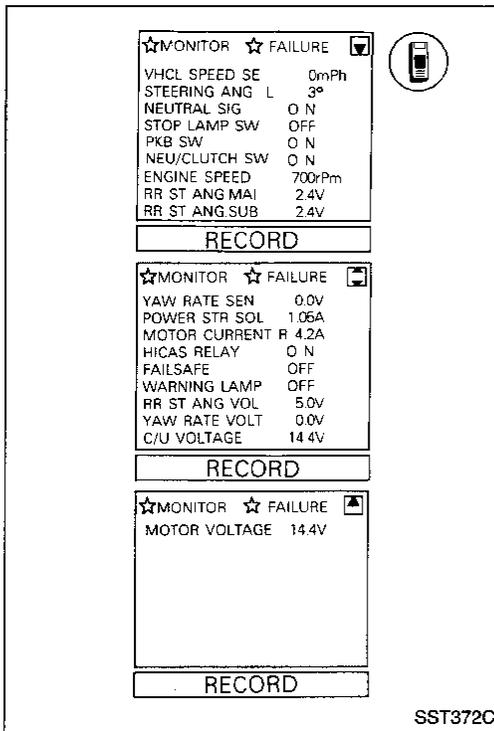
**Approx. 2.44**

**Rear sub sensor (V):**

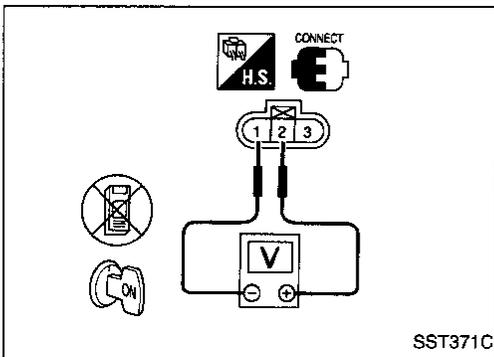
**Approx. 2.44**

**Rear sensor source voltage (V):**

**Approx. 5.0**



SST372C



SST371C

(8) Tighten each sensor mounting screw to the specified torque.

: 1.5 - 1.9 N·m (0.15 - 0.19 kg·m, 1.1 - 1.4 ft·lb)

(9) Remove Tool.

### CAUTION:

**If the Tool is difficult to remove, tap it lightly.**

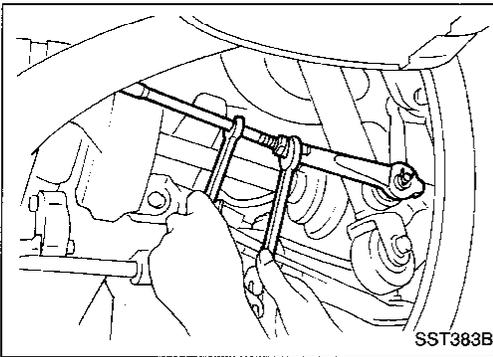
**Never attempt to apply reverse voltage to the motor to move the rack in the opposite direction.**

(10) Perform "ERASE" using CONSULT so that past sensor error data will be erased. Alternative method: Disconnect battery negative cable, and leave the cable disconnected for more than 30 minutes.

(11) Perform self-diagnosis to check sensor condition.

# SUPER HICAS SYSTEM

## Repair of Component Parts (Cont'd)



- After installing lower link assemblies, check toe-in to ensure that it is within specifications. If it is not within specifications, perform proper adjustments. Refer to "SUPER HICAS" in RA section.

GI

MA

EM

LC

EF &  
EC

FE

CL

MT

AT

PD

FA

RA

BR

ST

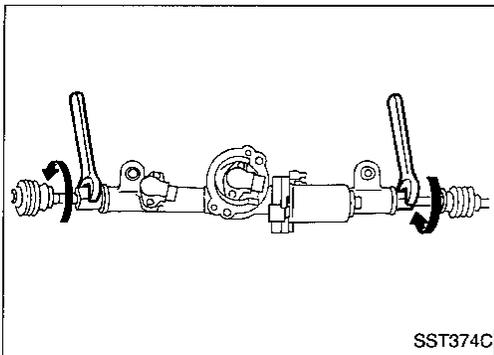
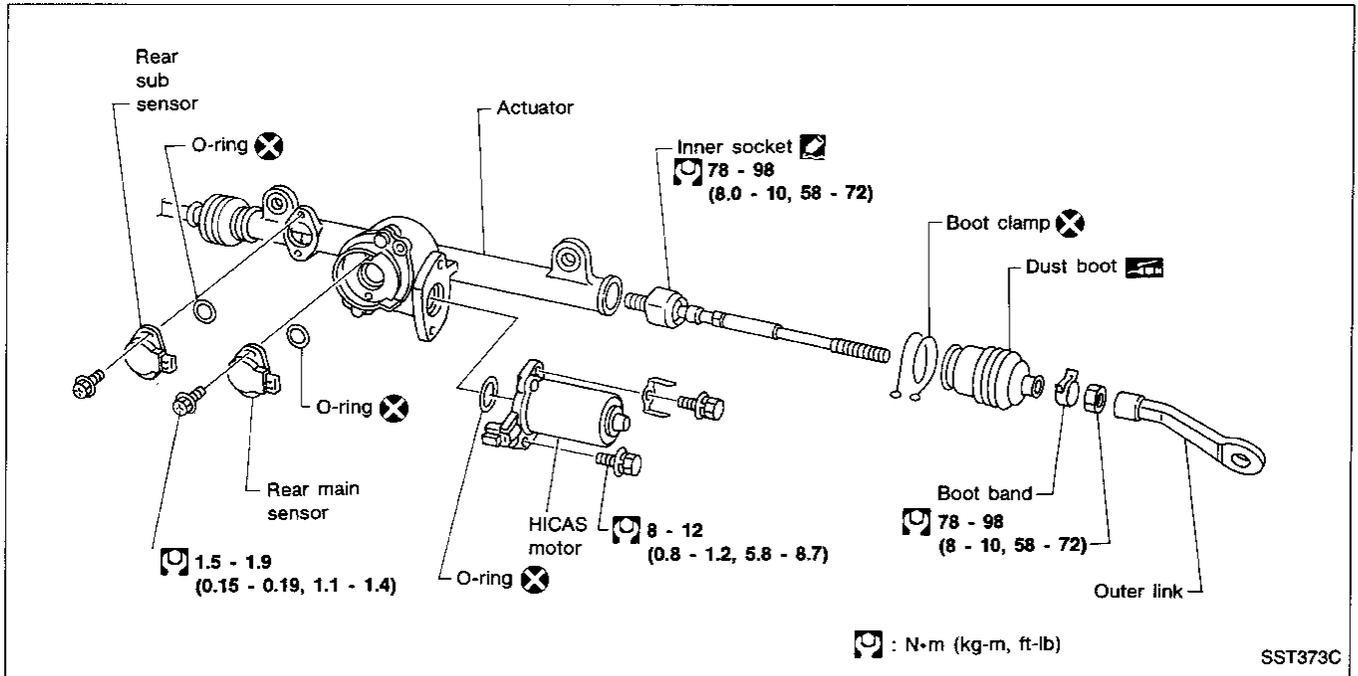
RS

BT

HA

EL

IDX



Actuator cannot be disassembled beyond limit shown above.

### Disassembly

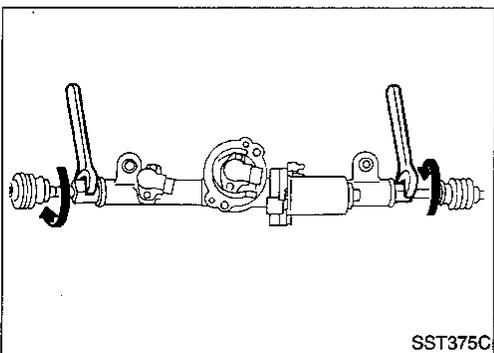
- Loosen outer link lock nut.
- Remove outer link and outer link lock nut.
- Remove clamps and dust boots.
- Attach wrenches to left and right ball joint sockets, and turn in directions that loosen lower links. Remove one of loosened lower link assemblies.
- Remove HICAS motor.
- Remove main and sub sensors.

### Assembly

- Apply Locktite to inner ball joint thread. Install lower link assembly. Attach a wrench to inner ball joint (to prevent it from turning), tighten inner socket to specified torque.

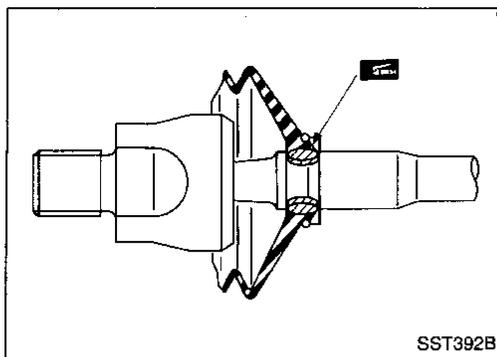
Inner socket:

⊗ : 78 - 98 N·m (8 - 10 kg·m, 58 - 72 ft·lb)

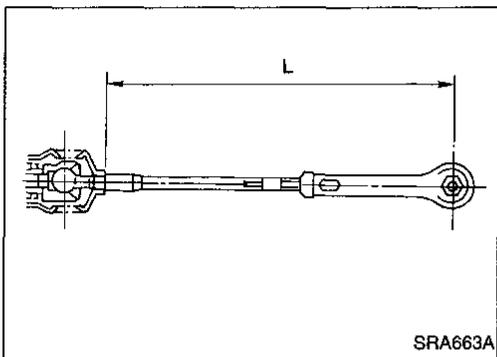


## SUPER HICAS SYSTEM

### Repair of Component Parts (Cont'd)



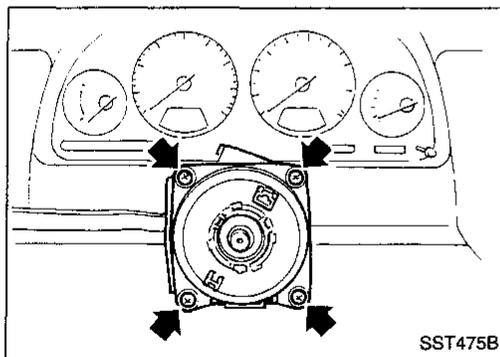
2. Install dust boot using new boot band and clamp.
  - Apply a coat of grease to grooves at boot location.
  - If main sensor and sub sensor are removed, do not install inner boot clamp. Install it after completing sensor installation and adjustment.



3. Install outer link lock nut and outer socket. Tighten outer link lock nut.

**Link standard length "L":**  
Refer to SDS (ST-81).

4. Install HICAS motor.
5. Install main and sub sensors.  
Refer to ST-41.



### STEERING ANGLE SENSOR

- Ensure that steering angle sensor bolts are secure and tight.
- If any part of steering angle sensor is malfunctioning, replace steering angle sensor assembly.

**Trouble Diagnoses**

**CONTENTS**

<b>How to Perform Trouble Diagnoses for Quick and Accurate Repair</b> .....	ST-46	
<b>Symptom Chart</b> .....	ST-47	
<b>Preliminary Check</b> .....	ST-48	MA
<b>Component Parts and Harness Connector Locations</b> .....	ST-50	
<b>Circuit Diagram</b> .....	ST-51	
<b>Wiring Diagram</b> .....	ST-52	EM
<b>Self-diagnosis</b> .....	ST-54	
<b>Control Unit Power Supply and Ground Circuit Check</b> .....	ST-57	
<b>Diagnostic Procedure 1</b>		LC
SYMPTOM: No warning lamp comes on when ignition switch is turned "ON". .....	ST-58	
<b>Diagnostic Procedure 2</b>		EF & EC
SYMPTOM (A): Warning lamp comes on during operation. ....	ST-58	
SYMPTOM (B): Warning lamp stays on after engine starts. ....	ST-59	
<b>Diagnostic Procedure 3</b>		FE
SYMPTOM: Considerable resistance is felt during stationary steering operation. ....	ST-60	
<b>Diagnostic Procedure 4</b>		
SYMPTOM: Abnormal noise occurs. ....	ST-61	
<b>Diagnostic Procedure 5</b>		CL
SYMPTOM: Other abnormalities .....	ST-62	
<b>Diagnostic Procedure 6</b>		
SYMPTOM: System is not set in self-diagnosis mode. ....	ST-65	MT
<b>Diagnostic Procedure 7</b>		
SYMPTOM: Control unit is abnormal. ....	ST-68	
<b>Diagnostic Procedure 8</b>		AT
SYMPTOM: HICAS motor power supply is not present. ....	ST-68	
<b>Diagnostic Procedure 9</b>		
SYMPTOM: HICAS motor output is not present. ....	ST-69	PD
<b>Diagnostic Procedure 10</b>		
SYMPTOM: Vehicle speed signal is not present. ....	ST-70	
<b>Diagnostic Procedure 11</b>		FA
SYMPTOM: Steering angle sensor input is not present. ....	ST-71	
<b>Diagnostic Procedure 12</b>		
SYMPTOM: Rear main or sub sensor input is not present. ....	ST-72	RA
<b>Diagnostic Procedure 13</b>		
SYMPTOM: Parking brake input is not present. ....	ST-75	
<b>Diagnostic Procedure 14</b>		BR
SYMPTOM: Inhibitor switch (A/T) or neutral position switch and clutch switch (M/T) input is not present. ....	ST-76	
<b>Diagnostic Procedure 15</b>		<b>ST</b>
SYMPTOM: Engine speed signal is not present. ....	ST-77	
<b>Control Unit Inspection Table</b> .....	ST-78	

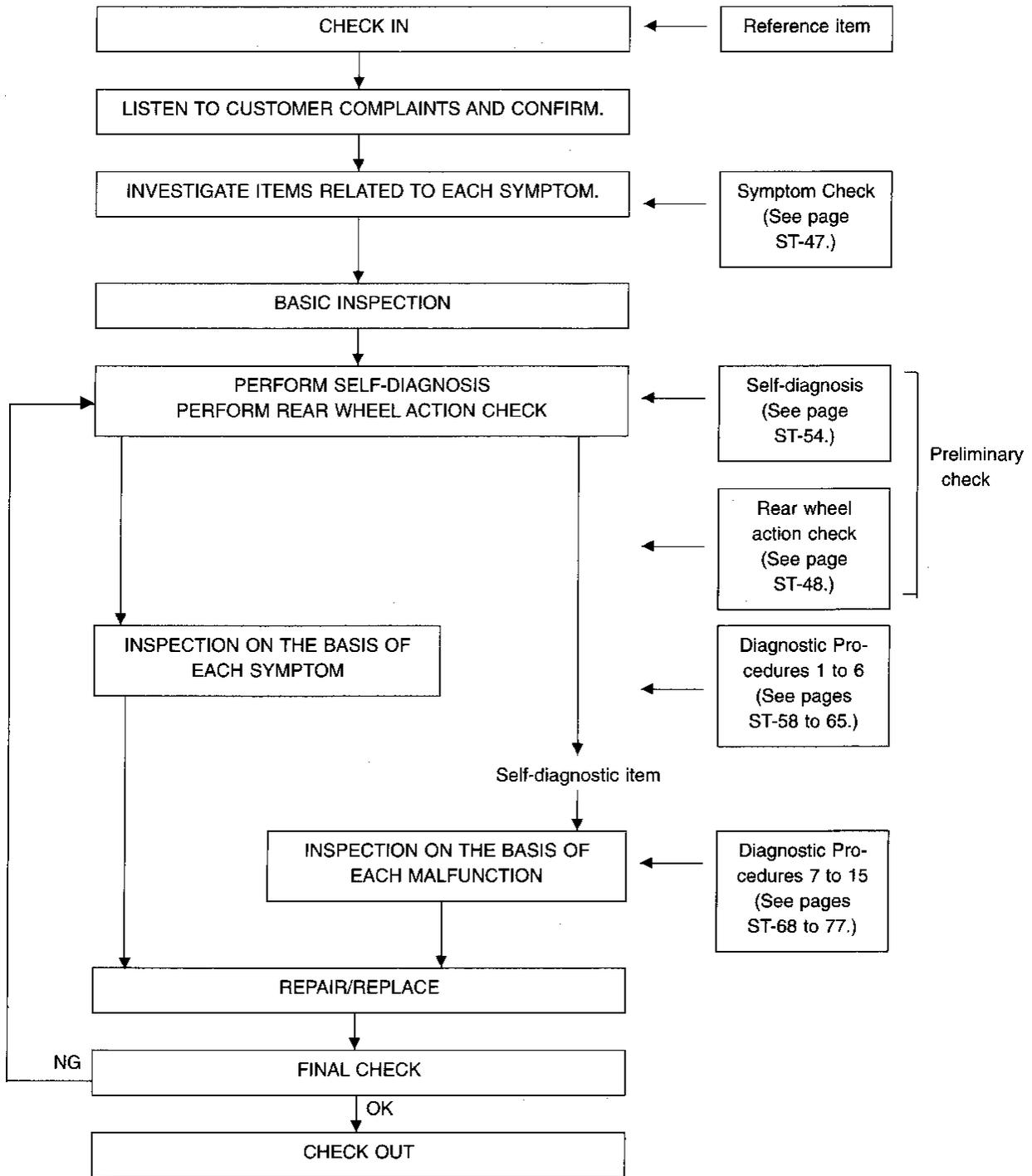
GI  
MA  
EM  
LC  
EF &  
EC  
FE  
CL  
MT  
AT  
PD  
FA  
RA  
BR  
**ST**  
RS  
BT  
HA  
EL  
IDX

# SUPER HICAS SYSTEM

## Trouble Diagnoses (Cont'd)

### HOW TO PERFORM TROUBLE DIAGNOSES FOR QUICK AND ACCURATE REPAIR

#### Work flow



# SUPER HICAS SYSTEM

## Trouble Diagnoses (Cont'd) SYMPTOM CHART

**Diagnostic table**

PROCEDURE			Preliminary Check		Diagnostic Procedure														
REFERENCE PAGE (ST-)			48	48	58	58	60	61	62	65	68	68	69	70	71	72	75	76	77
SYMPTOM			Preliminary check 1	Preliminary check 2	Diagnostic procedure 1	Diagnostic procedure 2	Diagnostic procedure 3	Diagnostic procedure 4	Diagnostic procedure 5	Diagnostic procedure 6	Diagnostic procedure 7	Diagnostic procedure 8	Diagnostic procedure 9	Diagnostic procedure 10	Diagnostic procedure 11	Diagnostic procedure 12	Diagnostic procedure 13	Diagnostic procedure 14	Diagnostic procedure 15
No warning lamp comes on when ignition switch is turned "ON"					○														
Warning lamp comes on when engine is running			○	○		○													
Considerable resistance is felt during stationary steering operation.							○							○					
Small resistance is felt when steering during high speed driving.														○					
Abnormal noise is emitted.			○	○				○											
Other abnormalities			○	○					○										
Self-diagnostic results	System is not set in self-diagnosis mode.									○									
	Self-diagnosis code No.	Diagnosed part	CONSULT indication																
	11	HICAS control unit	CONTROL UNIT									○							
	12	HICAS motor power supply is not present.	MOTOR VOLTAGE [LOW VOLTAGE] (ea)										○						
	13	HICAS motor output is not present.	MOTOR OUTPUT [ABNORMAL SIG] (ea) MOTOR OUTPUT [MOTOR LOCK] (eb)											○					
	21	Vehicle speed signal is not present.	VEHICLE SPEED SEN [NO SIGNAL] (ea) VEHICLE SPEED SEN [SIG-SUDDEN TURN] (eb)												○				
	22	Steering angle sensor input is not present.	STEERING ANGLE SEN [NO ANG SIGNAL] (ea) STEERING ANGLE SEN [ANG SIG FIX] (ee)													○			
	23		STEERING ANGLE SEN [NO NEUT SIGNAL] (eb) STEERING ANGLE SEN [NEUT SIG-360° OFF] (ec) STEERING ANGLE SEN [NEUT SIG-30° ON] (ed) STEERING ANGLE SEN [OFFSET NEUT] (el)													○			
	24		Rear main sensor input is not present.	RR ST ANGLE SENSOR [MAIN SIGNAL] (ea) RR ST ANGLE SENSOR [OFFSET SIG] (ec) RR ST ANGLE SENSOR [ABNORMAL VOL] (ed)													○		
	25	Rear sub sensor input is not present.	RR ST ANGLE SENSOR [SUB SIGNAL] (eb) RR ST ANGLE SENSOR [OFFSET SIG] (ec) RR ST ANGLE SENSOR [ABNORMAL VOL] (ed)													○			
	31	Parking brake input is not present.	—															○	
	32	Inhibitor switch (A/T) or neutral and clutch switch (M/T) input is not present.	—																○
	33	Engine speed signal is not present.	ENG REV SIGNAL [ABNORMAL SIGNAL]																

GI  
MA  
EM  
LC  
EF & EC  
FE  
CL  
MT  
AT  
PD  
FA  
RA  
BR  
**ST**  
RS  
BT  
HA  
EL  
IDX

# SUPER HICAS SYSTEM

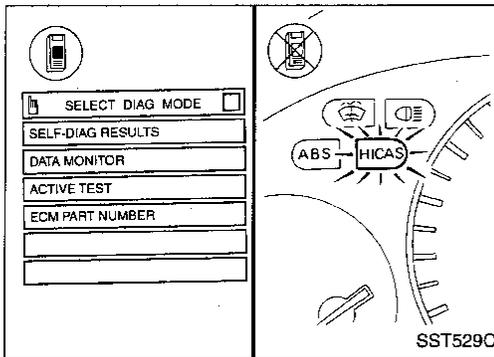
## Trouble Diagnoses (Cont'd)

### PRELIMINARY CHECK

#### Check 1

Perform self-diagnosis.

Refer to "Self-diagnosis" on page ST-54.



#### Check 2

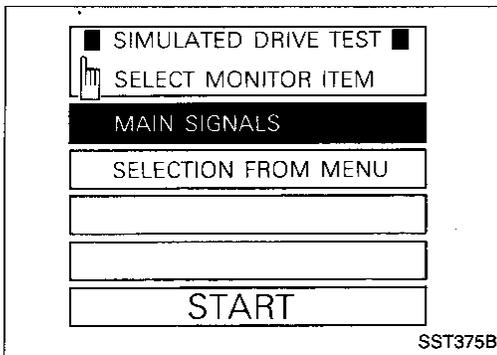
Perform rear wheel action check.

#### CAUTION:

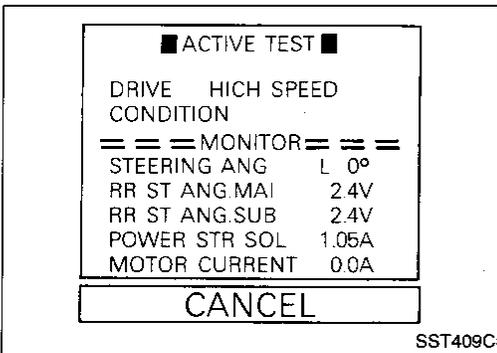
Ensure that shift lever is set to "P" position (A/T model) or "Neutral" position (M/T model) before checking HICAS system operation.

When CONSULT is used: 

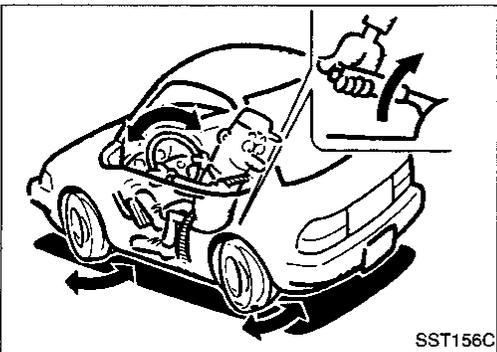
1. Have a helper sit in the driver's compartment, and raise vehicle.  
(Use a two-pole lift or a center pole lift so that the four wheels are free to rotate.)
2. Connect CONSULT unit to data link connector for CONSULT and start engine.
3. Touch "START" on CONSULT display.
4. Touch "HICAS", "ACTIVE TEST" and "SIMULATED DRIVE" in that order.
5. Touch "START" when "MAIN SIGNALS" display is reversed.



6. Touch "START."



7. While running engine, turn steering wheel more than 180° to the left and right from the neutral position. Ensure that rear wheels steer in response to rotation of steering wheel.

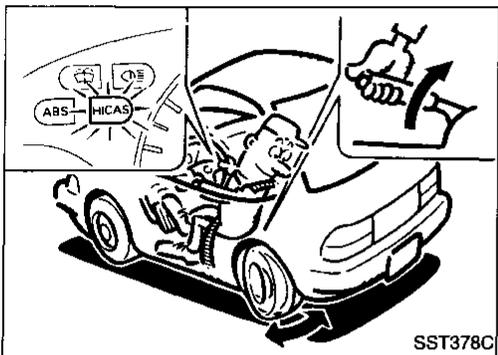
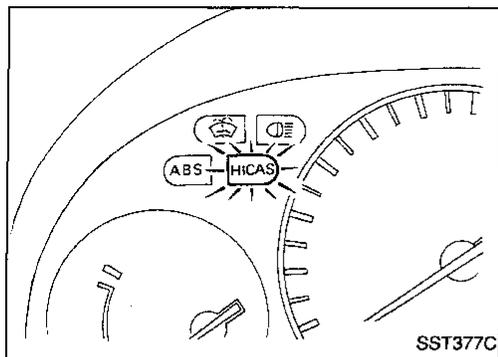


# SUPER HICAS SYSTEM

## Trouble Diagnoses (Cont'd)

When CONSULT is not used: 

1. Turn key switch "OFF".
2. Set HICAS system in self-diagnosis mode.
  - (1) Turn ignition switch "OFF".
  - (2) Set shift lever to "P" position (A/T model), or "Neutral" position (M/T model).
  - (3) Turn ignition switch "ON".
  - (4) Immediately start engine.
  - (5) Turn steering wheel from left to right (at least 20° from the neutral position) 5 times or more, then depress foot brake pedal at least 5 times all within 10 seconds after ignition switch has been turned "ON".
3. Turn steering wheel to a point approximately 30° from the neutral position, then set steering wheel back to the neutral position and check to ensure that rear wheels turn to the left and right alternately.



CI

MA

EM

LC

EF &

EC

FE

CL

MT

AT

PD

FA

RA

BR

**ST**

RS

BT

HA

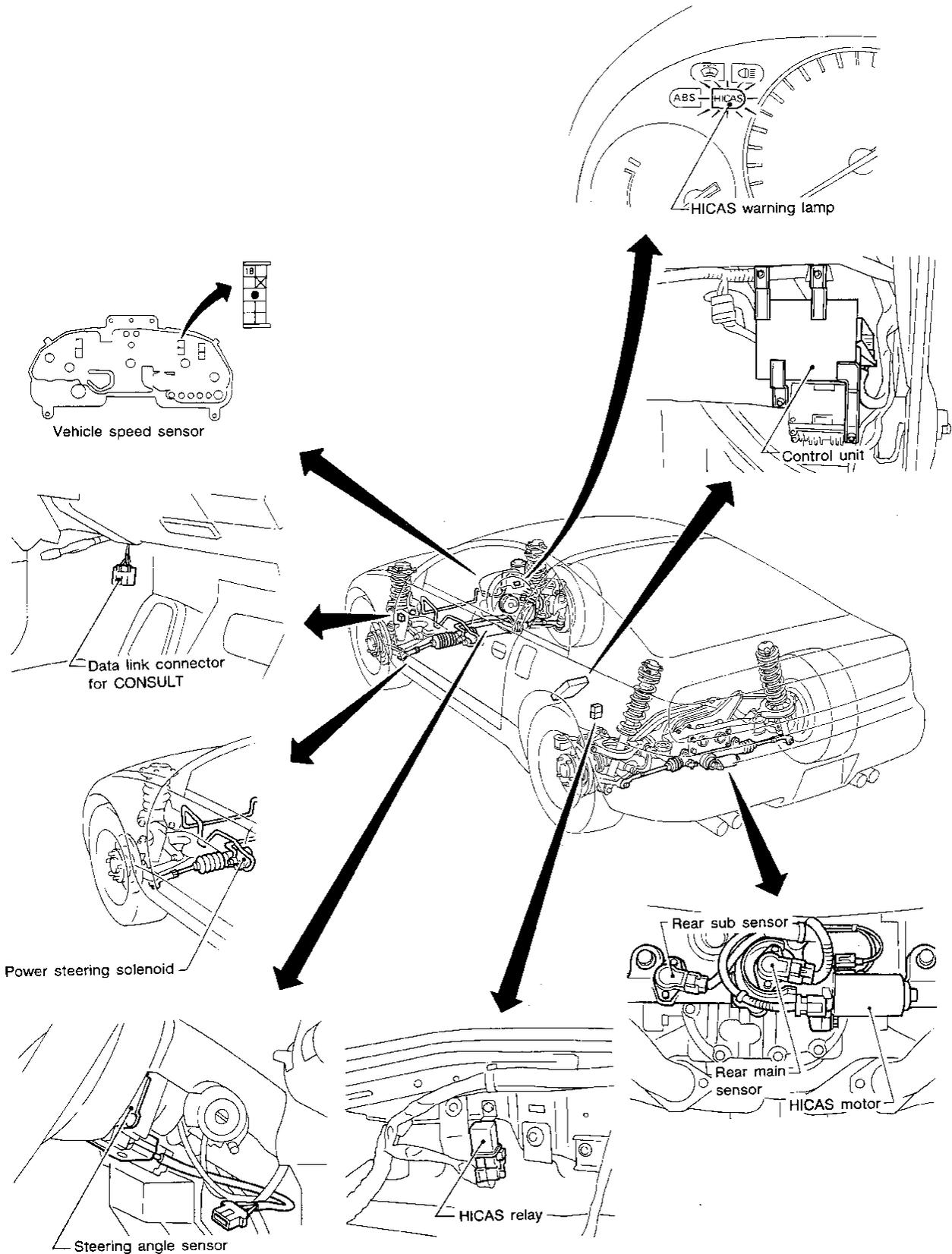
EL

IDX

# SUPER HICAS SYSTEM

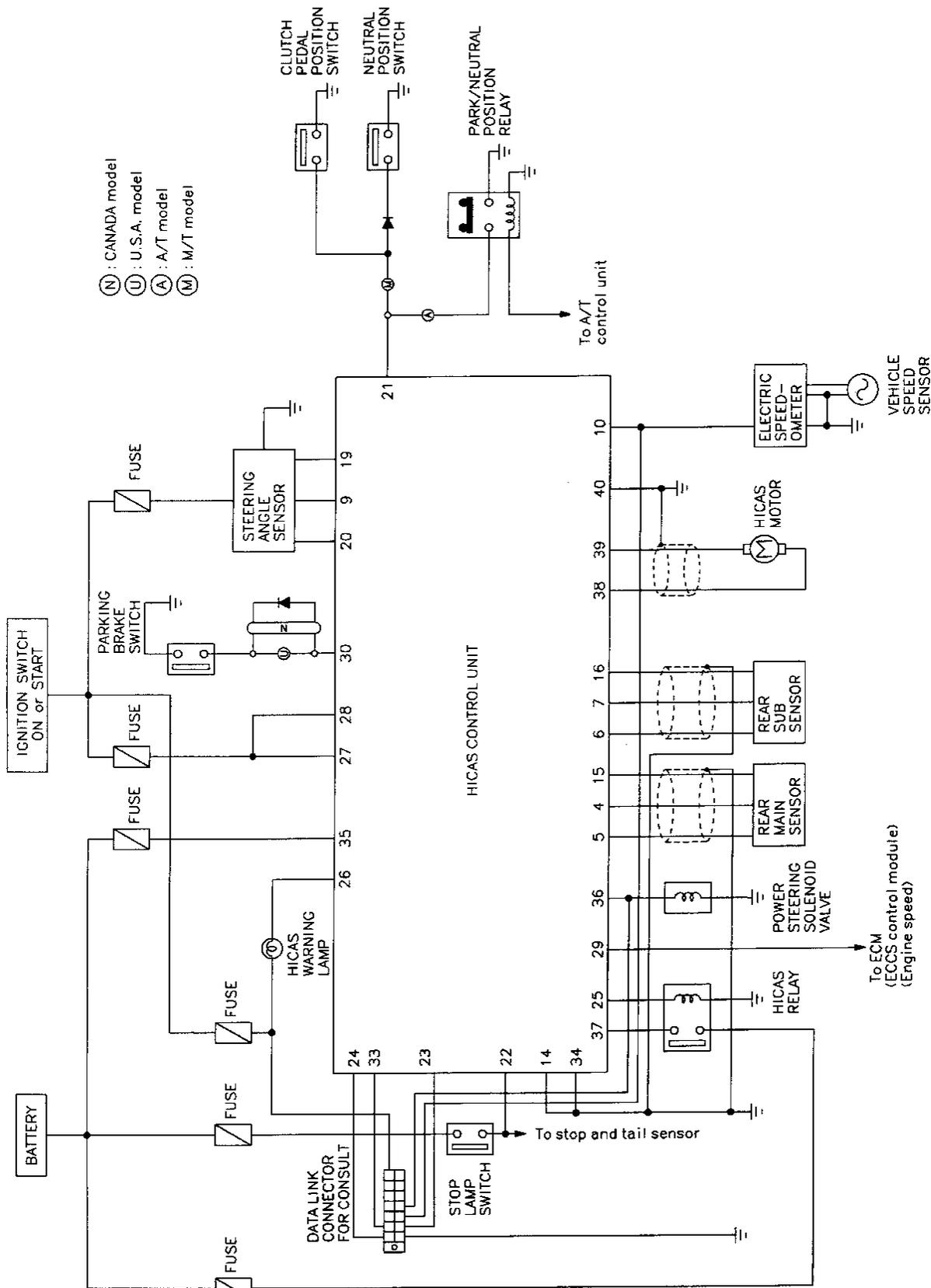
## Trouble Diagnoses (Cont'd)

### COMPONENT PARTS AND HARNESS CONNECTOR LOCATIONS



# SUPER HICAS SYSTEM

## Trouble Diagnoses (Cont'd) CIRCUIT DIAGRAM



GI

MA

EM

LC

EF &  
EC

FE

GL

MT

AT

PD

FA

RA

BR

**ST**

RS

BT

HA

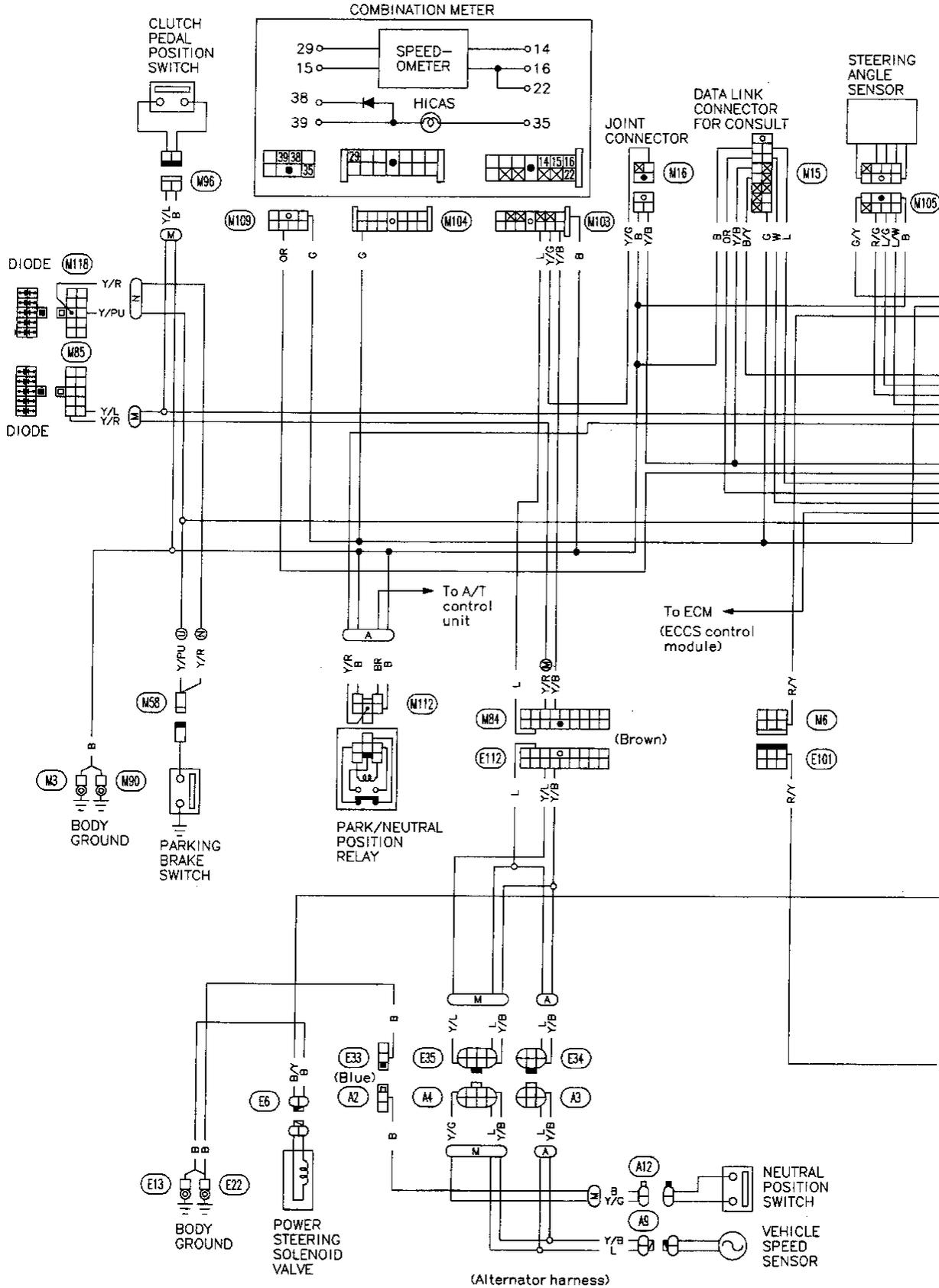
EL

IDX

# SUPER HICAS SYSTEM

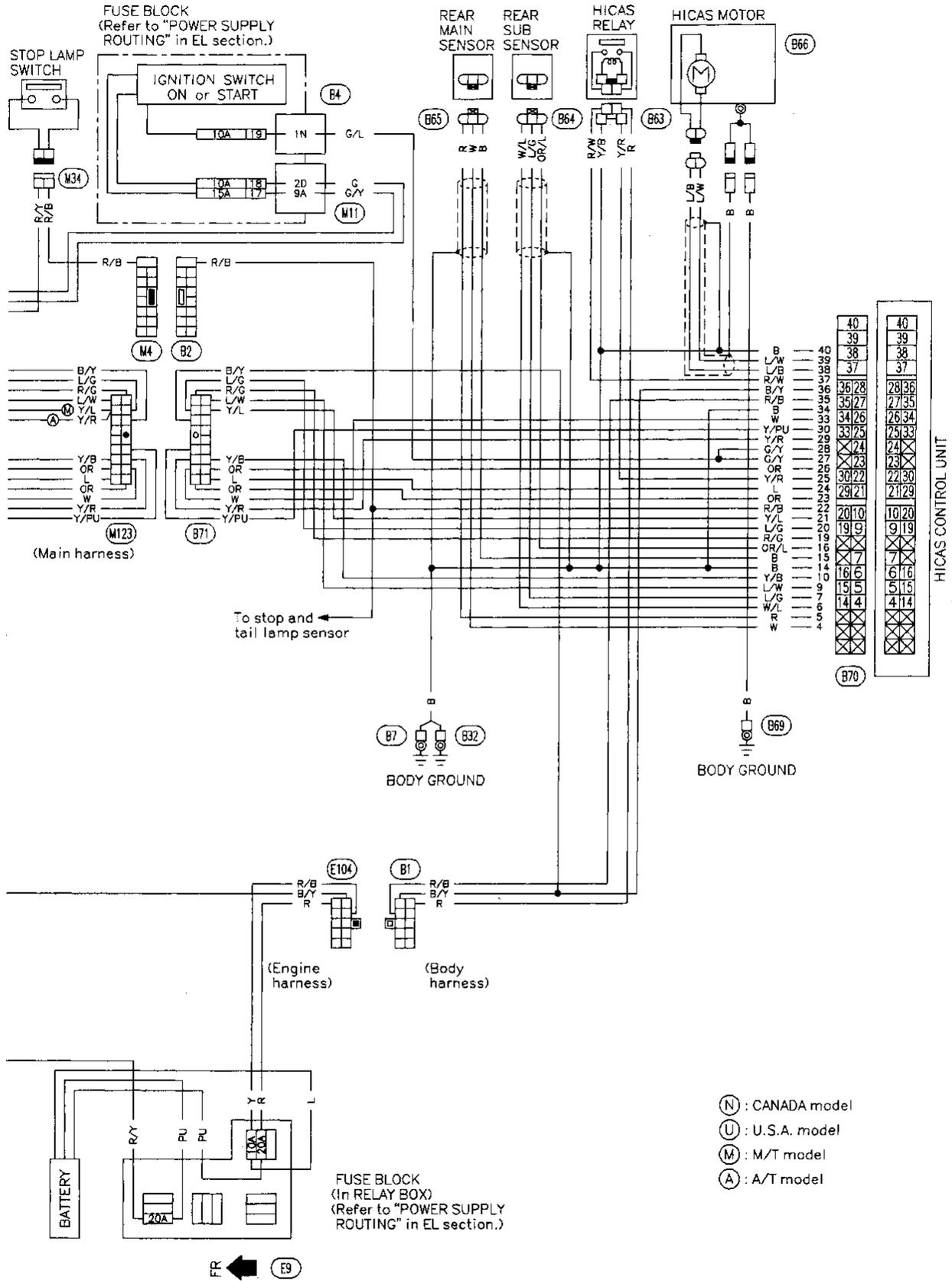
## Trouble Diagnoses (Cont'd)

### WIRING DIAGRAM



# SUPER HICAS SYSTEM

## Trouble Diagnoses (Cont'd)



GI  
MA  
EM  
LC  
EF & EC  
FE  
CL  
MT  
AT  
PD  
FA  
RA  
BR  
**ST**  
RS  
BT  
HA  
EL  
IDX

# SUPER HICAS SYSTEM

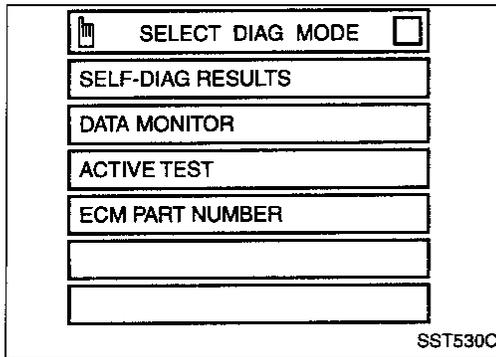
## Trouble Diagnoses (Cont'd)

### SELF-DIAGNOSIS

When CONSULT is used: 

- Start engine.
- Touch START (on CONSULT display).
- Touch HICAS.
- Touch SELF-DIAG RESULTS.

Refer to CONSULT operation manual "HICAS" for details.

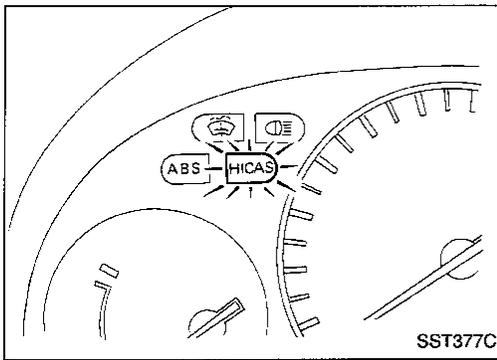


When CONSULT is not used: 

1. Input starting conditions for self-diagnosis.
  - (1) Turn ignition switch "OFF".
  - (2) Set shift lever to "P" position (A/T model), or "Neutral" position (M/T model).
  - (3) Turn ignition switch "ON".
  - (4) Immediately start engine.
  - (5) Turn steering wheel from left to right (at least 20° from the neutral position ) 5 times or more, then depress foot brake pedal at least 5 times all within 10 seconds after ignition switch has been turned "ON".
2. Input self-diagnosis item.
  - (1) Depress and release foot brake pedal.
  - (2) Turn steering wheel from left to right (at least 20°) from the neutral position.
  - (3) (M/T model)  
Depress clutch pedal and move gear shift lever to any position other than Neutral and return to Neutral. Release clutch pedal. (A/T model)  
Disengage and engage parking brake lever. Move shift lever to any position other than Neutral or Parking and return to Parking.
  - (4) Move car at least 3 meters (10 ft) forward and proceed at an indicated speed of at least 2 km/h (1 MPH) in self-diagnosis mode.

# SUPER HICAS SYSTEM

## Trouble Diagnoses (Cont'd)



3. The self-diagnosis mode will then appear in the "HICAS" warning lamp.

**When all systems are normal:**

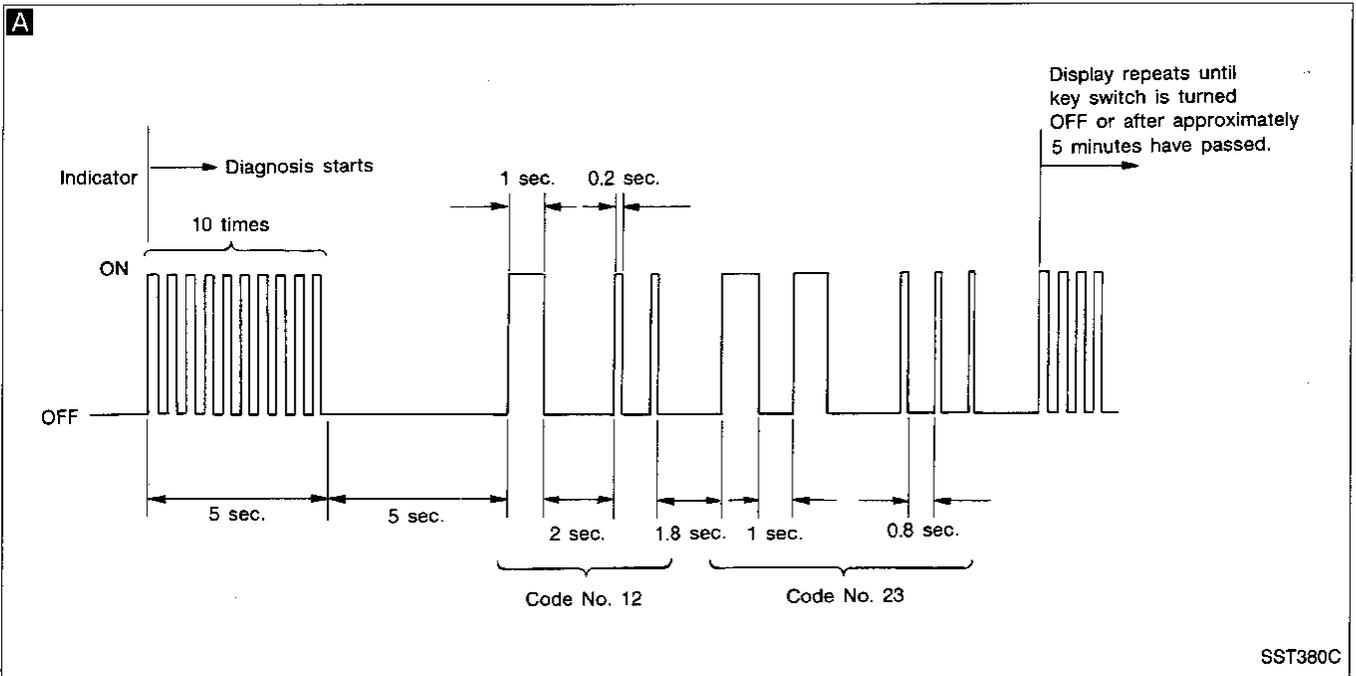
HICAS warning lamp flashes at 0.25-second intervals.

**When there is a system malfunction:**

Example: In case of code No. 12 (Motor power supply) and code No. 23 (Steering neutral position)

**A** If past fail-safe data is stored in memory, only troubled items will be displayed in the illustrated sequence, and this display will be repeated again.

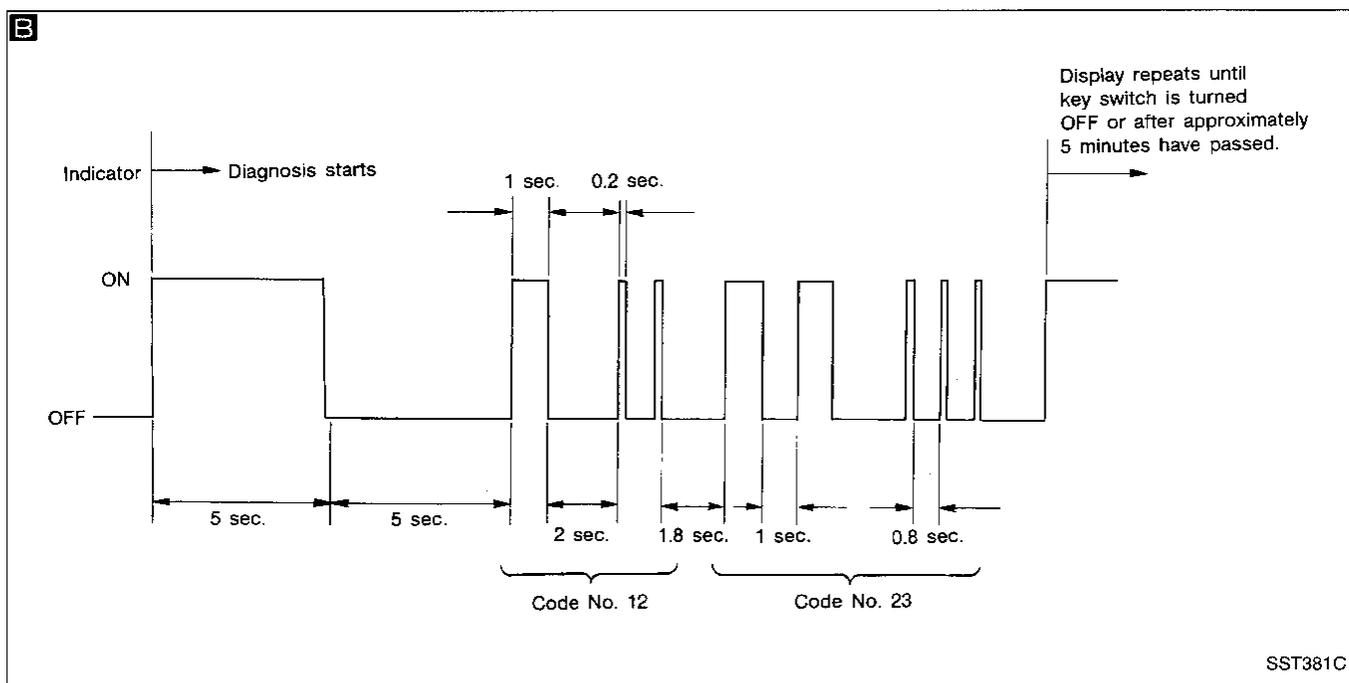
- Tens digit code: 1 sec. ON (1 sec. OFF)
- Units digit code: 0.2 sec. ON (0.8 sec. OFF)
- Pause between tens digit and units digit: 2 sec. OFF
- Code change: 1.8 sec. OFF



**B** If fail-safe function is currently being activated for the first time, and if no past fail-safe history data is stored in the memory, only troubled items will be displayed in the illustrated sequence, and this display will be repeated again.

# SUPER HICAS SYSTEM

## Trouble Diagnoses (Cont'd)



### CAUTION:

When steering angle sensor Error in self-diagnosis (Code: "No neutral signal (\*b)") is detected, check output of steering angle sensor.

If output is not good, replace steering angle sensor.

If output is OK, disconnect connector of HICAS control unit and connect it surely. Then perform SELF-DIAGNOSIS again to check whether steering angle sensor Error is detected or not.

Self-diagnosis code and diagnosed part indicated by flashing of HICAS warning lamp

Self-diagnosis code No.	Diagnosed part	Self-diagnosis code No.	Diagnosed part
11	HICAS control unit	24	Rear main sensor input is not present.
12	HICAS motor power supply is not present.	25	Rear sub sensor input is not present.
13	HICAS motor output is not present.	31	Parking brake input is not present.
21	Vehicle speed signal is not present.	32	Inhibitor switch (A/T) or neutral and clutch switch (M/T) input is not present.
22	Steering angle sensor (steering angle signal) is not present.	33	Engine speed signal is not present.
23	Steering angle sensor (steering neutral signal) is not present.		

### How to end the self-diagnosis mode

The self-diagnosis mode is ended by performing one of the following:

- Turning ignition switch "OFF".
- After self-diagnosing has been operated for approximately 5 minutes, the self-diagnosis mode will end automatically.
- Running a vehicle at speed of 15 km/h (9 MPH) or over.

The self-diagnostic results will remain in memory of HICAS control unit.

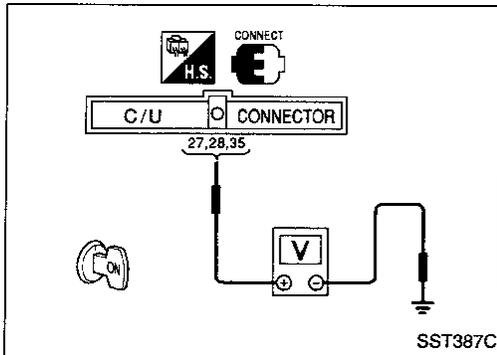
# SUPER HICAS SYSTEM

## Trouble Diagnoses (Cont'd)

### How to erase self-diagnostic results

The self-diagnostic results are erased when one of the following is performed:

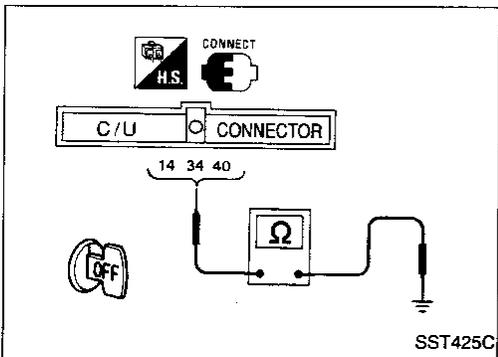
- Disconnecting battery terminal for more than 30 minutes.
- Touching "ERASE" on CONSULT display of SELF-DIAGNOSTIC RESULTS.



### CONTROL UNIT POWER SUPPLY AND GROUND CIRCUIT CHECK

#### Control unit power supply

Terminals	Battery voltage existence
⑲ - Ground ⑳ - Ground ㉓ - Ground	Yes



#### Control unit ground circuit

Terminals	Continuity
⑰ - Ground ⑳ - Ground ㉑ - Ground	Yes

GI

MA

EM

LC

EF &  
EC

FE

CL

MT

AT

PD

FA

RA

BR

**ST**

RS

BT

HA

EL

IDX

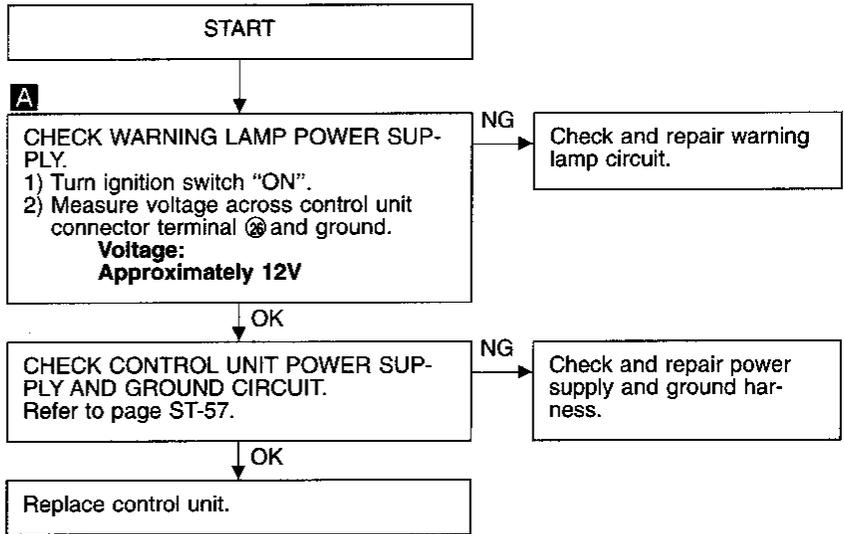
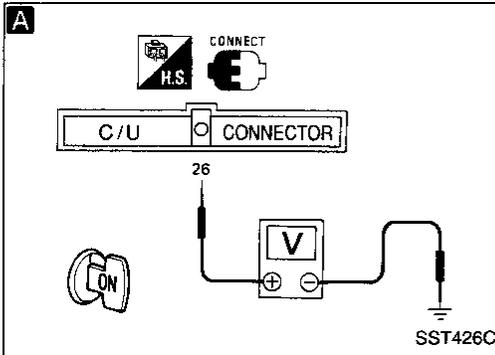
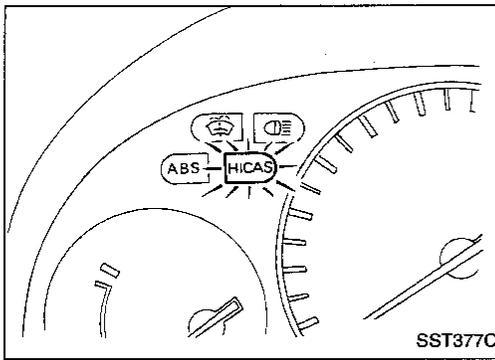
# SUPER HICAS SYSTEM

## Trouble Diagnoses (Cont'd)

### DIAGNOSTIC PROCEDURE 1

#### SYMPTOM:

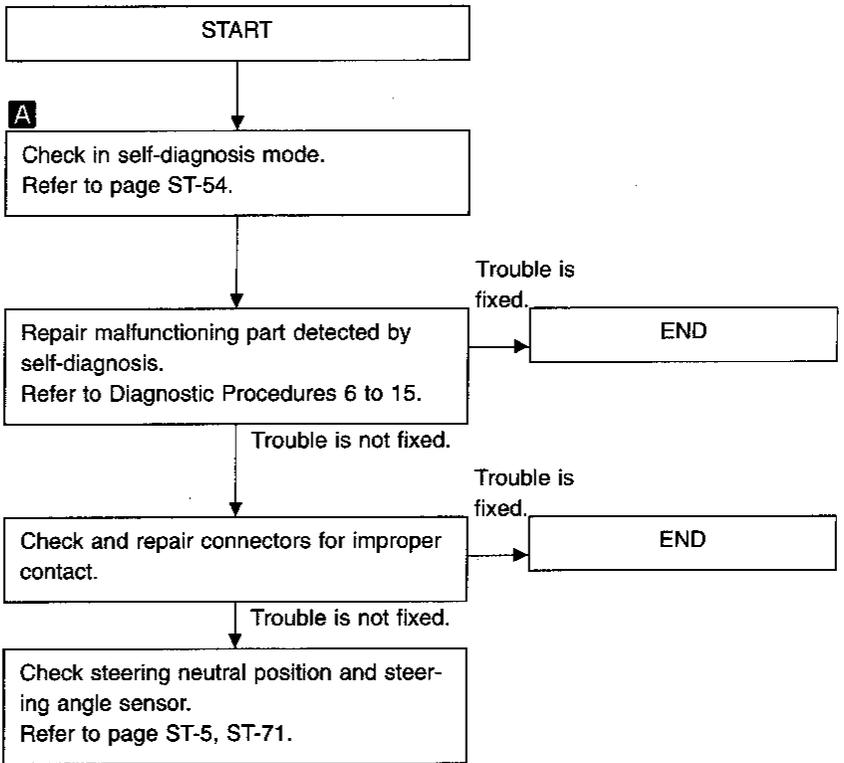
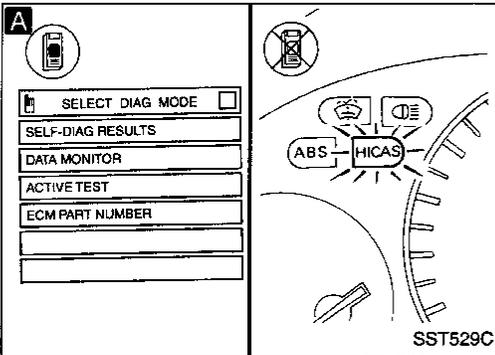
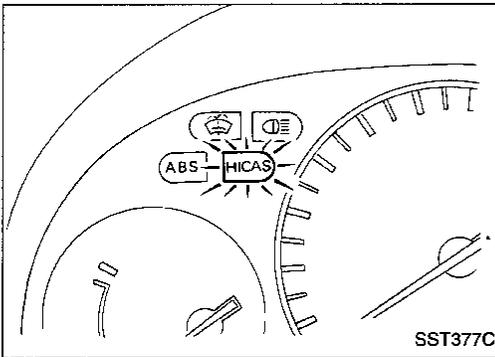
No warning lamp comes on when ignition switch is turned "ON".



### DIAGNOSTIC PROCEDURE 2

#### SYMPTOM (A):

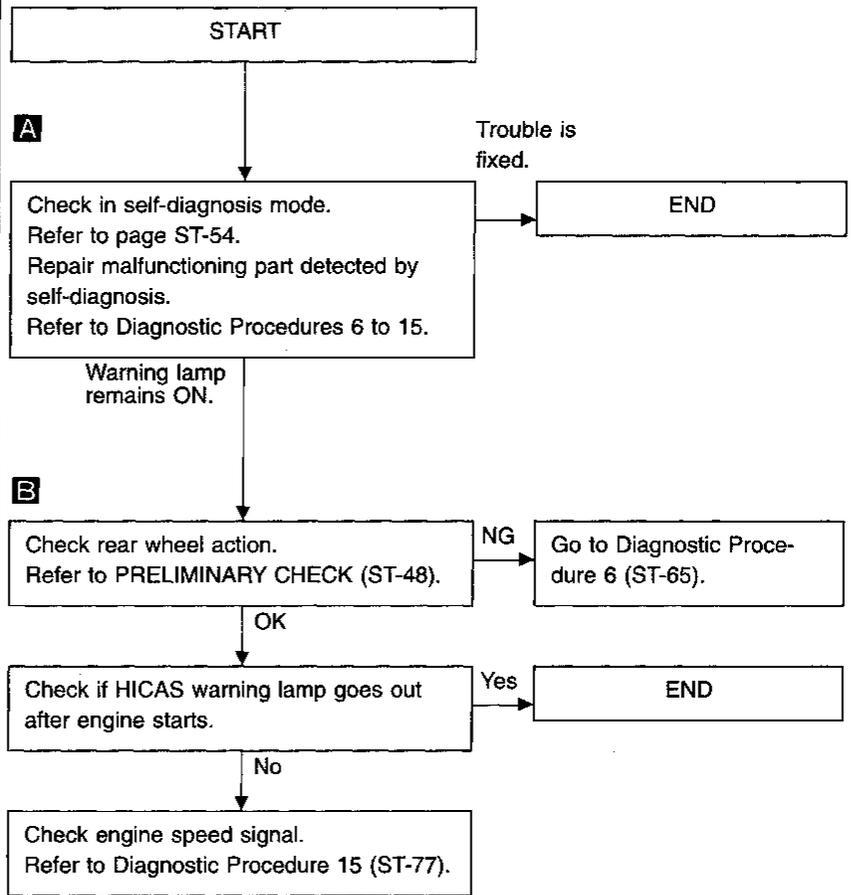
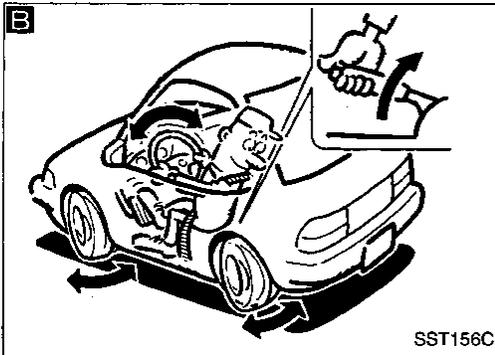
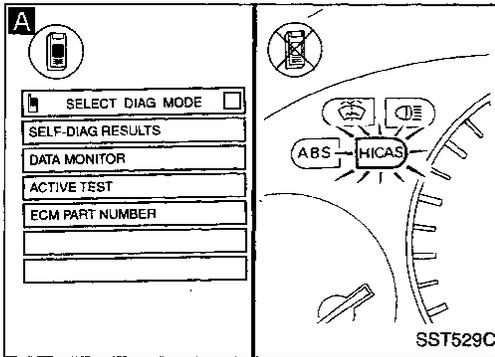
Warning lamp comes on during operation.



# SUPER HICAS SYSTEM

## Trouble Diagnoses (Cont'd)

**SYMPTOM (B):**  
Warning lamp stays on after engine starts.



GI  
MA  
EM  
LC  
EF & EC  
FE  
CL  
MT  
AT  
PD  
FA  
RA  
BR  
ST  
RS  
BT  
HA  
EL  
IDX

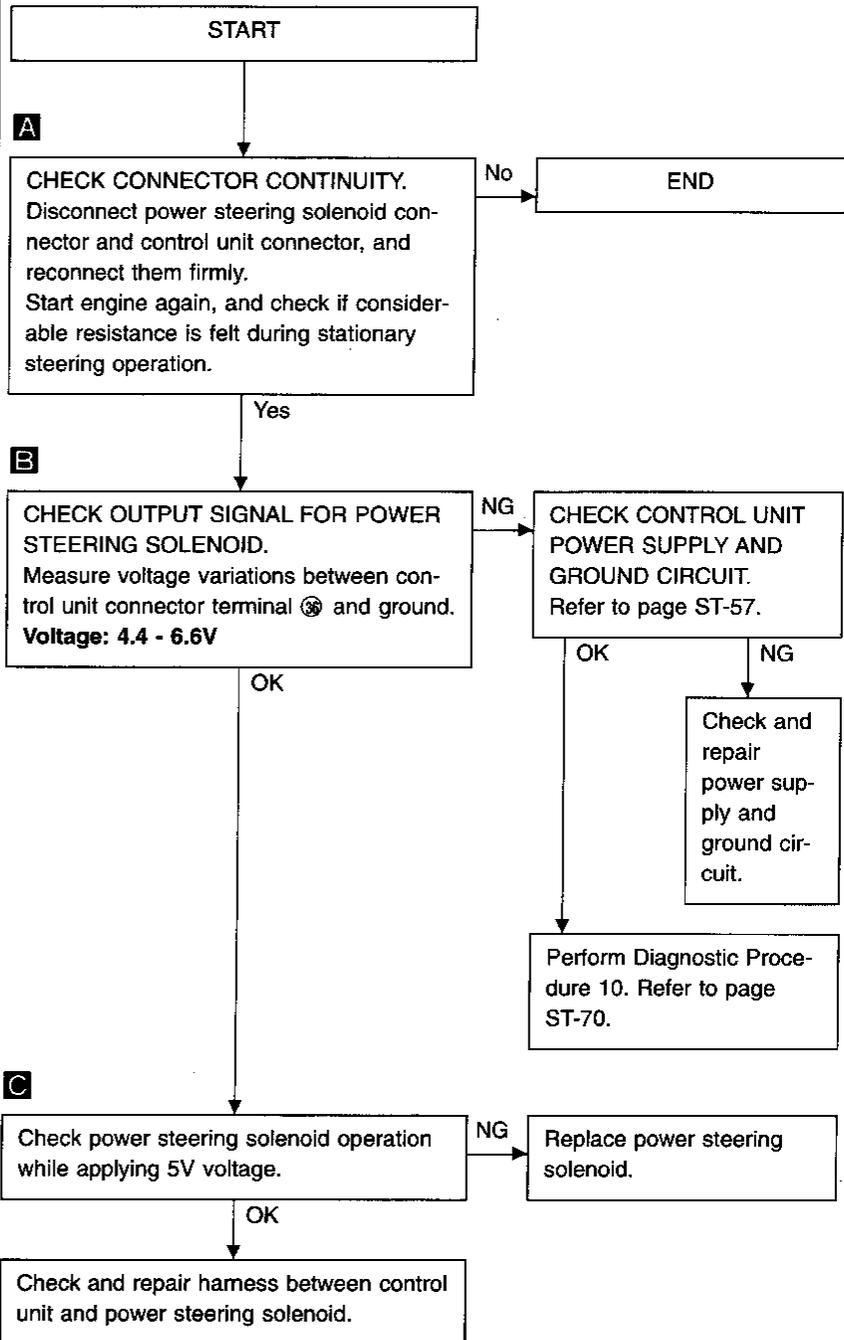
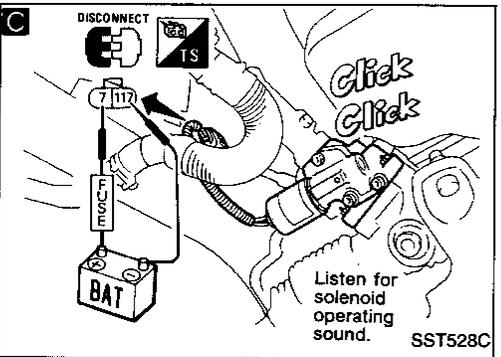
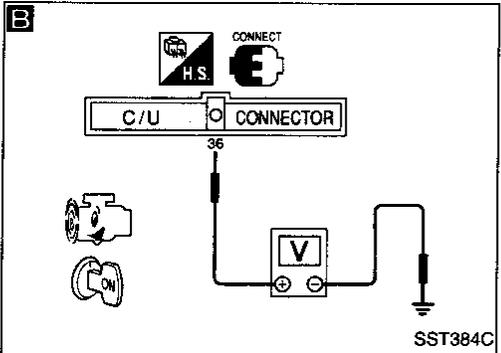
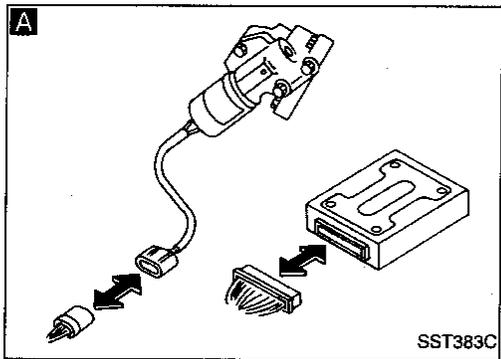
# SUPER HICAS SYSTEM

## Trouble Diagnoses (Cont'd)

### DIAGNOSTIC PROCEDURE 3

#### SYMPTOM:

Considerable resistance is felt during stationary steering operation.



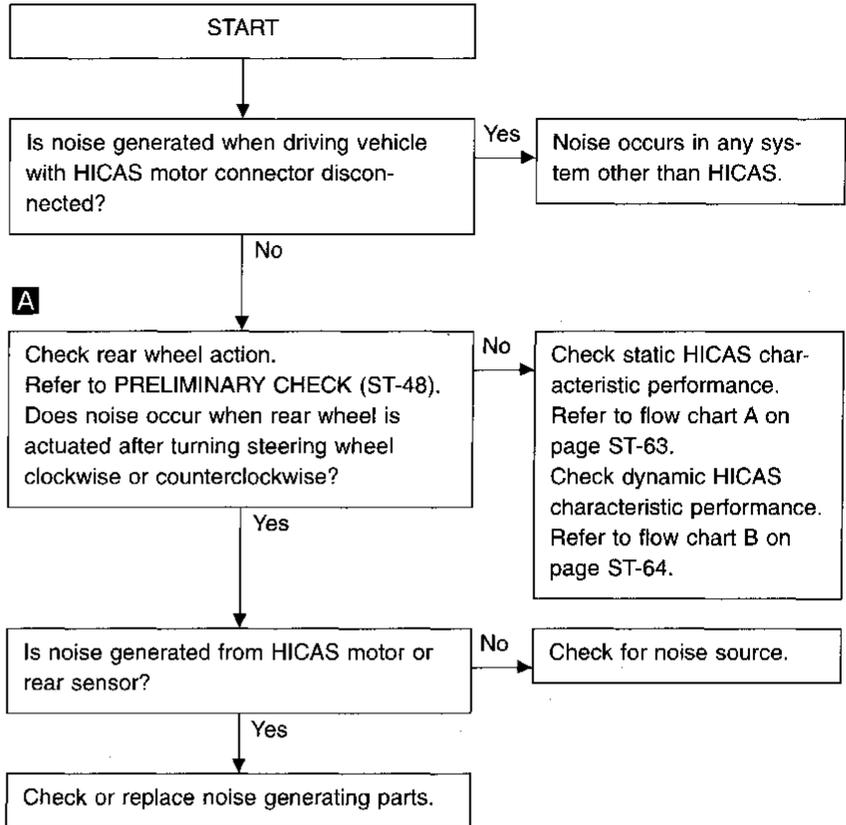
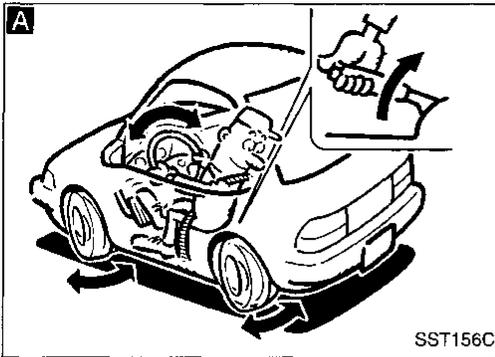
# SUPER HICAS SYSTEM

## Trouble Diagnoses (Cont'd)

### DIAGNOSTIC PROCEDURE 4

#### SYMPTOM:

Abnormal noise occurs.



GI

MA

EM

LC

EF &  
EC

FE

CL

MT

AT

PD

FA

RA

BR

**ST**

RS

BT

HA

EL

IDX

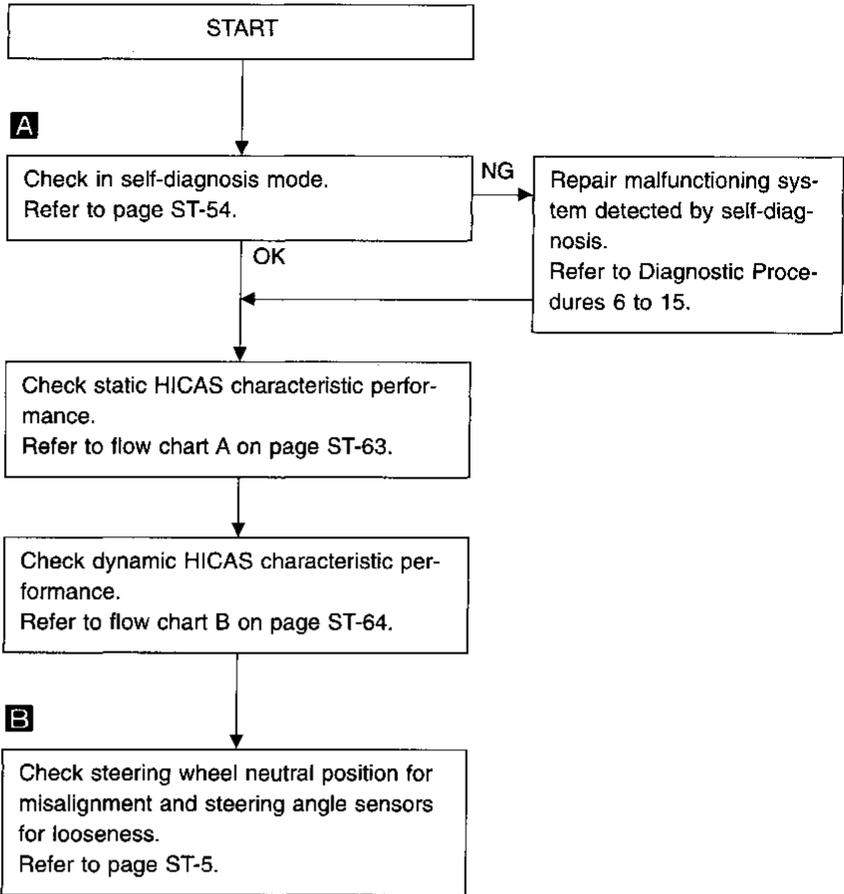
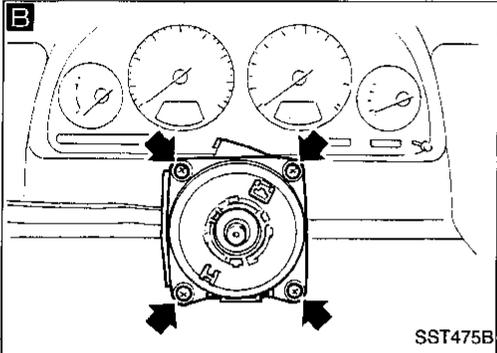
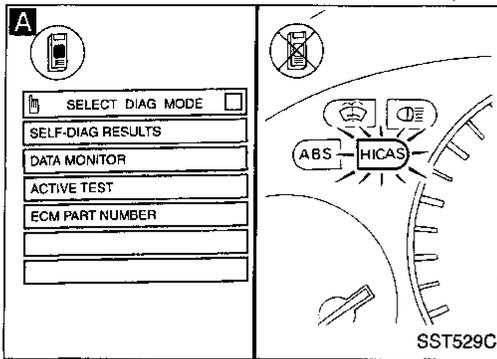
# SUPER HICAS SYSTEM

## Trouble Diagnoses (Cont'd)

### DIAGNOSTIC PROCEDURE 5

#### SYMPTOM:

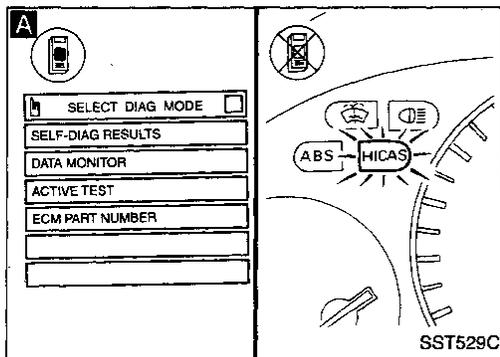
Other abnormalities



# SUPER HICAS SYSTEM

## Trouble Diagnoses (Cont'd)

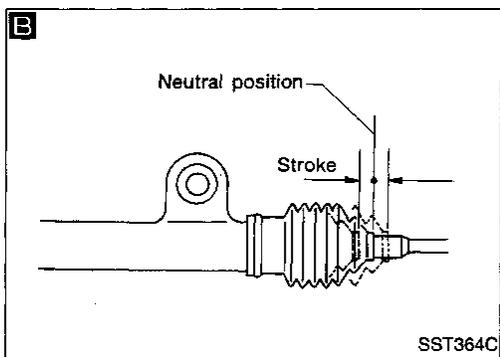
### A. Static HICAS characteristic performance check



START

**A**

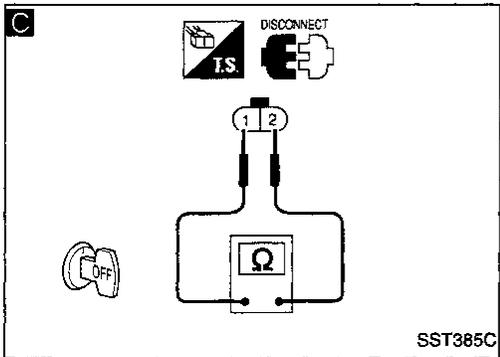
Set CONSULT in ACTIVE TEST mode. — OR —  
Set self-diagnosis mode. Refer to page ST-54.



**B**

**CHECK ACTUATOR STROKES.**  
Turn steering wheel approximately 180° to the left or right.  
**Each stroke from neutral position:**  
**Approximately 3 mm (0.12 in)**

OK → END



**C**

**CHECK RESISTANCE OF HICAS MOTOR.**  
1) Disconnect HICAS motor connector.  
2) Measure resistance between connector terminals ① and ②.  
**Resistance:**  
**Approximately 0.2 - 2.0Ω**

NG → Replace HICAS motor.

OK

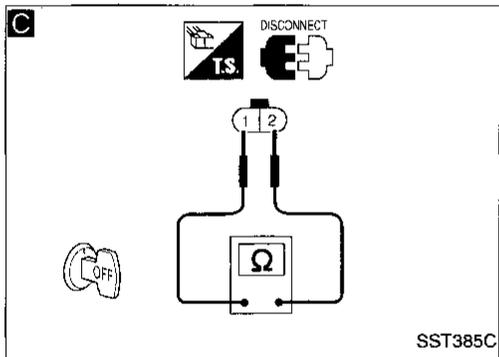
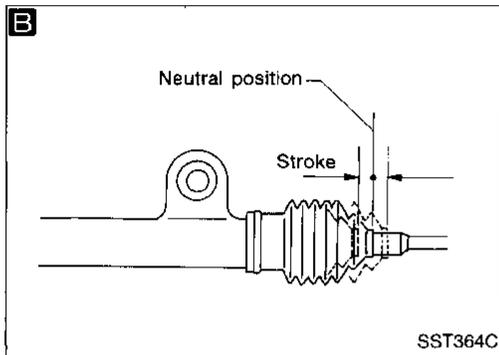
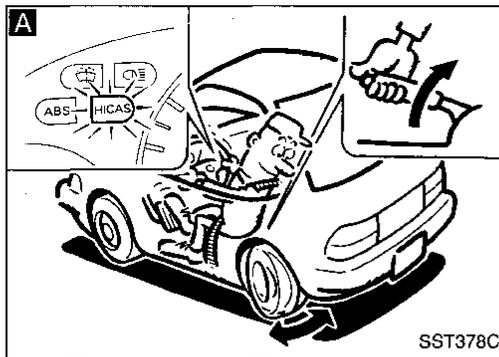
**CHECK REAR SENSOR.**  
Go to Diagnostic Procedure 12 (ST-72).

GI  
MA  
EM  
LC  
EF & EC  
FE  
CL  
MT  
AT  
PD  
FA  
RA  
BR  
ST  
RS  
BT  
HA  
EL  
IDX

# SUPER HICAS SYSTEM

## Trouble Diagnoses (Cont'd)

### B. Dynamic HICAS characteristic performance check



START

Set in self-diagnosis mode.  
Refer to page ST-54.

**A**  
CHECK REAR WHEELS FOR PROPER MOVEMENT.  
Rear wheels will turn to the left and right periodically if steering wheel is returned to neutral after being turned by approximately 30° in either direction.

**B**  
CHECK ACTUATOR STROKES.  
Each stroke from neutral position:  
More than 1.9 mm (0.075 in)

OK → END

NG

**C**  
CHECK RESISTANCE OF HICAS MOTOR.  
1) Disconnect HICAS motor connector.  
2) Measure resistance between connector terminals ① and ②.  
**Resistance:**  
Approximately 2Ω

NG → Replace HICAS motor.

OK

CHECK REAR SENSOR.  
Go to Diagnostic Procedure 12 (ST-72).

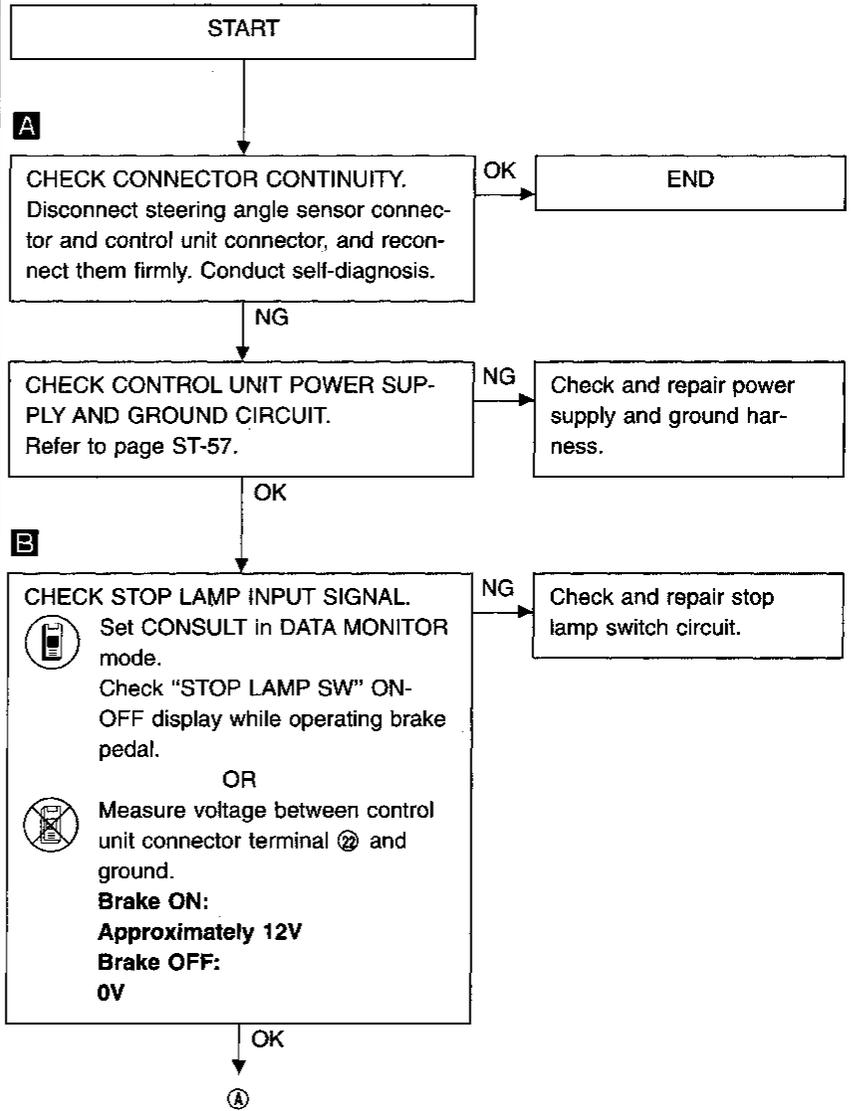
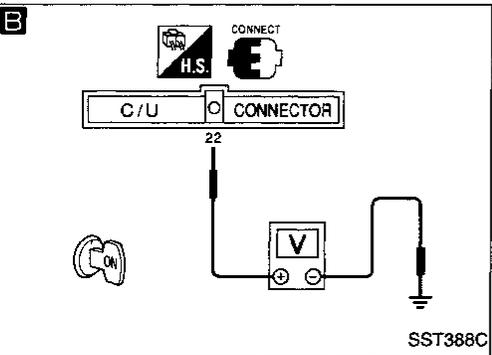
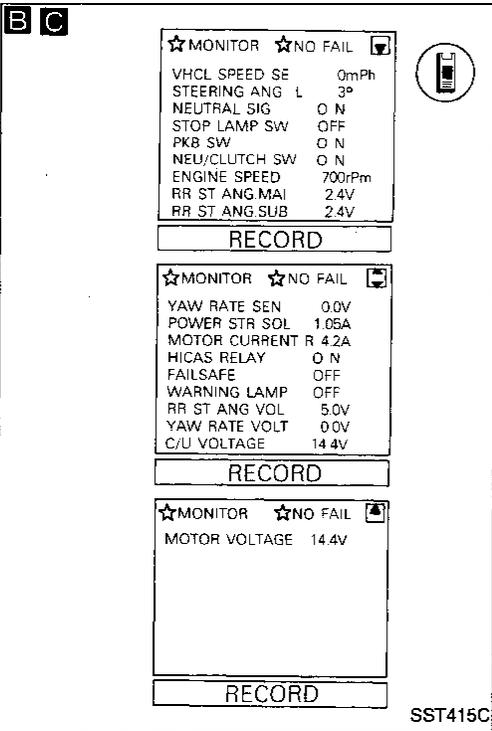
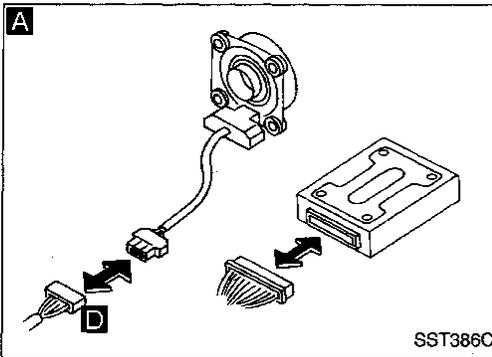
# SUPER HICAS SYSTEM

## Trouble Diagnoses (Cont'd)

### DIAGNOSTIC PROCEDURE 6

#### SYMPTOM:

System is not set in self-diagnosis mode.



GI

MA

EM

LC

EF & EC

FE

CL

MT

AT

PD

FA

RA

BR

ST

RS

BT

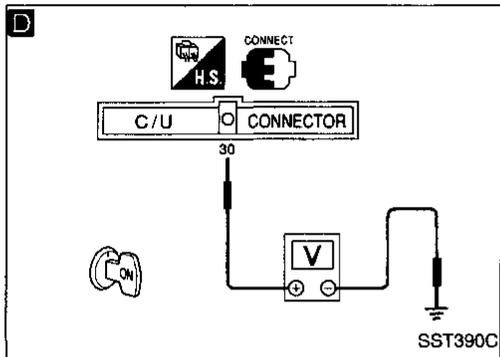
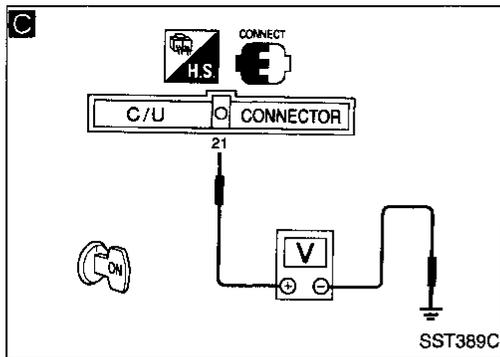
HA

EL

IDX

# SUPER HICAS SYSTEM

## Trouble Diagnoses (Cont'd)



**C**

**CHECK PARK/NEUTRAL POSITION INPUT SIGNAL.**

- Set CONSULT in DATA MONITOR mode. Check "NEU/CLUTCH SW" ON-OFF display while operating shift lever.
- OR
- Measure voltage between control unit connector terminal ② and ground.
  - "Neutral" position (M/T): 0V
  - "P" and "N" position (A/T): Approximately 4.8V

NG → Check and repair neutral position switch (M/T) or park/neutral position switch (A/T) circuit. Refer to "Position Switch Check" in MT section or "Electrical Components Inspection" of TROUBLE DIAGNOSES in AT section.

**C**

**CHECK CLUTCH INPUT SIGNAL. (M/T model)**

- Set CONSULT in DATA MONITOR mode. Check "NEU/CLUTCH SW" ON-OFF display while operating clutch pedal.
- OR
- Measure voltage between control unit connector terminal ② and ground.
  - Clutch ON: 0V
  - Clutch OFF: Approximately 4.8V

NG → Check and repair clutch switch circuit.

**D**

**CHECK PARKING BRAKE INPUT SIGNAL.**

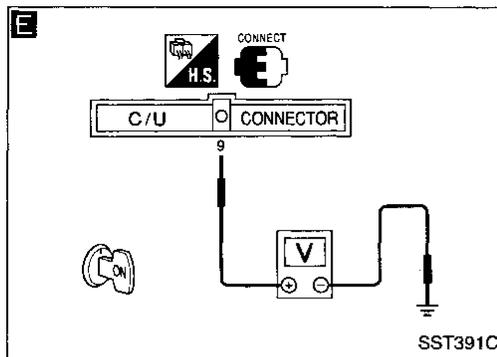
- Set CONSULT in DATA MONITOR mode. Check "PKB SW" ON-OFF display while operating parking brake lever.
- OR
- Measure voltage between control unit connector terminal ③ and ground.
  - Parking brake ON: 0V
  - Parking brake OFF: Approximately 5V

NG → Check and repair parking brake switch circuit.

OK  
②

# SUPER HICAS SYSTEM

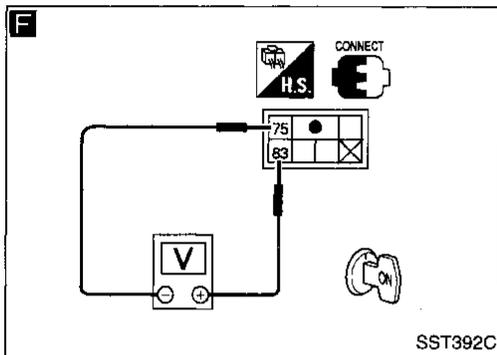
## Trouble Diagnoses (Cont'd)



**E** CHECK STEERING NEUTRAL POSITION SENSOR INPUT SIGNAL.  
 Measure voltage between control unit connector terminal ⑨ and ground.  
**Steering wheel neutral position:**  
**Approximately 5V**

OK → Replace control unit.

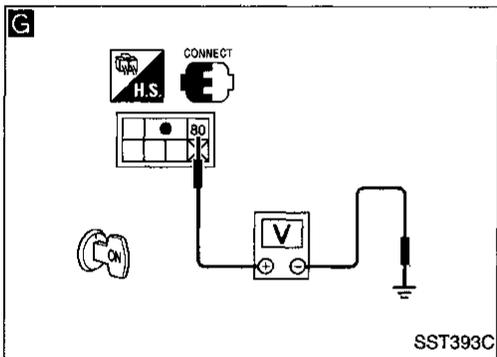
NG ↓



**F** CHECK STEERING ANGLE SENSOR OUTPUT SIGNAL.  
 Check that steering neutral output is present when steering wheel is turned to the left and right at least 20° from the neutral position.  
**Neutral position:**  
**Approximately 5V**  
**When turned at least 20°:**  
**0V**

OK → Repair or replace harness between control unit and steering angle sensor.

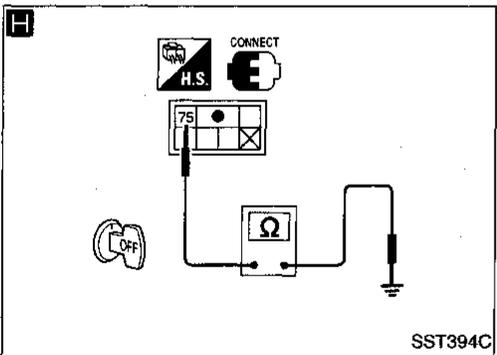
NG ↓



**G** CHECK STEERING ANGLE SENSOR POWER SUPPLY.  
 1) Turn ignition switch "ON".  
 2) Measure voltage across steering angle sensor connector terminal IGN and ground.  
**Voltage:**  
**Approximately 12V**

OK → Replace steering angle sensor.

NG ↓



**H** CHECK STEERING ANGLE SENSOR GROUND CIRCUIT.  
 Check continuity between steering angle sensor terminal GND and body ground.  
**Continuity should exist.**

OK →

NG ↓

Check steering angle sensor power supply and ground circuit.

GI  
 MA  
 EM  
 LC  
 EF & EC  
 FE  
 CL  
 MT  
 AT  
 PD  
 FA  
 RA  
 BR  
**ST**  
 RS  
 BT  
 HA  
 EL  
 IDX

# SUPER HICAS SYSTEM

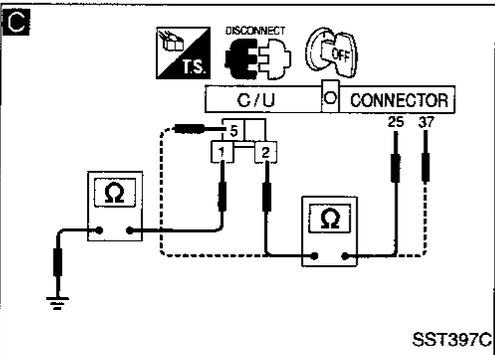
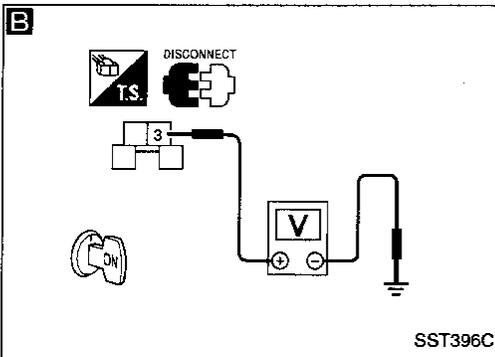
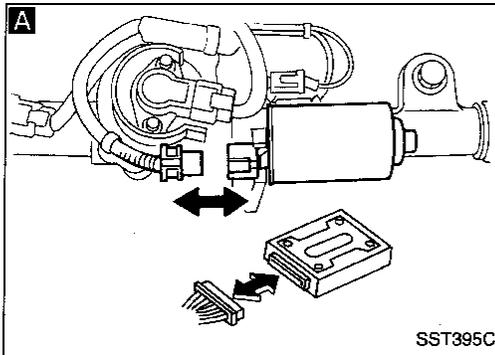
## Trouble Diagnoses (Cont'd)

### DIAGNOSTIC PROCEDURE 7

#### SYMPTOM:

Control unit is abnormal. (Code No. 11)

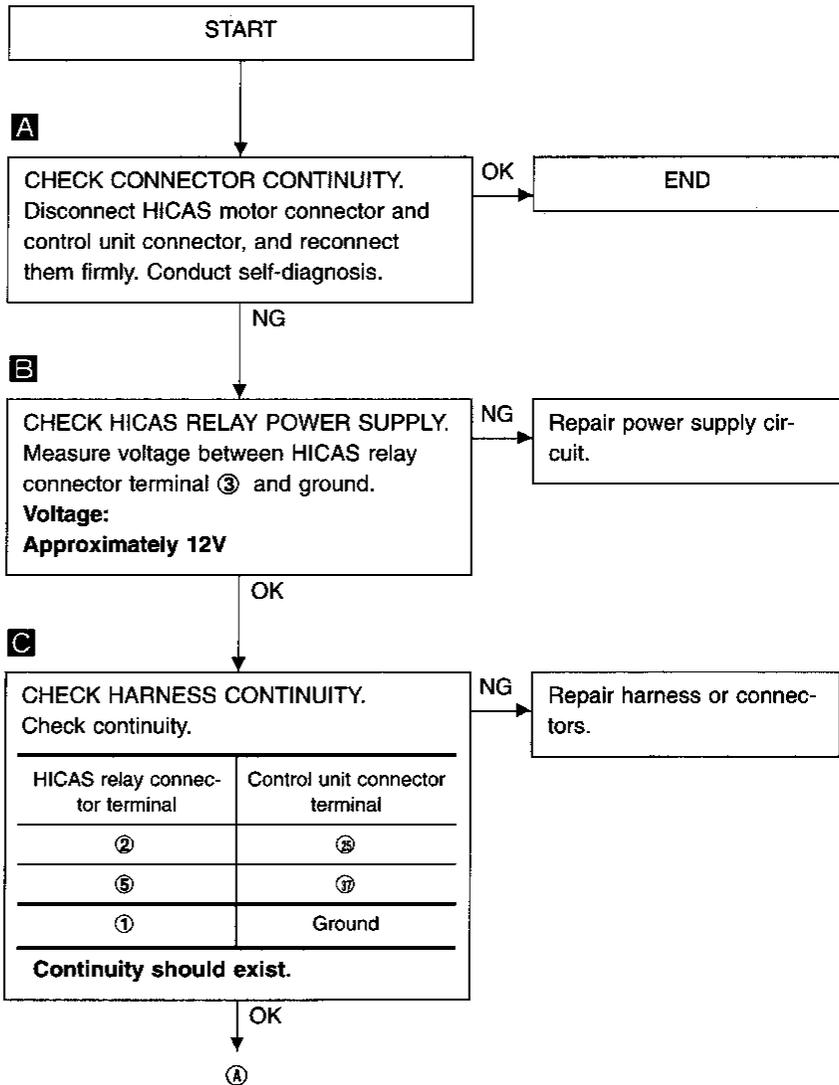
Replace control unit if it is determined abnormal by self-diagnosis.



### DIAGNOSTIC PROCEDURE 8

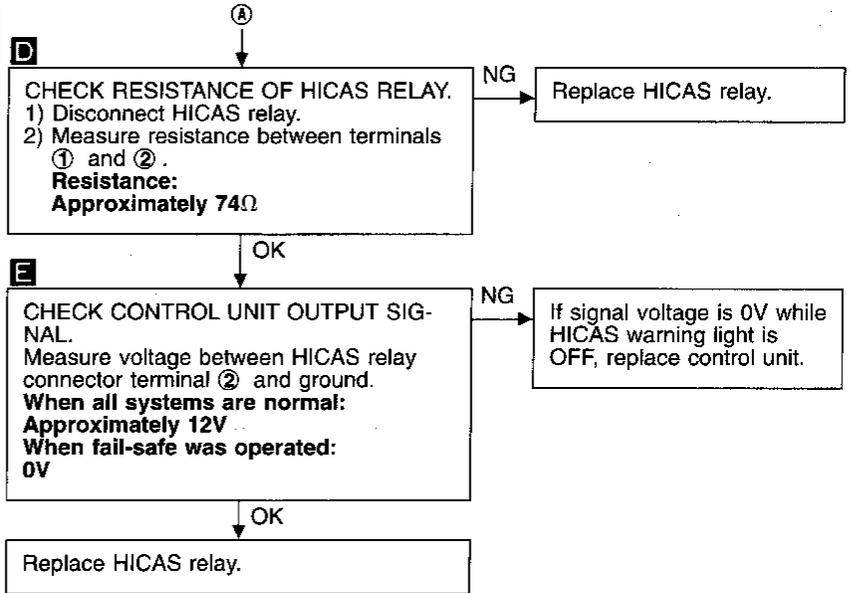
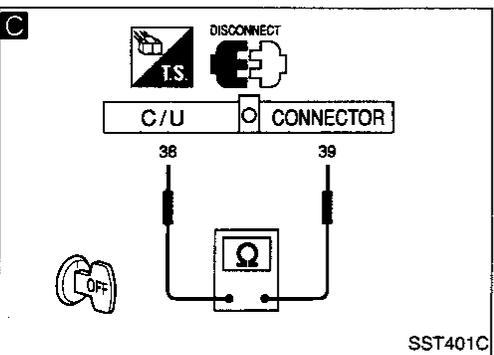
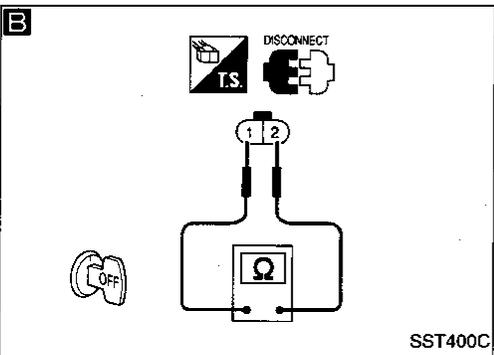
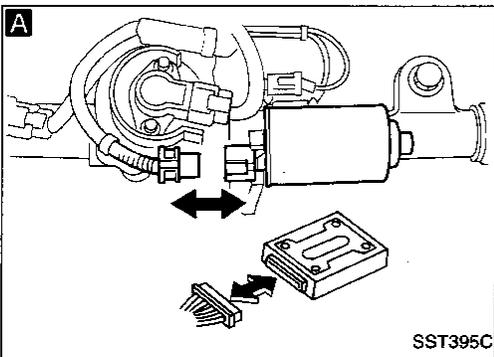
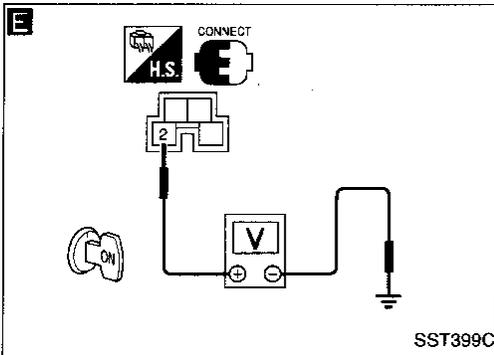
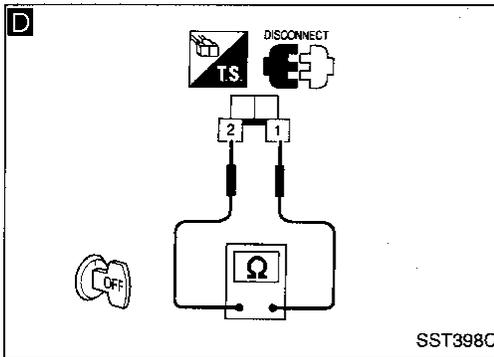
#### SYMPTOM:

HICAS motor power supply is not present. (Code No. 12)



# SUPER HICAS SYSTEM

## Trouble Diagnoses (Cont'd)



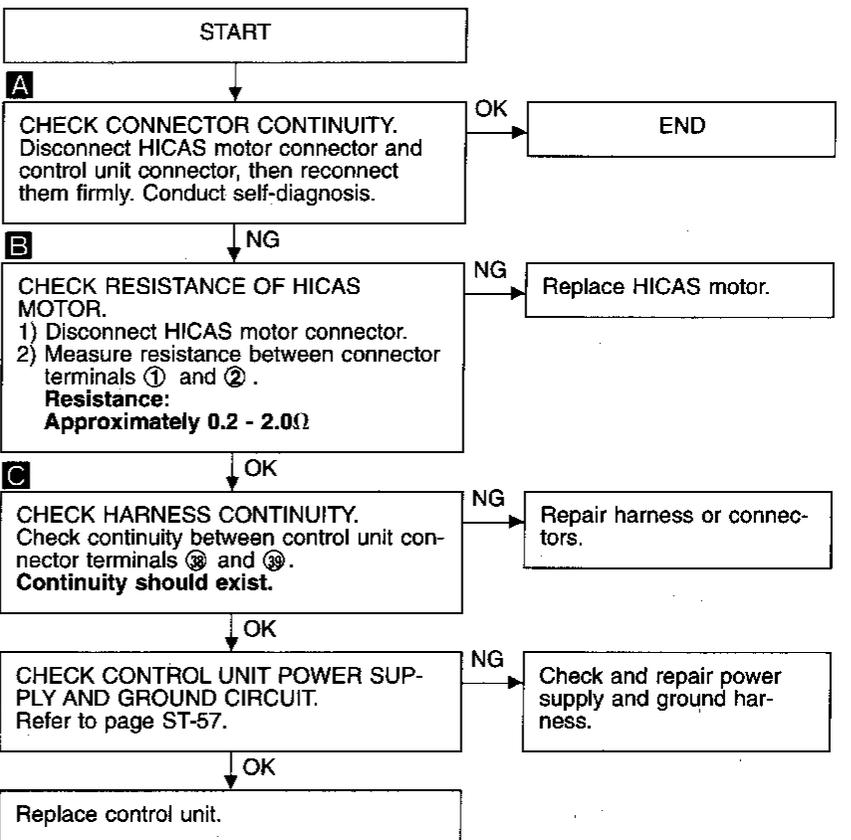
### DIAGNOSTIC PROCEDURE 9

#### SYMPTOM:

HICAS motor output is not present. (Code No. 13)

#### CAUTION:

If "MOTOR LOCK" is displayed on CONSULT, replace actuator assembly.



GI

MA

EM

LC

EF &  
EC

FE

CL

MT

AT

PD

FA

RA

BR

ST

RS

BT

HA

EL

IDX

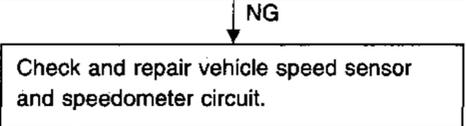
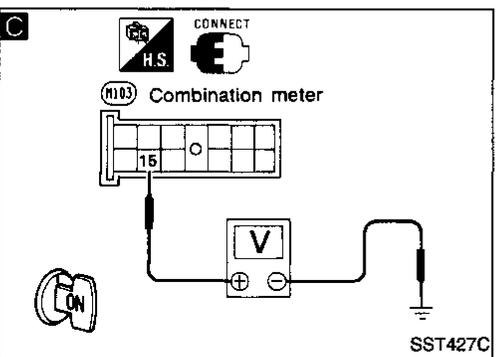
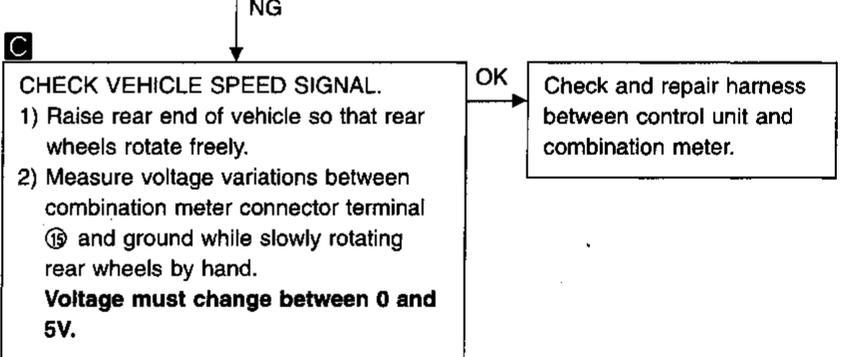
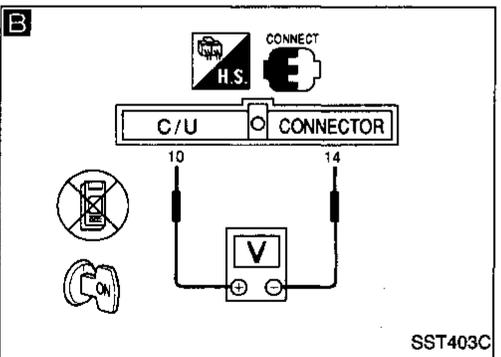
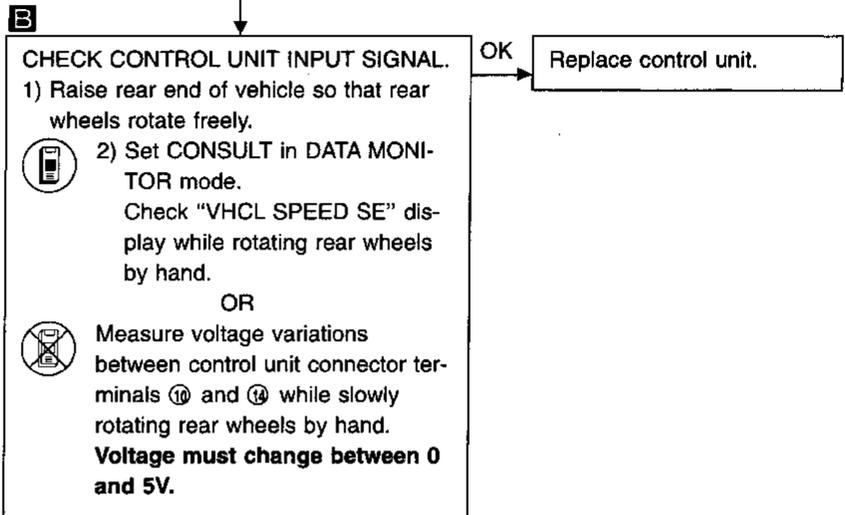
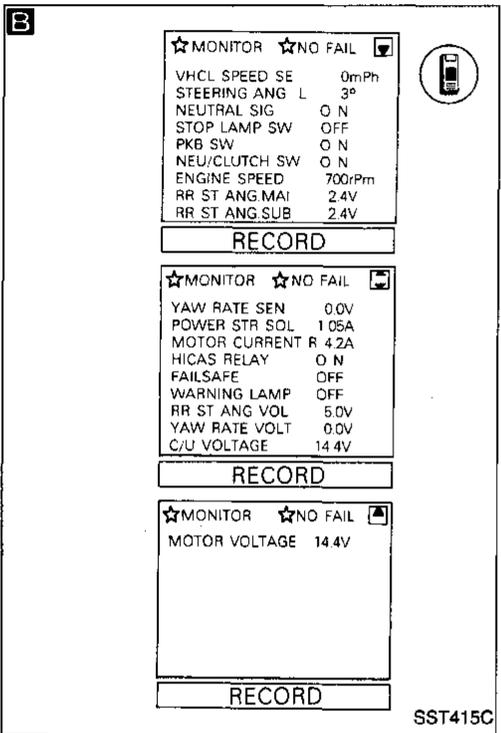
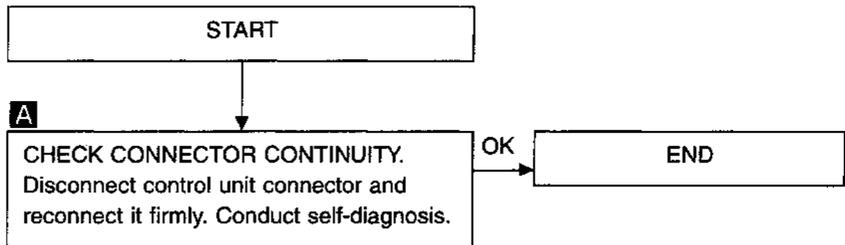
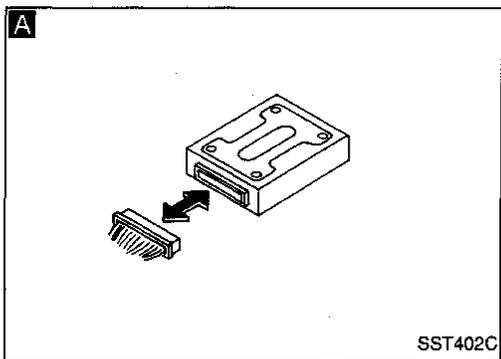
# SUPER HICAS SYSTEM

## Trouble Diagnoses (Cont'd)

### DIAGNOSTIC PROCEDURE 10

#### SYMPTOM:

Vehicle speed signal is not present. (Code No. 21)



# SUPER HICAS SYSTEM

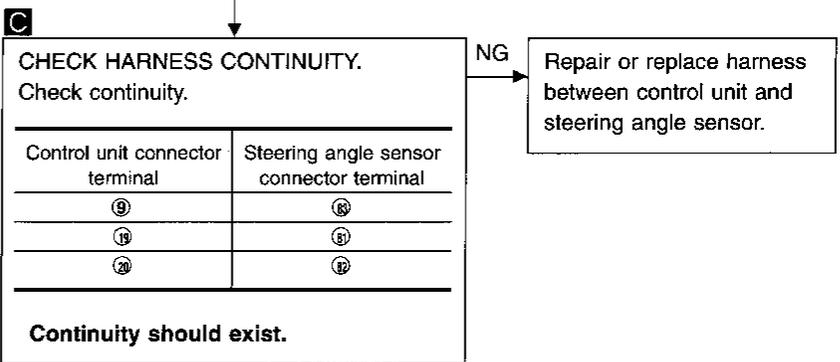
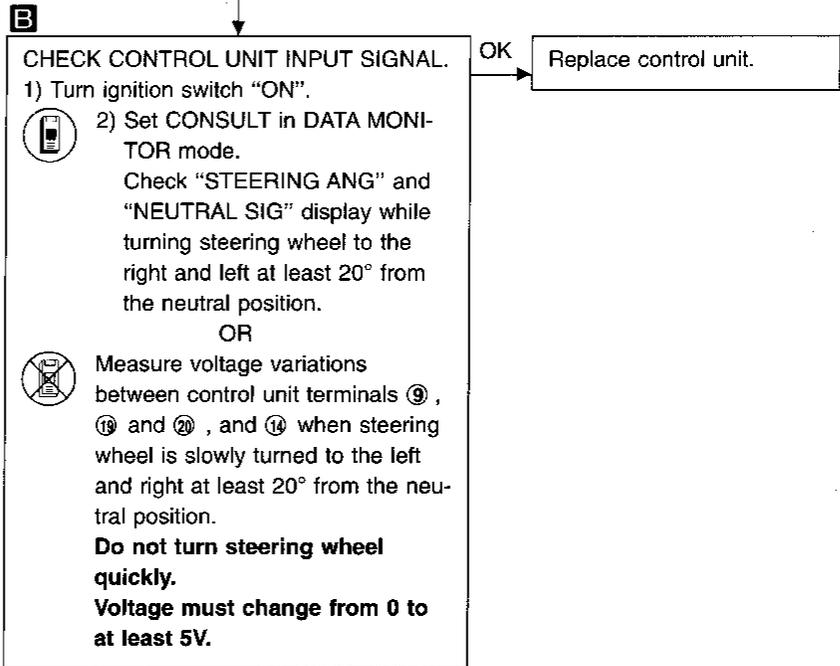
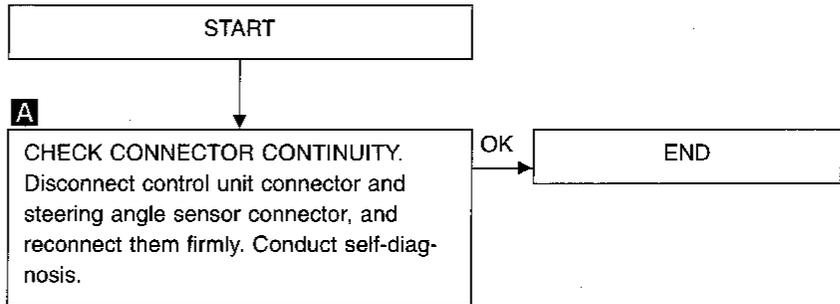
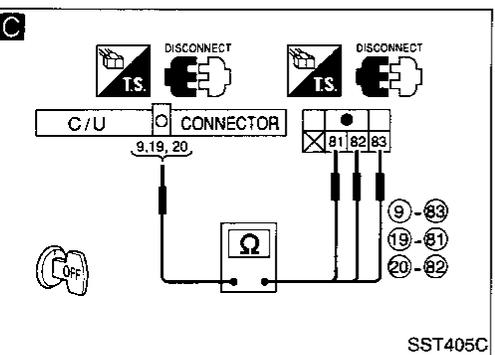
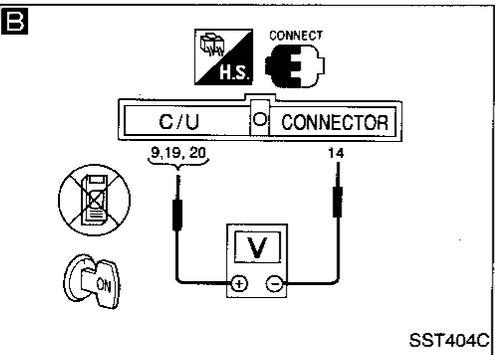
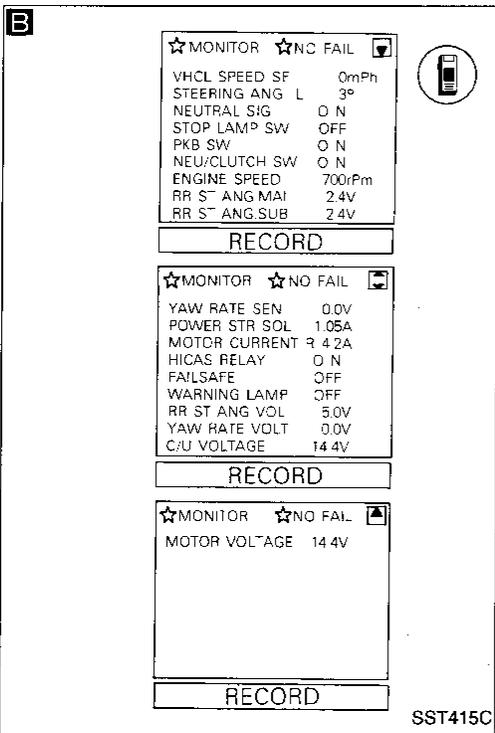
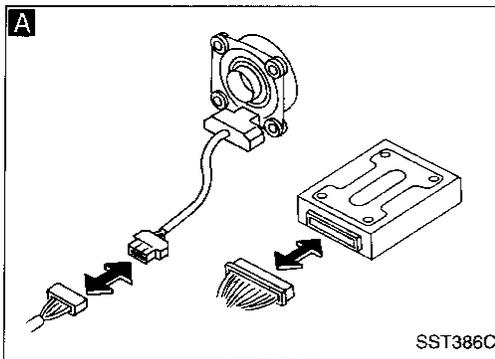
## Trouble Diagnoses (Cont'd)

### DIAGNOSTIC PROCEDURE 11

#### SYMPTOM:

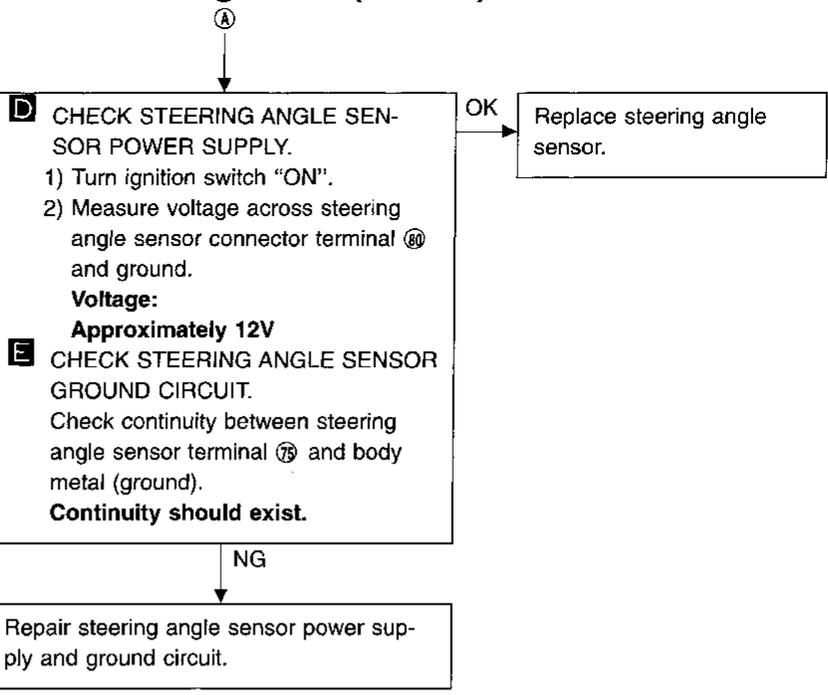
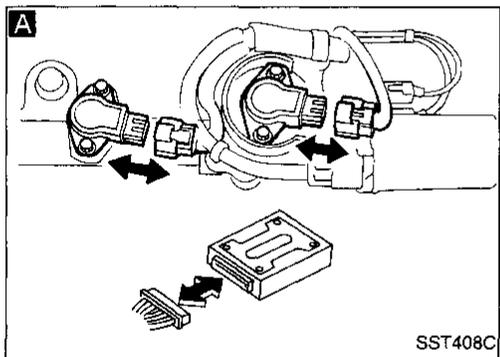
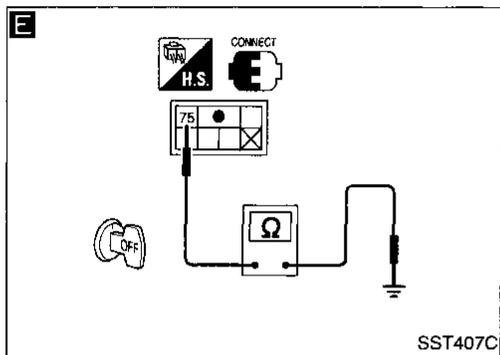
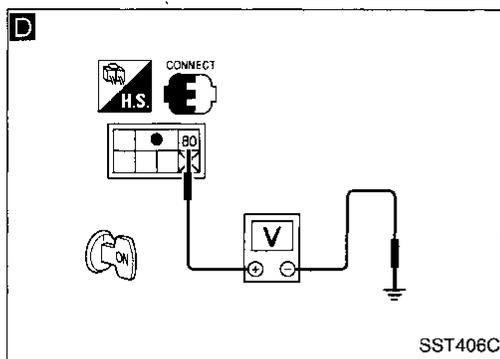
Steering angle sensor input is not present. (Code No. 22, 23)

GI  
MA  
EM  
LC  
EF & EC  
FE  
CL  
MT  
AT  
PD  
FA  
RA  
BR  
ST  
RS  
BT  
HA  
EL  
IDX



# SUPER HICAS SYSTEM

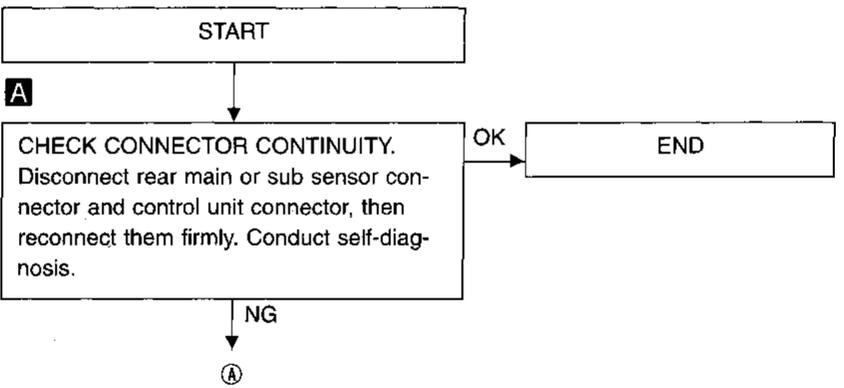
## Trouble Diagnoses (Cont'd)



### DIAGNOSTIC PROCEDURE 12

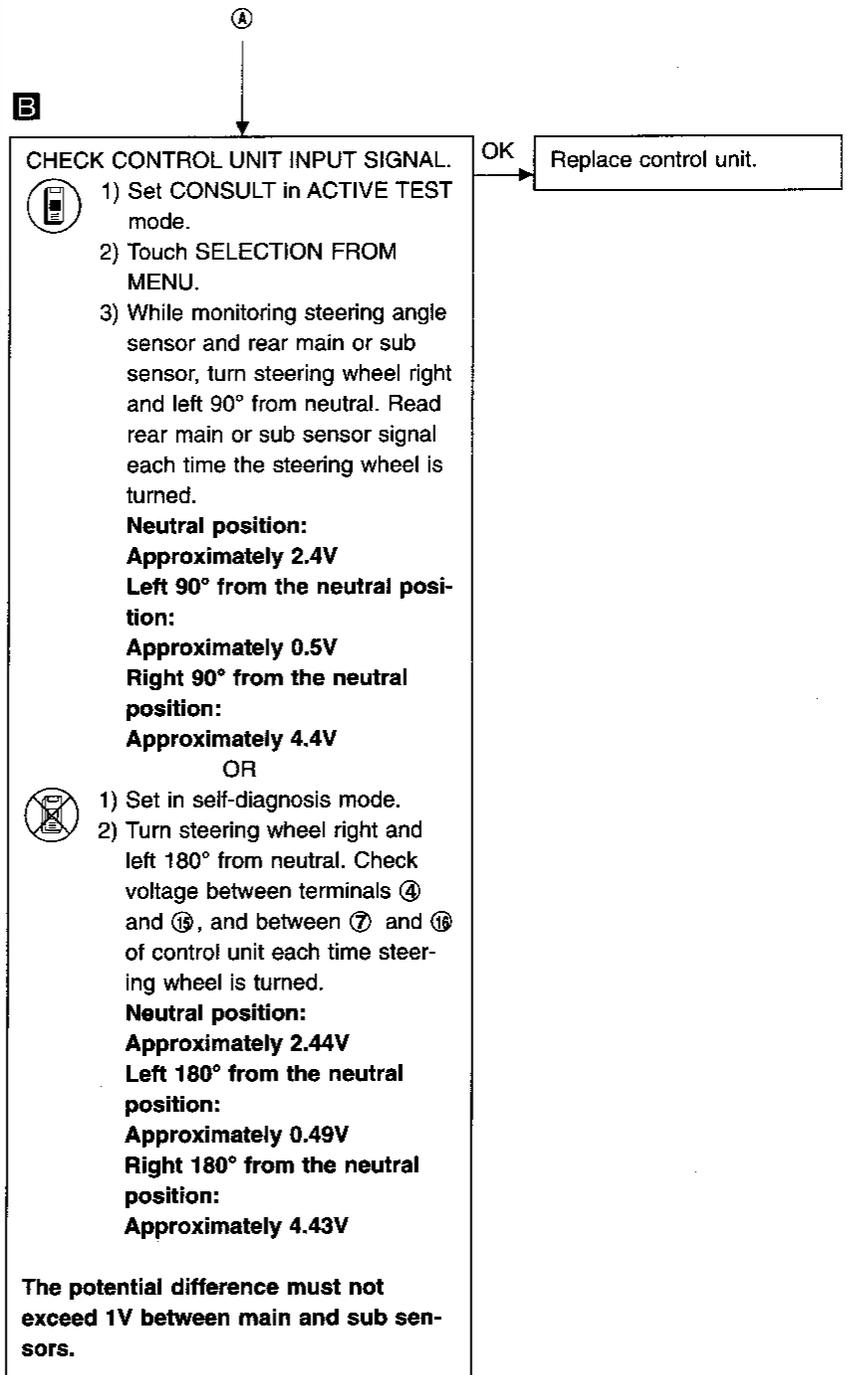
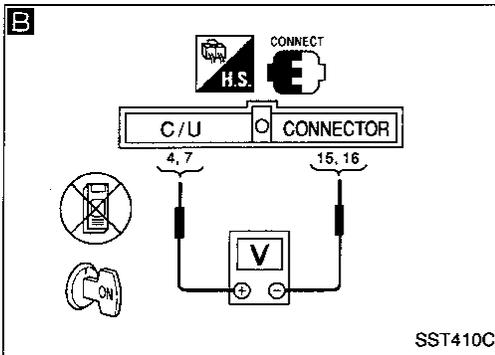
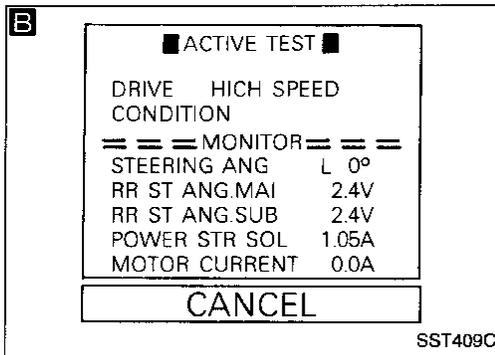
#### SYMPTOM:

Rear main or sub sensor input is not present. (Code No. 24: main sensor, 25: sub sensor)



# SUPER HICAS SYSTEM

## Trouble Diagnoses (Cont'd)



GI

MA

EM

LC

EF &  
EC

FE

CL

MT

AT

PD

FA

RA

BR

**ST**

RS

BT

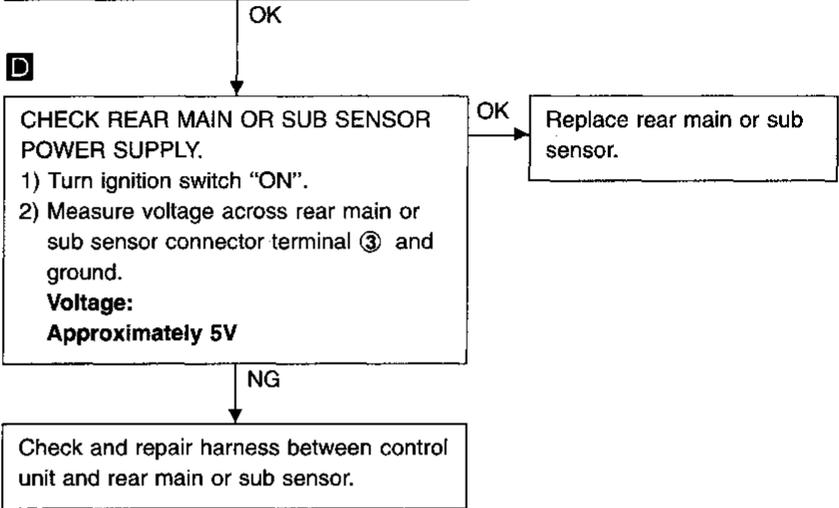
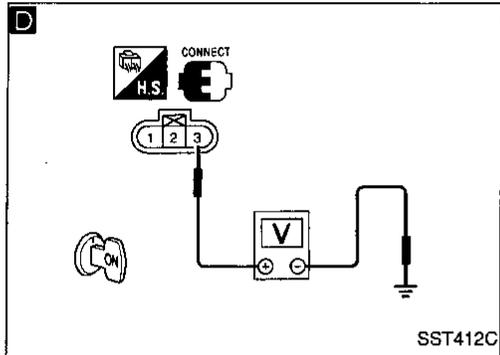
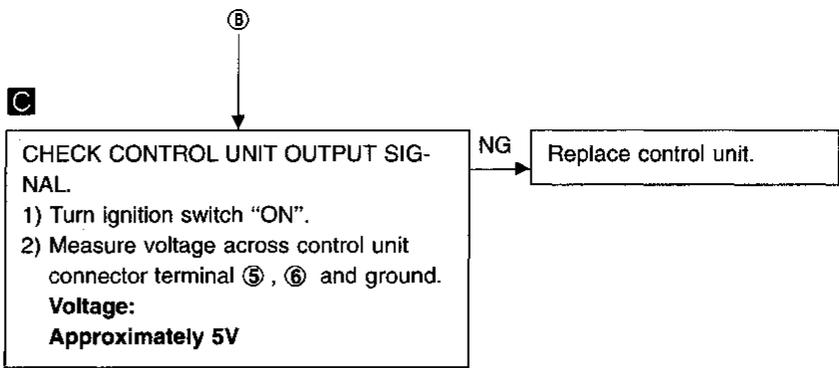
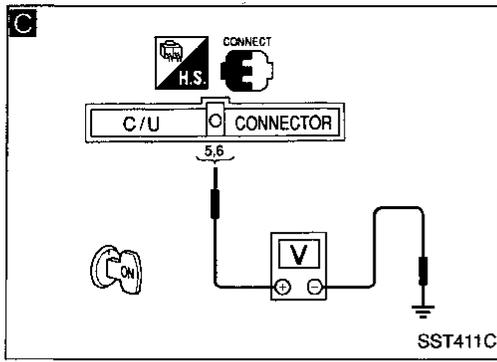
HA

EL

IDX

# SUPER HICAS SYSTEM

## Trouble Diagnoses (Cont'd)



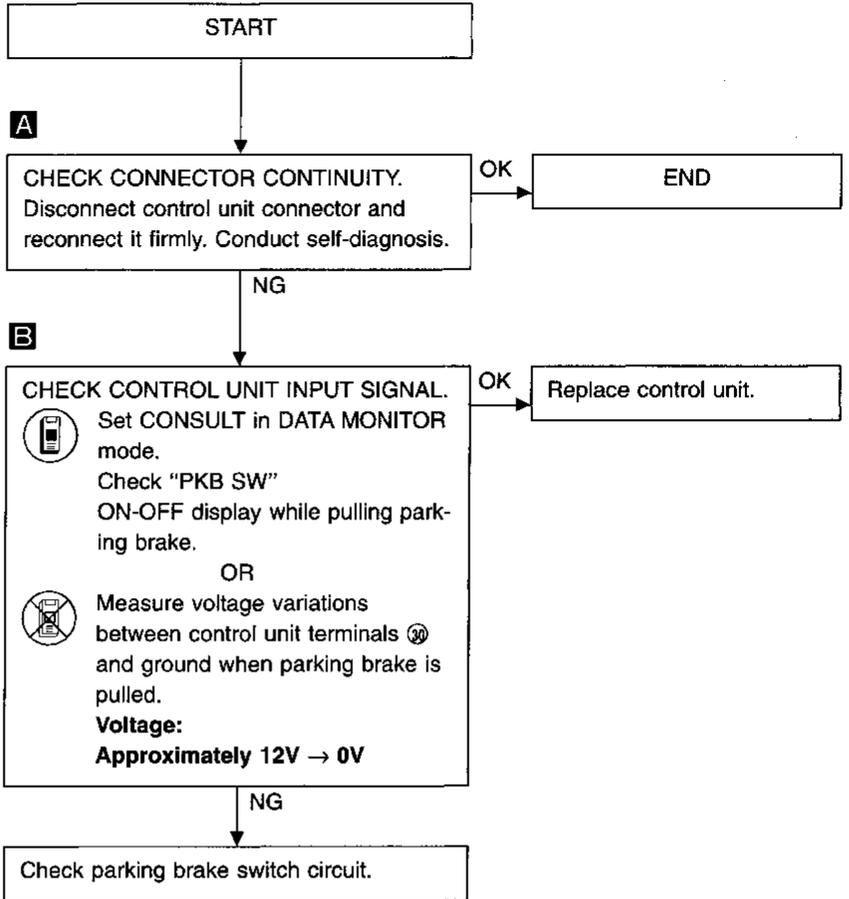
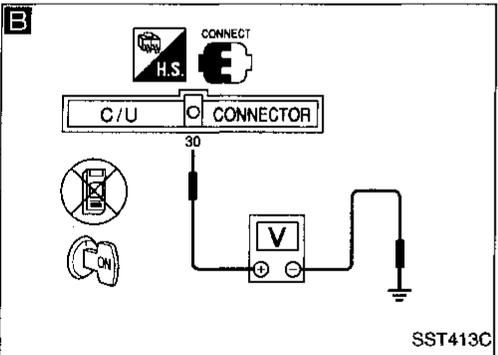
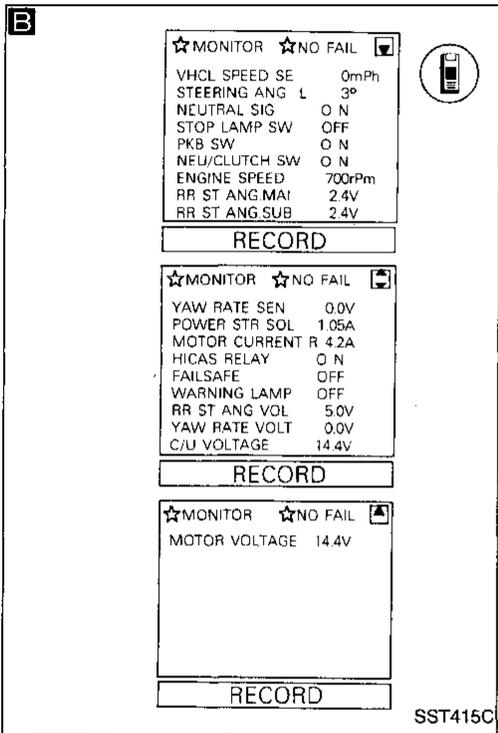
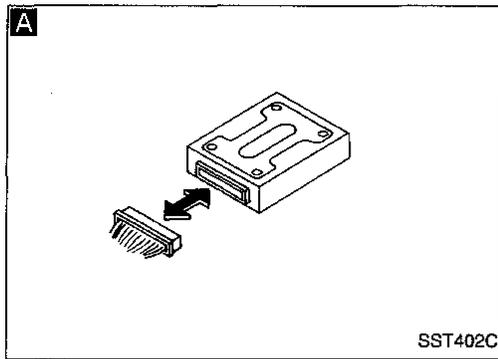
# SUPER HICAS SYSTEM

## Trouble Diagnoses (Cont'd)

### DIAGNOSTIC PROCEDURE 13

#### SYMPTOM:

Parking brake input is not present. (Code No. 31)



GI

MA

EM

LC

EF &  
EC

FE

CL

MT

AT

PD

FA

RA

BR

ST

RS

BT

HA

EL

IDX

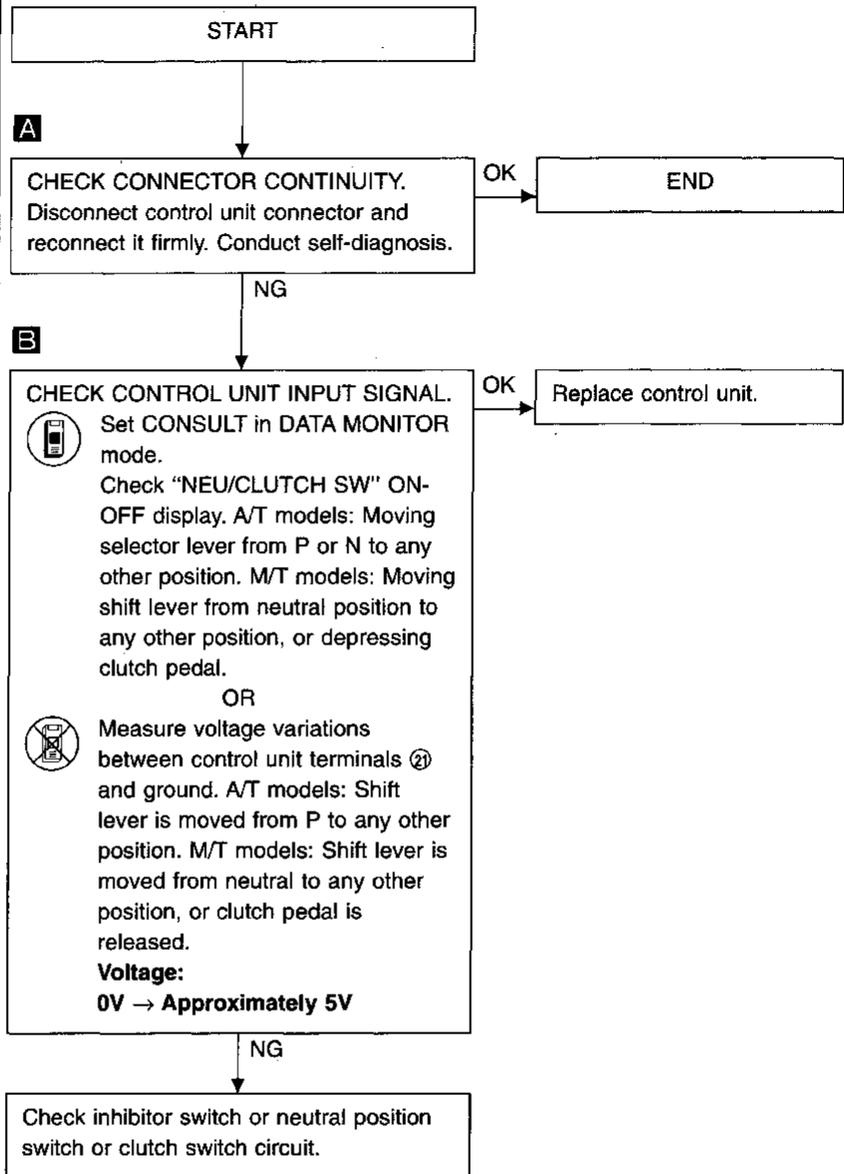
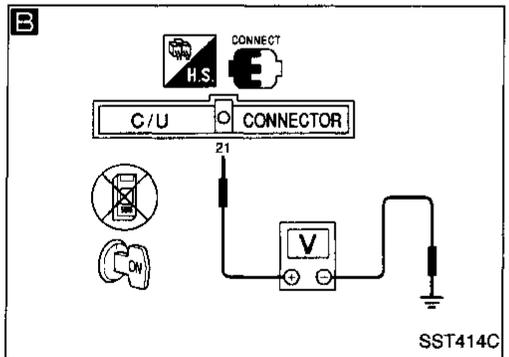
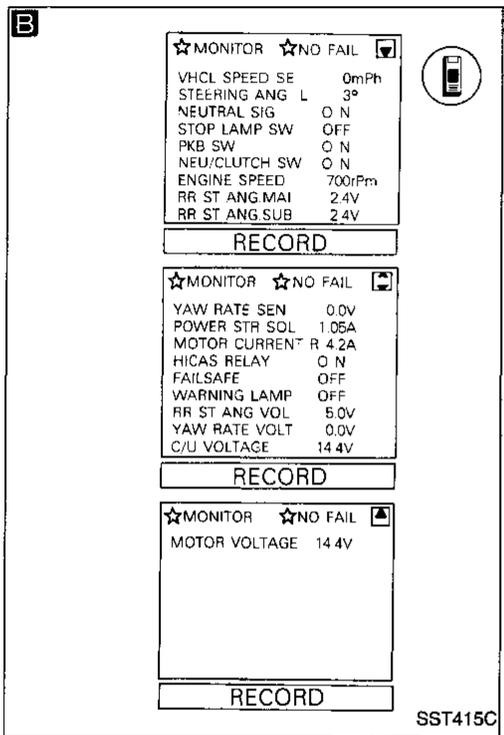
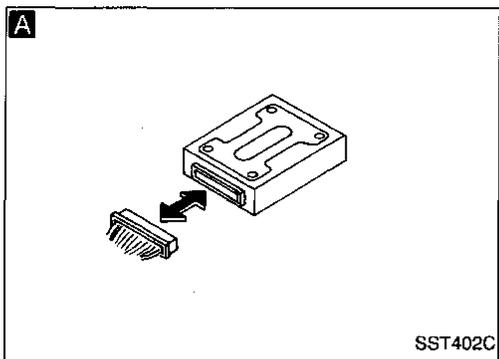
# SUPER HICAS SYSTEM

## Trouble Diagnoses (Cont'd)

### DIAGNOSTIC PROCEDURE 14

#### SYMPTOM:

Inhibitor switch (A/T) or neutral position switch and clutch switch (M/T) input is not present. (Code No. 32)



# SUPER HICAS SYSTEM

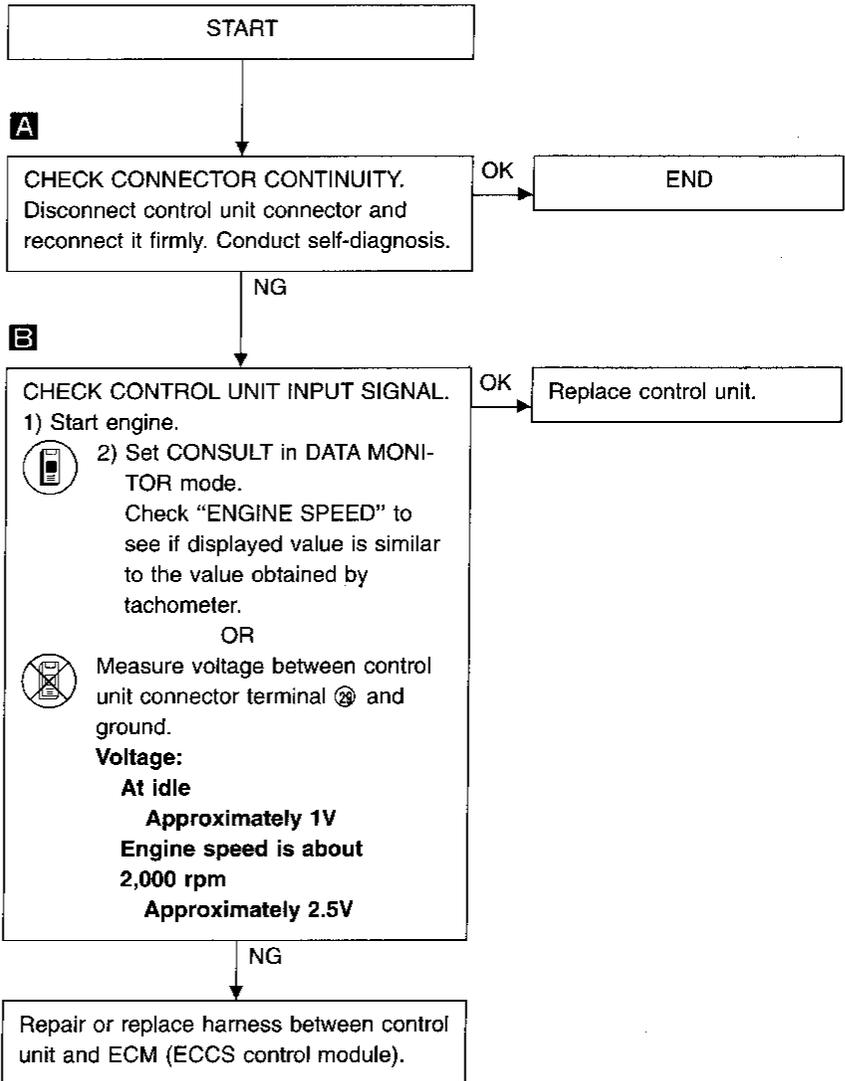
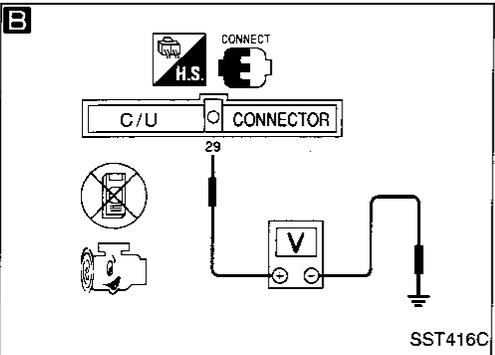
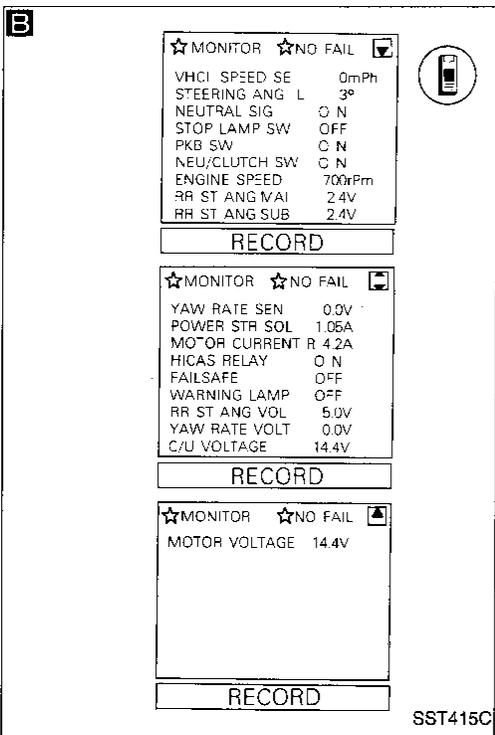
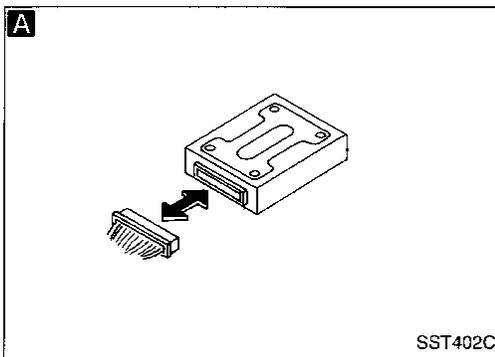
## Trouble Diagnoses (Cont'd)

### DIAGNOSTIC PROCEDURE 15

#### SYMPTOM:

Engine speed signal is not present. (Code No. 33)

GI  
MA  
EM  
LC  
EF & EC  
FE  
CL  
MT  
AT  
PD  
FA  
RA  
BR  
ST  
RS  
BT  
HA  
EL  
IDX



# SUPER HICAS SYSTEM

## Trouble Diagnoses (Cont'd) CONTROL UNIT INSPECTION TABLE

The standard values (voltage) measured with an analog tester, in contact with the control unit terminal, are shown below:

\*Data are reference values.

Terminal No.	Application	*Data
4	Rear main sensor signal	Neutral position: Approximately 2.44V
5	Rear main sensor power supply	Ignition switch ON: Approximately 5V Ignition switch in other position: 0V
6	Rear sub sensor power supply	Ignition switch ON: Approximately 5V Ignition switch in other position: 0V
7	Rear sub sensor signal	Neutral position: Approximately 2.44V
9	Steering neutral position sensor	Neutral position: Approximately 5V
10	Vehicle speed signal	Rear wheel rotating 0V ↔ greater than 5V (approx.), intermittent
14	Ground	0V
15	Rear main sensor ground	0V
16	Rear sub sensor ground	0V
19	Steering angle sensor-1 signal	Steering wheel turned 0V ↔ Approximately 5V, intermittent
20	Steering angle sensor-2 signal	Steering wheel turned 0V ↔ Approximately 5V, intermittent
21	Inhibitor switch signal (A/T), Neutral position signal (M/T), Clutch switch signal (M/T)	Shift lever in any position other than parking (A/T) or neutral (M/T): Approximately 5V Clutch disengaged (M/T): Approximately 5V
22	Stop lamp switch signal	Brake ON: Approximately 12V Brake OFF: 0V
23	Data link connector	—
24	Data link connector	—
25	HICAS relay output	Ignition switch ON: Approximately 12V (Fail-safe operation: 0V)
26	HICAS warning lamp	Lamp ON: 0V Lamp OFF: Approximately 12V
27 28	IGN power supply	Ignition switch ON: Approximately 12V Ignition switch in other position: 0V
29	Engine speed (ECM) signal	At idle: Approximately 1V Engine speed is about 2,000 rpm: Approximately 2.5V
30	Parking brake signal	Parking brake engaged: 0V Parking brake released: Approximately 12V
33	Data link connector	—
34	Ground	0V
35	Battery	Approximately 12V
36	Power steering output	Vehicle speed 0 km/h (0 MPH): Approximately 1.05A Vehicle speed 100 km/h (62 MPH): Approximately 0.43A
37	HICAS motor power supply	Ignition switch ON: Approximately 12V (Fail-safe operation: 0V)
38 39	Resistance of HICAS motor	Approximately 0.2 - 2.0Ω
40	HICAS motor ground	0V

# SUPER HICAS SYSTEM

## Trouble Diagnoses (Cont'd)



×	×	×	4	5	6	7	×	9	10	21	22	23	24	25	26	27	28	37	38	39	40
×	×	×	14	15	16	×	×	19	20	29	30	×	×	33	34	35	36				

SST417C

- GI
- MA
- EM
- LC
- EF &  
EC
- FE
- CL
- MT
- AT
- PD
- FA
- RA
- BR
- ST**
- RS
- BT
- HA
- EL
- IDX

# SERVICE DATA AND SPECIFICATIONS (SDS)

## General Specifications

	Without SUPER HICAS	With SUPER HICAS
Steering model	Power steering	
Steering gear type	PR26AE	
Steering overall gear ratio	16.9	14.8
Turn of steering wheel (Lock to lock)	2.7	2.4
Steering column type	Collapsible	

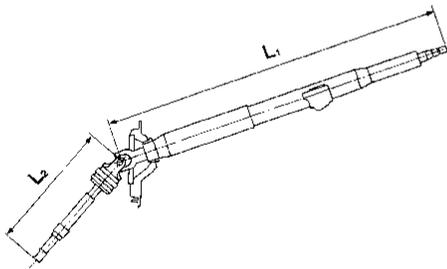
## Inspection and Adjustment

### STEERING WHEEL

Steering wheel axial play mm (in)	0 (0)
Steering wheel play mm (in)	0 - 35 (0 - 1.38)

### STEERING COLUMN

Steering column length "L <sub>1</sub> " mm (in)	749.4 - 751.0 (29.50 - 29.57)
Steering column lower shaft length "L <sub>2</sub> " mm (in)	280.6 - 282.2 (11.05 - 11.11)

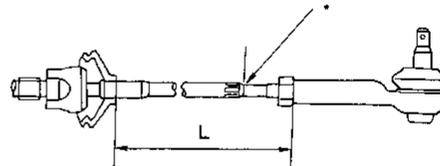


SST315B

### STEERING GEAR AND LINKAGE

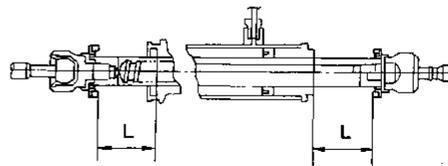
Steering gear type	PR26AE	
Tie-rod outer ball joint		
Swinging force "A" (at cotter pin hole) N (kg, lb)	4.61 - 46.09 (0.47 - 4.7, 1.04 - 10.36)	
Rotating torque "B" N·m (kg·cm, in·lb)	0.29 - 2.94 (3.0 - 30.0, 2.6 - 26.0)	
Axial end play "C" mm (in)	0 (0)	
Tie-rod inner ball joint		
Swinging force "A" N (kg, lb)	8.8 - 78.5 (0.9 - 8.0, 2.0 - 17.6)	
Axial end play "C" mm (in)	0 (0)	
Tie-rod standard length "L" mm (in)	155 (6.10)	

\*: Measuring point



SST161CA

Rack stroke "L" mm (in)	59.5 (2.343)
-------------------------	--------------



SST307B

# SERVICE DATA AND SPECIFICATIONS (SDS)

## Inspection and Adjustment (Cont'd)

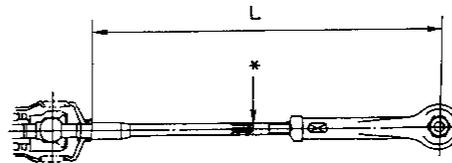
### POWER STEERING

	Without SUPER HICAS	With SUPER HICAS
Rack sliding force		
N (kg, lb)		
Under normal operating oil pressure		
Range within ±11.5 mm (±0.453 in) from the neutral position	206 - 265 (21 - 27, 46 - 60)	201 - 250 (20.5 - 25.5, 45.2 - 56.2)
Except above range	Not more than 294 (30, 66) beyond above value	
Retainer adjustment		
Adjusting screw		
Initial tightening torque	4.9 - 5.9 (50 - 60, 43 - 52)	
N·m (kg·cm, in·lb)		
Retightening torque after loosening	0.2 (2, 1.7)	
Tightening torque after gear has settled	4.9 (50, 43)	
Returning angle	60° - 100°	
degree		
Steering wheel turning force (Measured at one full turn from the neutral position)	39 (4, 9) or less	
N (kg, lb)		
Fluid capacity (Approximate) (US qt, Imp qt)	1.3 (1-3/8, 1-1/8)	
Oil pump maximum pressure	7,649 - 8,238 (78 - 84, 1,109 - 1,194)	
kPa (kg/cm <sup>2</sup> , psi)		

### POWER CYLINDER LOWER LINK (SUPER HICAS)

Power cylinder lower link ball joint		
Swinging force*	N (kg, lb)	2.9 - 41.2 (0.3 - 4.2, 0.7 - 9.3)
Axial end play	mm (in)	0 (0)
Power cylinder lower link standard length "L"	mm (in)	290.4 (11.43)
Stroke	mm (in)	3.0 (0.118)

\*: Measuring point



SST486B

GI

MA

EM

LC

EF &  
EC

FE

CL

MT

AT

PD

FA

RA

BR

**ST**

RS

BT

HA

EL

IDX