Edition: SEPTEMBER 2003
Revision: DECEMBER 2004
Publication No. SM4E-1R50U3

NISSAN PATHFINDER

MODEL R50 SERIES

QUICK REFERENCE INDEX

Control System

=NAAT0013

OUTLINE

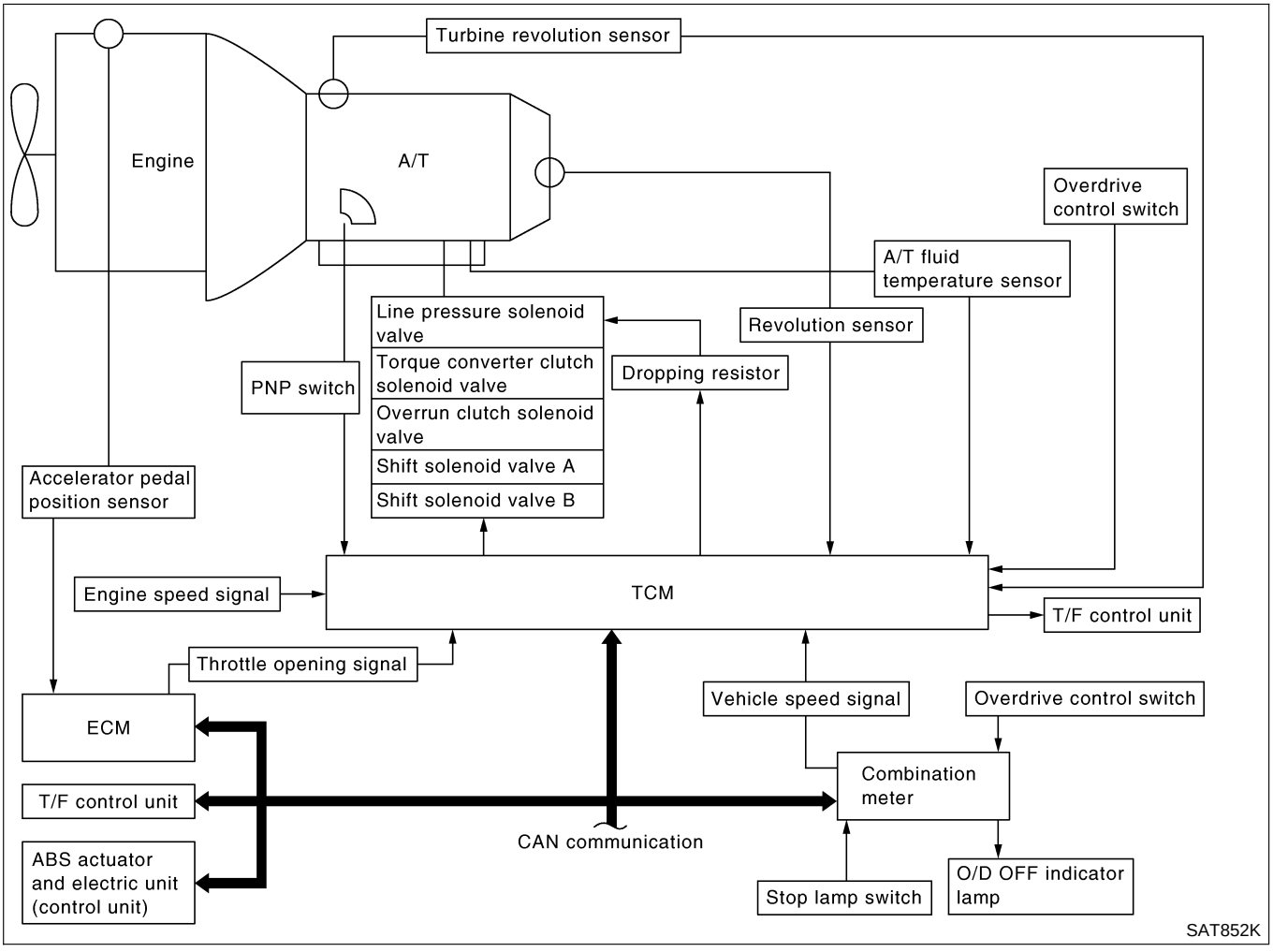
NAAT0013S01

The automatic transmission senses vehicle operating conditions through various sensors or signals. It always controls the optimum shift position and reduces shifting and lock-up shocks.

SENSORS (or SIGNALS)		TCM		ACTUATORS
PNP switch Accelerator pedal position sensor (throttle position sensor) Closed throttle position signal Wide open throttle position signal Engine speed signal A/T fluid temperature sensor Revolution sensor Vehicle speed sensor Overdrive control switch signal Stop lamp switch signal Turbine revolution sensor	▶	Shift control Line pressure control Lock-up control Overrun clutch control Timing control Fail-safe control Self-diagnosis CONSULT-II communication line Duet-EU control	▶	Shift solenoid valve A Shift solenoid valve B Overrun clutch solenoid valve Torque converter clutch solenoid valve Line pressure solenoid valve O/D OFF indicator lamp T/F control unit

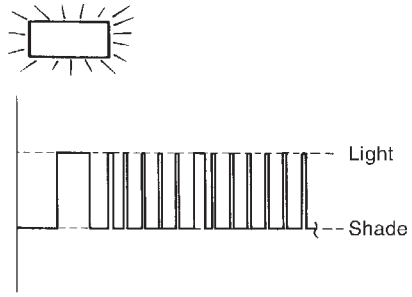
CONTROL SYSTEM

NAAT0013S02



O/D OFF indicator lamp:

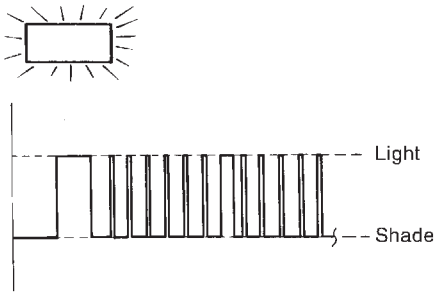
6th judgement flicker is longer than others.



SAT672I

Overrun clutch solenoid valve circuit is short-circuited or disconnected.
⇒ **Go to DTC P1760 OVERRUN CLUTCH SOLENOID VALVE, AT-185.**

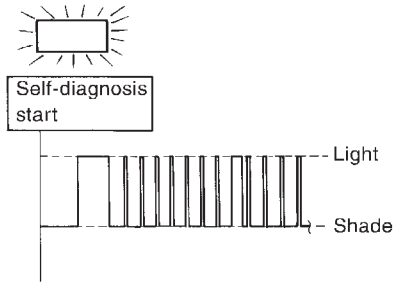
7th judgement flicker is longer than others.



SAT673I

Torque converter clutch solenoid valve circuit is short-circuited or disconnected.
⇒ **Go to DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE, AT-151.**

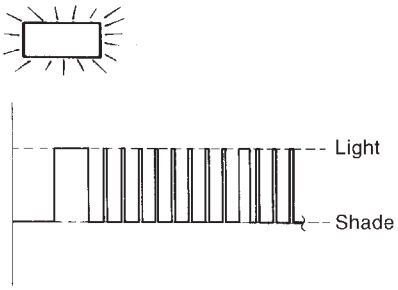
8th judgement flicker is longer than others.



SAT674I

A/T fluid temperature sensor is disconnected or TCM power source circuit is damaged.
⇒ **Go to DTC BATT/FLUID TEMP SEN (A/T FLUID TEMPERATURE SENSOR AND TCM POWER SOURCE), AT-190.**

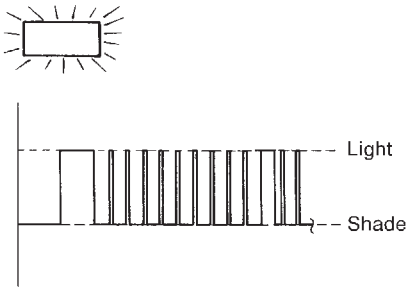
9th judgement flicker is longer than others.



SAT675I

Engine speed signal circuit is short-circuited or disconnected.
⇒ **Go to DTC P0725 ENGINE SPEED SIGNAL, AT-119.**

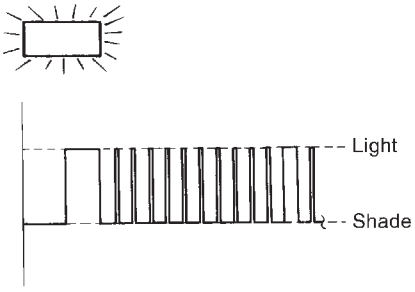
10th judgement flicker is longer than others.



SAT676I

Turbine revolution sensor circuit is short-circuited or disconnected.
⇒ **Go to DTC Turbine Revolution Sensor, AT-206.**

11th judgement flicker is longer than others.

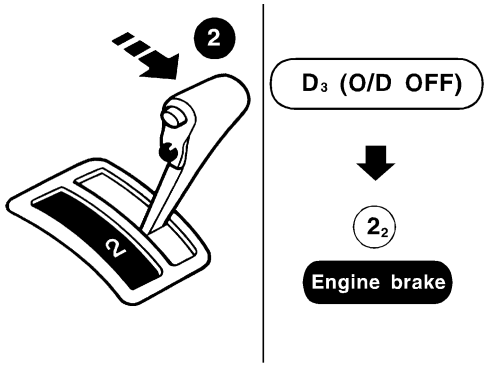


SAT677I

Line pressure solenoid valve circuit is short-circuited or disconnected.
⇒ **Go to DTC P0745 LINE PRESSURE SOLENOID VALVE, AT-165.**

5	CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?



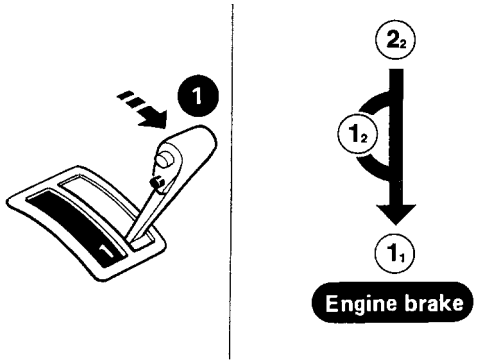
SAT791GB

Yes or No

Yes	▶	GO TO 6.
No	▶	Go to "Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)", AT-249.

6	CHECK SHIFT DOWN (2_2 TO 1_1)

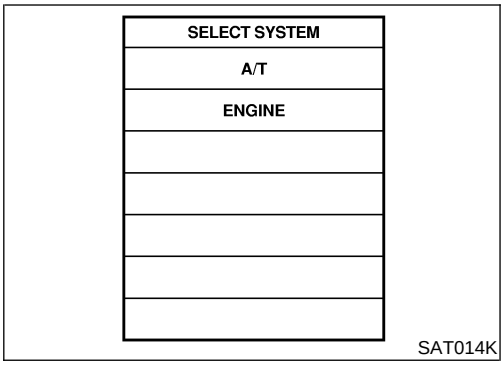
1. Move selector lever from "2" to "1" position while driving in 2_2.
2. Does A/T shift from 2_2 to 1_1 position?

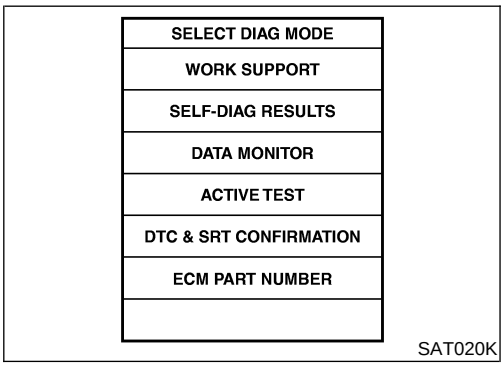


SAT778B

Yes or No

Yes	▶	GO TO 7.
No	▶	Go to "A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector lever "2" → "1" Position", AT-254.





DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NAAT0031S01

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

1) Turn ignition switch "ON" and select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
2) Start engine and maintain the following conditions for at least 10 minutes (Total). (It is not necessary to maintain continuously.)
   CMPS·RPM (REF): 450 rpm or more
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   THRTL POS SEN: More than 1.2V
   Selector lever: D position (OD "ON")

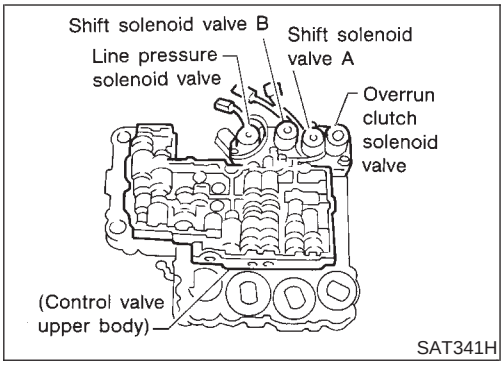
With GST

Follow the procedure "With CONSULT-II".

8) Make sure that "OK" is displayed. (If "NG" is displayed, refer to "DIAGNOSTIC PROCEDURE".) Refer to "DIAGNOSTIC PROCEDURE", AT-139.
Refer to shift schedule, AT-353.

With GST

Follow the procedure "With CONSULT-II".



Description

NAAT0057

The line pressure solenoid valve regulates the oil pump discharge pressure to suit the driving condition in response to a signal sent from the TCM.

The line pressure duty cycle value is not consistent when the closed throttle position switch is “ON”. To confirm the line pressure duty cycle at low pressure, the accelerator (throttle) should be open until the closed throttle position switch is “OFF”.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

NAAT0057S02

Remarks: Specification data are reference values.

Monitor item	Condition	Specification
Line pressure solenoid valve duty	Small throttle opening (Low line pressure) ↓ Large throttle opening (High line pressure)	Approximately 24% ↓ Approximately 95%

NOTE:

The line pressure duty cycle value is not consistent when the closed throttle position switch is “ON”. To confirm the line pressure duty cycle at low pressure, the accelerator (throttle) should be open until the closed throttle position switch is “OFF”.

TCM TERMINALS AND REFERENCE VALUE

NAAT0057S03

Remarks: Specification data are reference values.

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
1	GY	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine.	1.5 - 3.0V
				When depressing accelerator pedal fully after warming up engine.	0V
2	BR/Y	Line pressure solenoid valve (with dropping resistor)		When releasing accelerator pedal after warming up engine.	5 - 14V
				When depressing accelerator pedal fully after warming up engine.	0V

ON BOARD DIAGNOSIS LOGIC

NAAT0057S04

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: L/PRESS SOL/CIRC	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	• Harness or connectors (The solenoid circuit is open or shorted.) • Line pressure solenoid valve
: P0745		

Diagnostic Procedure

NAAT0173

1	INSPECTION START
Do you have CONSULT-II?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 6.

2	CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITH CONSULT-II)

With CONSULT-II

1. Start engine.
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out the value of “FLUID TEMP SE”.

Voltage:

Cold [20°C (68°F)] → Hot [80°C (176°F)]:

Approximately 1.5V → 0.5V

DATA MONITOR	
MONITORING	
VHCL/S SE-A/T	XXX km/h
VHCL/S SE-MTR	XXX km/h
THRTL POS SEN	XXX V
FLUID TEMP SE	XXX V
BATTERY VOLT	XXX V

SAT614J

OK or NG

OK ▶	GO TO 4.
NG ▶	GO TO 3.

3	DETECT MALFUNCTIONING ITEM

Check the following items:

- Harness for short to ground or short to power or open between TCM, ECM and terminal cord assembly (Main harness)
- Ground circuit for ECM.
  Refer to EC-157, “Wiring Diagram”.

OK or NG

OK ▶	GO TO 4.
NG ▶	Repair or replace damaged parts.

In “P” Position, Vehicle Moves Forward Or Backward When Pushed

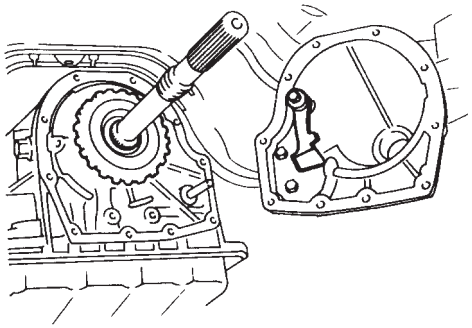
=NAAT0075

SYMPTOM:

Vehicle moves when it is pushed forward or backward with selector lever in “P” position.

1	CHECK PARKING COMPONENTS

Check parking components.
Refer to “Parking Pawl Components”, AT-334.



SAT133B

OK or NG

OK	▶	**INSPECTION END**
NG	▶	Repair or replace damaged parts.

Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)

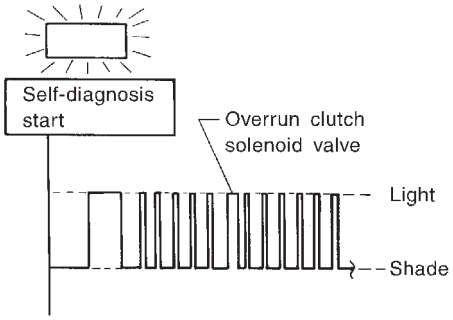
=NAAT0087

SYMPTOM:

- **Engine speed does not smoothly return to idle when A/T shifts from D_4 to D_3.**
- **Vehicle does not decelerate by engine brake when turning overdrive control switch OFF.**
- **Vehicle does not decelerate by engine brake when shifting A/T from "D" to "2" position.**

1	CHECK SELF-DIAGNOSTIC RESULTS

Does self-diagnosis show damage to overrun clutch solenoid valve circuit after cruise test?



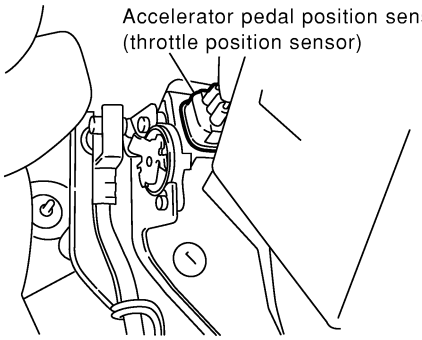
SAT583I

Yes or No

Yes	▶	Check overrun clutch solenoid valve circuit. Refer to "DTC P1760", AT-185.
No	▶	GO TO 2.

2	CHECK ACCELERATOR PEDAL POSITION SENSOR (THROTTLE POSITION SENSOR)

Check accelerator pedal position sensor (throttle position sensor). Refer to EC section.

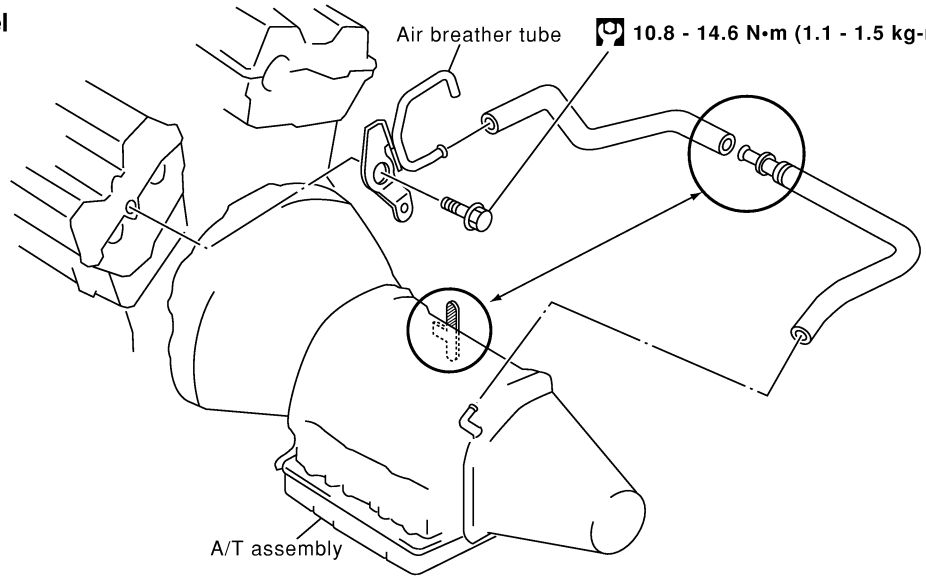


SAT516KA

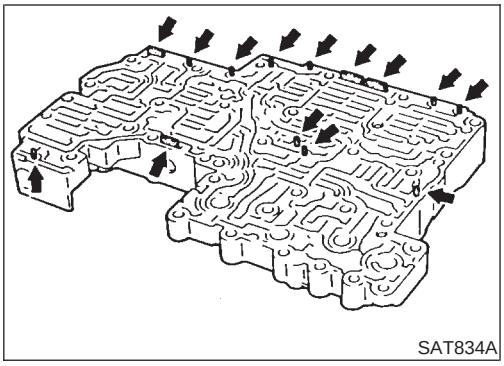
OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace accelerator pedal position sensor (throttle position sensor).

2WD model



SAT153K

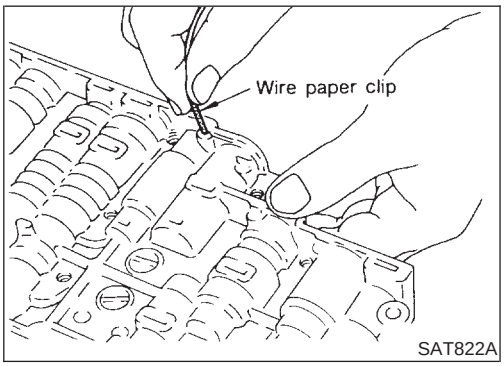

SAT834A

DISASSEMBLY

NAAT0121

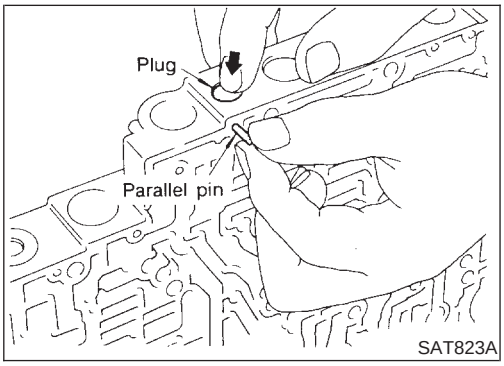
1. Remove valves at parallel pins.

- **Do not use a magnetic hand.**



SAT822A

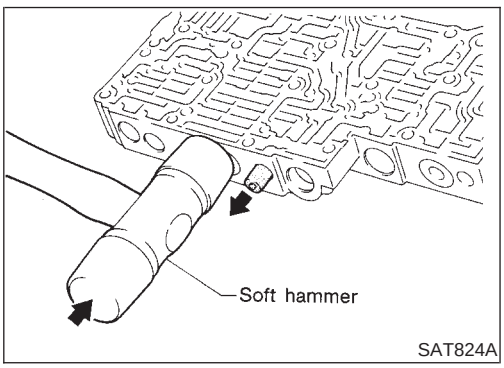
a. Use a wire paper clip to push out parallel pins.



SAT823A

b. Remove parallel pins while pressing their corresponding plugs and sleeves.

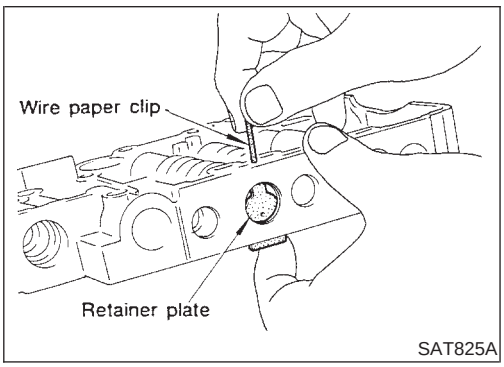
- **Remove plug slowly to prevent internal parts from jumping out.**



SAT824A

c. Place mating surface of valve facedown, and remove internal parts.

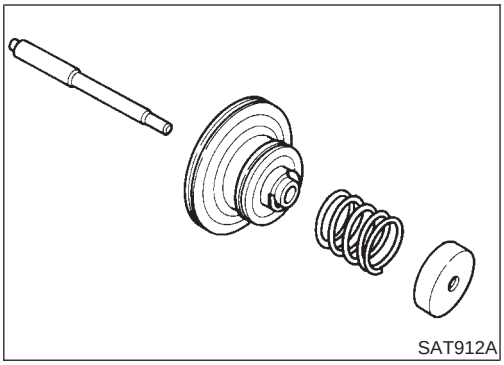
- **If a valve is hard to remove, place valve body facedown and lightly tap it with a soft hammer.**
- **Be careful not to drop or damage valves and sleeves.**



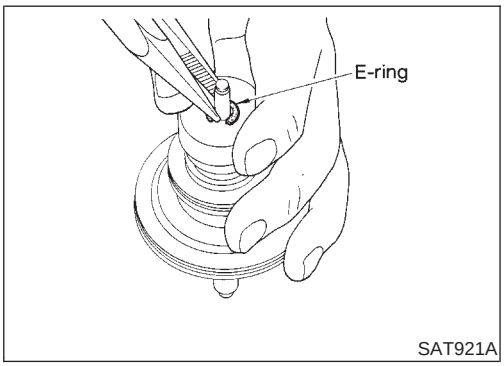
SAT825A

2. Remove valves at retainer plates.

a. Pry out retainer plate with wire paper clip.

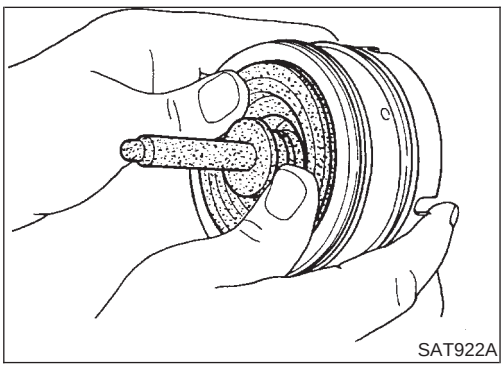

SAT912A

5. Install servo piston spring retainer, return spring C and piston stem onto band servo piston.

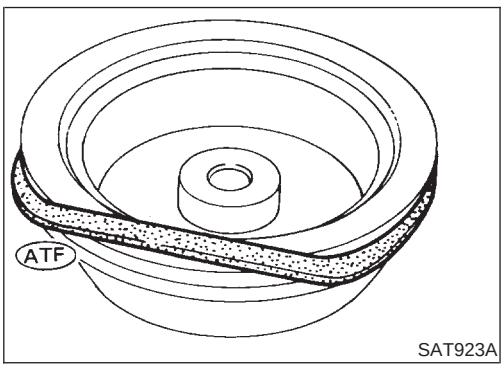


SAT921A

6. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.

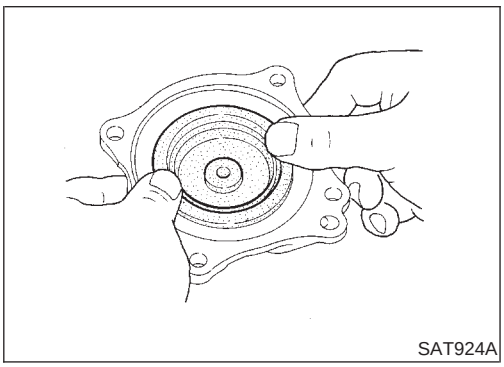

SAT922A

7. Install band servo piston assembly onto servo piston retainer by pushing it inward.



SAT923A

8. Install D-ring on OD band servo piston.
- **Apply ATF to D-ring.**


SAT924A

9. Install OD band servo piston onto servo piston retainer by pushing it inward.

FRONT & REAR AXLE

SECTION AX

CONTENTS

- **Use flare nut wrench when removing and installing brake tubes.**
- **When installing brake piping, be sure to check torque.**

WARNING:

- **Clean brakes with a vacuum dust collector to minimize risk of health hazard from powder caused by friction.**

Wiring Diagrams and Trouble Diagnoses

NABR0003

When you read wiring diagrams, refer to the following:

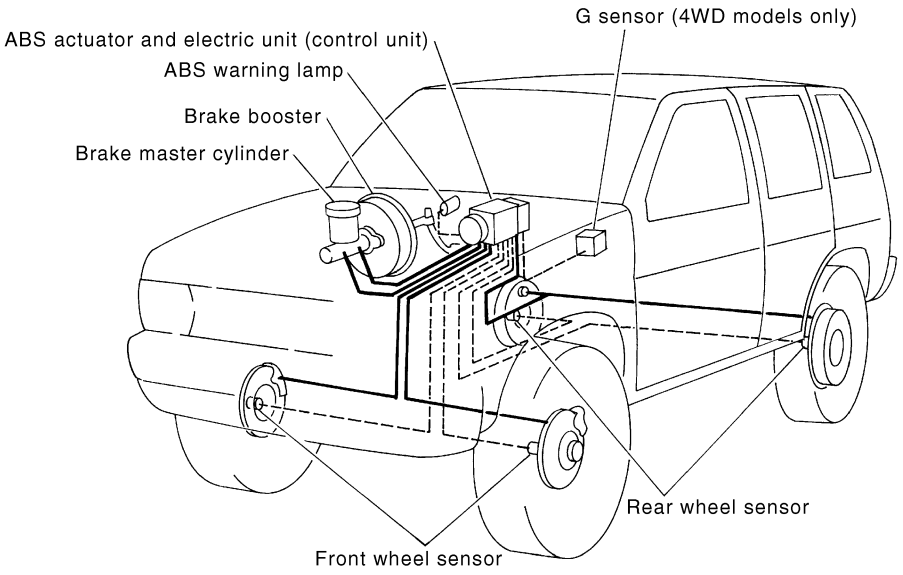
- GI-11, "HOW TO READ WIRING DIAGRAMS"
- EL-11, "POWER SUPPLY ROUTING" for power distribution circuit

When you perform trouble diagnoses, refer to the following:

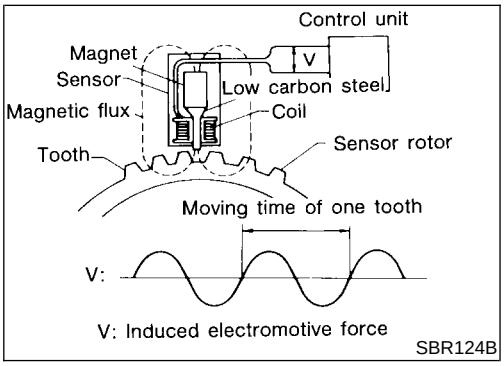
- GI-35, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES"
- GI-24, "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT"

System Components

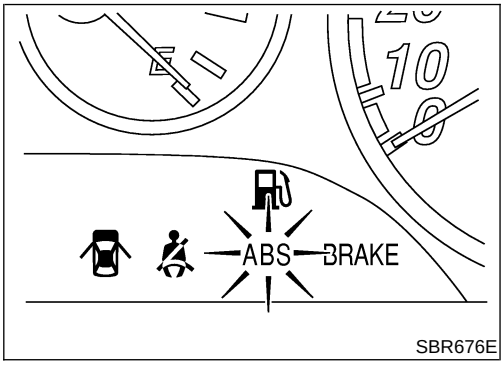
NABR0090



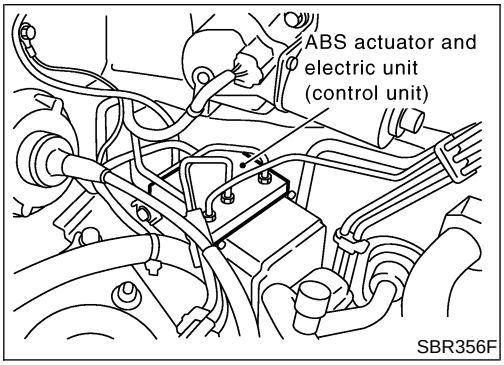
SBR355F



SBR124B



SBR676E



SBR356F

System Description

NABR0091

SENSOR

NABR0091S01

The sensor unit consists of a gear-shaped sensor rotor and a sensor element. The element contains a bar magnet around which a coil is wound. The front sensors are installed on the front spindles and the rear sensors are installed on the rear spindles. As the wheel rotates, the sensor generates a sine-wave pattern. The frequency and voltage increase(s) as the rotating speed increases.

BUILT-IN ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

NABR0091S02

The control unit computes the wheel rotating speed by the signal current sent from the sensor. Then it supplies a DC current to the actuator solenoid valve. It also controls ON-OFF operation of the valve relay and motor relay. If any electrical malfunction should be detected in the system, the control unit causes the warning lamp to light up. In this condition, the ABS will be deactivated by the control unit, and the vehicle's brake system reverts to normal operation. [For control unit layout, refer to ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT), BR-33.]

ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

NABR0091S03

The ABS actuator and electric unit (control unit) contains:

- An electric motor and pump
- Two relays
- Six solenoid valves, each inlet and outlet for
  — LH front
  — RH front
  — Rear
- ABS control unit

Motor Relay or Motor

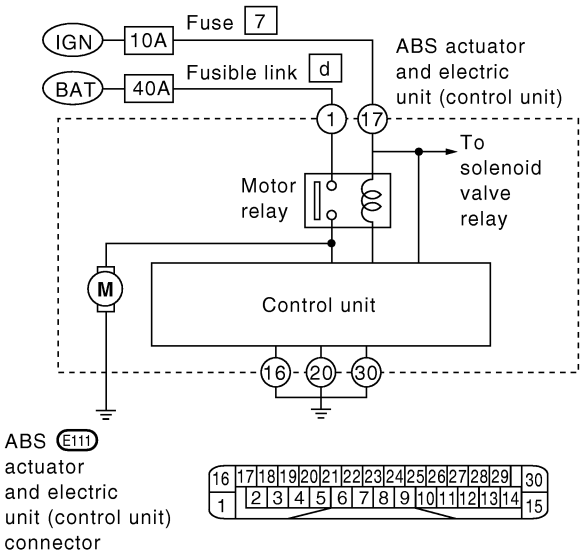
DIAGNOSTIC PROCEDURE

=NABR0134

Malfunction code No. 61

1	INSPECTION START

ABS motor relay inspection



SBR337F

▶	GO TO 2.

2	CHECK FUSIBLE LINK	
Check 40A fusible link **d**. For fusible link layout, refer to EL-11, “POWER SUPPLY ROUTING”.		
Is fusible link OK?		
Yes	▶	GO TO 3.
No	▶	GO TO 6.

3	CHECK CONNECTOR	
1. Disconnect ABS actuator and electric unit (control unit) connector. Check terminals for damage or loose connection. Then reconnect connector. 2. Carry out self-diagnosis again.		
Does warning lamp activate again?		
Yes	▶	GO TO 4.
No	▶	**INSPECTION END**

4	CHECK ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) GROUND CIRCUIT	
Refer to “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) GROUND” in “Ground Circuit Check”, BR-53.		
Is ground circuit OK?		
Yes	▶	GO TO 5.
No	▶	Repair harness or connector.

TCS Function

NABR0199S04

1. ABS actuator and electric unit (control unit) detects a spin at drive wheels by comparing wheel speed signals from all 4 wheels. At this time, output from control unit controls brake fluid pressure to both LH and RH rear wheels while cutting fuel to engine and closing throttle valve to reduce engine torque. Furthermore, throttle position is continuously controlled to insure appropriate engine torque at all times.
2. Depending on road circumstances, driver may have a sluggish feel. This is normal, because optimum traction has highest priority under TCS operation.
3. When vehicle is passing through a road where surface friction coefficient varies, downshifting or depressing accelerator pedal fully may activate TCS temporarily.
4. During TCS operation, it informs driver of system operation by flashing SLIP indicator lamp.

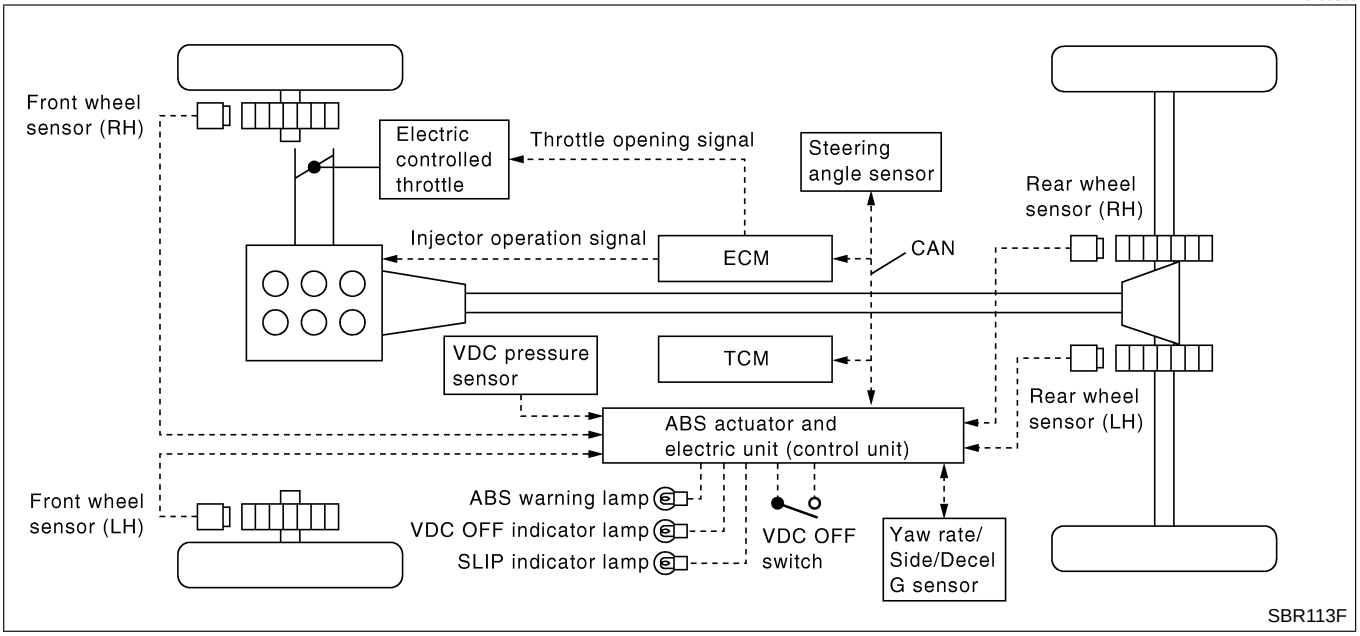
VDC Function

NABR0199S05

1. In addition to TCS/ABS function, VDC detects driver's steering operation amount and brake pedal travel from steering angle sensor and pressure sensor. Using information from yaw rate/side/decel G-sensor and wheel sensor, VDC judges driving condition (conditions of under steer and over steer) to improve stability by controlling brake application to 4 wheels and engine output.
2. SLIP indicator lamp flashes to inform driver of VDC operation.
3. During VDC operation, body and brake pedal lightly vibrate and mechanical noises may be heard. This is normal.
4. If vehicle is rotated on turn table, or rolled and rocked on ship, ABS warning lamp, VDC OFF indicator lamp, and SLIP indicator lamp may turn ON. In this case, start engine on normal road again. If ABS warning lamp, VDC OFF indicator lamp, and SLIP indicator lamp turn OFF after restart, it is normal.
5. When driving in steep slope such as bank, ABS warning lamp, VDC OFF indicator lamp, and SLIP indicator lamp may turn ON. In this case, start engine on normal road again. If ABS warning lamp, VDC OFF indicator lamp, and SLIP indicator lamp turn OFF after restart, it is normal.

System Diagram

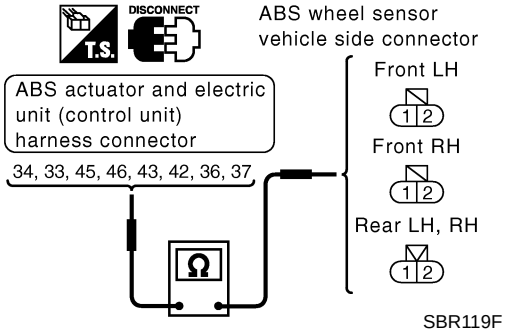
NABR0199S06



3	CHECKING WHEEL SENSOR CIRCUIT

1. Disconnect control unit connector E142.
2. Disconnect wheel sensor connector E14 (FR-LH), E51 (FR-RH), B8 (RR-LH), B69 (RR-RH).
3. Check resistance between terminals. (Check resistance when steering wheel is turned right and left, and when sensor harness inside wheel house is moved.)

	Power system		Signal system		GND system
Wheel	Control unit	Wheel sensor	Control unit	Wheel sensor	Control unit
Front RH wheel	34 (B)	1 (B)	33 (W)	2 (W)	16 (B), 47 (B)
Front LH wheel	45 (G)	1 (G)	46 (G/Y)	2 (G/Y)	
Rear RH wheel	43 (BR)	1 (BR)	42 (B/R)	2 (BR/B)	
Rear LH wheel	36 (OR)	1 (BR)	37 (P)	2 (B/R)	



SBR119F

Resistance value
Power system: 0 - 0.5 Ω
Signal system: 0 - 0.5 Ω
GND system: ∞Ω

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair harness and connectors between control unit and wheel sensor.

4	TIRE INSPECTION

Check air pressure, wear, and size.

Are air pressure, wear, and size within standards?

YES	▶	GO TO 5.
NO	▶	Adjust air pressure or replace tire.

5	SENSOR ROTOR INSPECTION

Check for damage to sensor rotor teeth and surface of rubber.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace sensor rotor.

6	POWER SUPPLY CHECK FOR CONTROL UNIT SENSOR

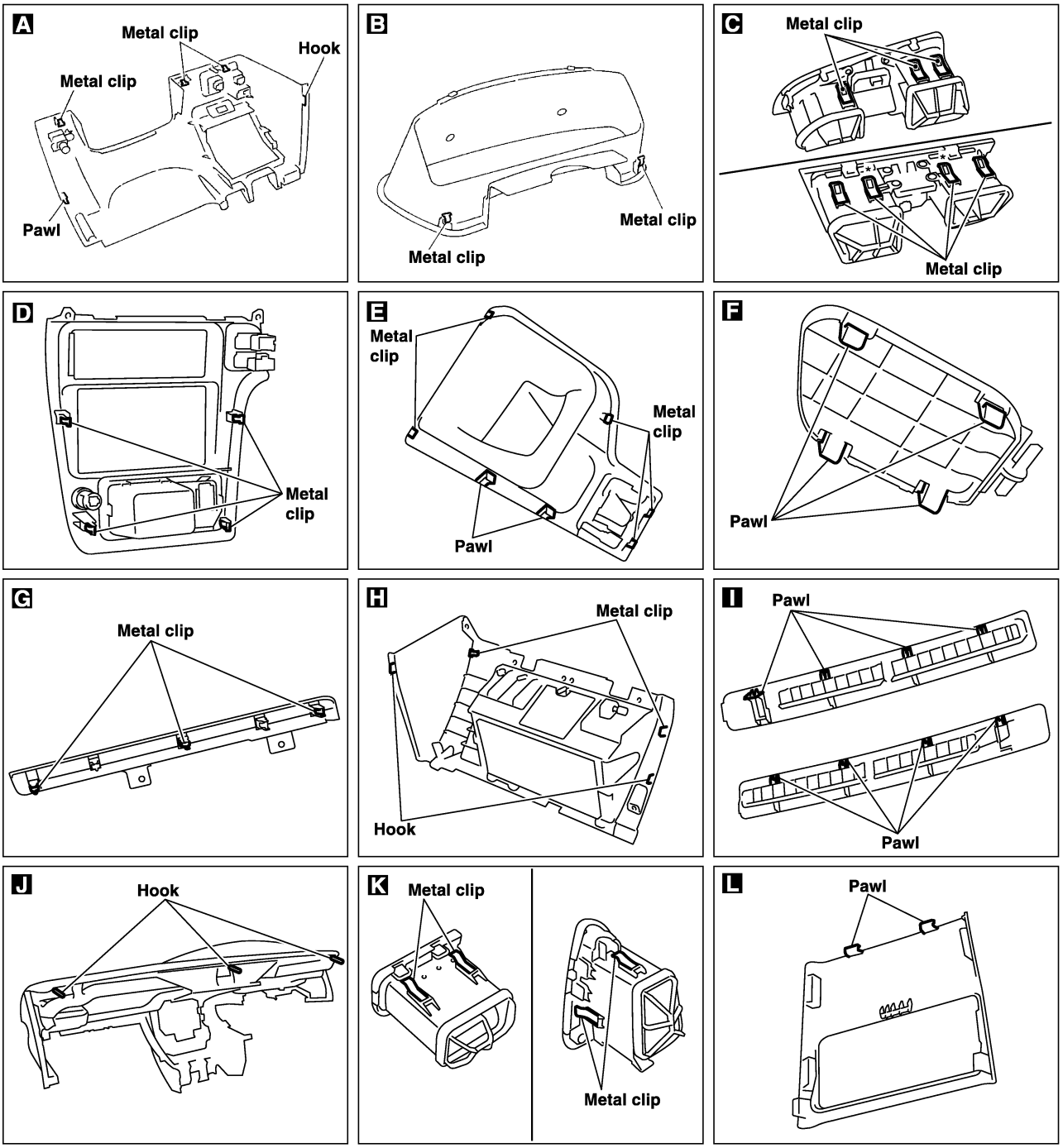
1. Disconnect wheel sensor connector E14 (FR-LH), E51 (FR-RH), B8 (RR-LH), B69 (RR-RH).
2. Check voltage between wheel sensor harness connector E14 terminal 1 (G), E51 terminal 1 (B), B8 terminal 1 (BR), B69 terminal 1 (BR) and ground.
   Voltage: 8V or more

OK	▶	Replace wheel sensor.
NG	▶	Replace control unit.

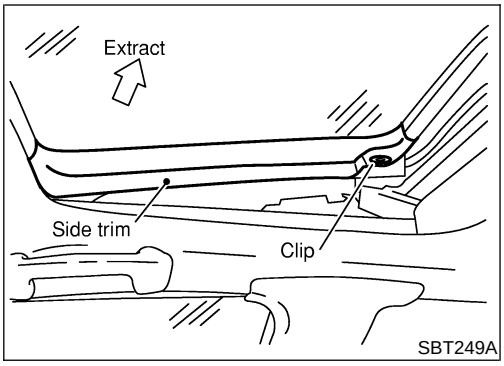
Parking Brake Control

NABR0084
Unit: notch

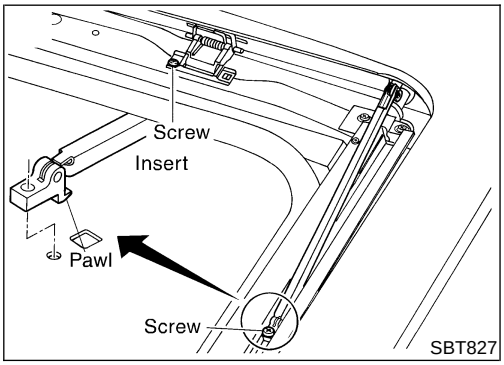
Control Type	Center lever
Lever stroke [under force of 196 N (20 kg, 44 lb)]	6 - 8
Lever stroke when warning switch comes on	1 or less


A
Metal clip
Hook
Metal clip
Pawl
B
Metal clip
Metal clip
C
Metal clip
Metal clip
D
Metal clip
E
Metal clip
Metal clip
Pawl
F
Pawl
G
Metal clip
H
Metal clip
Hook
I
Pawl
Pawl
J
Hook
K
Metal clip
Metal clip
L
Pawl

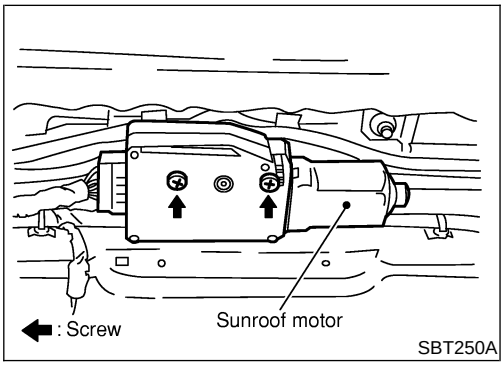
PIIA9874E



A Record the number of shims placed between glass lid assembly and link and wire assembly. Remove securing nuts and glass lid assembly.



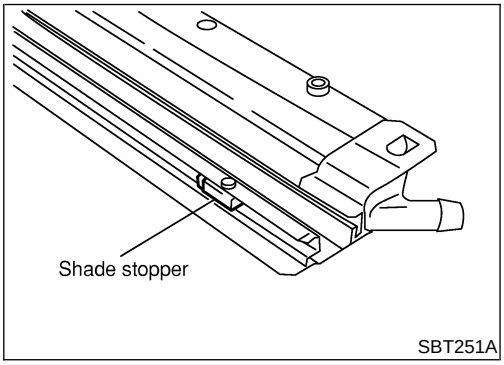
B Remove screws from left and right sides of each wind deflector holder. Extract pawls through rail holes, then remove left and right sides of wind deflector holder. Remove screws from front end of sunroof unit. Extract pawls through frame holes, then remove wind deflector from frame assembly.



C

CAUTION:

- **Before removing sunroof motor, make sure that sunroof is fully closed.**
- **After removing sunroof motor, never attempt to rotate sunroof motor as a single unit.**
- **Power supply to the motor is off when removing sunroof motor and vehicle harness or battery. Initialize at starting position.**



D Remove shade stoppers (2 points) from rear end of sunroof frame assembly. Remove sun shade from rear end of sunroof frame assembly.

Clutch Control System

NACL0028

Type of clutch control	Hydraulic

Clutch Master Cylinder (With damper)

NACL0021

Inner diameter	15.87 mm (5/8 in)

Clutch Operating Cylinder

NACL0022

Inner diameter	19.05 mm (3/4 in)

Clutch Disc

NACL0023

Unit: mm (in)

Model	250
Facing size (Outer dia. x inner dia. x thickness)	250 × 160 × 3.5 (9.84 × 6.30 × 0.138)
Thickness of disc assembly With load	7.9 - 8.3 (0.311 - 0.327) with 7,355 N (750 kg, 1,654 lb)
Wear limit of facing surface to rivet head	0.3 (0.012)
Runout limit of facing	0.7 (0.028)
Distance of runout check point (from hub center)	120 (4.72)
Maximum backlash of spline (at outer edge of disc)	1.0 (0.039)

Clutch Cover

NACL0024

Unit: mm (in)

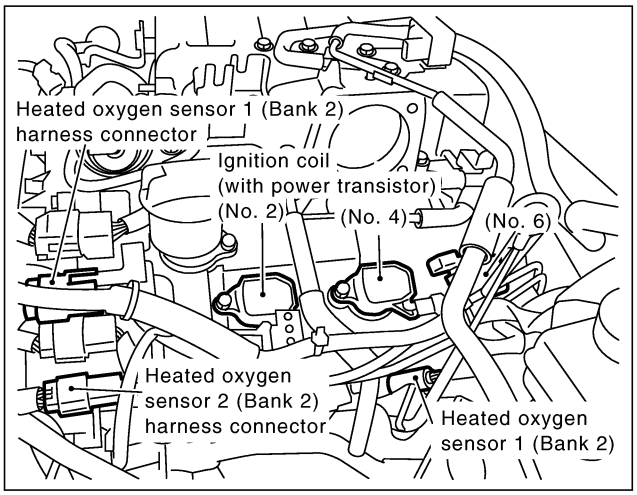
Model	250
Set-load	7,355 N (750 kg, 1,654 lb)
Diaphragm spring height	48.2 - 50.2 (1.898 - 1.976)
Uneven limit of diaphragm spring toe height	0.6 (0.024)

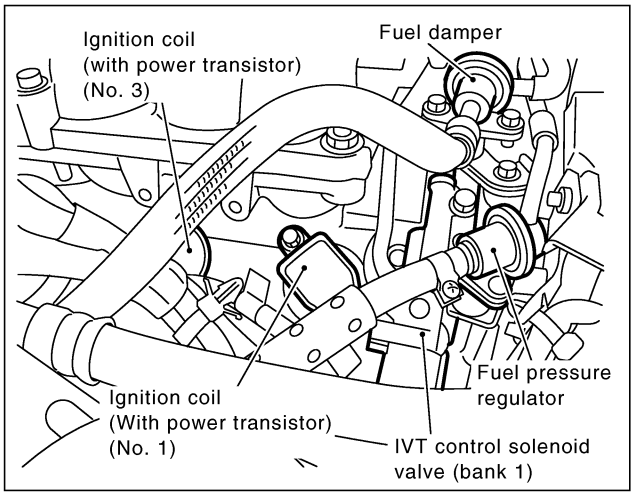
Clutch Pedal

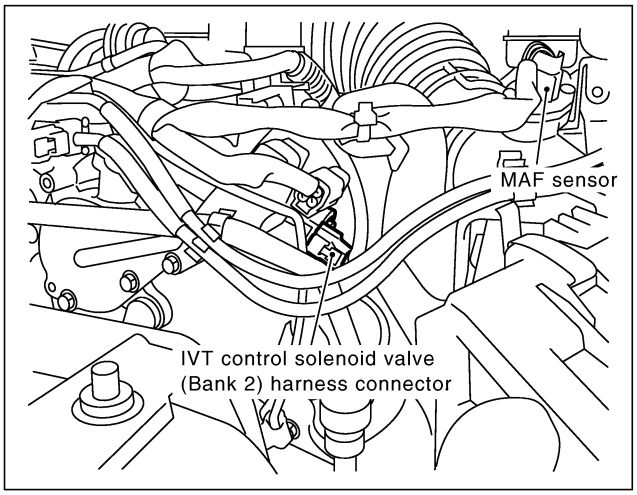
NACL0025

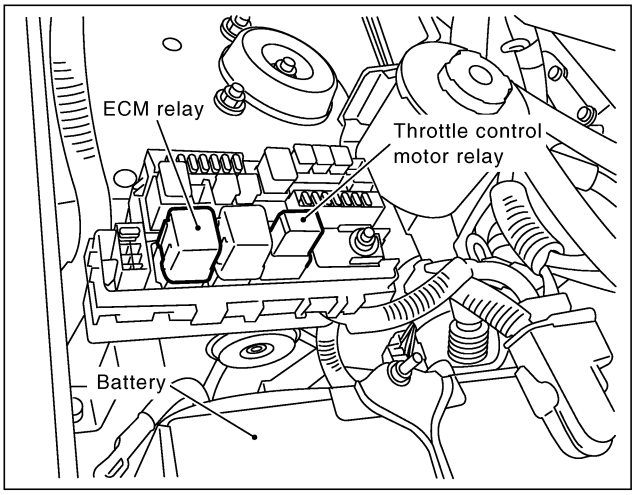
Unit: mm (in)

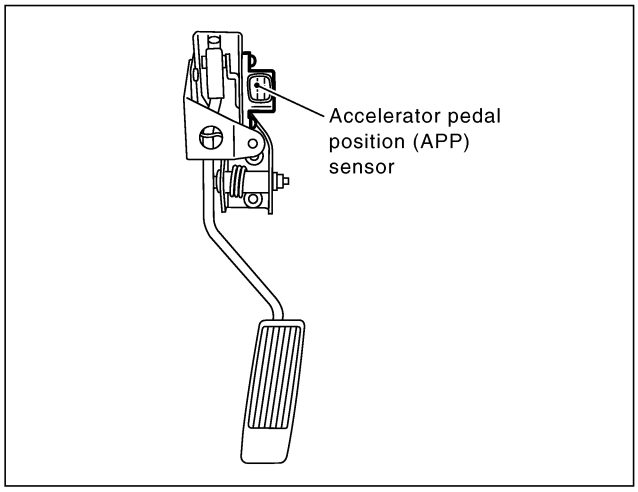
Clearance “C” between pedal stopper rubber and clutch interlock switch threaded while clutch pedal is fully depressed.	0.1 - 1.0 (0.004 - 0.039)

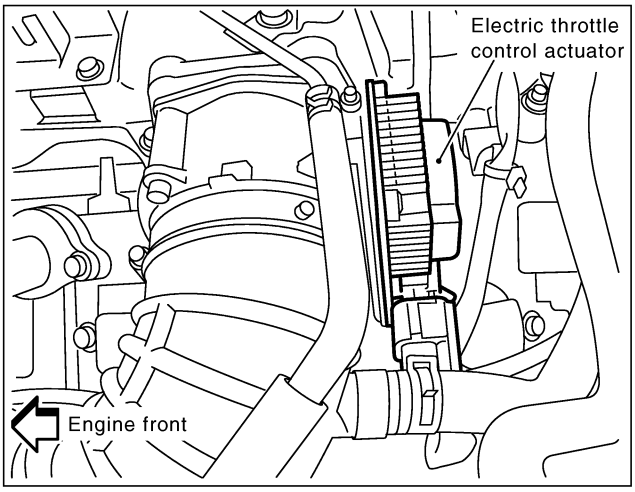

Heated oxygen sensor 1 (Bank 2) harness connector
Ignition coil (with power transistor) (No. 2)
(No. 4)
(No. 6)
Heated oxygen sensor 2 (Bank 2) harness connector
Heated oxygen sensor 1 (Bank 2)


Ignition coil (with power transistor) (No. 3)
Fuel damper
Fuel pressure regulator
Ignition coil (With power transistor) (No. 1)
IVT control solenoid valve (bank 1)


MAF sensor
IVT control solenoid valve (Bank 2) harness connector


ECM relay
Throttle control motor relay
Battery


Accelerator pedal position (APP) sensor


Electric throttle control actuator
Engine front

SEC409D

- CANCEL switch is pressed.
- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared.).
- Brake pedal is depressed.
- Clutch pedal is depressed (M/T models).
- A/T selector lever is shifted to P, N or R position (A/T models).
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
- TCS system is operated

When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking indicator lamp.

- Engine coolant temperature is slightly higher than the normal operating temperature: CRUISE lamp may blink slowly.
  When the engine coolant temperature decreases to the normal operating temperature, CRUISE lamp will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ACCEL switch.
- Malfunction for self-diagnosis regarding ASCD control: SET lamp will blink quickly.

If MAIN switch is turned to OFF while ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

Coast Operation

NAEC1370S06

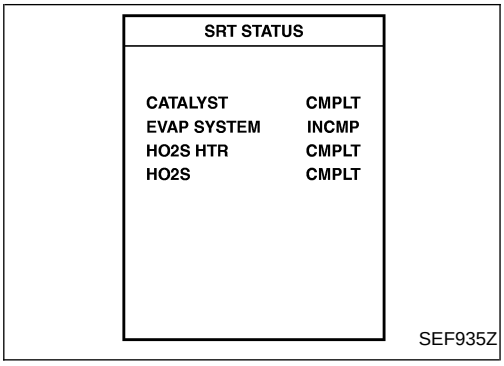
When the SET/COAST switch is pressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

Resume Operation

NAEC1370S07

When the RESUME/ACCEL switch is pressed after cancel operation other than pressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

- Brake pedal is released.
- Clutch pedal is released (M/T models).
- A/T selector lever is in other than P, N and R positions (A/T models).
- Vehicle speed is greater than 40 km/h (25 MPH) and 144 km/h (89 MPH).



How to Set SRT Code

NAEC0031S0302

To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. Each diagnosis may require a long period of actual driving under various conditions.

With CONSULT-II

Perform corresponding DTC Confirmation Procedure one by one based on "Performance Priority" in the table on EC-80.

Without CONSULT-II

The most efficient driving pattern in which SRT codes can be properly set is explained on the next page. The driving pattern should be performed one or more times to set all SRT codes.

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
INT/V SOL (B1) [%]			• The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. • The advance angle becomes larger as the value increases.	
INT/V SOL (B2) [%]				
TRVL AFTER MIL [km] or [Mile]			• Distance traveled while MIL is activated	
VIAS S/V [ON/OFF]			• The control condition of the VIAS control solenoid valve (determined by ECM according to the input signal) is indicated. • OFF ... VIAS control solenoid valve is not operating. ON ... VIAS control solenoid valve is operating.	
SWL CON VC SW	X		• Indicates [ON/OFF] condition from the swirl control valve control vacuum check switch. ON ... Swirl control valve is not operational. OFF ... Swirl control valve is operational.	
IDL A/V LEARN			• Display the condition of idle air volume learning YET ... Idle air volume learning has not been performed yet. CMPLT ... Idle air volume learning has already been performed successfully.	
AC PRESS SEN [V]			• The signal voltage from the refrigerant pressure sensor is displayed.	
SET VHCL SPD [km/h] or [mph]			• The preset vehicle speed is displayed.	
MAIN SW [ON/OFF]			• Indicates [ON/OFF] condition from MAIN switch signal.	
CANCEL SW [ON/OFF]			• Indicates [ON/OFF] condition from CANCEL switch signal.	
RESUME/ACC SW [ON/OFF]			• Indicates [ON/OFF] condition from RESUME/ACCEL switch signal.	
SET SW [ON/OFF]			• Indicates [ON/OFF] condition from SET/COAST switch signal.	
BRAKE SW1 [ON/OFF]			• Indicates [ON/OFF] condition from ASCD brake switch signal, and ASCD clutch switch signal (M/T models).	
BRAKE SW2 [ON/OFF]			• Indicates [ON/OFF] condition of stop lamp switch signal.	
VHCL SPD CUT [NON/CUT]			• Indicates the vehicle cruise condition. NON ... Vehicle speed is maintained at the ASCD set speed. CUT ...Vehicle speed increased to excessively high compared with the ASCD set speed, and ASCD operation is cut off.	

Major Sensor Reference Graph in Data Monitor Mode

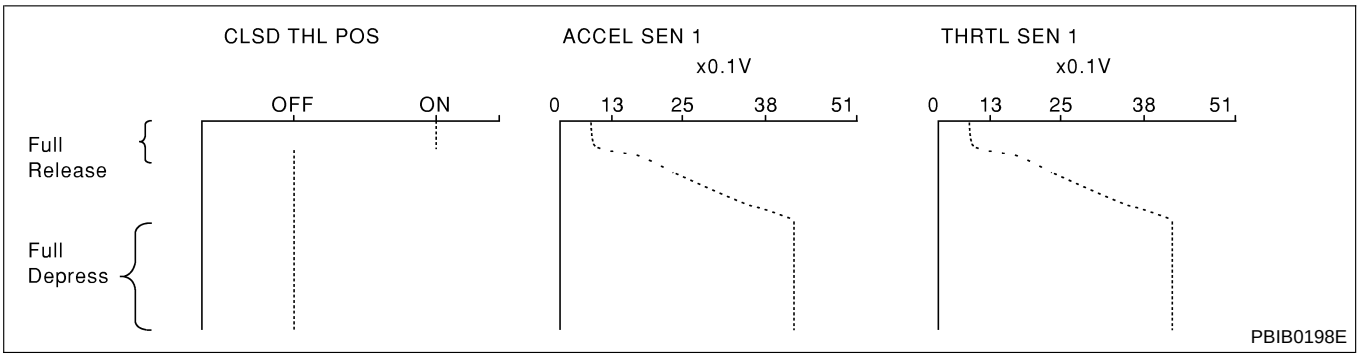
=NAEC0043

The following are the major sensor reference graphs in “DATA MONITOR” mode.

CLSD THL POS, ACCEL SEN 1, THRTL SEN 1

NAEC0043S01

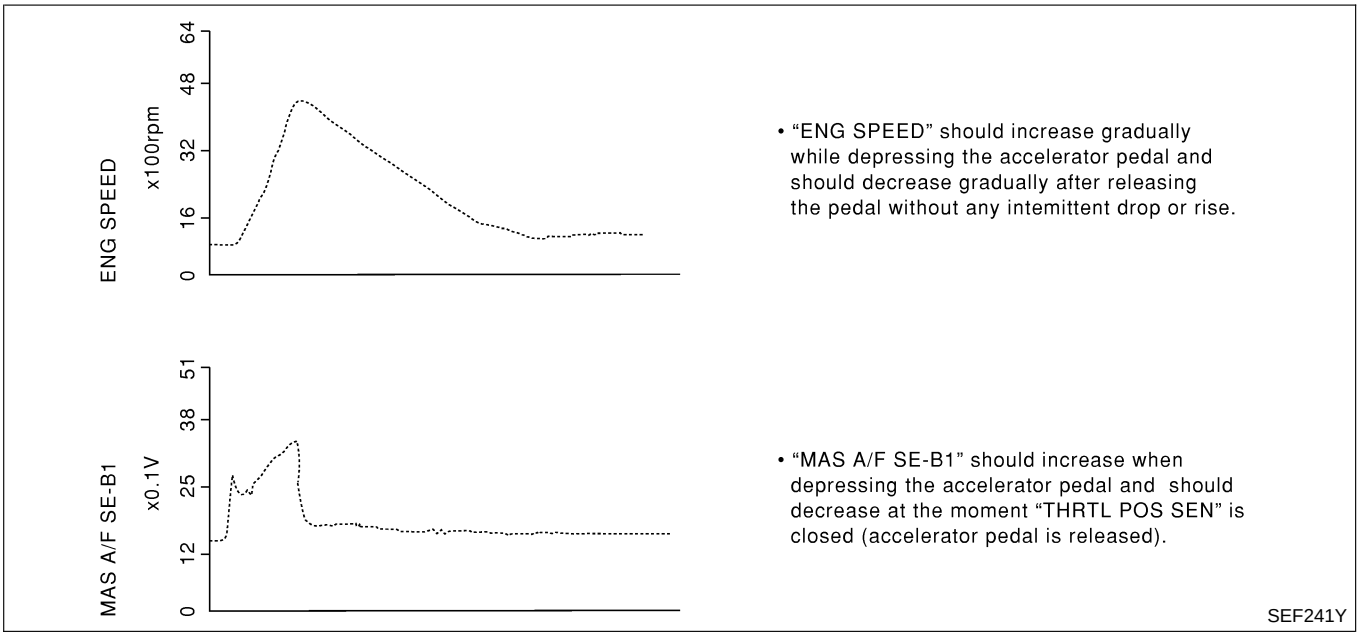
Below is the data for “CLSD THL POS”, “ACCEL SEN 1” and “THRTL SEN 1” when depressing the accelerator pedal with the ignition switch ON and with selector lever in D position (A/T models) or with shift lever in 1st position (M/T models).
The signal of “ACCEL SEN 1” and “THRTL SEN 1” should rise gradually without any intermittent drop or rise after “CLSD THL POS” is changed from ON to OFF.



ENG SPEED, MAS A/F SE-B1, THRTL SEN 1, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1

NAEC0043S02

Below is the data for “ENG SPEED”, “MAS A/F SE-B1”, “THRTL SEN 1”, “HO2S2 (B1)”, “HO2S1 (B1)” and “INJ PULSE-B1” when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.
Each value is for reference, the exact value may vary.

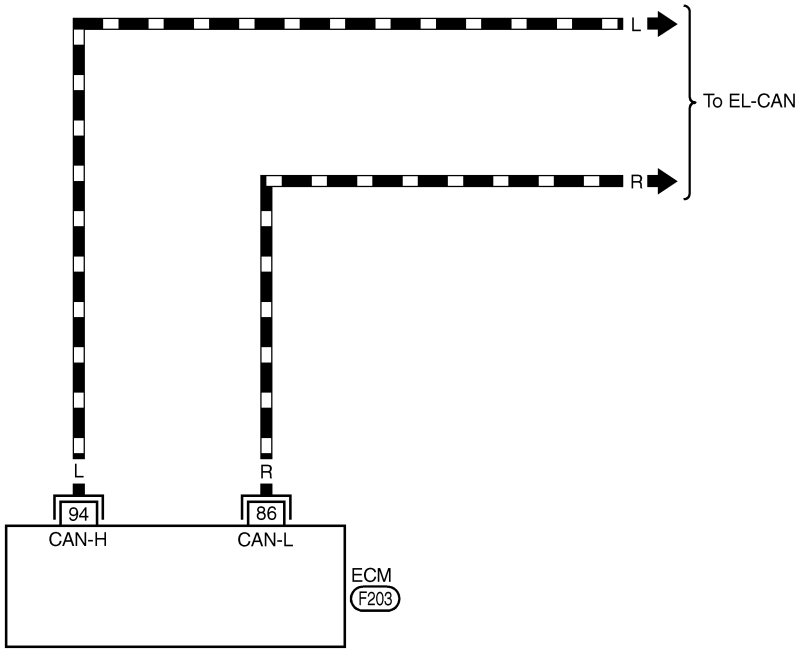


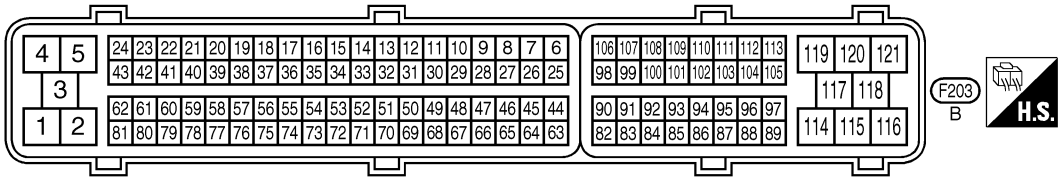
Wiring Diagram

NAEC1188

EC-CAN-01

: DATA LINE





MEC124E

On Board Diagnosis Logic

=NAEC1398

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P0102 0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM when engine is running.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor
P0103 0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor

FAIL-SAFE MODE

NAEC1398S01

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

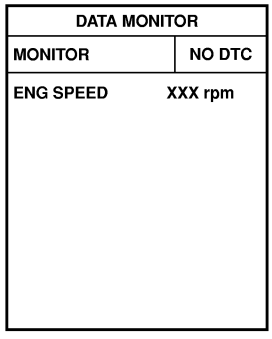
DTC Confirmation Procedure

NAEC1399

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

2



SEF058Y

PROCEDURE FOR DTC P0103

NAEC1399S01

With CONSULT-II

NAEC1399S0101

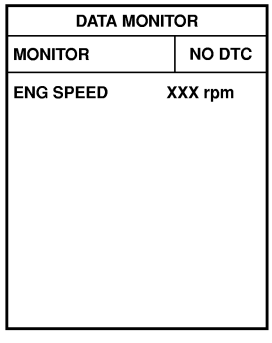
1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Wait at least 6 seconds.
4) If DTC is detected, go to “Diagnostic Procedure”, EC-197.

With GST

NAEC1399S0102

Follow the procedure “With CONSULT-II” above.

3



SEF058Y

PROCEDURE FOR DTC P0102

NAEC1399S02

With CONSULT-II

NAEC1399S0201

1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and wait at least 5 seconds.
4) If DTC is detected, go to “Diagnostic Procedure”, EC-197.

With GST

NAEC1399S0202

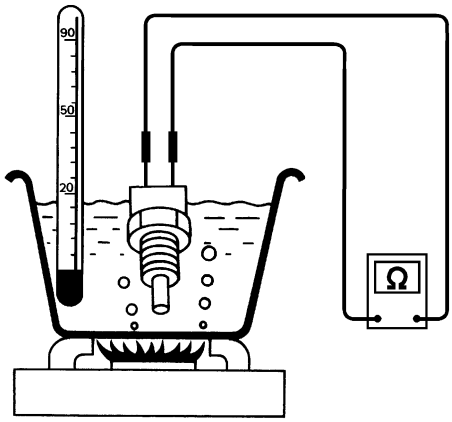
Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

NAEC1204

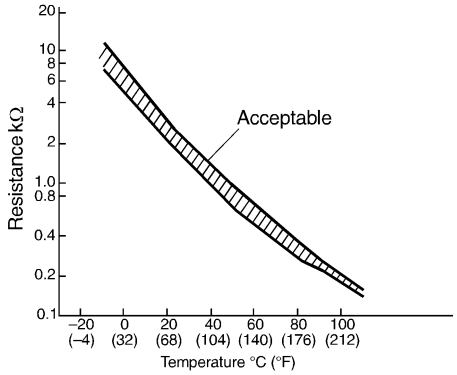
1	CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Remove engine coolant temperature sensor.
3. Check resistance between engine coolant temperature sensor terminals under the following conditions.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



SEF304X

OK or NG

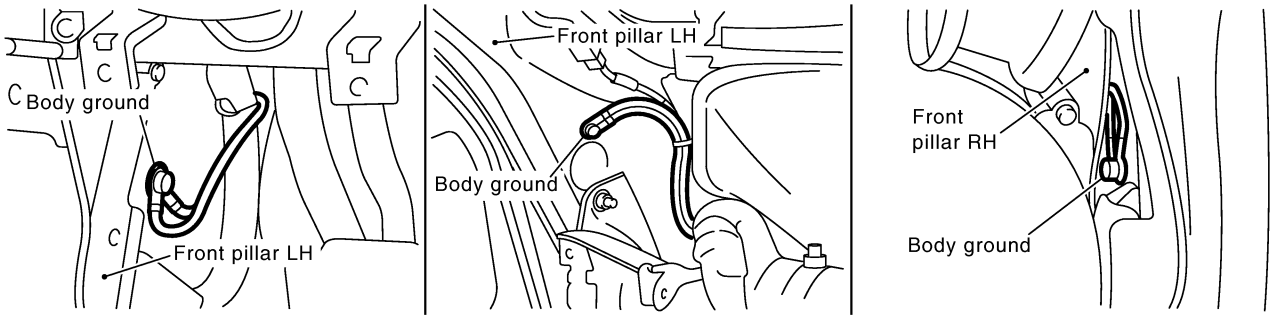
OK	▶	**INSPECTION END**
NG	▶	Replace engine coolant temperature sensor.

Diagnostic Procedure

NAEC0895

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



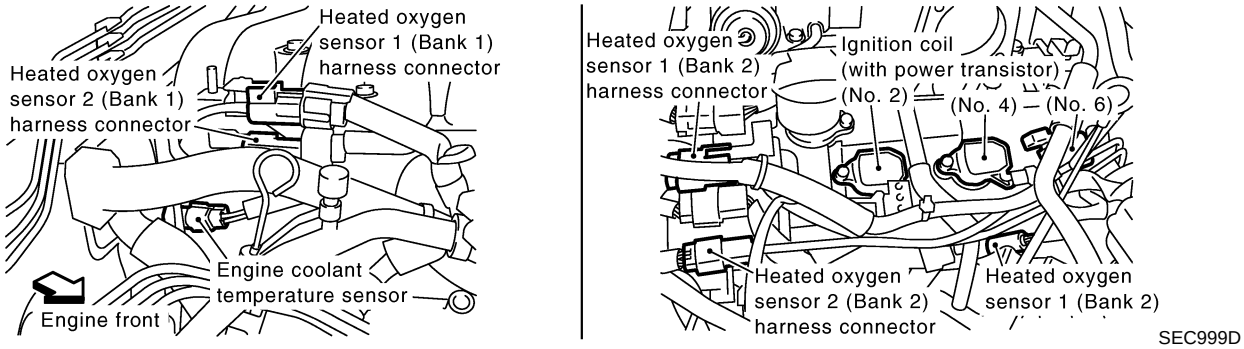
SEC997D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

2	CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.



SEC999D

2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S1 terminal 4 and ECM terminal 78.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	DETECT MALFUNCTIONING PART
Check the following. ● Fuel pump and circuit (Refer to EC-729.) ● Fuel pressure regulator (Refer to EC-57.) ● Fuel lines (Refer to MA-17, "Checking Fuel Lines".) ● Fuel filter for clogging	
▶	Repair or replace.

6	CHECK MASS AIR FLOW SENSOR
With CONSULT-II 1. Install all removed parts. 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. **2.0 - 6.0 g·m/sec: at idling** **7.0 - 20.0 g·m/sec: at 2,500 rpm**	
With GST 1. Install all removed parts. 2. Check mass air flow sensor signal in MODE 1 with GST. **2.0 - 6.0 g·m/sec: at idling** **7.0 - 20.0 g·m/sec: at 2,500 rpm**	
OK or NG	
OK ▶	GO TO 7.
NG ▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-194.

Diagnostic Procedure

NAEC0931

1	CHECK FOR INTAKE AIR LEAK	
1. Start engine and run it at idle speed. 2. Listen for the sound of the intake air leak. 3. Check PCV hose connection.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Discover air leak location and repair.

2	CHECK FOR EXHAUST SYSTEM CLOGGING	
1. Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace it.

3 PERFORM POWER BALANCE TEST

With CONSULT-II

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode.

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

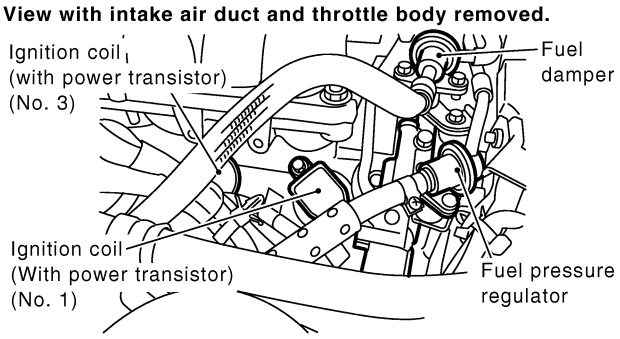
PBIB0133E

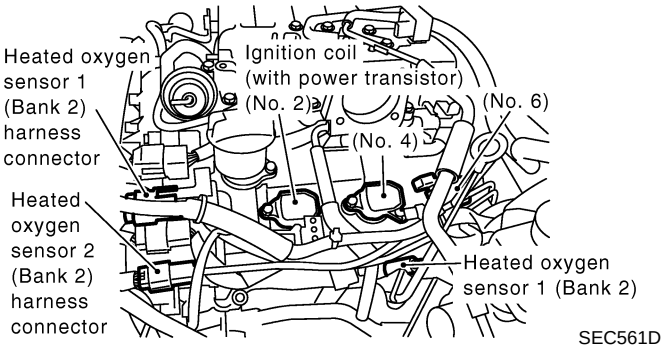
2. Is there any cylinder which does not produce a momentary engine speed drop?

Without CONSULT-II

When disconnecting each ignition coil harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?

View with intake air duct and throttle body removed.





SEC561D

Yes or No

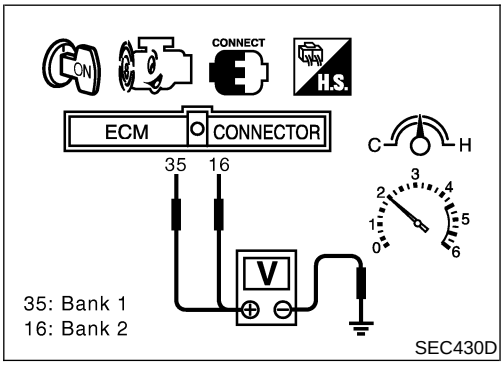
Yes	▶	GO TO 5.
No	▶	GO TO 4.

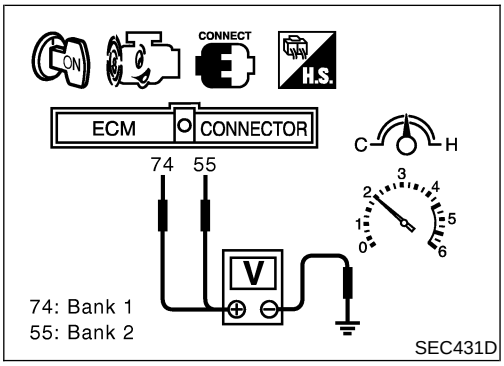
TEMP/S" indication on CONSULT-II.

d) When "COOLAN TEMP/S" indication reaches to 70°C (158°F), go to step 3.

10) Select "SELF-DIAG RESULTS" mode with CONSULT-II.

11) Confirm that the 1st trip DTC is not detected.
If the 1st trip DTC is detected, go to "Diagnostic Procedure", EC-335.





Overall Function Check

NAEC0953

Use this procedure to check the overall function of the warm-up three way catalyst. During this check, a 1st trip DTC might not be confirmed.

CAUTION:
Always drive vehicle at a safe speed.

WITH GST

NAEC0953S01

1) Start engine and warm it up to the normal operating temperature.
2) Turn ignition switch OFF and wait at least 10 seconds.
3) Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4) Let engine idle for 1 minute.
5) Set voltmeters probes between ECM terminals 35 [heated oxygen sensor 1 bank 1 signal], 16 [heated oxygen sensor 1 bank 2 signal] and ground, and ECM terminals 74 [heated oxygen sensor 2 bank 1 signal], 55 [heated oxygen sensor 2 bank 2 signal] and ground.
6) Keep engine speed at 2,000 rpm constant under no load.
7) Make sure that the voltage switching frequency (high & low) between ECM terminals 74 and ground, or 55 and ground is very less than that of ECM terminals 35 and ground, or 16 and ground.
Switching frequency ratio = A/B
A: Heated oxygen sensor 2 voltage switching frequency
B: Heated oxygen sensor 1 voltage switching frequency
This ratio should be less than 0.75.
If the ratio is greater than above, it means warm-up three way catalyst does not operate properly. Go to "Diagnostic Procedure", EC-335.

NOTE:
If the voltage at terminal 16 or 35 does not switch periodically more than 5 times within 10 seconds at step 5, perform trouble diagnosis for "DTC P0133, P0153" first. (See EC-233.)

Diagnostic Procedure

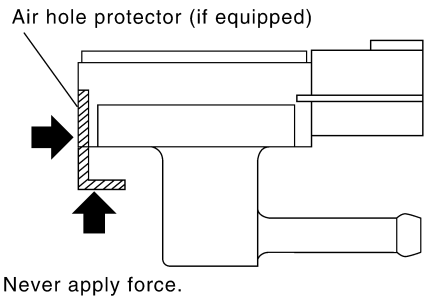
NAEC0954

1	CHECK EXHAUST SYSTEM	
Visually check exhaust tubes and muffler for dent. **OK or NG**		
OK	▶	GO TO 2.
NG	▶	Repair or replace.

26	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**

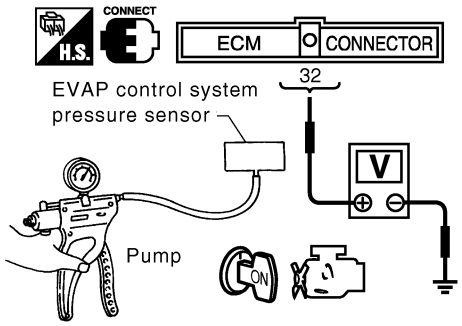
13	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
   - **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

2. Remove EVAP control system pressure sensor from EVAP canister.
   Do not reuse the O-ring, replace it with a new one.
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch ON and check output voltage between ECM terminal 32 and ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
–26.7 (–200, –7.87)	2.1 to 2.5V lower than above value

SEC422D

CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (−700 mmHg, −27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).**
- **Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5m (19.7in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace EVAP control system pressure sensor.

14	CHECK RUBBER TUBE

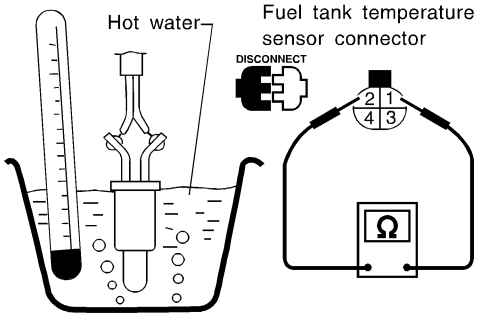
Check obstructed rubber tube connected to EVAP canister vent control valve.

OK or NG

OK	▶	GO TO 15.
NG	▶	Clean rubber tube using an air blower, repair or replace rubber tube.

18	CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit terminals 1 and 2 by heating with hot water or heat gun as shown in the figure.



Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

SEF974Y

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace fuel level sensor unit.

4	PERFORM DTC CONFIRMATION PROCEDURE
With CONSULT-II 1. Turn ignition switch ON. 2. Select "SELF DIAG RESULTS" mode with CONSULT-II. 3. Touch "ERASE". 4. **Perform "DTC Confirmation Procedure".** See EC-443. 5. Is the 1st trip DTC P1065 displayed again?	
With GST 1. Turn ignition switch ON. 2. Select MODE 4 with GST. 3. Touch "ERASE". 4. **Perform "DTC Confirmation Procedure".** See EC-443. 5. Is the 1st trip DTC P1065 displayed again?	
Yes or No	
Yes ▶	GO TO 5.
No ▶	**INSPECTION END**

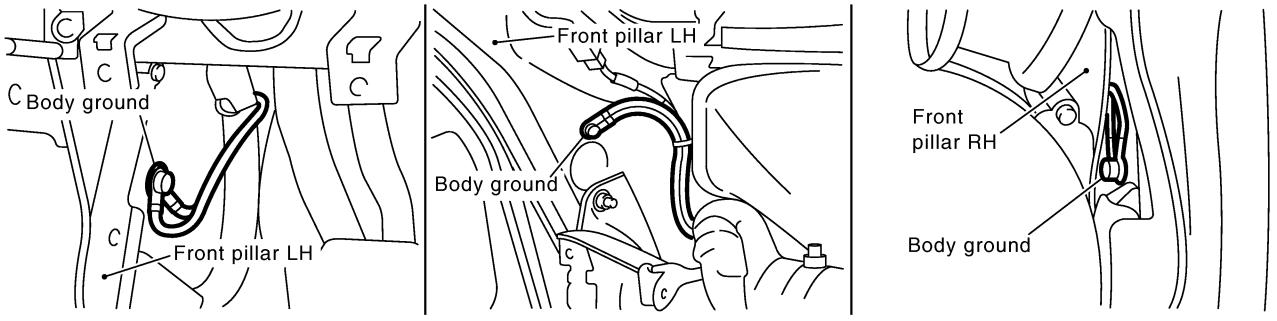
5	REPLACE ECM
1. Replace ECM. 2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)", EC-93. 3. Perform "Accelerator Pedal Released Position Learning", EC-73. 4. Perform "Throttle Valve Closed Position Learning", EC-73. 5. Perform "Idle Air Volume Learning", EC-73.	
▶	**INSPECTION END**

Diagnostic Procedure

NAEC1266

1	CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to “Ground Inspection”, EC-165.



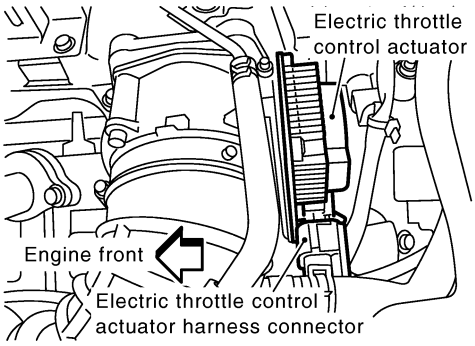
SEC997D

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace ground connections.

2	CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Disconnect electric throttle control actuator harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.
   Refer to Wiring Diagram.



SEC433D

Electric throttle control actuator terminal	ECM terminal	Continuity
3	5	Should not exist
	4	Should exist
6	5	Should exist
	4	Should not exist

MTBL1377

4. Also check harness for short to ground and short to power.

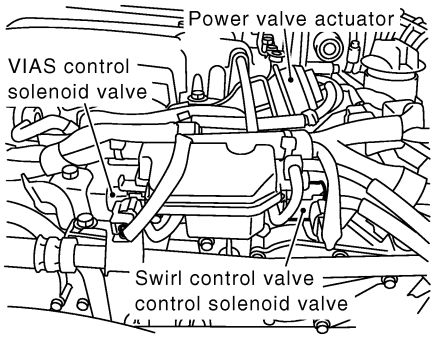
OK or NG

OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect the disconnected harness connectors.
2. Start engine and let it idle.
3. Remove vacuum hose connected to swirl control valve actuator.
4. Select "SWIRL CONT SOL VALVE" in "ACTIVE TEST" mode with CONSULT-II.
5. Touch "ON" and "OFF" on CONSULT-II screen.
6. Check vacuum existence and operation delay time under the following conditions.



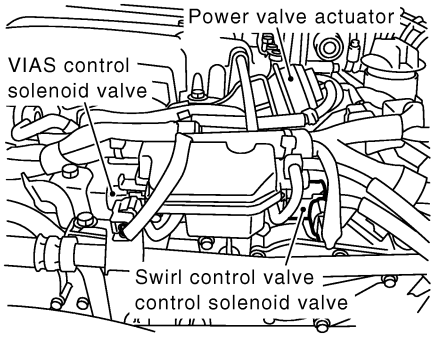
SWIRL CONT SOL VALVE	Vacuum
ON	Should exist.
OFF	Should not exist.

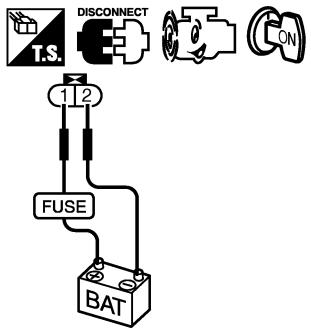
Operation takes less than 1 second.

SEC540D

Without CONSULT-II

1. Reconnect ECM harness connector.
2. Remove vacuum hose connected to swirl control valve actuator.
3. Start engine and let it idle.
4. Apply 12V of direct current between swirl control valve control solenoid valve terminals 1 and 2.
5. Check vacuum existence and operation delay time under the following conditions.





Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.

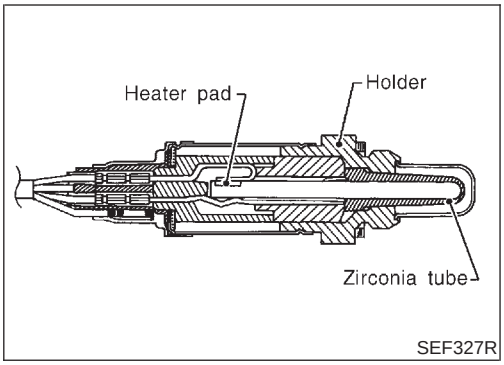
Operation takes less than 1 second.

SEC541D

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace intake manifold collector assembly.

7	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-155.	
▶	**INSPECTION END**



Component Description

NAEC1169

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NAEC1170

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	• Engine: After warming up • After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle up to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ⟷ RICH

ECM Terminals and Reference Value

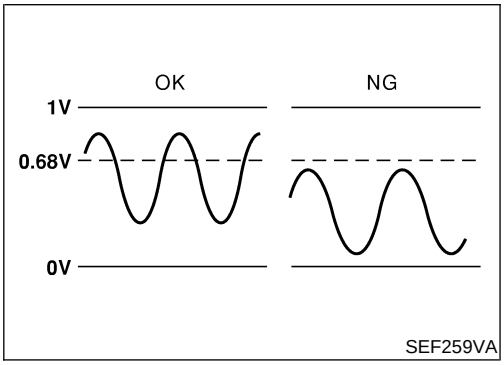
NAEC1171

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
55	OR/L	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** • **Warm-up condition** • Revving engine from idle up to 3,000 rpm after the following conditions are met. • After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
74	OR	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** • **Warm-up condition** • Revving engine from idle up to 3,000 rpm after the following conditions are met. • After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V



On Board Diagnosis Logic

NAEC1172

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.

With GST

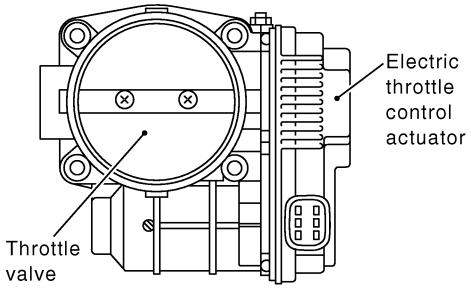
Follow the procedure "With CONSULT-II" above.

Diagnostic Procedure

NAEC1282

1	CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve and the housing.



SEC513D

OK or NG

OK	▶	GO TO 2.
NG	▶	Remove the foreign matter and clean the electric throttle control actuator inside.

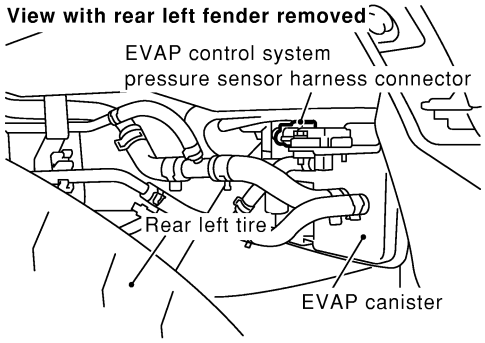
2	REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform "Throttle Valve Closed Position Learning", EC-73.
3. Perform "Idle Air Volume Learning", EC-73.

	▶	**INSPECTION END**

4	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.



SEC931C

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair it.

5	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

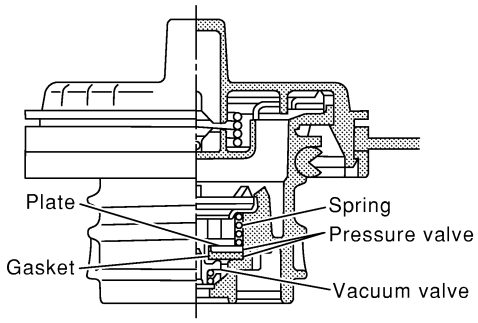
1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.
   Water should not exist.

OK or NG

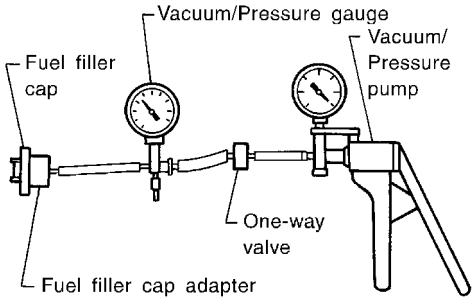
OK	▶	GO TO 6.
NG	▶	Replace EVAP control system pressure sensor.

4	CHECK FUEL TANK VACUUM RELIEF VALVE

1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.



SEF445Y



SEF943S

Pressure:
15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum:
−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)

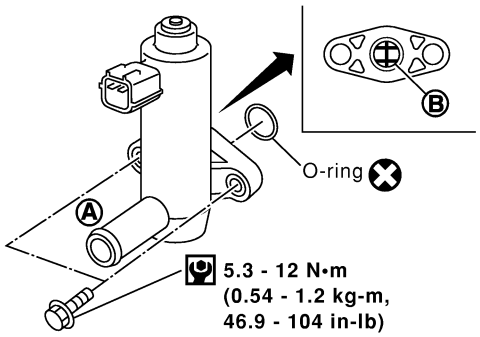
CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

14	CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



SEF376Z

OK or NG

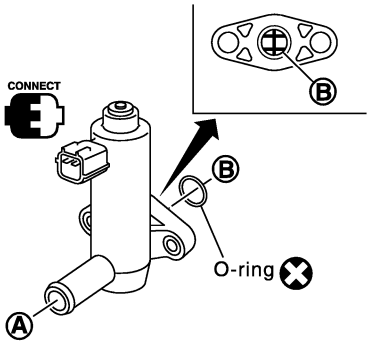
OK	▶	GO TO 15.
NG	▶	Replace EVAP canister vent control valve.

15	CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness disconnected connectors.
2. Turn ignition switch ON.
3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time.

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN



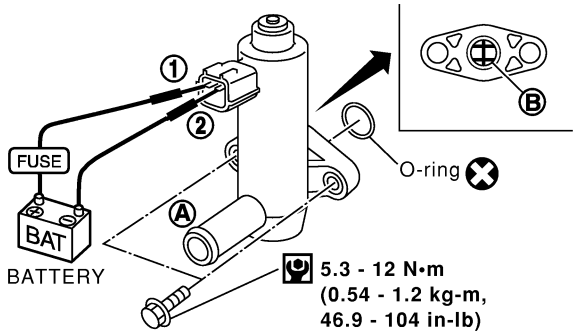
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEC158D

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.

SEF378Z

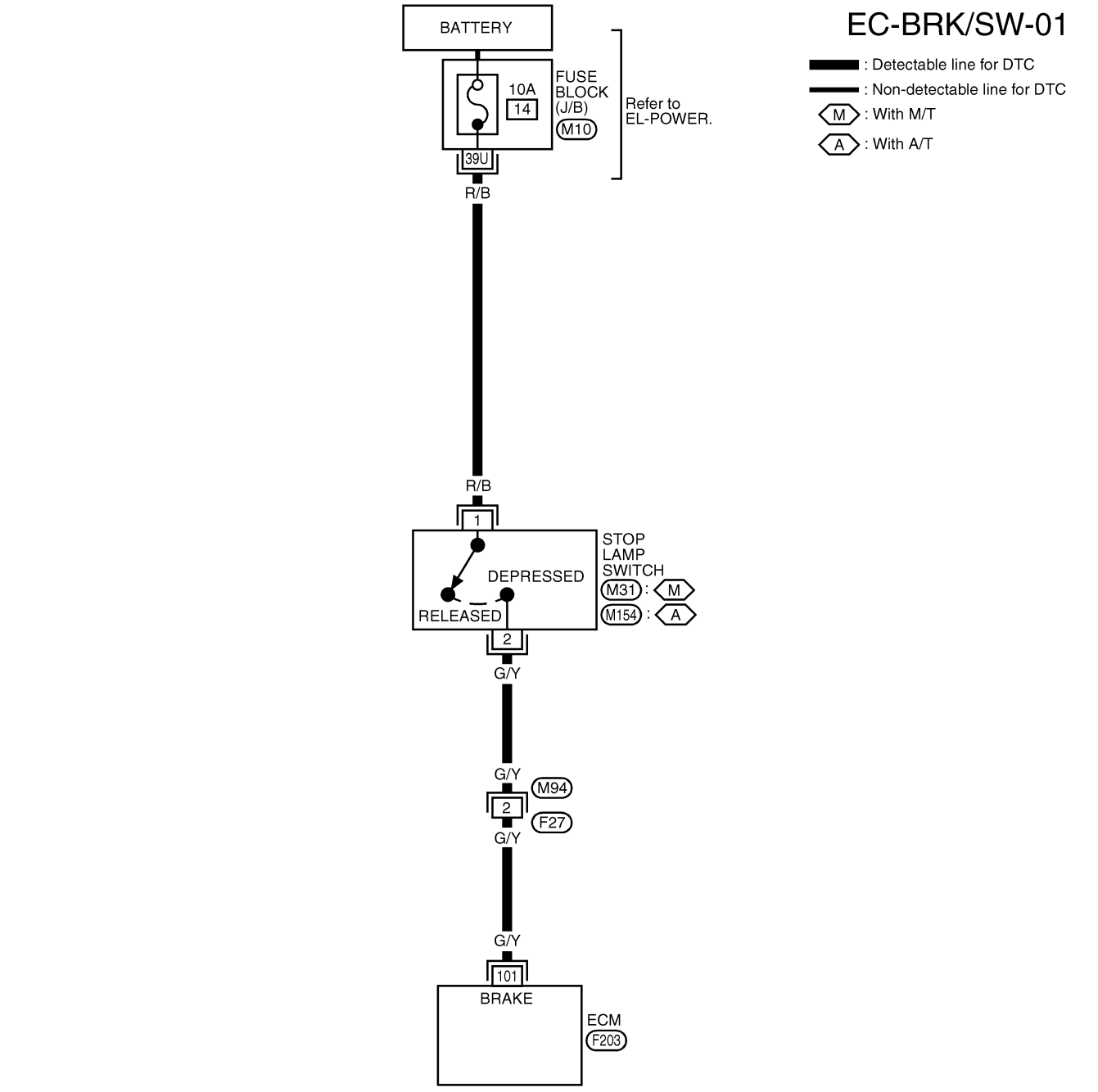
Make sure new O-ring is installed properly.

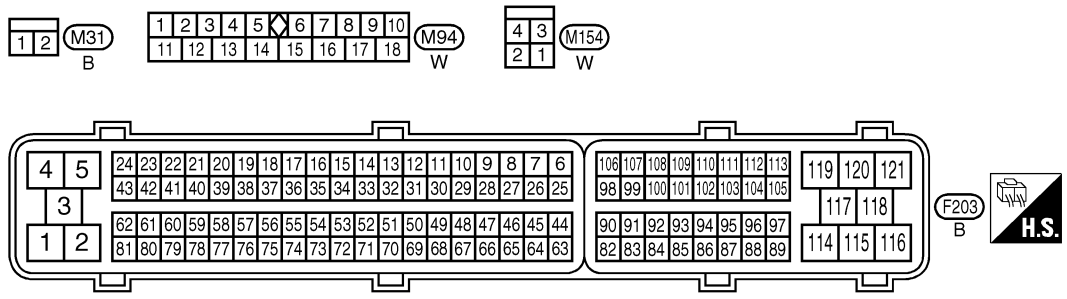
OK or NG

OK	▶	GO TO 17.
NG	▶	GO TO 16.

Wiring Diagram

NAEC1312





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

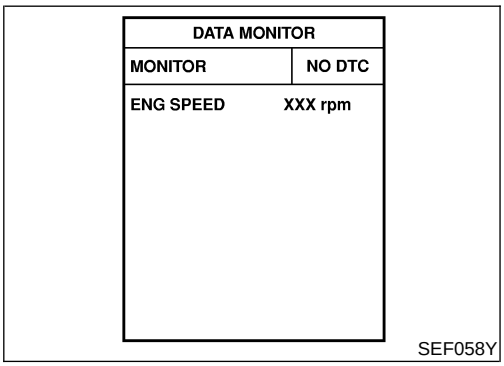
MEC120E

DTC Confirmation Procedure

NAEC1343

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.



With CONSULT-II

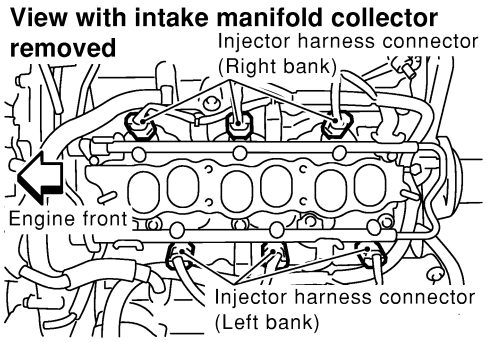
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to “Diagnostic Procedure”, EC-701.

With GST

Follow the procedure “WITH CONSULT-II” above.

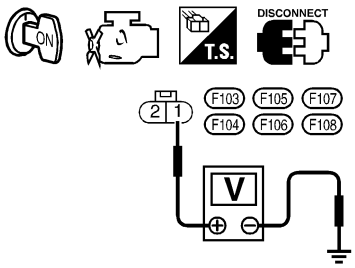
3	CHECK INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect injector harness connector.



SEF023Z

3. Turn ignition switch ON.
4. Check voltage between injector terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF364Z

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M33, F22
- Harness connectors F5, F100
- Fuse block (J/B) connector M10
- 10A fuse
- Harness for open or short between injector and fuse

	▶	Repair harness or connectors.

5	CHECK INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between injector terminal 2 and ECM terminals 23, 22, 21, 42, 41, 40. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

3	CHECK REAR WINDOW DEFOGGER FUNCTION

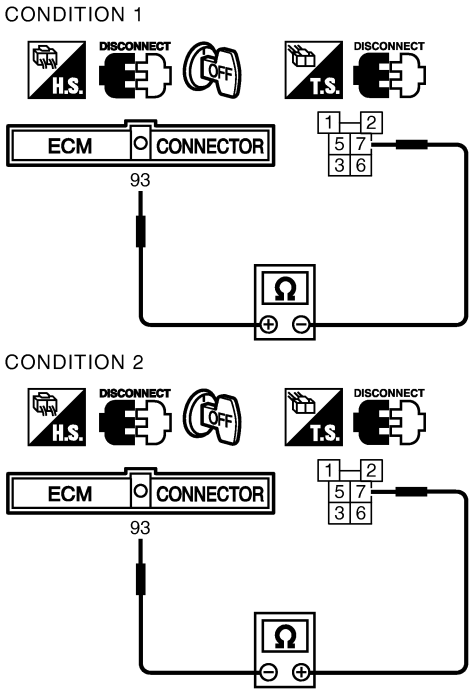
1. Start engine.
2. Turn ON the rear window defogger switch.
3. Check the rear windshield. Is the rear windshield heated up?

Yes or No

Yes	▶	GO TO 4.
No	▶	Refer to EL-192, "Rear Window Defogger".

4	CHECK REAR WINDOW DEFOGGER INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect rear window defogger relay.
4. Check harness continuity between ECM terminal 93 and rear window defogger relay terminal 7.



SEC569D

CONDITION	CONTINUITY
1	Should exist.
2	Should not exist.

MTBL1376

5. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

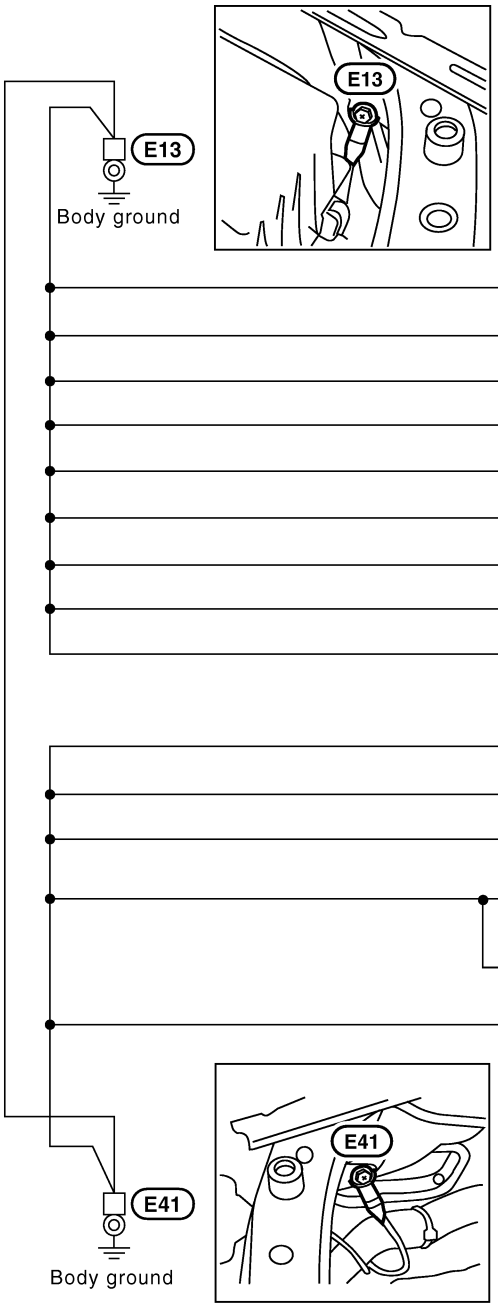
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E1, M1
- Harness connectors M33, F22
- Diode M37
- Harness for open and short between ECM and rear window defigger relay

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

ENGINE ROOM HARNESS

NAEL0250S02



CON-NECTOR NUMBER	CONNECT TO
E7	Combination switch (Lighting switch)
E8	Combination switch (Lighting switch)
E9	Combination switch (front wiper switch)
E12	Parking lamp LH, Front turn signal lamp LH
E24	ATP relay (With A/T and part-time 4-wheel drive)
E28	Brake fluid level switch
E45	Daytime light control unit
E62	Front fog lamp RH
E114	Combination switch (rear wiper switch)
E40	Parking lamp RH, Front turn signal lamp RH
E42	Washer level switch (For Canada)
E61	Front fog lamp LH
E95	Transfer shift Hi relay (With all-mode 4-wheel drive)
E99	Transfer shift Low relay (With all-mode 4-wheel drive)
E140	Front wiper motor

MEL129S

- through 10A fuse [No. 10, located in the fuse block (J/B)].

When the ignition switch is in the START position, power is supplied

- to daytime light control unit terminal 2
- through 7.5A fuse [No. 26, located in the fuse block (J/B)].

HEADLAMP OPERATION

NAEL0264S01

Power Supply to Low Beam and High Beam

NAEL0264S0101

When lighting switch is in 2ND or PASS position, ground is supplied

- to headlamp relay (LH and RH) terminal 2 from smart entrance control unit terminals 21 and 59
- through smart entrance control unit terminals 22 and 60
- from lighting switch terminal 12.

Headlamp relays (LH and RH) are energized and then power is supplied to headlamps (LH and RH).

Low Beam Operation

NAEL0264S0102

When the lighting switch is turned to 2ND and LOW ("B") positions, ground is supplied

- to terminal 2 of the headlamp LH
- through daytime light control unit terminals 11 and 15
- through lighting switch terminals 7 and 5
- through body grounds E13 and E41.

Ground is also supplied

- to terminal 2 of the headlamp RH
- through daytime light control unit terminals 8 and 12
- through lighting switch terminals 10 and 8
- through body grounds E13 and E41.

With power and ground supplied, the low beam headlamps illuminate.

High Beam Operation/Flash-to-pass Operation

NAEL0264S0103

When the lighting switch is turned to 2ND and HIGH ("A") or PASS ("C") positions, ground is supplied

- to terminal 1 of headlamp LH
- through daytime light control unit terminals 10 and 13, and
- to combination meter terminal 27 for the HIGH BEAM indicator
- through lighting switch terminals 6 and 5
- through body grounds E13 and E41.

Ground is also supplied

- to terminal 1 of headlamp RH
- through daytime light control unit terminals 9 and 14
- through lighting switch terminals 9 and 8
- through body grounds E13 and E41.

With power and ground supplied, the high beam headlamps and HIGH BEAM indicator illuminate.

EXTERIOR LAMP BATTERY SAVER CONTROL

NAEL0264S02

Except for Auto Light Control Operation

NAEL0264S0201

Headlamps will remain on for a short while after the ignition switch is turned from ON (or ACC) to OFF.
Continuity between terminals 21 and 22, and between terminals 59 and 60 of smart entrance control unit will be disturbed after 5 minutes, then the headlamps will be turned off.
When the lighting switch is turned from OFF to 2ND after headlamps are turned to off by the exterior lamp battery saver control, ground is supplied

- to smart entrance control unit terminals 20 and 58 from lighting switch terminal 11, and then,
- to headlamp LH and RH relays terminal 2 from smart entrance control unit terminals 21 and 59,
- through smart entrance control unit terminals 22 and 60 and
- through lighting switch terminal 12.

Then headlamps illuminate again.

System Description

NAEL0280

OUTLINE

NAEL0280S01

Power is supplied at all times
- to headlamp RH relay terminals 1 and 3
- through 15A fuse (No. 59, located in the fuse and fusible link box), and
- to smart entrance control unit terminal 49
- through 7.5A fuse [No. 24, located in the fuse block (J/B)], and
- to front fog lamp relay terminal 3
- through 15A fuse (No. 53, located in the fuse and fusible link box).

When ignition switch is in ON or START position, power is supplied
- to smart entrance control unit terminal 27
- through 7.5A fuse [No. 11, located in the fuse block (J/B)].

When the ignition switch is in the ACC or ON position, power is supplied
- to smart entrance control unit terminal 26
- through 10A fuse [No. 10, located in the fuse block (J/B)].

Ground is supplied
- to smart entrance control unit terminals 43 and 64
- through body grounds M4, M66, M111, M147 and M157.

When lighting switch is in 2ND position, ground is supplied
- to headlamp RH relay terminal 2 from smart entrance control unit terminals 21 and 59.
- through smart entrance control unit terminals 22 and 60,
- through lighting switch terminal 12, and
- through body grounds E13 and E41.

Headlamp RH relay is then energized.

FOG LAMP OPERATION

NAEL0280S02

The front fog lamp switch is built into the combination switch. The lighting switch must be in the 2ND position and LOW (“B”) position for front fog lamp operation.
With the front fog lamp switch in the ON position, ground is supplied
- to front fog lamp relay terminal 1
- through the front fog lamp switch, lighting switch and body grounds E13 and E41.

The front fog lamp relay is energized and power is supplied
- from front fog lamp relay terminal 5
- to terminal 1 of each front fog lamp.

Ground is supplied to terminal 2 of each front fog lamp through body grounds E13 and E41.
With power and ground supplied, the front fog lamps illuminate.

EXTERIOR LAMP BATTERY SAVER CONTROL

NAEL0280S03

Front fog lamps will remain on for a short while after the ignition switch is turned from ON (or ACC) to OFF. Continuity between terminals 21 and 22, and between terminals 59 and 60 of smart entrance control unit will be disturbed after 5 minutes, then the front fog lamps will be turned off.
When the lighting switch is turned from OFF to 2ND after front fog lamps are turned off by the battery saver control, ground is supplied
- to smart entrance control unit terminals 20 and 58 from lighting switch terminal 11, and then
- to headlamp RH relay terminal 2 from smart entrance control unit terminal 21 and 59
- through smart entrance control unit terminal 22 and 60 from lighting switch terminal 12.

Then the front fog lamps illuminate again.

NOTE:
For Trouble Diagnoses for battery saver control, refer to “HEADLAMP (FOR USA)”, EL-44.

CONSULT-II Application Items

NAEL0294

"INT LAMP"
Data Monitor

NAEL0294S01

NAEL0294S0101

Monitored Item	Description
IGN ON SW	Indicates [ON/OFF] condition of ignition switch.
DOOR SW-RR	Indicates [ON/OFF] condition of ignition switch.
KEY ON SW	Indicates [ON/OFF] condition of key switch.
DOOR SW-DR	Indicates [ON/OFF] condition of front door switch LH.
DOOR SW-AS	Indicates [ON/OFF] condition of front door switch RH.
LOCK SW DR/AS	Indicates [ON/OFF] condition of front door lock switch.
UNLK SW DR/AS	Indicates [ON/OFF] condition of front door lock switch.
KEY CYL LK-SW	Indicates [ON/OFF] condition of front door key cylinder switch.
KEY CYL UN-SW	Indicates [ON/OFF] condition of front door key cylinder switch.
LK BUTTON/SIG	Indicates [ON/OFF] condition of unlock signal from keyfob.
UN BUTTON/SIG	Indicates [ON/OFF] condition of unlock signal from keyfob.

Active Test

NAEL0294S0102

Test Item	Description
INT LAMP	This test enables to check interior lamp operation. When "ON" on CONSULT-II screen is touched: ● Interior lamp turns on when the switch is at DOOR. (Smart entrance control unit supplies power and ground to interior lamp.)
IGN ILLUM	This test enables to check ignition key hole illumination operation. The illumination turns on when "ON" on CONSULT-II screen is touched.
STEP LAMP	This test enables to check step lamp operation. The illumination turns on when "ON" on CONSULT-II screen is touched.

NOTE:
Even though ignition key hole illumination and step lamp are actually displayed on the CONSULT-II screen, those are not equipped, therefore, they cannot be activated.

Work Support

NAEL0294S0103

Work Item	Description
ROOM LAMP TIMER SET	Interior lamp timer mode can be changed by mode setting. Selects ON-OFF of the room lamp illumination at the time the driver door is unlocked. ● MODE 1 (ON)/MODE 2 (OFF) **NOTE:** Even though ignition keyhole illumination and step lamp are actually displayed on the CONSULT-II screen, those are not equipped, therefore, they cannot be activated.

"BATTERY SAVER"
Data Monitor

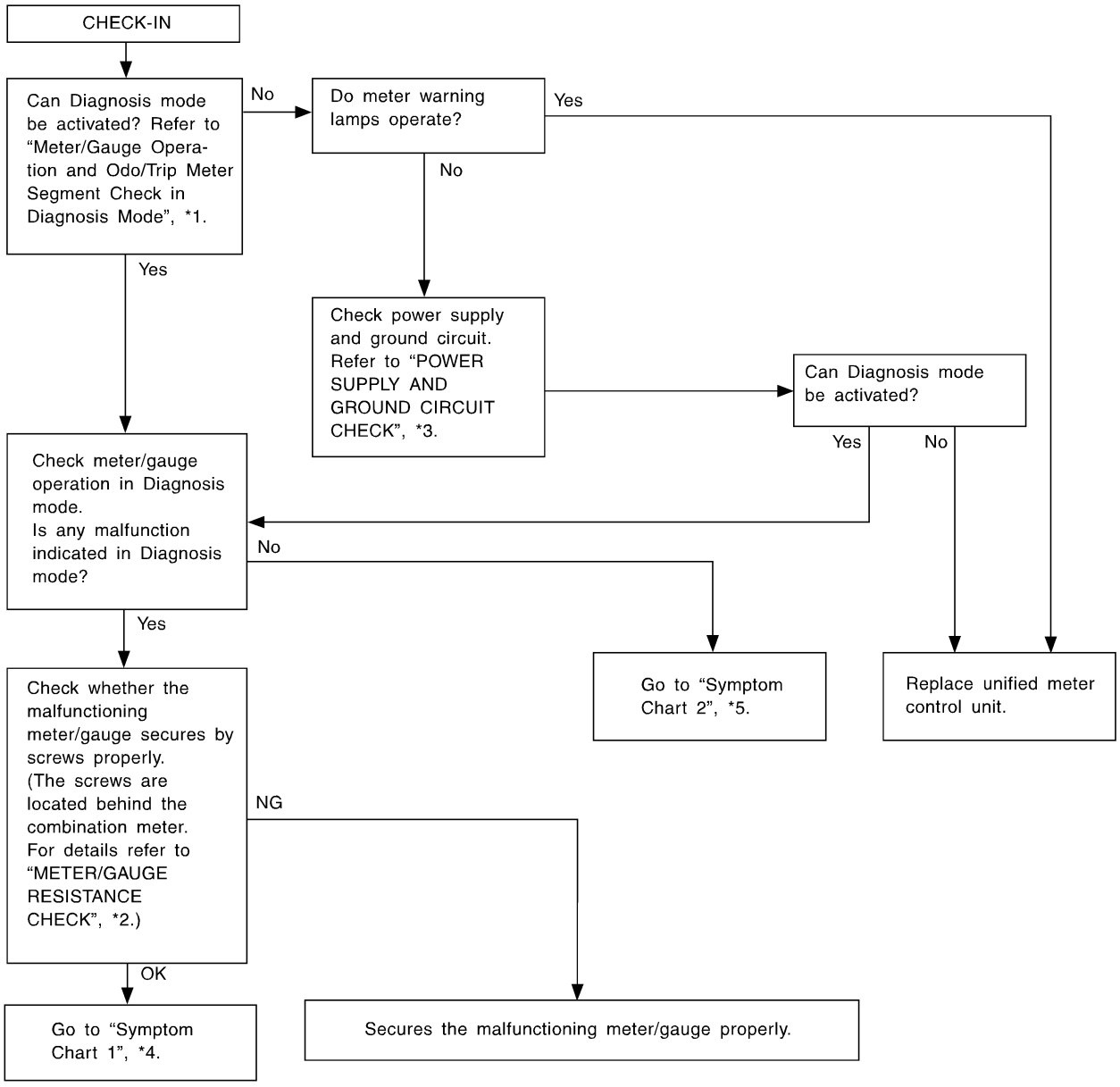
NAEL0294S02

NAEL0294S0201

Monitored Item	Description
IGN ON SW	Indicates [ON/OFF] condition of ignition switch.
DOOR SW-RR	Indicates [ON/OFF] condition of ignition switch.
KEY ON SW	Indicates [ON/OFF] condition of key switch.
DOOR SW-DR	Indicates [ON/OFF] condition of front door switch LH.

PRELIMINARY CHECK FOR FINE VISION METER

NAEL0302S12



SEL361W

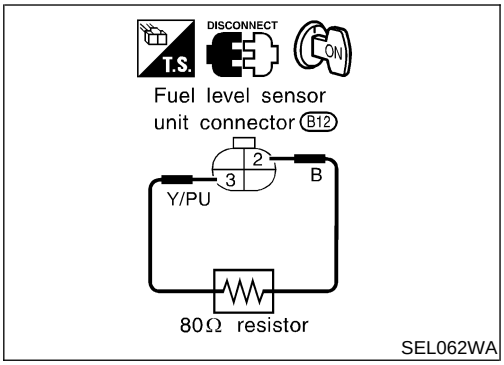
*1: Meter/Gauge Operation and Odo/Trip Meter Segment Check in Diagnosis Mode (EL-133)

*2: METER/GAUGE RESISTANCE CHECK FOR FINE VISION METER (EL-140)

*3: POWER SUPPLY AND GROUND CIRCUIT CHECK (EL-137)

*4: Symptom Chart 1 (EL-136)

*5: Symptom Chart 2 (EL-136)



SEL062WA

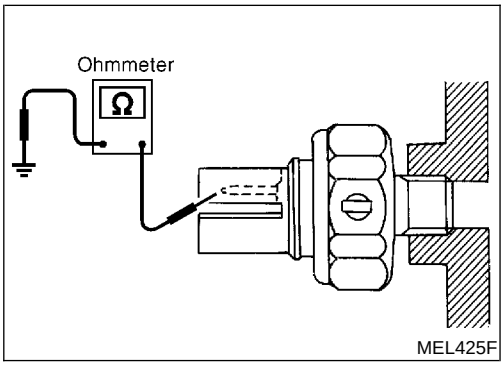
Fuel Warning Lamp Sensor Check

NAEL0310

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor unit harness connector B12.
3. Connect a resistor (80Ω) between fuel tank gauge unit harness connector terminals 2 and 3.
4. Turn ignition switch “ON”.

The fuel warning lamp should come on.

NOTE:
ECM might store the 1st trip DTC P0180 during this inspection.
If the DTC is stored in ECM memory, erase the DTC after reconnecting fuel tank gauge unit harness connector.
Refer to EC-78, “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”.



MEL425F

Electrical Components Inspection

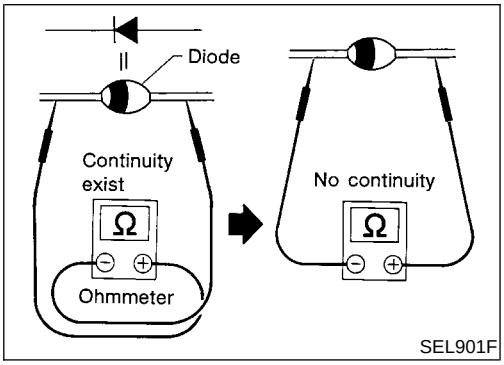
NAEL0311

OIL PRESSURE SWITCH CHECK

NAEL0311S01

Condition	Oil pressure kPa (kg/cm^2, psi)	Continuity
Engine running	More than 10 - 20 (0.1 - 0.2, 1 - 3)	No
Engine stopped	Less than 10 - 20 (0.1 - 0.2, 1 - 3)	Yes

Check the continuity between the terminals of oil pressure switch and body ground.



SEL901F

DIODE CHECK

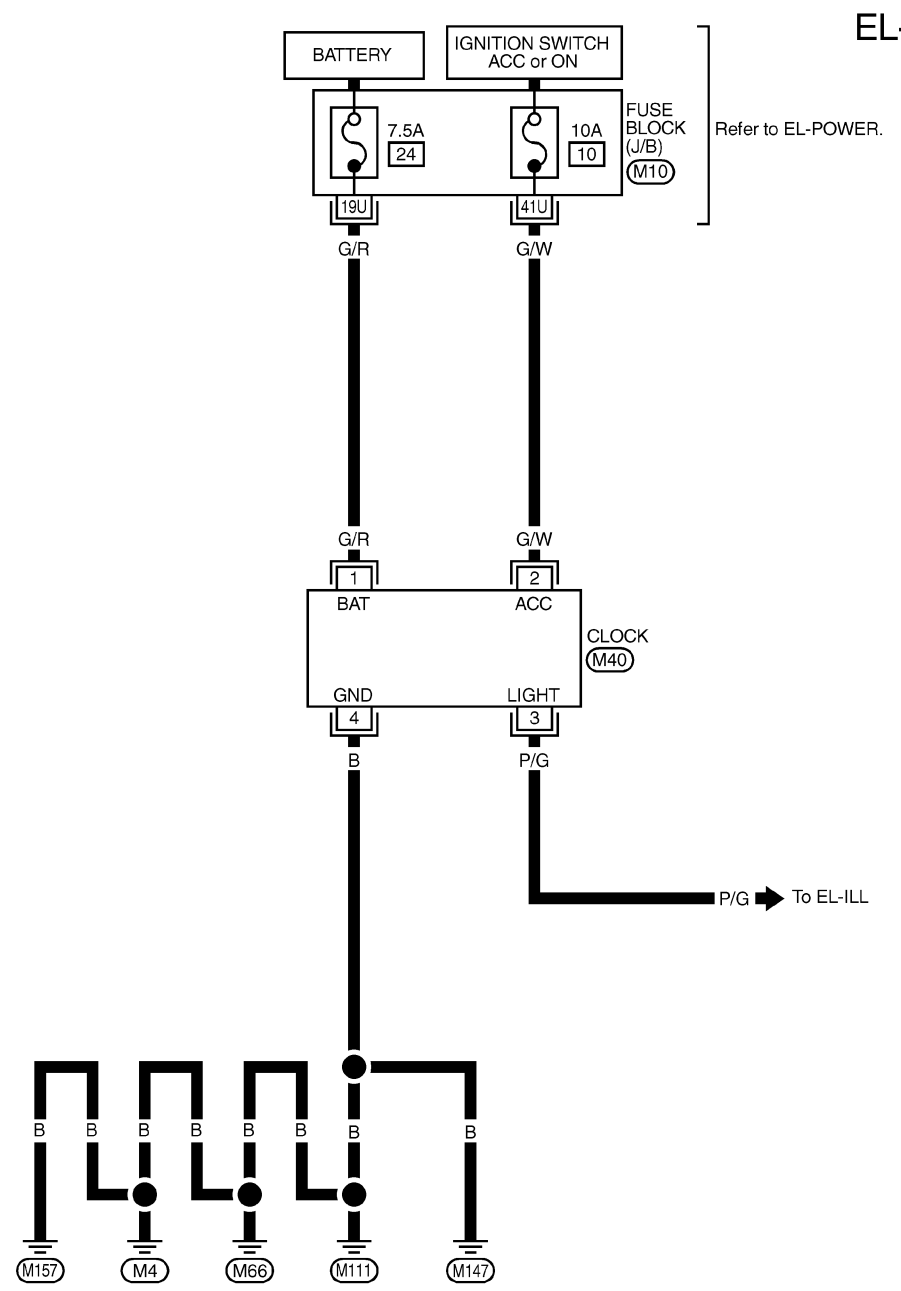
NAEL0311S02

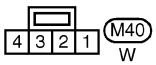
- Check continuity using an ohmmeter.
- Diode is functioning properly if test results are as shown in the figure at left.
- Check diodes at the combination meter harness connector instead of checking them on the combination meter assembly. Refer to EL-146, “WARNING LAMP” wiring diagrams.

NOTE:
Specification may vary depending on the type of tester. Before performing this inspection, be sure to refer to the instruction manual for the tester to be used.

Wiring Diagram — CLOCK —

NAEL0332





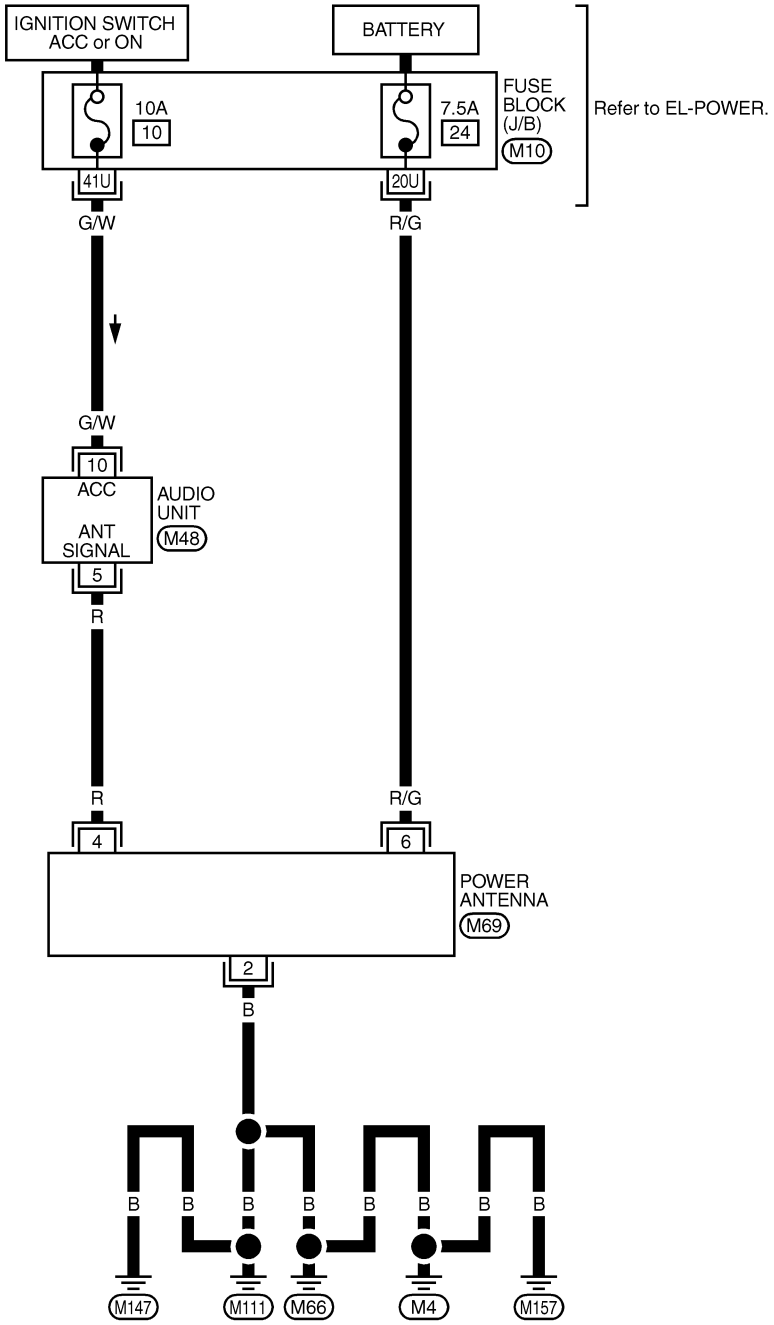
REFER TO THE FOLLOWING.
M10 -FUSE BLOCK-
JUNCTION BOX (J/B)

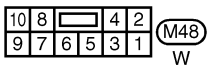
MEL947R

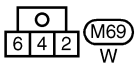
Wiring Diagram — P/ANT —

NAEL0351

EL-P/ANT-01







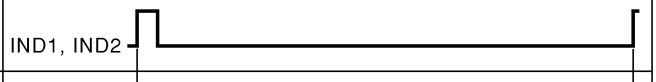
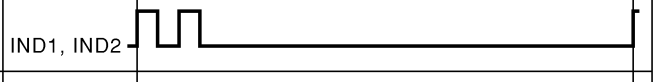
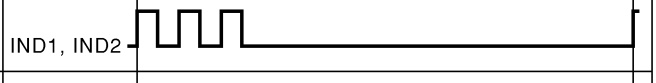
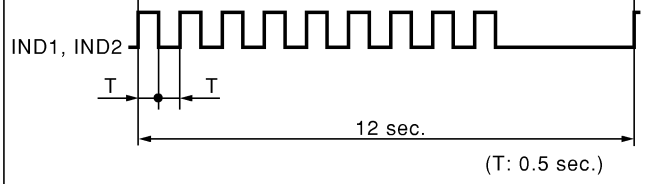
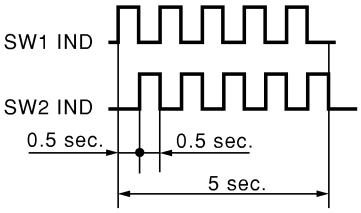
REFER TO THE FOLLOWING.
M10 - FUSE BLOCK - JUNCTION BOX (J/B)

MEL009Q

MALFUNCTION CODE TABLE

=NAEL0368S02

In this mode, a malfunction code is indicated by the number of flashes from the automatic drive positioner indicator lamps (indicator lamp 1, indicator lamp 2) as shown below.

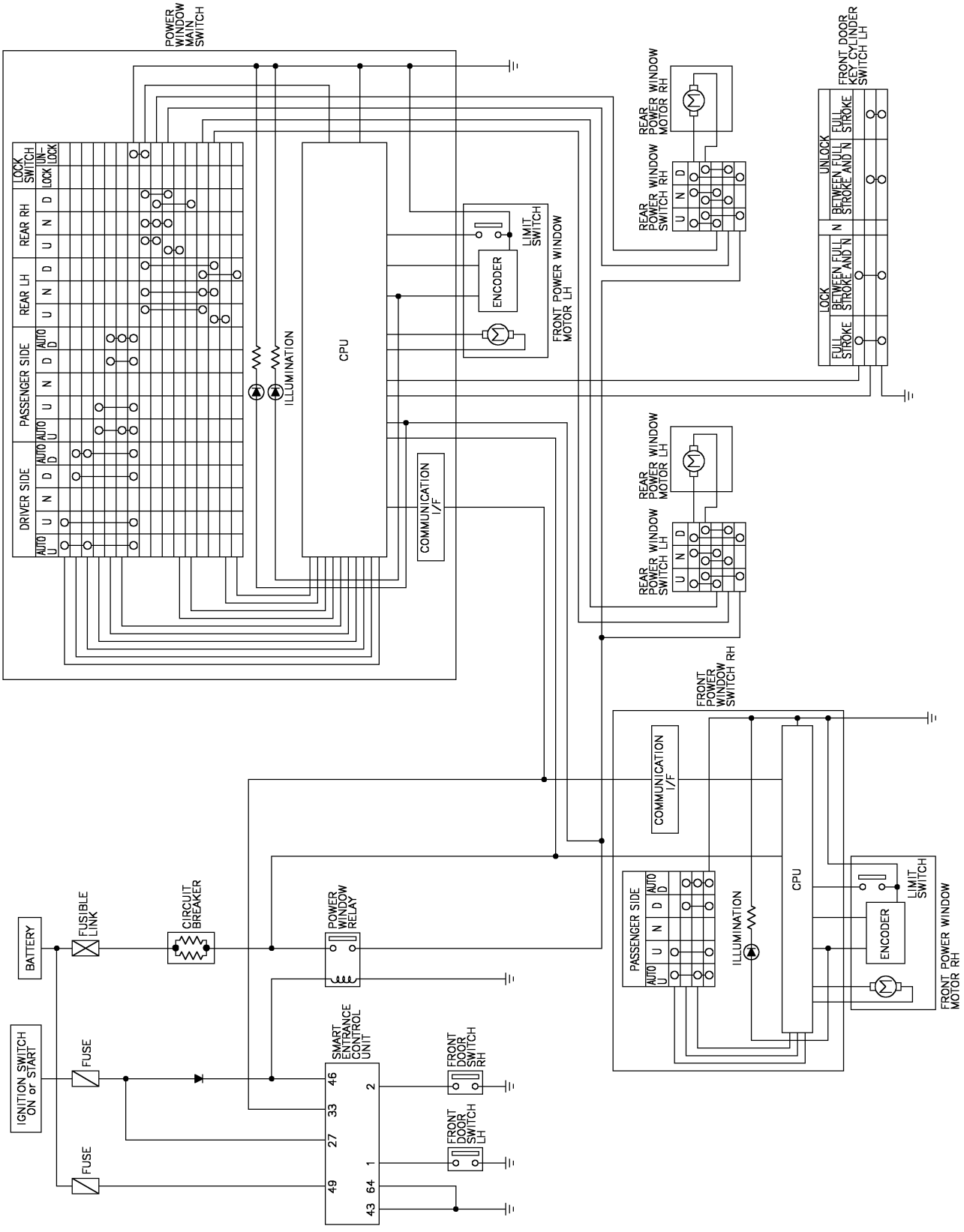
Code No.	Detected items	Indication of seat memory switches 1 and 2	Explanation
1	Seat sliding		While the seat motors are moving for 2.5 seconds, if the number of seat sliding/reclining/lifting encoder pulses changes 2 times or less, the seat device is determined to be malfunctioning.
2	Seat reclining		
3	Seat lifting front		
4	Seat lifting rear		
9	Vehicle speed signal circuit		If the vehicle speed signal output of less than 7 km/h (4 MPH) is detected, the ABS actuator and electric unit is determined to be malfunctioning.
–	No malfunction in the above items		—

SEL597WA

Code No.	Detected items	Diagnostic procedure	Reference page	Code No.	Detected items	Diagnostic procedure	Reference page
1	Seat sliding	PROCEDURE 2 (Sliding encoder check) PROCEDURE 6 (Sliding motor check)	EL-253 EL-261	4	Seat lifting rear	PROCEDURE 5 [Lifting encoder (rear) check] PROCEDURE 9 [Lifting motor (rear) check]	EL-259 EL-264
2	Seat reclining	PROCEDURE 3 (Reclining encoder check) PROCEDURE 7 (Reclining motor check)	EL-255 EL-262	9	Vehicle speed sensor	PROCEDURE 12 (Vehicle speed sensor check)	EL-267
3	Seat lifting front	PROCEDURE 4 [Lifting encoder (front) check] PROCEDURE 8 [Lifting motor (front) check]	EL-257 EL-263				

Schematic

NAEL0379



MEL952R

DOOR SWITCH CHECK

=NAEL0390S03

1 **CHECK DOOR SWITCH INPUT SIGNAL**

With CONSULT-II

Check door switches ("DOOR SW-DR", "DOOR SW-AS", "DOOR SW-RR") in "DATA MONITOR" mode with CONSULT-II.

DATA MONITOR	
MONITOR	
DOOR SW-RR	OFF
DOOR SW-DR	OFF
DOOR SW-AS	OFF

When any doors are open:
DOOR SW-DR ON
DOOR SW-AS ON
DOOR SW-RR ON

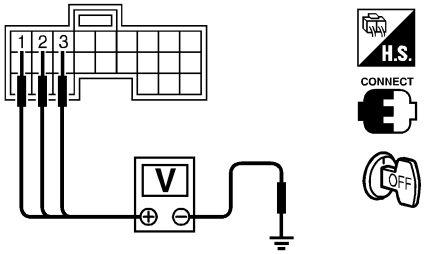
When any doors are closed:
DOOR SW-DR OFF
DOOR SW-AS OFF
DOOR SW-RR OFF

SEL009Y

Without CONSULT-II

Check voltage between smart entrance control unit harness connector M121 terminals 1 (G/OR), 2 (Y) or 3 (R/L) and ground.

Smart entrance control unit connector



	Terminals (+)	Terminals (–)	Condition	Voltage [V]
Front LH door switch	1	Ground	Open	0
			Closed	Approx. 5
Front RH door switch	2	Ground	Open	0
			Closed	Approx. 5
Rear door switches	3	Ground	Open	0
			Closed	Approx. 5

SEL010Y

Refer to wiring diagram in EL-293.

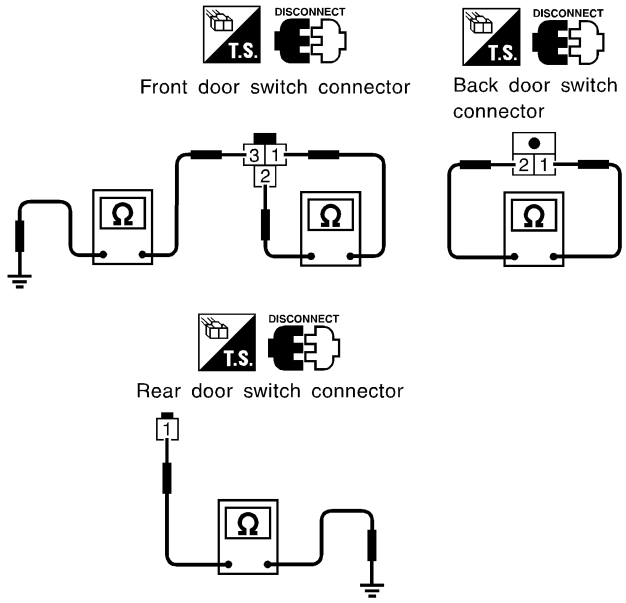
OK or NG

OK	▶	Door switch is OK.
NG	▶	GO TO 2.

2	CHECK DOOR SWITCH

1. Disconnect door switch harness connector.
2. Check the following.

- Continuity between front door switch connector B9 (LH) or B68 (RH) terminals 1 and 2
- Continuity between front door switch connector B9 (LH) or B68 (RH) terminal 3 and ground
- Continuity between back door switch connector D208 terminals 1 and 2
- Continuity between rear door switch connector B18 (LH) or B71 (RH) terminal 1 and ground



	Terminals	Condition	Continuity
Front door switches	1 - 2	Closed	No
	3 - Ground	Open	Yes
Back door switch	1 - 2	Closed	No
		Open	Yes
Rear door switches	1 - Ground	Closed	No
		Open	Yes

SEL287YA

OK or NG

OK	▶	**Check the following.** ● Door switch ground circuit (Front or back door) or door switch ground condition (Rear door) ● Harness for open or short between smart entrance control unit and door switch
NG	▶	Replace door switch.

SYMPTOM CHART

NAEL0406S02

REFERENCE PAGE (EL-)			358	360	361	366	368	370	373	375	325
SYMPTOM			PRELIMINARY CHECK	POWER SUPPLY AND GROUND CIRCUIT CHECK	DOOR, HOOD AND GLASS HATCH SWITCH CHECK	SECURITY INDICATOR LAMP CHECK	DOOR KEY CYLINDER SWITCH CHECK	BACK DOOR KEY CYLINDER SWITCH CHECK	VEHICLE SECURITY HORN ALARM CHECK	VEHICLE SECURITY HEADLAMP ALARM CHECK	Check "MULTI-REMOTE CONTROL" system.
1	Vehicle security indicator does not illuminate for 30 seconds.		X	X	X	X					
	Vehicle security system cannot be set by	All items	X	X	X						
		Door outside key	X				X				
		Back door key	X					X			
		Multi-remote control	X								X
2	*1 Vehicle security system does not alarm when ...	Any door is opened.	X		X						
		Any door is unlocked without using key or multi-remote controller	X								
3	Vehicle security alarm does not activate.	All function	X		X						
		Horn alarm	X						X		
		Headlamp alarm	X							X	
4	Vehicle security system cannot be canceled by	Door outside key	X				X				
		Back door key	X					X			
		Multi-remote control	X								X

X : Applicable

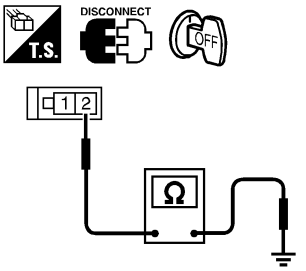
*1: Make sure the system is in the armed phase.

Before starting trouble diagnoses above, perform preliminary check, EL-358.

Symptom numbers in the symptom chart correspond with those of preliminary check.

4	CHECK GROUND CIRCUIT

Check continuity between homelink universal transceiver harness connector R5 terminal 2 (B) and ground.



Continuity should exist.

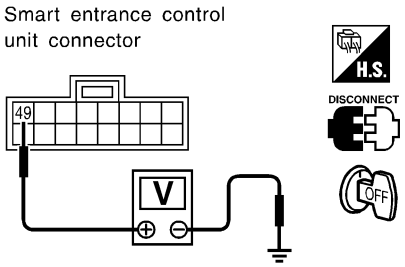
SEL359X

OK or NG

OK	▶	Replace homelink universal transceiver with sun visor assembly.
NG	▶	Repair harness.

5	CHECK MAIN POWER SUPPLY FOR SMART ENTRANCE CONTROL UNIT

1. Disconnect smart entrance control unit.
2. Check voltage between smart entrance control unit harness connector M123 terminal 49 (G/R) and ground.



Battery voltage should exist.

SEL284Y

OK or NG

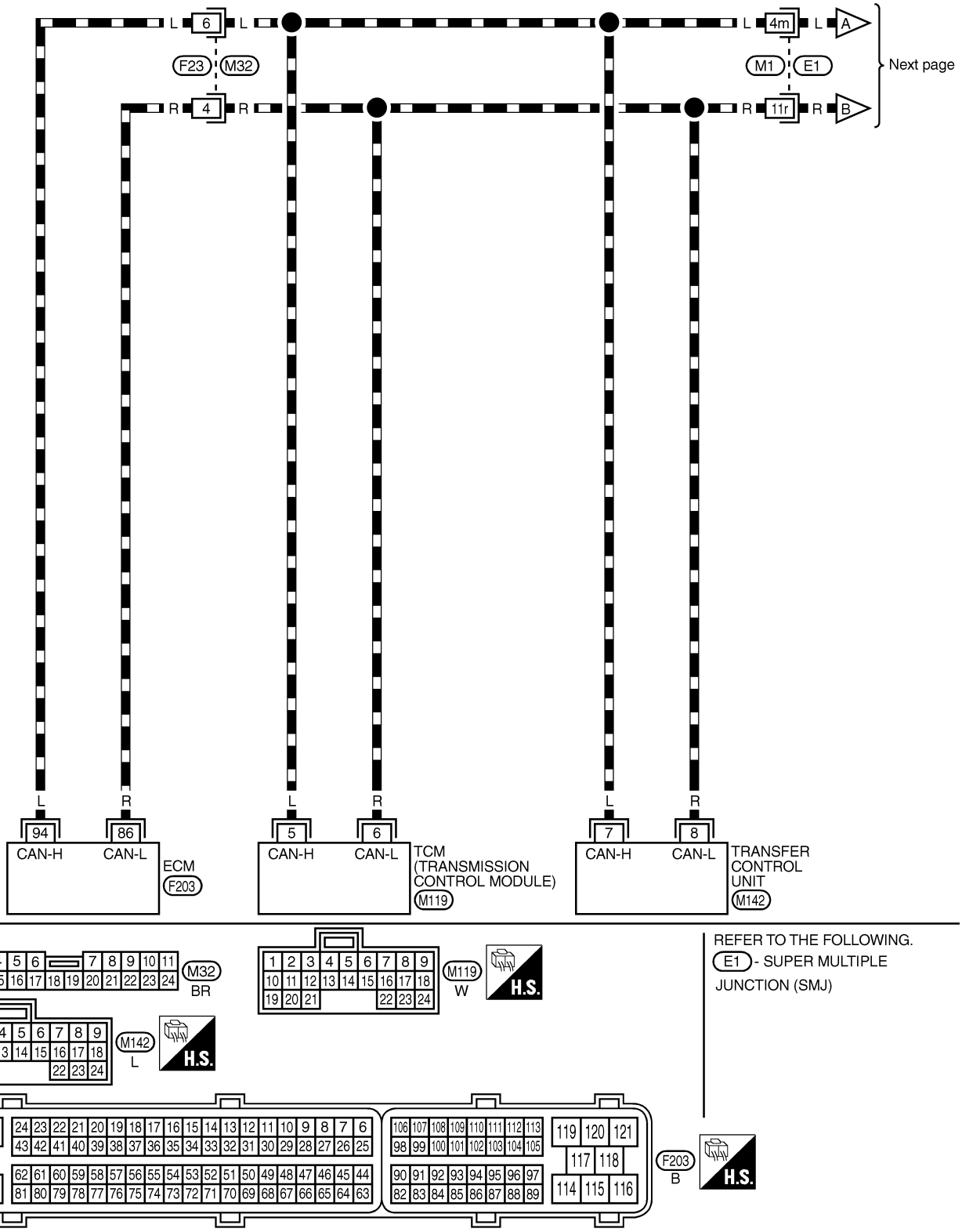
OK	▶	GO TO 6.
NG	▶	**Check the following.** ● 7.5A fuse No. 24, located in fuse block (J/B)

Wiring Diagram — CAN —

NAEL0466

EL-CAN-01

: DATA LINE



MEL578Q

CHECK SHEET RESULTS (EXAMPLE)

=NAEL0472S03

NOTE:

If "NG" is displayed on "INITIAL DIAG (Initial diagnosis)" as "CAN DIAG SUPPORT MNTR" for the diagnosed control unit, replace the control unit.

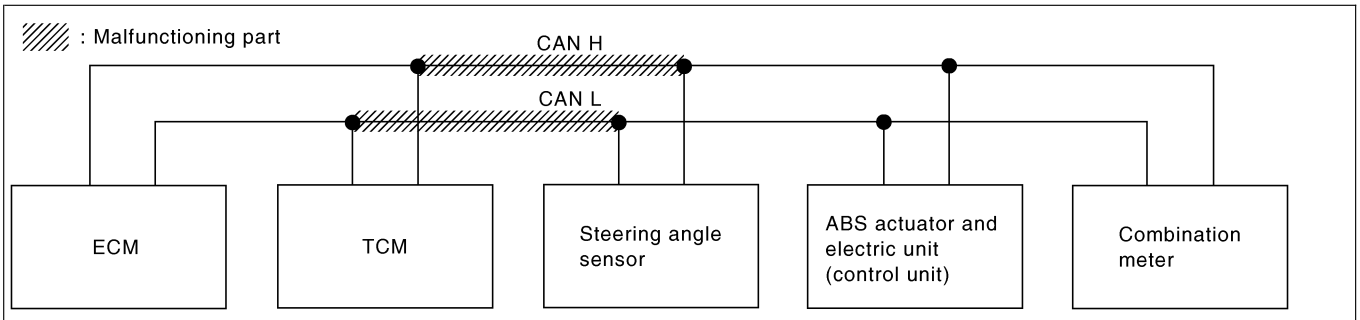
Case 1

NAEL0472S0301

Check harness between TCM and steering angle sensor. Refer to "CIRCUIT CHECK BETWEEN TCM AND STEERING ANGLE SENSOR" (EL-448).

SELECT SYSTEM screen	CAN DIAG SUPPORT MNTR						
	Initial diagnosis	Transmit diagnosis	Receive diagnosis				
			ECM	TCM	STRG	VDC/TCS/ ABS	METER/ M&A
ENGINE	NG	UNKWN	–	UNKWN	–	UNKWN ✓	UNKWN ✓
A/T	NG	UNKWN	UNKWN	–	–	UNKWN ✓	UNKWN ✓
ABS	NG	UNKWN	UNKWN ✓	UNKWN ✓	UNKWN	–	UNKWN

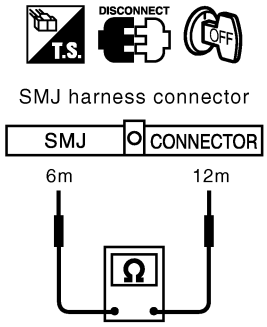
PKIA8721E



PKIA8743E

6	CHECK HARNESS FOR SHORT CIRCUIT

Check continuity between harness connector E1 terminals 6m (L) and 12m (R).



Continuity should not exist.

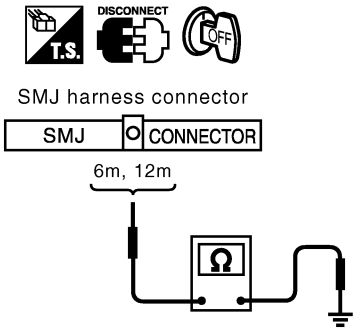
SEL732Y

OK or NG

OK	▶	GO TO 7.
NG	▶	Repair harness between harness connector E1 and harness connector E1.

7	CHECK HARNESS FOR SHORT CIRCUIT

Check continuity between harness connector E1 terminals 6m (L), 12m (R) and ground.



Continuity should not exist.

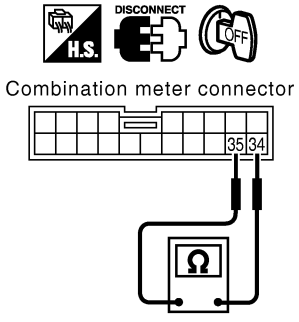
SEL733Y

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair harness between harness connector E1 and harness connector E1.

8	CHECK HARNESS FOR SHORT CIRCUIT

1. Disconnect combination meter connector.
2. Check continuity between combination meter harness connector M25 terminals 34 (Y) and 35 (L).



Continuity should not exist.

SEL721Y

OK or NG

OK	▶	GO TO 9.
NG	▶	Repair harness between combination meter and harness connector M1.

WIRING DIAGRAM CODES (CELL CODES)

Use the chart below to find out what each wiring diagram code stands for.
Refer to the wiring diagram code in the alphabetical index to find the location (page number) of each wiring diagram.

Code	Section	Wiring Diagram Name
1STSIG	AT	A/T 1ST Signal
2NDSIG	AT	A/T 2ND Signal
3RDSIG	AT	A/T 3RD Signal
4THSIG	AT	A/T 4TH Signal
A/C, A	HA	Auto Air Conditioner
A/C, M	HA	Manual Air Conditioner
ABS	BR	Anti-lock Brake System
APPS1	EC	Accelerator Pedal Position Sensor 1
APPS2	EC	Accelerator Pedal Position Sensor 2
APPS	EC	Accelerator Pedal Position Sensor
ASC/BS	EC	Automatic Speed Control Device Brake Switch
ASC/SW	EC	Automatic Speed Control Device Steering Switch
ASCIND	EC	Automatic Speed Control Device Indicator
ASCBOF	EC	Automatic Speed Control Device Brake Switch (Off)
AUDIO	EL	Audio
AUT/DP	EL	Automatic Drive Positioner
BA/FTS	AT	A/T Fluid Temperature Sensor and TCM Power Supply
BACK/L	EL	Back-up Lamp
BRK/SW	EC	Brake Switch
BYPS/V	EC	Vacuum Cut Valve Bypass Valve
CAN	AT	CAN Communication Line
CAN	EC	CAN Communication Line
CAN	EL	CAN System
CHARGE	SC	Charging System
CHIME	EL	Warning Chime
CIGAR	EL	Cigarette Lighter
CLOCK	EL	Clock
COMPAS	EL	Compass and Thermometer
D/LOCK	EL	Power Door Lock
DEF	EL	Rear Window Defogger
DTRL	EL	Headlamp — With Daytime Light System —
ECM/PW	EC	ECM Power supply (Back-up)
ECTS	EC	Engine Coolant Temperature Sensor
ENGSS	AT	Engine Speed Signal
ETC1	EC	Electric Throttle Control Function
ETC2	EC	Electric Throttle Control Motor Relay
ETC3	EC	Electric Throttle Control Motor
F/FOG	EL	Front Fog Lamp
F/PUMP	EC	Fuel Pump Control
FTS	AT	A/T Fluid Temperature Sensor
FTTS	EC	Fuel Tank Temperature Sensor
FUELB1	EC	Fuel Injection System Function (Bank 1)
FUELB2	EC	Fuel Injection System Function (Bank 2)
H/LAMP	EL	Headlamp
HEATER	HA	Heater
HORN	EL	Horn
HSEAT	EL	Heated Seat
IATS	EC	Intake Air Temperature Sensor
IGNSYS	EC	Ignition Signal
ILL	EL	Illumination
INJECT	EC	Injector
INT/L	EL	Interior, Spot, Vanity Mirror, and Luggage Room Lamps
IVCB1	EC	Intake Valve Timing Control Solenoid Valve Bank 1
IVCB2	EC	Intake Valve Timing Control Solenoid Valve Bank 2
KEYLES	EL	Remote Keyless Entry System
KS	EC	Knock Sensor
LOAD	EC	Electrical Load Signal
LPSV	AT	Line Pressure Solenoid Valve
MAFS	EC	Mass Air Flow Sensor
MAIN	AT	Main Power Supply and Ground Circuit
MAIN	EC	Main Power Supply and Ground Circuit

CAUTION:

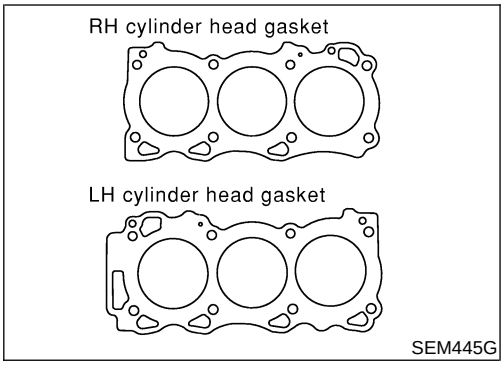
- **After removing timing chain, do not turn crankshaft and camshaft separately, or valves will strike piston heads.**
- **When installing camshafts, chain tensioners, oil seals, or other sliding parts, lubricate contacting surfaces with new engine oil.**
- **Apply new engine oil to bolt threads and seat surfaces when installing camshaft sprockets and crankshaft pulley.**
- **Before disconnecting fuel hose, release fuel pressure. Refer to EC-56, "Fuel Pressure Release".**
- **Be careful not to damage sensor edges.**
- **Do not spill engine coolant on drive belts.**

Removal

NAEM0012

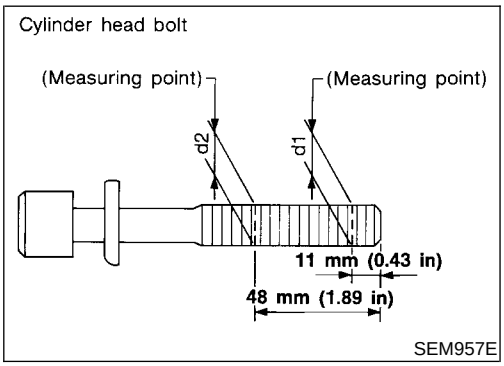
1. Release fuel pressure.
   Refer to EC-56, "Fuel Pressure Release".
2. Remove battery.
3. Remove radiator.
   Refer to LC-22, "REMOVAL AND INSTALLATION".
4. Drain engine oil.
5. Remove drive belts and idler pulley with brackets.
6. Remove cooling fan with bracket.
7. Remove engine cover.
8. Remove air duct with air cleaner case, collector, PCV hose, vacuum hoses, fuel hoses, water hoses, harnesses, connectors and so on.
9. Remove the air conditioner compressor, and tie it down using rope or the like to keep it from interfering.
10. Remove the power steering oil pump and reservoir tank. Tie them down using rope or the like to keep them from interfering.
11. Remove alternator.
12. Remove the following.

- Vacuum tank
- Water bypass pipe
- Brackets



4. Install cylinder heads with new gaskets.

- **Do not rotate crankshaft and camshaft separately, or valves will strike piston heads.**



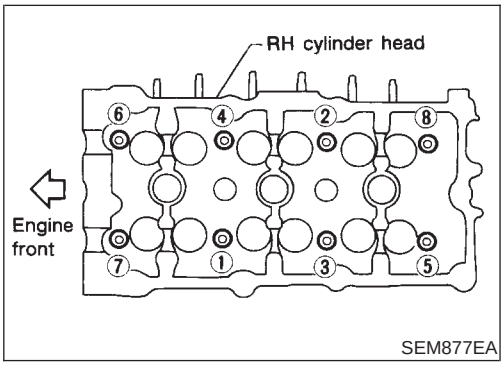
CAUTION:

Cylinder head bolts are tightened by plastic zone tightening method. Whenever the size difference between d1 and d2 exceeds the limit, replace them with new ones.

Limit (d1 - d2):

0.11 mm (0.0043 in)

- **Lubricate threads and seat surfaces of the bolts with new engine oil.**
- **If reduction of outer diameter appears in a position other than d2, use it as d2 point.**

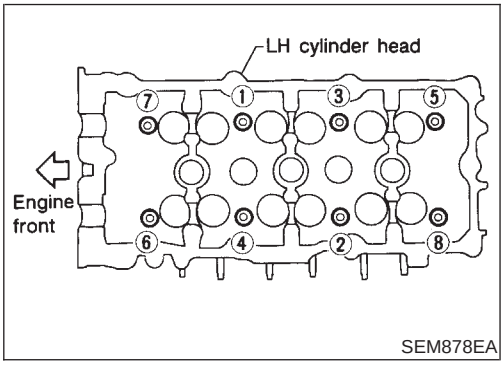


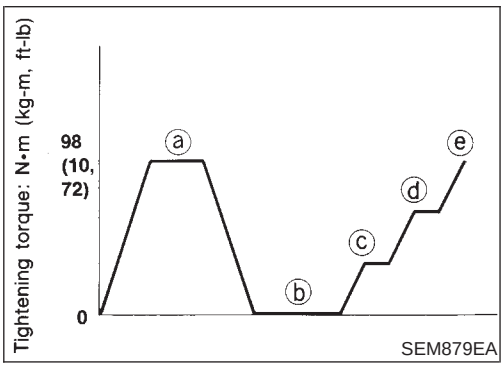
5. Install cylinder head outside bolts.

- **Tightening procedure:**

a. **Tighten all bolts to 98.1 N·m (10 kg-m, 72 ft-lb).**
b. **Completely loosen all bolts in reverse order shown.**
c. **Tighten all bolts to 34.3 to 44.1 N·m (3.5 to 4.4 kg-m, 25 to 33 ft-lb).**
d. **Turn all bolts 90 to 95 degrees clockwise [target: 90 degrees (angle tightening)].**
e. **Turn all bolts 90 to 95 degrees clockwise again [target: 90 degrees (angle tightening)].**

- **Tighten in numerical order shown in the figure.**





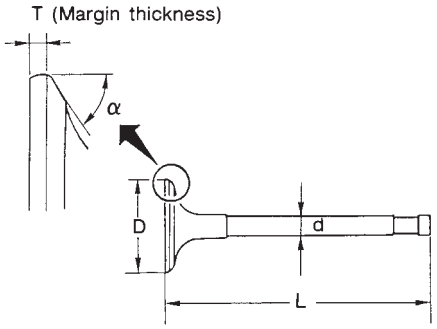
Valve

NAEM0032

VALVE

NAEM0032S01

Unit: mm (in)



SEM188

Valve head diameter “D”	Intake	37.0 - 37.3 (1.4567 - 1.4685)
	Exhaust	31.2 - 31.5 (1.228 - 1.240)
Valve length “L”	Intake	96.12 - 96.62 (3.7842 - 3.8039)
	Exhaust	93.65 - 94.15 (3.6870 - 3.7067)
Valve stem diameter “d”	Intake	5.965 - 5.980 (0.2348 - 0.2354)
	Exhaust	5.945 - 5.960 (0.2341 - 0.2346)
Valve seat angle “α”	Intake	45°15′ - 45°45′
	Exhaust	
Valve margin “T”	Intake	1.1 (0.044)
	Exhaust	1.3 (0.051)
Valve margin “T” limit		More than 0.5 (0.020)
Valve stem end surface grinding limit		Less than 0.2 (0.008)

VALVE CLEARANCE

NAEM0032S02

Unit: mm (in)

	Cold	Hot* (reference data)
Intake	0.26 - 0.34 (0.010 - 0.013)	0.304 - 0.416 (0.012 - 0.016)
Exhaust	0.29 - 0.37 (0.011 - 0.015)	0.308 - 0.432 (0.012 - 0.017)

*: Approximately 80°C (176°F)

VALVE SPRING

NAEM0032S04

Free height mm (in)		46.52 (1.8315)
Pressure N (kg, lb) at height mm (in)	Installation	196 (20.0, 44.1) at 37.0 (1.457)
	Valve open	433 (44.2, 97.3) at 27.8 (1.094)
Out-of-square mm (in)		Less than 2.0 (0.079)

VALVE LIFTER

NAEM0032S05

Unit: mm (in)

Valve lifter outer diameter	33.977 - 33.987 (1.3377 - 1.3381)
Lifter guide inner diameter	34.000 - 34.016 (1.3386 - 1.3392)
Clearance between lifter and lifter guide	0.013 - 0.039 (0.0005 - 0.0015)

QUICK REFERENCE CHART: PATHFINDER 2004

ENGINE TUNE-UP DATA

Engine model		VQ35DE		
Firing order		1-2-3-4-5-6		
Idle speed rpm	M/T	750±50		
	A/T (in "N" position)	750±50		
Ignition timing (degree BTDC at idle speed)		15°±5°		
CO% at idle		Idle mixture screw is preset and sealed at factory.		
Drive belt deflection (Cold) mm (in)		Used belt		Deflection of new belt
		Limit	Deflection after adjustment	
Alternator Power steering oil pump Fan		7 (0.28)	4 - 5 (0.16 - 0.20)	3.5 - 4.5 (0.138 - 0.177)
Air conditioner compressor		12 (0.47)	9 - 10 (0.35 - 0.39)	8 - 9 (0.31 - 0.35)
Applied pressed force N (kg, lb)		98 (10, 22)		
Drive belt tension adjustment (Cold) N (kg, lb)		Used belt		New belt
		Limit	After adjustment	
Alternator Power steering pump Fan		294 (30, 66)	730 - 818 (74.4 - 83.5, 164 - 184)	838 - 926 (85.4 - 94.5, 188 - 208)
Air conditioner compressor		196 (20, 44)	348 - 436 (35.5 - 44.5, 78 - 98)	470 - 559 (47.9 - 57.0, 106 - 126)
Radiator cap relief pressure kPa (kg/cm^2, psi)		78 - 98 (0.8 - 1.0, 11 - 14)		
Cooling system leakage testing pressure kPa (kg/cm^2, psi)		157 (1.6, 23)		
Compression pressure kPa (kg/cm^2, psi)/rpm	Standard	1,275 (13.0, 185)/300		
	Minimum	981 (10.0, 142)/300		
Spark plug	Standard	PLFR5A-11		
	Cold	PLFR6A-11		
	Hot	PLFR4A-11		

CLUTCH PEDAL

Unit: mm (in)

Clearance "C" between pedal stopper rubber and clutch interlock switch threaded while clutch pedal is fully depressed.	0.1 - 1.0 (0.004 - 0.039)

WHEEL ALIGNMENT (Unladen*)

Camber	Minimum	−0°35′ (−0.58°)
	Nominal	0°10′ (0.17°)
	Maximum	0°55′ (0.92°)
Degree minute (Decimal degree)	Left and right difference	45′ (0.75°) or less
Caster	Minimum	2°15′ (2.25°)
	Nominal	3°00′ (3.00°)
	Maximum	3°45′ (3.75°)
Degree minute (Decimal degree)	Left and right difference	45′ (0.75°) or less
Kingpin inclination	Minimum	13°35′ (13.58°)
	Nominal	14°20′ (14.33°)
Degree minute (Decimal degree)	Maximum	15°05′ (15.08°)
Total toe-in	Minimum	1 (0.04)
Distance (A − B)	Nominal	2 (0.08)
mm (in)	Maximum	3 (0.12)
Angle (left plus right)	Minimum	5′ (0.08°)
	Nominal	10′ (0.17°)
Degree minute (Decimal degree)	Maximum	15′ (0.25°)
Wheel turning angle (Full turn)	Minimum	30°00′ (30.00°)
Inside	Nominal	33°00′ (33.00°)
Degree minute (Decimal degree)	Maximum	34°00′ (34.00°)
Outside	Minimum	28°00′ (28.00°)
Degree minute (Decimal degree)	Nominal	31°00′ (31.00°)
	Maximum	32°00′ (32.00°)

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

BRAKE

Unit: mm (in)

Front brake	
Pad wear limit	2.0 (0.079)
Rotor repair limit	26.0 (1.024)
Rear brake	
Lining wear limit	1.5 (0.059)
Drum repair limit	296.5 (11.67)
Pedal free height	
M/T	165 - 175 (6.50 - 6.89)
A/T	175 - 185 (6.89 - 7.28)
Pedal depressed height*1	
M/T	65 (2.56)
A/T	70 (2.76)
Parking brake	
Number of notches*2	6 - 8

*1 Under force of 490 N (50 kg, 110 lb) with engine running
*2 At pulling force: 196 N (20 kg, 44 lb)

REFILL CAPACITIES

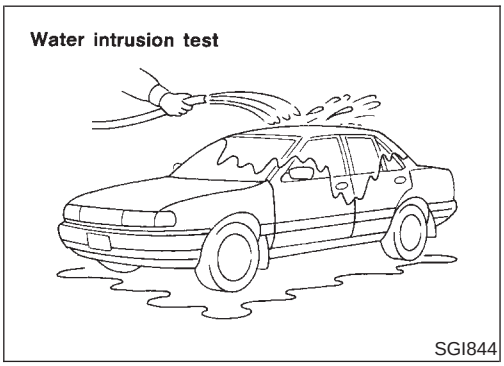
Unit			Liter	US measure
Coolant with reservoir			9.2	9-3/4 qt
Engine*	With oil filter		5.0	5-1/4 qt
	Without oil filter		4.8	5-1/8 qt
	Dry engine (engine overhaul)		6.8	7-1/4 qt
Transmission	M/T	4WD	5.1	10-3/4 pt
	A/T	2WD	8.5	9 qt
		4WD		
Transfer	Part-time 4WD		2.2	2-3/8 qt
	All-mode 4WD		3.0	3-1/8 qt
Differential carrier		Front	1.85	3-7/8 pt
		Rear	2.8	5-7/8 pt
Power steering system			0.9	1 qt
Air conditioning system		Refrigerant	0.45 kg	0.99 lb
		Compressor oil	0.18	6.3 fl oz

* For further details, see "Changing Engine Oil" in MA section.

FRONT WHEEL BEARING

Preload (At hub bolt) N (kg, lb)	Wheel bearing lock nut Tightening torque N·m (kg-m, ft-lb)	78 - 98 (8 - 10, 58 - 72)
	Retightening torque after loosening wheel bearing lock nut N·m (kg-m, in-lb)	0.5 - 1.5 (0.05 - 0.15, 4.3 - 13.0)
	Axial end play mm (in)	0 (0)
	Starting force at wheel hub bolt N (kg, lb)	A
	Turning angle degree	15° - 30°
	Starting force at wheel hub bolt N (kg, lb)	B
	Wheel bearing preload at wheel hub bolt B − A N (kg, lb)	7.06 - 20.99 (0.72 - 2.14, 1.59 - 4.72)

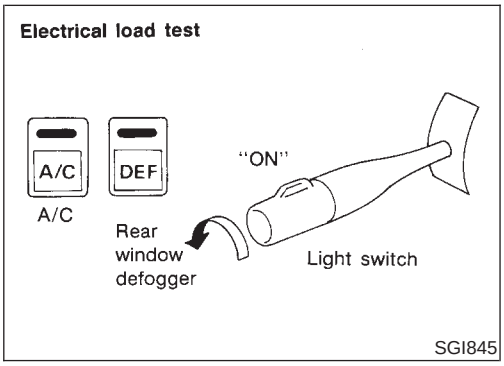
The second method is to put the suspect component into a freezer long enough for any water to freeze. Reinstall the part into the car and check for the reoccurrence of the incident. If it occurs, repair or replace the component.



WATER INTRUSION

NAGI0004S0205

The incident may occur only during high humidity or in rainy/snowy weather. In such cases the incident could be caused by water intrusion on an electrical part. This can be simulated by soaking the car or running it through a car wash.
Do not spray water directly on any electrical components.



ELECTRICAL LOAD

NAGI0004S0206

The incident may be electrical load sensitive. Perform diagnosis with all accessories (including A/C, rear window defogger, radio, fog lamps) turned on.

COLD OR HOT START UP

NAGI0004S0207

On some occasions an electrical incident may occur only when the car is started cold. Or it may occur when the car is restarted hot shortly after being turned off. In these cases you may have to keep the car overnight to make a proper diagnosis.

Circuit Inspection

NAGI0004S03

INTRODUCTION

NAGI0004S0302

In general, testing electrical circuits is an easy task if it is approached in a logical and organized method. Before beginning it is important to have all available information on the system to be tested. Also, get a thorough understanding of system operation. Then you will be able to use the appropriate equipment and follow the correct test procedure.
You may have to simulate vehicle vibrations while testing electrical components. **Gently shake** the wiring harness or electrical component to do this.

OPEN	A circuit is open when there is no continuity through a section of the circuit.	
SHORT	There are two types of shorts.	
	• SHORT CIRCUIT	When a circuit contacts another circuit and causes the normal resistance to change.
	• SHORT TO GROUND	When a circuit contacts a ground source and grounds the circuit.

NOTE:
Refer to "HOW TO CHECK TERMINAL" in GI-21 to probe or check terminal.

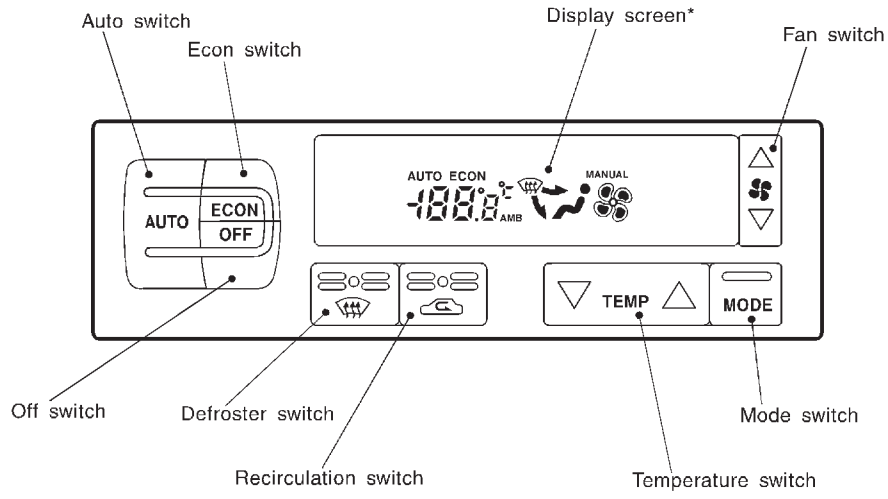
NEW TERM	NEW ACRONYM / ABBREVIATION	OLD TERM
Evaporative emission canister	EVAP canister	Canister
Evaporative emission system	EVAP system	Canister control solenoid valve
Exhaust gas recirculation valve	EGR valve	EGR valve
Exhaust gas recirculation control-BPT valve	EGRC-BPT valve	BPT valve
Exhaust gas recirculation control-solenoid valve	EGRC-solenoid valve	EGR control solenoid valve
Exhaust gas recirculation temperature sensor	EGRT sensor	Exhaust gas temperature sensor
EGR temperature sensor		
Flash electrically erasable programmable read only memory	FEEPROM	***
Flash erasable programmable read only memory	FEPROM	***
Flexible fuel sensor	FFS	***
Flexible fuel system	FF system	***
Fuel pressure regulator	***	Pressure regulator
Fuel pressure regulator control solenoid valve	***	PRVR control solenoid valve
Fuel tank temperature sensor	FTT	Tank fuel temperature sensor
Fuel trim	FT	***
Heated Oxygen sensor	HO2S	Exhaust gas sensor
Idle air control system	IAC system	Idle speed control
Idle air control valve-air regulator	IACV-air regulator	Air regulator
Idle air control valve-auxiliary air control valve	IACV-AAC valve	Auxiliary air control (AAC) valve
Idle air control valve-FICD solenoid valve	IACV-FICD solenoid valve	FICD solenoid valve
Idle air control valve-idle up control solenoid valve	IACV-idle up control solenoid valve	Idle up control solenoid valve
Idle speed control-FI pot	ISC-FI pot	FI pot
Idle speed control system	ISC system	***
Ignition control	IC	***
Ignition control module	ICM	***
Indirect fuel injection system	IFI system	***
Intake air	IA	Air
Intake air temperature sensor	IAT sensor	Air temperature sensor
Knock	***	Detonation
Knock sensor	KS	Detonation sensor
Malfunction indicator lamp	MIL	Check engine light
Manifold absolute pressure	MAP	***
Manifold absolute pressure sensor	MAPS	***

Control Operation

NAHA0170

EXCEPT LE GRADE

NAHA0170S10



* Display the operation of the system.

RHA452G

Display Screen

NAHA0170S1010

Displays the operational status of the system.

AUTO Switch

NAHA0170S1011

The compressor, intake doors, air mix door, outlet doors, and blower speed are automatically controlled so that the in-vehicle temperature will reach, and be maintained at the set temperature selected by the operator.

ECON Switch

NAHA0170S1012

By pressing the ECON switch, the display should indicate ECON and the compressor always turns OFF. With the compressor OFF, the system will not remove heat (cool) or de-humidify. The system will maintain the in-vehicle temperature at the set temperature when the set temperature is above the ambient (outside) temperature. The system will set the intake doors to the outside air position.

Temperature Switch (Potentio Temperature Control)

NAHA0170S1013

Increases or decreases the set temperature.

OFF Switch

NAHA0170S1014

The compressor and blower are OFF, the intake doors are set to the outside air position, and the air outlet doors are set to the foot (80% foot and 20% defrost) position.

FAN Switch

NAHA0170S1015

Manual control of the blower speed. Four speeds are available for manual control (as shown on the display screen):
low , medium low , medium high , high

Recirculation (REC) Switch

NAHA0170S1016

OFF position: Set the inlet to automatic control. Intake doors are set to FRE (Fresh) position automatically when switched to D/F or DEF and compressor turns OFF.
ON position: Interior air is recirculated inside the vehicle.

Defroster (DEF) Switch

NAHA0170S1017

Positions the air outlet doors to the defrost position. Also positions the intake doors to the outside air position.

MODE Switch

NAHA0170S1018

Controls the air discharge outlets.

8 CHECK ACTUATORS

Refer to the following chart and confirm discharge air flow, air temperature, blower motor voltage and compressor operation.

Checks must be made visually, by listening to any noise, or by touching air outlets with your hand, etc. for improper operation.

Code No.	Actuator test pattern				
	Mode door	Intake door	Air mix door	Blower motor	Compressor
41	VENT	REC	Full Cold	4 - 5V	ON
42	B/L	REC	Full Cold	9 - 11V	ON
43	B/L	20% FRE	Full Hot	7 - 9V	OFF
44	FOOT	FRE	Full Hot	7 - 9V	OFF
45	D/F	FRE	Full Hot	7 - 9V	ON
46	DEF	FRE	Full Hot	10 - 12V	ON

MTBL0200

Discharge air flow

Mode door position	Air outlet/distribution		
	Face	Foot	Defroster
	100%	—	—
	60%	40%	—
	—	80%	20%
	—	60%	40%
	—	—	100%

MTBL1831

OK or NG

OK	▶	GO TO 9.
NG	▶	• Air outlet does not change. Go to "Mode Door Motor" (HA-68). • Discharge air temperature does not change. Go to "Air Mix Door Motor" (HA-75). • Intake door does not change. Go to "Intake Door Motor" (HA-79). • Blower motor operation is malfunctioning. Go to "Blower Motor" (HA-87). • Magnet clutch does not engage. Go to "Magnet Clutch" (HA-98).

SYSTEM DESCRIPTION

=NAHA0192

Component Parts

NAHA0192S01

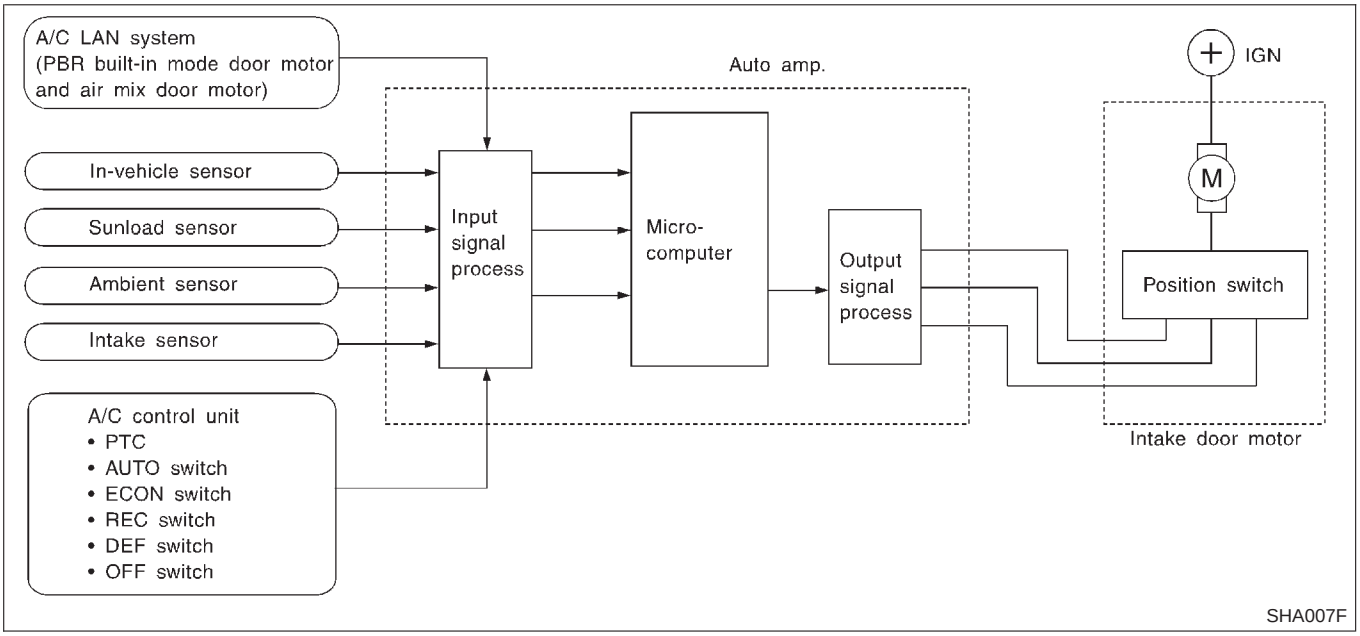
Intake door control system components are:

1) Auto amp.
2) Intake door motor
3) A/C LAN system (PBR built-in mode motor and air mix door motor)
4) In-vehicle sensor
5) Ambient sensor
6) Sunload sensor
7) Intake sensor

System Operation

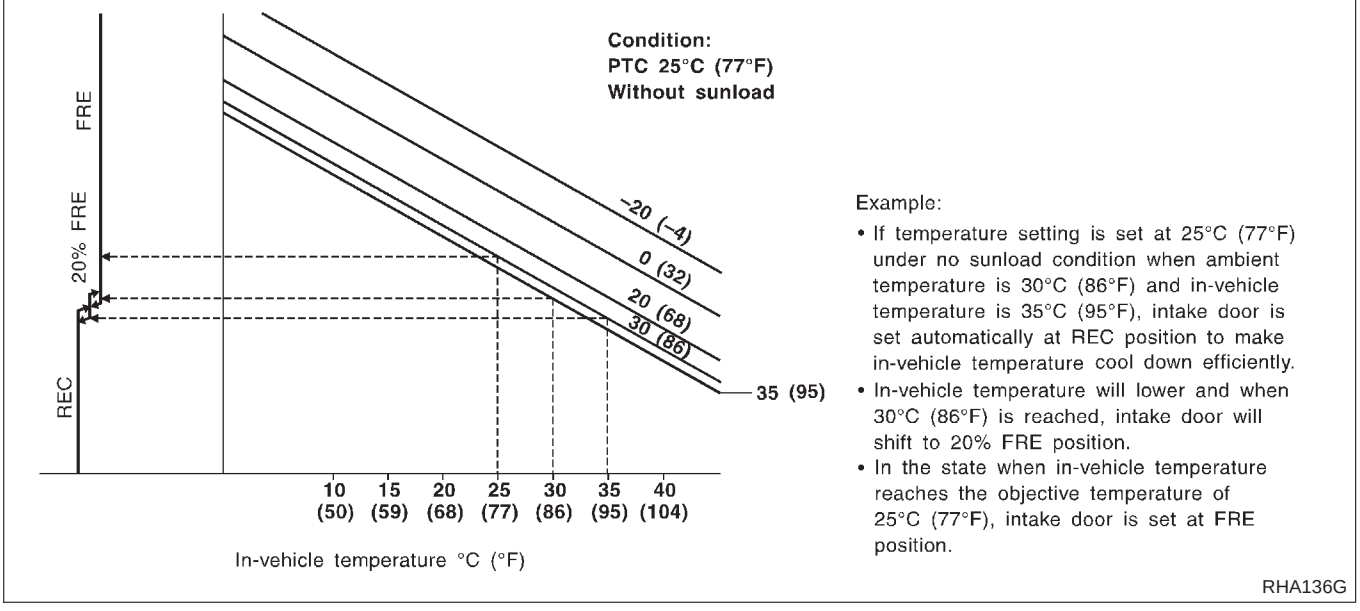
NAHA0192S02

The intake door control determines intake door position based on the ambient temperature, the intake air temperature and the in-vehicle temperature. When the ECON, DEFROST, or OFF switches are pushed, the auto amplifier sets the intake door at the "Fresh" position.



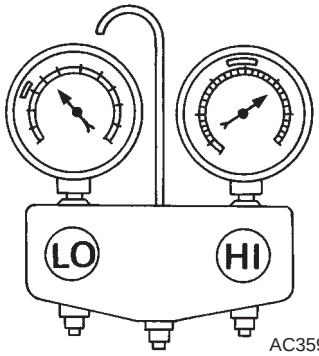
Intake Door Control Specification

NAHA0192S03



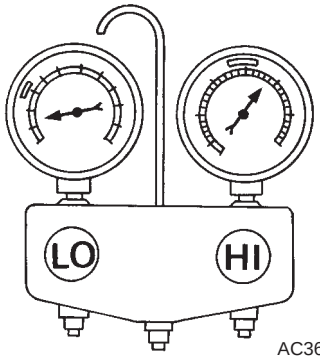
Both High and Low-pressure Sides are Too High.

NAHA0208S01

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Both high and low-pressure sides are too high. A  AC359A	• Pressure is reduced soon after water is splashed on condenser.	Excessive refrigerant charge in refrigeration cycle	Reduce refrigerant until specified pressure is obtained.
	Air suction by cooling fan is insufficient.	Insufficient condenser cooling performance ↓ 1. Condenser fins are clogged. 2. Improper fan rotation of cooling fan	• Clean condenser. • Check and repair cooling fan as necessary.
	• Low-pressure pipe is not cold. • When compressor is stopped high-pressure value quickly drops by approximately 196 kPa (2 kg/cm^2, 28 psi). It then decreases gradually thereafter.	Poor heat exchange in condenser (After compressor operation stops, high pressure decreases too slowly.) ↓ Air in refrigeration cycle	Evacuate repeatedly and recharge system.
	Engine tends to overheat.	Engine cooling systems malfunction.	Check and repair each engine cooling system.
	• An area of the low-pressure pipe is colder than areas near the evaporator outlet. • Plates are sometimes covered with frost.	• Excessive liquid refrigerant on low-pressure side • Excessive refrigerant discharge flow • Expansion valve is open a little compared with the specification. ↓ 1. Improper expansion valve installation 2. Improper expansion valve adjustment	Replace expansion valve.

High-pressure Side is Too High and Low-pressure Side is Too Low.

NAHA0208S02

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
High-pressure side is too high and low-pressure side is too low. B  AC360A	Upper side of condenser and high-pressure side are hot, however, liquid tank is not so hot.	High-pressure tube or parts located between compressor and condenser are clogged or crushed.	• Check and repair or replace malfunctioning parts. • Check lubricant for contamination.

3	CHECK COMPRESSOR	
Should the compressor be replaced? **Yes or No**		
Yes	▶	Go to "Lubricant Adjustment Procedure for Compressor Replacement", (HA-137).
No	▶	GO TO 4.

4	CHECK ANY PART	
Is there any part to be replaced? (Evaporator, condenser, liquid tank or in case there is evidence of a large amount of lubricant leakage.) **Yes or No**		
Yes	▶	Go to "Lubricant Adjusting Procedure for Components Replacement Except Compressor", (HA-137).
No	▶	Carry out the A/C performance test.

Lubricant Adjusting Procedure for Components Replacement Except Compressor

NAHA0229S0201

After replacing any of the following major components, add the correct amount of lubricant to the system.

Amount of lubricant to be added

Part replaced	Lubricant to be added to system Amount of lubricant mℓ (US fl oz, Imp fl oz)	Remarks
Evaporator	75 (2.5, 2.6)	—
Condenser	75 (2.5, 2.6)	—
Liquid tank	5 (0.2, 0.2)	Add if compressor is not replaced. *1
In case of refrigerant leak	30 (1.0, 1.1)	Large leak
	—	Small leak *2

*1: If compressor is replaced, addition of lubricant is included in the table.
*2: If refrigerant leak is small, no addition of lubricant is needed.

Lubricant Adjusting Procedure for Compressor Replacement

NAHA0229S0202

1. Before connecting Recovery/Recycling Recharging equipment to vehicle, check Recovery/Recycling Recharging equipment gauges. No refrigerant pressure should be displayed. If NG, recover refrigerant from equipment lines.
2. Connect Recovery/Recycling Recharging equipment to vehicle. Confirm refrigerant purity in supply tank using Recovery/Recycling Recharging equipment and refrigerant identifier. If NG, refer to "CONTAMINATED REFRIGERANT", HA-3.
3. Confirm refrigerant purity in vehicle A/C system using Recovery/Recycling Recharging equipment and refrigerant identifier. If NG, refer to "CONTAMINATED REFRIGERANT", HA-3.
4. Discharge refrigerant into the refrigerant recovery/recycling equipment. Measure lubricant discharged into the recovery/recycling equipment.
5. Remove the drain plug of the "old" (removed) compressor.

Operation

=NAHA0132S02

1. Operation Control Valve

NAHA0132S0201

Operation control valve is located in the suction port (low-pressure) side, and opens or closes in response to changes in refrigerant suction pressure.
Operation of the valve controls the internal pressure of the crankcase.
The angle of the wobble (swash) plate is controlled between the crankcase's internal pressure and the piston cylinder pressure.

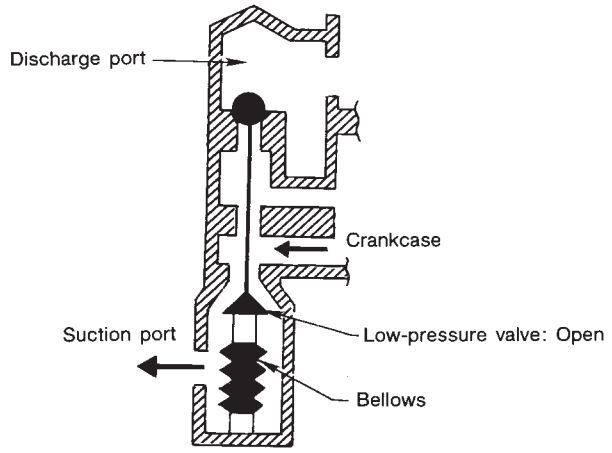
2. Maximum Cooling

NAHA0132S0202

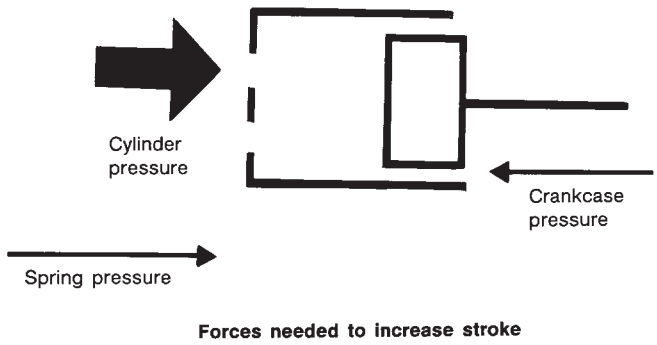
Refrigerant pressure on the low-pressure side increases with an increase in heat loads.
When this occurs, the control valve's bellows compress to open the low-pressure side valve and close the high-pressure side valve.
This causes the following pressure changes:

- the crankcase's internal pressure to equal the pressure on the low-pressure side;
- the cylinder's internal pressure to be greater than the crankcase's internal pressure.

Under this condition, the wobble (swash) plate is set to the maximum stroke position.



Valve position for lowering crankcase pressure

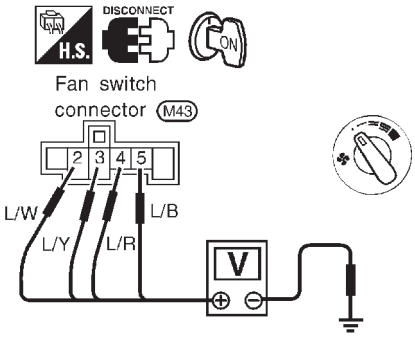


Forces needed to increase stroke

RHA473C

10	CHECK FAN SWITCH CIRCUIT

Do approx. 12 volts exist between each fan switch harness connector M43 terminal and ground?



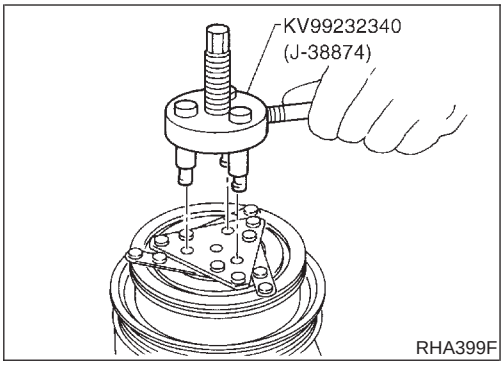
RHA578F

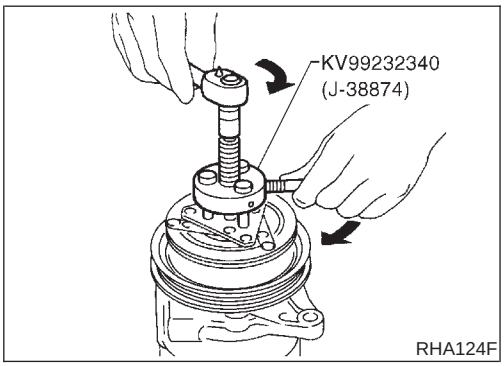
Test group No.	Terminal No. (+)	Terminal No. (−)	Voltage
2	5	Ground	Approx. 12V
3	4		
4	3		
5	2		

MTBL1837

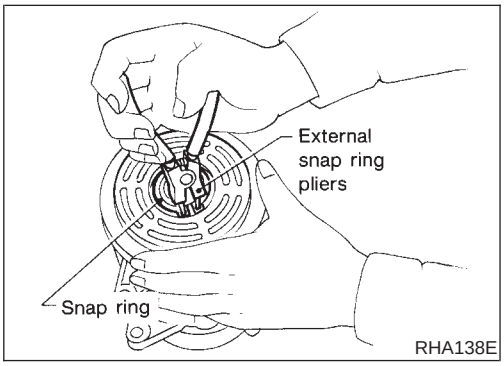
Yes or No

Yes	▶	GO TO 12.
No	▶	GO TO 11.

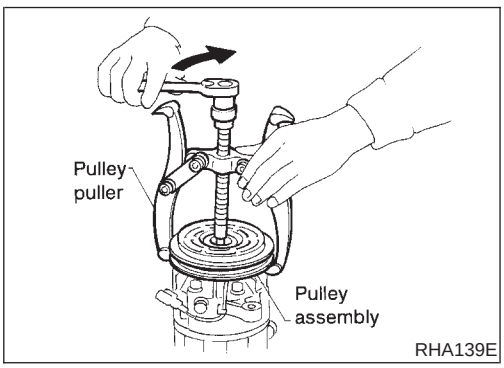




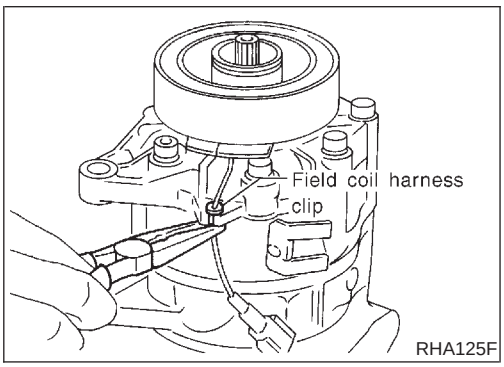
- Remove the clutch disc using the clutch disc puller.
  Insert the holder's three pins into the holes in the clutch disc. Rotate the holder clockwise to hook it onto the plate. Then, tighten the center bolt to remove the clutch disc.
  After removing the clutch disc, remove the shims from either the drive shaft or the clutch disc.



- Remove the snap ring using external snap ring pliers.

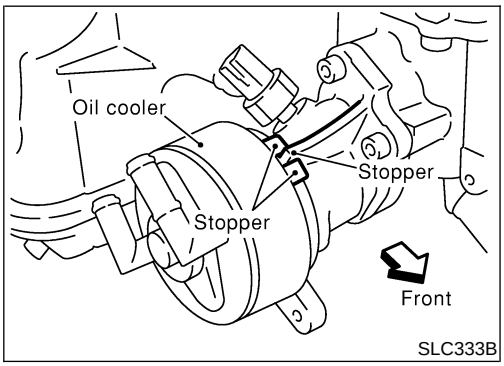


- Pulley removal
  Position the center pulley puller on the end of the drive shaft, and remove the pulley assembly using any commercially available pulley puller.
  To prevent the pulley groove from being deformed, the puller claws should be positioned onto the edge of the pulley assembly.



- Remove the field coil harness clip using a pair of pliers.

- Inspect the oil cooler after removing it.



3. Installation is in reverse order of removal.

- **When installing the oil cooler, align the oil cooler stopper with the stopper of the oil cooler bracket.**

INSPECTION

NALC0037

Oil Cooler

NALC0037S01

1. Check oil cooler for cracks.
2. Check oil cooler for clogging by blowing through engine coolant inlet.
   If necessary, replace oil cooler assembly.

Oil Pressure Relief Valve

NALC0037S02

Inspect oil pressure relief valve for movement, cracks and breaks by pushing the ball. If replacement is necessary, remove valve by prying it out with a suitable tool. Install a new valve in place by tapping it.

Service Data and Specifications (SDS)

OIL PRESSURE

NALC0010

Engine speed rpm	Approximate discharge pressure kPa (kg/cm^2, psi)
Idle speed 2,000	More than 100 (1.0, 15) 290 (3.0, 42)

REGULATOR VALVE

NALC0011

Unit: mm (in)

Regulator valve to oil pump cover clearance	0.040 - 0.097 (0.0016 - 0.0038)

OIL PUMP

NALC0012

Unit: mm (in)

Body to outer rotor radial clearance	0.114 - 0.260 (0.0045 - 0.0102)
Inner rotor to outer rotor tip clearance	Below 0.180 (0.0071)
Body to inner rotor axial clearance	0.030 - 0.070 (0.0012 - 0.0028)
Body to outer rotor axial clearance	0.050 - 0.110 (0.0020 - 0.0043)
Inner rotor to brazed portion of housing clearance	0.045 - 0.091 (0.0018 - 0.0036)

Abbreviations: R = Replace. I = Inspect. Correct or replace if necessary. L = Lubricate.

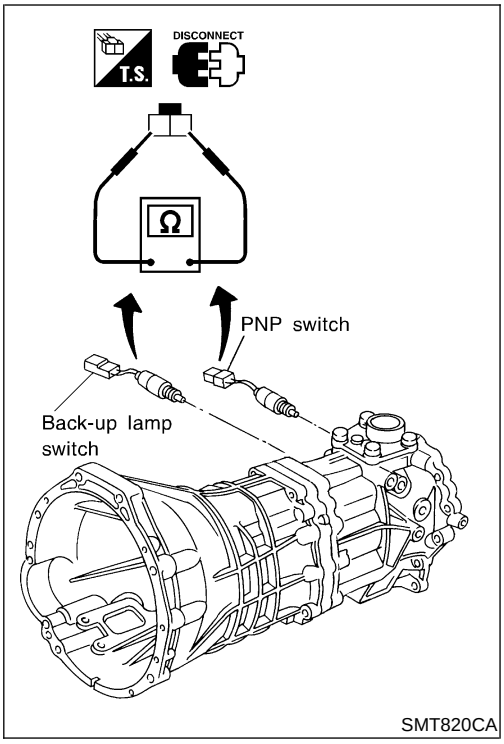
MAINTENANCE OPERATION			MAINTENANCE INTERVAL																Reference Section - Page or - Content Title
Perform at number of miles, kilometers or months, whichever comes first.		Miles x 1,000 (km x 1,000) Months	3.75 (6) 3	7.5 (12) 6	11.25 (18) 9	15 (24) 12	18.75 (30) 15	22.5 (36) 18	26.25 (42) 21	30 (48) 24	33.75 (54) 27	37.5 (60) 30	41.25 (66) 33	45 (72) 36	48.75 (78) 39	52.5 (84) 42	56.25 (90) 45	60 (96) 48	
Brake lines & cables						I				I				I				I	MA-27
Brake pads, rotors, drums & linings				I		I		I		I		I		I		I		I	MA-27, 28
Automatic transmission fluid, (all-mode 4WD) transfer fluid, manual transmission oil & differential gear oil (exc. LSD)		NOTE (1)				I				I				I				I	MA-22, 23, 24, 25
LSD gear oil		NOTE (1)				I				R				I				R	MA-26
Steering gear, linkage & transfer gear, axle & suspension parts				I		I		I		I		I		I		I		I	MA-28 MA-29
Tire rotation		NOTE (2)																	MA-5 MA-26
Drive shaft boots & propeller shaft (4x4)				I		I		I		I		I		I		I		I	MA-30 MA-25
Propeller shaft		NOTE (3)		L		L		L		L		L		L		L		L	MA-25
"Front wheel bearing grease"	4x2									I								I	MA-30
Front wheel bearing grease	4x4					I				R				I				R	MA-30
Exhaust system				I		I		I		I		I		I		I		I	MA-22

NOTE:

(1) If towing a trailer, using a camper or a car-top carrier, or driving on rough or muddy roads, change (not just inspect) oil (exc. LSD) at every 30,000 miles (48,000 km) or 24 months, and change LSD gear oil every 15,000 miles (24,000 km) or 12 months.

(2) Refer to "Tire rotation" under the "GENERAL MAINTENANCE" heading earlier in this section.

(3) The propeller shaft should be re-greased after being immersed in water.



Position Switch Check

NAMT0024

Switch	Gear position	Continuity
Back-up lamp switch	Reverse	Yes
	Except reverse	No
PNP switch	Neutral	Yes
	Except neutral	No

General Specifications

NAMT0016

Applied model	VQ35DE		
	4WD		
Transmission	FS5R30A		
Model code number	4W120		
Number of speed	5		
Shift pattern	 MT-SDS-2		
Synchromesh type	Warner		
	Gear ratio	Number of teeth	
		Mainshaft	Countershaft
Drive	—	22	32
1st	3.580	32	13
2nd	2.077	30	21
3rd	1.360	29	31
4th	1.000	—	—
OD	0.811	24	43
Reverse	3.636	30	12
Reverse idler gear	22		
Oil capacity ℓ (US pt, Imp pt)*	5.1 (10-3/4, 9)		
Remarks	2nd & 3rd double baulk ring type synchronizer		

*: Refer to MA-12, “Fluids and Lubricants”.

Gear End Play

NAMT0017

Unit: mm (in)

Gear	End play
1st main gear	0.23 - 0.33 (0.0091 - 0.0130)
2nd main gear	0.23 - 0.33 (0.0091 - 0.0130)
3rd main gear	0.06 - 0.16 (0.0024 - 0.0063)
OD counter gear	0.23 - 0.33 (0.0091 - 0.0130)
Reverse main gear	0.33 - 0.43 (0.0130 - 0.0169)
Counter gear	0.10 - 0.25 (0.0039 - 0.0098)
Reverse idler gear	0.30 - 0.53 (0.0118 - 0.0209)

Clearance Between Baulk Ring and Gear

NAMT0018

Unit: mm (in)

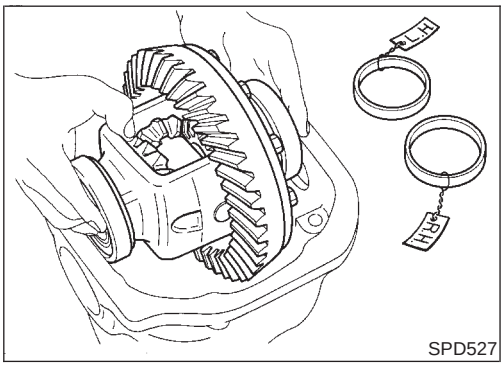
	Standard	Wear limit
1st	1.05 - 1.3 (0.0413 - 0.0512)	0.7 (0.028)
Main drive	1.05 - 1.3 (0.0413 - 0.0512)	
OD	1.05 - 1.3 (0.0413 - 0.0512)	

Adjustment

NAPD0020

For quiet and reliable final drive operation, the following five adjustments must be made correctly:

1. Side bearing preload
2. Pinion gear height
3. Pinion bearing preload
4. Drive gear-to-pinion backlash. Refer to SDS, PD-38.
5. Drive and pinion gear tooth contact pattern



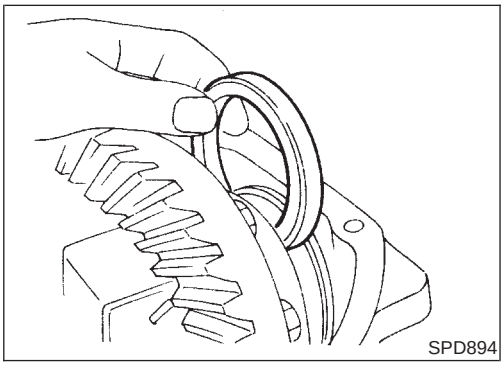
SPD527

SIDE BEARING PRELOAD

NAPD0020S01

A selection of carrier side bearing adjusting washer is required for successful completion of this procedure.

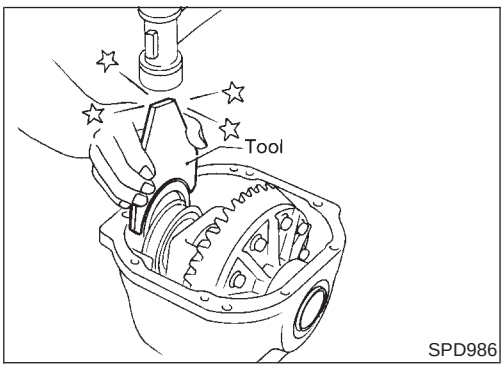
1. Make sure all parts are clean and that the bearings are well lubricated with light oil or "DEXRON™" type automatic transmission fluid.
2. Place the differential carrier, with side bearings and bearing races installed, into the final drive housing.


SPD894

3. Put the side bearing spacer in place.

CAUTION:

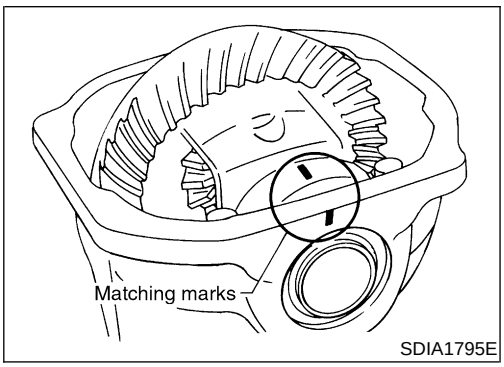
Side bearing spacer is placed on either the right or left depending upon final drive gear ratio. Be sure to replace it on the correct side.



SPD986

4. Using Tool, install original carrier side bearing preload shims on the carrier end, opposite the drive gear.

   Tool number: KV38100600 (J25267)



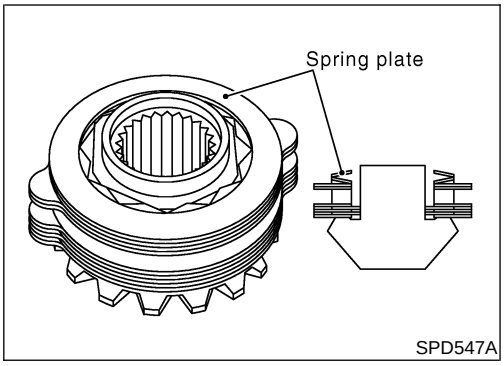
SDIA1795E

5. Install the side bearing caps in their correct locations and torque the bearing cap retaining bolts.

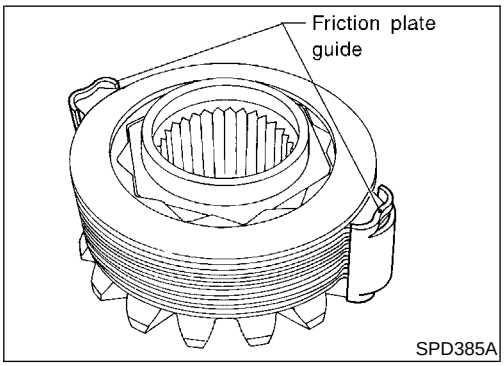
   Specification:

   88 - 98 N·m (9 - 10 kg-m, 65 - 72 ft-lb)

6. Turn the carrier several times to seat the bearings.

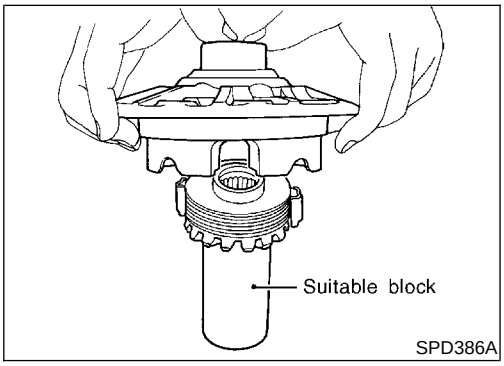


2. Install two spring plates.



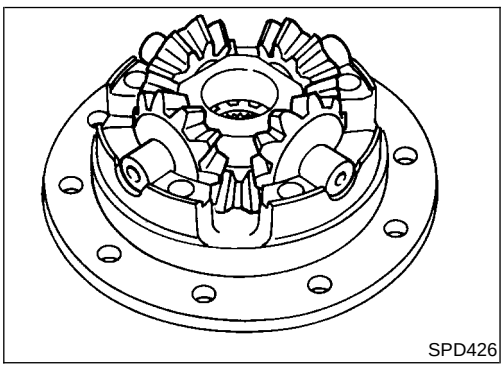
3. Install friction plate guides.

Correctly align the raised portions of friction plates, and apply LSD gear oil to inner surfaces of friction plate guides to prevent them from falling.

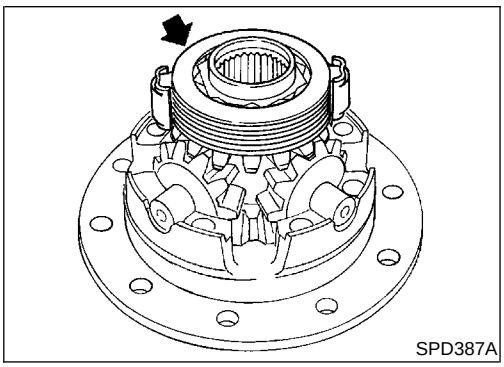


4. Install differential case B over side gear, discs, plates, spacer and friction plate guide assembly.

- **Install differential case B while supporting friction plate guides with your middle finger inserted through oil hole in differential case.**
- **Be careful not to detach spring plate from the hexagonal part of the side gear.**



5. Install pinion mate gears and pinion mate thrust washers on pinion mate shaft, then install pinion mate shaft in differential case B.



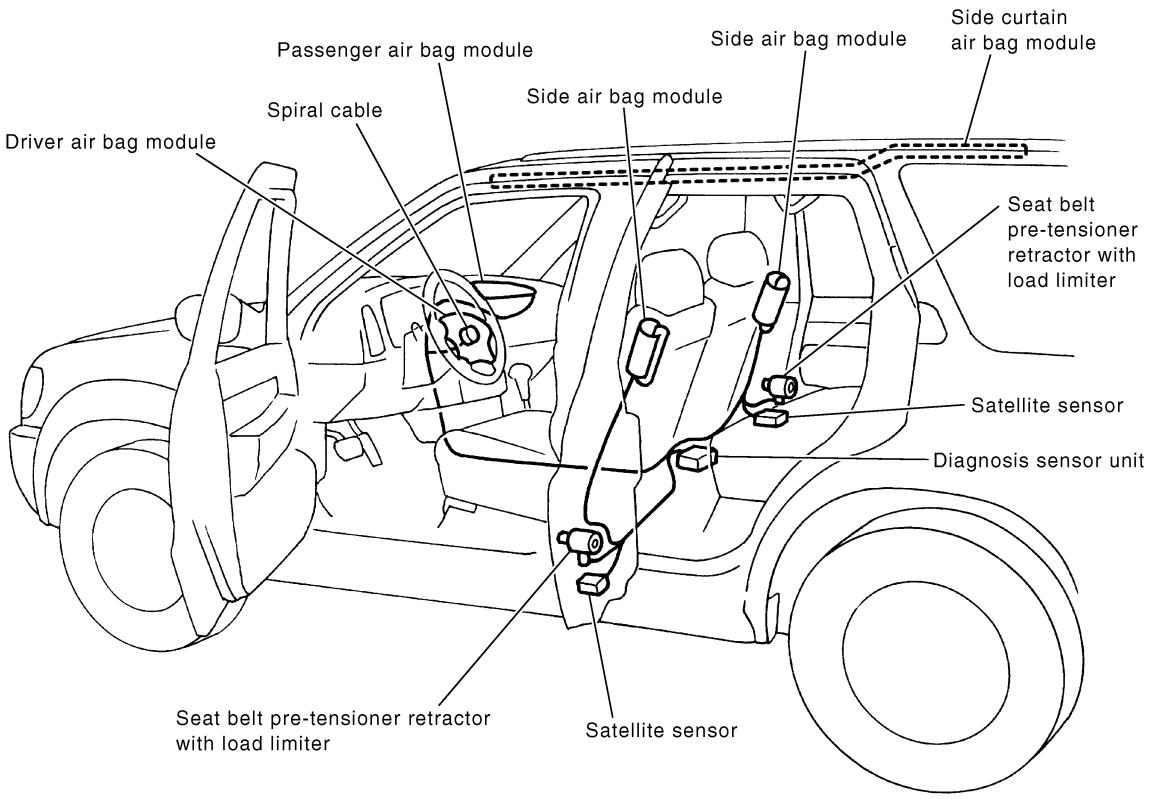
6. Install side gear to pinion mate gears.
7. Install each disc and plate.

Use same procedures as outlined in steps 1. through 4. above.

SRS Component Parts Location

NARS0010

SEC. 240•251•253•484•680•868•870



SRS019A

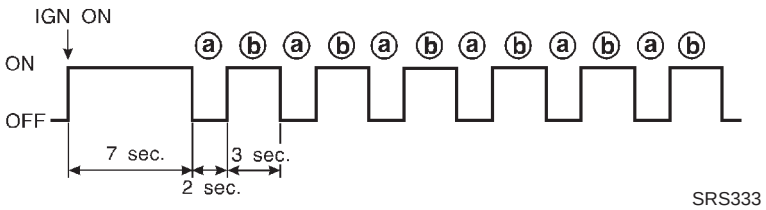
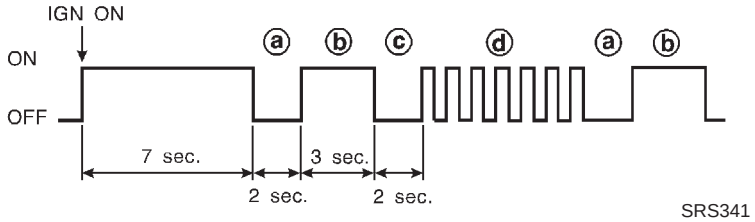
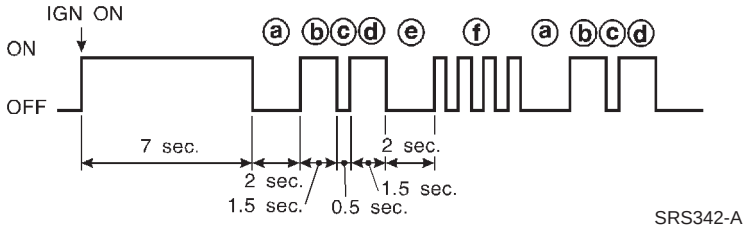
Diagnosis Sensor Unit

REMOVAL AND INSTALLATION

NARS0012

CAUTION:

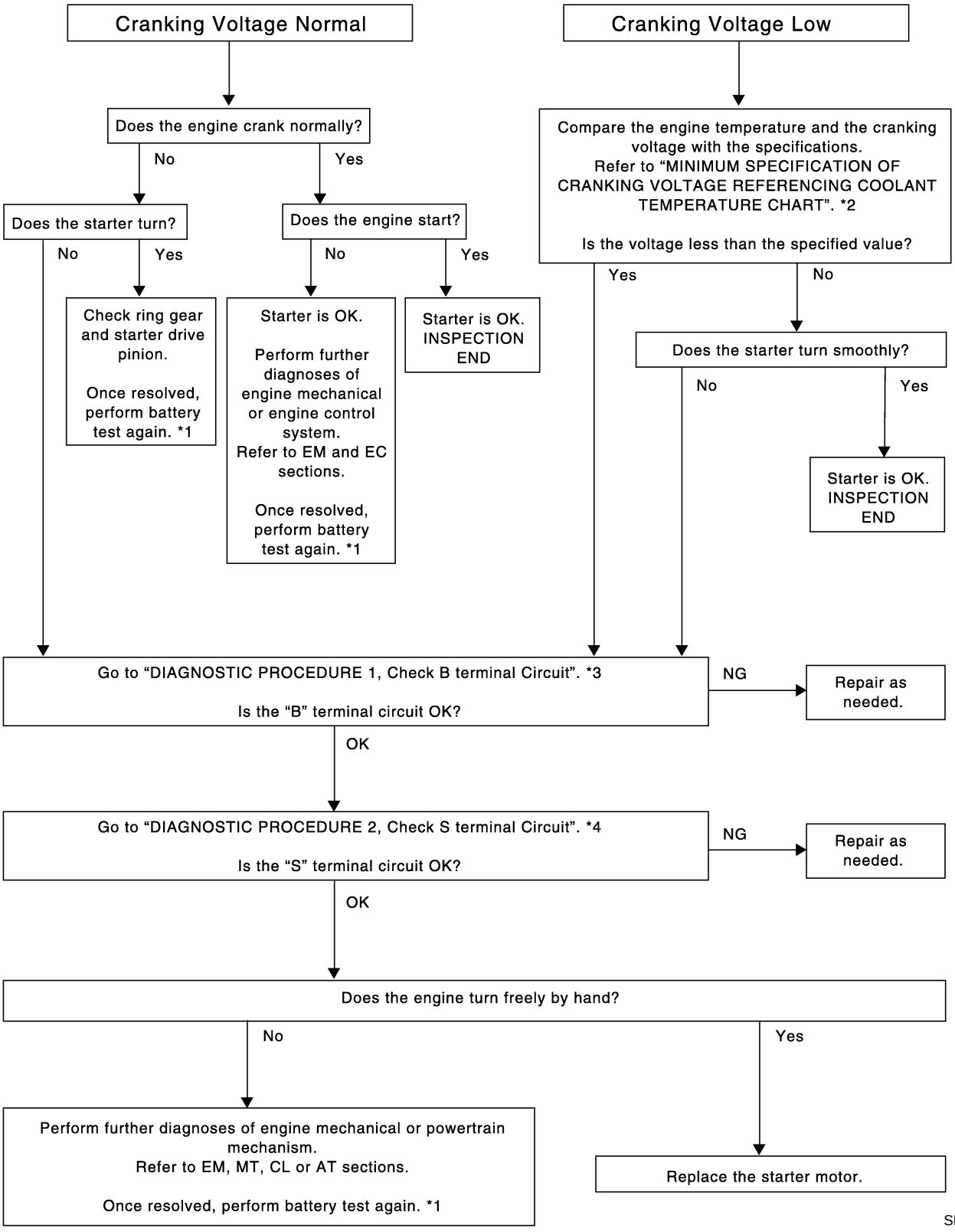
- **Before servicing SRS, turn the ignition switch off, disconnect both battery cables and wait for at least 3 minutes.**
- **Do not use old bolts after removal; replace with new ones.**
- **Check diagnosis sensor unit for proper installation.**
- **Check diagnosis sensor unit to ensure it is free of deformities, dents, cracks or rust. If they show any visible signs of damage, replace them with new ones.**
- **Check diagnosis sensor unit brackets to ensure they are free of deformities or rust.**
- **Replace diagnosis sensor unit if it has been dropped or sustained an impact.**
- **After replacement of diagnosis sensor unit, perform self-diagnosis for SRS. Refer to “SRS Operation Check” for details (RS-31).**

No.	"AIR BAG" warning lamp flash pattern — Diagnosis mode —		SRS condition
1		**a** through **b** are repeated.	• Diagnosis results (previously stored in the memory) might not be erased after repair. • Intermittent malfunction has been detected in the past. Go to DIAGNOSTIC PROCEDURE 8 (RS-49).
2		**a** through **d** are repeated. **b** — Driver and passenger air bag and seat belt pre-tensioner marker (For identifying driver air bag, passenger air bag and/or seat belt pre-tensioners malfunctioning) **d** — Indicates malfunctioning part. The number of flash varies with malfunctioning part (0.5 sec. ON and 0.5 sec. OFF is counted as one flash.)	The system is malfunctioning and needs to be repaired.
3		**a** through **f** are repeated. **b**, **c**, **d** — Side air bag marker (For identifying side air bag malfunctioning) **f** — Indicates malfunctioning part. The number of flash varies with malfunctioning part (0.5 sec. ON and 0.5 sec. OFF is counted as one flash.)	

7. Malfunctioning part is indicated by the number of flashes (part **d** or **f**). Compare the number of flashes to "Air Bag Warning Lamp Flash Code Chart", page RS-44, and locate malfunctioning part.
8. Turn ignition switch "OFF", and disconnect both battery cables.
9. Repair the system as outlined by the "Repair order" in "Warning Lamp Flash Code Chart" that corresponds to the flash code. For replacement procedure of component parts, refer to RS-15.
10. After repairing the system, go to DIAGNOSTIC PROCEDURE 7, page RS-48.

WORK FLOW

NASC0019S02

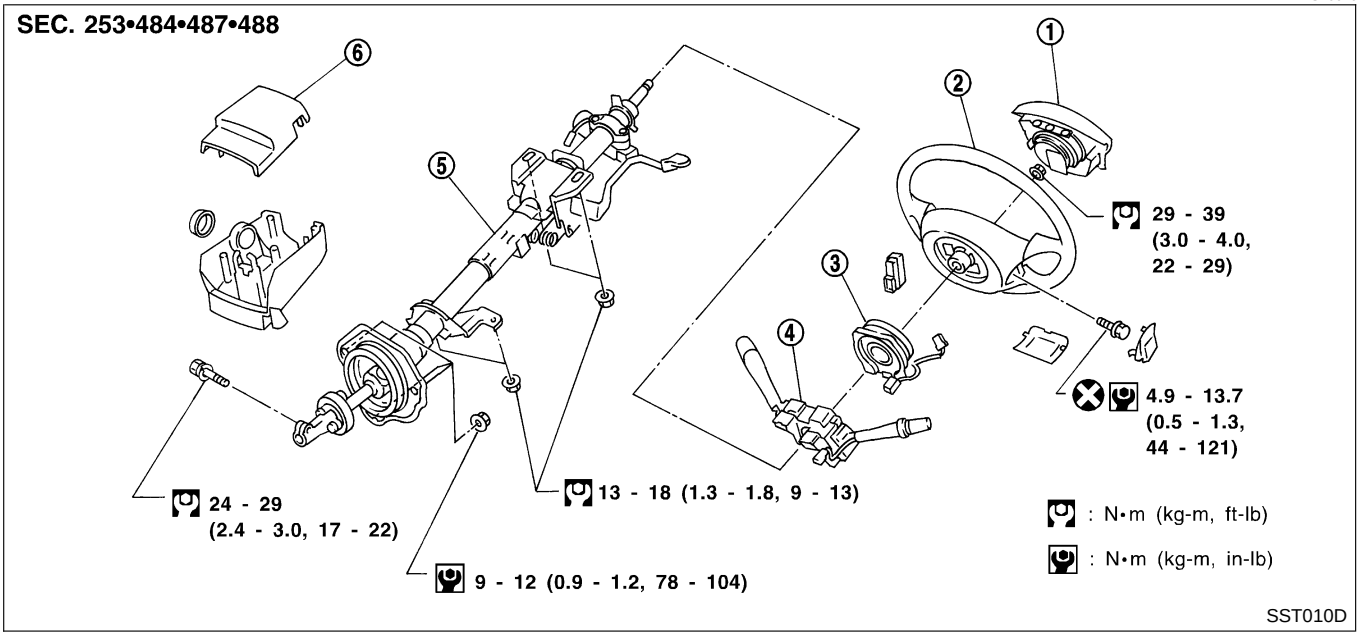


SEL411XA

*1 SC-7 *3 SC-16 *4 SC-18
*2 SC-19

Components

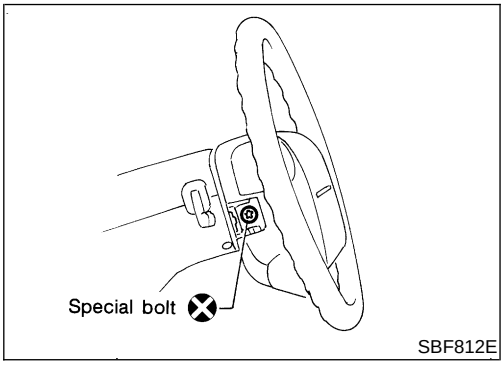
NAST0016



1. Air bag module
2. Steering wheel
3. Spiral cable
4. Combination switch
5. Steering column assembly
6. Column cover

CAUTION:

- **The rotation of the spiral cable (SRS "AIR BAG" 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.**
- **Remove the steering wheel before removing the steering lower joint to avoid damaging the SRS spiral cable.**



Removal and Installation

NAST0017

STEERING WHEEL

NAST0017S01

1. Remove air bag module and spiral cable. Refer to RS-17, "Removal — Air Bag Module and Spiral Cable".

Components

NASU0004

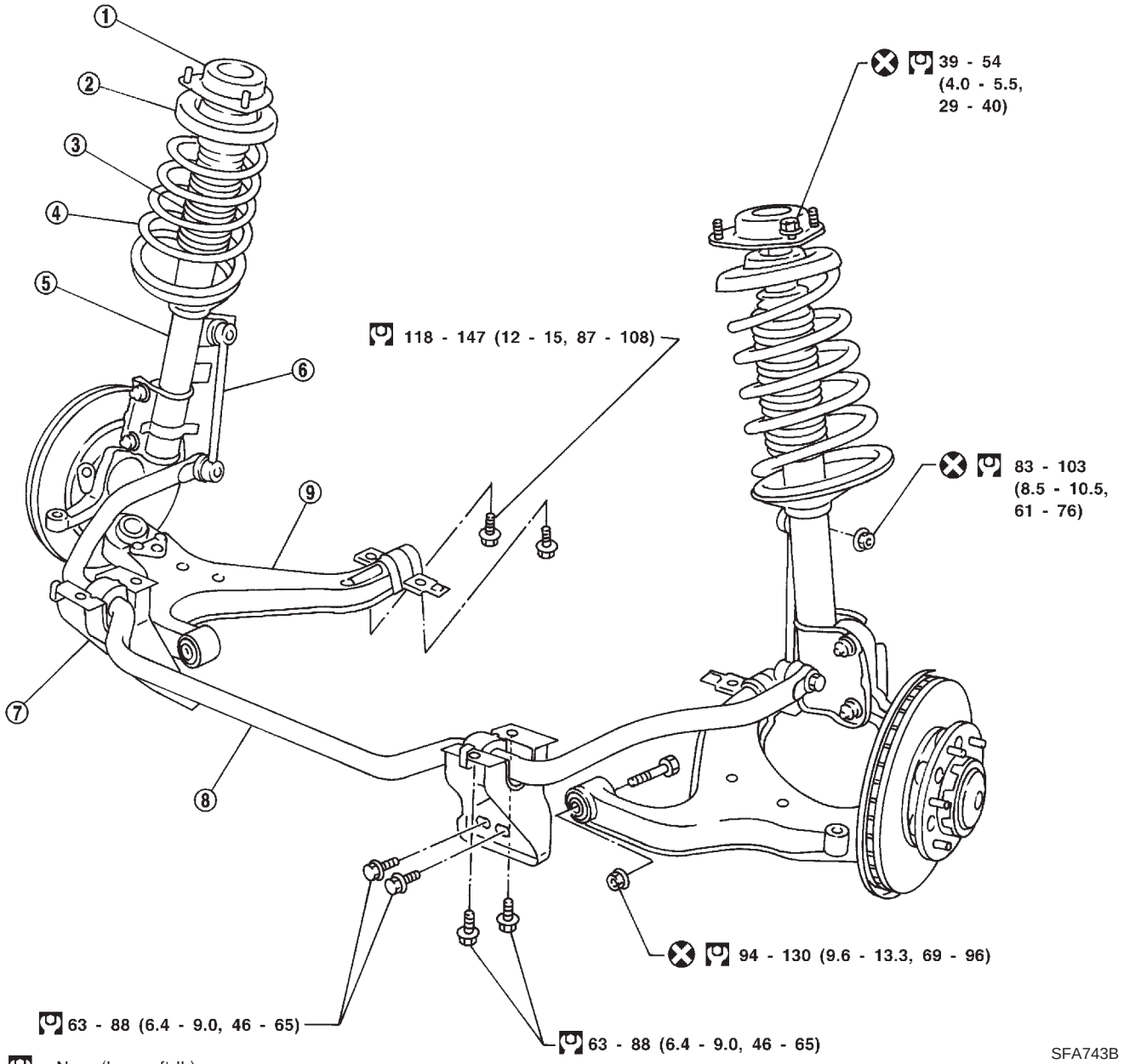
2WD

NASU0004S01

SEC. 400•401

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

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



: N•m (kg-m, ft-lb)

SFA743B

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

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

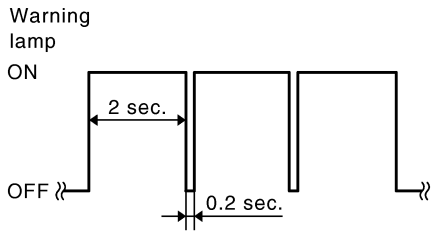
NASU0051

DIAGNOSTIC PROCEDURE

1	CHECK WARNING LAMP

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

Mode A



SEIA0347E

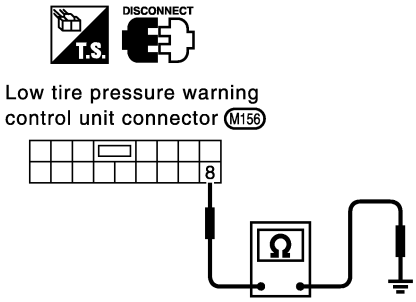
OK or NG

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

2	CHECK CIRCUIT

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

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



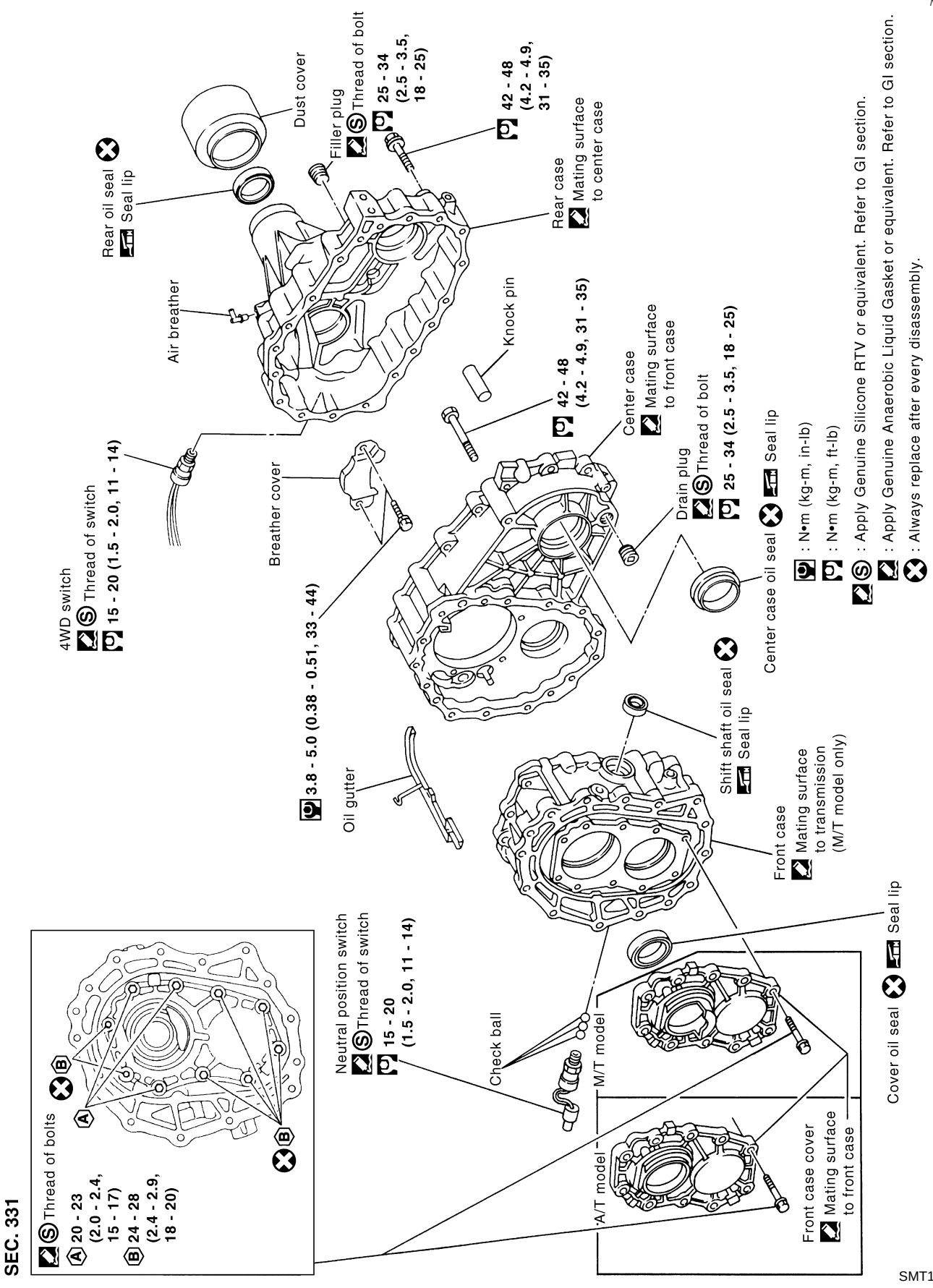
SEIA0237E

OK or NG

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

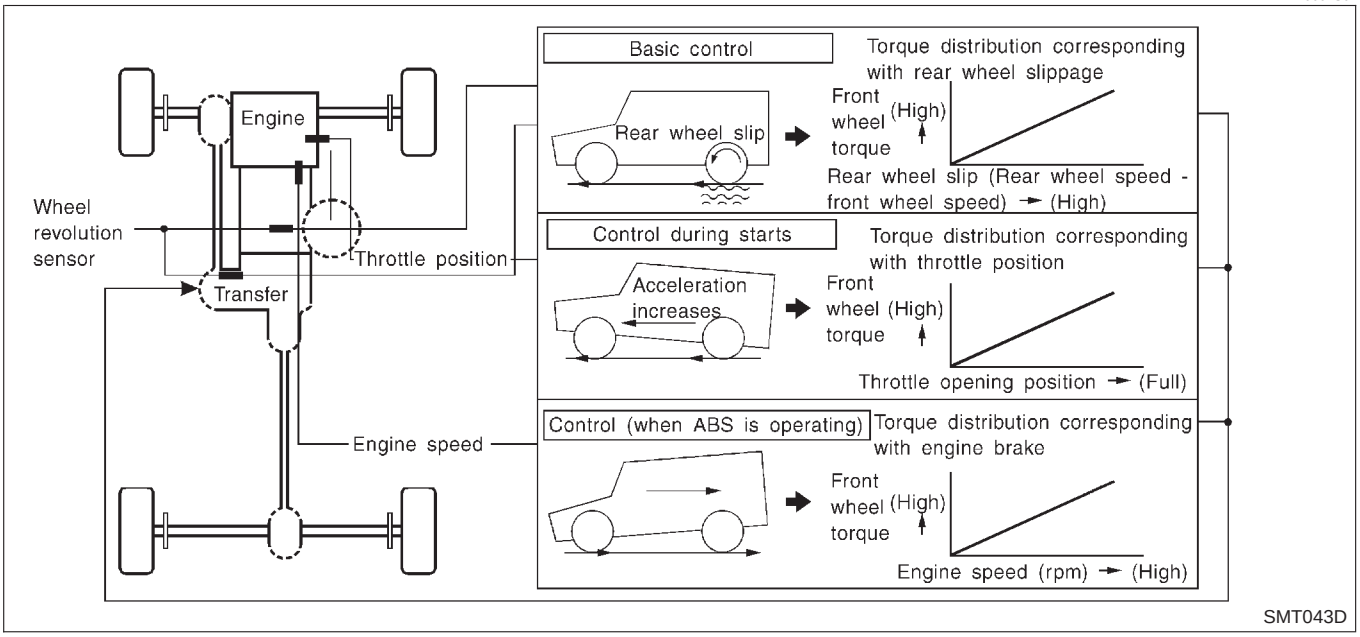
Case Components

NATF0102



ALL-MODE 4WD TRANSFER BASIC CONTROL

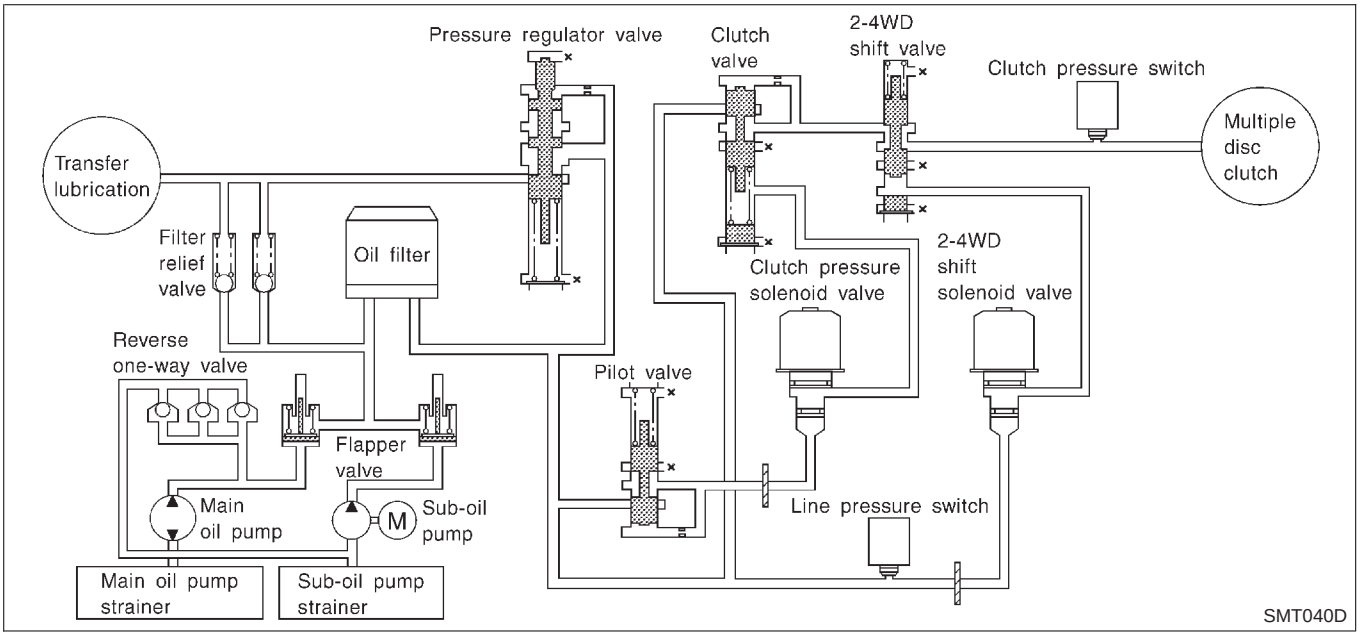
NATF0007S01



SMT043D

HYDRAULIC CONTROL CIRCUITS

NATF0007S02



SMT040D

OUTLINE

NATF0007S03

All-mode 4WD transfer is controlled by the transfer control unit and sensors.

If a malfunction occurs in the all-mode 4WD system, the 4WD warning lamp lights up to indicate the system malfunction. There are two ways to identify the cause of the malfunction.

1) Performing the self-diagnosis. (The 4WD warning lamp will indicate what kind of malfunction has occurred by flickering.)
2) Performing diagnosis using CONSULT-II.

Indicated items (Screen terms for CONSULT-II, "DATA MONITOR" mode)	Display	Conditions
Front wheel speed	0 - 255 km/h (0 - 158 MPH)	0 km/h (vehicle at standstill)
Rear wheel speed	0 - 255 km/h (0 - 158 MPH)	0 km/h (vehicle at standstill)
Shift ACTR operating 1, Shift activating monitor 1	OFF	During normal operation
	ON	During shifts from "4H" to "4LO" position
Shift ACTR operating 2, Shift activating monitor 2	OFF	During normal operation
	ON	During shifts from "4LO" to "4H" position
4WD fail lamp	OFF	During normal operation
	ON	During 2-second period (after key switch turned to "ON") or when system is out of order
Shift ACTR position sensing switch 1	OFF	4WD shift switch is in a position other than "4LO".
	ON	4WD shift switch in "4LO" position
Shift ACTR position sensing switch 2	OFF	4WD shift switch in "4LO" position
	ON	4WD shift switch is in a position other than "4LO".
2WD indicator lamp	OFF	Engine at rest or system out of order
	ON	Except the above condition
AUTO indicator lamp	OFF	Engine at rest during 2WD-mode operation or system out of order
	ON	4WD shift switch in "4LO" or "4H" or "AUTO" position
LOCK indicator lamp	OFF	Engine at rest and 4WD shift switch in "AUTO" position during 2WD-mode operation or system out of order
	ON	4WD shift switch in "4H" or "4LO" position
4LO indicator lamp	OFF	Engine at rest and 4WD shift switch in "AUTO" position during 2WD-mode operation or system out of order
	ON	4WD shift switch in "4LO" position
VDC operation signal (VDC OPER SIG)	OFF	VDC is not operating.
	ON	VDC is operating.
TCS operation signal (TCS OPER SIG)	OFF	TCS is not operating.
	ON	TCS is operating.

WORK SUPPORT

NATF0012S06

Purpose

NATF0012S0601

When there is no problem with transfer and 4WD system, following symptoms in "AUTO" mode may be claimed by a customer.

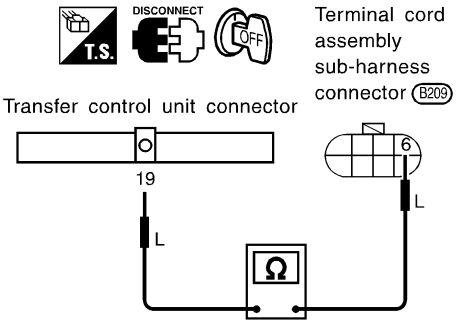
- Tight corner braking symptom after accelerator (throttle) opening (Note 1)
- Vibration when accelerating on a low μ road (snow-covered or icy road) (Note 2)
  It is possible to deal with these symptoms by changing "CLUTCH FORCE RELEASE LIMIT VALUE". However, be careful when changing the values because it may adversely affect driving performance.

NOTE:

1) When the accelerator is slightly open (approx. 1/8) or fully closed after being opened. The tight corner braking symptom

3	CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to "OFF" position.
2. Check continuity between transfer terminal cord assembly sub-harness connector terminal 6 and transfer control unit harness connector terminal 19.
   Continuity should exist.



SMT777D

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace harness between transfer terminal cord assembly sub-harness connector terminal 6 and transfer control unit harness connector terminal 19.

4	PERFORM SELF-DIAGNOSIS

After driving for a while, perform self-diagnosis.
Refer to "Trouble Diagnosis without CONSULT-II", TF-61 and "Trouble Diagnosis with CONSULT-II", TF-64.

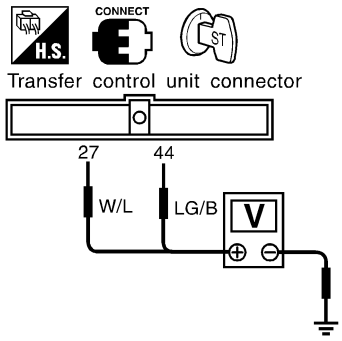
OK or NG

OK	▶	**INSPECTION END**
NG	▶	1. Perform transfer control unit input/output signal inspection. Refer to "TRANSFER CONTROL UNIT INSPECTION TABLE", TF-89. 2. If NG, recheck transfer control unit pin terminals for damage or loose connection with harness connector.

5	CHECK INPUT SIGNAL

Without CONSULT-II

1. Start engine (idling).
2. Check voltage transfer control unit harness connector terminal 27 (or 44) and body ground while 4WD shift switch is set from 4H to 4LO (or from 4LO to 4H).



SMT830D

3. Result

Terminal No.	Condition	Voltage
27	4WD shift switch is set to 4H.	Less than 1V
	4WD shift switch is set except 4H.	Battery voltage
44	4WD shift switch is set to 4LO.	Less than 1V
	4WD shift switch is set except 4LO.	Battery voltage

MTBL0203

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	CHECK HARNESS CONTINUITY BETWEEN TRANSFER CONTROL UNIT AND TRANSFER CONTROL DEVICE

OK or NG

OK	▶	GO TO 7.
NG	▶	Repair and replace harness connector between transfer control unit and transfer control device.

7	PERFORM SELF-DIAGNOSIS AGAIN

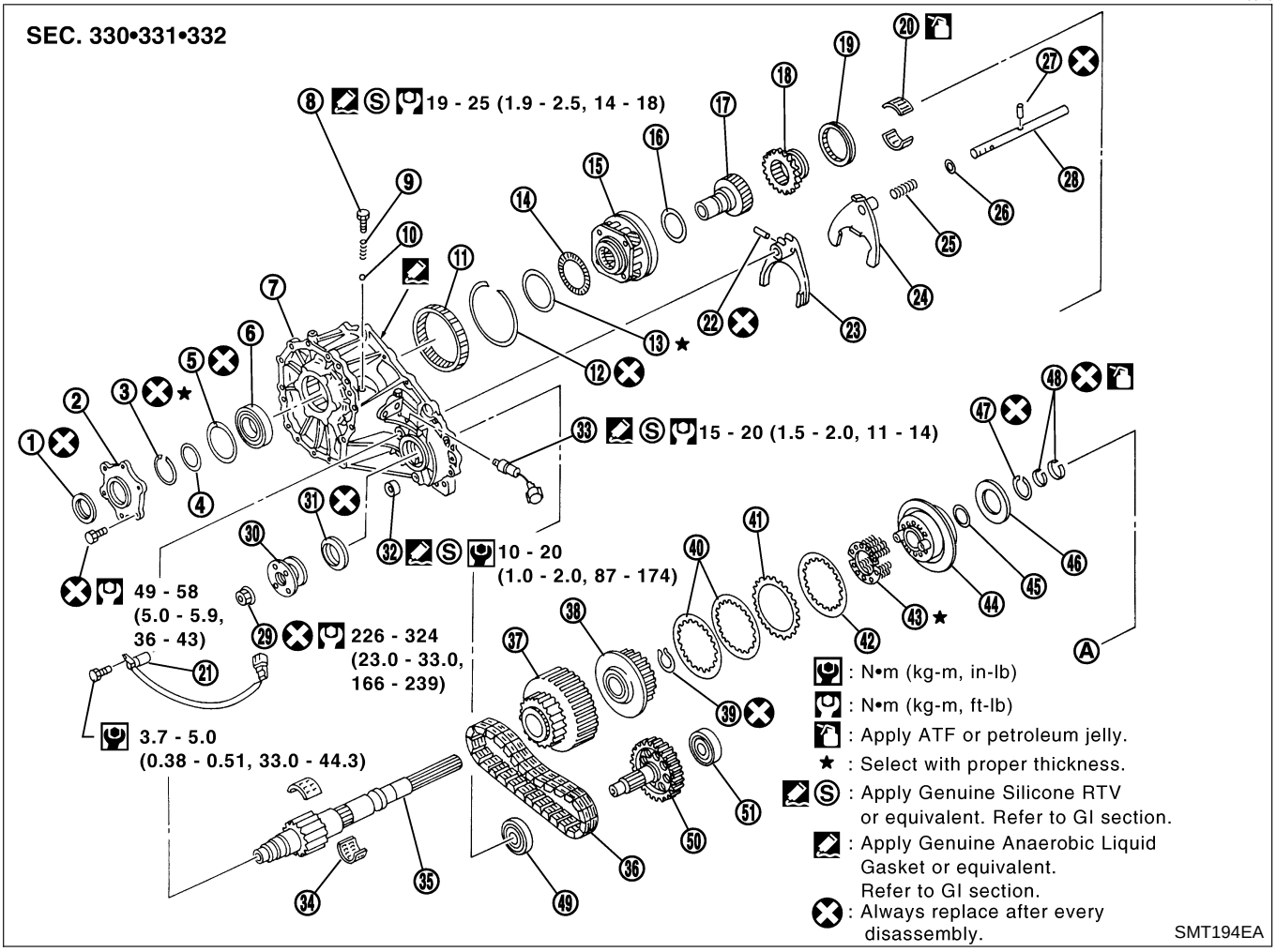
After driving for a while, perform self-diagnosis again.
Refer to "Trouble Diagnosis without CONSULT-II", TF-61.

OK or NG

OK	▶	INSPECTION END
NG	▶	1. Perform transfer control unit/output signal inspection. Refer to "TRANSFER CONTROL UNIT INSPECTION TABLE", "TROUBLE DIAGNOSIS — GENERAL DESCRIPTION", TF-89. 2. If NG, recheck transfer control unit pin terminals for damage or loose connection with harness connector.

Transfer Components

NATF0076



1. Oil seal
2. Transfer cover
3. Snap ring
4. Washer
5. Snap ring
6. Main gear bearing
7. Front case
8. Check plug
9. Check spring
10. Check ball
11. Internal gear
12. Snap ring
13. Bearing race
14. Thrust needle bearing
15. Planetary carrier
16. Thrust needle bearing
17. Sun gear
18. L-H sleeve
19. 2-4 sleeve
20. Radial needle bearing
21. Front revolution sensor
22. Retaining pin
23. L-H fork
24. 2-4 fork
25. Shift fork spring
26. Fork guide
27. Retaining pin
28. Shift rod
29. Self-lock nut
30. Companion flange
31. Oil seal
32. Drain plug
33. Wait detection switch
34. Needle bearing
35. Mainshaft
36. Drive chain
37. Clutch drum
38. Clutch hub
39. Snap ring
40. Driven plate
41. Drive plate
42. Retaining plate
43. Return spring assembly
44. Press flange
45. Washer
46. Thrust needle bearing
47. Snap ring
48. Seal ring
49. Front bearing
50. Front drive shaft
51. Rear bearing