

SECTION SBC

SEAT BELT CONTROL SYSTEM

CONTENTS

BASIC INSPECTION	4	Diagnosis Procedure	18
DIAGNOSIS AND REPAIR WORKFLOW	4	Component Inspection	19
Work Flow	4	B2454 SEAT BLT PWR DR CIRC	21
SYSTEM DESCRIPTION	7	Description	21
PRE-CRASH SEAT BELT SYSTEM	7	DTC Logic	21
System Diagram	7	Diagnosis Procedure	21
System Description	7	B2455 CONTROL UNIT DR	23
Component Parts Location	9	Description	23
Component Description	10	DTC Logic	23
SEAT BELT WARNING SYSTEM	11	Diagnosis Procedure	23
System Diagram	11	B2456 SEAT BLT PWR AS	24
System Description	11	Description	24
Component Parts Location	12	DTC Logic	24
Component Description	12	Diagnosis Procedure	24
DIAGNOSIS SYSTEM (PRE-CRASH SEAT BELT)	13	B2457 CONTROL UNIT AS	26
CONSULT Function	13	Description	26
DTC/CIRCUIT DIAGNOSIS	15	DTC Logic	26
U1000 CAN COMM CIRCUIT	15	Diagnosis Procedure	26
Description	15	B2458 LOCAL COMM	27
DTC Logic	15	Description	27
B2451 SEAT BLT MTR DR CIRC	16	DTC Logic	27
Description	16	Diagnosis Procedure	27
DTC Logic	16	B2461 VHCL SPEED SIGNAL	29
Diagnosis Procedure	16	Description	29
B2452 SEAT BLT MTR AS CIRC	17	DTC Logic	29
Description	17	Diagnosis Procedure	29
DTC Logic	17	B2462 VHCL DISTANCE SIGNAL	30
Diagnosis Procedure	17	Description	30
B2453 BR STROKE SEN CIRC	18	DTC Logic	30
Description	18	Diagnosis Procedure	30
DTC Logic	18	B2466 DR/AS CONTROL UNIT	31
		Description	31
		DTC Logic	31
		Diagnosis Procedure	31

B2470 SYS HEAT PROTC DR	32	SEAT BELT WARNING LAMP SYSTEM : Component Function Check	42
Description	32	SEAT BELT WARNING LAMP SYSTEM : Diagnosis Procedure	43
DTC Logic	32	SEAT BELT WARNING LAMP SYSTEM : Component Inspection (Belt Buckle Switch)	44
Diagnosis Procedure	32	SEAT BELT WARNING LAMP CIRCUIT	45
B2471 SYS HEAT PROTC AS	33	Diagnosis Procedure	45
Description	33	SEAT BELT WARNING SYSTEM	46
DTC Logic	33	Wiring Diagram - SEAT BELT WARNING SYSTEM -	46
Diagnosis Procedure	33	ECU DIAGNOSIS INFORMATION	52
U0126 ST ANG SEN SIG	34	PRE-CRASH SEAT BELT CONTROL UNIT	52
Description	34	Reference Value	52
DTC Logic	34	Fail Safe	54
Diagnosis Procedure	34	DTC Index	55
U0428 STRG ANGL CAL	35	Wiring Diagram - PRE-CRASH SEAT BELT SYSTEM -	57
Description	35	SYMPTOM DIAGNOSIS	64
DTC Logic	35	PRE-CRASH SEAT BELT DOSE NOT OPERATE	64
Diagnosis Procedure	35	BOTH SIDES	64
POWER SUPPLY AND GROUND CIRCUIT	36	BOTH SIDES : Diagnosis Procedure	64
Diagnosis Procedure	36	DRIVER SIDE	64
SEAT BELT BUCKLE SWITCH (DRIVER SIDE)	37	DRIVER SIDE : Diagnosis Procedure	64
PRE-CRASH SEAT BELT SYSTEM	37	PASSENGER SIDE	64
PRE-CRASH SEAT BELT SYSTEM : Description..	37	PASSENGER SIDE : Diagnosis Procedure	64
PRE-CRASH SEAT BELT SYSTEM : Component Function Check	37	SEAT BELT WARNING LAMP DOES NOT TURN OFF	66
PRE-CRASH SEAT BELT SYSTEM : Diagnosis Procedure	37	Diagnosis Procedure	66
PRE-CRASH SEAT BELT SYSTEM : Component Inspection (Belt Buckle Switch)	38	SEAT BELT WARNING LAMP DOES NOT TURN ON	67
SEAT BELT WARNING LAMP SYSTEM	38	Diagnosis Procedure	67
SEAT BELT WARNING LAMP SYSTEM : Description	38	PRECAUTION	68
SEAT BELT WARNING LAMP SYSTEM : Component Function Check	38	PRECAUTIONS	68
SEAT BELT WARNING LAMP SYSTEM : Diagnosis Procedure	39	Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"	68
SEAT BELT WARNING LAMP SYSTEM : Component Inspection (Belt Buckle Switch)	40	Precaution for Seat Belt Service	68
SEAT BELT BUCKLE SWITCH (PASSENGER SIDE)	41	Precautions For Xenon Headlamp Service	69
PRE-CRASH SEAT BELT SYSTEM	41	Precautions for Removing Battery Terminal	69
PRE-CRASH SEAT BELT SYSTEM : Description..	41	PERIODIC MAINTENANCE	70
PRE-CRASH SEAT BELT SYSTEM : Component Function Check	41	PRE-INSPECTION FOR DIAGNOSTIC	70
PRE-CRASH SEAT BELT SYSTEM : Diagnosis Procedure	41	Description	70
PRE-CRASH SEAT BELT SYSTEM : Component Inspection (Belt Buckle Switch)	42	BRAKE PEDAL STROKE SENSOR	71
SEAT BELT WARNING LAMP SYSTEM	42	Exploded View	71
SEAT BELT WARNING LAMP SYSTEM : Description	42		

Removal and Installation	71	Exploded View	72
PRE-CRASH SEAT BELT CONTROL UNIT	72	Removal and Installation	72

A

B

C

D

E

F

G

SBC

I

J

K

L

M

N

O

P

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

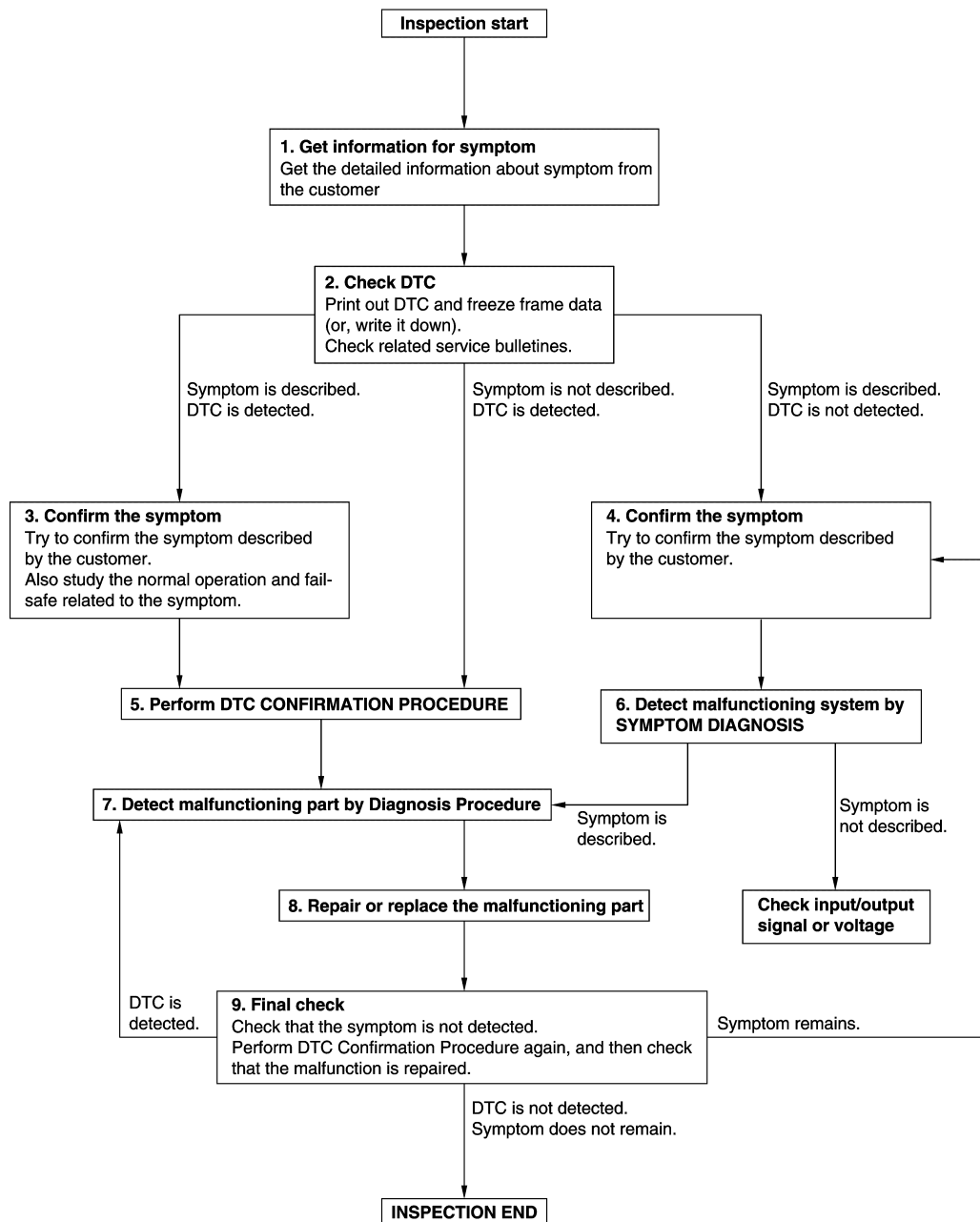
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:000000010580869

OVERALL SEQUENCE



JMKIA8652GB

DETAILED FLOW

Revision: 2015 February

SBC-4

2015 QX70

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

1.GET INFORMATION FOR SYMPTOM

1. Get detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurs).
2. Check operation condition of the function that is malfunctioning.

>> GO TO 2.

2.CHECK DTC

1. Check DTC.
2. Perform the following procedure if DTC is detected.
 - Record DTC and freeze frame data (Print them out using CONSULT.)
 - Erase DTC.
 - Study the relationship between the cause detected by DTC and the symptom described by the customer.
3. Check related service bulletins for information.

Are any symptoms described and any DTC detected?

Symptom is described, DTC is detected>>GO TO 3.

Symptom is described, DTC is not detected>>GO TO 4.

Symptom is not described, DTC is detected>>GO TO 5.

3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.

Also study the normal operation and fail-safe related to the symptom.

Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.

Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC CONFIRMATION PROCEDURE for the detected DTC, and then check that DTC is detected again. At this time, always connect CONSULT to the vehicle, and check self diagnostic results in real time.

NOTE:

- Freeze frame data is useful if the DTC is not detected.
- Perform Component Function Check if DTC CONFIRMATION PROCEDURE is not included on Service Manual. This simplified check procedure is an effective alternative though DTC cannot be detected during this check.

If the result of Component Function Check is NG, it is the same as the detection of DTC by DTC CONFIRMATION PROCEDURE.

Is DTC detected?

YES >> GO TO 7.

NO >> Check according to [GI-47. "Intermittent Incident"](#).

6.DETECT MALFUNCTIONING SYSTEM BY SYMPTOM DIAGNOSIS

Detect malfunctioning system according to SYMPTOM DIAGNOSIS based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

Is the symptom described?

YES >> GO TO 7.

NO >> Monitor input data from related sensors or check voltage of related module terminals using CONSULT.

7.DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

Inspect according to Diagnosis Procedure of the system.

Is malfunctioning part detected?

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

- YES >> GO TO 8.
NO >> Check according to [GI-47, "Intermittent Incident"](#).

8. REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
3. Check DTC. If DTC is detected, erase it.

>> GO TO 9.

9. FINAL CHECK

When DTC is detected in step 2, perform DTC CONFIRMATION PROCEDURE again, and then check that the malfunction is repaired securely.

When symptom is described by the customer, refer to confirmed symptom in step 3 or 4, and check that the symptom is not detected.

Is DTC detected and does symptom remain?

- YES-1 >> DTC is detected: GO TO 7.
YES-2 >> Symptom remains: GO TO 4.
NO >> Before returning the vehicle to the customer, always erase DTC.

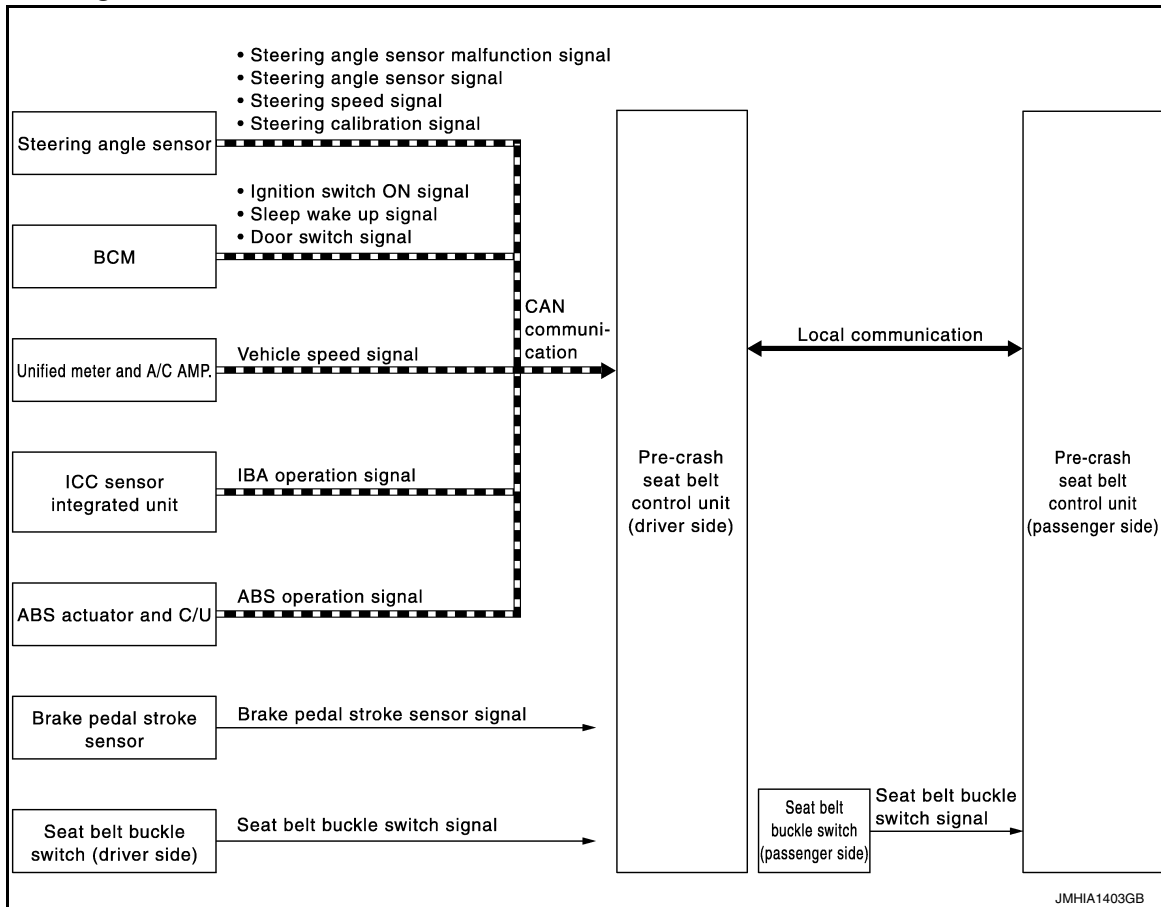
PRE-CRASH SEAT BELT SYSTEM

< SYSTEM DESCRIPTION >

SYSTEM DESCRIPTION

PRE-CRASH SEAT BELT SYSTEM

System Diagram



System Description

INFOID:0000000010580871

- Pre-crash seat belt system (with comfort function) is adopted for driver and passenger seat belts.
- Pre-crash seat belt system integrates control unit and motor in driver and passenger seat belt retractors.
- Provides a sense of ease when pre-crash seat belt control unit judges the emergency braking operation, the intelligent brake assistance operating status, the continuous ABS operating status, the emergency steering wheel operation, or the lateral slippage status during cornering, the motor immediately retracts the seat belt and suppresses change in occupant posture.
- Even in a situation where a collision is unavoidable, effects of other safety devices, like the air bag, are maximized and damages are reduced.
- Motor retracts seat belt when unfastening and extracts seat belt when fastening to reduce the feeling of pressure.(comfort function)

FUNCTION DESCRIPTION

Pre-crash seat belt system operates under the following conditions.

- During emergency brake operation
- When ABS continuously operates
- When intelligent brake assistance operates
- When lateral slippage during cornering occurs
- When steering wheel is rotated for emergency
- When comfort function operates

OPERATION CONDITION

Operation start and stop conditions of pre-crash seat belt system are as shown in the following table.

PRE-CRASH SEAT BELT SYSTEM

< SYSTEM DESCRIPTION >

Operation starts when all of the operation start conditions are satisfied and operation stops when any one of the stop conditions is satisfied.

Operation item	Operation start condition	Operation stop condition
During emergency brake operation	- Emergency braking status is detected - Vehicle speed is 15 km/h (9 MPH) or more	- During acceleration - When stopped
When ABS continuously operates	- ABS continuously operates for 2 seconds or more - Brake pedal is in depressed state	
When intelligent brake assistance operates	System detects that intelligent brake assistance is in operating status	2 seconds after operation start
When lateral slippage during cornering occurs	- Vehicle speed is 30 km/h (19 MPH) or more - System detects that the vehicle is in lateral slippage state - System detects that the vehicle is driving on a curve	- Vehicle stopped 1 second or more after maintaining steering wheel angle in straight driving state
When steering wheel is rotated for emergency	- Vehicle speed is 60 km/h (36 MPH) or more - Steering wheel angle is 90 degrees or more - System detects that steering wheel is rotated for emergency	

NOTE:

For details of intelligent brake assist system. Refer to [BRC-147, "System Description"](#).

Comfort function

- Seat belt is retracted and the looseness is reduced in the state as shown in the following table.
- Operation starts when all of the operation start conditions are satisfied and operation stops when any one of the stop conditions is satisfied.

	Activating condition	Deactivating condition
Door open	- Seat belt not installed condition - Door is operated to open from close - Vehicle stopped	- Seat belt retract is complete 13 seconds after start retracting
Seat belt is fastened	- When door is closed - Seat belt is fastened	- Seat belt is unfastened 1 second after operation
Seat belt is released	Seat belt is unfastened	- Seat belt retract is complete 10 seconds after start retracting

Operation Prohibition Condition

Pre-crash seat belt system does not operate in the following conditions.

- When seat belt is not fastened (Only the seat belt that is not fastened does not operate)
- When motor is overheat due to contentious operation*1
- When the system is in fail-safe mode

*1: System operation is temporarily deactivated to avoid overheating, when comfort function is continuously operated (18 times or more) during a short period of time by fastening and unfastening seat belts or opening and closing doors.

MALFUNCTION WARNING

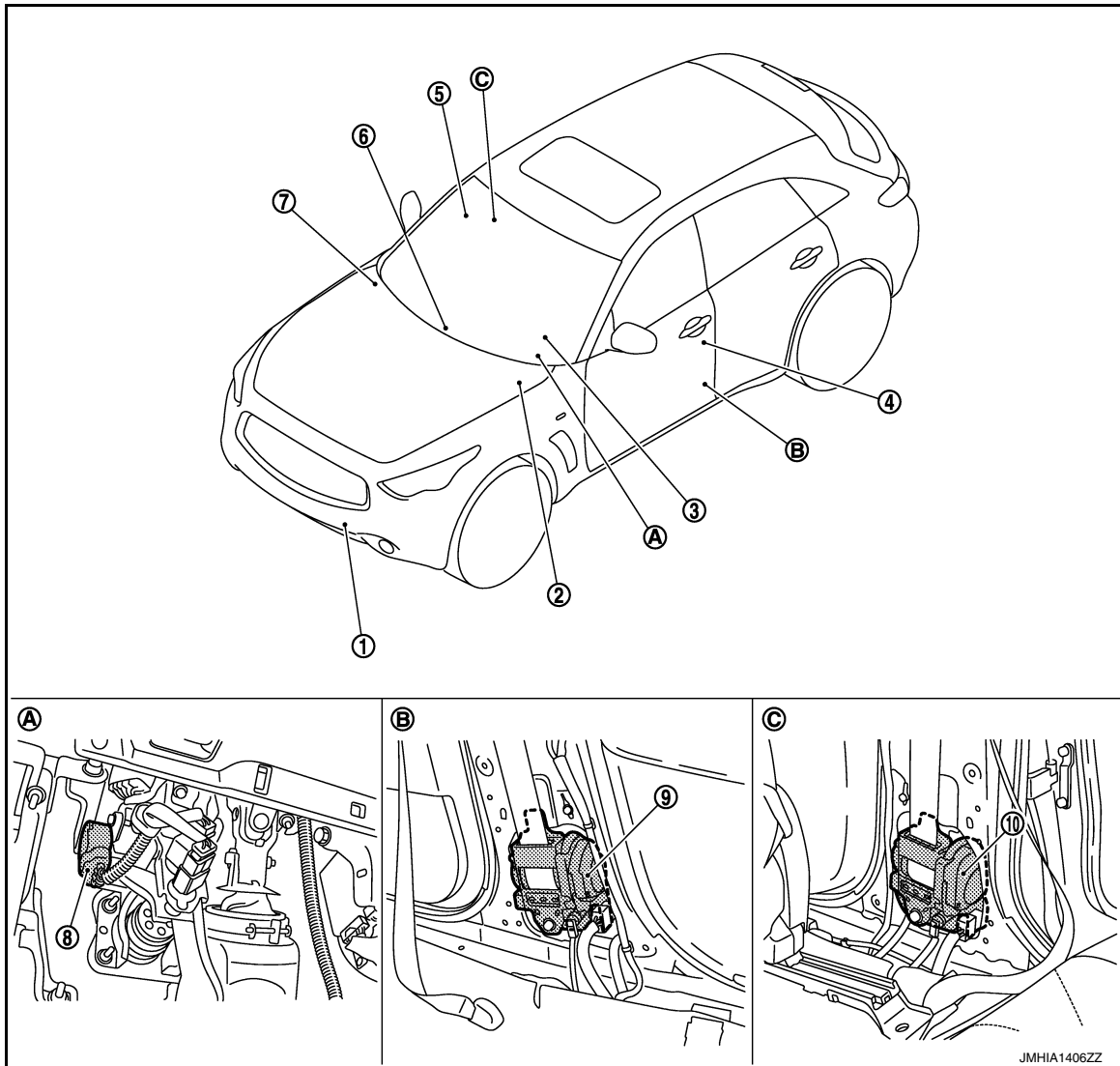
When system malfunction is detected, comfort function is deactivated to warn customer of system malfunction.

PRE-CRASH SEAT BELT SYSTEM

< SYSTEM DESCRIPTION >

Component Parts Location

INFOID:000000010580872



A

B

C

D

E

F

G

SBC

I

J

K

L

M

N

O

P

- | | | |
|--|--|---|
| 1. ICC sensor integrated unit | 2. ABS actuator and electric unit (control unit) | 3. Steering angle sensor Pre-crash |
| 4. Seat belt buckle switch (driver side) | 5. Seat belt buckle switch (passenger side) | 6. Unified meter and A/C amp. |
| 7. BCM | 8. Brake pedal stroke sensor | 9. Pre-crash seat belt control unit (driver side) |
| 10. seat belt control unit (passenger side) | | |
| A. View with instrument driver lower cover removed | B. View with center pillar lower garnish removed (driver side) | C. View with center pillar lower garnish removed (passenger side) |

PRE-CRASH SEAT BELT SYSTEM

< SYSTEM DESCRIPTION >

Component Description

INFOID:0000000010580873

Component	Function
Pre-tensioner seat belt with pre-crush control unit built in motor	• It controls pre-crash seat belt motor according to input signal. • It is built into seat belt retractor, and it pulls, returns, and maintains according to the motor rotation.
Brake pedal stroke sensor	• It changes voltage according to brake pedal depressed amount and sends the signal to pre-crash seat belt control unit. • There are 2 signals (brake pedal stroke sensor 1 and 2) sent from the brake pedal stroke sensor. Pre-crash seat belt control unit judges the stroke amount and the speed of the brake pedal according to the voltage of the signal sent by each side.
Seat belt buckle switch	It is arranged in the seat belt buckle and judges whether the seat belt is fastened or not fastened.
CAN system • Unified meter and A/C amp • BCM • Steering angle sensor • ABS actuator and electric unit (control unit)	It transmits the vehicle status to pre-crash seat belt control unit using the CAN communication system.

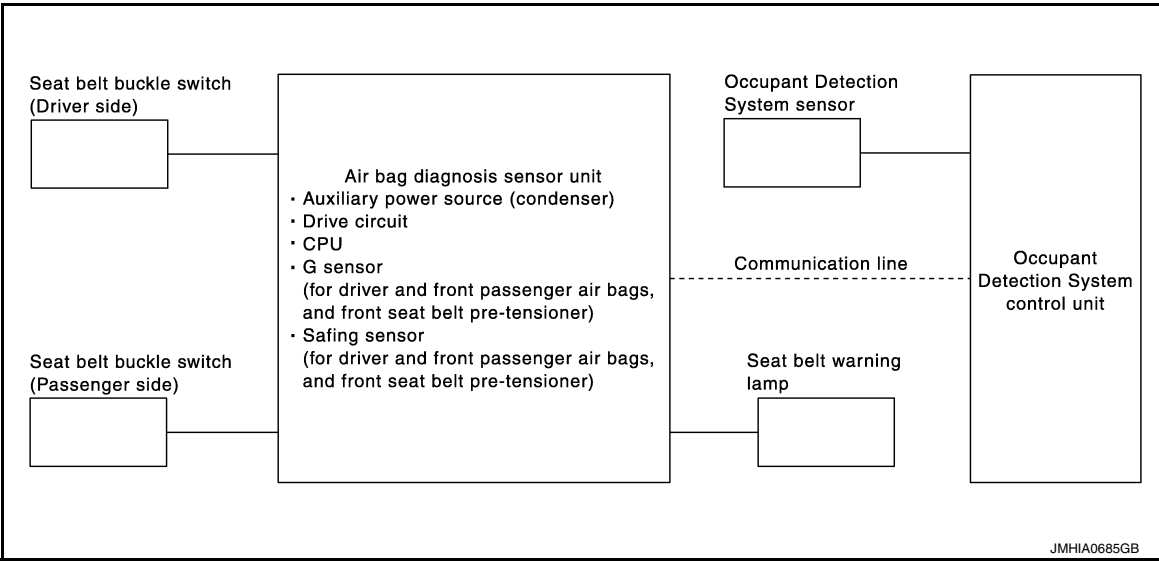
SEAT BELT WARNING SYSTEM

< SYSTEM DESCRIPTION >

SEAT BELT WARNING SYSTEM

System Diagram

INFOID:000000010580874



System Description

INFOID:000000010580875

- Turns ON seat belt warning lamp, when the Occupant Detection System judges adult or child in the front passenger seat and the passenger seat belt buckle switch is OFF.
- Operation of air bag diagnosis sensor unit when air bag diagnosis sensor unit receives information from Occupant Detection System.
- In addition, seat belt warning lamp illuminates, when the driver side seat belt is not fasten. This does not relate to the air bag diagnosis sensor unit.
- For driver seat belt function, refer to [MWI-6. "METER SYSTEM : System Diagram"](#)

Status (front passenger seat)	Seat belt warning lamp (When front passenger seat is unbuckled)
Empty	OFF
An object	OFF
Child/ child-seat	ON
Adult	ON
Malfunction	OFF
Zero point reset	OFF
Not yet performed (service parts only)	OFF

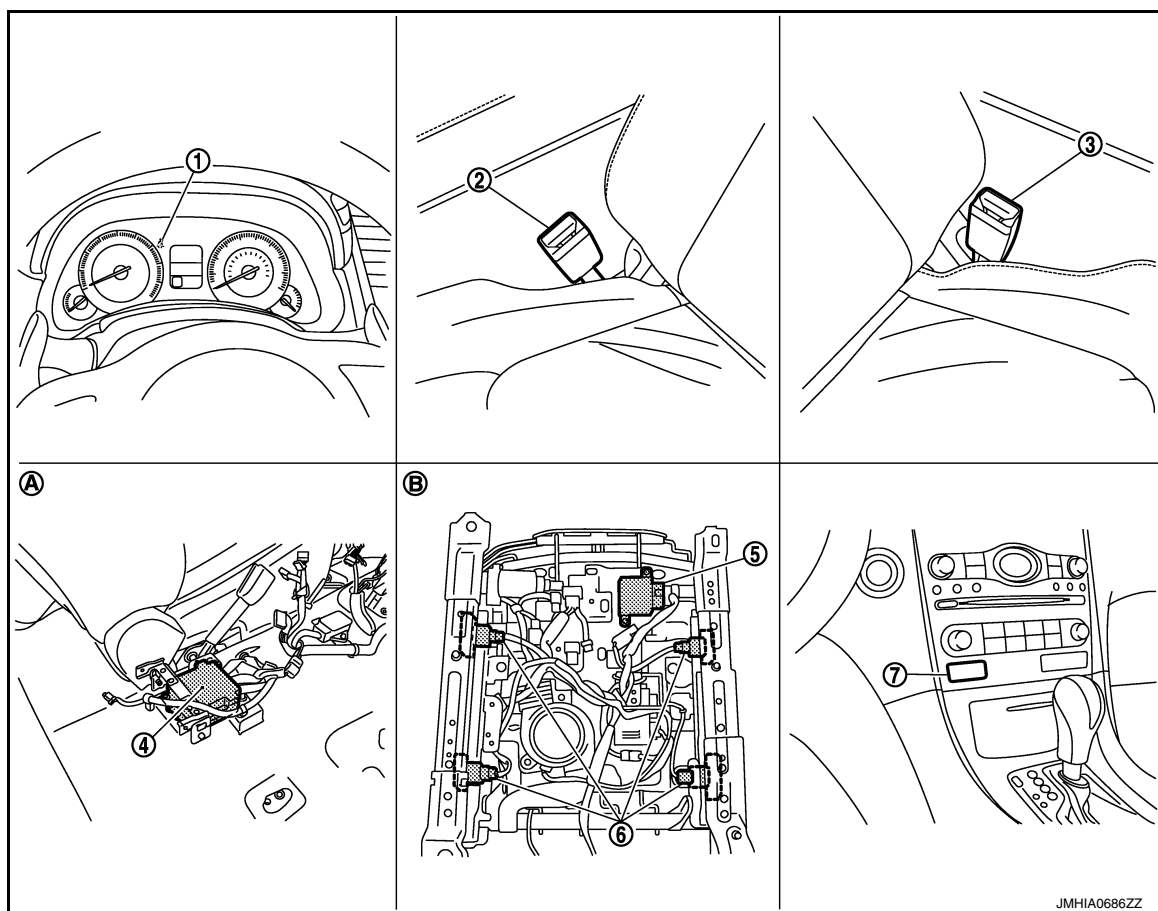
A
B
C
D
E
F
G
SBC
I
J
K
L
M
N
O
P

SEAT BELT WARNING SYSTEM

< SYSTEM DESCRIPTION >

Component Parts Location

INFOID:0000000010580876



- | | | |
|---|--|---|
| 1. Combination meter (seat belt warning lamp) | 2. Seat belt buckle switch (driver side) | 3. Seat belt buckle switch (passenger side) |
| 4. Air bag diagnosis sensor unit | 5. Occupant Detection Sensor unit | 6. Occupant Detection Sensor sensor |
| 7. Passenger air bag OFF indicator | | |
| A. View with center console assembly removed | B. Backside of the seat cushion | |

Component Description

INFOID:0000000010580877

Component parts	Outline of function
Seat belt buckle switch (Driver side)	Detects if the seat belt buckle switch (driver side) is fastened or unfastened
Seat belt buckle switch (Passenger side)	Detects if the seat belt buckle switch (passenger side) is fastened or unfastened
Seat belt warning lamp	Turns the seat belt warning lamp ON when the seat belt is unfastened
Occupant Detection System control unit	Judges the passenger seat condition based on the information from Occupant Detection System control unit
Occupant Detection System sensor	Detects if the passenger seat is empty or occupied
Air bag diagnosis sensor unit	Turns ON seat belt warning lamp based on the information from Occupant Detection System control unit
Front passenger air bag OFF indicator	Turns the front passenger air bag OFF indicator lamp ON when the front passenger seat is occupied by a child or a child seat

DIAGNOSIS SYSTEM (PRE-CRASH SEAT BELT)

< SYSTEM DESCRIPTION >

DIAGNOSIS SYSTEM (PRE-CRASH SEAT BELT)

CONSULT Function

INFOID:000000010580878

Diagnosis for pre-crash seat belt system can be performed using CONSULT.

APPLICATION ITEM

Part to be diagnosed	Diagnosis Mode	Function description
Pre-crash seat belt	Self-diagnosis Results	- Displays data recorded when a malfunction is detected. - Can print out the display. - Erases DTC recorded in memory.
	Data Monitor	Displays input data for pre-crash seat belt control unit in real time.
	Work Support	Changes the setting for each system function.
	CAN DIAG SUPPORT MNTR	Monitors communication status of CAN communication.
	Ecu Identification	Displays pre-crash seat belt control unit part number.

SELF-DIAGNOSIS RESULTS

Check self-diagnosis results.

CAUTION:

When malfunctions are detected in several systems, including the CAN communication [U1000], troubleshoot the CAN communication [U1000].

DTC	Trouble diagnosis name (CONSULT display)	DTC detection condition	Reference
U1000	CAN COMM CIRCUIT	Pre-crash seat belt control unit cannot transmit and receive CAN communication signal for 2 seconds or more	SBC-15
B2451	SEAT BLT MTR DR CIRC	- Motor or control unit malfunction - Seat belt motor circuit is shorted or open	SBC-16
B2452	SEAT BLT MTR DR CIRC	- Motor or control unit malfunction - Seat belt motor circuit is shorted or open	SBC-17
B2453	BR_STROKE_SEN_CIRC	- Brake pedal stroke sensor malfunction - Brake pedal stroke sensor circuit is short	SBC-18
B2454	SEAT BLT PWR DR CIRC	Motor power supply circuit is shorted or open	SBC-21
B2455	CONTROL UNIT DR	Malfunction in pre-crash seat belt control unit	SBC-23
B2456	SEAT BLT PWR AS	Motor power supply circuit is shorted or open	SBC-24
B2457	CONTROL UNIT AS	Malfunction in pre-crash seat belt control unit	SBC-26
B2458	LOCAL COMM	Local communication line shorted or open	SBC-27
B2461	VHCL SPEED SIGNAL	Vehicle speed signal malfunction is received	SBC-29
B2462	VHCL DISTANCE SIGNAL	ACC signal malfunction is received	SBC-30
B2466	DR/AS CONTROL UNIT	Control unit is out of the vehicle specification	SBC-31
B2470	SYS HEAT PROTC DR	Deactivation for cooling to prevent system heating due to continuous operation	SBC-32
B2471	SYS HEAT PROTC AS	Deactivation for cooling to prevent system heating due to continuous operation	SBC-33
U0126	STRG ANG SEN SIG	Steering angle sensor malfunction is received	SBC-34
U0428	STRG ANGL CAL	Steering angle sensor calibration incomplete signal is received	SBC-35

ERASING SELF-DIAGNOSIS RESULTS

- SELF-DIAGNOSIS RESULTS

DIAGNOSIS SYSTEM (PRE-CRASH SEAT BELT)

< SYSTEM DESCRIPTION >

Current "SELF-DIAG RESULTS" are displayed. (If all suspect circuits have been repaired, "NO DTC" is displayed.)

- SELF-DIAG RESULTS [MEMORY]

Resume trouble diagnosis item selection screen, confirm "SELF-DIAG RESULTS", and then touch ERASE MEMORY.

DATA MONITOR

Monitor item	Contents
BUCKLE SW RH	Indicates [ON/OFF] condition of seat belt buckle switch (RH).
BUCKLE SW LH	Indicates [ON/OFF] condition of seat belt buckle switch (LH).
VEHICLE DISTANCE	Indicates [ON/OFF] condition of intelligent brake assist signal.
IGN SW	Indicates [ON/OFF] condition of ignition switch.
FR DOOR SW RH	Indicates [Close/Open] condition of front door switch (RH).
FR DOOR SW LH	Indicates [Close/Open] condition of front door switch (LH).
VHCL SPEED	Indicates [Km/h] vehicle speed signal.
BRK PEDAL SNSR1	Indicates [V] voltage of brake pedal stroke sensor 1 signal.
BRK PEDAL SNSR2	Indicates [V] voltage of brake pedal stroke sensor 2 signal.
STRG ANGLE	Indicates [deg] steering angle signal.
STRG ACCL SPEED	Indicates [deg/s] steering acceleration speed signal.
HEAT PROTC RH	Indicates [ON/OFF] condition of heat protection (RH).
HEAT PROTC LH	Indicates [ON/OFF] condition of heat protection (RH).

WORK SUPPORT

Monitor item	Description
DOOR OPENING RETRACT RETRY	Changes the number of times for the seat belt retract retry when the door opens.