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CAN Communication Signal Chart

Refer to How to Use CAN Communication Signal Chart [How to Use CAN Communication Signal Chart](#)  for how to use CAN communication signal chart.

note Refer to [Abbreviation List](#)  for the abbreviations of the connecting units.

Signal name	ECM	ABS	IPDM-E	TCM	M&A	A-BAG	HVAC	8ch GW 2	HFM	EPS/DAST 3	BCM	SONAR	A-AMP.	LANE	ACC 2	LASER	CCM	Multi Around Monitor	RDR-R	RDR-L	AV	IVC	4WD	ADP	E-HUD	WL CHG	PWBD	E-SHIFT	STRG	EVTC
A/C compressor request signal	T		R																											
A/C relay control signal	T		R																											
Accelerator pedal position signal	T	R		R											R		R						R							
ASCD status signal	T																								R					
Battery warning request signal (ECM)	T				R																									
Brake torque request signal	T																R													
		R															T													
Closed throttle position signal	T			R											R															
Cooling fan control signal	T		R																											
Cooling fan speed request signal	T		R																											
Cranking enable (ECM) signal	T		R																											

Signal name	ECM	ABS	IPDM-E	TCM	M&A	A-BAG	HVAC	8ch GW 2	HFM	EPS/DAST 3	BCM	SONAR	A-AMP.	LANE	ACC 2	LASER	CCM	Multi Around Monitor	RDR-R	RDR-L	AV	IVC	4WD	ADP	E-HUD	WL CHG	PWBD	E-SHIFT	STRG	EVTC
ECO mode indicator signal	T				R																									
ECO pedal guide signal	T				R																									
Electrical power cut freeze signal	T										R																			
Engine and CVT integrated control signal	T			R																										
	R			T																										
Engine coolant temperature signal	T			R	R		R				R																			
Engine oil pressure warning light signal	T				R																	R								
Engine speed signal	T	R		R	R		R				R		R		R								R							
Engine status signal	T				R					R	R											R	R							
Engine torque signal	T	R															R													
EPS assist request signal	T									R																				
Fuel consumption monitor signal	T				R																									
Malfunction indicator light signal	T																					R								
	R			T																										
MI-PILOT Assist permission signal	T														R															
										T					R															
MI-PILOT Assist steering switch signal	T														R															
Refrigerant pressure	T						R																							

Signal name	ECM	ABS	IPDM-E	TCM	M&A	A-BAG	HVAC	8ch GW 2	HFM	EPS/DAST 3	BCM	SONAR	A-AMP.	LANE	ACC 2	LASER	CCM	Multi Around Monitor	RDR-R	RDR-L	AV	IVC	4WD	ADP	E-HUD	WL CHG	PWBD	E-SHIFT	STRG	EVTC
sensor signal																														
Remaining distance signal	T				R																									
Starter cut relay request signal	T										R																			
Stop/Start status signal	T									R																				
Valve timing target position	T																													R
Wheel torque signal	T																						R							
																	R						T							
ABS malfunction signal		T		R											R		R													
ABS operation signal		T		R											R		R						R							
ABS warning light signal		T			R										R							R								
Automatic brake hold status signal		T															R													
Battery voltage signal		T																							R					
			T										R																	
Brake fluid pressure signal		T													R		R													
Brake hold status signal		T															R													
Brake warning light signal		T			R																	R								
Brake wheel torque signal		R													T															
															R							T								

Signal name	ECM	ABS	IPDM-E	TCM	M&A	A-BAG	HVAC	8ch GW 2	HFM	EPS/DAST 3	BCM	SONAR	A-AMP.	LANE	ACC 2	LASER	CCM	Multi Around Monitor	RDR-R	RDR-L	AV	IVC	4WD	ADP	E-HUD	WL CHG	PWBD	E-SHIFT	STRG	EVTC
Buzzer output signal		T			R																									
					R				T																					
					R						T																			
					R										T															
					R													T												
Decel G sensor signal		T		R													R						R							
Driver brake signal		T															R													
Electric parking brake indicator light signal		T			R																									
Electric parking brake malfunction signal		T															R													
Electric parking brake operation signal		T													R															
Electric parking brake operation signal (switch)		T															R													
Electric parking brake status signal		T			R												R													
Electric parking brake warning light signal		T			R												R													
Front LH wheel speed signal		T															R	R					R							
Front RH wheel speed signal		T															R	R					R							
Odometer signal		T			R		R						R										R		R					
					T																	R								

Signal name	ECM	ABS	IPDM-E	TCM	M&A	A-BAG	HVAC	8ch GW 2	HFM	EPS/DAST 3	BCM	SONAR	A-AMP.	LANE	ACC 2	LASER	CCM	Multi Around Monitor	RDR-R	RDR-L	AV	IVC	4WD	ADP	E-HUD	WL CHG	PWBD	E-SHIFT	STRG	EVTC
Rear LH wheel speed signal		T															R	R					R							
Rear RH wheel speed signal		T															R	R					R							
Side G sensor signal		T													R		R						R							
TCS malfunction signal		T													R		R													
TCS operation signal	R	T		R											R		R						R							
ASC malfunction signal		T													R		R													
ASC OFF indicator light signal		T			R																									
ASC OFF signal		T													R		R													
ASC operation signal	R	T		R											R		R						R							
ASC status signal		T															R													
ASC warning light signal		T			R																	R								
Vehicle speed signal		T	R	R			R		R	R	R	R			R		R	R			R	R		R						
	R				T					R	R						R													
	T					R																								
														R	T	R			R	R										
Yaw rate signal		T													R								R							
A/C compressor feedback signal			T				R																							
Auto ACC status signal			T																		R									
											T														R					
Battery warning request			T		R																									

Signal name	ECM	ABS	IPDM-E	TCM	M&A	A-BAG	HVAC	8ch GW 2	HFM	EPS/DAST 3	BCM	SONAR	A-AMP.	LANE	ACC 2	LASER	CCM	Multi Around Monitor	RDR-R	RDR-L	AV	IVC	4WD	ADP	E-HUD	WL CHG	PWBD	E-SHIFT	STRG	EVTC
signal (IPDM E/R)																														
Front wiper status signal			T								R																			
Front wiper stop position signal			T								R																			
Generator voltage request signal	R		T																											
Headlight warning signal			T		R																									
Hood switch signal			T								R																			
Ignition ON signal			T								R																			
			R								T						R							R						
Ignition switch ON signal		R	T														R								R					
Reverse position signal			T								R																			
Sleep-ready signal			T								R																			
					T						R																			
									T		R																			
											R						T													
											R														T					
											R																			
											R																			
											R																			
Starter cut relay status signal			T								R																			
Starter relay status signal			T		R																									
Cranking enable (TCM) signal			R	T																										
Current gear position signal		R		T											R		R						R							

Signal name	ECM	ABS	IPDM-E	TCM	M&A	A-BAG	HVAC	8ch GW 2	HFM	EPS/DAST 3	BCM	SONAR	A-AMP.	LANE	ACC 2	LASER	CCM	Multi Around Monitor	RDR-R	RDR-L	AV	IVC	4WD	ADP	E-HUD	WL CHG	PWBD	E-SHIFT	STRG	EVTC
CVT accept permission signal		R		T																										
CVT warning message signal				T	R																									
Electric shift warning light signal				T	R																									
Electric shift warning message signal				T	R																									
G sensor signal	R			T																										
Input speed signal				T											R															
Neutral hold mode signal				T	R																									
Output shaft revolution signal	R			T											R													R		
Shift position signal		R	R	T	R				R		R	R			R			R			R	R		R				R		
Shift P range request display signal				T	R																									
Shift refuse buzzer signal				T	R																									
Shift target signal				T																								R		
Ambient temperature signal					T		R				R																			
Automatic power liftgate setting signal					T																						R			
Brake fluid level switch signal		R			T																									

Signal name	ECM	ABS	IPDM-E	TCM	M&A	A-BAG	HVAC	8ch GW 2	HFM	EPS/DAST 3	BCM	SONAR	A-AMP.	LANE	ACC 2	LASER	CCM	Multi Around Monitor	RDR-R	RDR-L	AV	IVC	4WD	ADP	E-HUD	WL CHG	PWBD	E-SHIFT	STRG	EVTC
Driver seat belt switch signal					T										R															
HUD setting signal					T																				R					
MOD setting signal					T												R													
Parking brake status signal					T						R											R	R							
Seat belt buckle switch (driver side) signal											T						R													
System selection signal					T										R															
Vehicle speed display signal					T																				R					
	T				R																									
Car crush information signal						T					R											R								
Occupant detection signal					R	T																								
SRS air bag warning light signal					R	T																								
Seat belt buckle switch (rear) signal					R	T																								
Seat belt warning (front RH) signal					R	T																								
A/C ON signal	R						T																							
Blower fan ON signal	R						T				R																			
Cooling fan request signal	R						T																							
ECV control signal			R				T																							

Signal name	ECM	ABS	IPDM-E	TCM	M&A	A-BAG	HVAC	8ch GW 2	HFM	EPS/DAST 3	BCM	SONAR	A-AMP.	LANE	ACC 2	LASER	CCM	Multi Around Monitor	RDR-R	RDR-L	AV	IVC	4WD	ADP	E-HUD	WL CHG	PWBD	E-SHIFT	STRG	EVTC
Idle up request signal	R						T																							
PTC thermal request signal							T				R																			
Rear window defogger request signal							T				R																			
Charge stop request signal									T																	R				
Door lock/unlock request signal									T		R																			
Key ID verification completed signal									T																		R			
Meter display signal					R				T																					
					R										T															
					R												T													
Push-button ignition switch status signal									T		R																			
User identification signal									T																	R				
Battery supply current signal	R									T																				
EPS operation signal	R									T																				
Power steering warning light signal					R					T																				
Steering torque signal										T					R															
Power liftgate open											T																R			

Signal name	ECM	ABS	IPDM-E	TCM	M&A	A-BAG	HVAC	8ch GW 2	HFM	EPS/DAST 3	BCM	SONAR	A-AMP.	LANE	ACC 2	LASER	CCM	Multi Around Monitor	RDR-R	RDR-L	AV	IVC	4WD	ADP	E-HUD	WL CHG	PWBD	E-SHIFT	STRG	EVTC
request signal																														
Power liftgate switch signal											T							R												
Brake pedal position switch signal											T				R															
Brake pedal status signal		R									T							R												
Daytime running light request signal			R								T																			
Dimmer signal					R						T				R															
Door lock status signal											T											R		R						
Door switch (driver side) signal		R									T																			
Door switch signal				R	R				R		T		R		R			R						R						
Drive mode switch signal											T							R												
ECO advice signal					R						T																			
Front fog light request signal			R								T							R												
Front fog light status signal					R						T																			
Front wiper request signal			R								T											R								
Front washer motor request signal			R								T																			
Hazard warning light status signal			R								T																			
High beam assist indicator signal					R						T																			

Signal name	ECM	ABS	IPDM-E	TCM	M&A	A-BAG	HVAC	8ch GW 2	HFM	EPS/DAST 3	BCM	SONAR	A-AMP.	LANE	ACC 2	LASER	CCM	Multi Around Monitor	RDR-R	RDR-L	AV	IVC	4WD	ADP	E-HUD	WL CHG	PWBD	E-SHIFT	STRG	EVTC
High beam request signal			R								T							R												
High beam status signal					R						T																			
Horn request signal			R								T																			
Key ID signal											T													R						
Key ID verification request signal									R		T																			
Light reminder warning signal					R						T																			
Low beam request signal			R								T							R												
Low beam status signal					R						T																			
Low tire pressure warning light signal					R						T																			
Low tire pressure wheel location signal					R						T																			
Paddle shifter shift down signal				R							T																			
Paddle shifter shift up signal				R							T																			
Passing request signal			R								T																			
Position light request signal			R								T							R												
Position light status signal					R						T																			
Rear washer motor			R								T																			

Signal name	ECM	ABS	IPDM-E	TCM	M&A	A-BAG	HVAC	8ch GW 2	HFM	EPS/DAST 3	BCM	SONAR	A-AMP.	LANE	ACC 2	LASER	CCM	Multi Around Monitor	RDR-R	RDR-L	AV	IVC	4WD	ADP	E-HUD	WL CHG	PWBD	E-SHIFT	STRG	EVTC
request signal																														
Rear window defogger feedback signal							R				T																			
Remote engine start status signal							R				T																			
Seat belt buckle switch (front LH) signal				R	R	R					T																			
				R	T																									
Sleep wake up signal		R	R		R				R		T		R								R	R		R			R	R		
Stop light switch signal		R		R					R		T				R								R							
TPMS malfunction warning light signal					R						T																			
Turn indicator signal			R								T				R			R												
													R	T																
Vehicle status signal		R	R								T														R					
Parking sensor error signal					R							T																		
Sonar indicator signal					R							T						R												
Sonar sensor signal												T			R															
Detected lane condition signal														T	R															
Driver assistance buzzer signal														T	R															
															R				T											
															R					T										
Motor operation signal														T	R															

Signal name	ECM	ABS	IPDM-E	TCM	M&A	A-BAG	HVAC	8ch GW 2	HFM	EPS/DAST 3	BCM	SONAR	A-AMP.	LANE	ACC 2	LASER	CCM	Multi Around Monitor	RDR-R	RDR-L	AV	IVC	4WD	ADP	E-HUD	WL CHG	PWBD	E-SHIFT	STRG	EVTC
Pedestrian ahead signal														T	R															
Vehicle ahead signal														T	R															
AEB warning light signal					R										T															
Brake fluid pressure control signal		R													T															
BSW indicator dimmer signal															T				R	R										
BSW indicator signal															T				R	R										
Display signal															T											R				
														T												R				
MI-PILOT Assist operation signal	R									R					T															
RAB warning light signal					R										T															
Target yaw moment signal		R													T															
Wheel torque request signal	R														T															
Yaw moment request signal															T		R													
		R															T													
Distance sensor signal															R	T														
Active ride control signal		R															T													
Automatic brake hold					R												T													

Signal name	ECM	ABS	IPDM-E	TCM	M&A	A-BAG	HVAC	8ch GW 2	HFM	EPS/DAST 3	BCM	SONAR	A-AMP.	LANE	ACC 2	LASER	CCM	Multi Around Monitor	RDR-R	RDR-L	AV	IVC	4WD	ADP	E-HUD	WL CHG	PWBD	E-SHIFT	STRG	EVTC
indicator light signal																														
Automatic brake hold operation request signal		R															T													
Automatic brake hold release request signal		R															T													
Chassis control module malfunction signal		R															T													
Engine brake request signal				R													T													
Drive mode signal	R	R		R	R					R					R		T						R							
Electric parking brake operation request signal		R															T													
Intelligent engine brake signal		R															T													
Intelligent trace control signal		R															T													
Language setting signal																		T			R									
MOD setting status signal					R													T												
View change signal																		T			R									
Vehicle detection signal															R				T											
															R					T										
Auto ACC request signal											R										T									
											R											T								

Signal name	ECM	ABS	IPDM-E	TCM	M&A	A-BAG	HVAC	8ch GW 2	HFM	EPS/DAST 3	BCM	SONAR	A-AMP.	LANE	ACC 2	LASER	CCM	Multi Around Monitor	RDR-R	RDR-L	AV	IVC	4WD	ADP	E-HUD	WL CHG	PWBD	E-SHIFT	STRG	EVTC
Blower reduction request signal							R														T									
Camera switch signal																	R				T									
Curve signal															R						T									
Key link activation status signal																					T				R					
Door lock/unlock signal											R											T								
Engine start request signal											R											T								
Panic alarm request signal											R											T								
AWD warning display signal					R																		T							
Torque distribution indicator signal					R																		T							
Memory guidance display request signal					R																			T						
Mirror control signal											R													T						
CVT warning message request signal				R																								T		
Electric shift malfunction signal				R																								T		
Electric shift selector signal				R																								T		
Steering angle															R														T	

Signal name	ECM	ABS	IPDM-E	TCM	M&A	A-BAG	HVAC	8ch GW 2	HFM	EPS/DAST 3	BCM	SONAR	A-AMP.	LANE	ACC 2	LASER	CCM	Multi Around Monitor	RDR-R	RDR-L	AV	IVC	4WD	ADP	E-HUD	WL CHG	PWBD	E-SHIFT	STRG	EVTC
sensor malfunction signal																														
Steering angle sensor signal									R						R						R		R						T	
		T													T	R														
Steering angle speed signal															R														T	
Valve timing position trouble detection signal	R																													T

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CAN System Specification Chart

Determine CAN system type from the following specification chart.

note

Refer to [Trouble Diagnosis Flow Chart](#)  for how to use CAN system specification chart.

Body type	4-Door Wagon											
Axle	2WD						AWD					
Engine	PR25DD											
Transmission	CVT											
Brake control	ASC											
Intelligent around view monitor		X	X	X	X	X		X	X	X	X	X
Automatic power power liftgate system			X	X	X	X			X	X	X	X
Automatic drive positioner				X	X	X				X	X	X
BOSE audio					X	X					X	X
Head Up Display						X						X
CAN system type	1	2	3	4	5	6	7	8	9	10	11	12
Vehicle CAN communication unit												
BCM	X	X	X	X	X	X	X	X	X	X	X	X
Air bag diagnosis sensor unit	X	X	X	X	X	X	X	X	X	X	X	X
Intelligent key unit	X	X	X	X	X	X	X	X	X	X	X	X
A/C amp.	X	X	X	X	X	X	X	X	X	X	X	X
IPDM E/R	X	X	X	X	X	X	X	X	X	X	X	X
Combination meter	X	X	X	X	X	X	X	X	X	X	X	X
Automatic power liftgate control unit			X	X	X	X			X	X	X	X

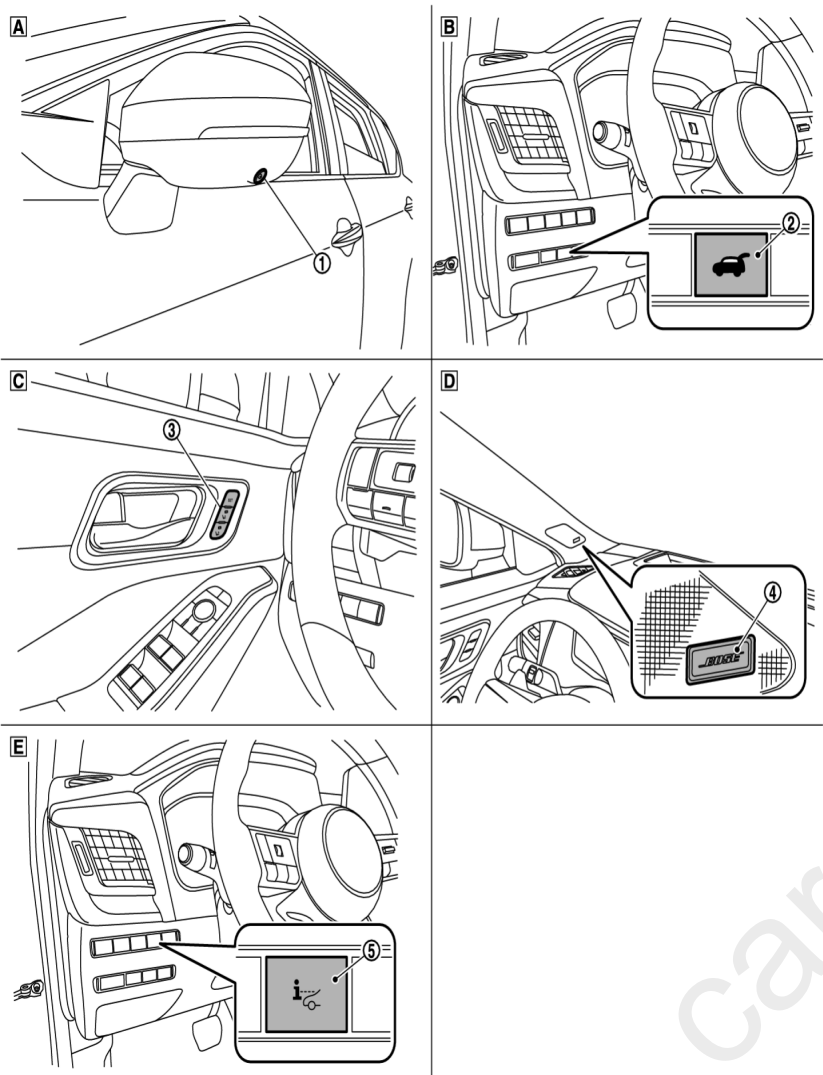
Driver seat control unit				X	X	X				X	X	X
8CH CAN gateway	X	X	X	X	X	X	X	X	X	X	X	X
ITS CAN communication unit												
8CH CAN gateway	X	X	X	X	X	X	X	X	X	X	X	X
ADAS control unit 2	X	X	X	X	X	X	X	X	X	X	X	X
Around view monitor control unit		X	X	X	X	X		X	X	X	X	X
Distance sensor	X	X	X	X	X	X	X	X	X	X	X	X
Front camera unit	X	X	X	X	X	X	X	X	X	X	X	X
Side radar LH	X	X	X	X	X	X	X	X	X	X	X	X
Side radar RH	X	X	X	X	X	X	X	X	X	X	X	X
Sonar control unit	X	X	X	X	X	X	X	X	X	X	X	X
Chassis CAN communication unit												
Chassis control module	X	X	X	X	X	X	X	X	X	X	X	X
AWD control unit							X	X	X	X	X	X
Power steering control module	X	X	X	X	X	X	X	X	X	X	X	X
Head up display unit						X						X
Steering angle sensor	X	X	X	X	X	X	X	X	X	X	X	X
ABS actuator and electric unit (control unit)	X	X	X	X	X	X	X	X	X	X	X	X
8CH CAN gateway	X	X	X	X	X	X	X	X	X	X	X	X
Drivetrain CAN communication unit												
ECM	X	X	X	X	X	X	X	X	X	X	X	X
TCM	X	X	X	X	X	X	X	X	X	X	X	X
Electric shift control module	X	X	X	X	X	X	X	X	X	X	X	X
Chassis control module	X	X	X	X	X	X	X	X	X	X	X	X
8CH CAN gateway	X	X	X	X	X	X	X	X	X	X	X	X
IT CAN communication unit												
8CH CAN gateway	X	X	X	X	X	X	X	X	X	X	X	X
AV control unit	X	X	X	X	X	X	X	X	X	X	X	X
TCU		X	X	X	X	X		X	X	X	X	X
Wireless charger unit						X						X

BOSE speaker amp.					X	X					X	X
Engine CAN communication unit												
ECM	X	X	X	X	X	X	X	X	X	X	X	X
Electric intake valve timing control module	X	X	X	X	X	X	X	X	X	X	X	X
Diagnostic CAN communication unit												
8CH CAN gateway	X	X	X	X	X	X	X	X	X	X	X	X
Data link connector	X	X	X	X	X	X	X	X	X	X	X	X

×: Applicable

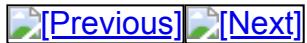
Vehicle Equipment Identification Information

note	Check CAN system type from the vehicle shape and equipment.
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①	Side camera LH	②	Automatic power back switch	③	Seat memory switch
④	BOSE logo	⑤	Head Up Display main switch		
A	With intelligent around view monitor	B	With automatic power power liftgate system	C	With automatic drive positioner
D	With BOSE audio	E	With Head Up Display		

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Component Description

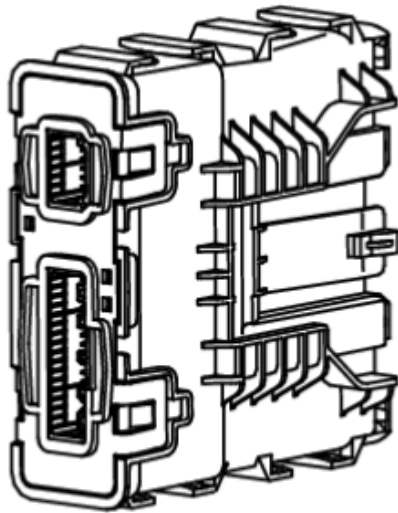
EXPLANATIONS OF COMPONENT PARTS

Component Function Within The System

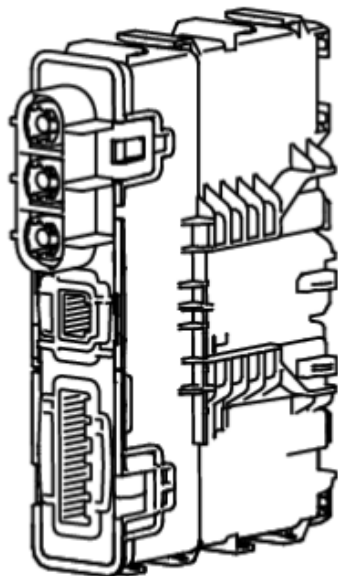
Individual Component Function

8CH CAN gateway transmits CAN signals from each network.

- Without ethernet harness connector



- With ethernet harness connector

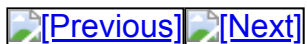


Component Operation

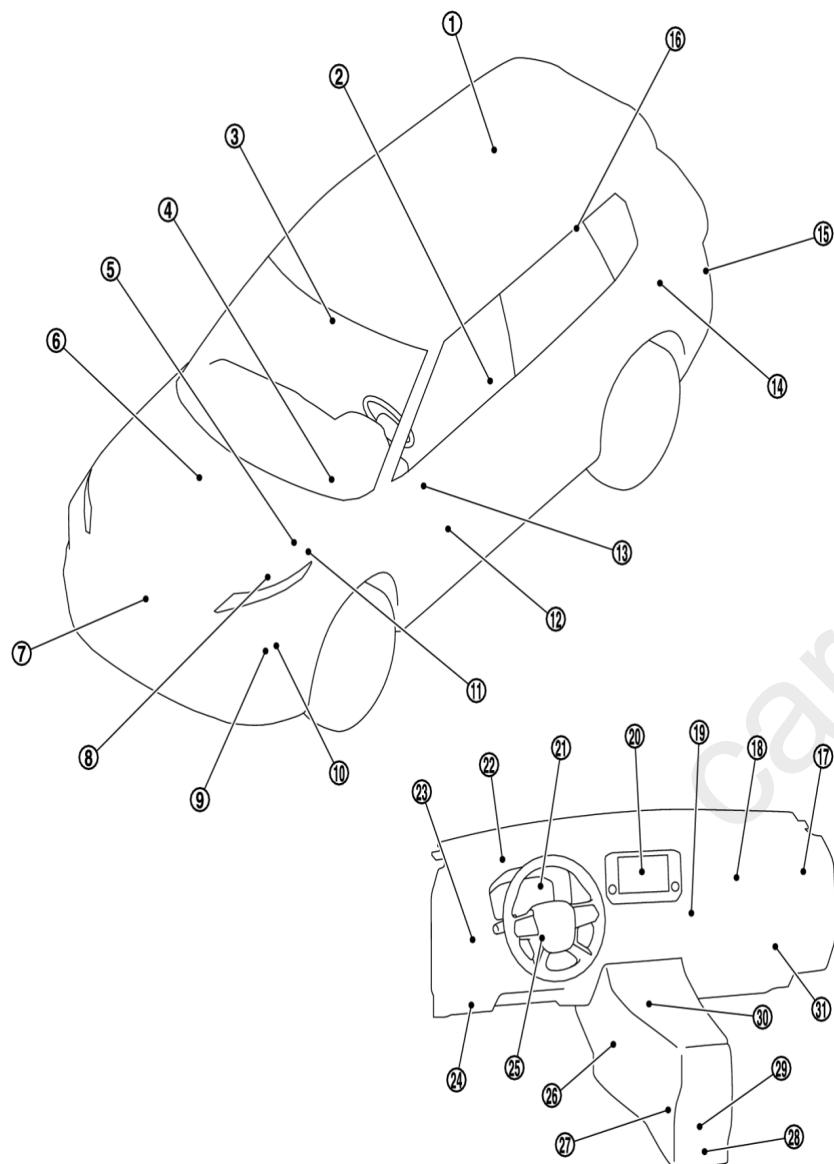
Refer to [System Description](#) .

Component Parts Location

8CH CAN gateway is installed at behind the instrument panel. Refer to [Component Parts Location](#) .

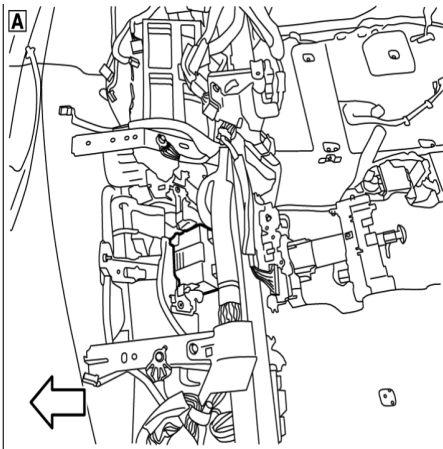
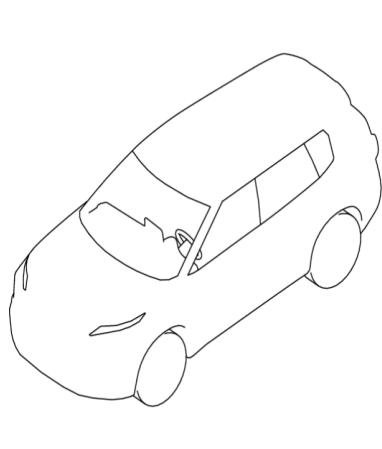


Component Parts Location



①	Side radar RH	②	AWD control unit	③	Front camera unit
④	8CH CAN gateway	⑤	ECM	⑥	ABS actuator and electric unit (control unit)
⑦	Distance sensor	⑧	Power steering control module	⑨	Electric intake valve timing control module
⑩	TCM	⑪	IPDM E/R	⑫	BOSE speaker amp.
⑬	Driver seat control unit	⑭	Automatic power liftgate control unit	⑮	Side radar LH
⑯	Sonar control unit	⑰	Chassis control module	⑱	Keyless operation key unit
⑲	TCU	⑳	AV control unit	㉑	Combination meter
㉒	Head Up Display unit	㉓	BCM	㉔	Data link connector
㉕	Steering angle sensor	㉖	Electric shift control module	㉗	Air bag diagnosis sensor unit
㉘	ADAS control unit 2	㉙	Around view monitor control unit	㉚	Wireless charger unit
㉛	A/C amp.				

Component Parts Location



①	8CH CAN gateway				
A	Instrument panel assembly removed condition	←	Vehicle front		

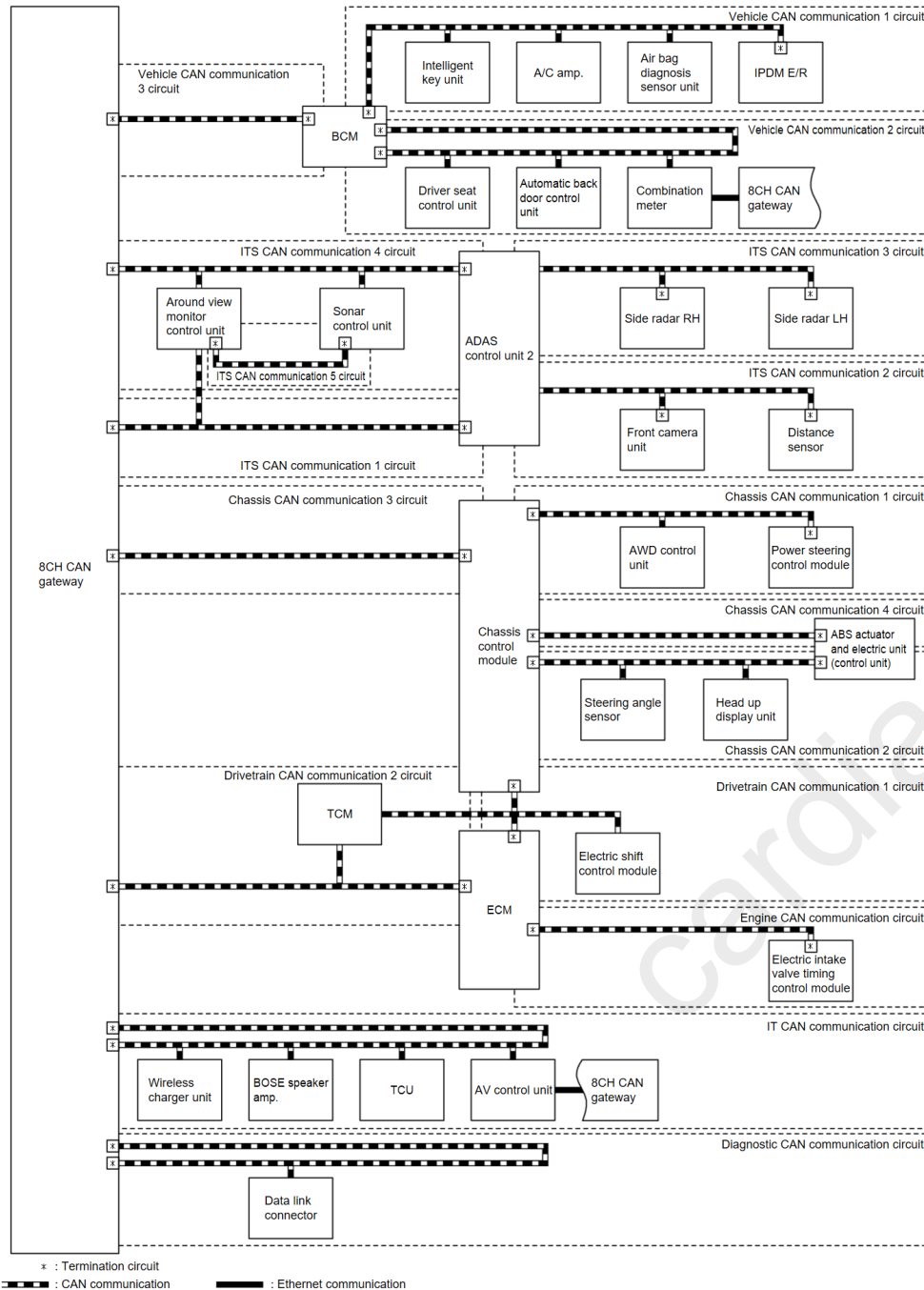
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System Description

SYSTEM DIAGRAM

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DESCRIPTION

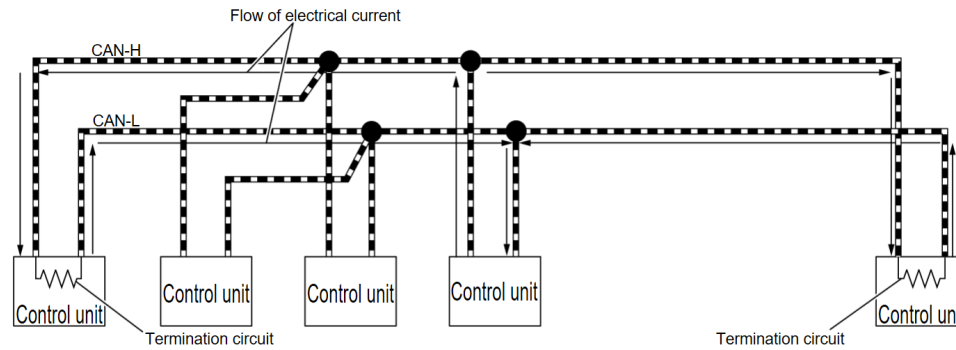
- CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN-H line, CAN-L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.
- The following control units include a gateway function and communicate signals between the different CAN communication circuits.

CAN communication circuit	Gateway control unit	Reference
Between the following circuits. - Vehicle CAN communication 1 circuit - Vehicle CAN communication 2 circuit - Vehicle CAN communication 3 circuit	BCM	System Description 
Between the following circuits. - Vehicle CAN communication 3 circuit - ITS CAN communication 1 circuit - ITS CAN communication 4 circuit - Chassis CAN communication 3 circuit - Drivetrain CAN communication 2 circuit - IT CAN communication circuit - Diagnostic CAN communication circuit	8CH CAN gateway	8CH CAN Gateway Component Description 
Between the following circuits. - ITS CAN communication 1 circuit - ITS CAN communication 2 circuit - ITS CAN communication 3 circuit - ITS CAN communication 4 circuit	ADAS control unit 2	ADAS Control Unit 2 
Between the following circuits. - Chassis CAN communication 1 circuit - Chassis CAN communication 2 circuit - Chassis CAN communication 3 circuit - Chassis CAN communication 4 circuit	Chassis control module	System Description 

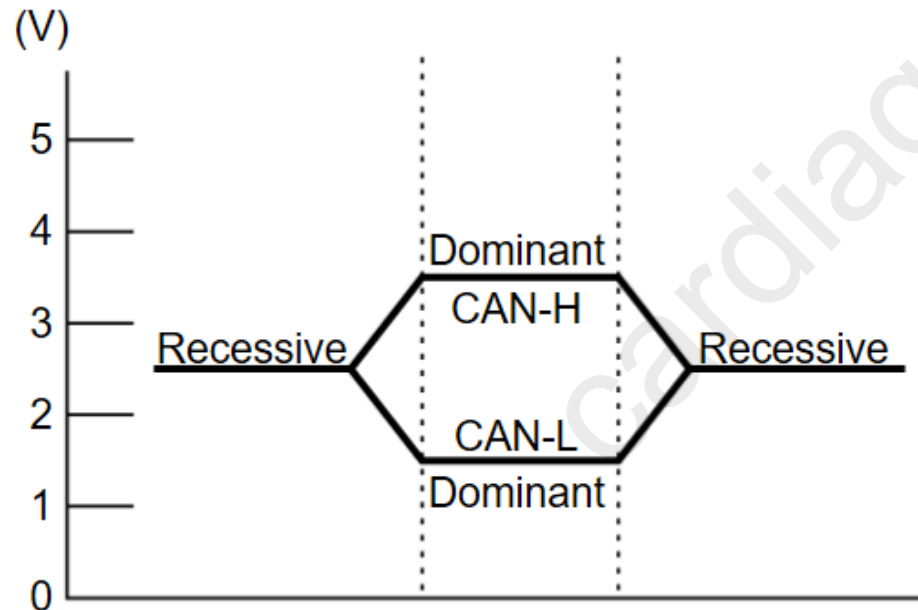
CAN communication circuit	Gateway control unit	Reference
Drivetrain CAN communication 1 circuit		
Between the following circuits. (with Intelligent around view monitor system) - ITS CAN communication 1 circuit - ITS CAN communication 4 circuit - ITS CAN communication 5 circuit	Around view monitor control unit	Around View Monitor Control Unit 
ITS CAN communication 4 circuit ↔ ITS CAN communication 5 circuit	Sonar control unit	Sonar Control Unit 
Chassis CAN communication 2 circuit ↔ Chassis CAN communication 4 circuit	ABS actuator and electric unit (control unit)	System Description 
Between the following circuits. - Drivetrain CAN communication 1 circuit - Drivetrain CAN communication 2 circuit - Engine CAN communication circuit	ECM	System Description 
Drivetrain CAN communication 1 circuit ↔ Drivetrain CAN communication 2 circuit	TCM	TCM 

CAN Communication Signal Generation

- Termination circuits (resistors) are connected across the CAN communication system. When transmitting a CAN communication signal, each control unit passes a current to the CAN-H line and the current returns to the CAN-L line.

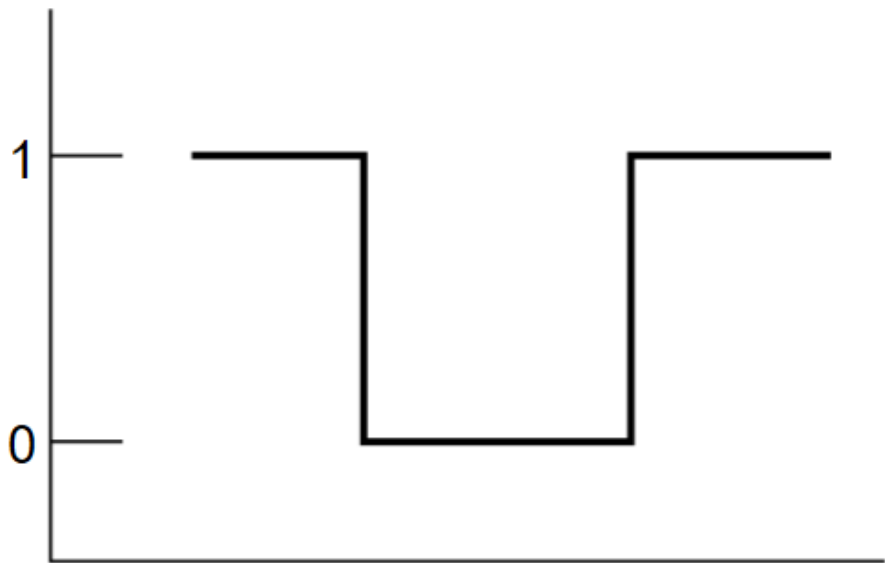


- The current flows separately into the termination circuits connected across the CAN communication system and the termination circuits drop voltage to generate a potential difference between the CAN-H line and the CAN-L line.



note A signal with no current passage is called “Recessive” and one with current passage is called “Dominant”.

- The system produces digital signals for signal communications, by using the potential difference.



The Construction of CAN Communication Signal (Message)

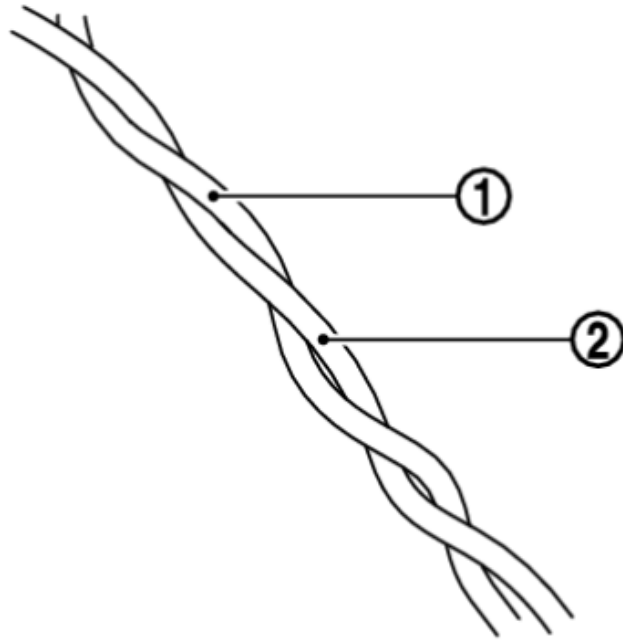
1	2	3	4	5	6	7
---	---	---	---	---	---	---

No.	Message name	Description
1	Start of frame (1 bit)	Start of message.
2	Arbitration of field (11 bit)	Priorities of message-sending are shown when there is a possibility that multiple

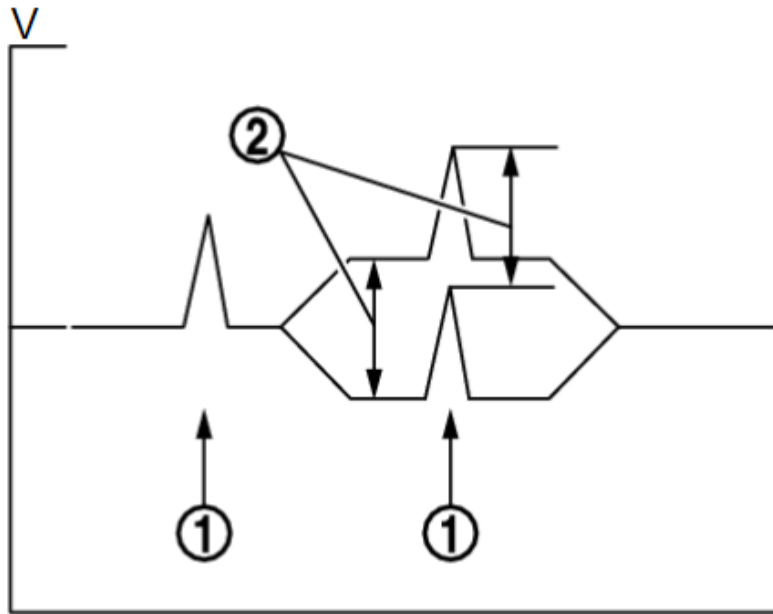
No.	Message name	Description
		messages are sent at the same time.
3	Control field (6 bit)	Signal quantity in data field is shown.
4	Data field (0-64 bit)	Actual signal is shown.
5	CRC field (16 bit)	• The transmitting control unit calculates sending data in advance and writes the calculated value in a message. • The receiving control unit calculates received data and judges that the data reception is normal when the calculated value is the same as the value written in the sent data.
6	ACK field (2 bit)	The completion of normal reception is sent to the transmitting unit.
7	End of frame (7 bit)	End of message.

CAN Communication Line

The CAN communication line is a twisted pair wire consisting of strands of CAN-H ① and CAN-L ② and has noise immunity.

**note**

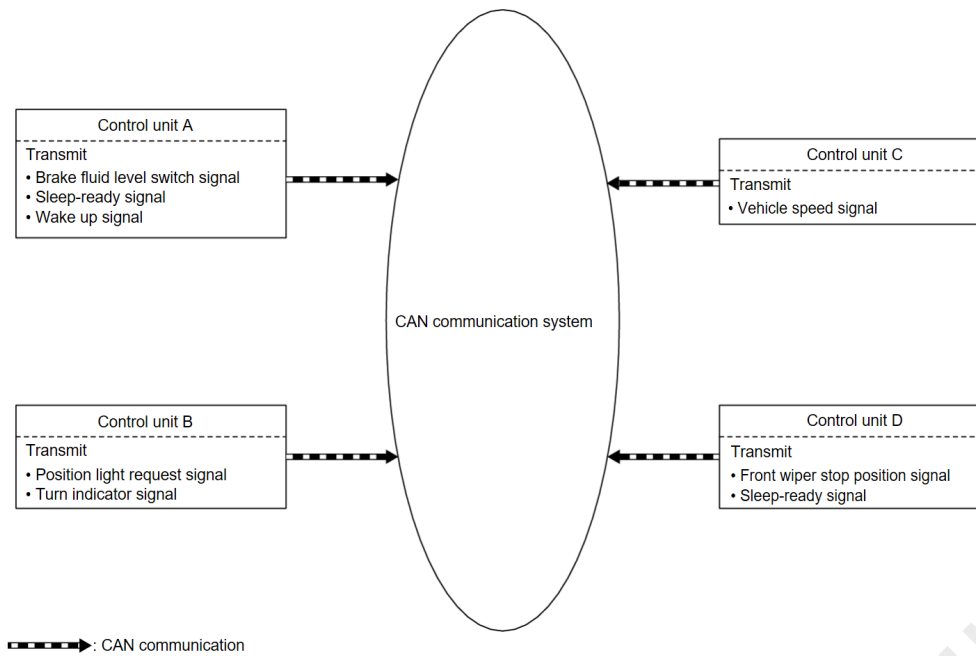
The CAN communication system has the characteristics of noise-resistant because this system produces digital signals by using the potential difference between the CAN-H line and the CAN-L line and has the twisted pair wire structure. Since the CAN-H line and the CAN-L line are always adjacent to each other, the same degree of noise occurs, respectively, when a noise ① occurs. Although the noise changes the voltage, the potential difference ② between the CAN-H line and the CAN-L line is insensitive to noise. Therefore, noise-resistant signals can be obtained.



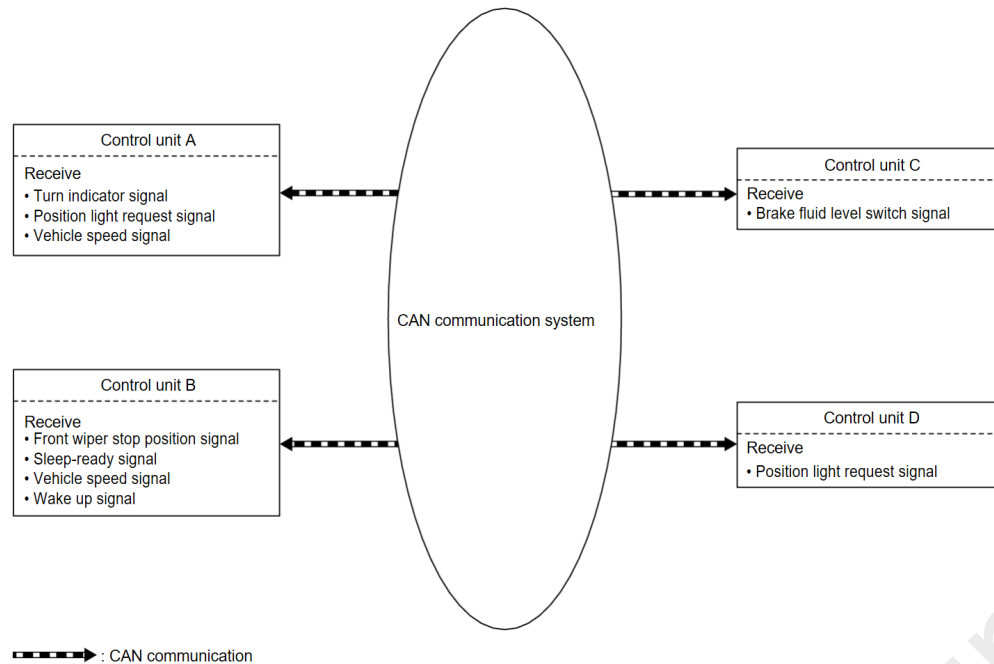
CAN Signal Communications

Each control unit of the CAN communication system transmits signals through the CAN communication control circuit included in the control unit and receives only necessary signals from each control unit to perform various kinds of control.

- Example: Transmitted signals



- Example: Received signals

**note**

The above signal names and signal communications are provided for reference purposes. For CAN communications signals of this vehicle, refer to [CAN Communication Signal Chart](#) .

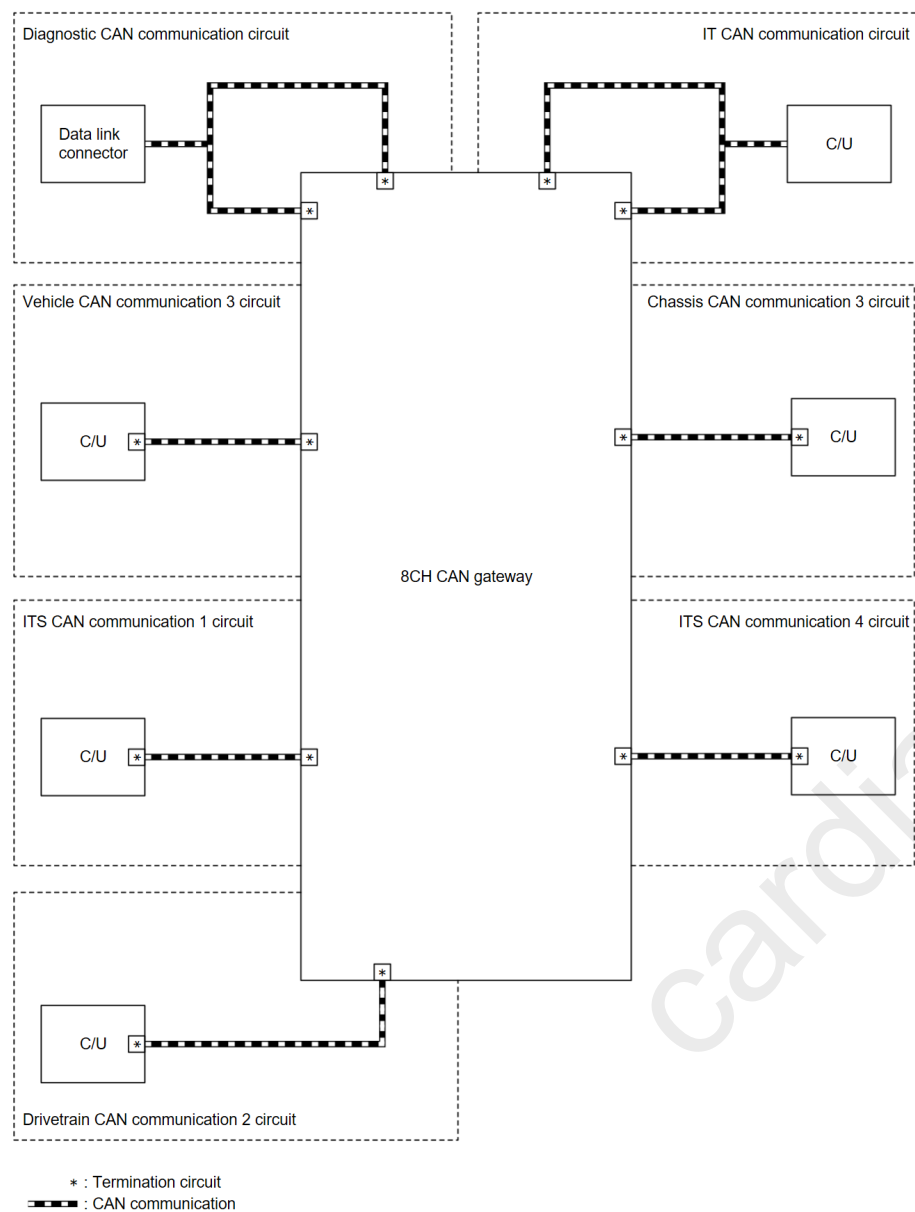


System Description

8CH CAN GATEWAY

System Diagram

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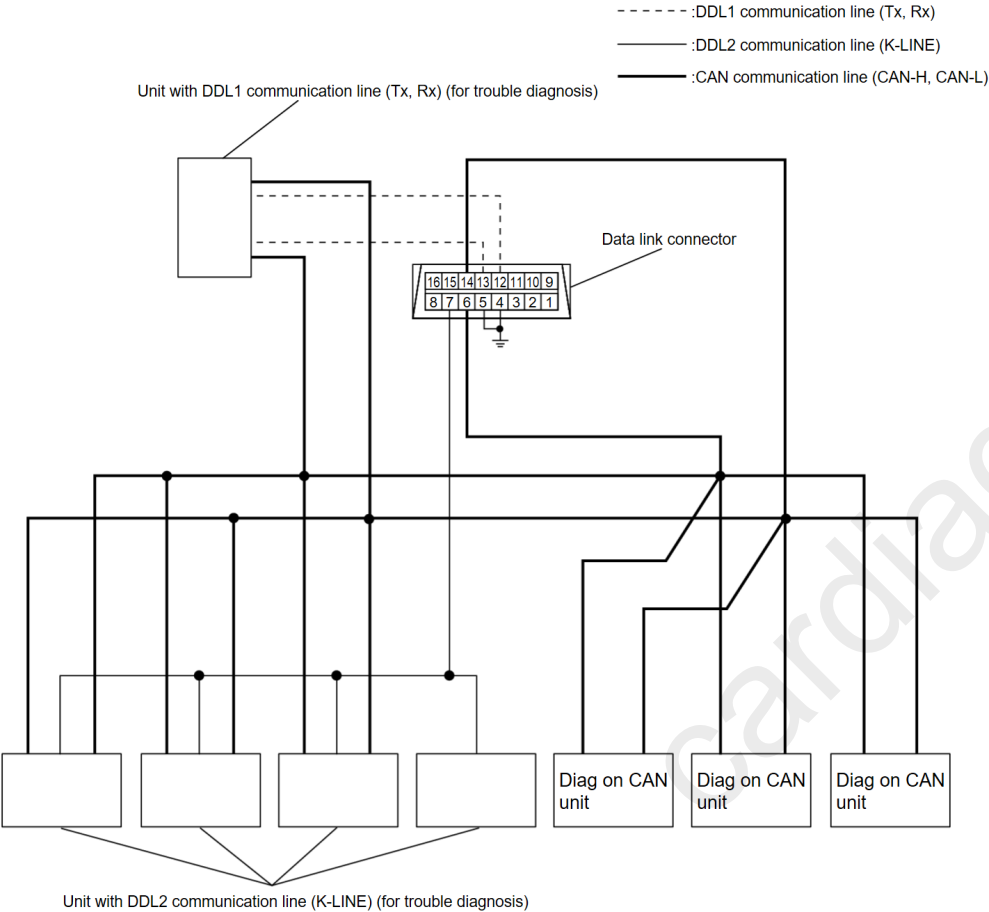


System Description

- The 8CH CAN gateway system communicates between vehicle CAN communication circuits, ITS CAN communication circuits, chassis CAN communication circuits, IT CAN communication circuit, Drivetrain CAN communication circuit, and diagnostic CAN communication circuit.
- This system selects and transmits only necessary information.

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System Diagram



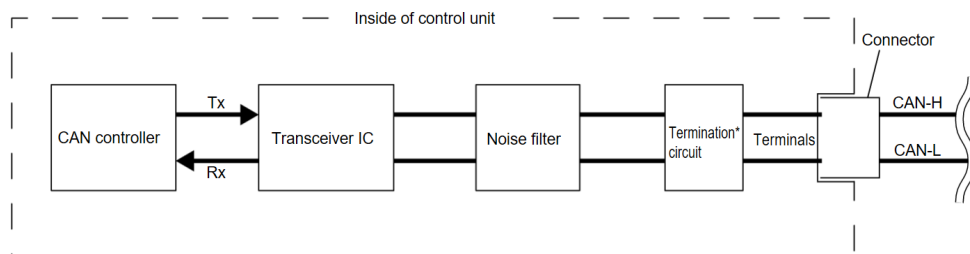
Name	Harness	Description
DDL1	Tx Rx	It is used for trouble diagnosis. (CAN-H and CAN-L are used for controlling)

Name	Harness	Description
DDL2	K-LINE	It is used for trouble diagnosis. (CAN-H and CAN-L are used for controlling)
Diag on CAN	CAN-H CAN-L	It is used for trouble diagnosis and control.

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CAN Communication Control Circuit

CAN communication control circuit is incorporated into the control unit and transmits/receives CAN communication signals.



Tx: Transmit
Rx: Receive

Component	System description
CAN controller	It controls CAN communication signal transmission and reception, error detection, etc.
Transceiver IC	It converts digital signal into CAN communication signal, and CAN communication signal into digital signal.
Noise filter	It eliminates noise of CAN communication signal.
Termination circuit* (Resistance of approx. 120 Ω)	Generates a potential difference between CAN-H and CAN-L.

*: These are the only control units wired with both ends of CAN communication system.

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Symptom When Error Occurs in CAN Communication System

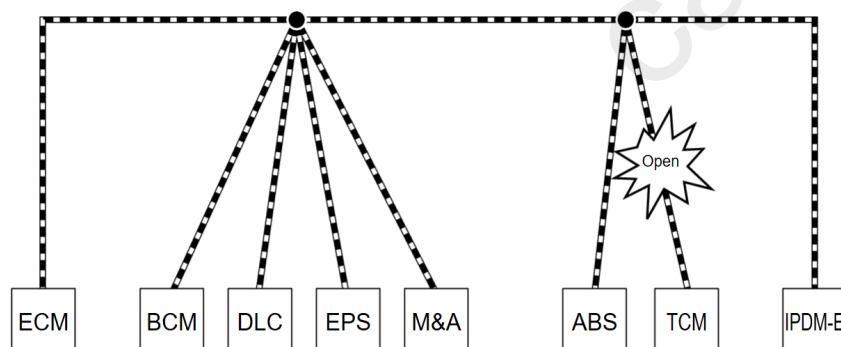
In CAN communication system, multiple units mutually transmit and receive signals. Each unit cannot transmit and receive signals if any error occurs on CAN communication line. Under this condition, multiple control units related to the root cause malfunction or go into fail-safe mode.

ERROR EXAMPLE

note

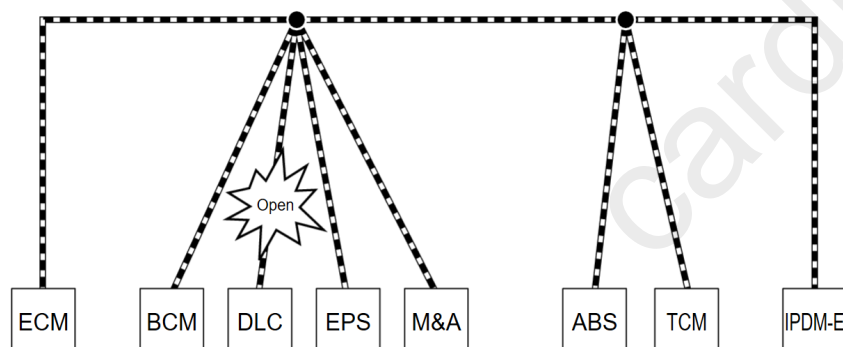
- Each vehicle differs in symptom of each unit under fail-safe mode and CAN communication line wiring.
- Refer to [Abbreviation List](#)  for the unit abbreviation.

Example: TCM branch line open circuit



Unit name	Symptom
ECM	Engine torque limiting is affected, and shift harshness increases.
BCM	Reverse warning chime does not sound.
EPS control unit	Normal operation.
Combination meter	- Shift position indicator and OD OFF indicator turn OFF. - Warning lamps turn ON.
ABS actuator and electric unit (control unit)	Normal operation.
TCM	No impact on operation.
IPDM E/R	Normal operation.

Example: Data link connector branch line open circuit

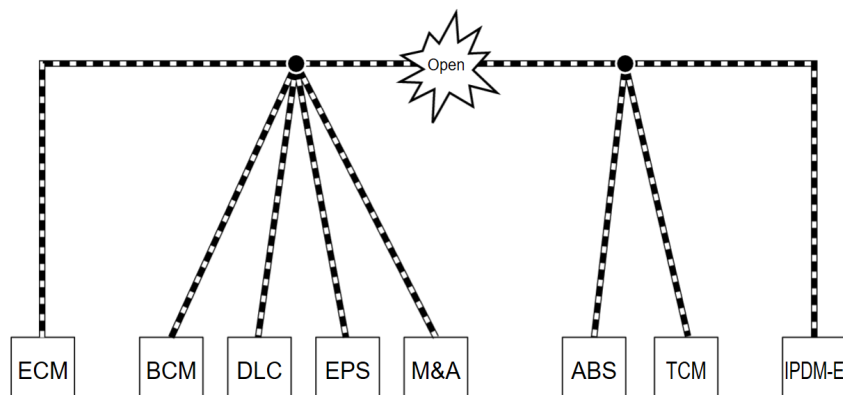


Unit name	Symptom
ECM	Normal operation.
BCM	
EPS control unit	
Combination meter	
ABS actuator and electric unit (control unit)	
TCM	
IPDM E/R	

note	- When data link connector branch line is open, transmission and reception of CAN communication signals are not affected. Therefore, no symptoms occur. However, be sure to repair malfunctioning circuit. - The model (all units on CAN communication system are Diag on CAN) cannot perform CAN diagnosis with M.U.T.-III SE if the following error occurs. The error is judged by the symptom.
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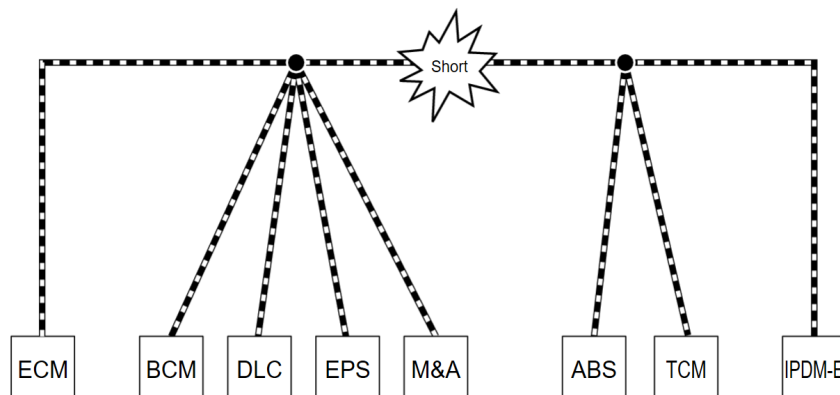
Error	Difference of symptom
Data link connector branch line open circuit	Normal operation.
CAN-H, CAN-L harness short-circuit	Most of the units which are connected to the CAN communication system enter fail-safe mode or are deactivated.

Example: Main Line Between Data Link Connector and ABS Actuator and Electric Unit (Control Unit) Open Circuit



Unit name	Symptom
ECM	Engine torque limiting is affected, and shift harshness increases.
BCM	- Reverse warning chime does not sound. - The front wiper moves under continuous operation mode even though the front wiper switch being in the intermittent position.
EPS control unit	The steering effort increases.
Combination meter	- The shift position indicator and OD OFF indicator turn OFF. - The speedometer is inoperative. - The odometer stops.
ABS actuator and electric unit (control unit)	Normal operation.
TCM	No impact on operation.
IPDM E/R	When the ignition switch is ON, - The headlamps (Lo) turn ON. - The cooling fan continues to rotate.

Example: CAN-H, CAN-L Harness Short Circuit



Unit name	Symptom
ECM	• Engine torque limiting is affected, and shift harshness increases. • Engine speed drops.
BCM	• Reverse warning chime does not sound. • The front wiper moves under continuous operation mode even though the front wiper switch being in the intermittent position. • The room light does not turn ON. • The engine does not start (if an error or malfunction occurs while turning the ignition switch OFF.) • The steering lock does not release (if an error or malfunction occurs while turning the ignition switch OFF.)
EPS control unit	The steering effort increases.

Unit name	Symptom
Combination meter	• The tachometer and the speedometer do not move. • Warning lamps turn ON. • Indicator lamps do not turn ON.
ABS actuator and electric unit (control unit)	Normal operation.
TCM	No impact on operation.
IPDM E/R	When the ignition switch is ON, • The headlamps (Lo) turn ON. • The cooling fan continues to rotate.

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Self-Diagnosis

If communication signals cannot be transmitted or received among units communicating via CAN communication line, CAN communication-related DTC is displayed on the M.U.T.-III SE “Self Diagnostic Result” screen.

note The following table shows examples of CAN communication-related DTC. For other DTC, refer to the applicable sections.

DTC	Self-diagnosis item (M.U.T.-III SE indication)	DTC detection condition		Inspection/Action
U1000	CAN COMM CIRCUIT	ECM	When ECM is not transmitting or receiving CAN communication signal of OBD (emission-related diagnosis) for 2 seconds or more.	Start the inspection. Refer to the applicable section of the indicated control unit.
		Except for ECM	When a control unit (except for ECM) is not transmitting or receiving CAN communication signal for 2 seconds or more.	
U1001	CAN COMM CIRCUIT	When ECM is not transmitting or receiving CAN communication signal other than OBD (emission-related diagnosis) for 2 seconds or more.		
U1002	SYSTEM COMM	When a control unit is not transmitting or receiving CAN communication signal for 2 seconds or less.		
U1010	CONTROL UNIT(CAN)	When an error is detected during the initial diagnosis for CAN controller of each control unit.		

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Removal and Installation

note

Perform ADDITIONAL SERVICE WHEN REPLACING 8CH CAN GATEWAY. Refer to [Work Procedure](#) .

REMOVAL

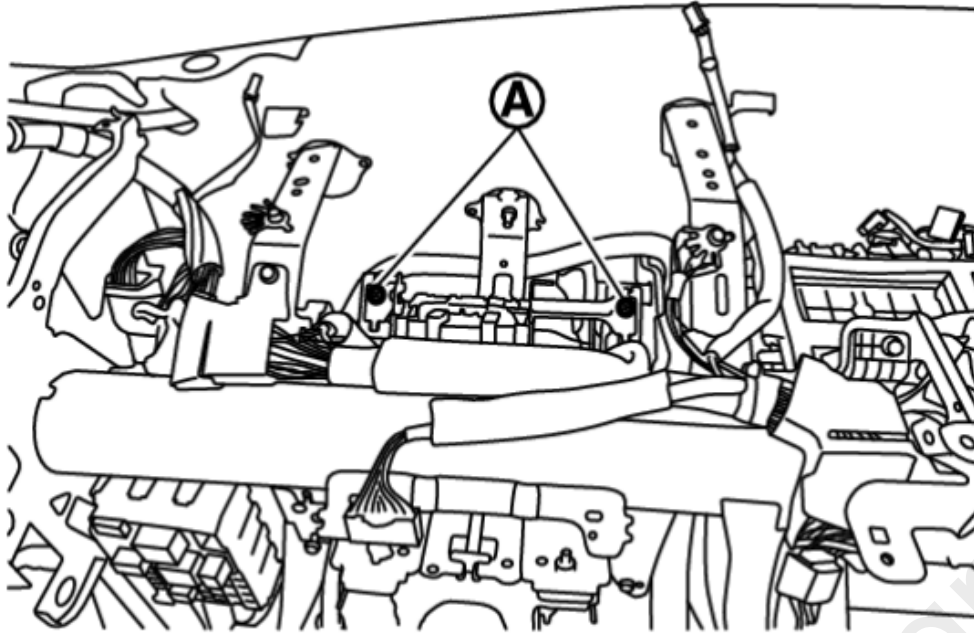
1. Remove combination meter. Refer to the following.

- Full TFT meter: [Removal and Installation](#) 
- 7 inch information display: [Removal and Installation](#) 

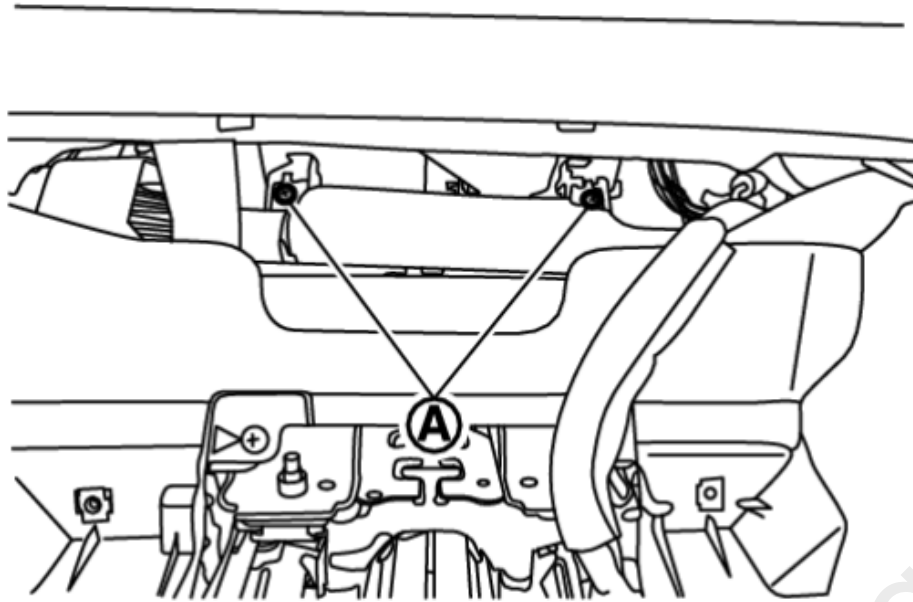
2. Remove instrument lower panel LH. Refer to [Removal and Installation](#) .

3. Remove mounting screw .

- Without ethernet harness connector

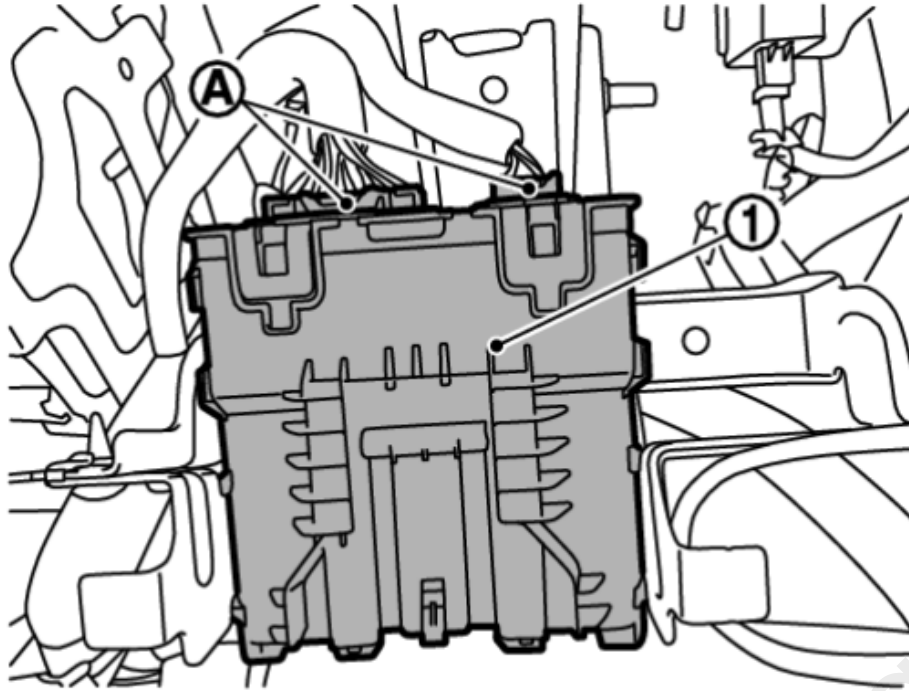


- With ethernet harness connector

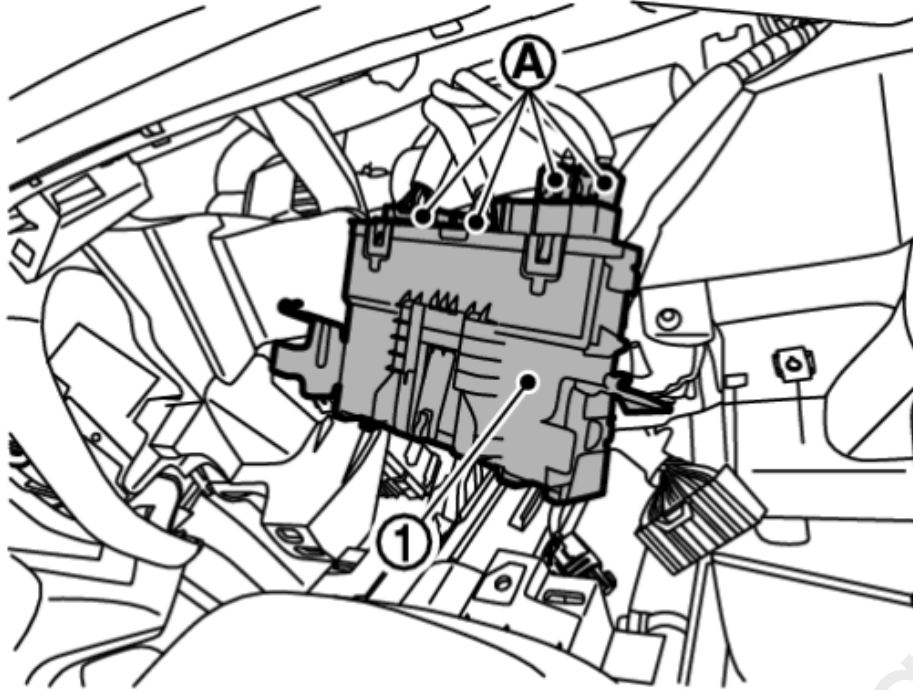


4. Remove harness connector^A to remove 8CH CAN gateway¹.

- Without ethernet harness connector



- With ethernet harness connector



INSTALLATION

Install in the reverse order of removal.