

TOYOTA CAMRY / AURION REPAIR MANUAL

NEW CAR FEATURES

CAMRY ACV40 RHD

NEW MODEL OUTLINE

ENGINE

CHASSIS

BODY

BODY ELECTRICAL

APPENDIX

Foreword

To assist you in your sales and service activities, this manual explains the main characteristics of the new CAMRY, in particular providing a technical explanation of the construction and operation of new mechanisms and new technology used.

Some drawings and pictures used in this publication are for illustration purposes. They may not be the same as that on the actual vehicle.

Applicable model: ACV40R

This manual is divided into 3 sections.

- 1. New Model Outline** - Explanation of the product to give a general understanding of its features.
- 2. Technical Description** - Technical explanation of the construction and operation of each new system and components.
- 3. Appendix** - Major technical specifications of the vehicle.

CAUTION, NOTICE, REFERENCE and **NOTE** are used in the following ways:

CAUTION	A potentially hazardous situation which could result in injury to people may occur if the instructions on “what to do” or “not do” are ignored.
NOTICE	Damage to the vehicle or components may occur if the instructions on “what to do” or “not do” are ignored.
REFERENCE	Explains the theory behind mechanisms and techniques.
NOTE	Notes or comments not included under the above 3 titles.

For detail service specifications and repair procedures, refer to the following Manuals:

Repair Manual	RM02N0EQ
Electrical Wiring Diagram	EM02N0EQ
Body Repair Manual	BM02N0EQ

WARNING

This publication is for internal use by Toyota Dealers for the purpose of training only and must not be given to customers.

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TOYOTA MOTOR CORPORATION AUSTRALIA LIMITED

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NEW MODEL OUTLINE

EXTERIOR APPEARANCE

Front View.....	MO-2
Rear View.....	MO-2

MODEL CODE	MO-3
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MODEL LINE-UP	MO-3
----------------------------	------

EXTERIOR

Front View.....	MO-4
Radiator Grille.....	MO-4
Rear View.....	MO-5
Side View.....	MO-5
Tyre & Disc Wheel.....	MO-6
Exterior Color List.....	MO-6

INTERIOR

Instrument Panel.....	MO-7
Centre Cluster.....	MO-7
Combination Meter.....	MO-8
Welcome Function.....	MO-9
Shift Lever.....	MO-10
Steering Wheel.....	MO-10
Console Box.....	MO-11
Rear Seat.....	MO-12

EQUIPMENT

Audio System.....	MO-14
Bluetooth Hands-free Telephone with Navigation System.....	MO-16
Glass.....	MO-18

PERFORMANCE

Power Train.....	MO-19
Chassis.....	MO-21

ENVIRONMENT and RECYCLING

Adoption of TSOP & TPO.....	MO-22
-----------------------------	-------

DIMENSIONS	MO-23
-------------------------	-------

EQUIPMENT LIST	MO-24
-----------------------------	-------

EXTERIOR APPEARANCE

Front View



DOMCAM-02KMO22TE

Rear View



02KMO23TE

MODEL CODE**ACV40R – DEMNKO**

1

2

3

4

5

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7

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1	BASIC MODEL CODE
	ACV40: With 2AZ-FE Engine

5	GEAR SHIFT TYPE
	M: 5-Speed Manual, Floor A: 5-Speed Automatic, Floor

2	STEERING WHEEL POSITION
	L: Left-Hand Drive R: Right-Hand Drive

6	GRADE
	D: Altise (New Zealand: GL) N: Ateva G: Grande (New Zealand: GLX) V: Sportivo

3	MODEL NAME
	D: Camry

7	ENGINE SPECIFICATION
	K: DOHC and EFI

4	BODY TYPE
	E: 4-Door Sedan

8	DESTINATION
	Q: Australia, New Zealand, SPI V: GCC Countries, Iran

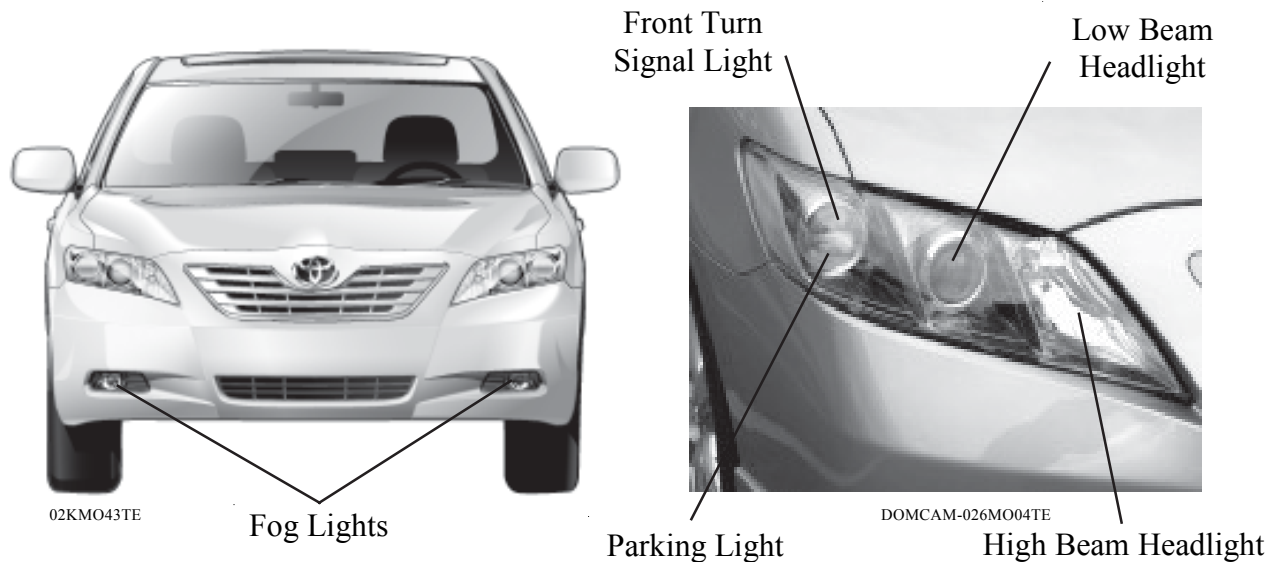
MODEL LINE-UP

Destination	Engine	Grade	Transaxle	
			E354	U250E
Australia	2AZ-FE	Altise	ACV40R-DEMDKQ	ACV40R-DEADKQ
		Sportivo	ACV40R-DEMVKQ	ACV40R-DEAVKQ
		Ateva	—	ACV40R-DEANKQ
		Grande	—	ACV40R-DEAGKQ
New Zealand	2AZ-FE	GL	ACV40R-DEMDKQ	ACV40R-DEADKQ
		Sportivo	ACV40R-DEMVKQ	ACV40R-DEAVKQ
		GLX	—	ACV40R-DEAGKQ
South Pacific Islands	2AZ-FE	Ateva	—	ACV40R-DEANKQ

EXTERIOR

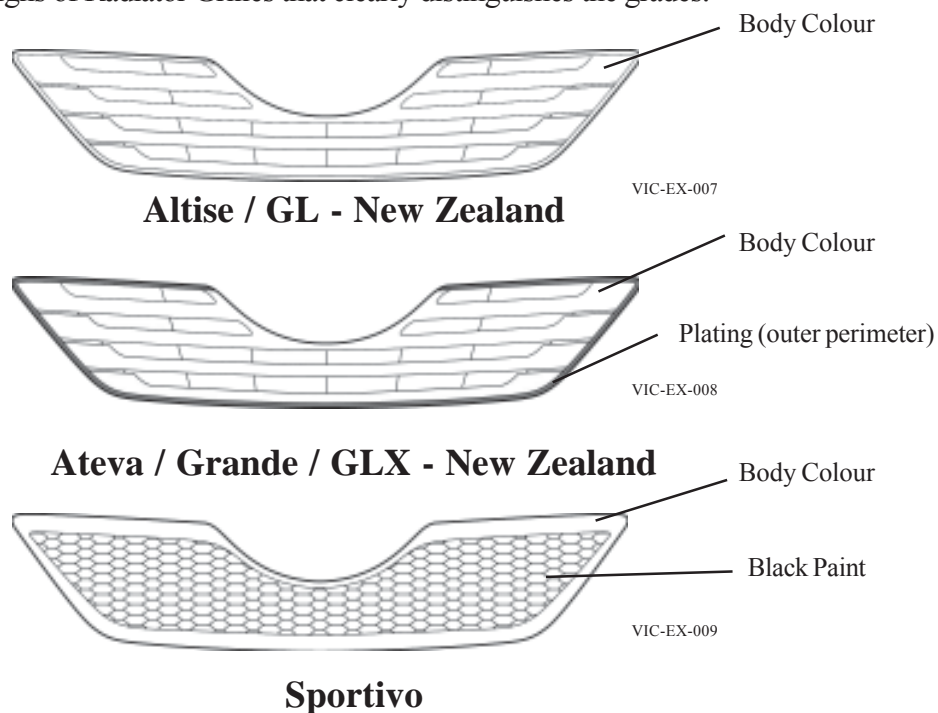
Front View

- Dynamic modernism has been produced by providing a solid-looking hood shape from the front grille to the centre of the hood and framing the hood with the left and right fenders.
- The front design, with minimum surface boundaries between the hood, grille, top mark and bumper, stretches out from the impressively projecting top mark.
- The headlights have a long, narrow design, which incorporates two accent lines, producing a crystal-like texture and boldness.



Radiator Grille

There are 3 different designs of Radiator Grilles that clearly distinguishes the grades.

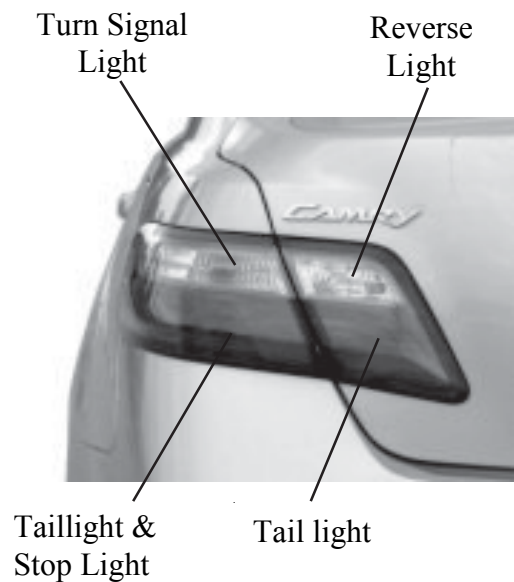


Rear View

- Power and modernity have been produced by providing a solid-looking body shape from the luggage door to the centre of the bumper and framing the luggage door with the left and right fenders.
- The edge of the rear combination light has been extended further into the side of the body, and the inner lens portion is ingot-effect white, expressing modernity and width.



02KMO24TE



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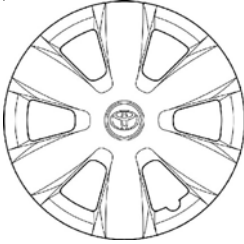

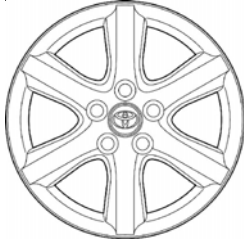
Side View

In order to express a dynamic 3-dimensional form, the extruded front and rear fender shapes have been incorporated into the body design, which is based on straight lines.



02KMO25TE

Tyre & Disc Wheel

Tyre	Size	P215/60R16	P215/60R16	P215/55R17
Disc Wheel	Size	16 x 6.5 JJ	16 x 6.5 J	17 x 7 J
	Material	Steel with Full Cap	Aluminium with Centre Ornament	Aluminium with Centre Ornament
Full cap / Wheel Design		 DOMCAM -025MO12Y	 DOMCAM-025MO14Y	 DOMCAM-025MO13Y

Exterior Colour List

Colour No.	Colour Name	Colour No.	Colour Name
061	White (Diamond White)	580	Yellow Mica Metallic (Aurora Gold)
1D4	Silver Metallic (Silver Ash)	6U7	Green Mica Metallic (Cyber Green)
209	Black Mica (Ink)	8M7	Light Blue Metallic (Ice Blue)
4N3	Beige Mica Metallic (Titan Silver)	8T0	Blue Mica Metallic (Caribbean Blue)
3R3	Red Mica Metallic (Red Earth)	—	—

INTERIOR

Instrument Panel

A light, sporty and open feel has been achieved with lines that flow from the centre cluster to both left and right, seemingly floating on the instrument panel lower.



DOMCAM-026MO10TE

Centre Cluster

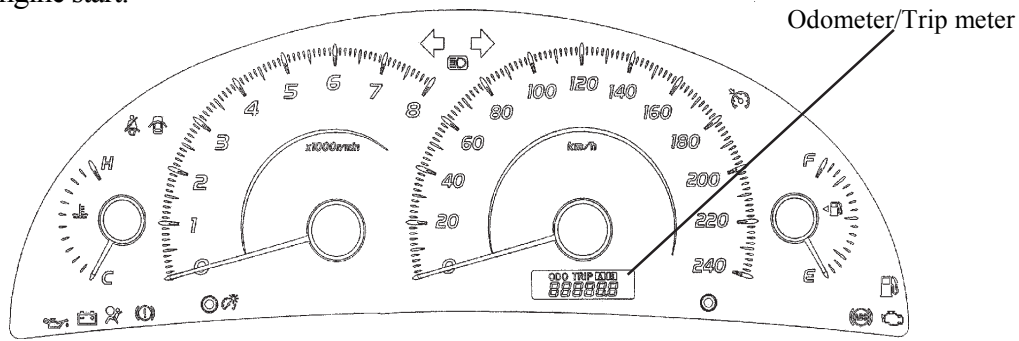
The centre cluster has been designed to be fresh and clear. By making the LCD display larger and putting the display and the switches closer together, both ease of use and freshness have been achieved. Light is emitted by the entire panel at night, creating a fresh atmosphere.



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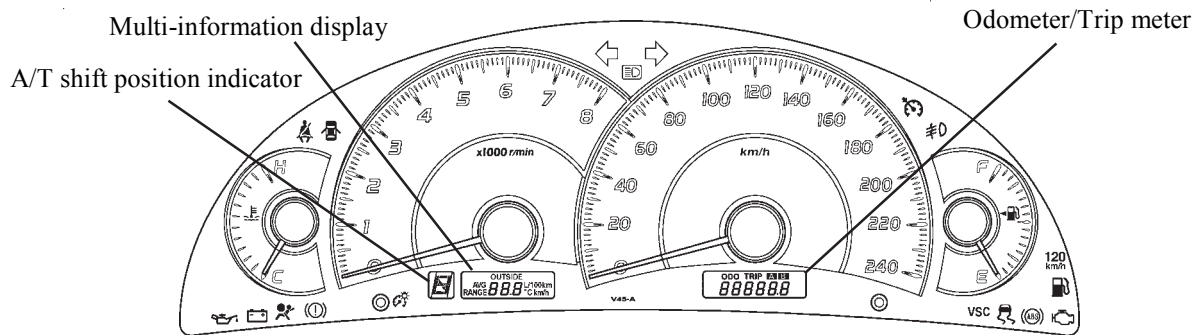
Combination Meter

- Three types of meters are available based on the grade.
- A large 4-meter combination meter is used.
- The multi-information display is provided under the tachometer on the high grade and sports grade models.
 - The multi-information display indicates; outside temperature, possible driving range, average fuel consumption since refuelling, distance driven since engine start and average speed since engine start.



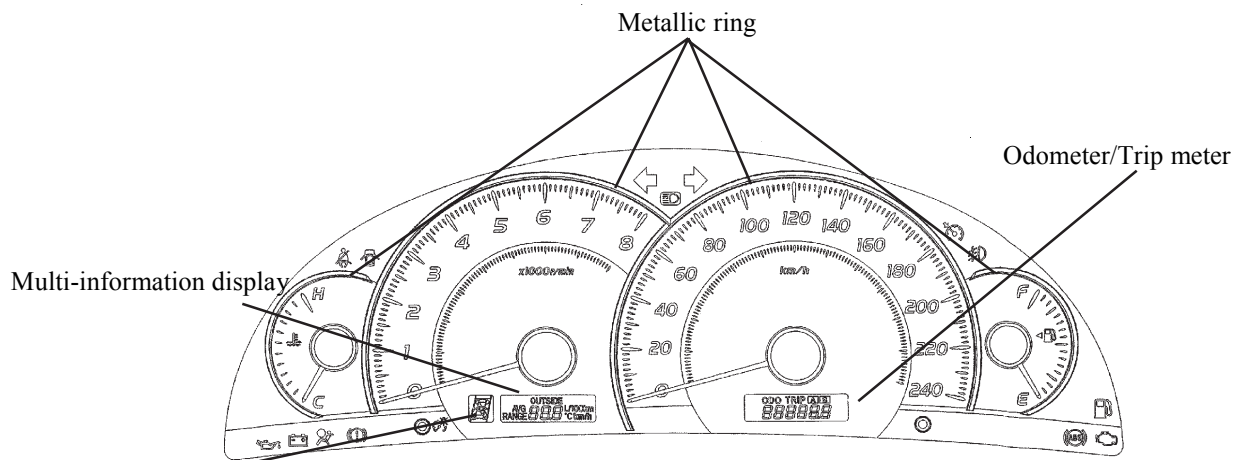
Basic type: Altise (New Zealand: GL)

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High grade type: Ateva & Grande (New Zealand: GLX)

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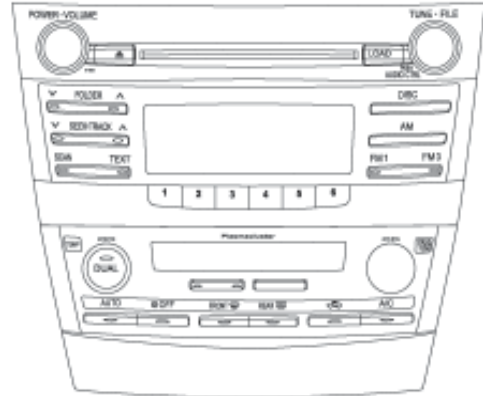
Sports grade type: Sportivo

DOMCAM-V1CC-IN-062

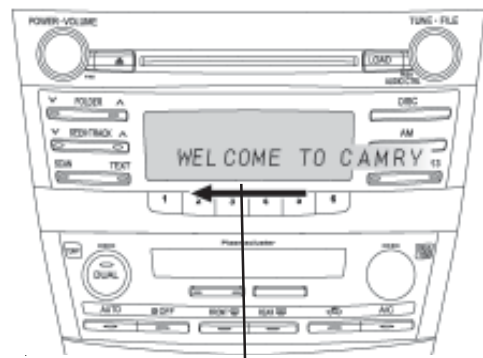
Welcome Function

When the driver starts the engine, the graduated illumination sequence of the combination meter, audio and heater control panel gives the impression of the driver being welcomed aboard.

(1) 0.7 seconds after engine start



(2) Approximately 2 seconds after engine start



Horizontal Scrolling Display

(3) Approximately 3 seconds after engine start



02KMO37Y

Shift Lever

On the new Camry, 2 types of shift lever are available, in accordance with the type of transaxle: Manual transaxle shift lever and a gate type 5-speed automatic transaxle shift lever.



DOMCAM-026MO21Y

Manual Transaxle Shift Lever (Sportivo)

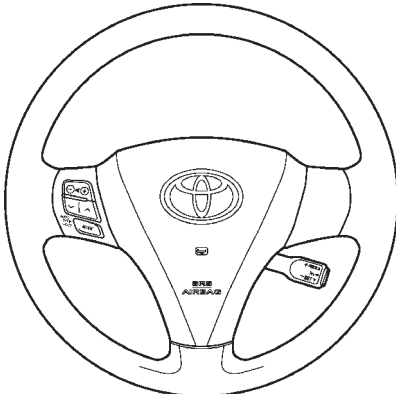
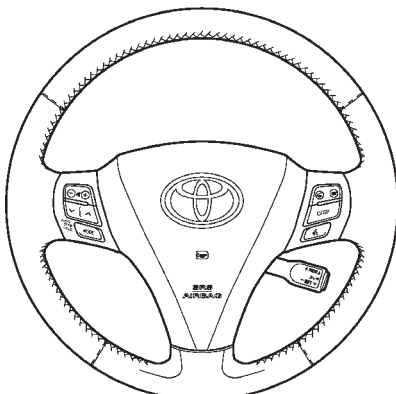


DOMCAM-026MO20Y

**Gate Type 5-speed Automatic
Transaxle Shift Lever (Altise)**

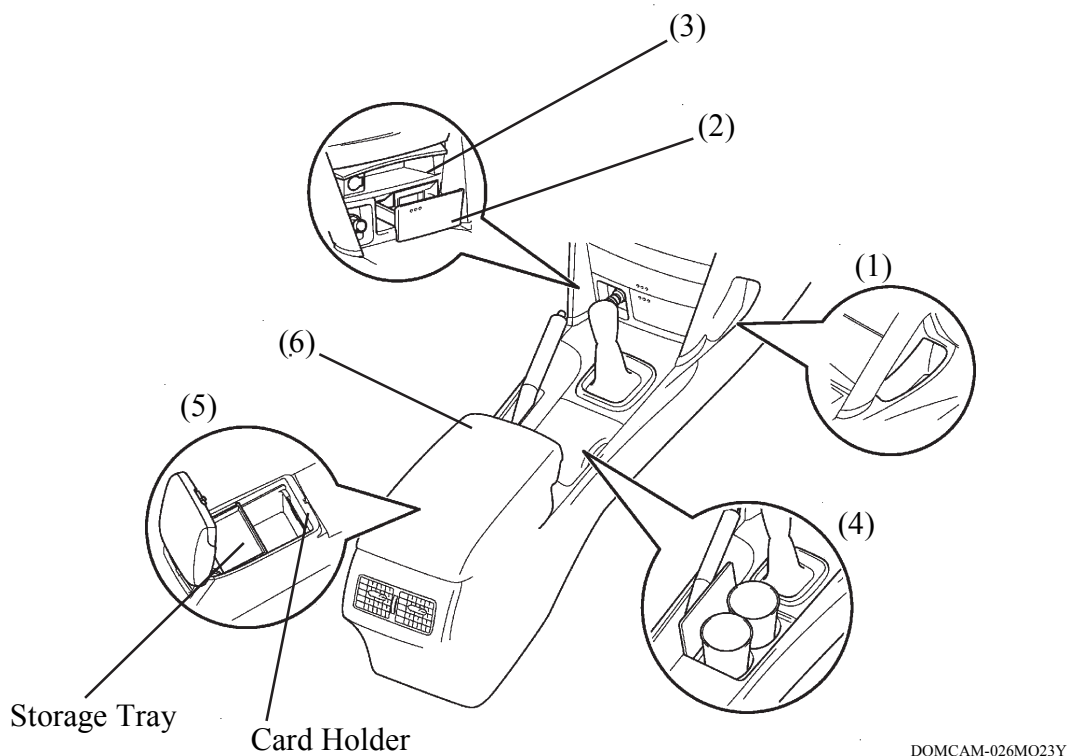
Steering Wheel

- There are two types of steering wheels available; 3-spoke urethane type and 3-spoke leather-wrapped.
- A newly designed steering switch pad is used to give a more integrated and attractive appearance.
 - Audio controls are standard across the range.
 - A display switch is mounted on the right side of the steering wheel and is used to operate the Multi-function Display (fitted to high & Sportivo grades).
 - Bluetooth hands-free telephone and voice-recognition switches are fitted on the Grande.
- The cruise control switch is incorporated in the steering wheel for ease of operation.

Design	3-Spoke Urethane	3-Spoke Leather-wrapped
	 <p>02KMO15Y</p>	 <p>02KMO16Y</p>

Console Box

- A storage pocket for items such as mobile phones and wallets has been provided beside the front console (1).
- An ashtray has been built into the front box (2).
- A storage box for small articles with an internal 12V power supply terminal has been provided above the ashtray (3).
- Two drink cup holders, which can hold large sized drink cups with a lid, have been provided on the centre console, behind the shift lever (4).
- The rear console box has a large capacity, card holder and a storage tray has been provided for keeping small articles (5). The console box lid can be used as an armrest (6).

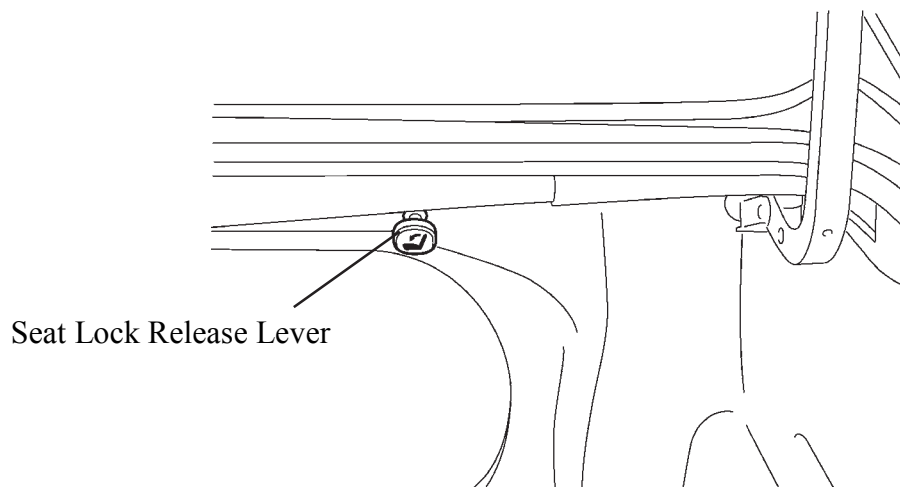
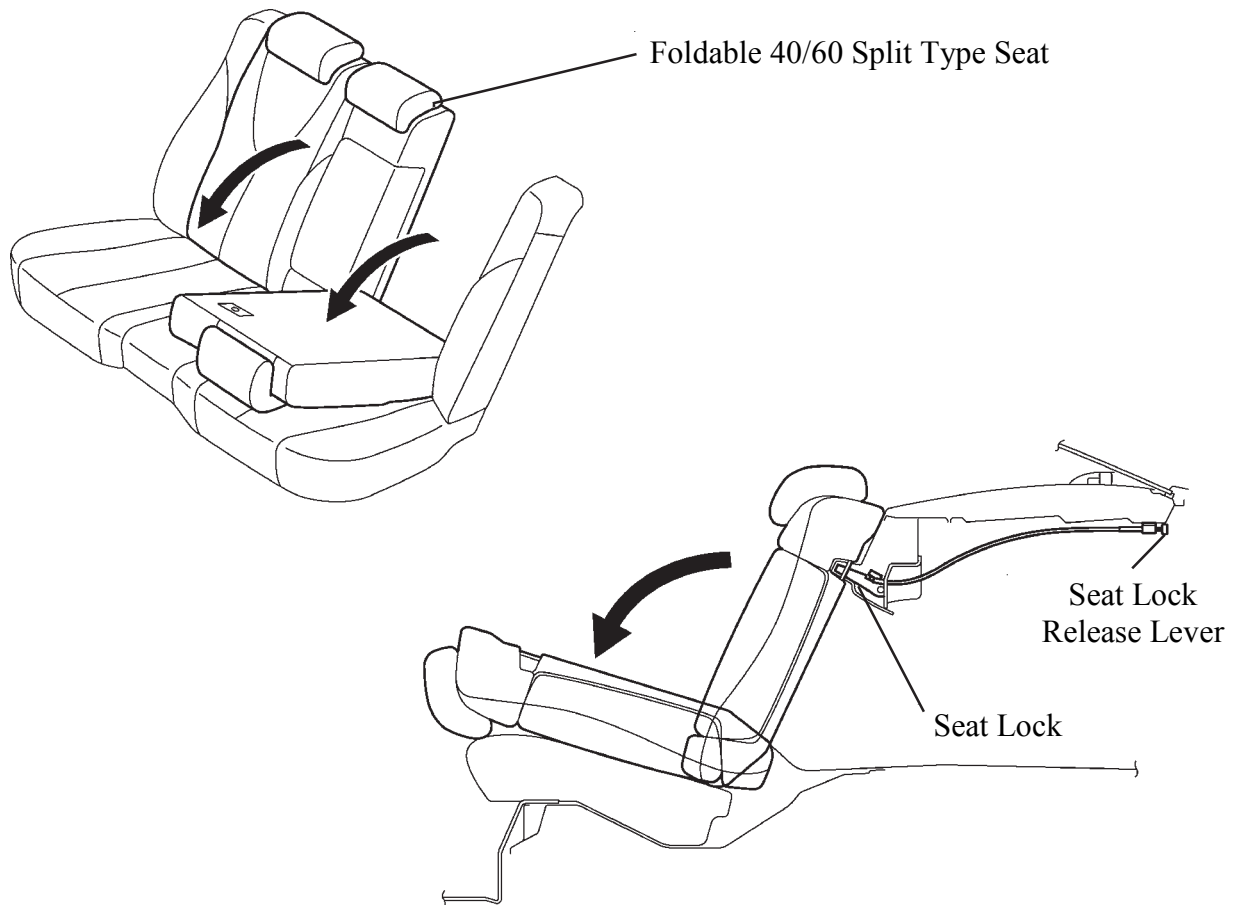


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Console Box

Rear Seat

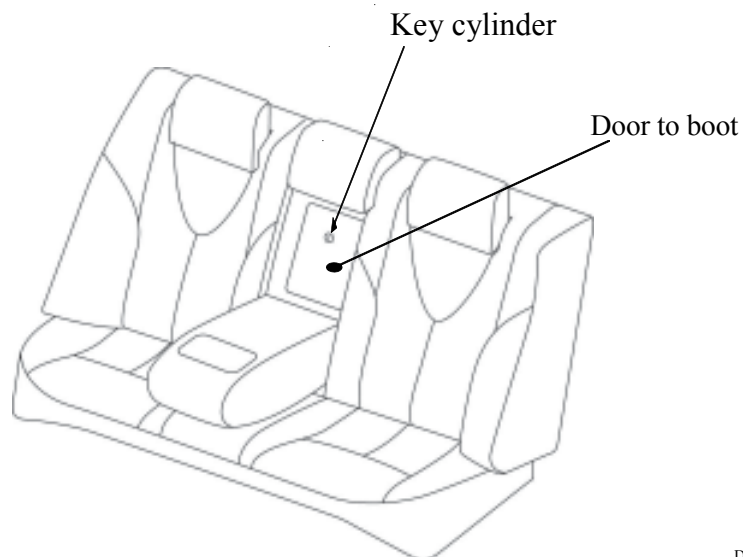
- A fold-down function has been provided for all models excluding Sportivo.
- The rear seat lock is now released from the trunk compartment, this has increased boot security when the boot is dead locked.
- An adjustable centre rear headrest is fitted to all grades excluding Altise and GL: New Zealand



Foldable Seat and Seat Lock Release Lever

DOMCAM-025MO26Y

- A fixed rear seat is used on Sportivo grades with a lockable rear seat door to boot.

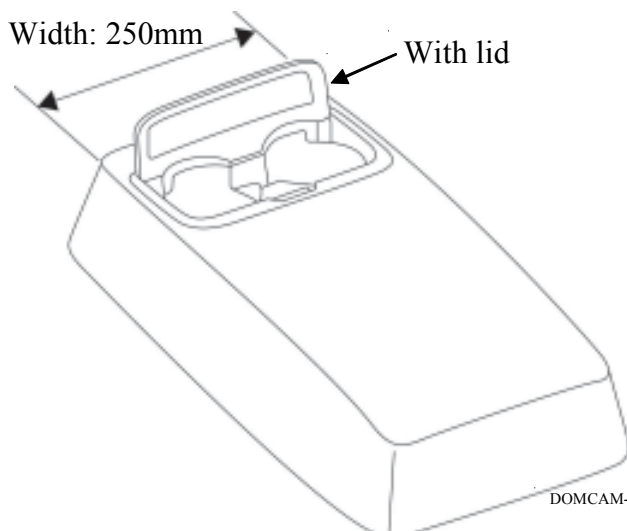


Fixed Rear Seat

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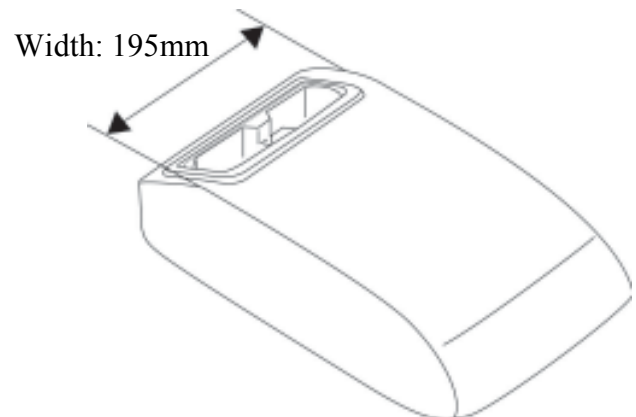
Rear Seat Armrest

- A large rear seat centre arm rest is available
- The armrest features a cup holder that can accommodate two large-sized cups
- The cup holder has a lid that enhances appearance when not in use (Sportivo grade only)
- The armrest has been made 20 mm higher for greater ease of use



DOMCAM-V1CC-IN-036

**Armrest for fixed seat
(Sportivo only)**



DOMCAM-V1CC-IN-035

**Armrest for 40:60 fold-down seat
(excluding Altise/GL: NZ)**

EQUIPMENT

Audio System

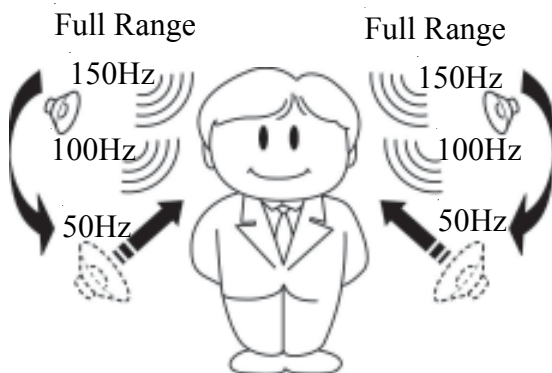
- The large and varied original LCD panels and large switched are provided for each audio head unit, improving visibility and ease of use.
- Psychoacoustics is adopted for all audio systems to achieve space control that portrays rich bass sounds spreading throughout the cabin from low to high volumes. As a result, the depth and power of the sound have been enhanced.
- The CD audio system supports MP3 and WMA (Windows Media Audio) playback.
- The text display during MP3 and WMA playback features ID3 tag version 1.0/1.1 including folder name, file name or MP3 file album name, track number, and artist name.
- A new DSP (Digital Signal Processor) is adopted, which features psychoacoustics. Optimal tuning is used to create clear and powerful audio without distortion.
- The radio tuner features digital processing that further reduces AM/FM noise (multipass and adjacent interference).
- The audio system features an ASL (Automatic Sound Leveliser) that automatically controls volume and frequency characteristics in relation to vehicle speed for greater audio quality.
- A large LCD monitor is adopted for the audio system, and a 7-inch display is adopted for the integrated navigation system. In addition, large switches are adopted for greater visibility and easier operation.
- A “Welcome Display” function is adopted for the audio system. (Except for integrated navigation system)
 - > When the key is switched to ACC or IG, the peripheral accessories including the meters slowly illuminate, and the message “WELCOME TO CAMRY” scrolls across the monitor. (Except for navigation-integrated system)
 - > The surface lights illuminate to give the cabin a luxurious feel.

-REFERENCE-

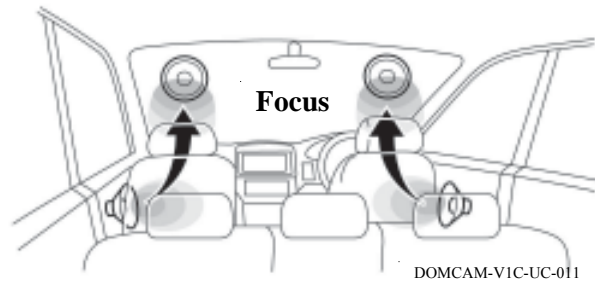
Psychoacoustic theory is technology that exploits human perceptions (sensory illusions). Through the implementation of this technology, without changing the speaker sizes or locations, listeners can sense deeper bass sound and feel as if the speakers were located at eye level, despite them being located in low positions like door speakers.

Psychoacoustics

- Psychoacoustics is acoustic technology that cleverly uses human mentality and illusions. Rather than changing the speaker size or speaker layout, psychoacoustics is used to create a sense of the sound powerfully flowing throughout the cabin.
- The heavy bass playback function broadens the playback range of heavy bass tones and causes the listener to feel the heavy bass tones as if the system was equipped with a woofer.
- The upper position control function causes the sound coming from the speakers positioned near the bottom of the doors to sound as if it is actually coming from the front.

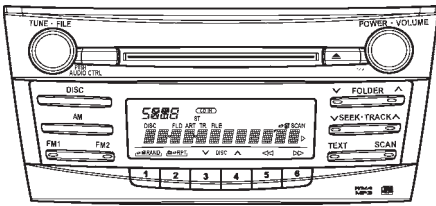
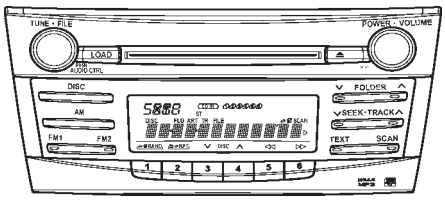
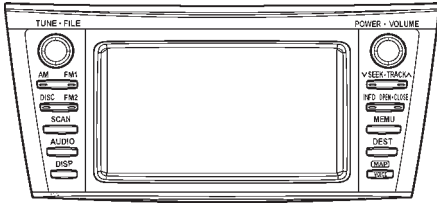


Heavy bass playback function image



Upper position control function image

Audio Head Unit

Grade	Design	Specifications
Altise GL: NZ*		<ul style="list-style-type: none"> • AM/FM Tuner • CD (MP3, WMA Compatible*¹) • DSP*²/ASL*³ • 4-Speaker System • Maker: Fujitsu Ten
Ateva, GLX: NZ*, Sportivo (incl. NZ*)		<ul style="list-style-type: none"> • AM/FM Tuner • In-Dash 6-CD Changer (MP3, WMA Compatible*¹) • DSP*²/ASL*³ • 6-Speaker System • Maker: Fujitsu Ten
Grande		<ul style="list-style-type: none"> • AM/FM Tuner • In-Dash 4-CD Changer (MP3, WMA Compatible*¹) • DSP*²/ASL*³ Function • 6-Speaker System • Maker: Fujitsu Ten

*1: Compatible with the compressed sound and music files complying with MP3 (MPEG Audio Layer-3) standard and WMA (Windows Media Audio)

*2: Digital Sound Processor

*3: Automatic Sound Leveliser

NZ*: New Zealand

Bluetooth Hands-free Telephone with Navigation System

The integrated navigation system has a Bluetooth hands-free telephone feature. This enables hands free operation of some Bluetooth compatible phones without cable or special connections.

There is a conversation microphone located in the overhead console with the voice recognition and telephone switches are located on the steering wheel.

The integrated navigation system display (on some compatible phones) has some of following Bluetooth hands-free telephone functions;

Function	Description
Dialling function	The number is entered into the display screen and dialed
Phonebook dial function	The driver can select and dial a number from the phonebook list sent from the mobile phone to the head unit and displayed on the display screen. The phonebook can accommodate up to 1,000 entries
Outgoing call log dialing	The system records the last five phone numbers dialed. The Bluetooth hands-free function can be used to select one of these numbers to dial
Incoming call log dialing	The system records the last five incoming phone numbers. The Bluetooth hands-free function can be used to select one of these numbers to dial
One-touch dial	A maximum of 17 preset phone numbers can be dialed with a single touch
Voice dialing	The voice dialing feature enables calls to be placed by saying the phone numbers of one of 20 pre-recorded entries
Navigation system info dialing	Calls can be made using phone numbers registered in the navigation system's database of facilities and services
Receiving calls	Calls can be received hands-free by simply touching the switch on the display screen or the telephone switch (off-hook) on the steering wheel
	The display screen will display name and phone number info only for contacts registered in the phonebook. When they are not registered, only phone numbers will be displayed
Other features	Dial tone sending
	Switching between hands-free calling and normal telephone use
	Volume setting
	Screen display changes

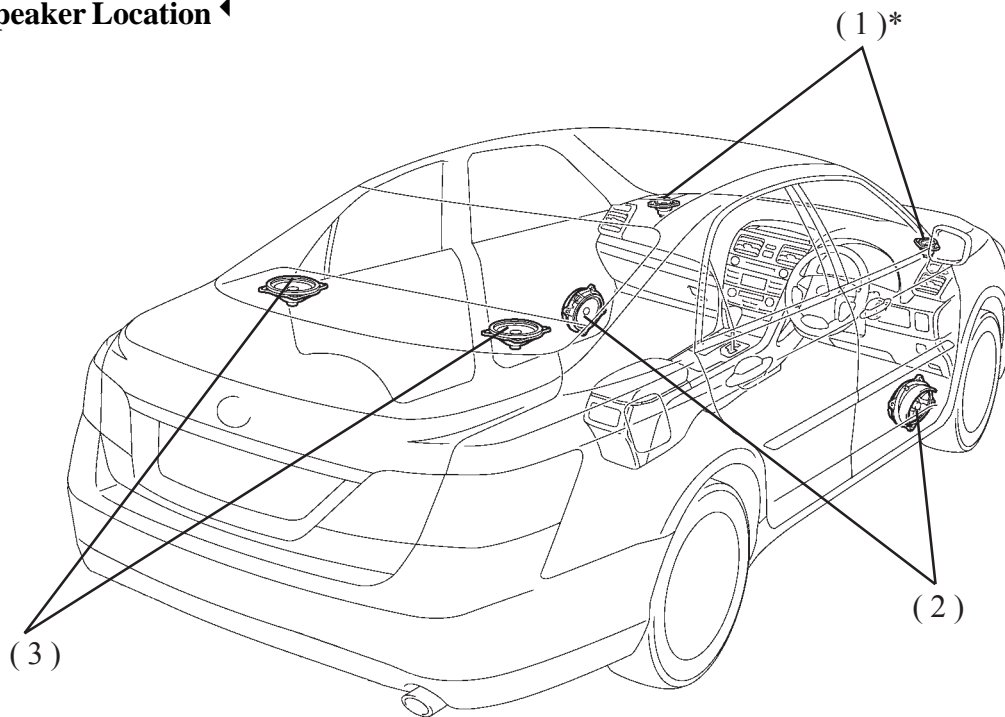
Special note:

The above features may not be available when used in conjunction with some mobile phones.

Due to continual mobile phone software updates we are unable to list compatible phones.

Speaker

▶ Speaker Location ◀

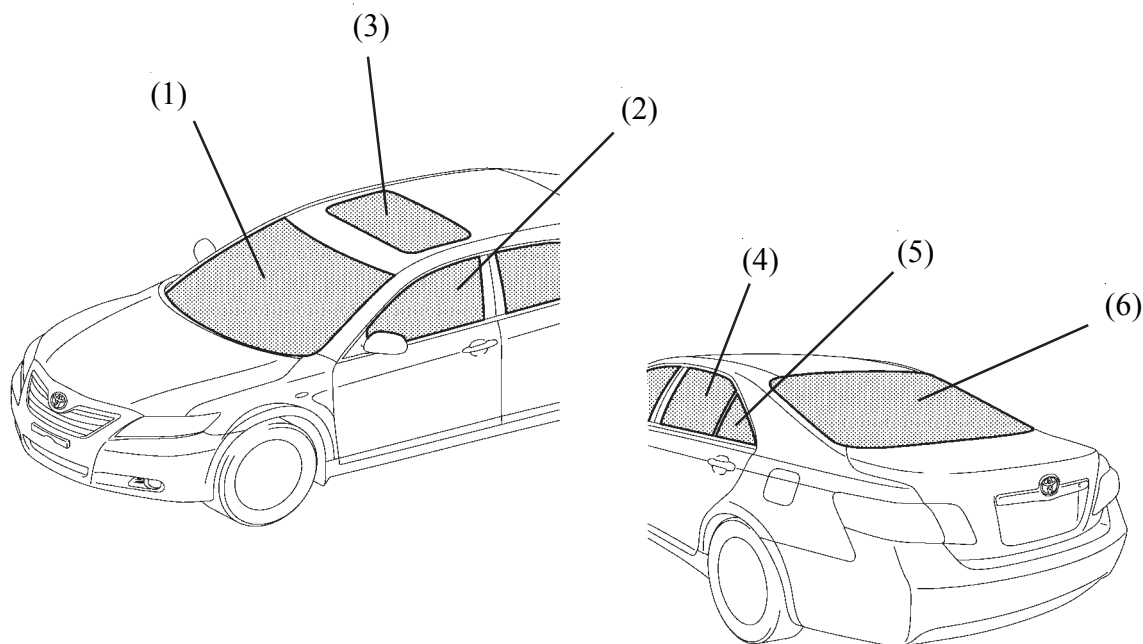


DOMCAM-02KMO39Y

▶ Speaker Specifications ◀

Location	Speaker Type	Caliber	Impedance	Input Rated (Max)
(1)*	Front Tweeter × 2	65 mm	4 Ω	17.5 W
(2)	Front Midrange × 2	150×225mm	4 Ω	20 W
(3)	Rear Full Range × 2	150×225mm	4 Ω	20 W

* Except for Altise and GL for New Zealand

Glass

026MO28TE

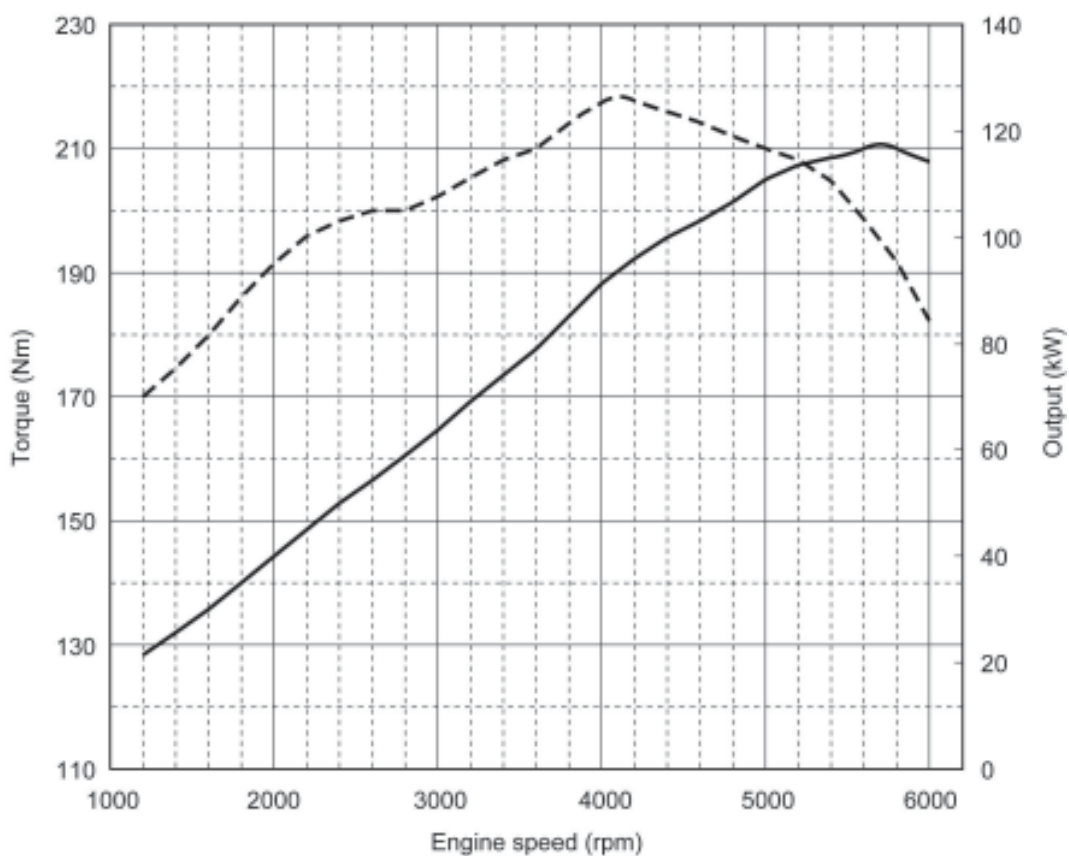
Glass Portion		Colour	Glass Type	Visible Light Penetration Rate
(1)	Windshield	Green with Dark Shade	Laminate	75% or more
(2)	Front Door	Green	Tempered	70% or more
(3)	Moon Roof Panel	Grey	Tempered	20 %
(4)	Rear Door	Green	Tempered	70% or more
(5)	Rear Door Quarter	Green	Tempered	70% or more
(6)	Back Window	Green	Tempered	70% or more

PERFORMANCE

Power Train

Engine

Type	2AZ-FE
No. of Cylinders & Arrangement	4-Cylinder, In-line
Valve Mechanism	16-Valve DOHC, Chain Drive (with VVT-i)
Displacement	2362 cm ³
Max. Output [EEC]	117kW @5700rpm
Max. Torque [EEC]	218N·m @4000rpm

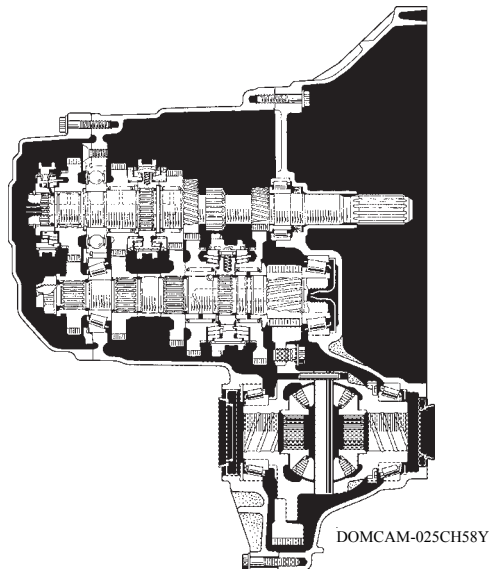
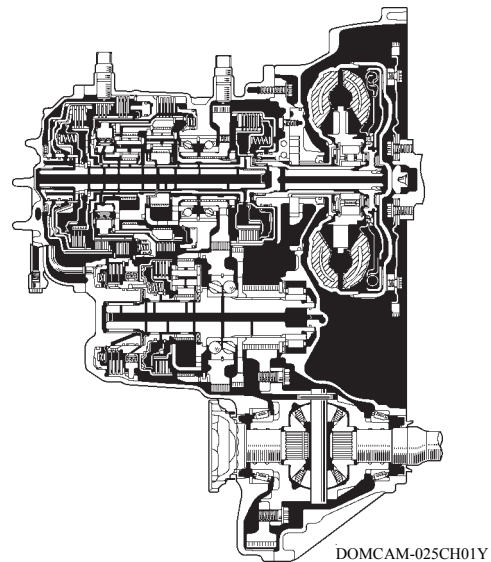


DOMCAM-V1CC-DP-050

Transaxle

Type		5-Speed Manual E354	5-Speed Automatic U250E
Gear Ratio	1st	3.538	3.943*
	2nd	2.045	2.197*
	3rd	1.333	1.413*
	4th	1.028	0.975*
	5th	0.820	0.703*
	Reverse	3.583	3.145*
Differential Gear Ratio		3.944	3.391
Oil grade / Fluid type		API GL-4 or GL-5	Toyota Genuine ATF WS

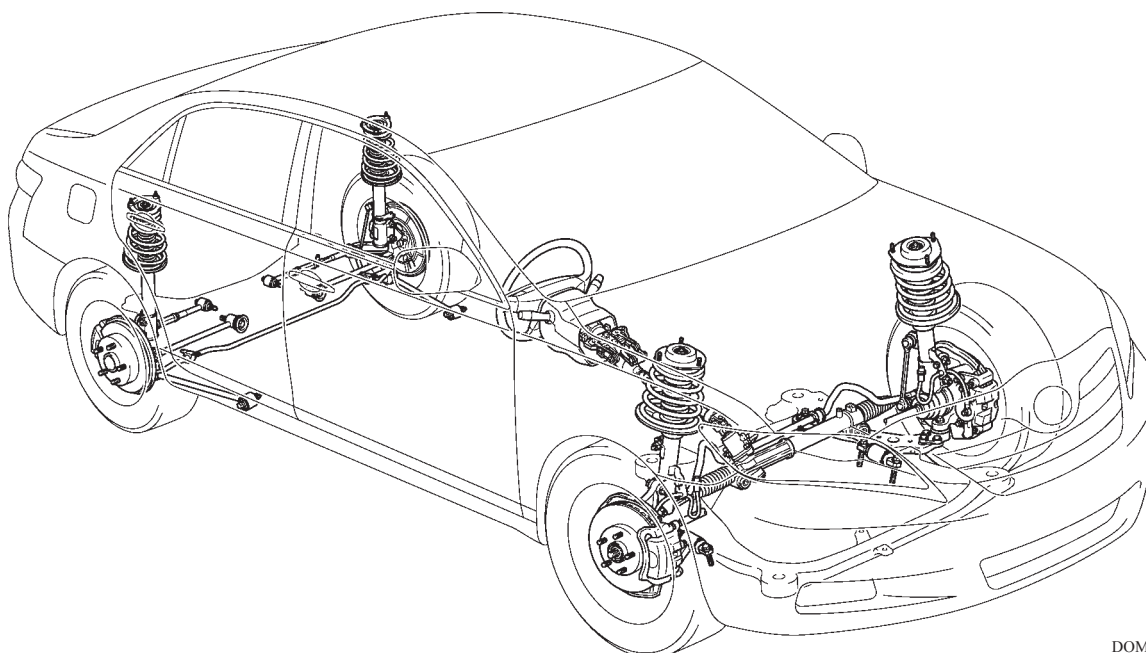
*: Counter gear ratio included

**E354 Manual Transaxle****U250E Automatic Transaxle**

Chassis

Suspension

Front Suspension	Rear Suspension
MacPherson Strut Type Independent Suspension	Dual Link MacPherson Strut Type Independent Suspension



DOMCAM-026MO29Y

Steering

Steering Type	Engine Speed Sensing Hydraulic Type Power Steering
Gear Type	Rack & Pinion

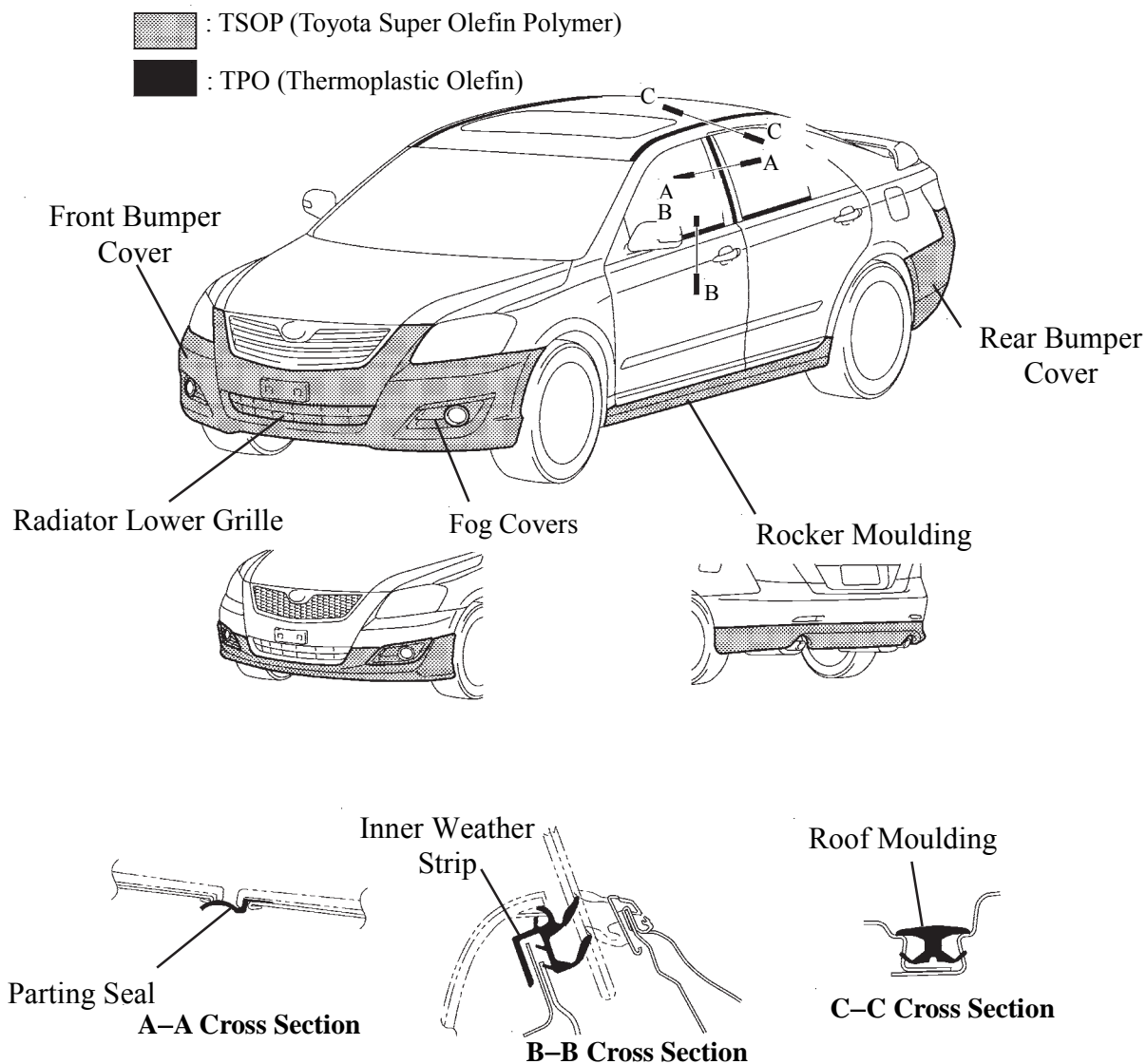
Brake

Front Brake Type	Ventilated Disc
Front Rotor Size (D x T) mm	296 x 28
Rear Brake Type	Solid Disc
Rear Rotor Size (D x T) mm	286 x 10
Parking Brake	Centre Lever Type
Brake Control System	<ul style="list-style-type: none"> •ABS with EBD, Brake Assist (mechanical) •ABS with EBD, Brake Assist, TRC and VSC

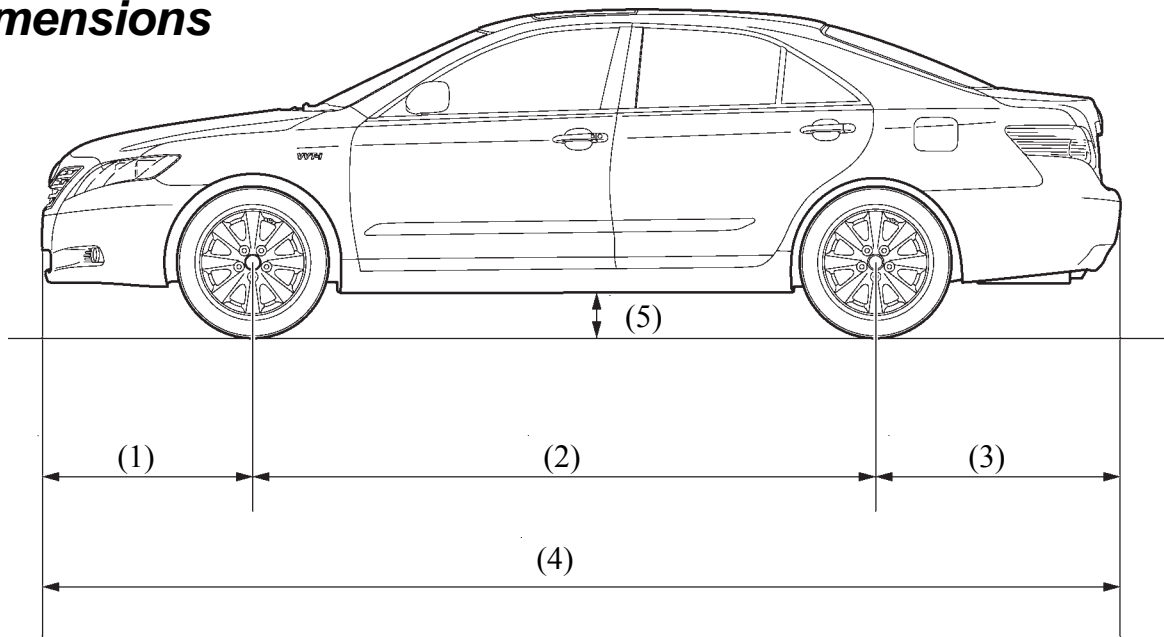
ENVIRONMENT and RECYCLING

Adoption of TSOP & TPO

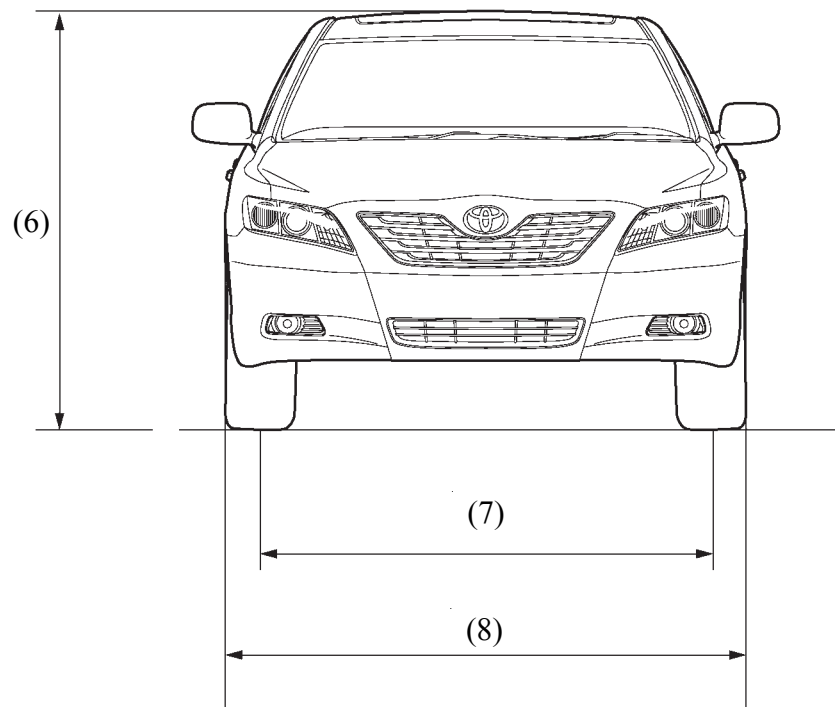
TSOP (Toyota Super Olefin Polymer), TPO (Thermoplastic Olefin), which have superior recyclability, are actively utilised while the use of chlorine has been reduced as much as possible.



Dimensions



DOMCAM-026MO18TE



DOMCAM-026MO19TE

(1)	Front Overhang	955mm	(5)	Minimum Running Ground Clearance	# 160mm
(2)	Wheel Base	2775mm	(6)	Overall Height	# 1460mm
(3)	Rear Overhang	1085mm	(7)	Tread	Front 1575mm
					Rear 1565mm
(4)	Overall Length	4815mm	(8)	Overall Width	1820mm

#: Note Minimum Running Ground Clearance and Overall Height indicated is based on an Unladen Vehicle
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EQUIPMENT LIST

•: Standard O: Option -: Not available

Camry / Grade			Altise / GL	Sportivo	Ateva	Grande / GLX
Exterior	Boot Spoiler Lip type		O	•	-	-
	Radiator Grille	Normal	•	-	-	-
		Sporty	-	•	-	-
		Normal with Chrome Plated	-	-	•	•
	Body Colour outside door handles		•	•	•	-
	Chrome outside door handles		-	-	-	•
	Sportivo Body Kit		-	•	-	-
	Side Protection Moulding	Colour	•	•	•	•
	Mud Guard	Black	•	-	-	-
		Colour	-	•	•	•
Chassis	Brake Control	ABS with EBD & BA (mechanical)	•	•	•	-
		ABS with EBD, BA (Electrical), VSC & TRC	-	-	-	•
	Tyre	215/60R16 tyres (95V)	•	-	•	•
		215/55R17 tyres (93V)	-	•	-	-
	Rim	16 x 6.5JJ Steel Wheels	•	-	-	-
		16 x 6.5J Alloy Wheels	O	-	•	•
		17 x 7 Alloy Wheels	•	•	-	-
	Spare Rim	Spare Wheel Steel	•	-	•	-
		Spare Wheel Alloy	-	•	-	•
	Steering Wheel	3-Spoke Urethane	•	-	-	-
		3-Spoke Leather	-	•	•	•
	Steering System	Engine Speed Sensing Hydraulic Type	•	•	•	•
		Manual Tilt & Telescopic Mechanism	•	•	•	•
	Gate Type Automatic Transaxle Shift Lever with Shift Lock (Automatic only)		•	•	•	•
	PKB Lever Type		•	•	•	•

(Continued)

		●: Standard	O: Option	-: Not available	
Camry / Grade		Altise GL	/ Sportivo	Ateva	Grande / GLX
Body	Alloy Sports pedals	-	●	-	-
	Seat Cover Material	Fabric	●	●	-
		Leather	-	O	●
	Front Seat	Normal	●	-	●
		Sporty	-	●	-
	Rear Seat	40/60 Split fold rear seat excluding armrest	●	-	-
		40/60 Split fold rear seat including armrest	-	-	●
		40/60 released from the boot for added security	●	-	●
		Fixed Rear seat with arm rest incl. cup holders and lockable Trunk through door	-	●	-
	Front Seat Belt	3-Point ELR with Pre- tensioner and Force Limiter	●	●	●
	Rear Seat Belt	3-Point ELR + ALR x 3	●	●	●
	Front Console Box	Metallic	●	●	-
		Woody	-	-	●
	Rear Console Box (Leather)		●	●	●
	Front cup holders		●	●	●
	Card holder in the centre console		●	●	●

(Continued)

●: Standard O: Option -: Not available

Camry / Grade				Altise / GL	Sportivo	Ateva	Grande / GLX
Body Electrical	CD AM/FM 4 Speaker (MP3)			●	-	-	-
	6 CD AM/FM 6 Speaker (MP3)			-	●	●	-
	AVN*, 4 CD AM/FM 6 Speaker (W/ Bluetooth)			-	-	-	●
	Steering Pad Switch			●	●	●	●
	Cruise Control System			●	●	●	●
	Engine Immobiliser			●	●	●	●
	Wireless Door Lock Control System including boot release			●	●	●	●
	Alarm (incl. panic)			●	●	●	●
	Wiper System	Washer linked wiper function		●	●	●	●
		Rain Sensing Wipers		-	-	-	●
	Dual Stage Driver & Passenger Airbag			●	●	●	●
	Front Driver & Passenger side and curtain Airbag			O	●	●	●
	Clock with over speed warning display (3 setting)			●	●	●	●
	Power mirrors (Colour coded)			●	●	●	●
	Power Window System	One-Touch Auto Up-and-Down with Jam Protection	Driver's Door	●	●	●	●
	Multi-Information Display (incl. outside temp.) with control on steering wheel			-	●	●	●
	Sliding Roof			-	O	O	●
	Illuminated Entry System			-	●	●	●
	Power Drivers seat (incl. lumbar support)			-	●	●	●
	Power Passenger seat (incl. lumbar support)			-	●	●	●
	Manual Drivers seat (incl. Power lumbar support)			●	-	-	-
	Power Rear Sunshade			-	-	-	●
	Sports Headlamps (projector low, halogen high)			-	●	-	-
	Headlamps Standard (projector low, halogen high)			●	-	●	●
	Front Fog lights			-	●	●	●
	Automatic Light Control System			●	●	●	●
Light Turn-Off System (with delay function)			●	●	●	●	
Air Conditioner System	Manual		●	●	-	-	
	Dual Zone - Temperature Control Automatic		-	-	●	●	
Clean Air Filter			●	●	●	●	

AVN*: Audio Visual Navigation

2. Technical Description

Engine	EG
Chassis	CH
Body	BO
Body Electrical	BE

ENGINE

2AZ-FE Engine

<i>Description.....</i>	<i>EG-2</i>
<i>Features of 2AZ-FE Engine.....</i>	<i>EG-4</i>
<i>Engine Proper.....</i>	<i>EG-5</i>
<i>Valve Mechanism.....</i>	<i>EG-11</i>
<i>Lubrication System.....</i>	<i>EG-15</i>
<i>Cooling System.....</i>	<i>EG-17</i>
<i>Intake and Exhaust System.....</i>	<i>EG-19</i>
<i>Fuel System.....</i>	<i>EG-24</i>
<i>Ignition System.....</i>	<i>EG-26</i>
<i>Charging System.....</i>	<i>EG-27</i>
<i>Starting System.....</i>	<i>EG-29</i>
<i>Serpentine Belt Drive System.....</i>	<i>EG-31</i>
<i>Engine Control System.....</i>	<i>EG-32</i>

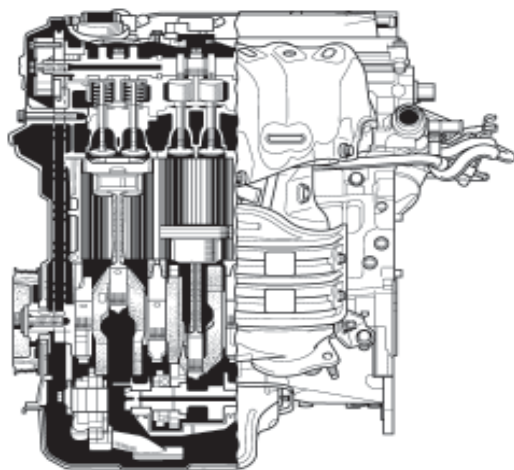
ENGINE

2AZ-FE ENGINE

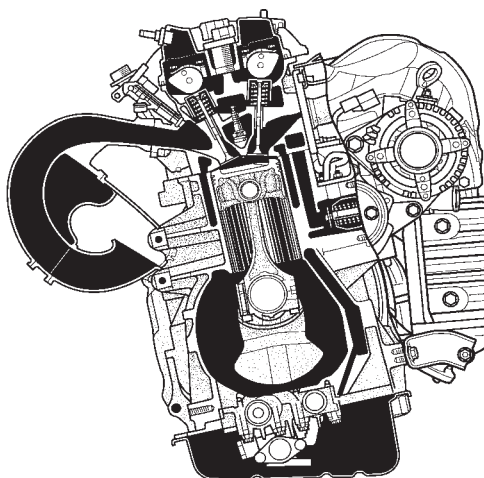
✱ DESCRIPTION

In-line 4-cylinder, 2.4-litre, 16-valve DOHC 2AZ-FE engine is used on the new Camry. This engine uses the VVT-i (Variable Valve Timing-intelligent) system, DIS (Direct Ignition System), ETCS-i (Electronic Throttle Control System-intelligent).

These control functions achieve improved engine performance, fuel economy, and reduced exhaust emissions.



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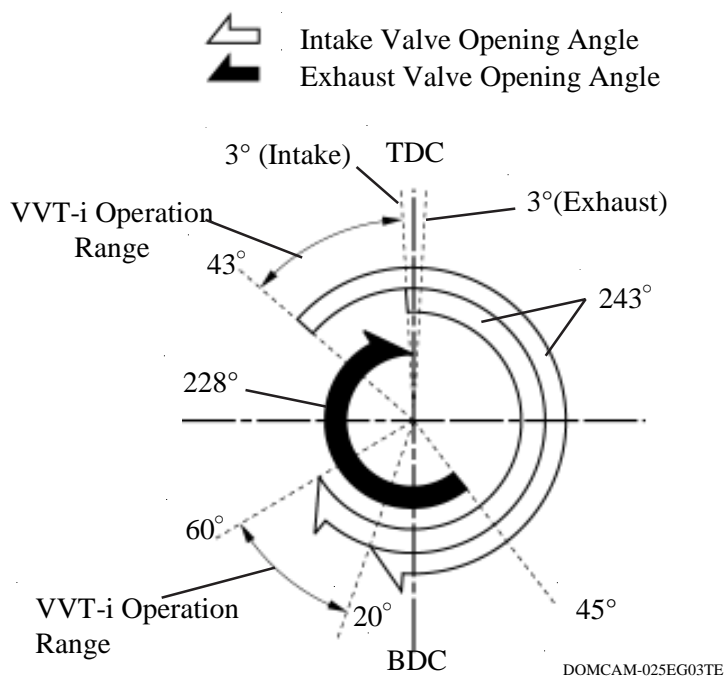


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▸ Engine Specifications ◀

Model			Previous	New
Engine			2AZ-FE	←
No. of Cyls. & Arrangement			4-Cylinder, In-line	←
Valve Mechanism			16-Valve DOHC, Chain Drive (with VVT-i)	←
Combustion Chamber			Pentroof Type	←
Manifolds			Cross-Flow	←
Fuel System			EFI	←
Ignition System			DIS	←
Displacement cm ³			2362	←
Bore X Stroke mm			88.5 X 96.0	←
Compression Ratio			9.6 : 1	←
Max. Output (EEC)			112 kW @ 5600 rpm	117 kW @ 5700 rpm
Max. Torque (EEC)			218 N·m @ 4000 rpm	←
Valve Timing	Intake	Open	46° BTDC ~ 4° ATDC	3° ~ 43° BTDC
		Close	10° ~ 60° ABDC	20° ~ 60° ABDC
	Exhaust	Open	45° BBDC	←
		Close	3° ATDC	←
Firing Order			1 – 3 – 4 – 2	←
Oil Grade			API grade SL "Energy-Conserving", "Energy-Conserving" SM or ILSAC	←
Research Octane Number			91 or higher	←
Emission Regulation			EURO II	EURO IV
Engine Service Mass* (Reference) kg			159	←

▸ Valve Timing ◀



FEATURES OF 2AZ-FE ENGINE

The 2AZ-FE engine has achieved the following performance through the use of the items listed below.

- (1) High performance and reliability
- (2) Low noise and vibration
- (3) Lightweight and compact design
- (4) Good serviceability
- (5) Clean emission and fuel economy

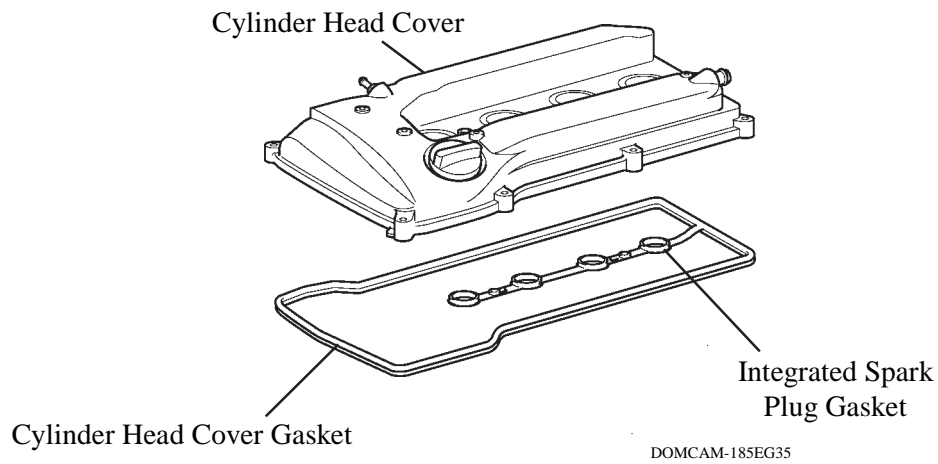
Item		(1)	(2)	(3)	(4)	(5)
Engine Proper	A head cover made of magnesium is used.			○		
	A taper squish shape is used for the piston head.	○				○
	A cylinder block made of aluminium alloy is used.			○		
	A resin gear balance shaft is used.		○	○		
Valve Mechanism	The VVT-i (Variable Valve Timing-intelligent) system is used.	○				○
	A timing chain and chain tensioner are used.		○	○	○	
Cooling System	The engine coolant is used the TOYOTA Genuine SLLC (Super Long Life Coolant).				○	
Intake and Exhaust System	The link-less type throttle body is used.			○	○	
	The intake manifold made of plastic is used.			○		
	A 2-way exhaust control system is used.	○	○			
	A ceramic type TWC (Three-Way Catalytic Converter) is used.					○
Fuel System	The fuel return less system is used.			○	○	○
	12-hole type fuel injectors with high atomizing performance are used.	○				○
	Quick connectors are used to connect the fuel hose with the fuel pipe.				○	
Ignition System	The DIS (Direct Ignition System) makes ignition timing adjustment unnecessary.	○			○	○
	Iridium-tipped spark plugs are used.	○			○	
Charging System	A segment conductor type alternator is used.	○		○		
Starting System	The PS (Planetary reduction-Segment conductor motor) type starter is used.			○		
Serpentine Belt Drive System	A serpentine belt drive system is used.			○	○	
Engine Control System	The ETCS-i (Electronic Throttle Control System-intelligent) is used.	○				○
	Evaporative emission control system is used.					○

✱ ENGINE PROPER

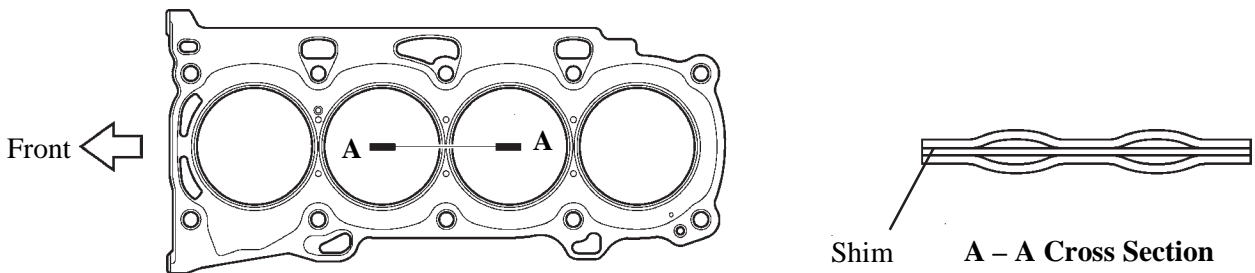
1. Cylinder Head Cover

A lightweight magnesium alloy diecast cylinder head cover used.

- The cylinder head cover gasket and the spark plug gasket have been integrated to reduce the number of parts.



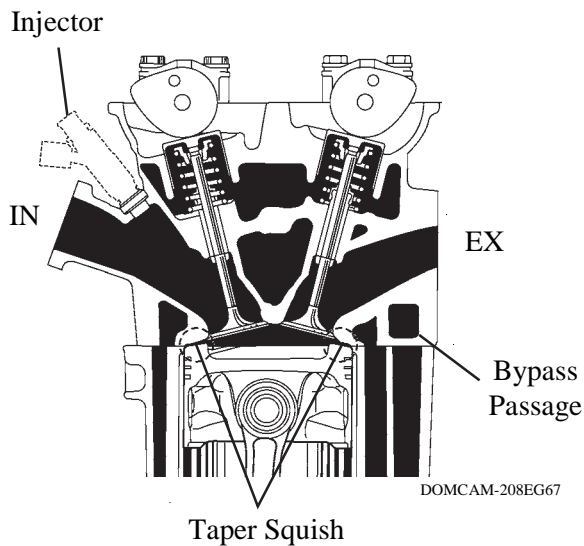
2. Cylinder Head Gasket



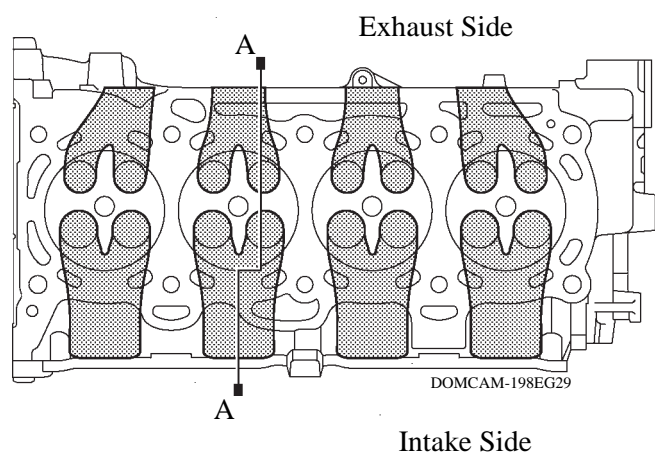
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3. Cylinder Head

- The taper squish combustion chamber is used to realize the engine's knocking resistance and fuel efficiency.
- An upright intake port has been used to achieve a highly efficient intake.
- Installing the injectors in the cylinder head enables the injectors to inject fuel as close as possible to the combustion chamber. This prevents the fuel from adhering to the intake port walls, which reduces HC exhaust emissions.
- The routing of the water bypass jacket in the cylinder head has been optimized for improved cooling performance. In addition, a water bypass passage has been provided below the exhaust ports to reduce the number of parts and to achieve weight reduction.



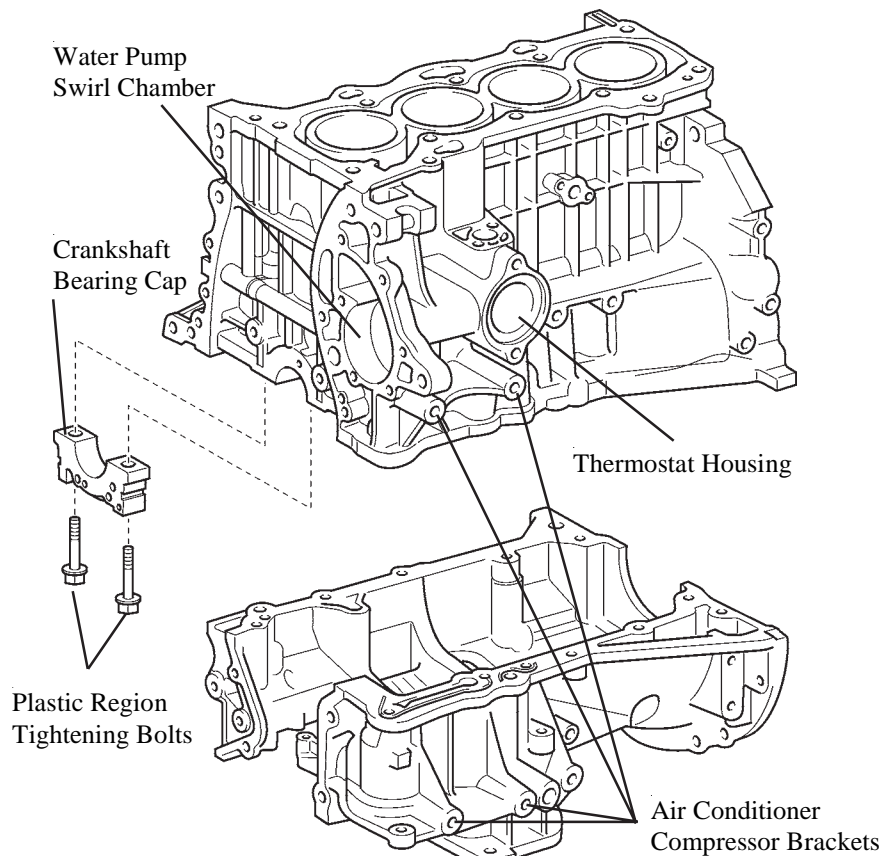
A – A Cross Section



View from the Back Side

4. Cylinder Block

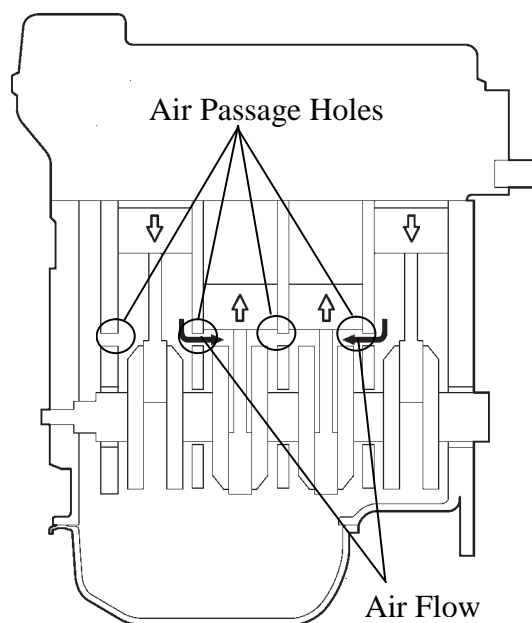
- Lightweight aluminium alloy is used for the cylinder block.
- By producing the thin cast-iron liners and cylinder block as a unit, compaction is realised.
- Air passage holes are provided in the crankshaft bearing area of the cylinder block. As a result, the air at the bottom of the cylinder flows smoother, and pumping loss (back pressure at the bottom of the piston generated by the piston's reciprocal movement) is reduced to improve the engine's output.
- The oil filter and the air conditioner compressor brackets are integrated into the crankcase. Also, the water pump swirl chamber and thermostat housing are integrated into the cylinder block.



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NOTICE

Never attempt to machine the cylinder because it has a thin liner thickness.

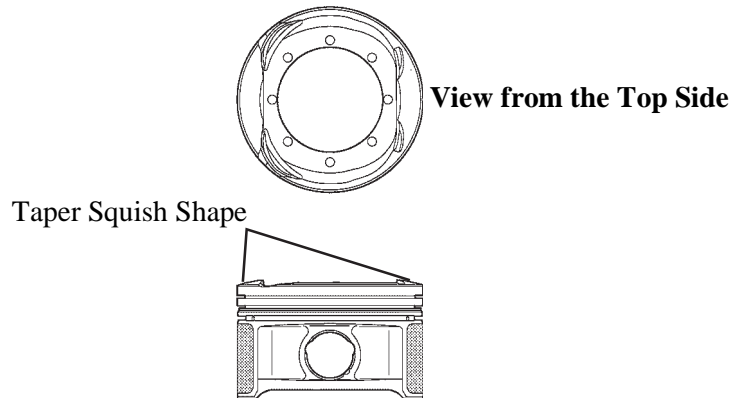
▶ Air Flow During Engine Revolution ◀

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5. Piston

- The piston is made of aluminium alloy and skirt area is compact and lightweight.
- The piston head portion is used a taper squish shape.
- The piston skirt has been coated.
- Full floating type piston pins are used.
- By increasing the machining precision of the cylinder bore diameter, the outer diameter of the piston has been made into one type.

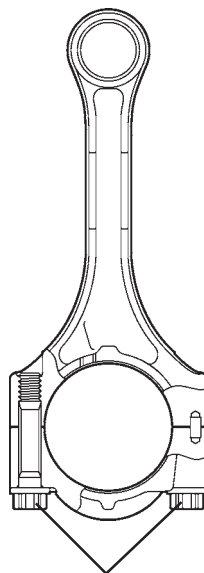
■ : Coating Area



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6. Connecting Rod

- The connecting rods and caps are made of high strength steel for weight reduction.
- Nut less-type plastic region tightening bolts of the connecting rod are used for a lighter design.

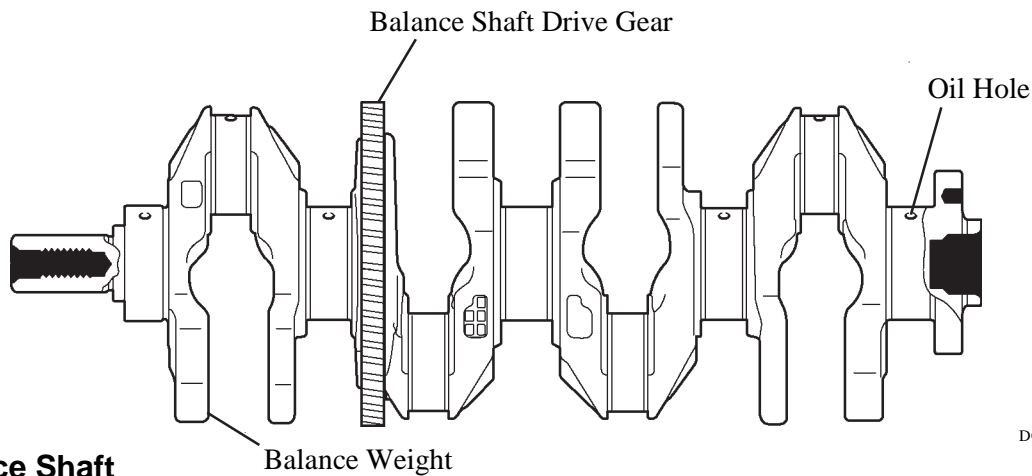


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Plastic Region Tightening Bolts

7. Crankshaft

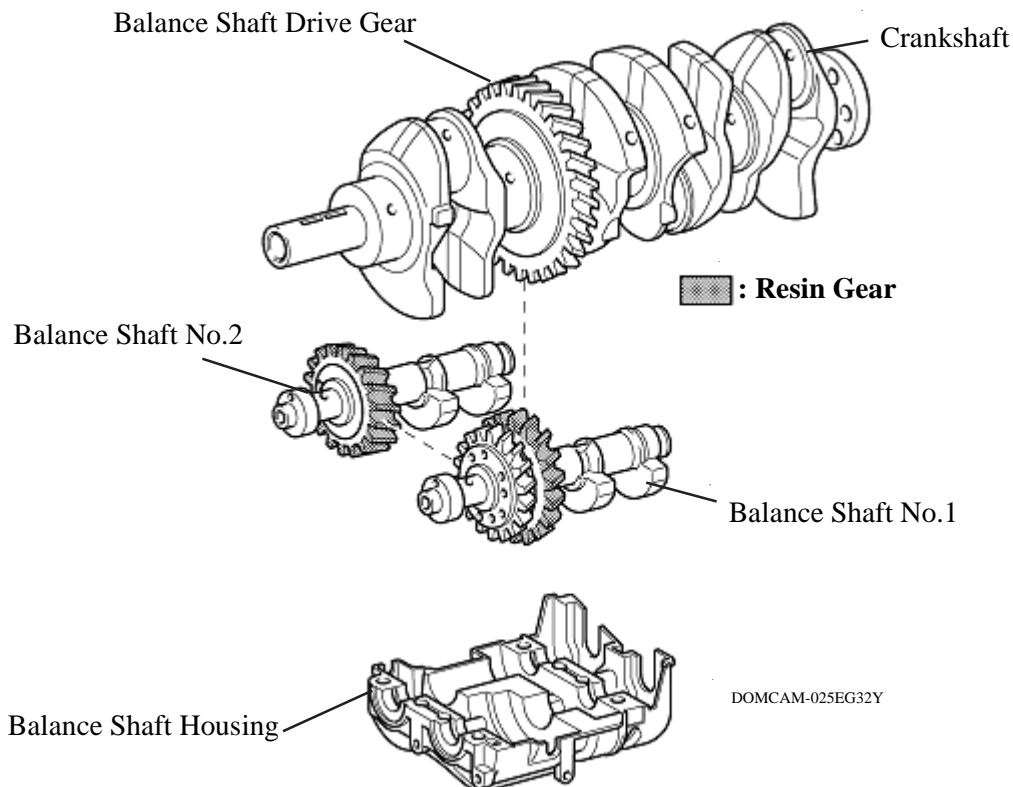
- The crankshaft has 5 journals and 8 balance weights.
- The precision and surface roughness of the pins and journals have been realized to reduce friction.
- The balance shaft drive gear has been installed onto the crankshaft.
- The crankshaft is made of forged steel.



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8. Balance Shaft

- A balance shaft is used to reduce vibrations.
- A direct-drive system is used which makes use of a gear that is installed onto the counterweight of crankshaft.
- In addition, a resin gear is used on the driven side to suppress noise and offer lightweight design.

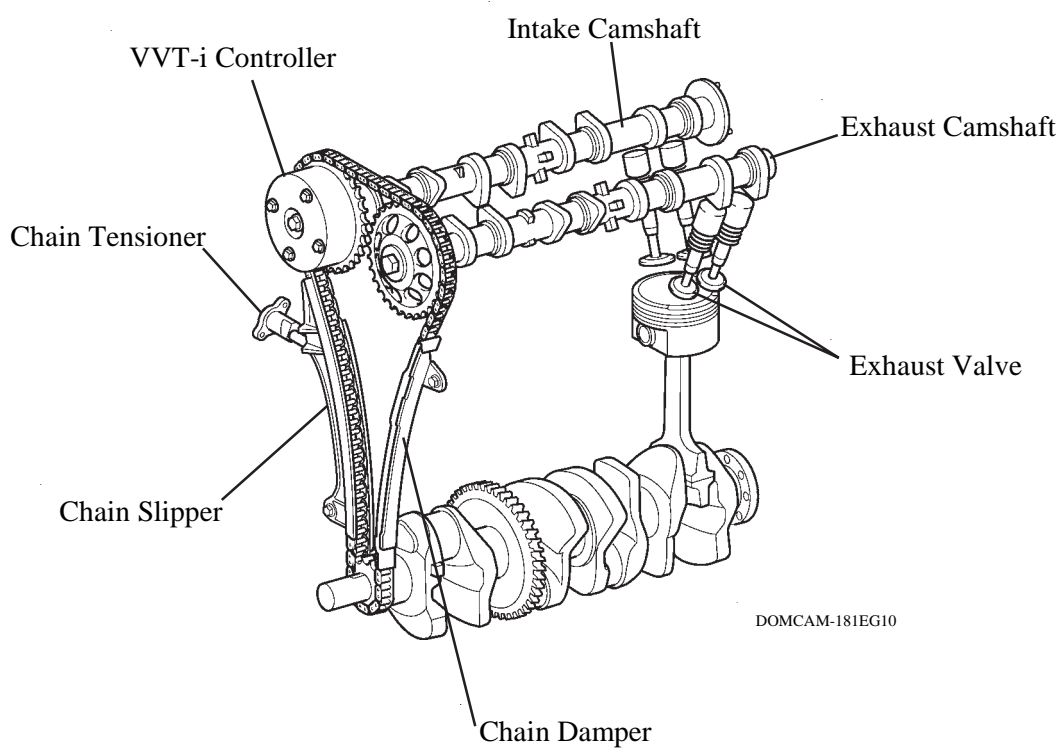


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● VALVE MECHANISM

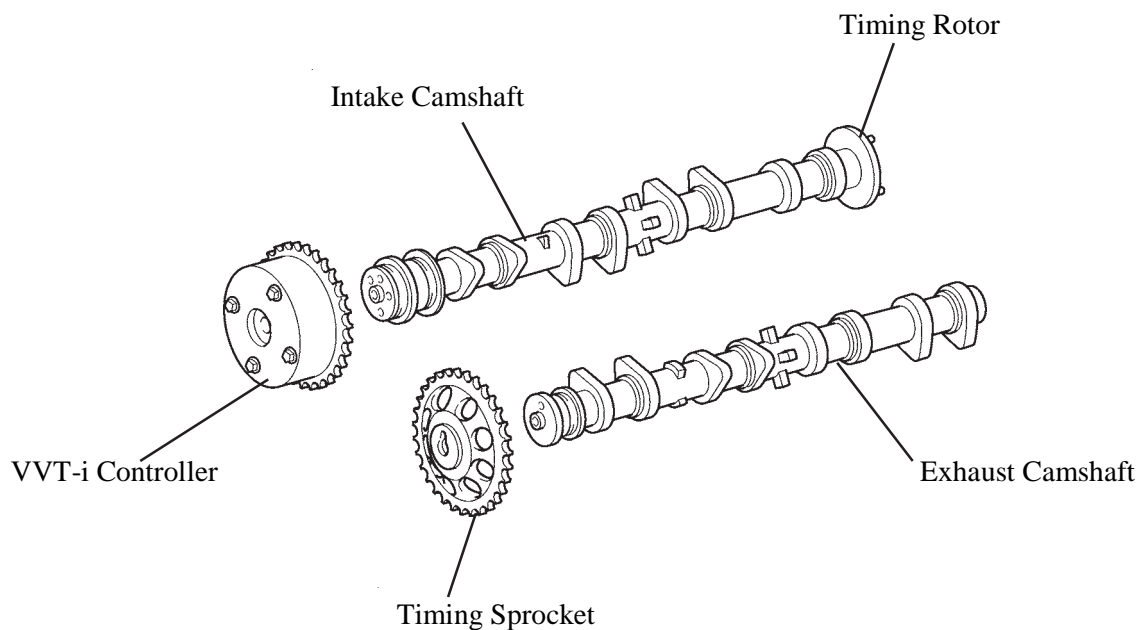
1. General

- Each cylinder is equipped with 2 intake valves and 2 exhaust valves. Intake and exhaust efficiency has been increased due to the larger total port areas.
- The valves are directly opened and closed by 2 camshafts.
- The intake and exhaust camshafts are driven by a chain. The VVT-i system used for the intake camshaft is used to increase fuel economy, engine performance and reduce exhaust emissions.
- The shim less type valve lifter is used.



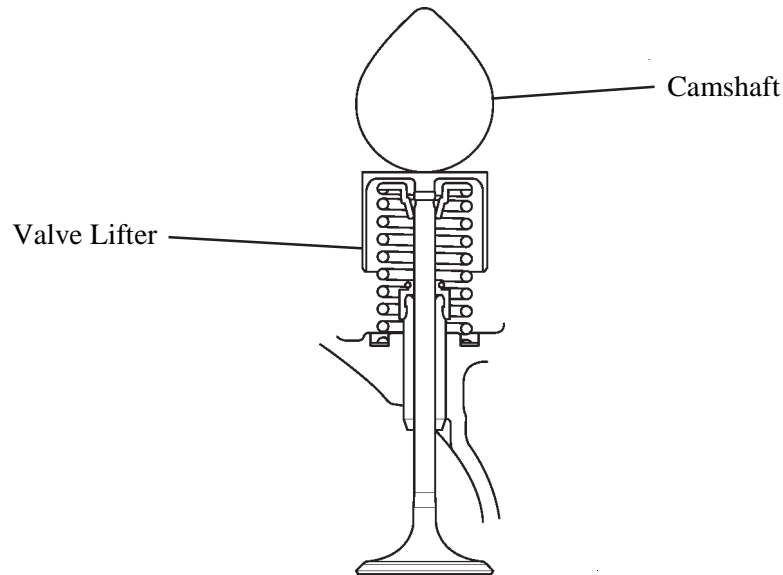
2. Camshaft

- The intake cam profile has been changed in conjunction with the change in valve timing. The new camshaft is adopted to realise excellent fuel economy, engine performance and reduce exhaust emissions.
- The intake camshaft is provided with timing rotor to trigger the camshaft position sensor.
- In conjunction with the adoption of the VVT-i system, an oil passage is provided in the intake camshaft in order to supply engine oil pressure to the VVT-i system.
- A VVT-i controller has been installed on the front of the intake camshaft to vary the timing of the intake valves.



3. Intake and Exhaust Valve

- Intake and exhaust valves with large-diameter valve face have been adopted to improve the intake air and exhaust gas flow.
- Narrow valve stems are used to reduce the intake and exhaust resistance and for weight reduction.



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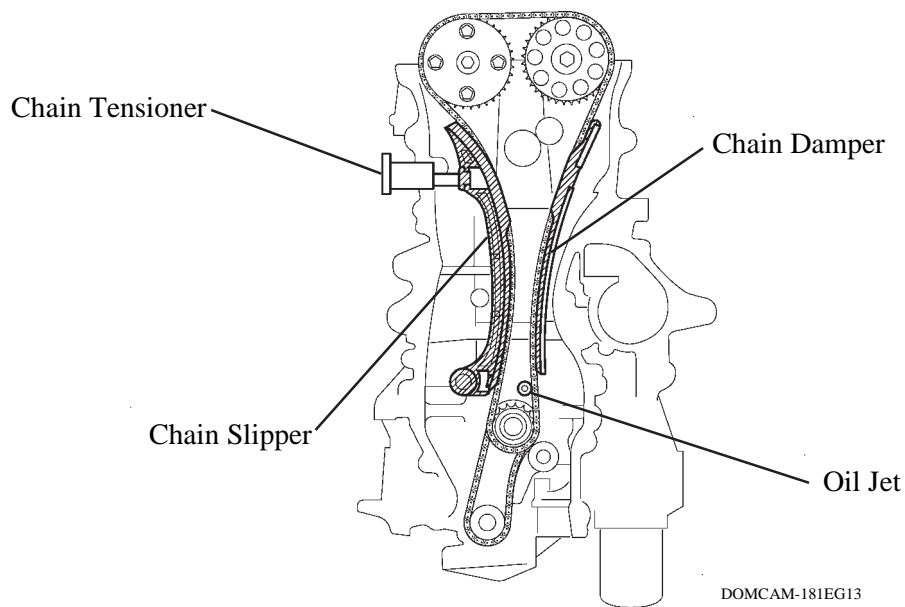
- Along with the increased amount of valve lift, shim less valve lifters that provide a large cam contact surface are used. The adjustment of the valve clearance is accomplished by selecting and replacing the appropriate valve lifters.

Service Tip

The valve lifters are available in 35 sizes with increments of 0.020 mm, from 5.060 mm to 5.740 mm. For details, refer to the Camry Repair Manual (Pub. No. AA-GC0171).

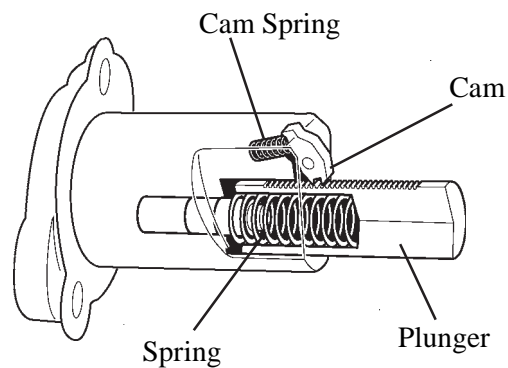
4. Timing Chain

- A roller chain with an 8 mm pitch is used.
- The timing chain is lubricated by an oil jet.



5. Chain Tensioner

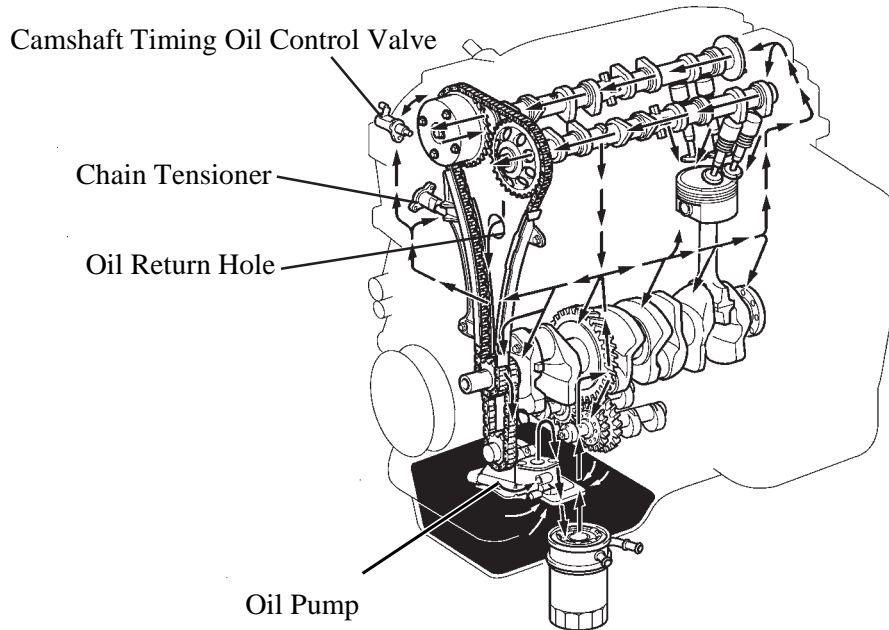
- The chain tensioner uses a spring and oil pressure to maintain proper chain tension at all times. The chain tensioner suppresses noise generated by the chain. A ratchet type non-return mechanism is also used.
- To improve serviceability, the chain tensioner is constructed so that it can be removed and installed from the outside of the timing chain cover.



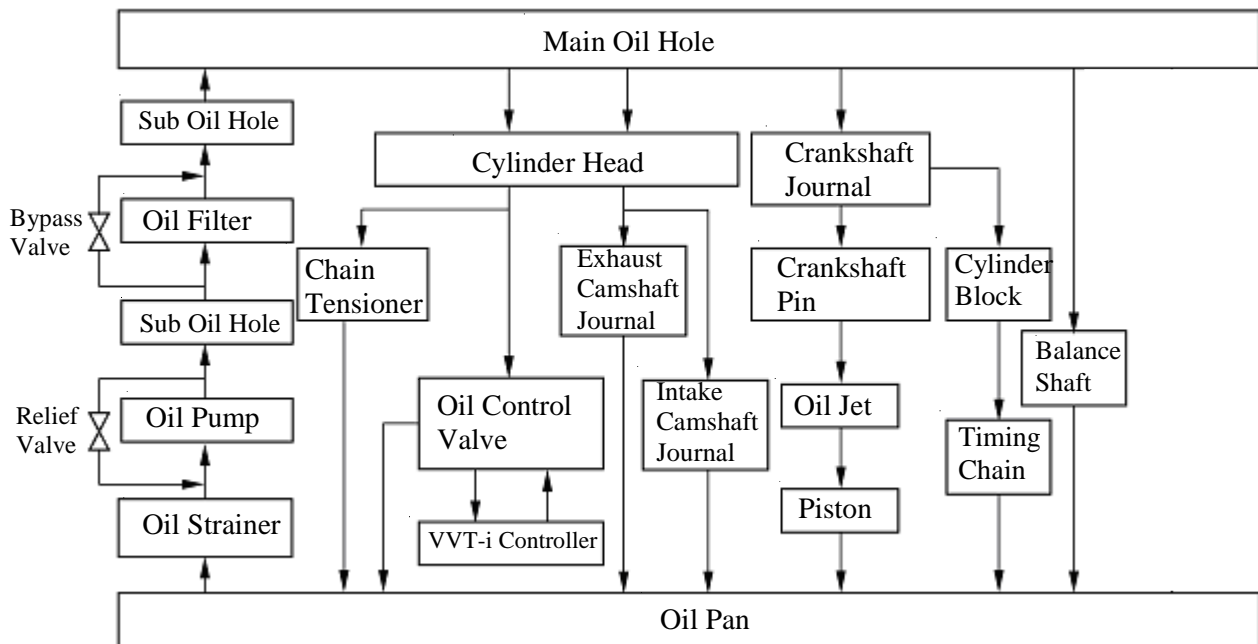
✱ LUBRICATION SYSTEM

1. General

- The lubrication circuit is fully pressurized and oil passes through an oil filter.
- The trochoidal type oil pump is chain-driven by the crankshaft.
- The oil filter is attached downward from the crankcase to improve serviceability.
- Along with the adoption of the VVT-i system, the cylinder head is provided with a VVT-i controller and a camshaft timing oil control valve. This system operates using the engine oil.
- A water-cooled oil cooler has been installed between the crank case and the oil filter.



▸ Oil Circuit ◀



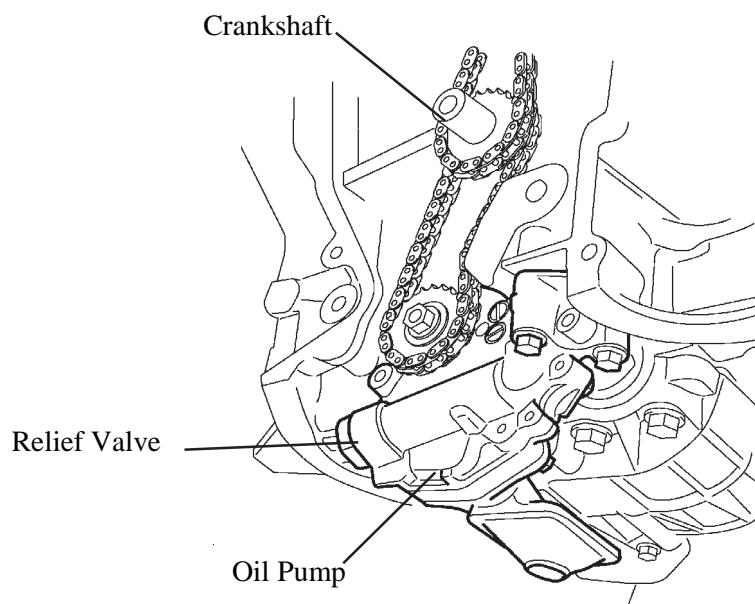
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▸ Specifications ◀

Oil Capacity	Dry	5.0 litres
	with Oil Filter	4.3 litres
	without Oil Filter	4.1 litres

2. Oil Pump

- The trochoidal type oil pump is chain-driven by the crankshaft, and fits compactly inside the oil pan.
- Friction has been reduced by means of 2 relief holes in the internal relief system.

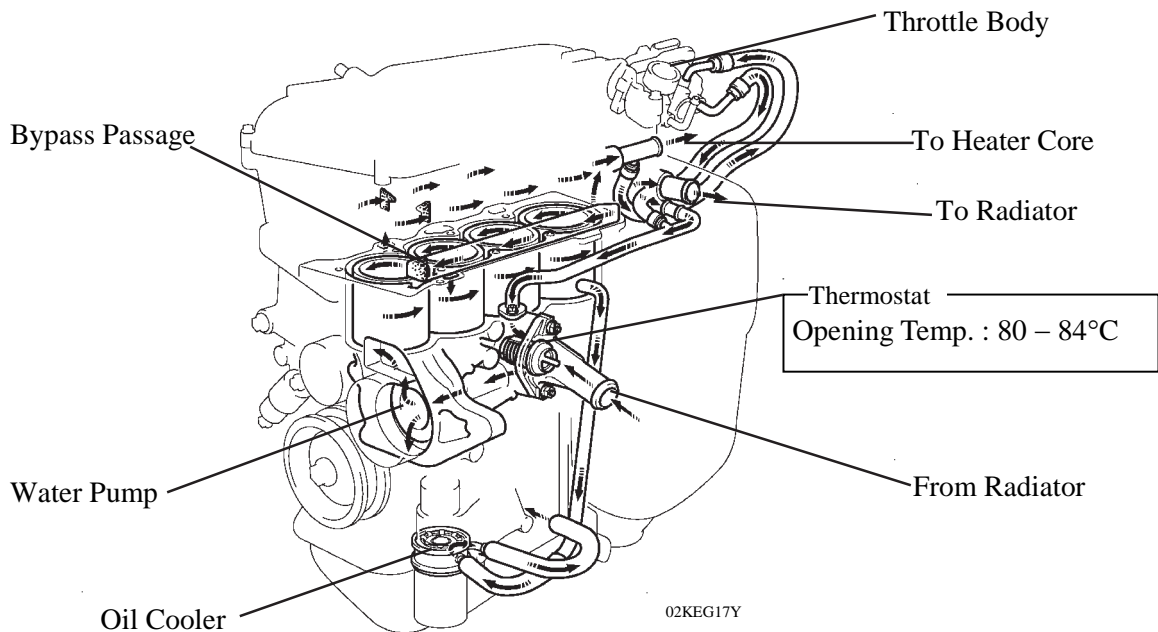


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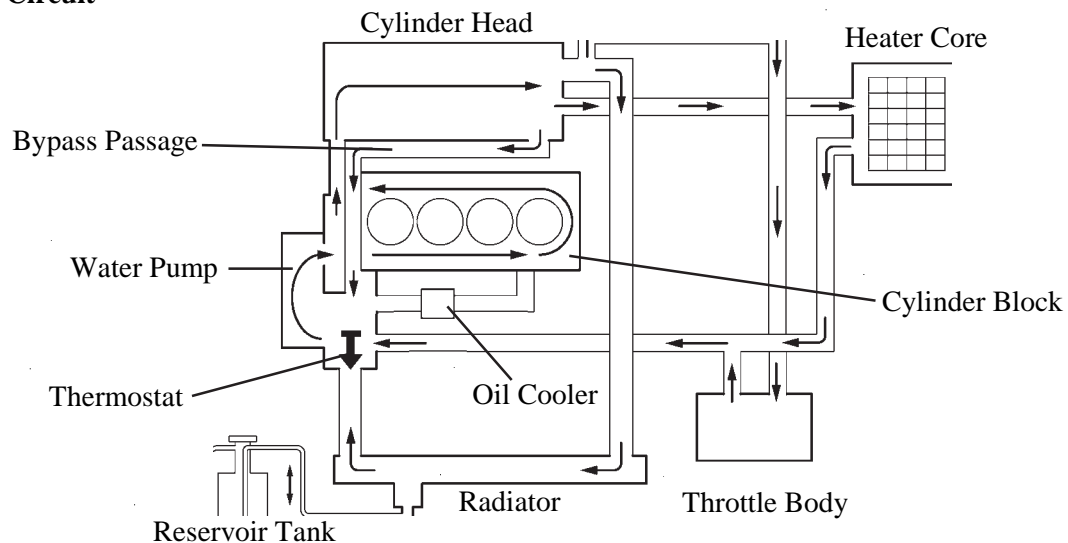
COOLING SYSTEM

1. General

- The cooling system uses a pressurised forced circulation system with open air type reservoir tank.
- A thermostat with a bypass valve is located on the water inlet housing to maintain suitable temperature distribution in the cooling system. This prevents sudden jumps in temperature while the engine is warming up.
- The flow of the engine coolant makes a U-turn in the cylinder block to ensure a smooth flow of the engine coolant. In addition, a bypass passage is enclosed in the cylinder head and the cylinder block.
- Warm engine coolant from the engine is sent to the throttle body to prevent freeze-up.
- TOYOTA Genuine SLLC (Super Long Life Coolant) is used to extend the maintenance interval.



► Water Circuit ◀



2. Engine Coolant

- TOYOTA genuine SLLC (Super Long Life Coolant) is used. Maintenance interval is as shown in the table below:

Type		TOYOTA Genuine SLLC or the Following*
Maintenance Intervals	First Time	150,000 km
	Subsequent	Every 75,000 km
Colour		Pink

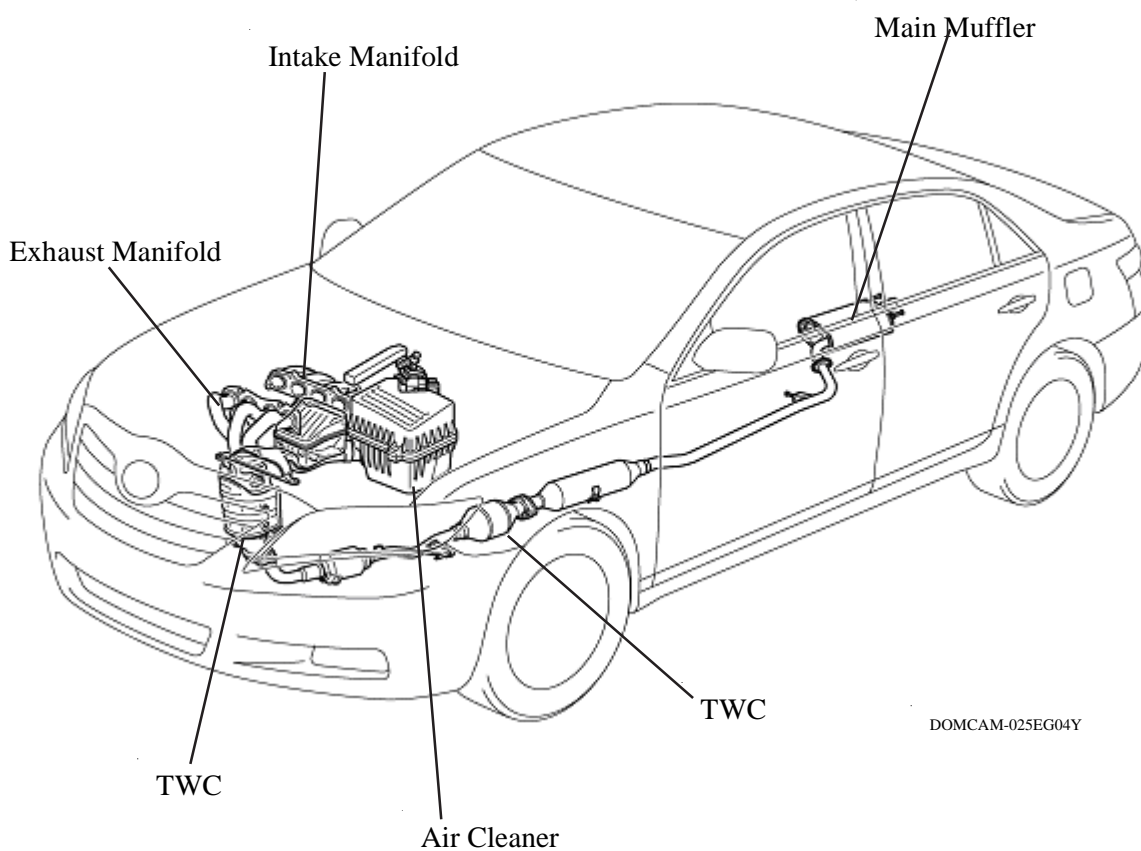
*: Similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite, and non-borate coolant with long-life hybrid organic acid technology. (Coolant with hybrid organic acid technology consists of the combination of low phosphates and organic acids.)

- SLLC is pre-mixed (50 % coolant and 50 % deionized water), so no dilution is needed when adding or replacing SLLC in the vehicle.
- You can also apply the new maintenance interval (every 75,000 km) to vehicles initially filled with LLC (red-colour), if you use SLLC (pink-colour) for the engine coolant change.

✱ INTAKE AND EXHAUST SYSTEM

1. General

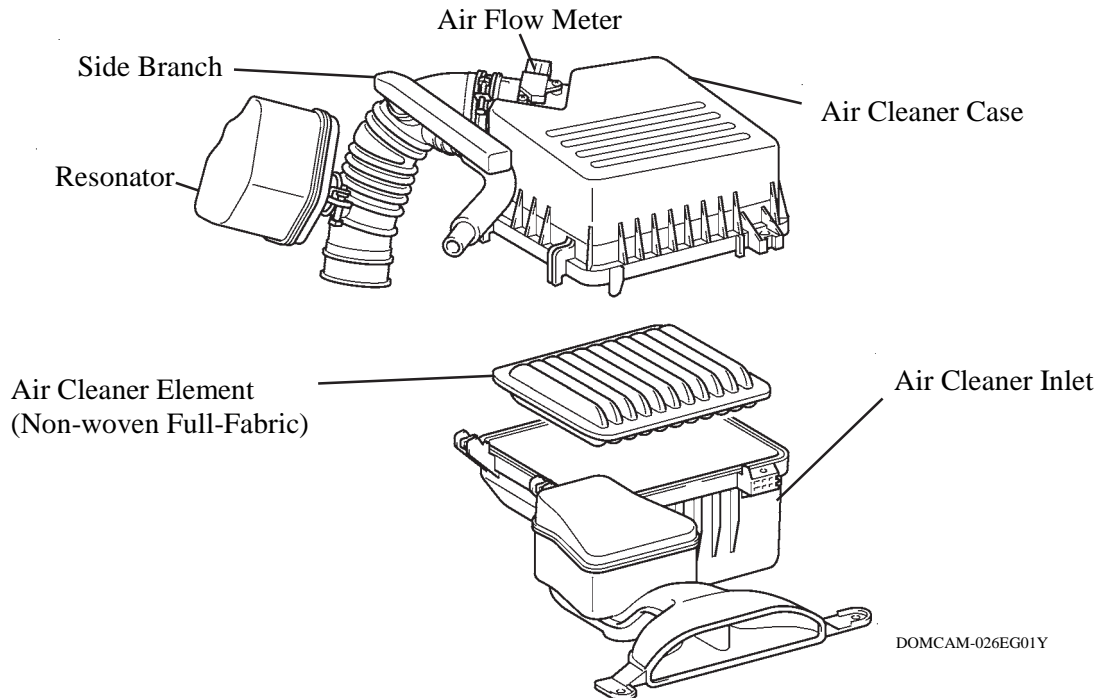
- The link-less type throttle body is used and it realises excellent throttle control.
- The intake manifold is made of plastic to reduce the weight and the amount of heat transferred from the cylinder head.
- The adoption of the ETCS-i (Electronic Throttle Control System-intelligent) has realised excellent throttle control, For details of throttle body, refer to page EG-46.
- 2-way exhaust control system is provided to reduce noise and vibration in the main muffler.



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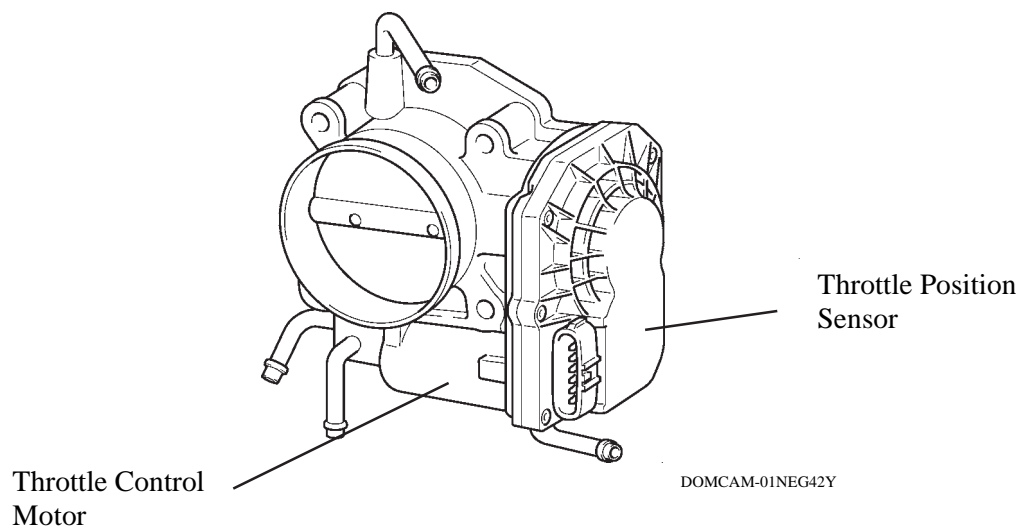
2. Air Cleaner

- A non-woven, full-fabric type air cleaner element is used.
- Resonators have been provided to reduce the amount of intake air sound.



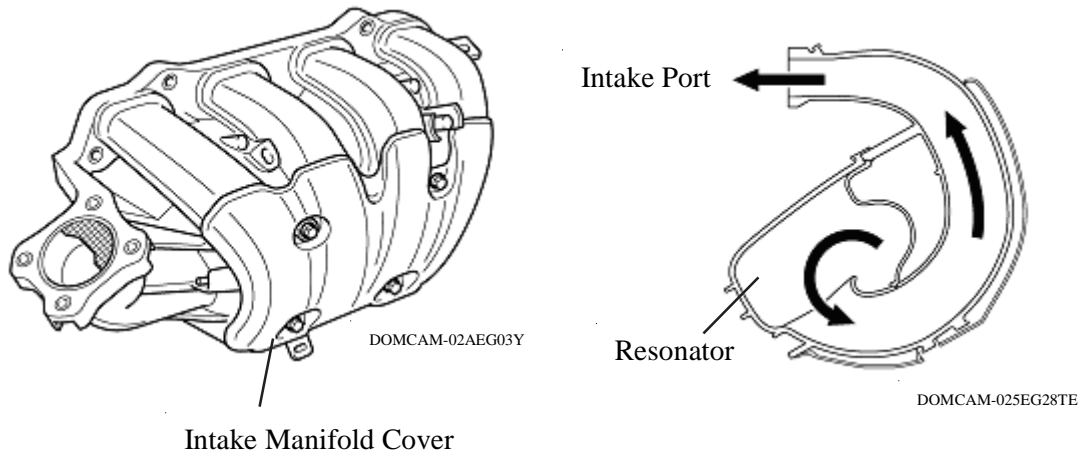
3. Throttle Body

- A link-less type throttle body in which the throttle position sensor and the throttle control motor are integrated is used. It realises excellent throttle valve control. For details, see page EG-41.
- In the throttle control motor, a DC motor with excellent response and minimal power consumption is used. The engine ECU performs the duty ratio control of the direction and the amperage of the current that flows to the throttle control motor in order to regulate the throttle valve angle.



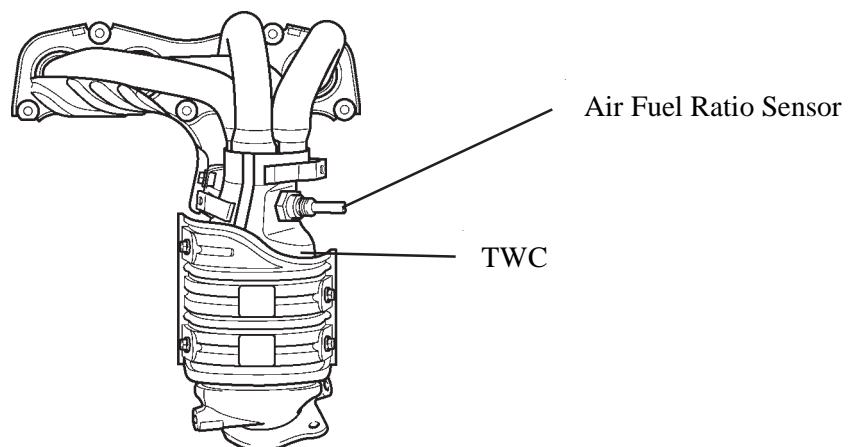
4. Intake Manifold

- The intake manifold is made of plastic to reduce the weight and the amount of heat transferred from the cylinder head. As a result, it has become possible to reduce the intake air temperature and improve the intake volumetric efficiency.
- A resonator is installed inside the air intake chamber which makes use of the intake pulse to improve torque in the mid-speed range.
- The intake manifold cover is used on the intake manifold to reduce intake air noise.



5. Exhaust Manifold

- A stainless steel exhaust manifold is used for improving the warm-up of TWC and for weight reduction.
- The air fuel ratio sensor is used to the exhaust manifold.
- A ceramic type TWC is used. This TWC improves exhaust emissions by optimising the cell density.

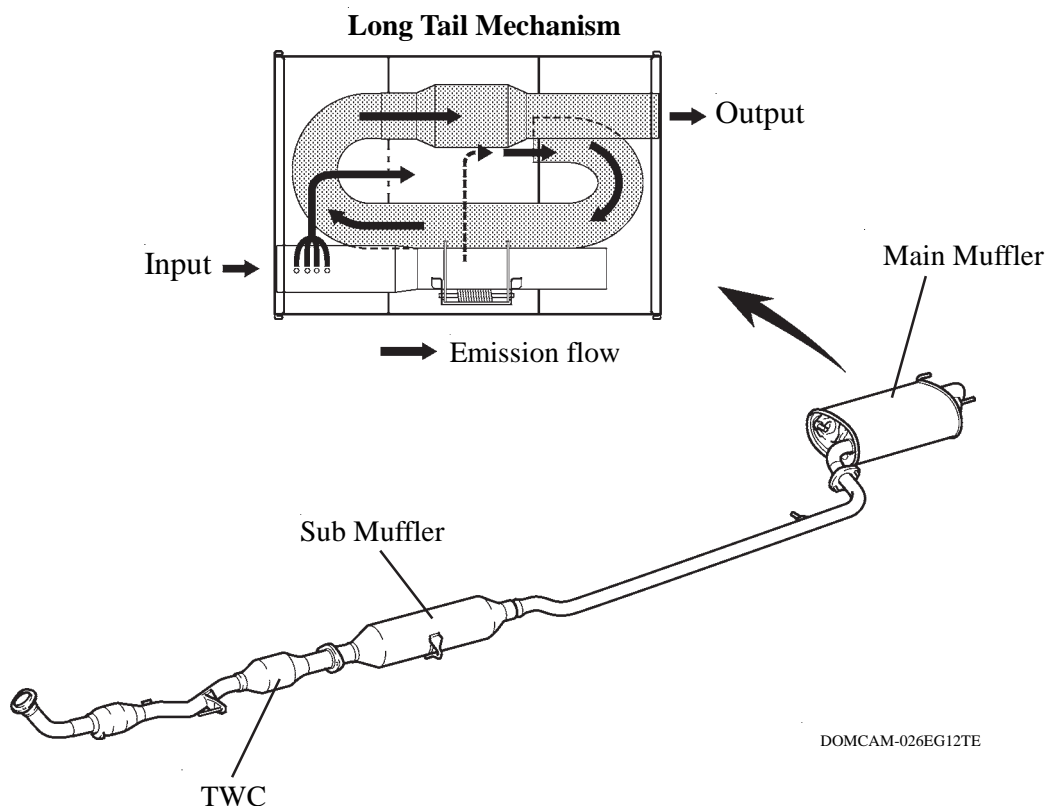


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6. Exhaust Pipe

General

- 2-way exhaust control system is provided to reduce noise and vibration in the main muffler.
- A long tail mechanism is used in the main muffler to aim at reducing exhaust noise while the engine is running in the low speed range.



2-Way Exhaust Control System

- A 2-way exhaust control system is used. This system reduces the back pressure by opening and closing a variable valve that is enclosed in the main muffler, thus varying the exhaust gas pressure.
- The valve opens smoothly in accordance with the operating condition of the engine, thus enabling a quieter operation at lower engine speeds, and reducing back pressure at higher engine speeds.

1) Construction

The control valve is enclosed in the main muffler. When the exhaust gas pressure overcomes the spring pressure, the control valve opens smoothly in accordance with the exhaust gas pressure.

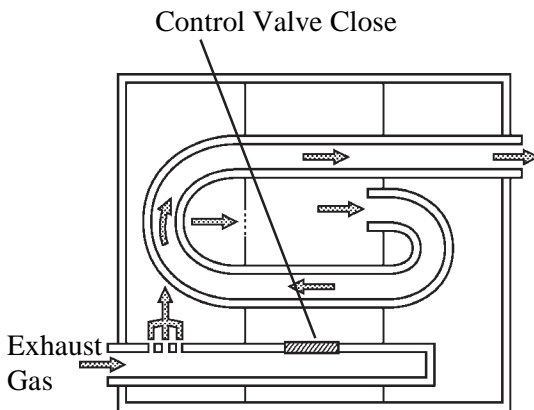
2) Operation

a. When Control Valve is Closed (low engine speed)

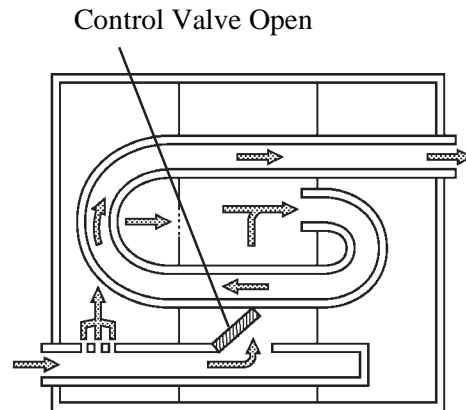
Since the pressure in the main muffler is low, the control valve is closed. Hence exhaust gas does not pass the bypass passage, and exhaust noise is decreased in the main muffler.

b. When Control Valve is Open (middle to high engine speed)

The valve opens as the engine speed and the back pressure in the muffler increase. This allows a large volume of exhaust gas to pass the bypass passage, thereby substantially decreasing the back pressure.



Low Engine Speed



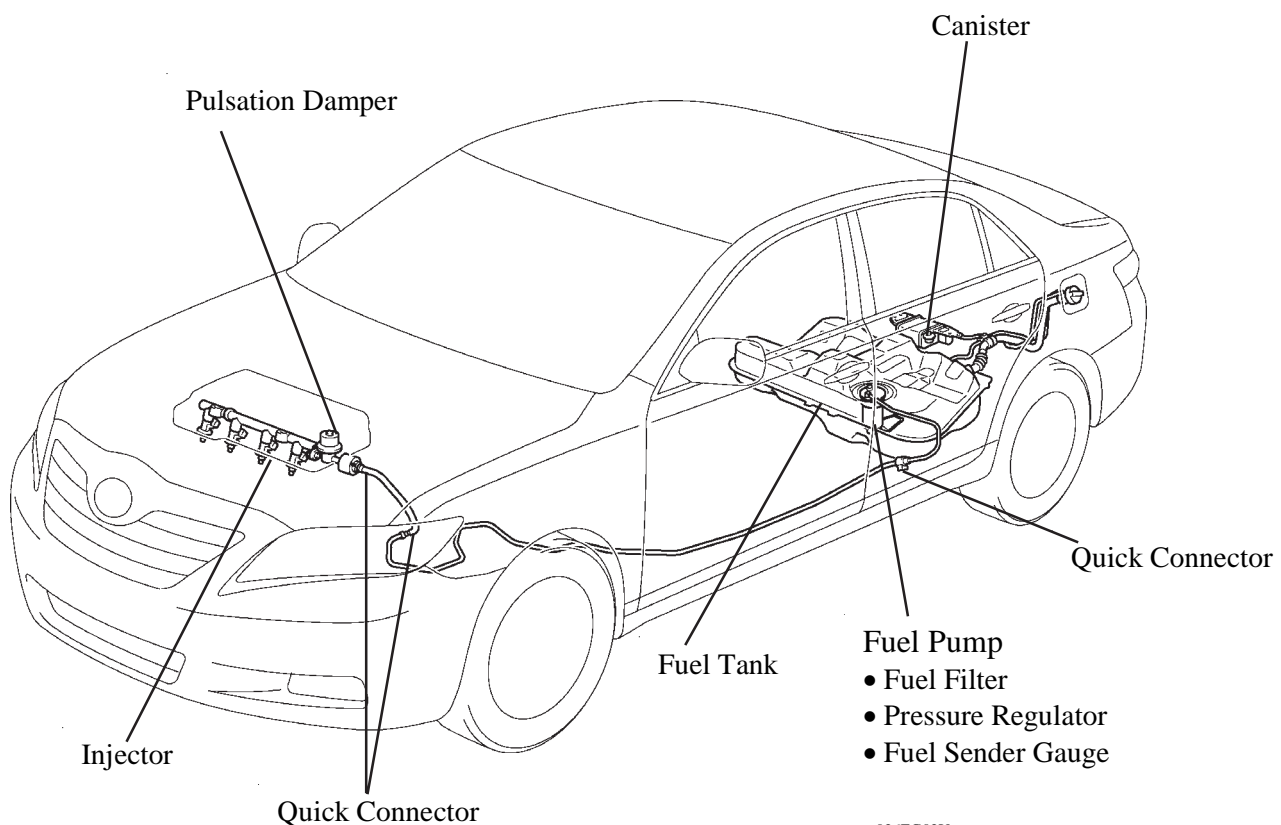
Middle to High Engine Speed

025EG30Y

✱ FUEL SYSTEM

1. General

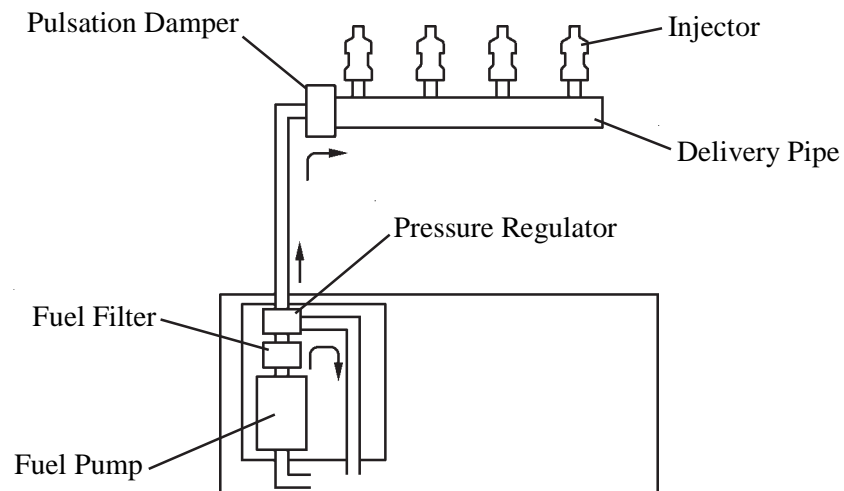
- A fuel return less system is used to reduce evaporative emissions.
- A fuel cut control is used to stop the fuel pump when the SRS airbag is deployed in a frontal or side collision. For details, see page EG-52.
- A compact fuel pump in which a fuel filter, pressure regulator, and fuel sender gauge is integrated in the fuel pump assembly is used.
- A quick connector is used to connect the fuel pipe with the fuel hose for excellent serviceability.
- The aluminium die-cast delivery pipe has been integrated with the pulsation damper.
- A compact 12-hole type injector is used to increase atomisation of the fuel.



026EG02Y

2. Fuel Returnless System

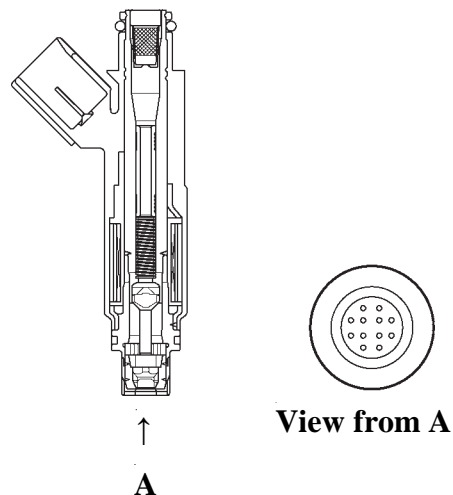
The fuel returnless system is used to reduce the evaporative emission. As shown below, integrating the fuel filter, pressure regulator, and fuel sender gauge with fuel pump assembly makes it possible to discontinue the return of fuel from the engine area and prevent temperature rise inside the fuel tank.



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3. Fuel Injector

The 12-hole type injector is used to improve the atomisation of fuel.



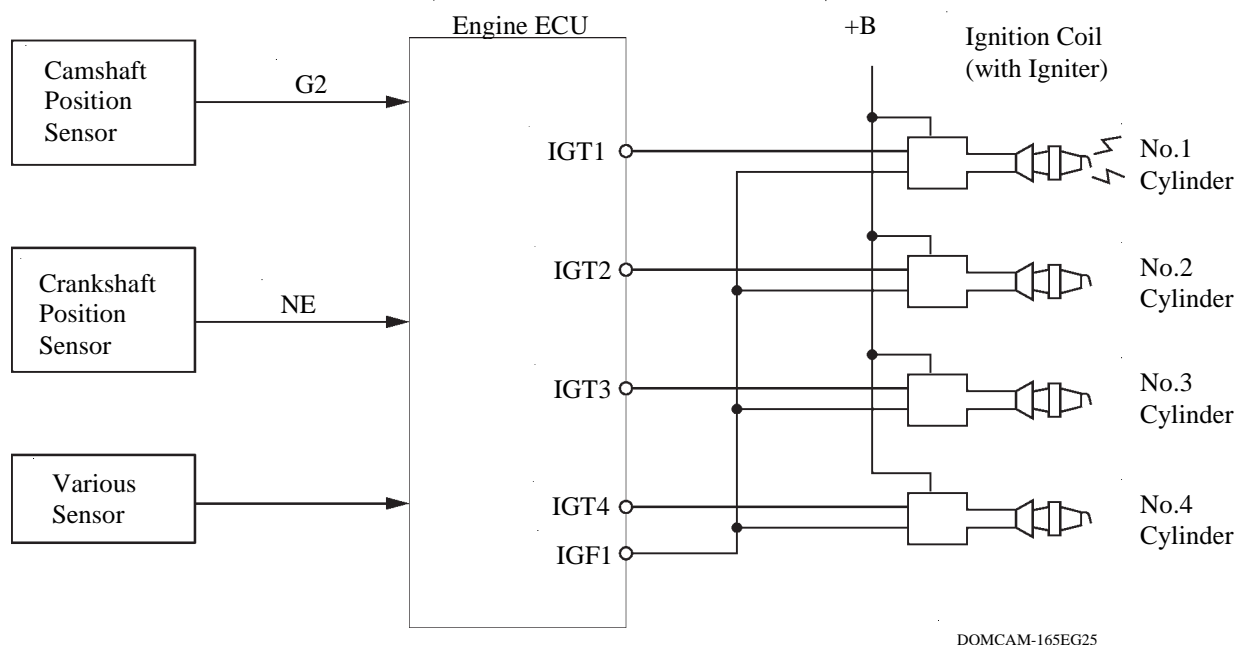
DOMCAM-181EG41

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❁ IGNITION SYSTEM

1. General

A DIS (Direct Ignition System) is used. The DIS improves the ignition timing accuracy, reduces high-voltage loss, and enhances the overall reliability of the ignition system by eliminating the distributor. The DIS in this engine is an independent ignition system, which has one ignition coil (with igniter) for each cylinder.

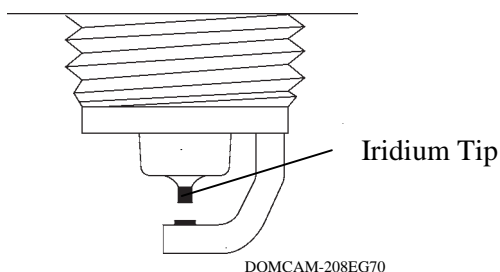


2. Ignition Coil

The DIS provides 4 ignition coils, one for each cylinder. The spark plug caps, which provide contact to the spark plugs, are integrated with an ignition coil. Igniters also form part of this system.

3. Spark Plug

Iridium-tipped spark plugs are used to realise a 90,000 km maintenance-free operation. By making the centre electrode of iridium, the same ignition performance as the platinum-tipped spark plug have been achieved and further improvement of durability has been realised.



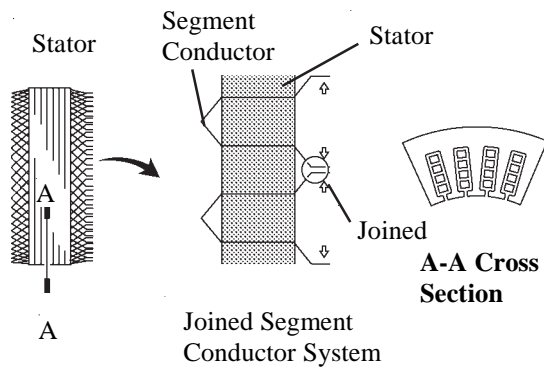
► Specifications ◀

DENSO	SK20R11
Plug Gap	1.0 - 1.1 mm

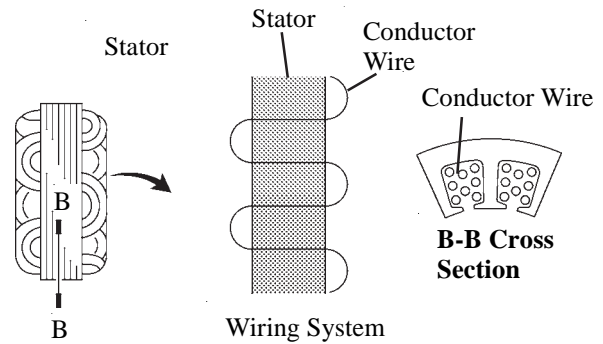
✱ CHARGING SYSTEM

General

- Instead of the conventional type alternator, a compact and lightweight segment conductor type alternator is used. This type of alternator generates a high amperage output in a highly efficient manner.
- This alternator uses a joined segment conductor system, in which multiple segment conductors are welded together to the stator. Compared to the conventional winding system, the electrical resistance is reduced due to the shape of the segment conductors, and their arrangement helps to make the alternator more compact.



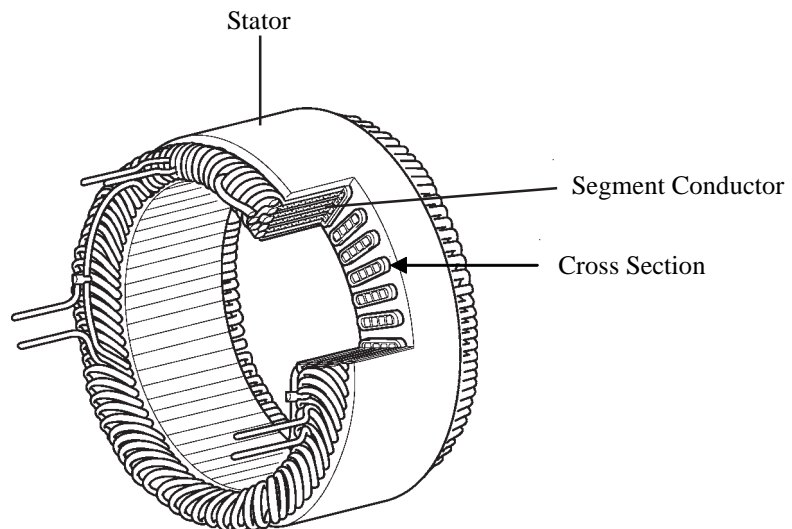
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Segment Conductor Type Alternator

Conventional Type Alternator



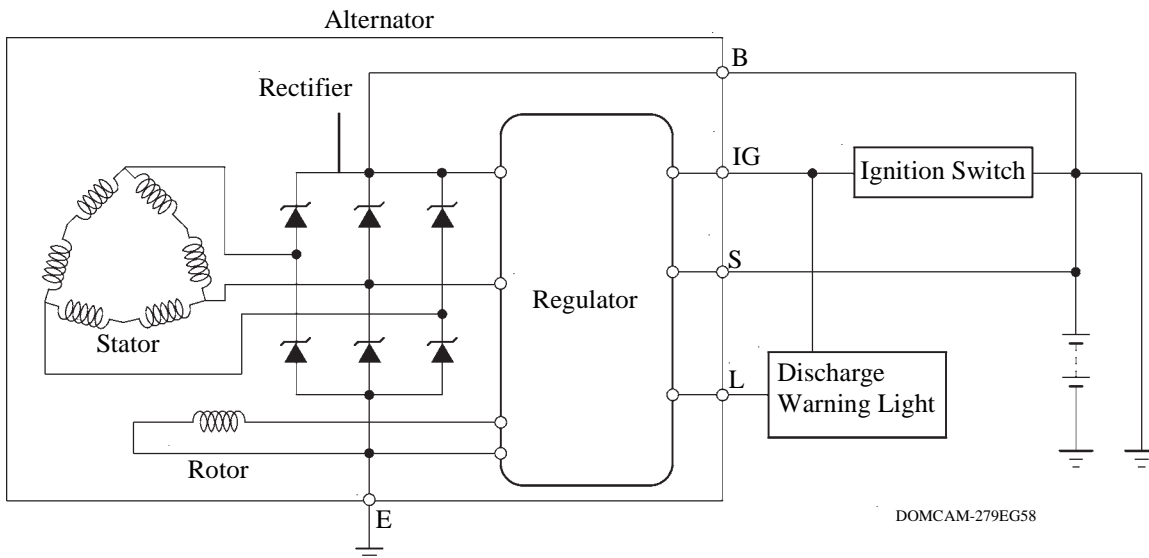
DOMCAM-206EG42

Stator of Segment Conductor Type Alternator

▸ Specifications ◀

Type	SE08A
Rated Voltage	12V
Output Rated	80 A

▶ Wiring Diagram ◀



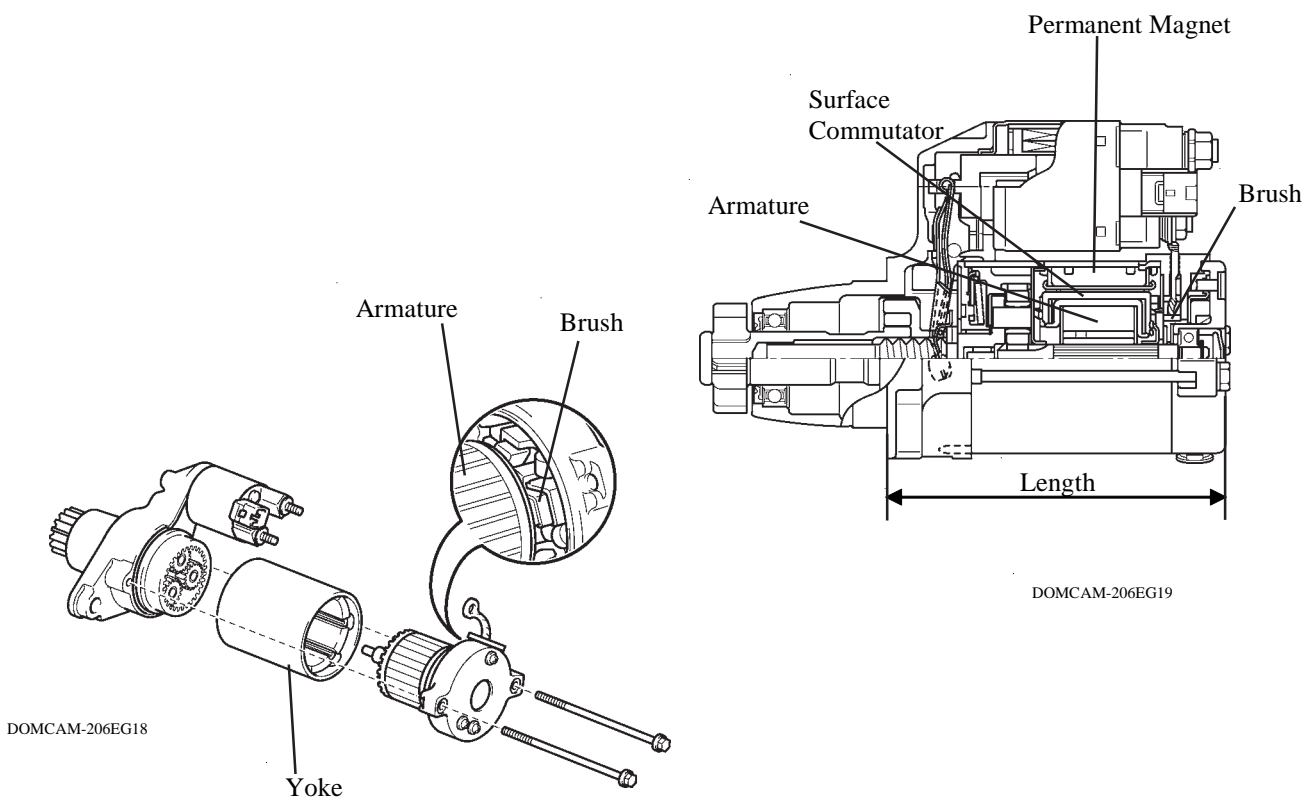
Service Tip

Although the charging circuit of a conventional alternator is checked through the F terminal, this check cannot be performed on the Segment Conductor type alternator through the use of the F terminal because the F terminal has been eliminated. For details, refer to the Camry Repair Manual (Pub. No. AA-GC0171).

STARTING SYSTEM

1 General

- A compact and lightweight PS (Planetary reduction-Segment conductor motor) starter is used on all models.
- The PS starter contains an armature that uses square-shaped conductors and its surface functions as a commutator, resulting in improved output torque and overall length reduction.
- In place of the field coil used in the conventional starter, the PS starter uses two types of permanent magnets: main magnets and inter-polar magnets. The main magnets and inter-polar magnets have been efficiently arranged to increase the magnetic flux and to shorten the length of the yoke.



▸ Specifications ◀

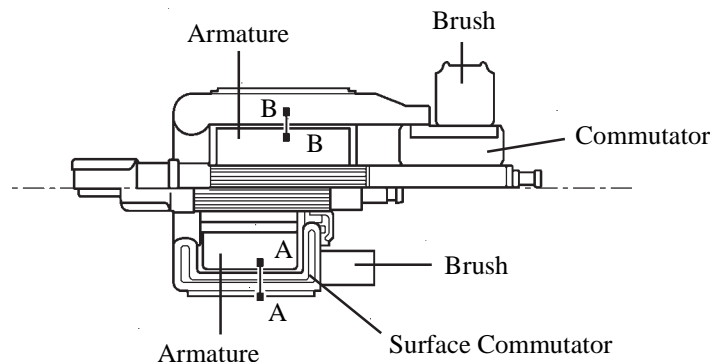
Type	PS Starter (PS1.6)
Length	128 mm
Weight	2950 g
Rating Voltage	12V
Rating Output	1.6 kW
Rotating Direction	Counter clockwise*

*: Viewed from Pinion Side

2 Construction

- Instead of the round-shaped conductor wires used in the conventional starter, the PS type starter uses square-shaped conductors. In this type of construction, square-shaped conductors can achieve the same conditions as those achieved by winding numerous round-shaped conductor wires, but without increasing the mass. As a result, the output torque is increased, and the armature coil is more compact.
- Because the surface of the square-shaped conductors that are used in the armature coil functions as a commutator, the overall length of the PS type starter has been shortened.

Conventional Type Starter



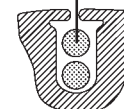
PS Starter

Square Shaped Conductor



**A-A Cross Section
(PS Type)**

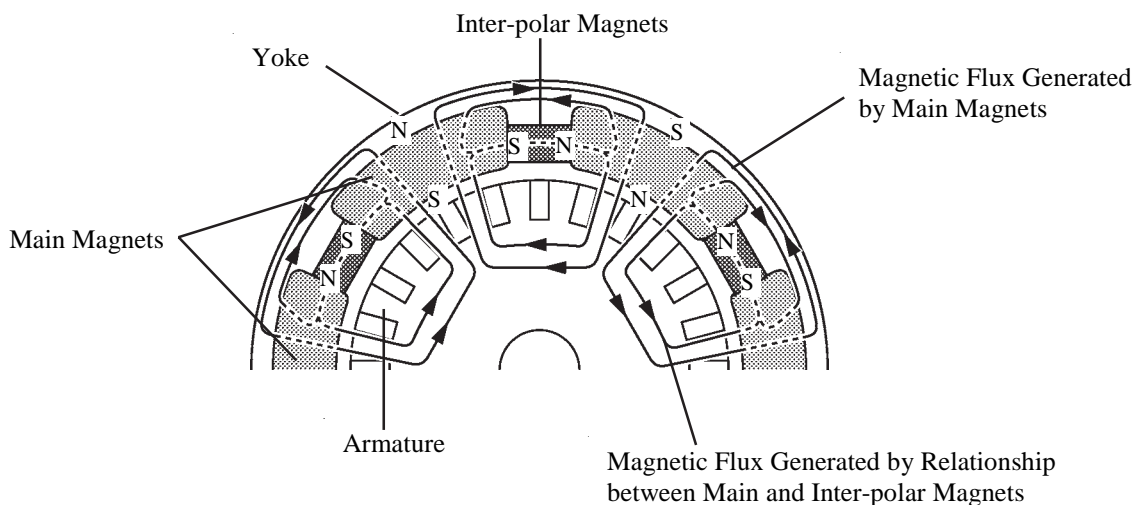
Round-Shaped Conductor Wire



**B-B Cross Section
(Conventional Type)**

DOMCAM-206EG20

- Instead of the field coils used in the conventional starter, the PS type starter uses two types of permanent magnets: the main magnets and the inter-polar magnets. The main and inter-polar magnets are arranged alternately inside the yoke. This allows the magnetic flux generated between the main and inter-polar magnets to be added to the magnetic flux generated by the main magnets. In addition to increasing the amount of magnetic flux, this construction shortens the overall length of the yoke.



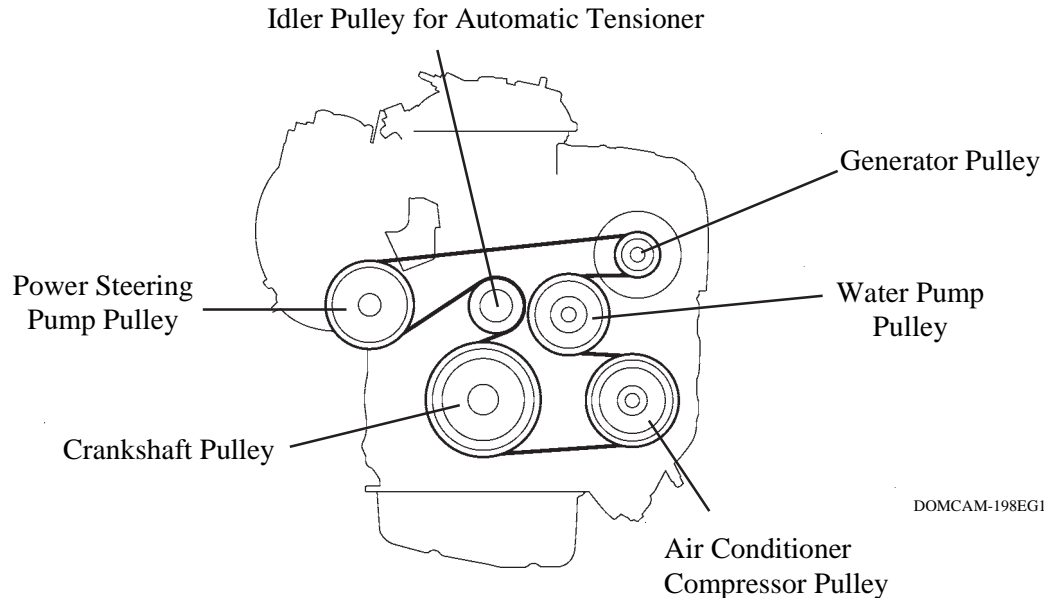
Cross Section of Yoke Portion

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❁ SERPENTINE BELT DRIVE SYSTEM

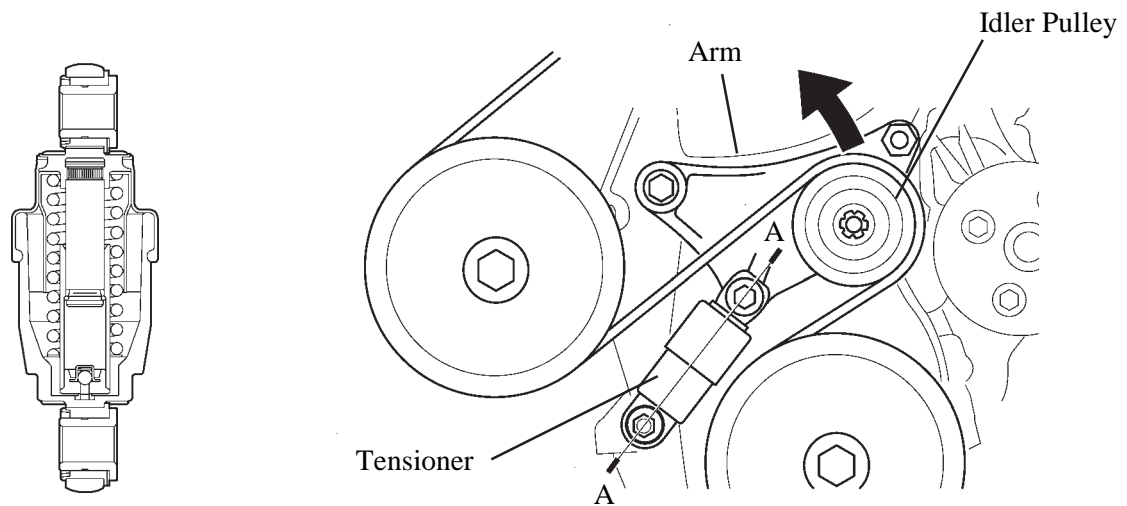
1. General

- Accessory components are driven by a serpentine belt consisting of a single V-ribbed belt. It reduces the overall engine length, weight and number of engine parts.
- An automatic tensioner eliminates the need for tension adjustment.



2. Automatic Tensioner

- The automatic tensioner consists of an idler pulley, an arm, and a tensioner. The idler pulley maintains belt tension by the force of the spring that is located in the tensioner.
- Due to the different suppliers used, the tensioner comes in two types, although their basic operation remain the same and they are interchangeable.



A - A
Cross Section

DOMCAM-258RV77

✱ ENGINE CONTROL SYSTEM

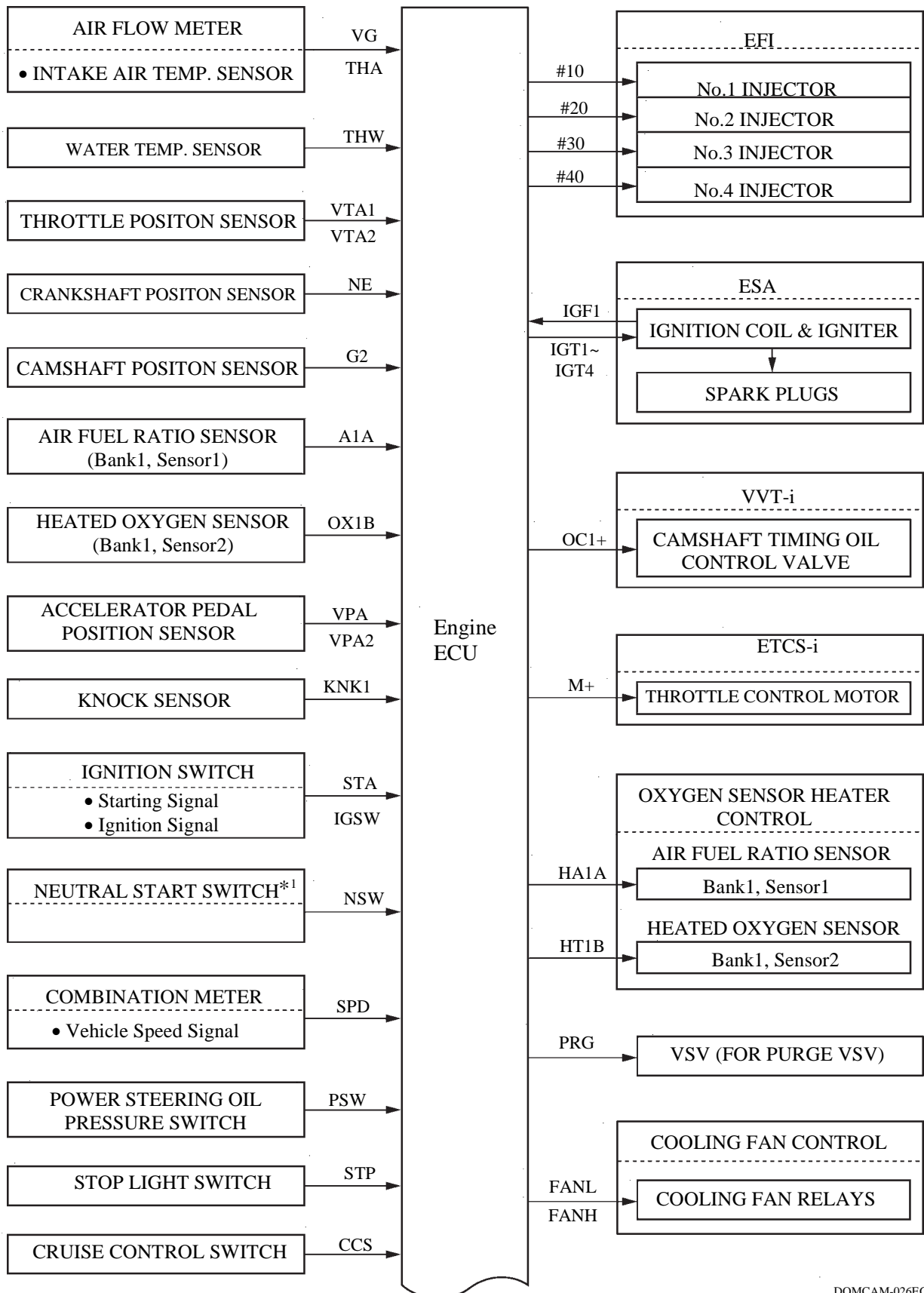
1. General

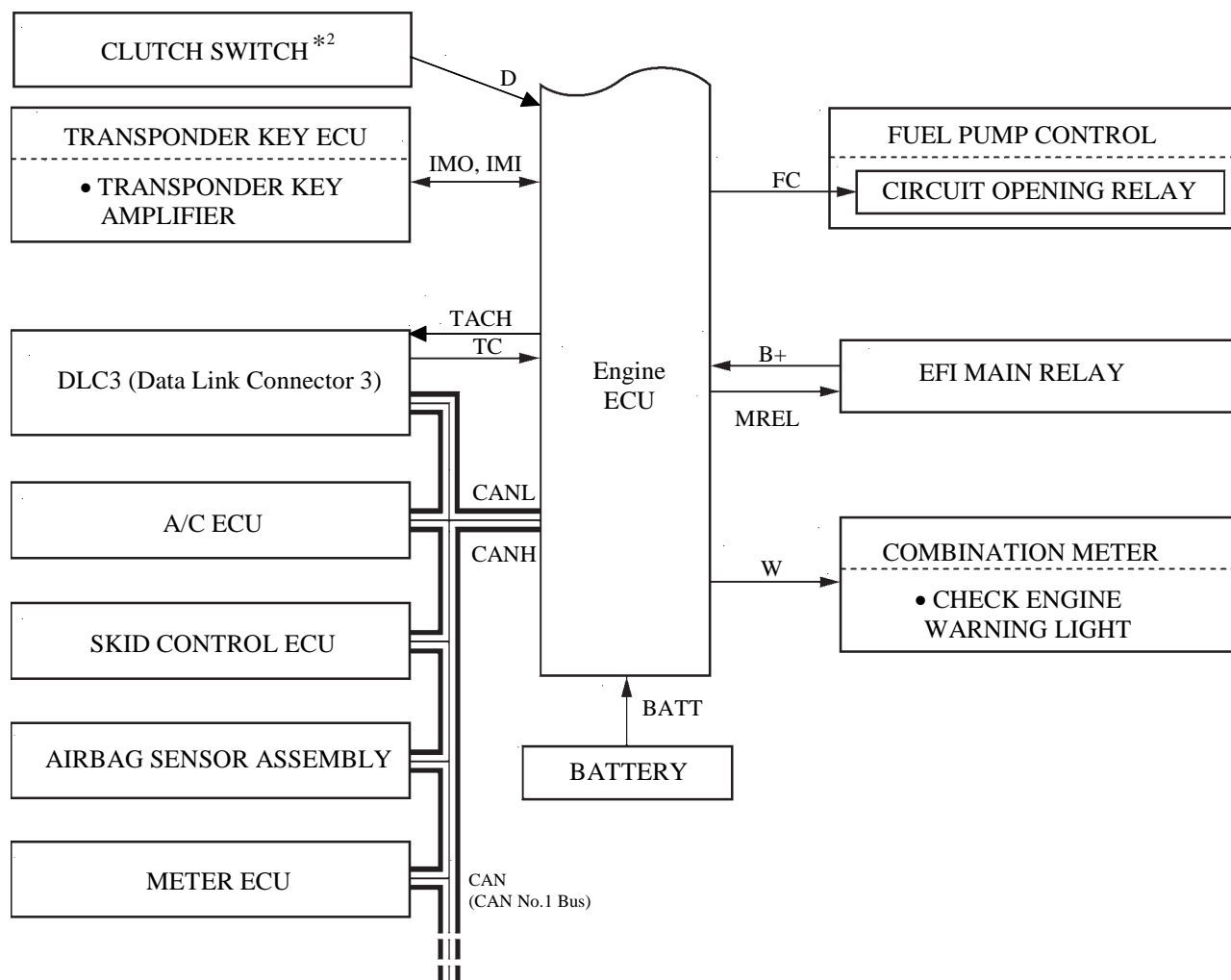
The engine control system of the 2AZ-FE engine has the following features.

System	Outline
EFI - Electronic Fuel Injection	<ul style="list-style-type: none"> • An L-type EFI system directly detects the intake air mass with a hot wire type air flow meter. • The fuel injection system is a sequential multi-port fuel injection system. • Fuel injection takes two forms: Synchronous injection, which always takes place with the same timing in accordance with the basic injection duration and an additional correction based on the signals provided by the sensors. Non-synchronous injection, which takes place at the time an injection request based on the signals provided by the sensors, is detected, regardless of the crankshaft position. • Synchronous injection is further divided into group injection during a cold start, and independent injection after the engine is started.
ESA - Electronic Spark Advance	<ul style="list-style-type: none"> • Ignition timing is determined by the engine ECU based on signals from various sensors. The engine ECU corrects ignition timing in response to engine knocking. • This system selects the optimal ignition timing in accordance with the signals received from the sensors and sends the (IGT) ignition signal to the igniter.
ETCS-i - Electronic Throttle Control System-intelligent	Optimally controls the throttle valve opening in accordance with the amount of accelerator pedal effort and the condition of the engine and the vehicle. [See page EG-46]
VVT-i - Variable Valve Timing-intelligent	Controls the intake camshaft to optimal valve timing in accordance with the engine condition. [See page EG-48]
Fuel Pump Control [See page EG-52]	<ul style="list-style-type: none"> • Fuel pump operation is controlled by signals from the engine ECU. • The fuel pump is stopped, when the SRS airbag is deployed in a frontal, side, and rear of side collision.
Air Conditioner Cut-off Control	By turning the air conditioner compressor ON or OFF in accordance with the engine condition, drivability is maintained.
Cooling Fan Control [See page EG-53]	Cooling fan operation is controlled by signals from the engine ECU based on the water temperature sensor signal and air conditioner operation.
Air Fuel Ratio Sensor and Oxygen Sensor Heater Control	Maintains the temperature of the air fuel ratio sensor or oxygen sensor at an appropriate level to increase accuracy of detection of the oxygen concentration in the exhaust gas.
Evaporative Emission Control	The engine ECU controls the purge flow of evaporative emission (HC) in the canister in accordance with engine conditions.
Engine Immobiliser	Prohibits fuel delivery and ignition if an attempt is made to start the engine with an invalid key.
Diagnosis [See page EG-54]	When the engine ECU detects a malfunction, the engine ECU diagnoses and memorises the failed section.
Fail-Safe [See page EG-55]	When the engine ECU detects a malfunction, the engine ECU stops or controls the engine according to the data already stored in the memory.

2. Construction

The configuration of the engine control system is as shown in the following chart.



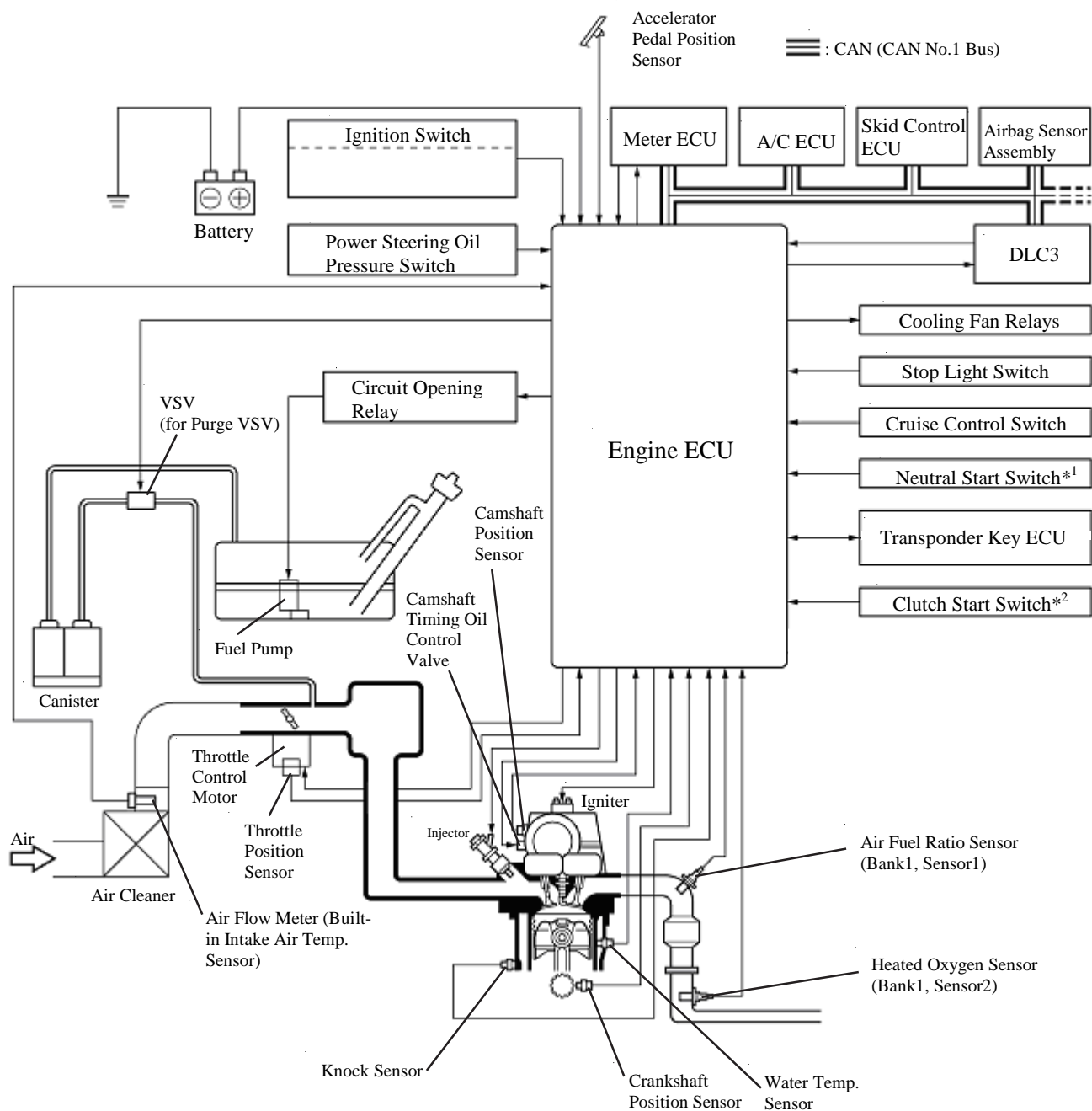


DOMCAM-026EG04P

*1: Automatic transaxle models

*2: Manual transaxle models

3. Engine Control System Diagram

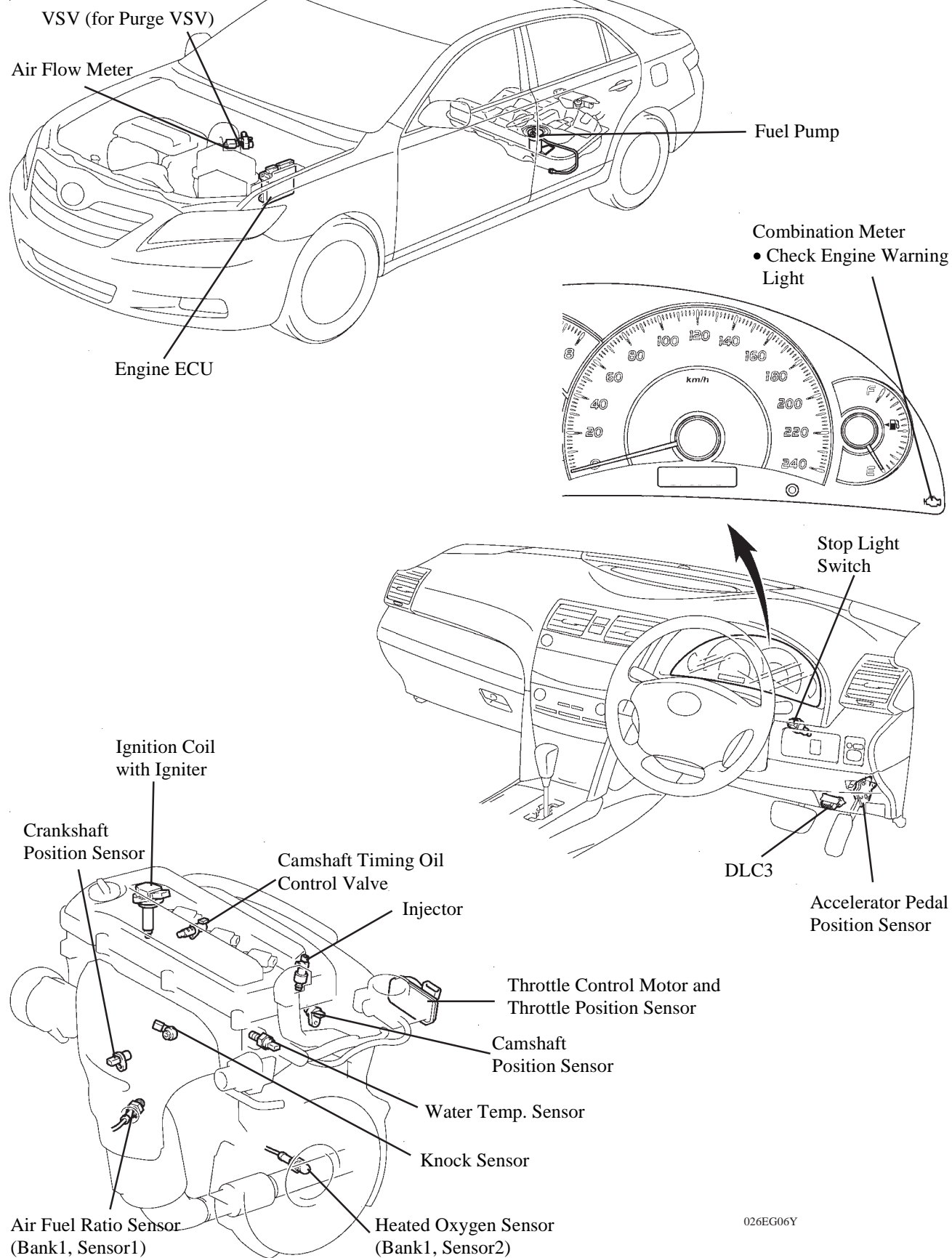


*1: With automatic transaxle model

*2: With manual transaxle model

DOMCAM-026EG05TE

4. Layout of Main Components



026EG06Y

5. Main Component of Engine Control System

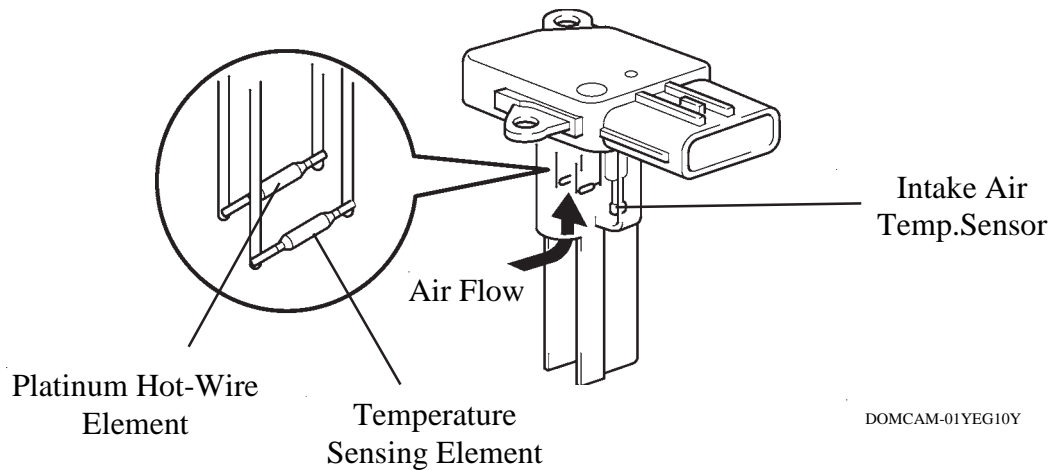
General

The main components of the 2AZ-FE engine control system are as follows:

Components	Outline	Quantity	Function
Engine ECU	32-bit CPU	1	The engine ECU optimally controls the EFI (Electronic Fuel Injection), ESA (Electronic Spark Advance) and ISC (Idle Speed Control) to suit the operating conditions of the engine in accordance with the signals provided by the sensors.
Oxygen Sensor (Bank 1, Sensor 2)	Cup Type with Heater	1	This sensor detects the oxygen concentration in the exhaust emission by measuring the electromotive force which is generated in the sensor itself.
Air Fuel Ratio Sensor (Bank 1, Sensor 1)	Planar Type with Heater	1	As with the oxygen sensor, this sensor detects the oxygen concentration in the exhaust emission. However, it detects the oxygen concentration in the exhaust emission linearly.
Air Flow Meter	Hot-wire Type	1	This sensor has a built-in hot-wire to directly detect the intake air mass.
Crankshaft Position Sensor (Rotor Teeth)	Pick-up Coil Type (36-2)	1	This sensor detects the engine speed and performs the cylinder identification.
Camshaft Position Sensor (Rotor Teeth)	Pick-up Coil Type (3)	1	This sensor performs the cylinder identification.
Water Temperature Sensor	Thermistor Type	1	This sensor detects the engine coolant temperature by means of an internal thermistor.
Intake Air Temperature Sensor	Thermistor Type	1	This sensor detects the intake air temperature by means of an internal thermistor.
Knock Sensor	Built-in Piezoelectric Type (Flat Type)	1	This sensor detects an occurrence of the engine knocking indirectly from the vibration of the cylinder block caused by the occurrence of engine knocking.
Throttle Position Sensor	No-contact Type	1	This sensor detects the throttle valve opening angle.
Accelerator Pedal Position Sensor	No-contact Type	1	This sensor detects the amount of pedal effort applied to the accelerator pedal.
Injector	12-Hole Type	4	The injector is an electromagnetically-operated nozzle which injects fuel in accordance with signals from the engine ECU.

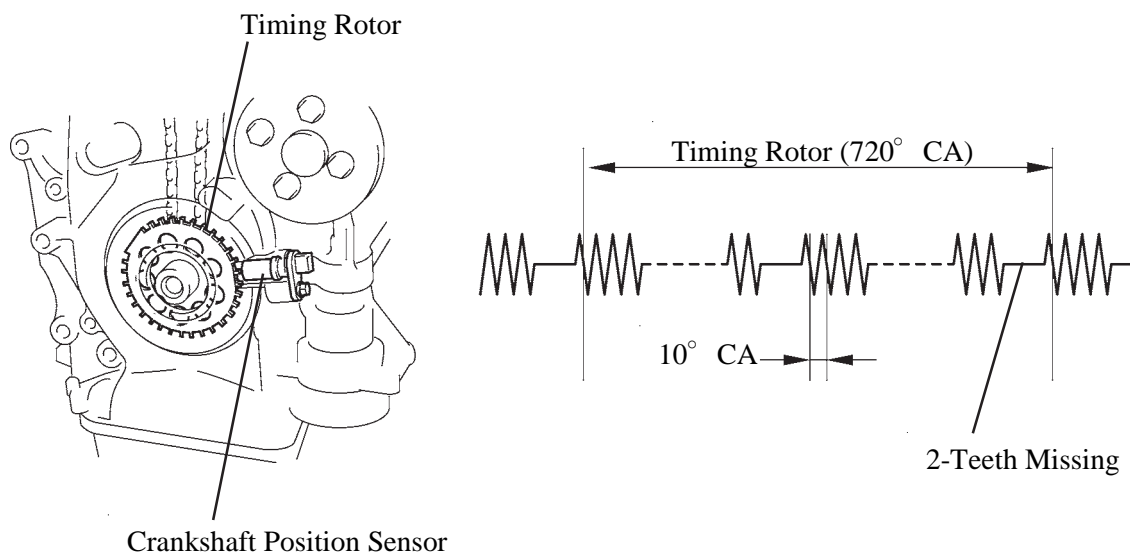
Air Flow Meter

- This air flow meter, which is a plug-in type, allows a portion of the intake air to flow through the detection area. By directly measuring the mass and the flow rate of the intake air, the detection precision is improved and the intake air resistance is reduced.
- This air flow meter has a built-in intake air temperature sensor.



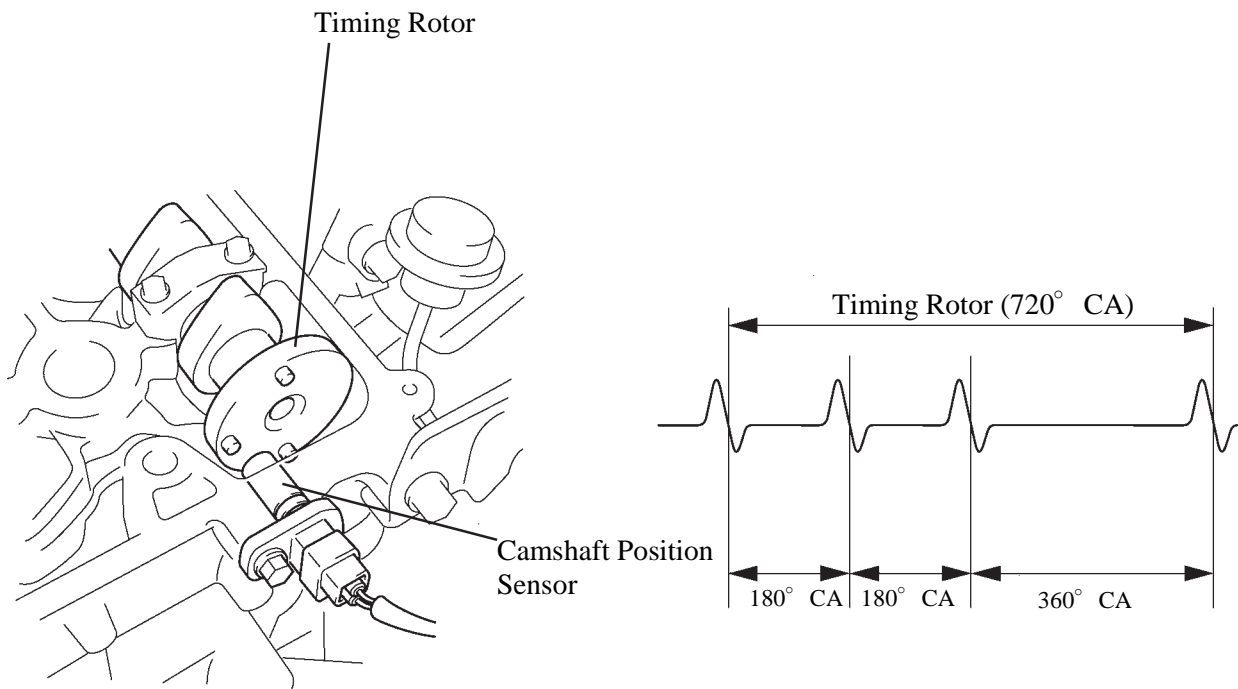
Crankshaft Position Sensor

The timing rotor of the crankshaft consists of 34 teeth, with 2 teeth missing. The crankshaft position sensor outputs the crankshaft rotation signals every 10° , and the missing teeth are used to determine the top-dead-centre.



Camshaft Position Sensor

The camshaft position sensor is mounted on the left bank of cylinder head. To detect the camshaft position, a protrusion that is provided on the timing pulley is used to generate 1 pulse for every 2 revolution of the crankshaft.

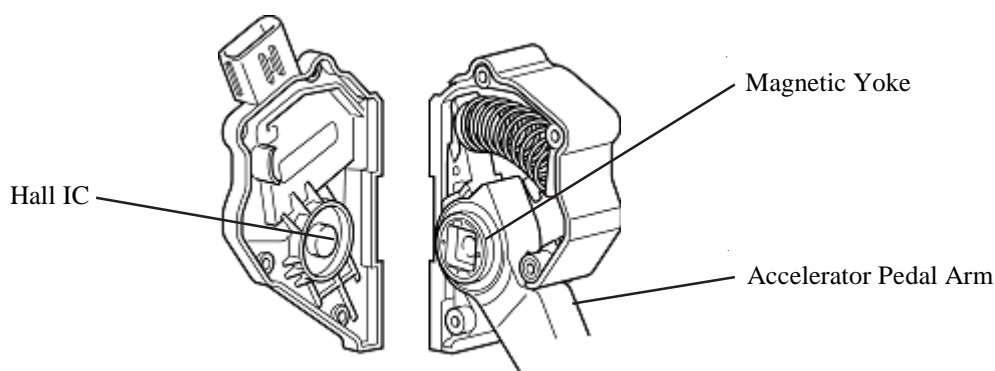


DOMCAM-208EG25

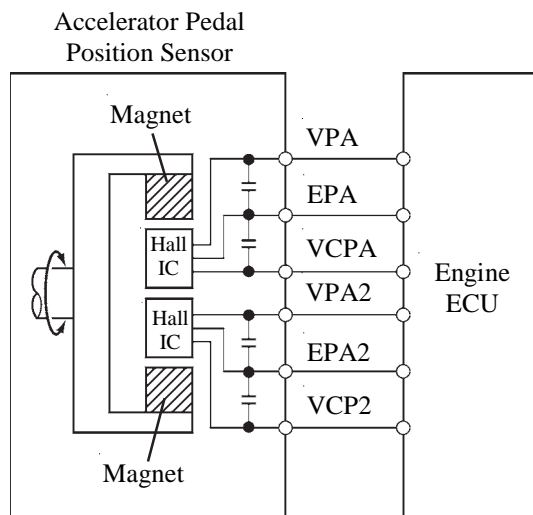
Accelerator Pedal Position Sensor

This no-contact type accelerator pedal position sensor uses a Hall IC, which is mounted on the accelerator pedal arm.

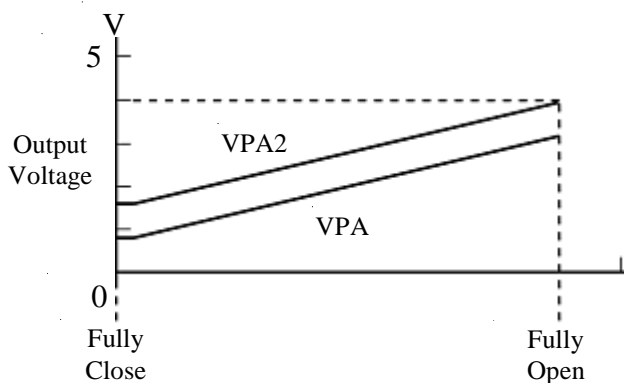
- The magnetic yoke is mounted at the base of the accelerator pedal arm. This yoke rotates around the Hall IC in accordance with the amount of effort that is applied to the accelerator pedal. The Hall IC converts the changes in the magnetic flux that occur into electrical signals, and outputs them in the form of accelerator pedal position signals to the engine ECU.
- The Hall IC contains two circuits, one for the main signal, and one for the sub signal. It converts the accelerator pedal position (angle) into electric signals that have differing characteristics and outputs them to the engine ECU.



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Accelerator Pedal Position (Angle)

DOMCAM-0140EG126C

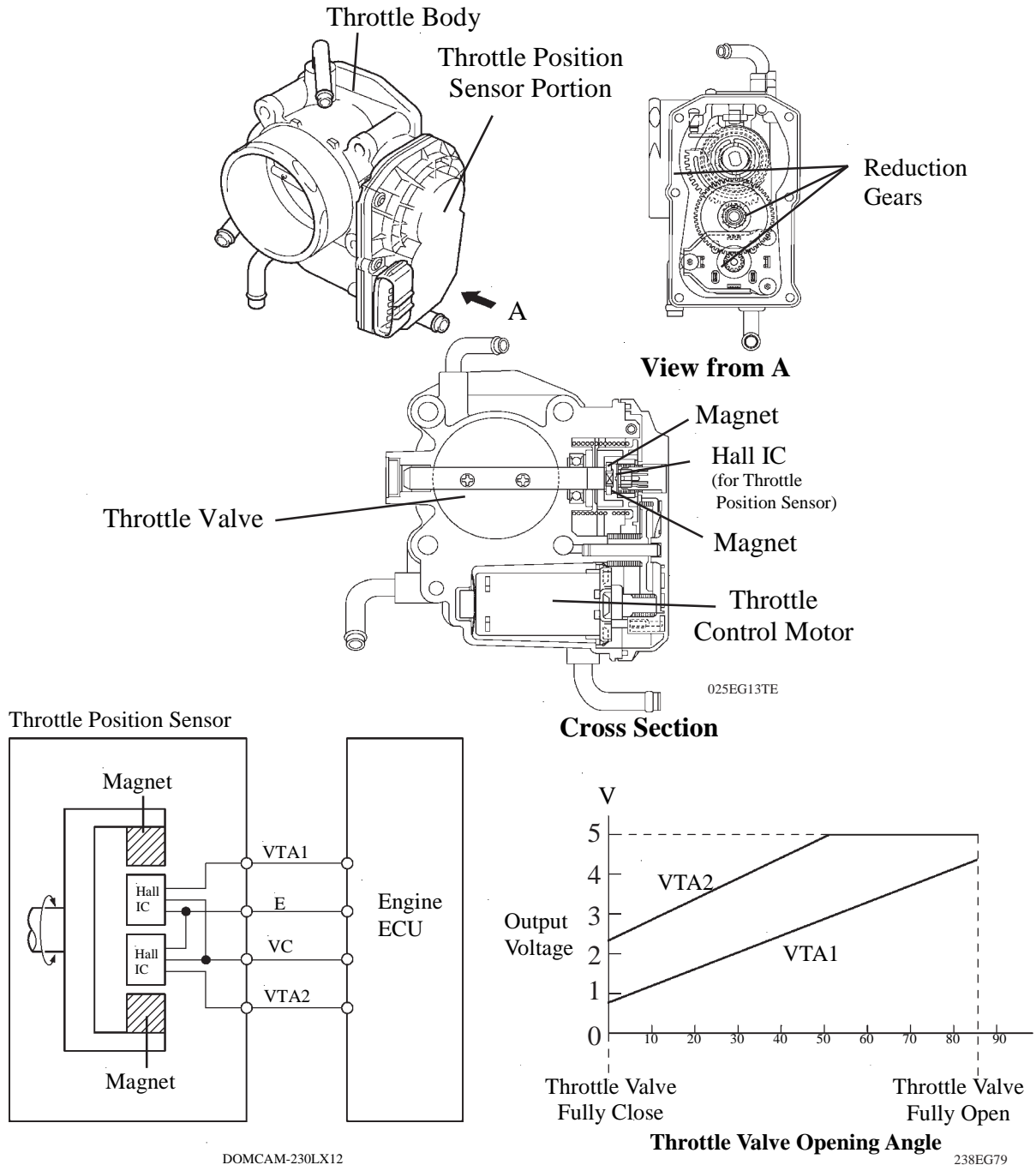
Service Tip

The inspection method differs from a conventional accelerator pedal position sensor because this sensor uses a Hall IC. For details, refer to the Camry Repair Manual.

Throttle Position Sensor

The no-contact type throttle position sensor uses a Hall IC, which is mounted on the throttle body.

- The Hall IC is surrounded by a magnetic yoke. The Hall IC converts the changes that occur in the magnetic flux at that time into electrical signals and outputs them in the form of a throttle valve intention to the engine ECU.
- The Hall IC contains circuits for the main and sub signals. It converts the throttle valve opening angles into electric signals with two differing characteristics and outputs them to the engine ECU.



Service Tip

The inspection method differs from a conventional accelerator pedal position sensor because this sensor uses a Hall IC. For details, refer to the Camry Repair Manual (Pub. No. AA-GC0171).

Knock Sensor (Flat Type)

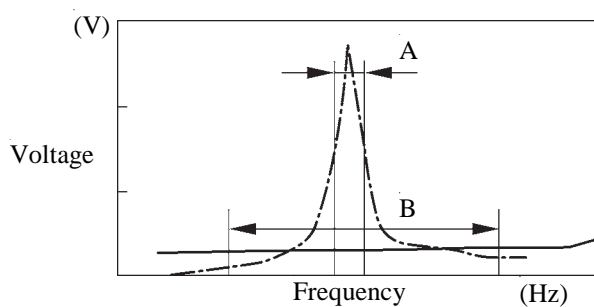
1) General

In the conventional type knock sensor (resonant type), a vibration plate, which has the same resonance point as the knocking frequency of the engine, is built in and can detect the vibration in this frequency band.

On the other hand, a flat type knock sensor (non-resonant type) has the ability to detect vibration in a wider frequency band from about 6 kHz to 15 kHz, and has the following features:

- The engine knocking frequency will change a bit depending on the engine speed. The flat type knock sensor can detect vibration even when the engine knocking frequency is changed. Thus the vibration detection ability is increased compared to the conventional type knock sensor, and a more precise ignition timing control is possible.

— · — : Conventional Type
 — : Flat Type



A: Detection Band of Conventional Type

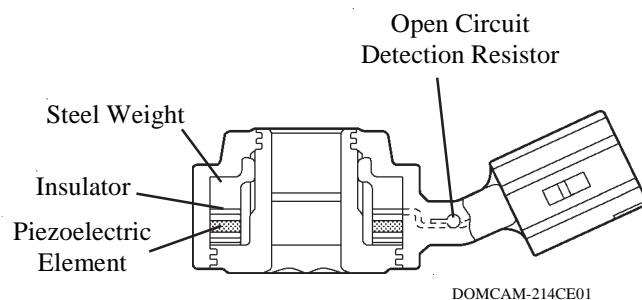
B: Detection Band of Flat Type

DOMCAM-214CE04

Characteristic of Knock Sensor

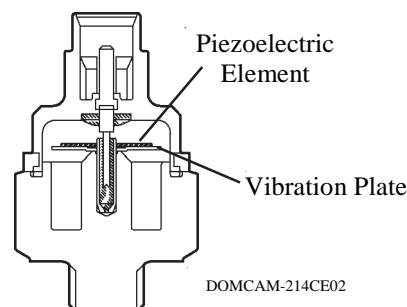
2) Construction

- The flat type knock sensor is installed on the engine through the stud bolt installed on the cylinder block. For this reason, a hole for the stud bolt is running through in the centre of the sensor.
- Inside of the sensor, a steel weight is located on the upper portion and a piezoelectric element is located under the weight through the insulator.
- The open/short circuit detection resistor is integrated.



DOMCAM-214CE01

Flat Type Knock Sensor
(Non-Resonant Type)

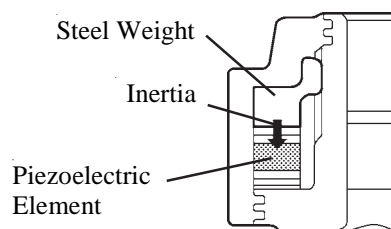


DOMCAM-214CE02

Conventional Type Knock Sensor
(Resonant Type)

3) Operation

The knocking vibration is transmitted to the steel weight and its inertia applies pressure to the piezoelectric element. The action generates electromotive force.

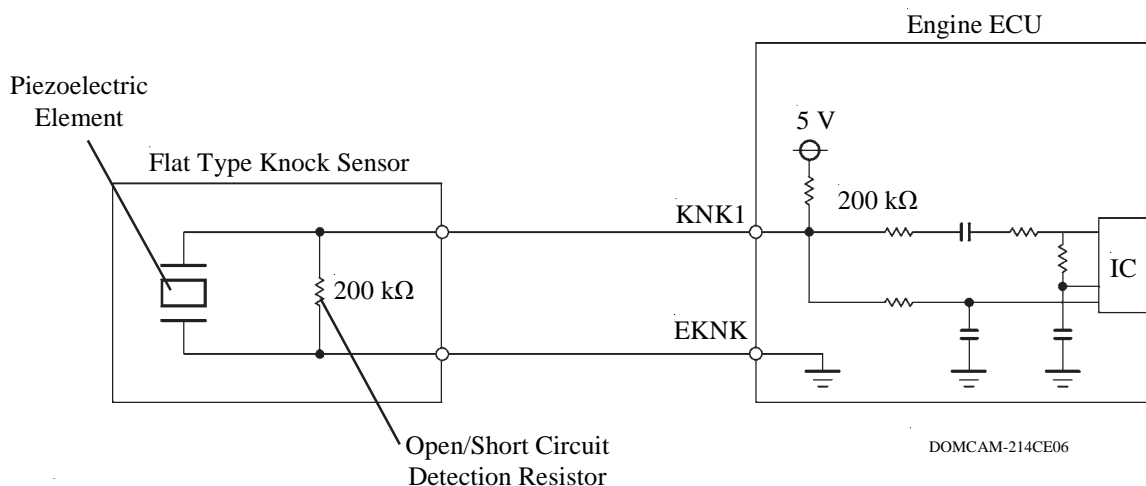


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4) Open/Short Circuit Detection Resistor

During the ignition is ON, the open/short circuit detection resistor in the knock sensor and the resistor in the engine ECU keep the voltage at the terminal KNK1 of engine constant.

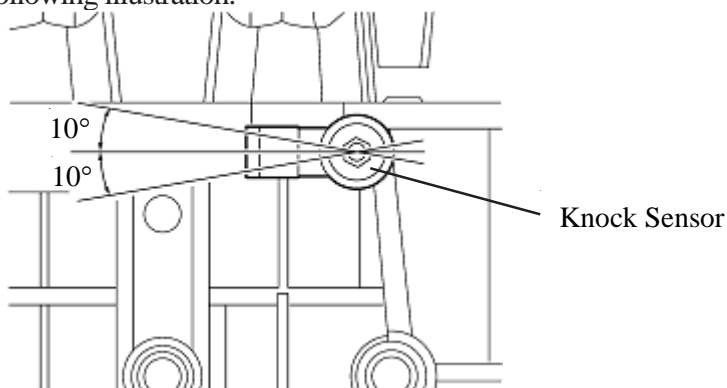
An IC (Integrated Circuit) in the engine ECU is always monitoring the voltage of the terminal KNK1. If the open/short circuit occurs between the knock sensor and the engine ECU, the voltage of the terminal KNK1 will change and the engine ECU detects the open/short circuit and stores DTC (Diagnostic Trouble Code).



DOMCAM-214CE06

Service Tip

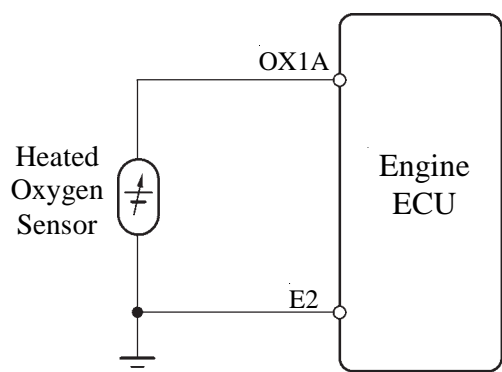
- In accordance with the adoption of open/short circuit detection resistor, the inspection method for the sensor has been changed. For details, refer to Camry Repair Manual (Pub. No.AA-GC0171).
- To prevent the water accumulation in the connector, make sure to install the flat type knock sensor in the position as shown in the following illustration.



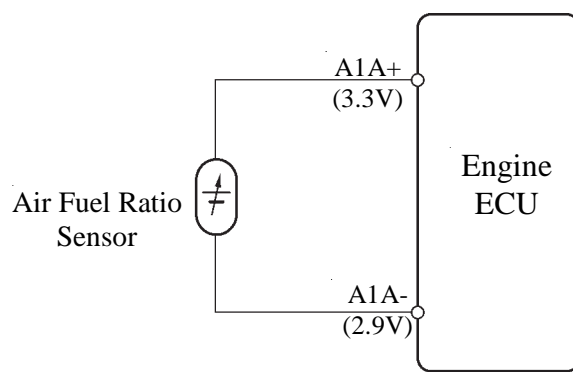
Heated Oxygen Sensor and Air Fuel Ratio Sensor

1) General

- The heated oxygen sensor and the air fuel ratio sensor differ in output characteristics.
- The output voltage of the heated oxygen sensor changes in accordance with the oxygen concentration in the exhaust gas. The engine ECU uses this output voltage to determine whether the present air-fuel ratio is richer or leaner than the stoichiometric air-fuel ratio.
- Approximately 0.4V is constantly applied to the air-fuel ratio sensor, which outputs an amperage that varies in accordance with the oxygen concentration in the exhaust gas. The engine ECU converts the changes in the output amperage into voltage in order to linearly detect the present air-fuel ratio.

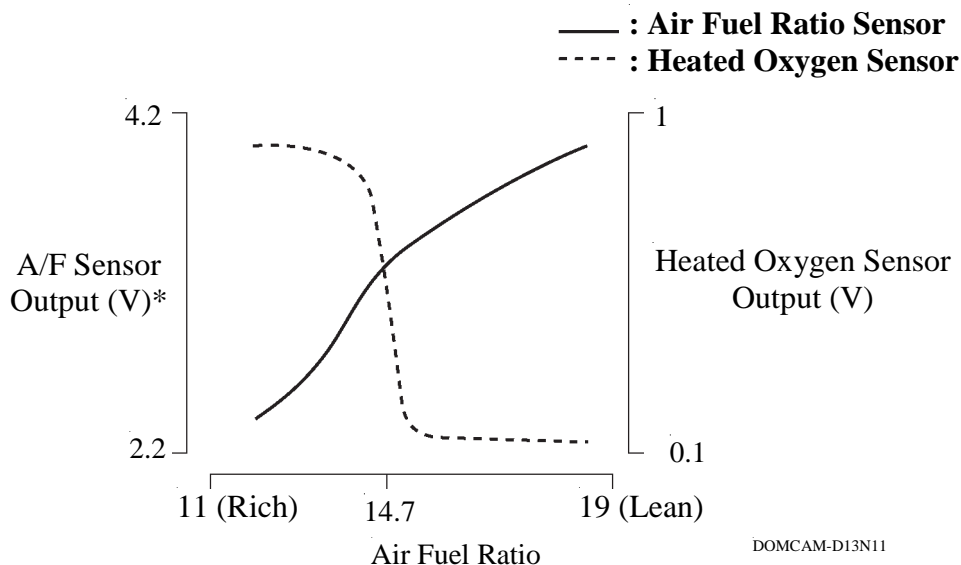


Heated Oxygen Sensor Circuit



Air Fuel Ratio Sensor Circuit

DOMCAM-271EG44

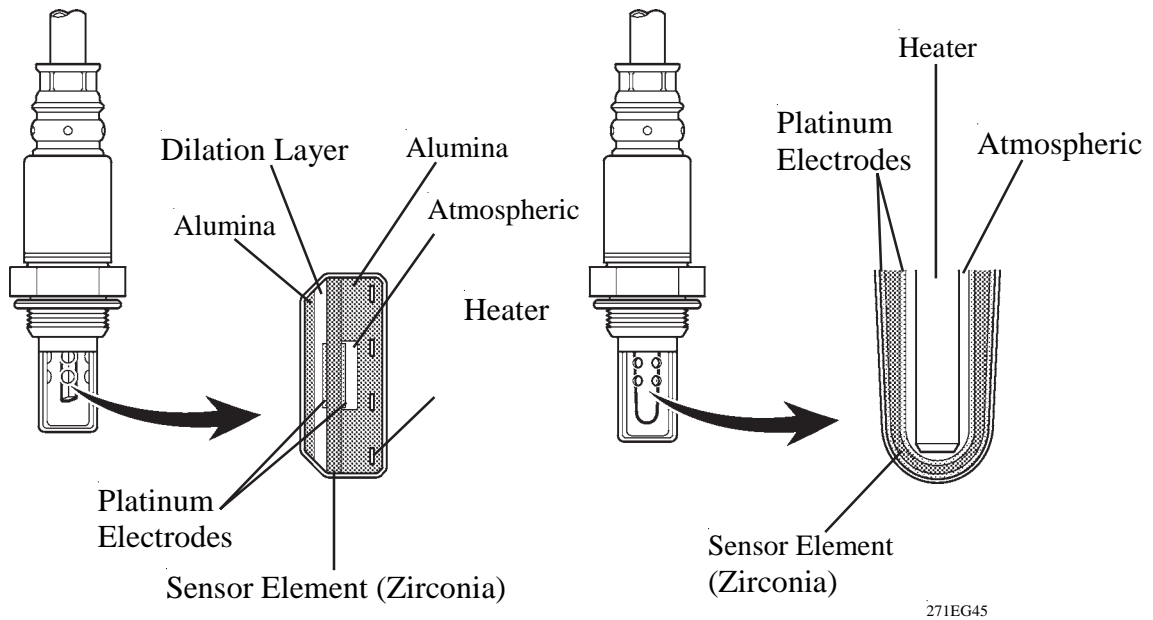


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*: This calculation value is used internally in the engine ECU, and is not an engine ECU terminal voltage.

2) Construction

- The basic construction of the heated oxygen sensor and the air-fuel ratio sensor is the same. However, they are divided into the cup type and the planar type, according to the different types of heater construction that are used.
- The cup type sensor contains a sensor element that surrounds a heater.
- The planar type sensor uses alumina, which excels in heat conductivity and insulation, to integrate a sensor element with a heater, thus improving the warm-up performance of the sensor.



Planar Type Air Fuel Ratio Sensor

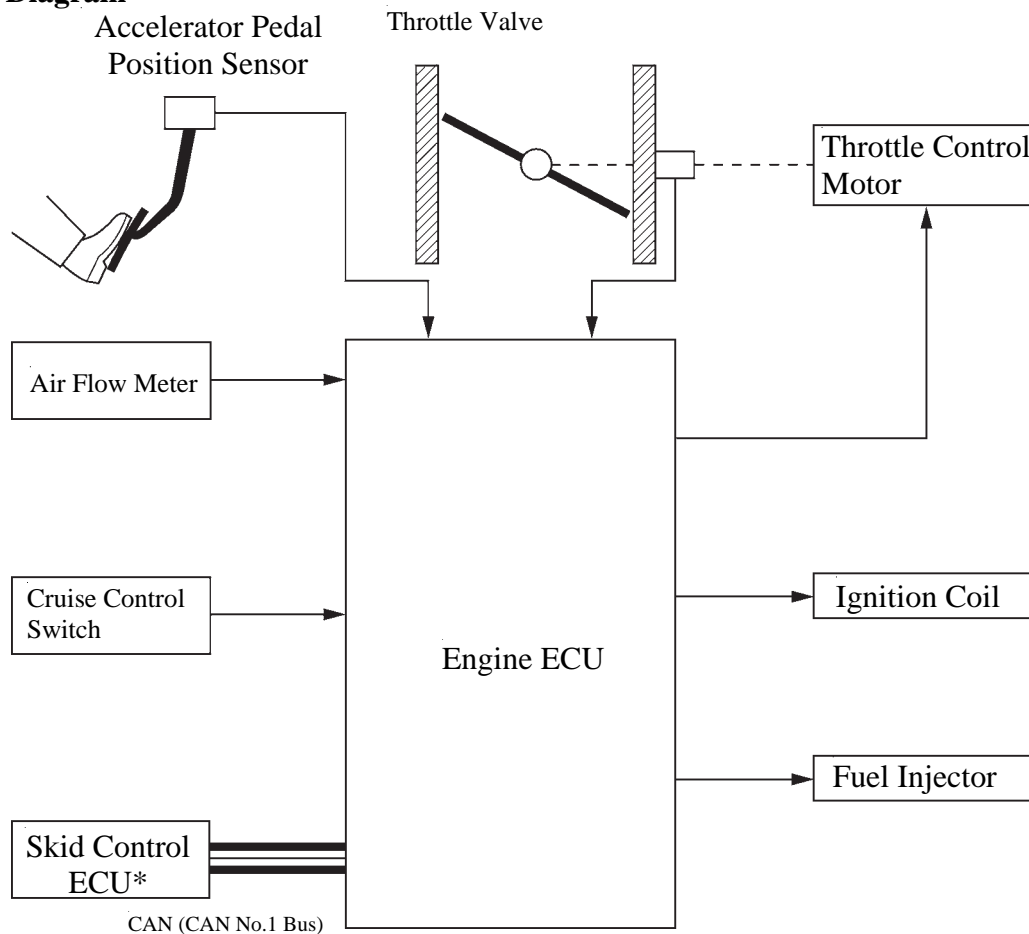
Cup Type Heated Oxygen Sensor

6. ETCS-i (Electronic Throttle Control System-intelligent)

General

- In the conventional throttle body, the throttle valve angle is determined invariably by the amount of the accelerator pedal effort. In contrast, ETCS-i uses the engine ECU to calculate the optimal throttle valve angle that is appropriate for the respective driving condition and uses a throttle control motor to control the angle.
- In case of an abnormal condition, this system transfers to the limp mode. For details, see page EG-59.

▶ System Diagram ◀



Control

1) General

The ETCS-i consists of the following five functions:

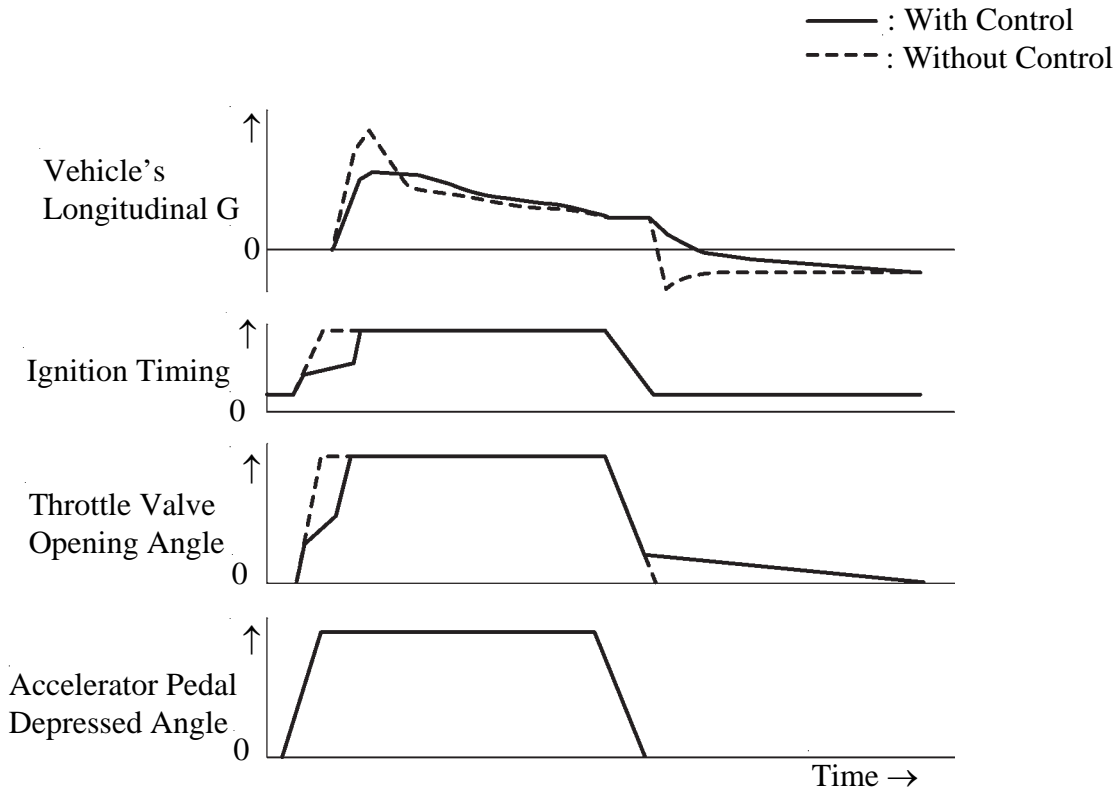
- Normal Throttle Control (Non-linear Control)
- ISC (Idle Speed Control)
- TRC (Traction Control)*
- VSC (Vehicle Stability Control) *
- Cruise Control

*: Only for models with brake control system (ABS with EBD, Brake Assist, TRC and VSC)

2) Normal Throttle Control (non-linear control)

Controls the throttle to an optimal throttle valve angle that is appropriate for the driving condition such as the amount of the accelerator pedal effort and the engine speed in order to realise excellent throttle control and comfort in all operating ranges.

► Conceptual Diagrams of Engine Control during Acceleration and Deceleration ◀



00MEG38Y

3) Idle Speed Control

The engine ECU controls the throttle valve in order to constantly maintain an ideal idle speed.

4) TRC Throttle Control

As part of the TRC system, the throttle valve is closed by a demand signal from the skid control ECU if an excessive amount of slippage is created at a driving wheel, thus facilitating the vehicle in ensuring excellent vehicle stability and driving force.

5) VSC Coordination Control

In order to bring the effectiveness of the VSC system control into full play, the throttle valve angle is controlled by effecting a coordination control with the skid control ECU.

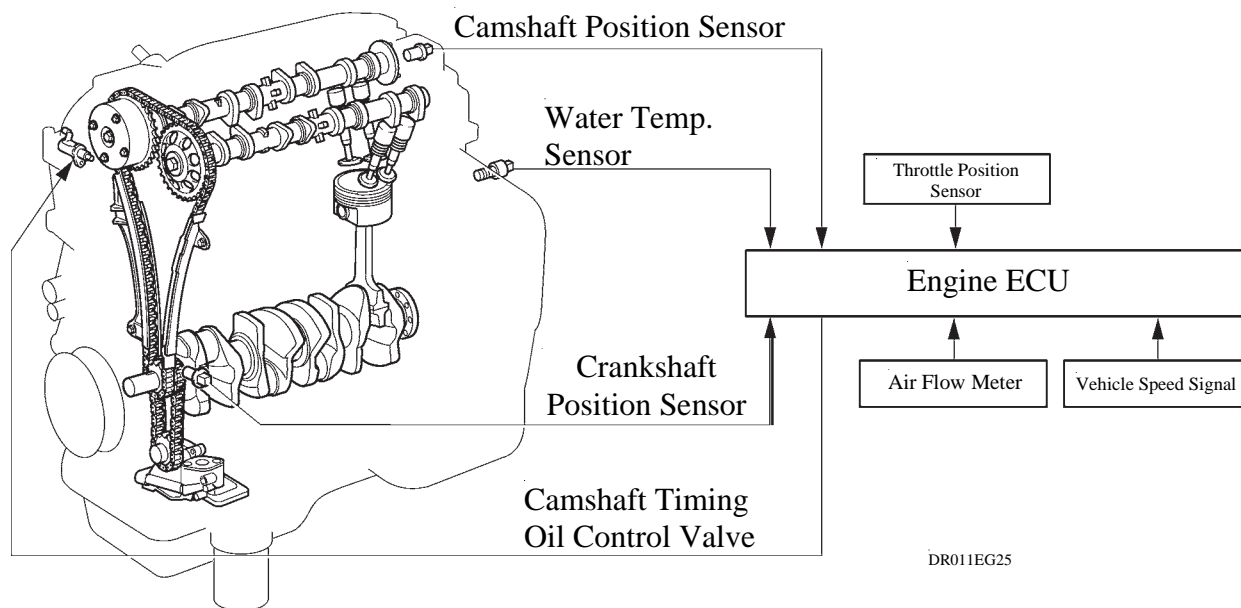
6) Cruise Control

An engine ECU with an integrated cruise control ECU directly actuates the throttle valve for operation of the cruise control.

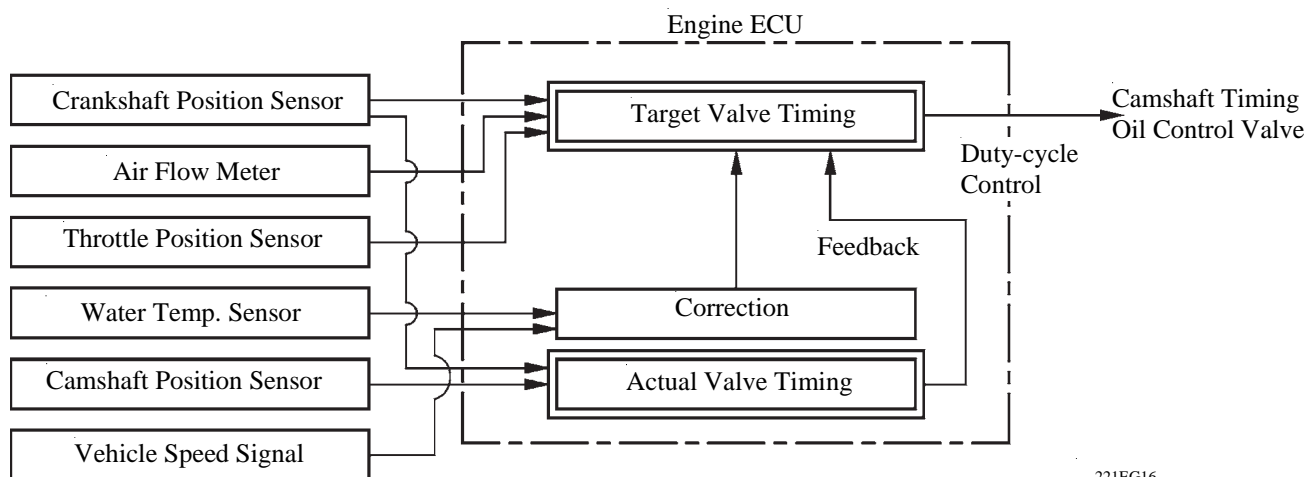
7. VVT-i (Variable Valve Timing-intelligent) System

General

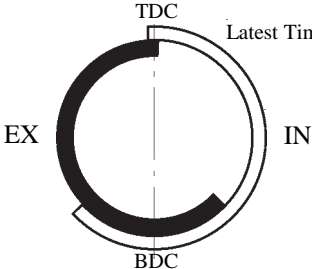
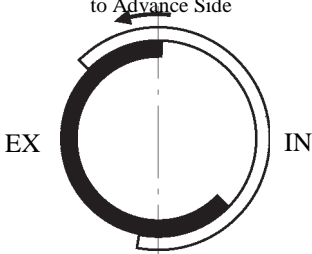
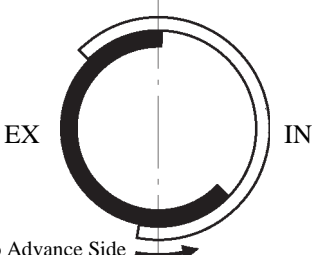
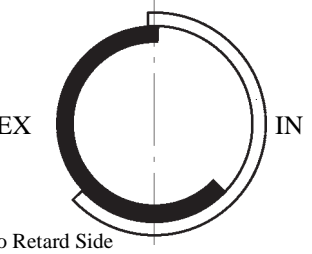
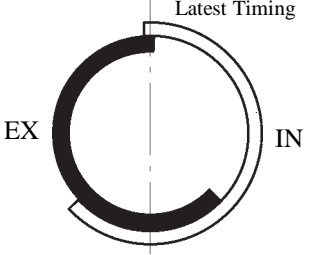
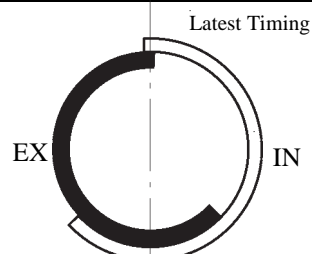
- The VVT-i system is designed to control the intake camshaft within a range of 40° (of Crankshaft Angle) to provide valve timing that is optimally suited to the engine condition. This improves torque in all the speed ranges as well as increasing fuel economy, and reducing exhaust emissions.



- Using the engine speed, intake air volume, throttle position and water temperature, the engine ECU can calculate optimal valve timing for each driving condition and controls the camshaft timing oil control valve. In addition, the engine ECU uses signals from the camshaft position sensor and the crankshaft position sensor to detect the actual valve timing, thus providing feedback control to achieve the target valve timing.



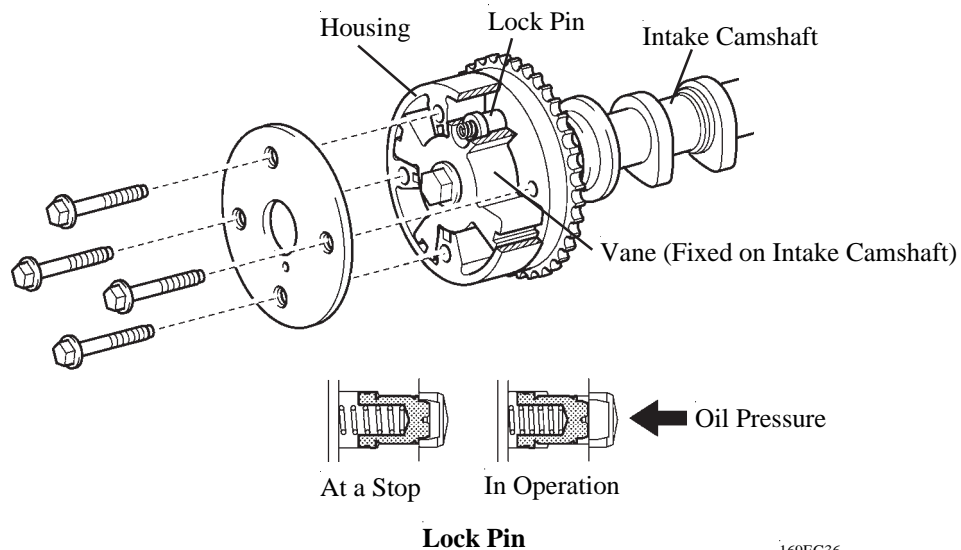
Effectiveness of the VVT-i System

Operation State	Objective	Effect
<ul style="list-style-type: none"> • During Idling • At Light Load 	 <p>Minimising overlap to prevent blow back to the intake side</p> <p>DOMCAM-DR011EG27</p>	<ul style="list-style-type: none"> • Stabilised idling rpm • Better fuel economy
At Medium Load	 <p>Increasing overlap to increase internal EGR to reduce pumping loss</p> <p>DOMCAM-DR011EG28</p>	<ul style="list-style-type: none"> • Better fuel economy • Improved emission control
In Low to Medium Speed Range with Heavy Load	 <p>Advancing the intake valve close timing for volumetric efficiency improvement</p> <p>DOMCAM-DR011EG29</p>	Improved torque in low to medium speed range
In High Speed Range with Heavy Load	 <p>Retarding the intake valve close timing for volumetric efficiency improvement</p> <p>DOMCAM-DR011EG27</p>	Improved output
At Low Temp	 <p>Minimising overlap to prevent blow back to the intake side</p> <p>DOMCAM-DR011EG27</p>	<ul style="list-style-type: none"> • Stabilised fast idle rpm • Better fuel economy
<ul style="list-style-type: none"> • Upon Starting • Stopping the Engine 	 <p>Minimising overlap to prevent blow back to the intake side</p> <p>DOMCAM-DR011EG27</p>	Improved start ability

Construction

1) VVT-i Controller

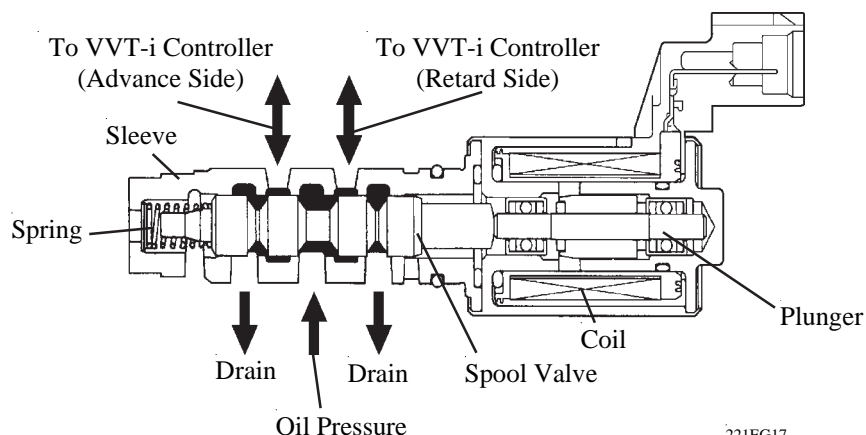
- This controller consists of the housing driven from the timing chain and the vane coupled with the intake camshaft.
- The oil pressure sent from the advance or retard side path at the intake camshaft causes rotation in the VVT-i controller vane circumferential direction to vary the intake valve timing continuously. When the engine is stopped, the intake camshaft will be in the most retarded state to ensure start ability. When hydraulic pressure is not applied to the VVT-i controller immediately after the engine has been started, the lock pin locks the movement of the VVT-i controller to prevent a knocking noise.



169EG36

2) Camshaft Timing Oil Control Valve

The camshaft timing oil control valve controls the spool valve position in accordance with the duty control from the engine ECU thus allocating the hydraulic pressure that is applied to the VVT-i controller to the advance and the retard side. When the engine is stopped, the camshaft timing oil control valve is in the most retarded state.

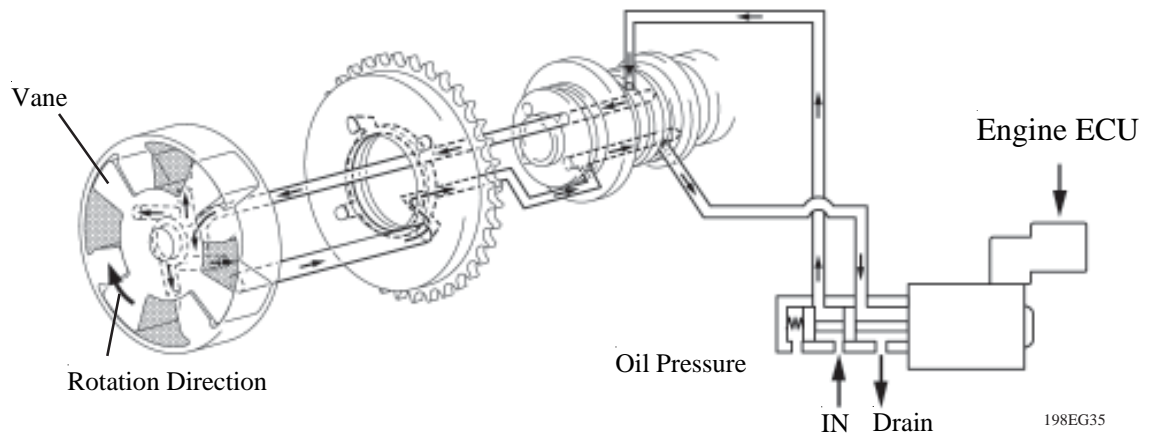


221EG17

Operation

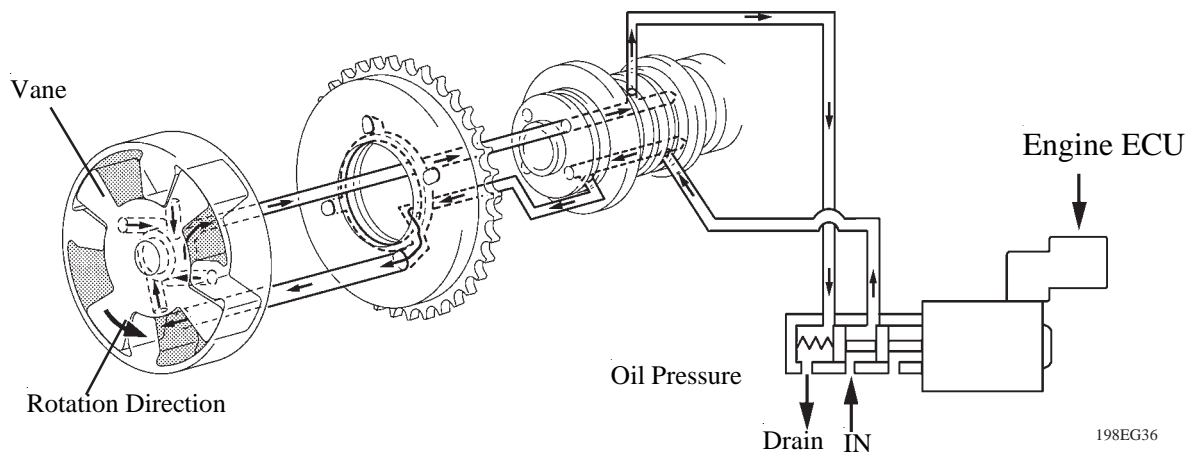
1) Advance

When the camshaft timing oil control valve is positioned as illustrated below by the advance signal from the engine ECU, the resultant oil pressure is applied to the timing advance side vane chamber to rotate the camshaft in the timing advance direction.



2) Retard

When the camshaft timing oil control valve is positioned as illustrated below by the retard signal from the engine ECU, the resultant oil pressure is applied to the timing retard side vane chamber to rotate the camshaft in the timing retard direction.



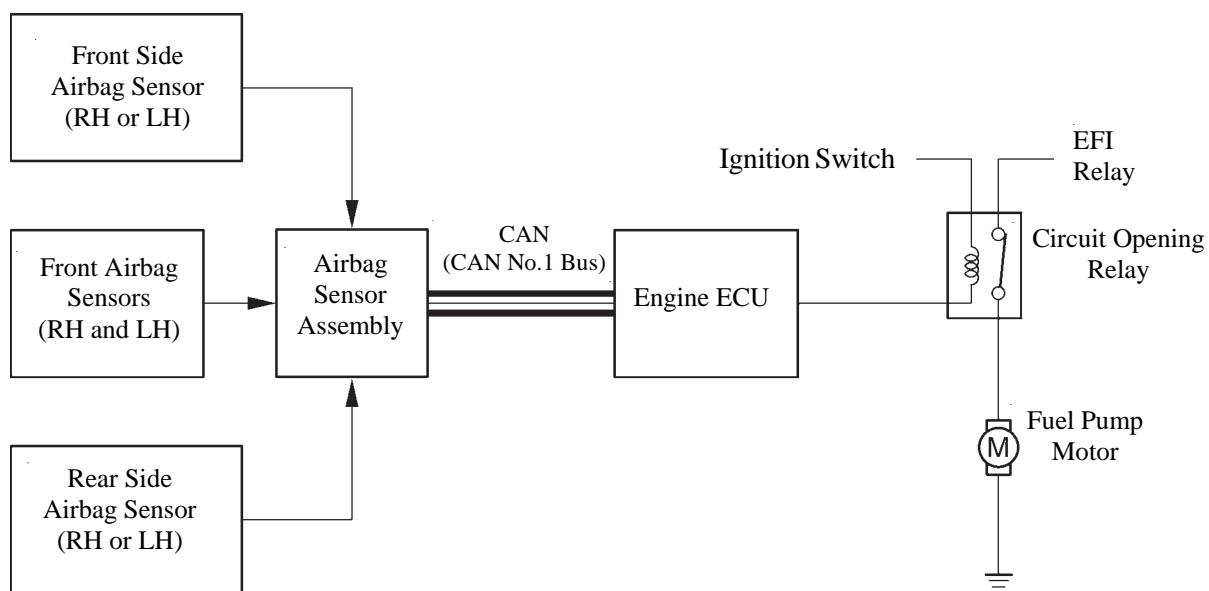
3) Hold

After reaching the target timing, the valve timing is held by keeping the camshaft timing oil control valve in the neutral position unless the travelling state changes.

This adjusts the valve timing at the desired target position and prevents the engine oil from running out when it is unnecessary.

8. Fuel Pump Control

A fuel cut control is used to stop the fuel pump once when any of the SRS airbags is deployed. In this system, the airbag deployment signal from the airbag sensor assembly is detected by the engine ECU, and it turns OFF the circuit opening relay. After the fuel cut control has been activated, turning the ignition switch from OFF to ON cancels the fuel cut control, and the engine can be restarted.

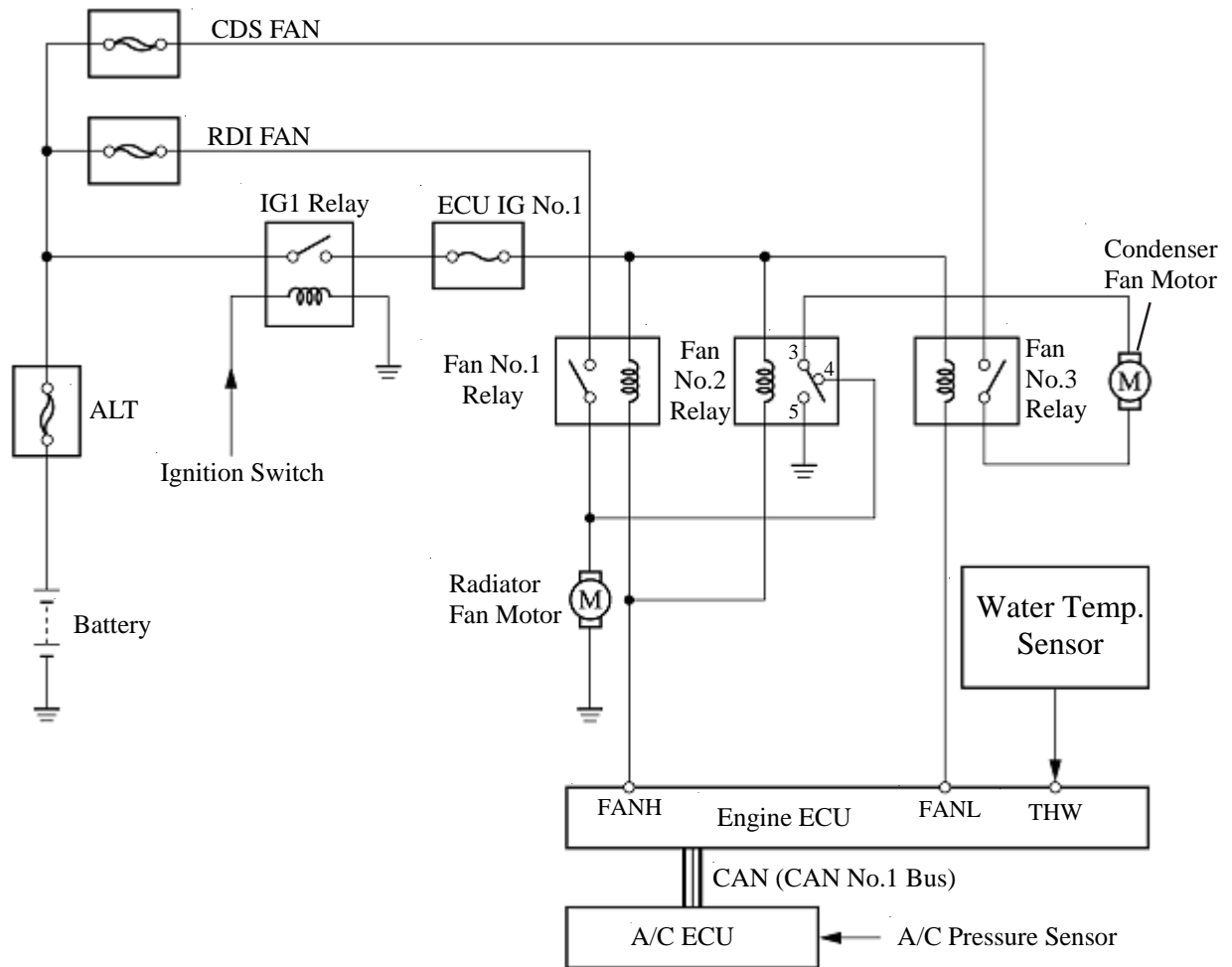


02HEG20TE

9. Cooling Fan Control System

- A cooling fan control system in which the engine ECU controls the cooling fan speed in accordance with the engine coolant temperature and the air conditioner operating condition.
- The engine ECU controls the cooling fan speed based on A/C pressure sensor signals and water temperature sensor signals. The A/C pressure sensor signals are sent from the A/C ECU to the engine ECU via the CAN. This control is accomplished by operating the 2 fan motors in 2 stages at low speed (series connection) and high speed (parallel connection).

▶ Wiring Diagram ◀



02KEG28TE

▶ Cooling Fan Operation ◀

Air Conditioner Operating Condition	Engine Coolant Temperature	Relay Operation			Cooling Fan Motor Connection	Cooling Fan Operation
		No.1	No.2	No.3		
OFF	Low	OFF	3 to 4	OFF	OFF	OFF
	High	ON	3 to 5	ON	Parallel	High
A/C Pressure "Low"	Low	OFF	3 to 4	ON	Series	Low
A/C Pressure "High"	Low	ON	3 to 5	ON	Parallel	High
A/C Pressure "Low"	High	ON	3 to 5	ON	Parallel	High
A/C Pressure "High"	High	ON	3 to 5	ON	Parallel	High

10. Diagnosis

- When the engine ECU detects a malfunction, the engine ECU makes a diagnosis and memorises the failed section. Furthermore, the check engine warning light in the combination meter illuminates or blinks to inform the driver.
- The engine ECU will also store the DTC (Diagnostic Trouble Code) of the malfunctions. The DTC can be accessed by using the intelligent tester II.
- For details, see the Camry Repair Manual.

Service Tip

- The engine ECU of the Camry uses the CAN protocol for diagnostic communication. Therefore, an intelligent tester II is required for accessing diagnostic data. For details, see the Camry Repair Manual.
- To clear the DTC that is stored in the engine ECU, use an intelligent tester II or disconnect the battery terminal or remove the EFI No.1 fuse and ETCS fuse for 1 minute or longer.

11. Fail-Safe

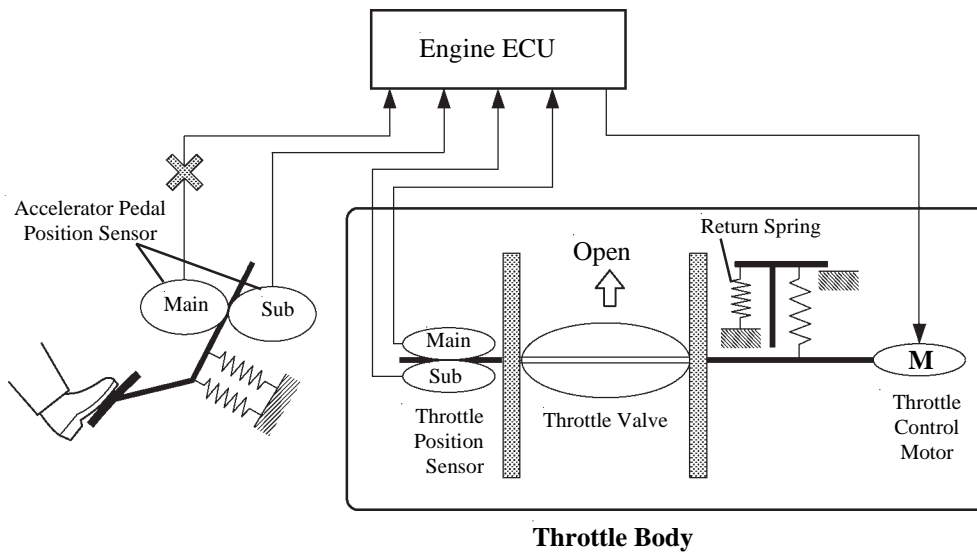
General

When a malfunction is detected at any of the sensors, there is a possibility of an engine or other malfunction occurring if the engine ECU were to continue to control the engine control system in the normal way. To prevent such a problem, the fail-safe function of the engine ECU either relies on the data stored in memory to allow the engine control system to continue operating, or stops the engine if a hazard is anticipated. For details, refer to the Camry Repair Manual.

Fail-safe of Accelerator Pedal Position Sensor

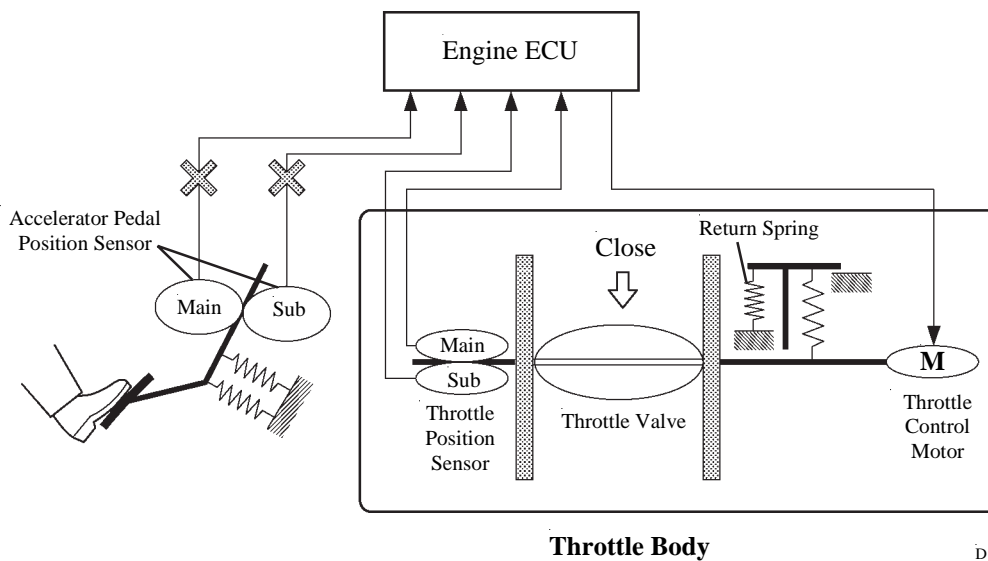
The accelerator pedal position sensor comprises two (Main, Sub) sensor circuits.

- If a malfunction occurs in either of the sensor circuits, the engine ECU detects the abnormal signal voltage difference between these two sensor circuits and switches into the limp mode. In the limp mode, the remaining circuit is used to calculate the accelerator pedal opening, in order to operate the vehicle under limp mode control.



D13N08

- If both circuits malfunction, the engine ECU detects the abnormal signal voltage from these two sensor circuits and discontinues the throttle control. At this time, the vehicle can be driven within its idling range.

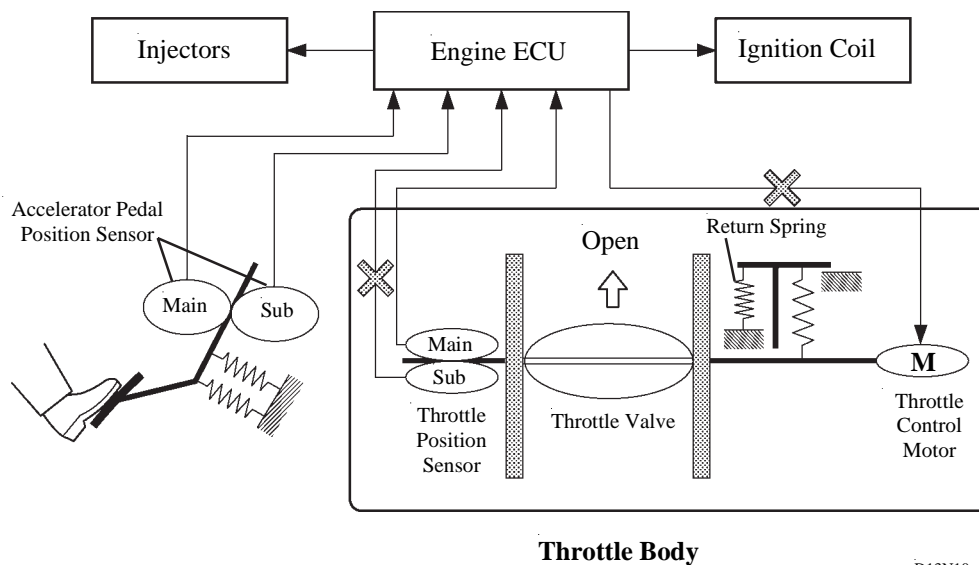


D13N09

Fail-safe of Throttle Position Sensor

The throttle position sensor comprises two (Main, Sub) sensor circuits.

- If a malfunction occurs in either of the sensor circuits, the engine ECU detects the abnormal signal voltage difference between these two sensor circuits, cuts off the current to the throttle control motor, and switches to the limp mode.
- Then, the force of the return spring causes the throttle valve to return and stay at the prescribed opening. At this time, the vehicle can be driven in limp mode while the engine output is regulated through the control of the fuel injection and ignition timing in accordance with the accelerator opening.
- The same control as above is effected if the engine ECU detects a malfunction in the throttle control motor system.



CHASSIS

CLUTCH

Description..... CH-2

E354 MANUAL TRANSAXLE

Description..... CH-3

Shift and Select Mechanism..... CH-4

U250E AUTOMATIC TRANSAXLE

Description..... CH-5

Torque Converter..... CH-8

Oil Pump..... CH-8

Planetary Gear Unit..... CH-9

Valve Body Unit..... CH-16

Electronic Control System..... CH-22

Shift Control Mechanism..... CH-33

DRIVE SHAFT

Description..... CH-36

SUSPENSION AND AXLE

Suspension..... CH-37

Axle..... CH-44

BRAKE

Description..... CH-45

Front Brake..... CH-47

Rear Brake..... CH-48

Brake Control System
(ABS with EBD and Brake Assist)..... CH-49

Brake Control System
(ABS with EBD, Brake Assist, TRC and VSC) CH-59

STEERING

Description..... CH-83

Power Steering Vane Pump..... CH-84

Steering Column..... CH-86

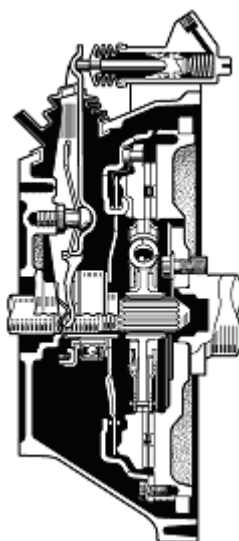
CHASSIS

CLUTCH

DESCRIPTION

The new Camry has a clutch system with the following features.

- A dry type single plate which is operated by hydraulic pressure is used.
- A clutch master cylinder made of plastic is used.
- A clutch disc that uses an organic solvent-free material is used to help protect the environment.
- A clutch accumulator is used to reduce the noise and vibration.
- A turnover mechanism, which reduces clutch pedal effort, is used.



025CH87Y

Specifications

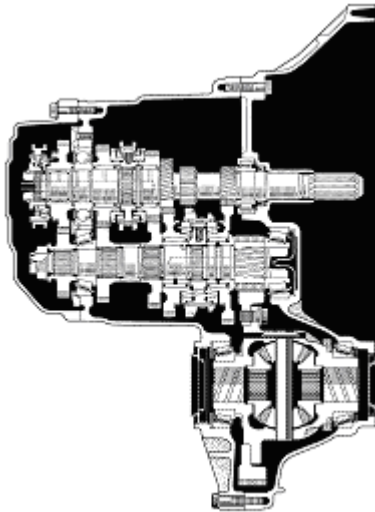
Engine Type		2AZ-FE
Clutch	Type	Dry Type Single Plate Clutch Diaphragm Spring
	Operation	Hydraulic
Clutch Cover	Type	DST (Diaphragm Spring Turnover)
	Size mm	239
	Installed Load N	5900
Clutch Disc	Facing Size* mm	236 × 150 × 3.5
	Facing Area cm ²	260
Master Cylinder	Type	Plunger
	Cylinder Dia. mm	15.87
Release Cylinder	Type	Non-Adjustable
	Cylinder Dia. mm	20.64
Clutch Pedal		Turnover

* Outer Diameter x Inner Diameter x Thickness

E354 MANUAL TRANSAXLE

✱ DESCRIPTION

The 2AZ-FE engine model is used the 5-speed E354 manual transaxle.



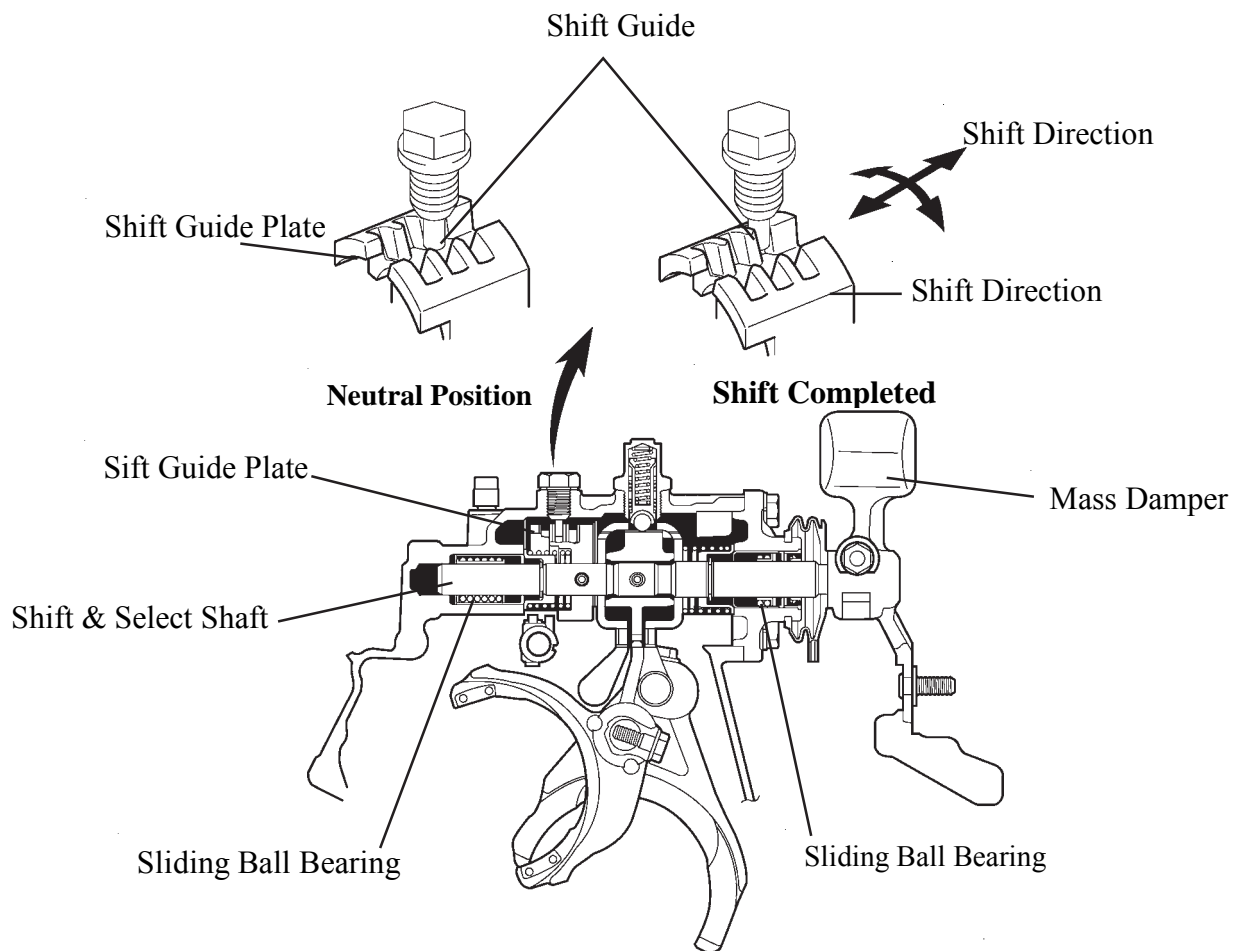
025CH58Y

► Specifications ◀

Gear Ratio	1st	3.538
	2nd	2.045
	3rd	1.333
	4th	1.028
	5th	0.820
	Reverse	3.583
Differential Gear Ratio		3.944
Oil Capacity	Litres	2.5
Oil Viscosity	SAE 75W-90	
Oil Grade	API GL-4 or GL-5	
Dry Weight	kg	44.3

● SHIFT AND SELECT MECHANISM

- An excellent shift feel has been achieved through the use of the mass damper on the shift and select shaft, and sliding ball bearing.
- A shift guide plate is provided on the shift and select shaft. The movement distance of the shift and select shaft in the select direction after the shifting is completed is regulated by the shift guide plate and shift guide pin. This clarifies the position of the shift knob and enables accurate shift operations.

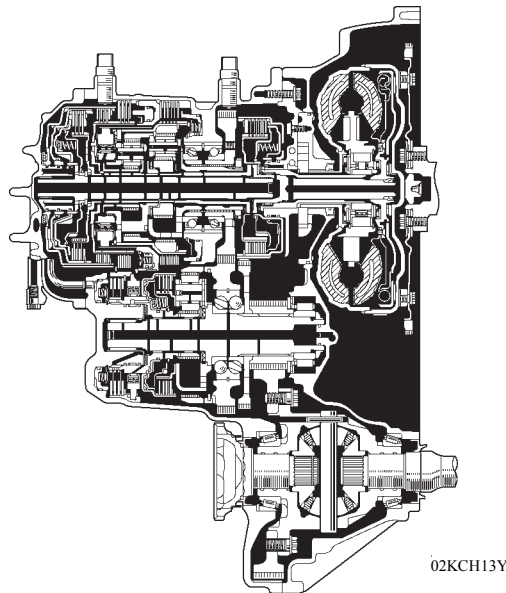


025YCH53Y

U250E AUTOMATIC TRANSAXLE

✱ DESCRIPTION

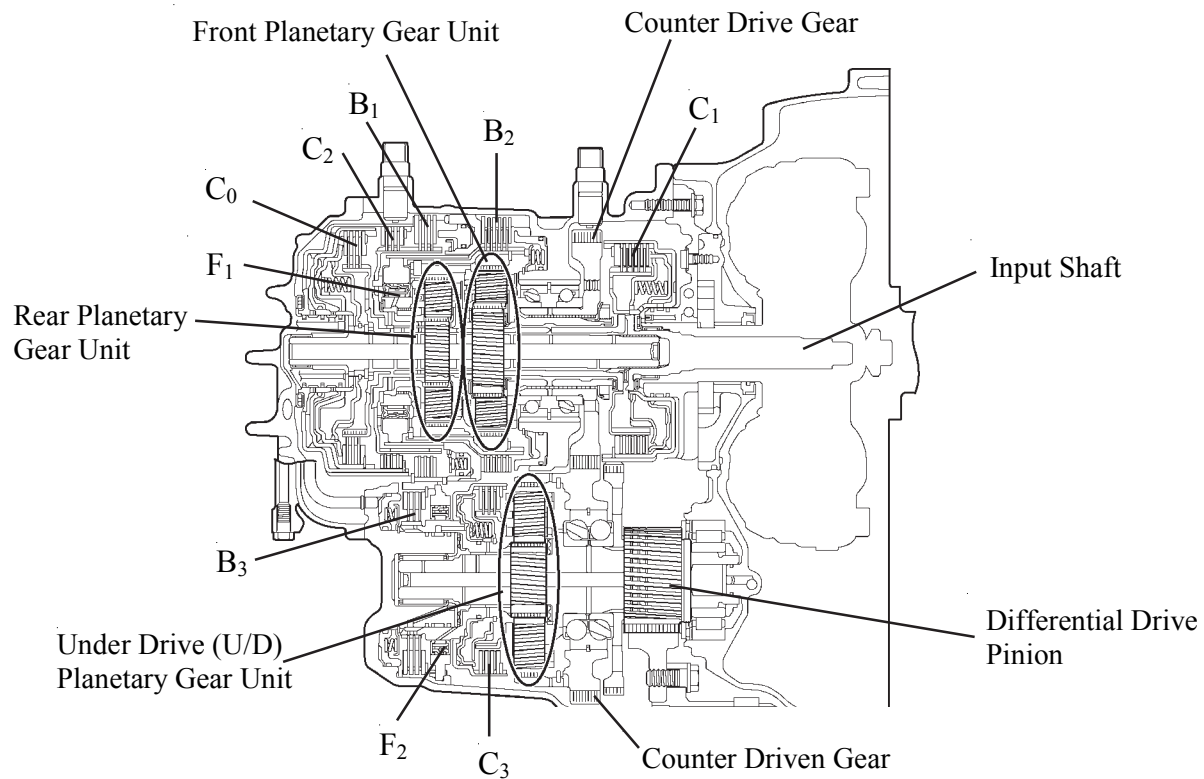
- U250E automatic transaxle is used on the 2AZ-FE engine models. This automatic transaxle is a compact, lightweight and high-capacity 5-speed Super ECT (Electronically Controlled Transaxle).
- ATF WS is used to reduce the resistance of the ATF and improve the fuel economy. For detail, refer to page CH-7.



► Specifications ◀

Gear Ratio (Counter Gear included)	1st	3.943
	2nd	2.197
	3rd	1.413
	4th	0.975
	5th	0.703
	Reverse	3.145
Differential Gear Ratio		3.391
Fluid Capacity (Includes Differential) Litres		8.0
Fluid Type		Toyota Genuine ATF WS
Weight (Reference)* kg		93

* Weight shows the figure with the fluid filled to the maximum level.



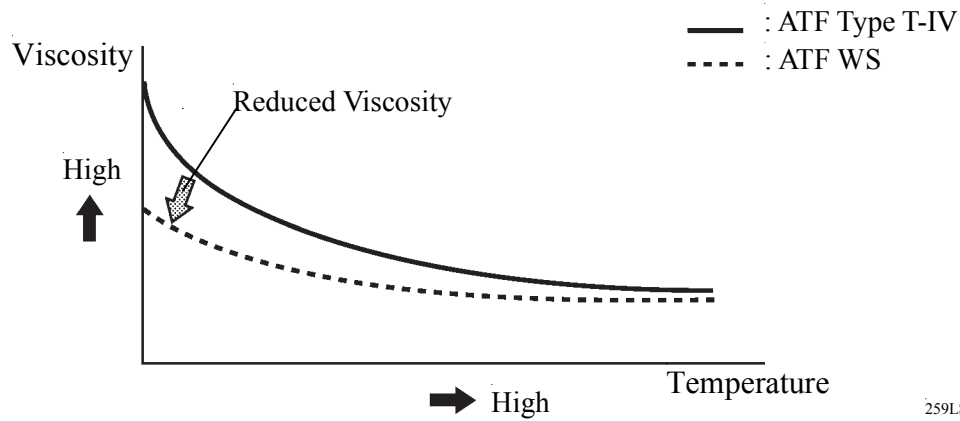
► Specifications ◀

02KCH14Y

C ₁	Forward Clutch	The No. of Discs	5
C ₂	Reverse Clutch		3
C ₃	U/D Direct Clutch		3
C ₀	Direct & O/D Clutch		3
B ₁	2nd & O/D Brake		3
B ₂	1st & Reverse Brake		5
B ₃	U/D Brake		3
F ₁	No. 1 One-way Clutch	The No. of Sprags	22
F ₂	U/D One-way Clutch		15
Front Planetary Gear Unit		The No. of Sun Gear Teeth	43
		The No. of Pinion Gear Teeth	17
		The No. of Ring Gear Teeth	77
Rear Planetary Gear Unit		The No. of Sun Gear Teeth	31
		The No. of Pinion Gear Teeth	19
		The No. of Ring Gear Teeth	69
U/D Planetary Gear Unit		The No. of Sun Gear Teeth	32
		The No. of Pinion Gear Teeth	26
		The No. of Ring Gear Teeth	83
Counter Gear		The No. of Drive Gear Teeth	50
		The No. of Driven Gear Teeth	51

✱ ATF (AUTOMATIC TRANSMISSION FLUID) WS

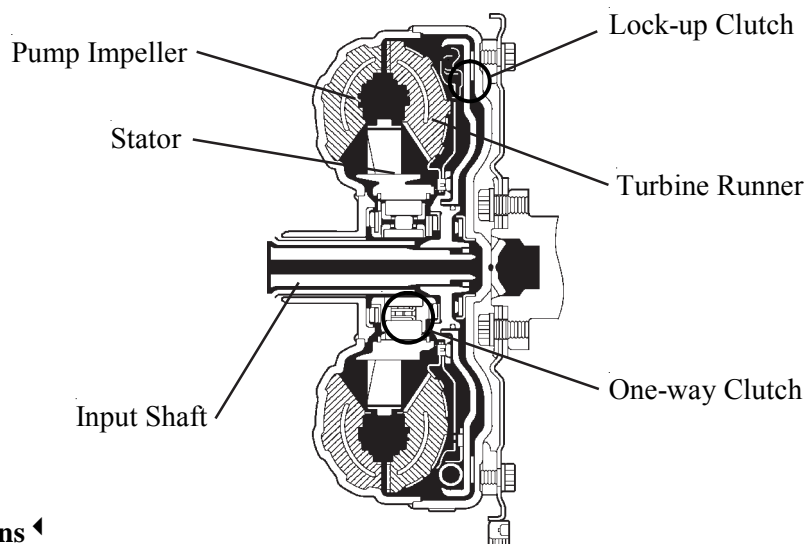
- ATF WS is used to reduce the resistance of the ATF and improve the fuel economy by reducing its viscosity in the practical operating temperature range. At higher fluid temperatures, the viscosity is the same as that of ATF Type T-IV, which ensures the durability of the automatic transaxle.
- ATF WS and other types of ATF (ATF Type T-IV, D-II) are not interchangeable.



259LSK03

✿ TORQUE CONVERTER

- This torque converter has optimally designed fluid passages and impeller configuration resulting in substantially enhanced transmission efficiency to ensure better starting, acceleration and fuel economy.
- Furthermore, a hydraulically operated lock-up mechanism, which enables the lock-up operation at medium to high vehicle speeds, is used to reduce the slip loss of the torque converter.



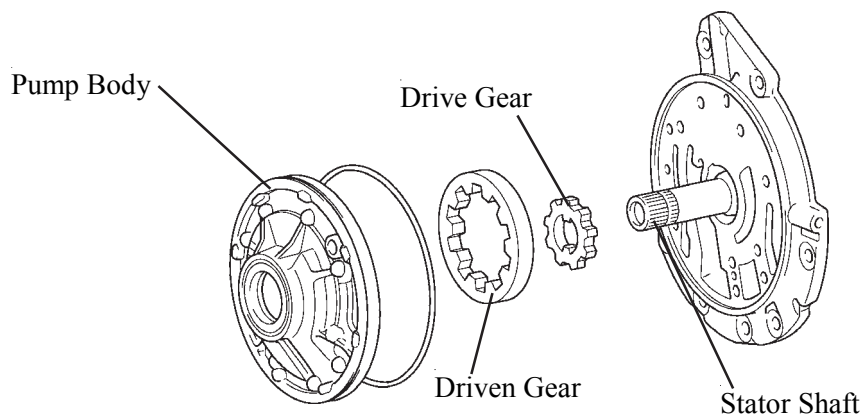
208CH02

► Specifications ◀

Torque Converter Type	3-Element, 1-Step, 2-Phase
Stall Torque Ratio	1.8

✿ OIL PUMP

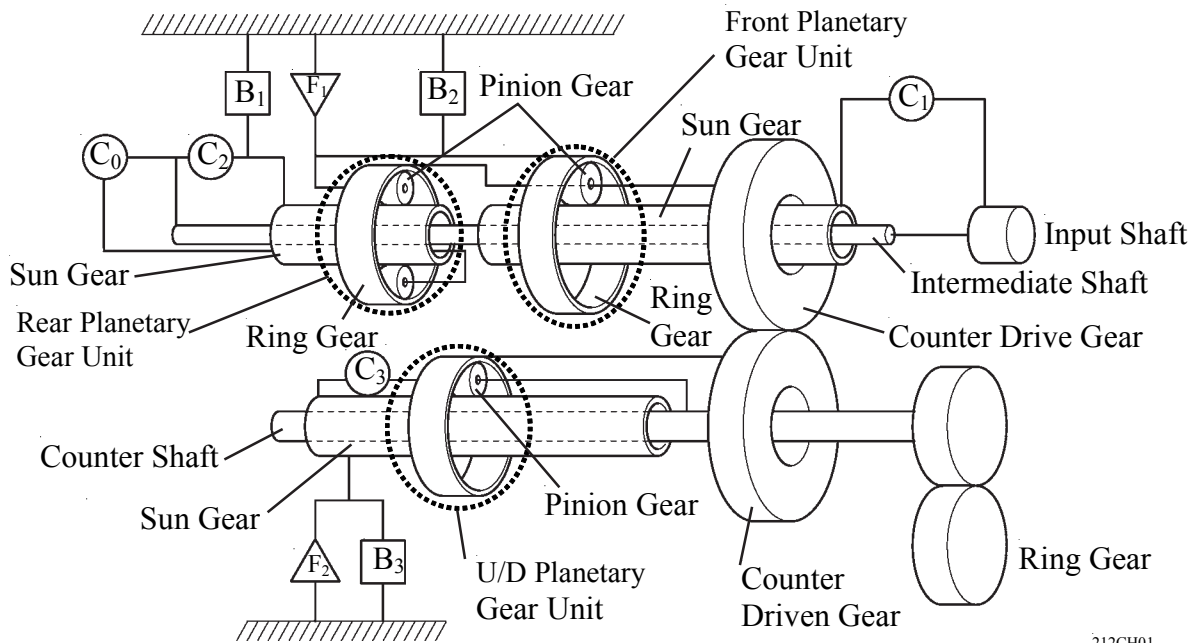
The oil pump is operated by the torque converter. It lubricates the planetary gear units and supplies operating fluid pressure for hydraulic control.



✱ PLANETARY GEAR UNIT

1. Construction

- The U250E automatic transaxle uses the gear layout in which the front and rear planetary gear units are placed on the input shaft (intermediate shaft), the counter drive and driven gears are placed on the front of the front planetary gear unit, and the U/D planetary gear unit is placed on the counter shaft.
- A centrifugal fluid pressure cancelling mechanism is used.



2. Function of Components

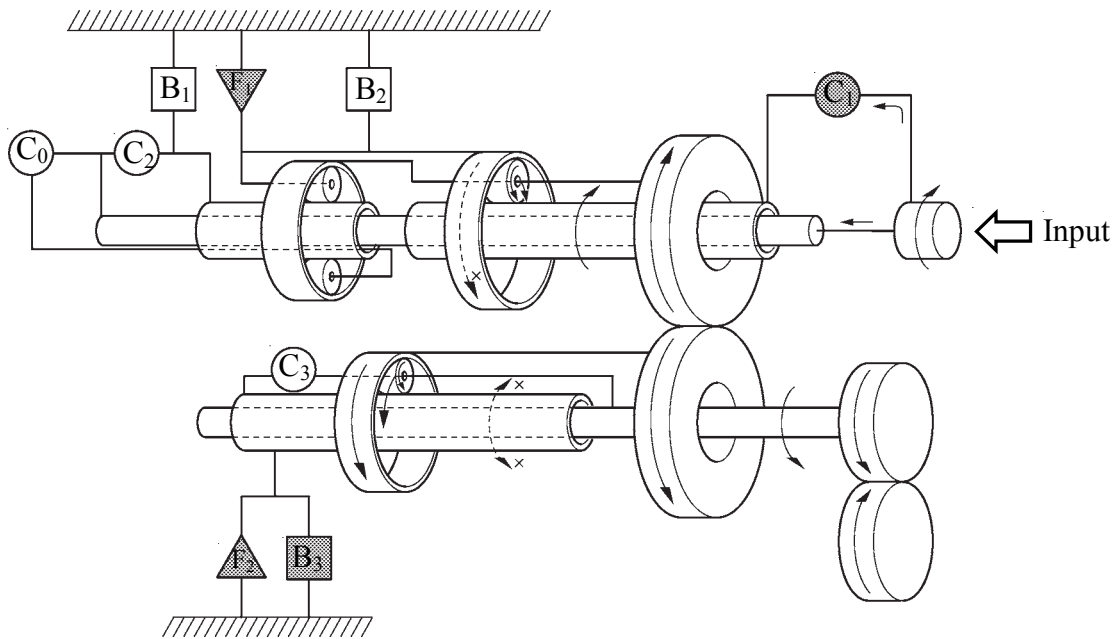
Component		Function
C ₁	Forward Clutch	Connects input shaft and front planetary sun gear.
C ₂	Reverse Clutch	Connects input shaft and rear planetary sun gear.
C ₃	U/D Direct Clutch	Connects U/D planetary sun gear and U/D planetary carrier.
C ₀	Direct & O/D Clutch	Connects input shaft and rear planetary carrier.
B ₁	2nd & O/D Brake	Prevents rear planetary sun gear from turning either clockwise or counter clockwise.
B ₂	1st & Reverse Brake	Prevents rear planetary carrier and front planetary ring gear from turning either clockwise or counter clockwise.
B ₃	U/D Brake	Prevents U/D planetary sun gear from turning either clockwise or counter clockwise.
F ₁	No. 1 One-Way Clutch	Prevents rear planetary carrier and front planetary ring gear from turning counter clockwise.
F ₂	U/D One-Way Clutch	Prevents U/D planetary sun gear from turning clockwise.
Planetary Gears		These gears change the route through which driving force is transmitted, in accordance with the operation of each clutch and brake, in order to increase or reduce the input and output speeds.

3. Transaxle Power Flow

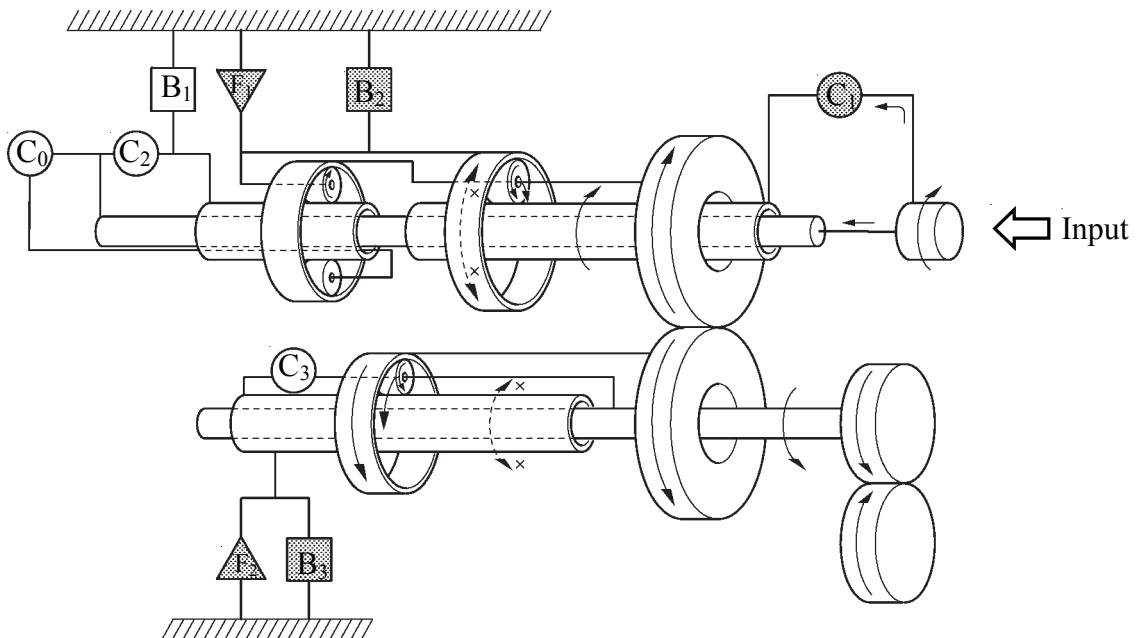
Shift Lever Position	Gear	Solenoid Valve						Clutch				Brake			One-way Clutch	
		S4	SR	DSL	SL1	SL2	SL3	C ₀	C ₁	C ₂	C ₃	B ₁	B ₂	B ₃	F ₁	F ₂
P	Park				○	○								○		
R	Reverse				○	○				○			○	○		
N	Neutral				○	○								○		
D	1st				○	○			○					○	○	○
	2nd					○			○			○		○		○
	3rd		○		○			○	○					○		○
	4th		○	Δ*		Δ*	○	○				○		○		○
	5th	○	○	Δ		Δ	○	○			○	○				
4	1st				○	○			○					○	○	○
	2nd					○			○			○		○		○
	3rd		○		○			○	○					○		○
	4th		○	Δ		Δ	○	○				○		○		○
3	1st				○	○			○					○	○	○
	2nd					○			○			○		○		○
	3rd		○		○			○	○					○		○
2	1st				○	○			○					○	○	○
	2nd					○			○			○		○		○
L	1st			○	○	○			○				○	○	○	○

○: ON Δ: Lock-up ON

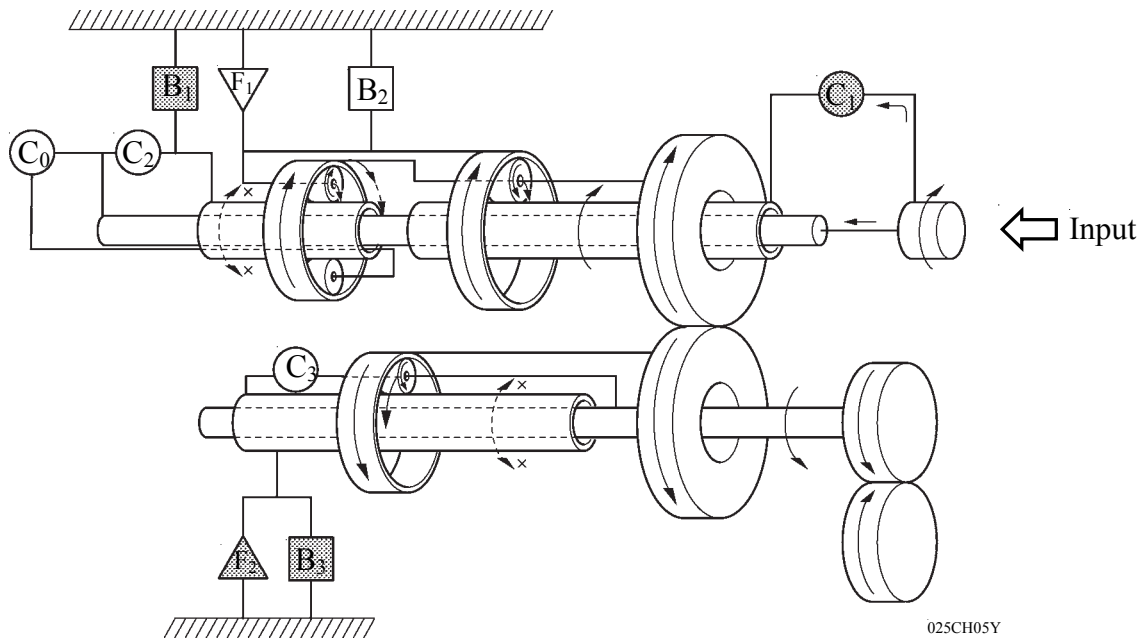
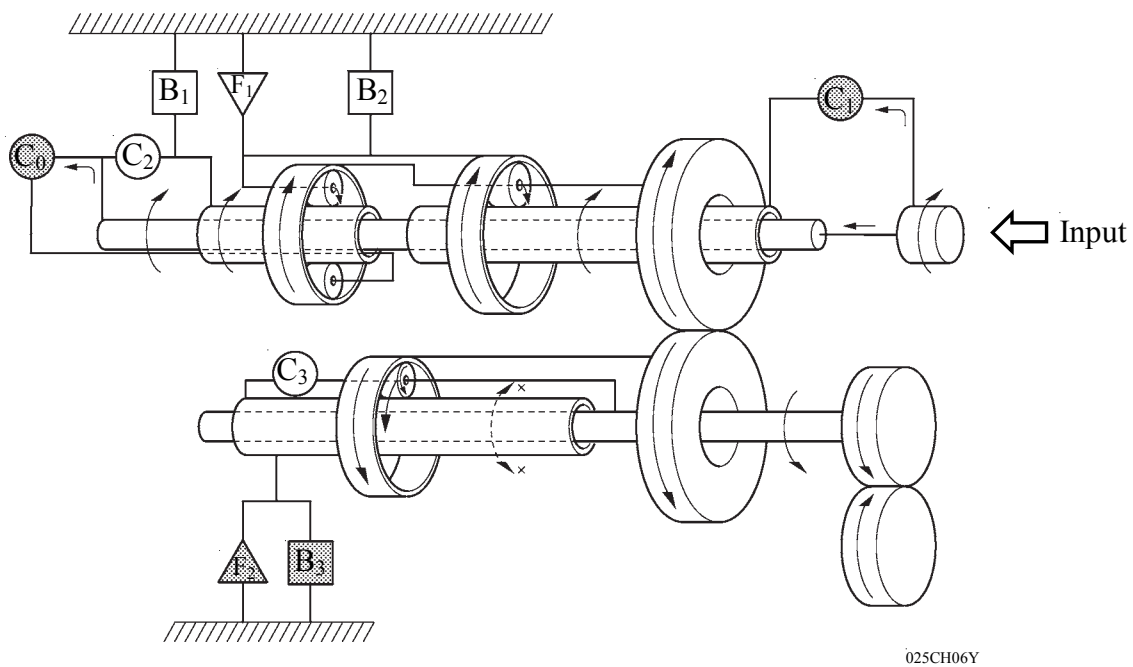
*: Shift control operates only when 5th is prohibited while travelling uphill / downhill.

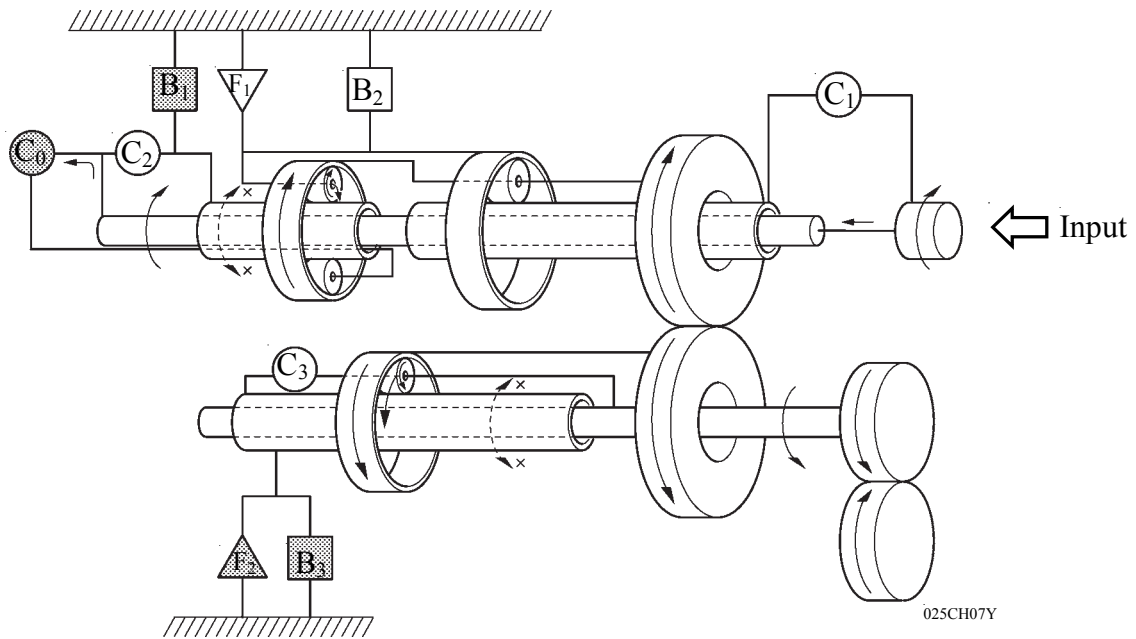
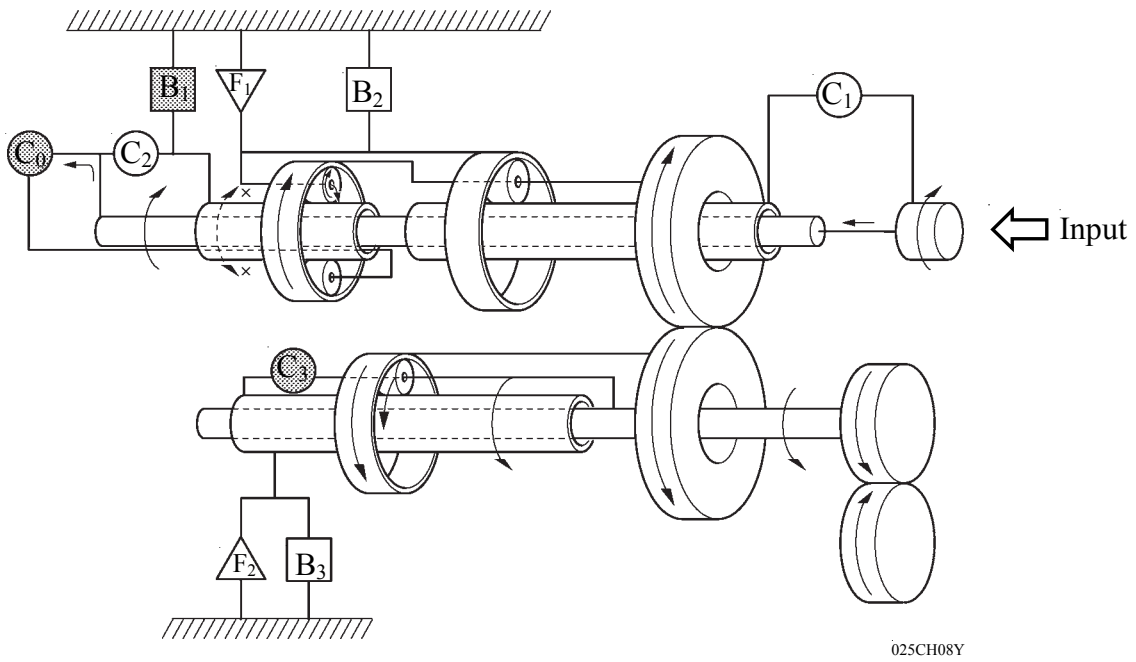
1st Gear (D, 4, 3, 2 Position)

275CA44

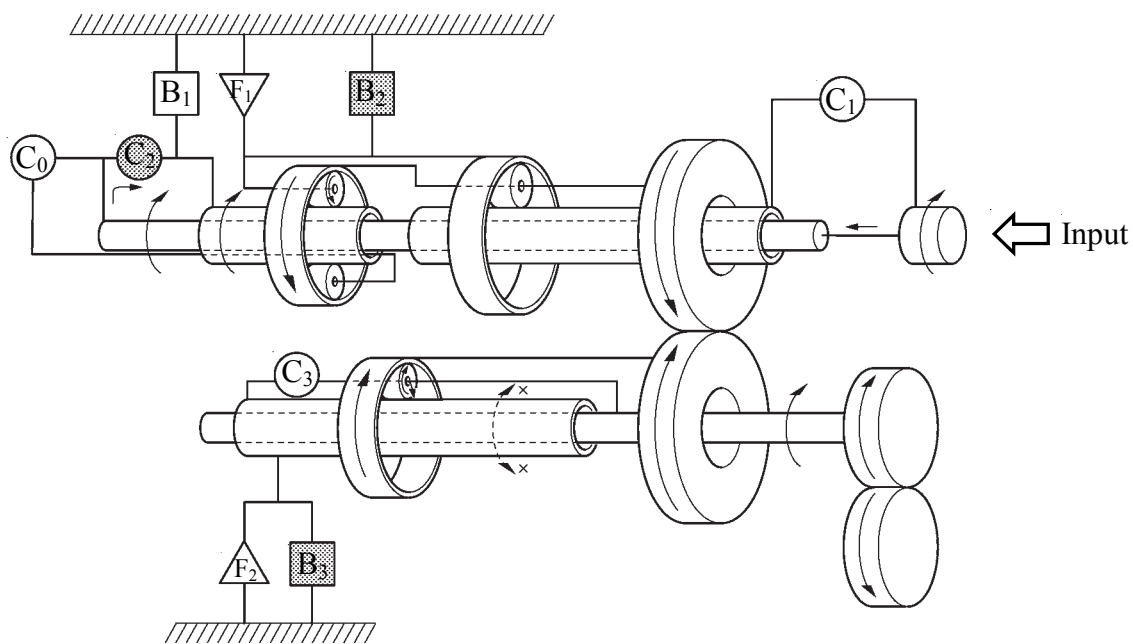
1st Gear (L Position)

275CA44

2nd Gear (D, 4, 3, 2 Position)**3rd Gear (D, 4, 3 Position)**

4th Gear (D, 4 Position)**5th Gear (D Position)**

Reverse Gear (R Position)



025CH09Y

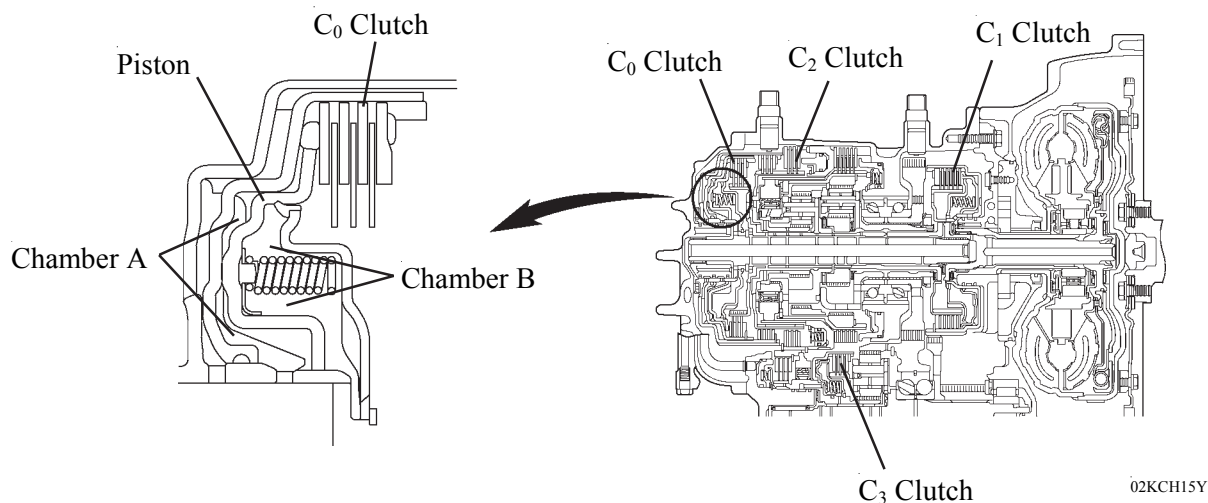
4. Centrifugal Fluid Pressure Cancelling Mechanism

This mechanism is applied to C_0 , C_1 , and C_3 clutches when shifting from 2nd to 3rd, from 3rd to 4th and from 4th to 5th. The basic construction and operation of the mechanism are the same as those used on U241E.

There are two reasons for improving the conventional clutch mechanism:

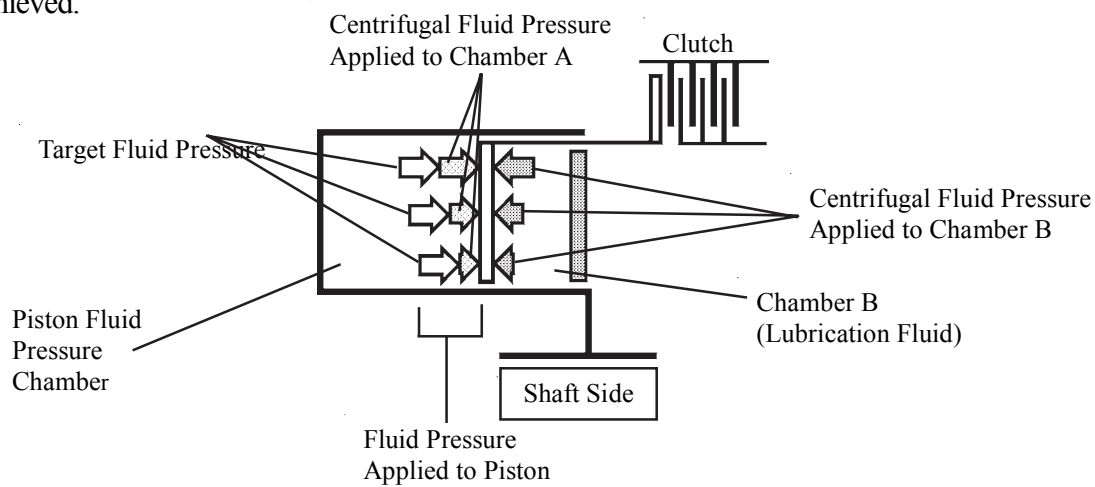
- To prevent the generation of pressure by the centrifugal force that is applied to the fluid in piston fluid pressure chamber (hereafter referred to as “chamber A”) when the clutch is released, a check ball is provided to discharge the fluid. Therefore, before the clutch could be subsequently applied, it took time for the fluid to fill the chamber A.
- During shifting, in addition to the original clutch pressure that is controlled by the valve body, the pressure that acts on the fluid in chamber A also exerts influence, which is dependent upon revolution fluctuations.

To address these two needs for improvement, a canceling fluid pressure chamber (hereafter referred to as “chamber B”) has been provided opposite chamber A.



02KCH15Y

By utilising lubrication fluid such as that of the shaft, an equal centrifugal force is applied, thus cancelling the centrifugal force that is applied to the piston itself. Accordingly, it is not necessary to discharge the fluid through the use of a check ball, and a highly responsive and smooth shifting characteristic has been achieved.



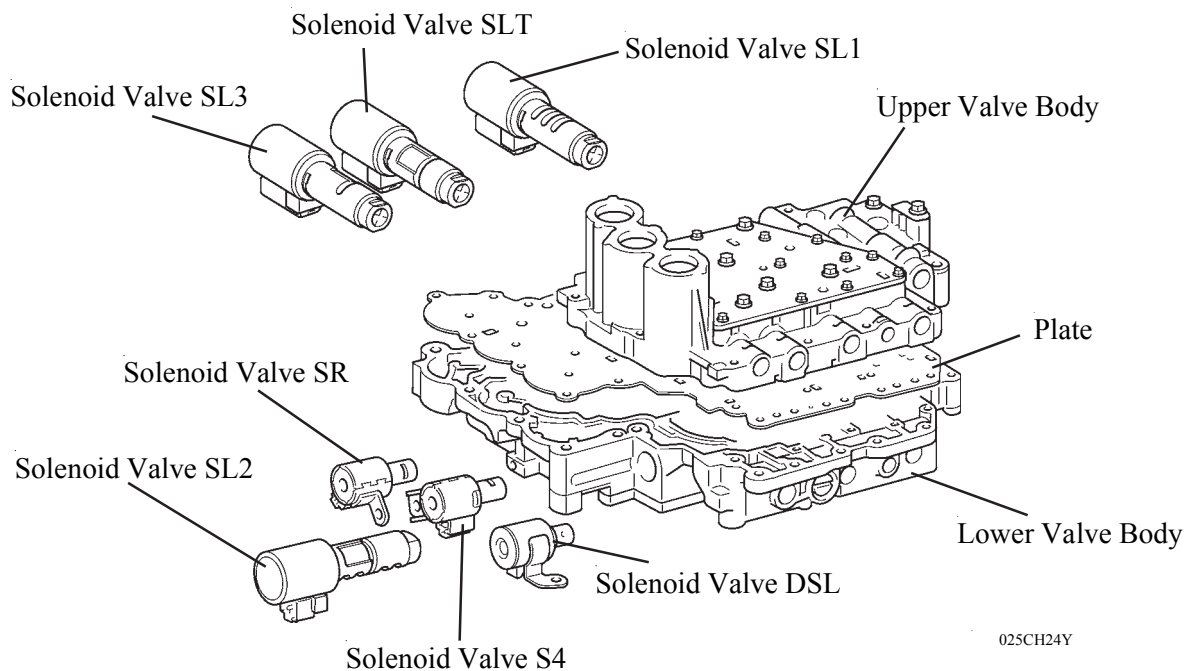
Fluid pressure applied to piston	–	Centrifugal fluid pressure applied to chamber B	=	Target fluid pressure (original clutch pressure)
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157CH17

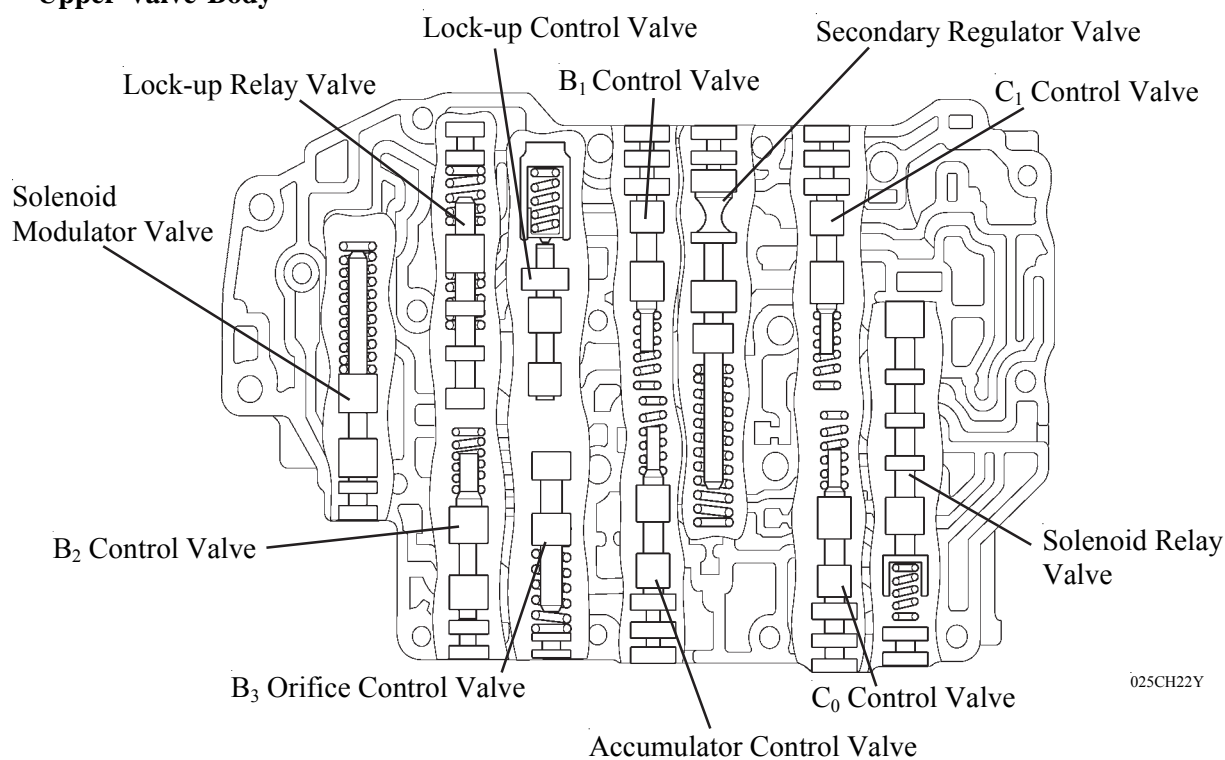
✱ VALVE BODY UNIT

1. General

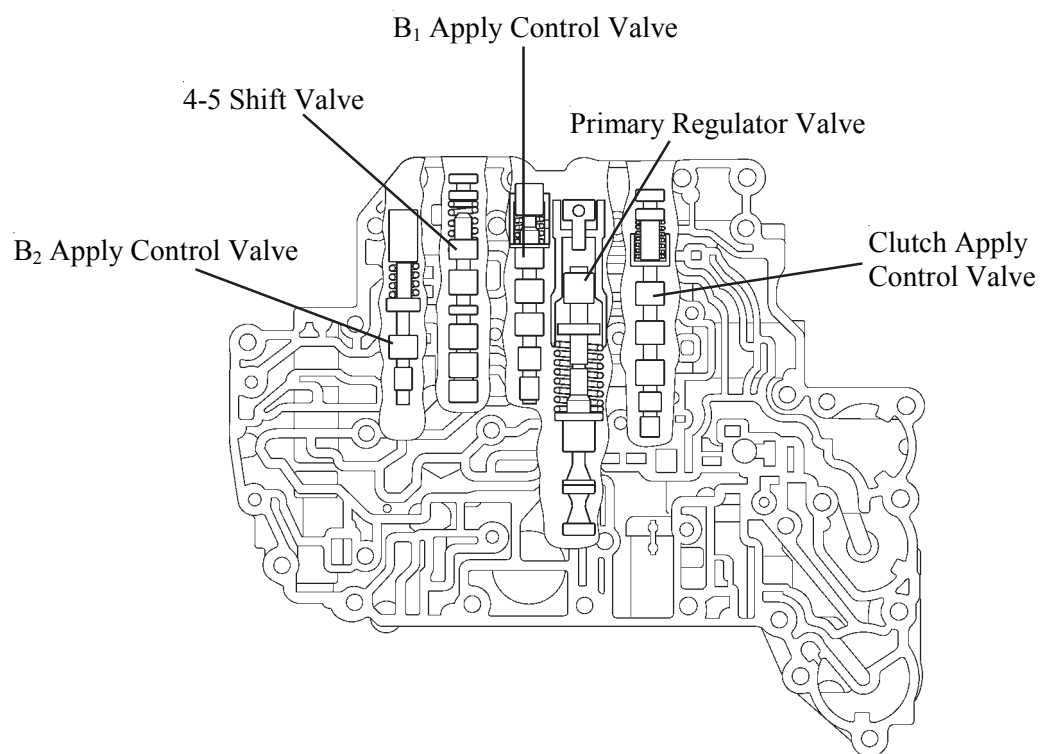
- The valve body consists of the upper and lower valve bodies and 7 solenoid valves (SL1, SL2, SL3, SLT, DSL, S4, SR).
- Apply orifice control, which controls the flow volume to the B₃ brake, is used in this unit.



► Upper Valve Body ◀



▸ Lower Valve Body ◀

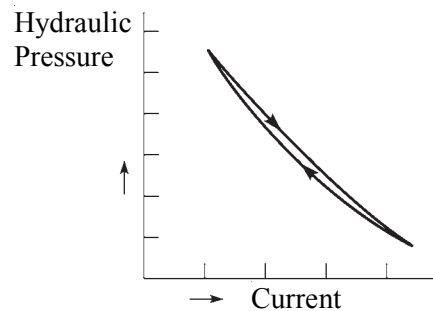
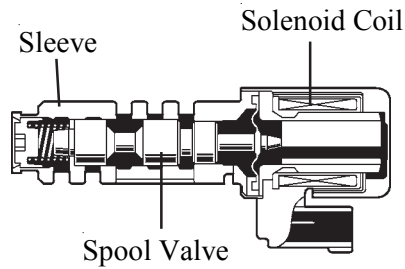


025CH23Y

2. Solenoid Valves

Solenoid Valves SL1, SL2, SL3 and SLT

- In order to provide a hydraulic pressure that is proportion to current that flows to the solenoid coil, the solenoid valves SL1, SL2, SL3, and SLT linearly control the line pressure and clutch and brake engagement pressure based on the signals received from the engine & ECT ECU.
- The solenoid valves SL1, SL2, SL3, and SLT have the same basic structure.



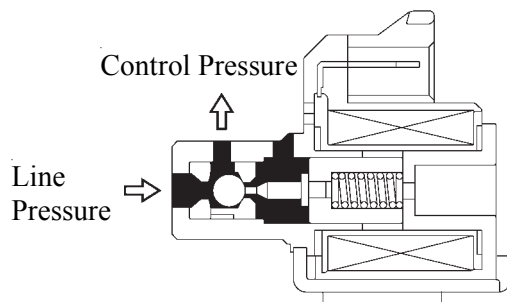
275CA51

► Function of Solenoid Valves ◀

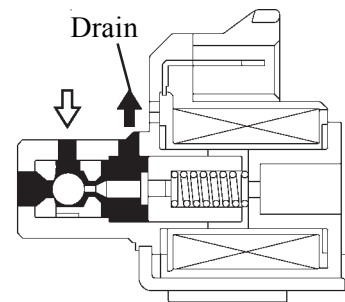
Solenoid Valve	Function
SL1	B ₁ brake pressure control
SL2	<ul style="list-style-type: none"> • C₀ clutch pressure control • Lock-up clutch pressure control
SL3	C ₁ clutch pressure control
SLT	<ul style="list-style-type: none"> • Line pressure control • Secondary pressure control

Solenoid Valve SR, S4 and DSL

- The solenoid valves SR, S4, and DSL use a three-way solenoid valve.



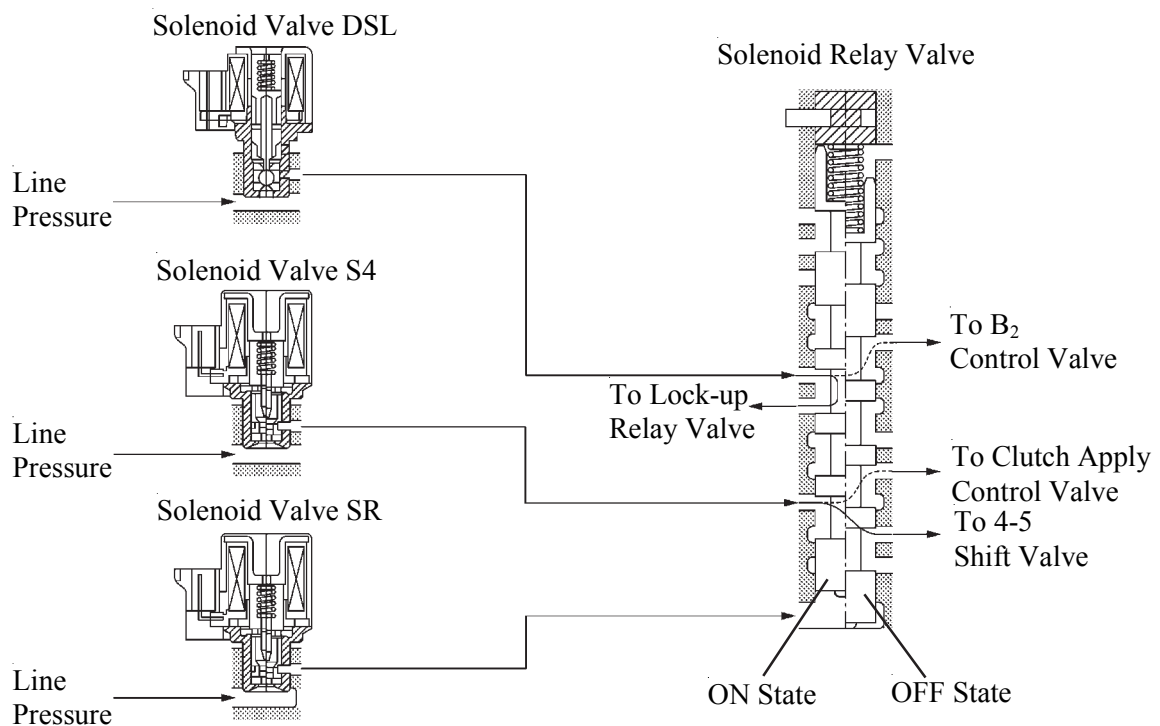
Solenoid Valve ON



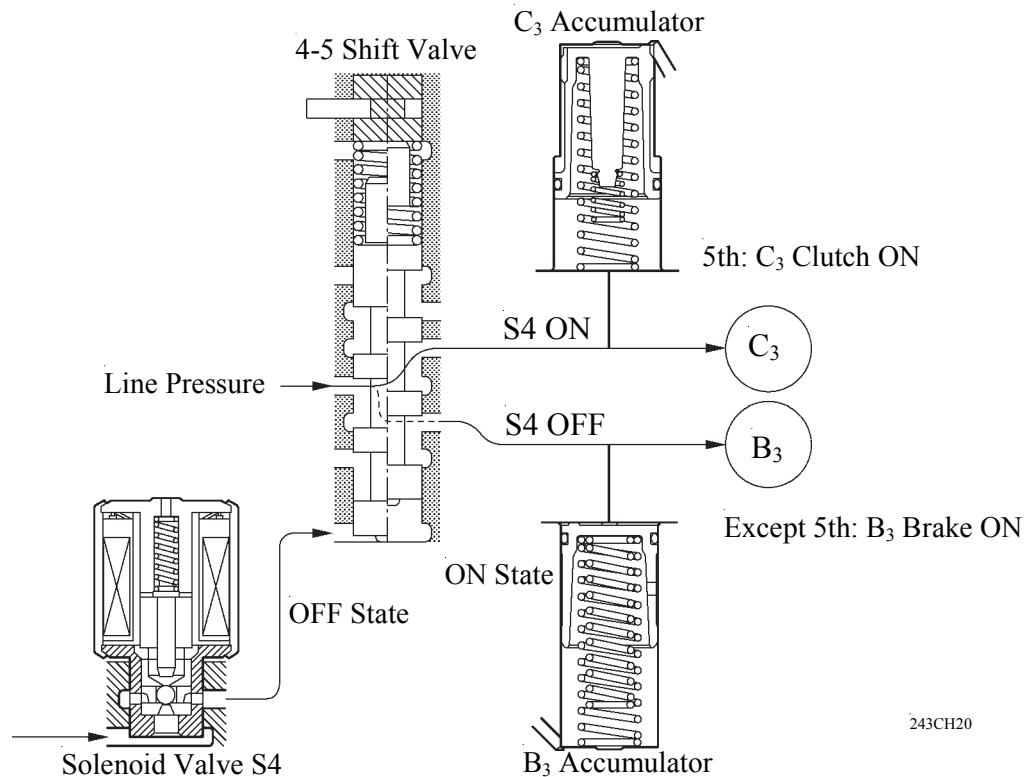
Solenoid Valve OFF

025CH11Y

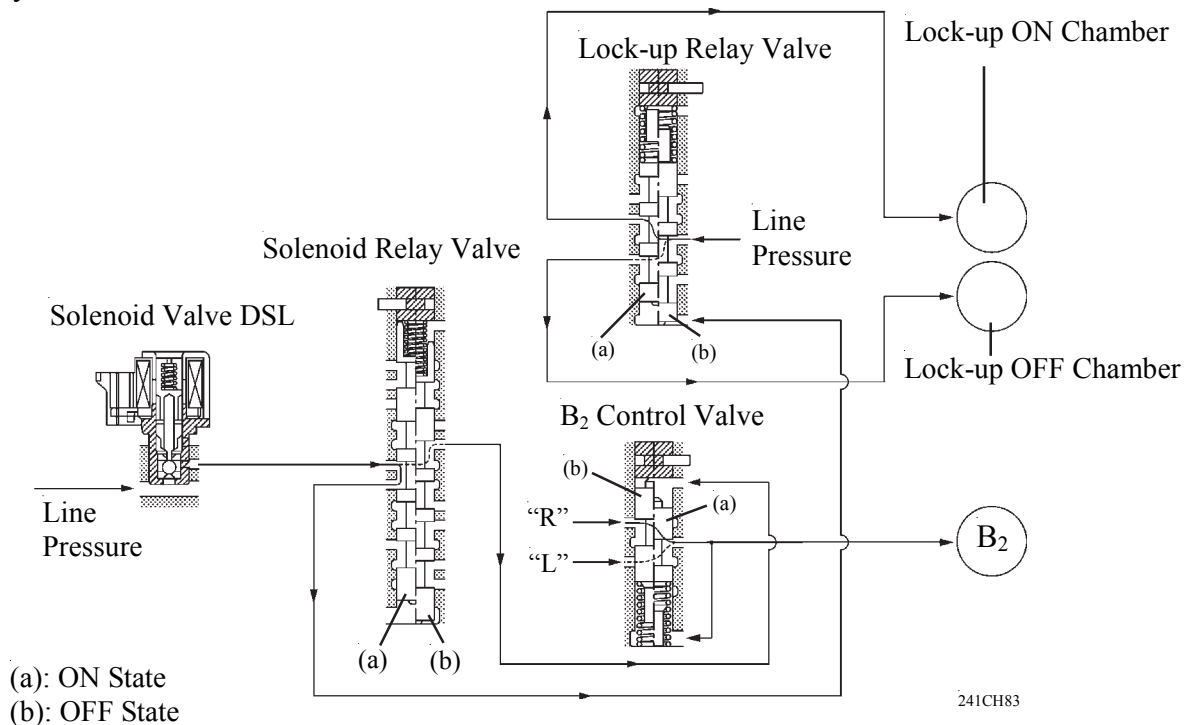
- The solenoid valve SR controls the solenoid relay valve. Accordingly, the fluid passages from the solenoid valve DSL and S4 have been changed.



- The solenoid valve S4, when set to ON, controls the 4-5 shift valve to establish the 5th by changing over the fluid pressure applied to B₃ brake and C₃ clutch.

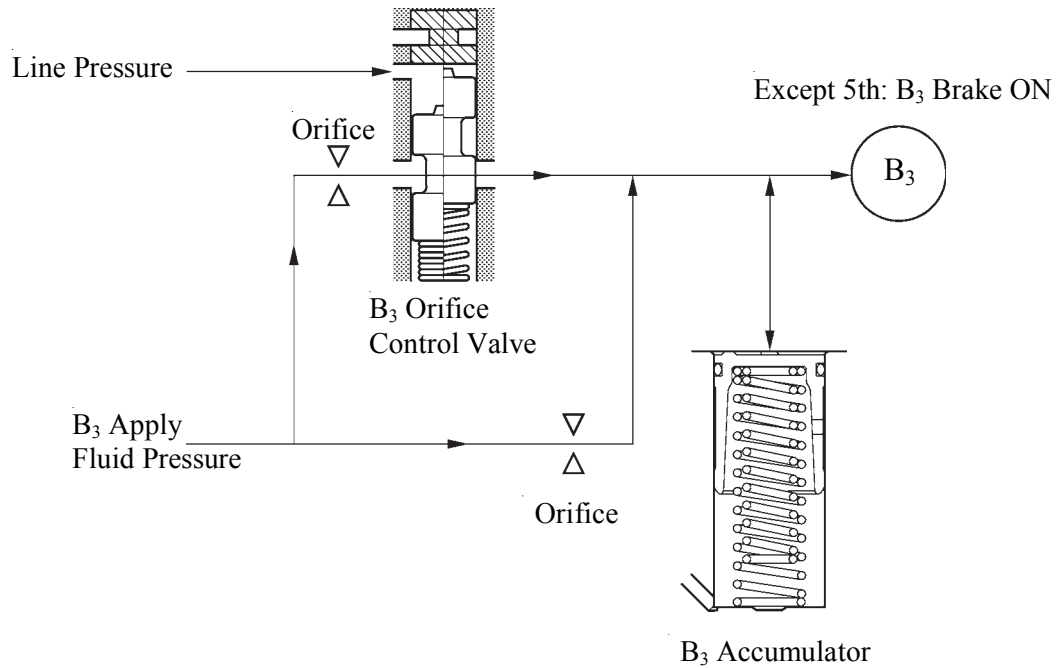


- The solenoid valve DSL controls the B₂ control valve via the solenoid relay valve when the transaxle is shifted in the R or L position. During lock-up, the lock-up relay valve is controlled via the solenoid relay valve.



3. Apply Orifice Control

This control is effected by the B_3 orifice control valve. The B_3 orifice control valve has been provided for the B_3 brake, which is applied when shifting from 5th to 4th. The B_3 orifice control valve is controlled by the amount of the line pressure in accordance with shifting conditions, and the flow volume of the fluid that is supplied to the B_3 brake is controlled by varying the size of the orifice in the control valve.



241CH84

✿ ELECTRONIC CONTROL SYSTEM

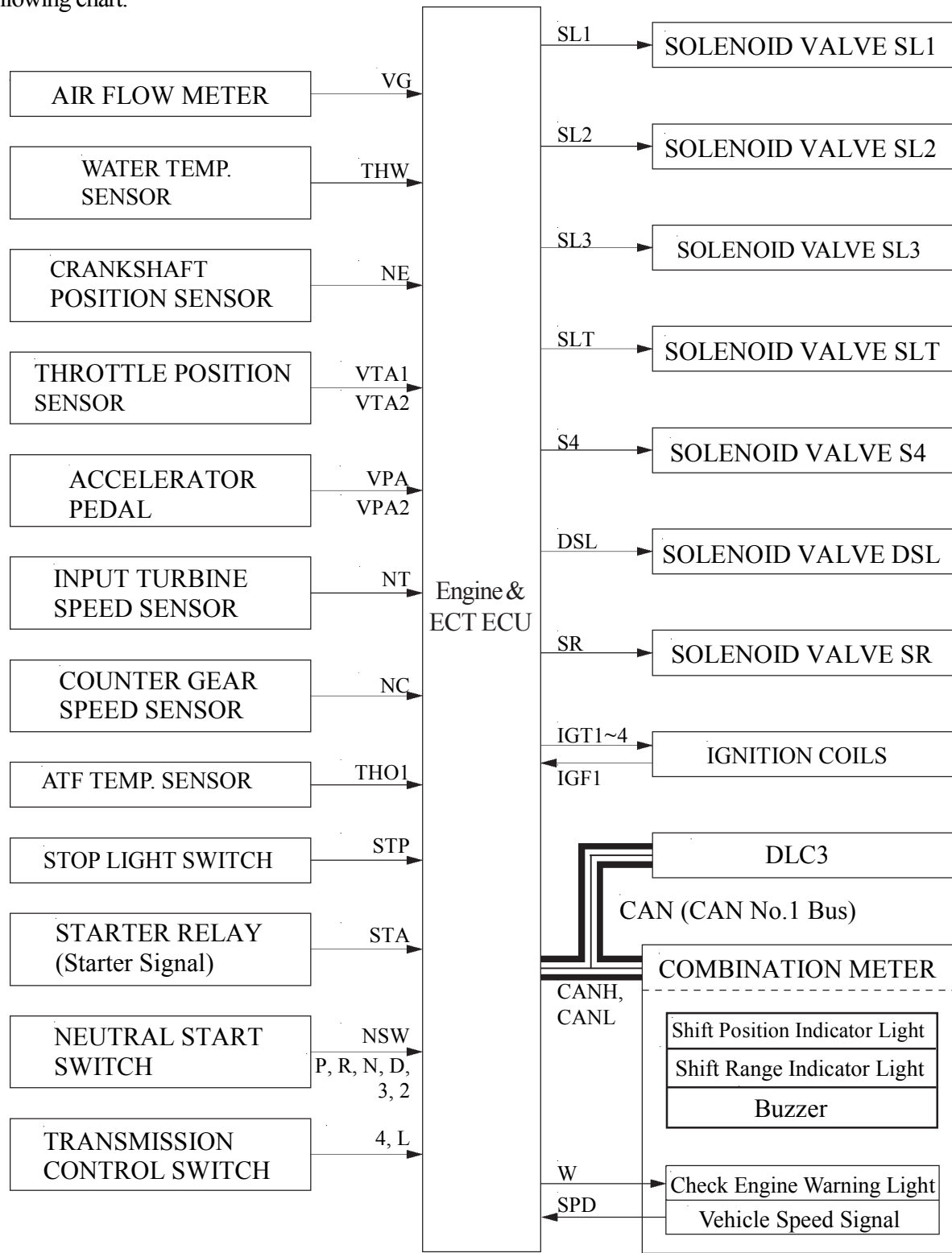
1. General

The electronic control system of the U250E automatic transaxle consists of the control listed below.

System	Outline
Shift Timing Control	The engine & ECT ECU sends current to 3 solenoid valves (SL1, SL2, and SL3) based on signals from each sensor and shifts the gear.
Clutch Pressure Control (See page CH-27)	<ul style="list-style-type: none"> Controls the pressure that is applied directly to B₁ brake, C₀ and C₁ clutches by actuating 3 solenoid valves (SL1, SL2, and SL3) in accordance with engine & ECT ECU signals. 3 solenoid valves (SL1, SL2, and SL3) minutely control the clutch pressure in accordance with the engine output and driving conditions.
Line Pressure Optimal Control (See page CH-29)	Actuates the solenoid valve SLT to control the line pressure in accordance with information from the engine & ECT ECU and the operating conditions of the transaxle.
Shifting Control in Uphill/Downhill Travelling (See page CH-30)	Controls to restrict the 4th or 5th up shift or to provide appropriate engine braking by the engine & ECT ECU to determine whether the vehicle is travelling uphill or downhill.
Lock-up Timing Control	The engine & ECT ECU sends current to the solenoid valves DSL and SL2 based on signals from each sensor and engages or disengages the lock-up clutch.
Engine Torque Control	Retards the engine ignition timing temporarily to improve shift feeling during up or down shifting.
“N” to “D” Squat Control	When the shift lever is shifted from “N” to “D” position, the gear is temporarily shifted to 3rd and then to 1st to reduce vehicle squat.
Diagnosis (See page CH-31)	When the engine & ECT ECU detects a malfunction, the engine & ECT ECU makes a diagnosis and memorizes the malfunctioning part.
Fail-safe (See page CH-31)	Even if a malfunction is detected in the sensors or solenoids, the engine & ECT ECU activates fail-safe control to prevent the vehicle's drivability from being significantly affected.

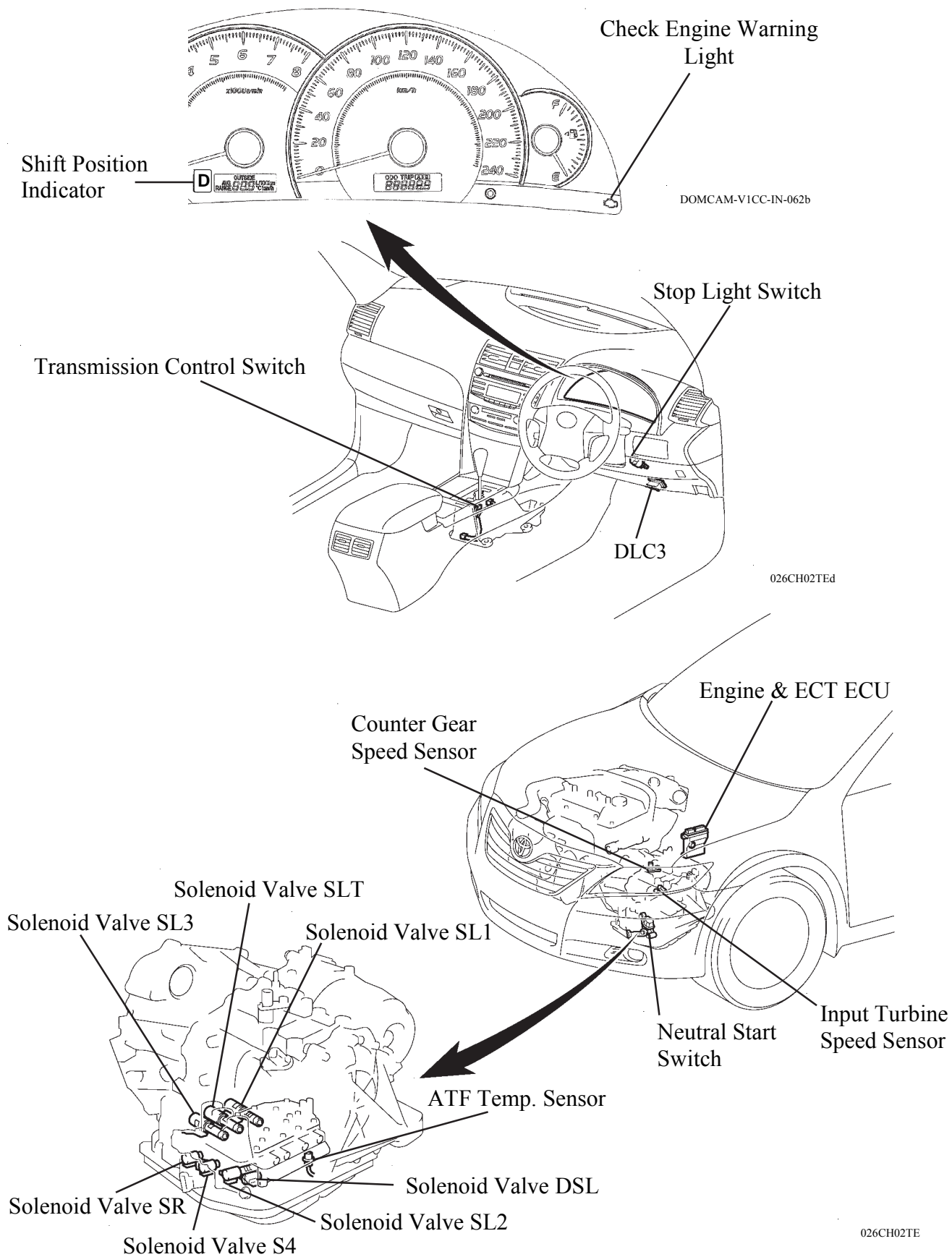
2. Construction

The configuration of the electronic control system in the U250E automatic transaxle is as shown in the following chart.



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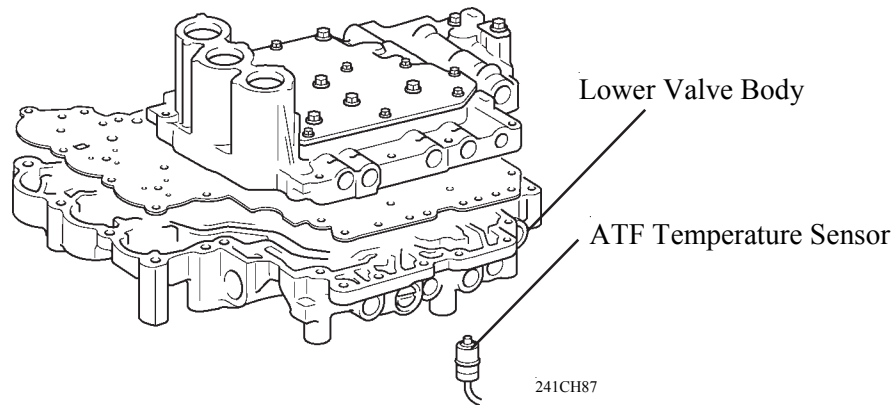
3. Layout of Main Components



4. Construction and Operation of Main Components

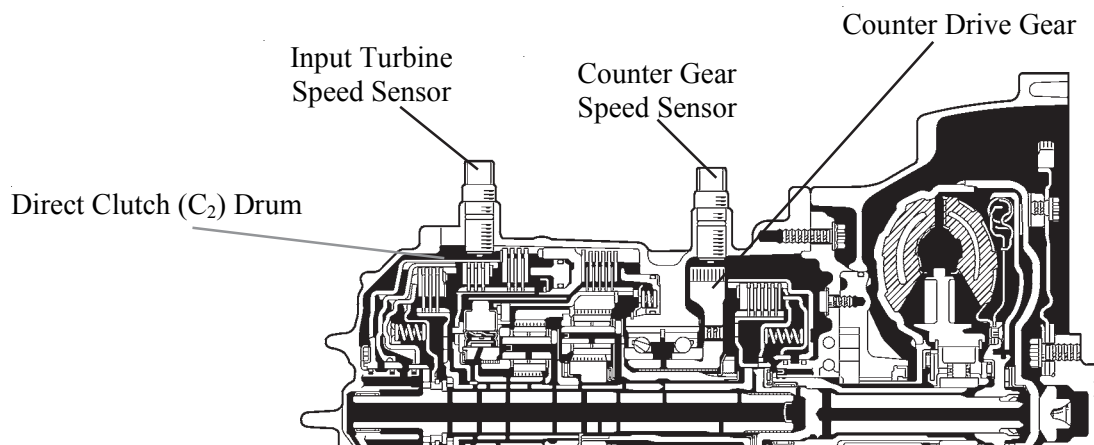
ATF Temperature Sensor

- The ATF temperature sensor is installed in the valve body for direct detection of the fluid temperature.
- The ATF temperature sensor is used for the revision of clutch and brake pressures to maintain a smooth shift quality every time.



Speed Sensors

- The U250E automatic transaxle uses an input turbine speed sensor (for the NT signal) and a counter gear speed sensor (for the NC signal). Thus, the engine & ECT ECU can detect the timing of the shifting of the gears and appropriately control the engine torque and hydraulic pressure in response to the various conditions. These speed sensors are the pick-up coil type.
- The input turbine speed sensor detects the input speed of the transaxle. The direct clutch (C_2) drum is used as the timing rotor for this sensor.
- The counter gear speed sensor detects the speed of the counter gear. The counter drive gear is used as the timing rotor for this sensor.



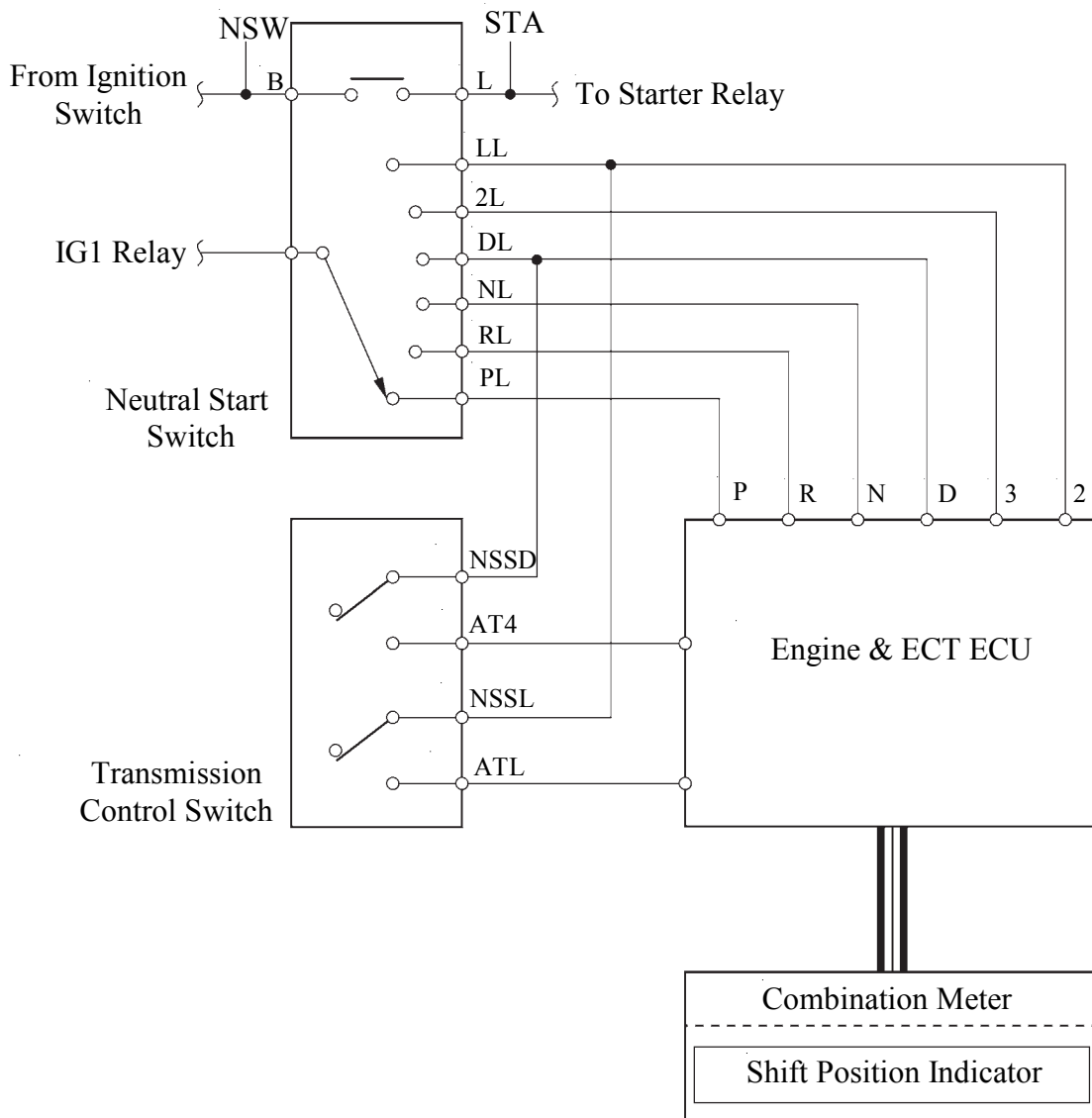
Transmission Control Switch and Neutral Start Switch

1) General

The engine & ECT ECU uses these switches to detect the shift lever position.

- On models with multi-mode automatic transmission, the engine & ECT ECU detects the shift lever positions P, R, N and D using the neutral start switch, and detects S mode shift lever positions (S, SFTU and SFTD) using the transmission control switch provided in the shift lever.
- On models without multi-mode automatic transmission mode, the engine & ECT ECU detects shift lever positions P, R, N, D, 3 and 2 using the neutral start switch, and detects shift lever positions 4 and L using the transmission control switch provided in the shift lever.
- The engine & ECT ECU sends these shift position signals to the combination meter (meter ECU) through CAN communication. The combination meter (meter ECU) controls the shift position indicator light based on these signals.

2) Wiring Diagram

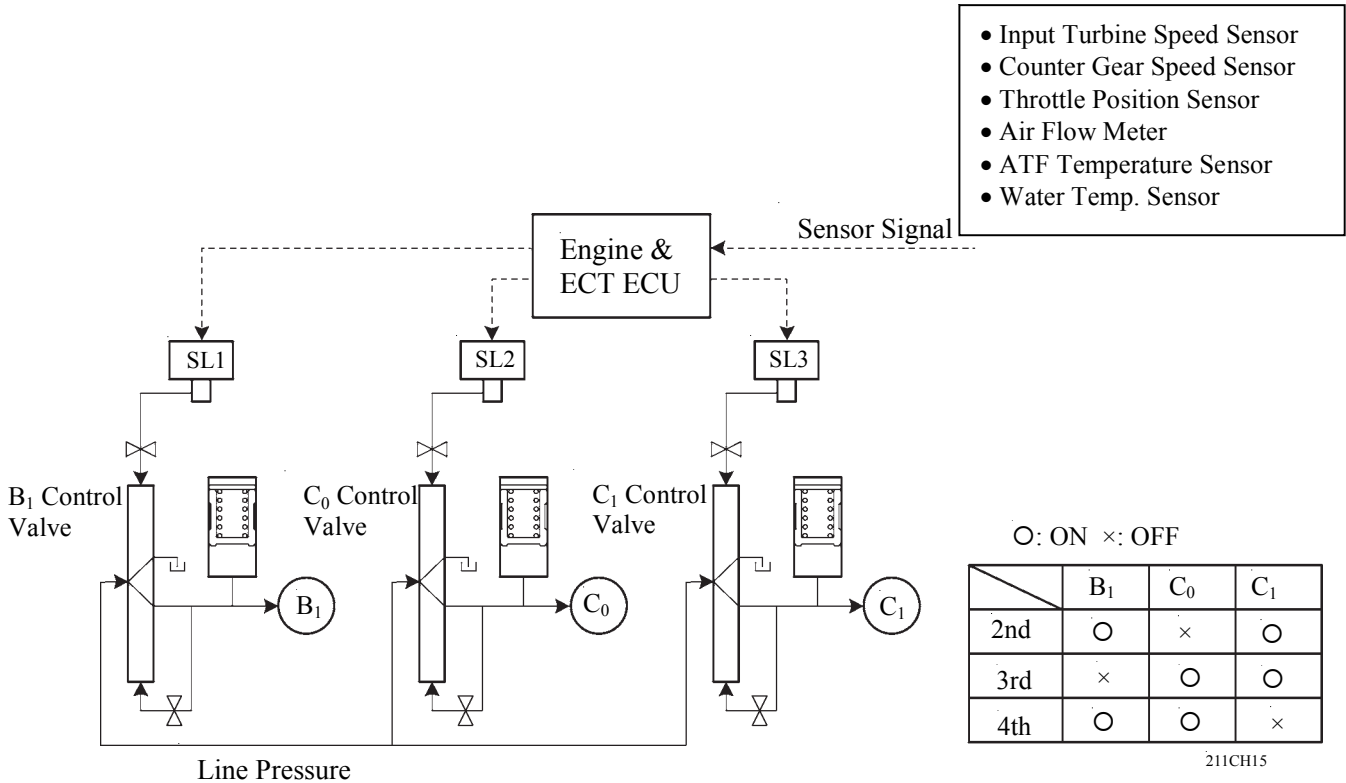


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5. Clutch Pressure Control

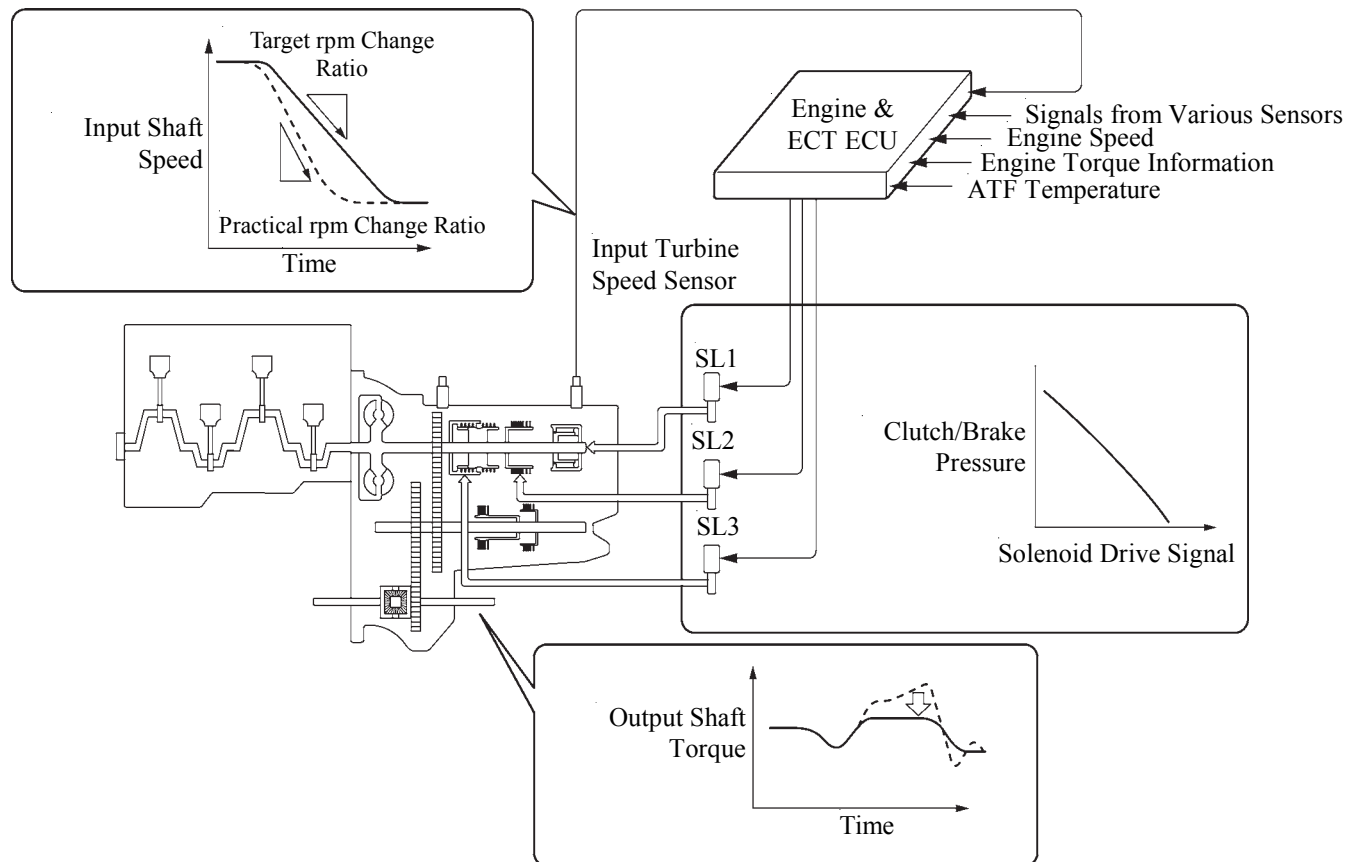
Clutch to Clutch Pressure Control

- This control is used for shifting from the 2nd to 3rd gear, and from the 3rd to 4th gear.
- Solenoid valves actuate SL1, SL2, and SL3 in accordance with the signals from the engine & ECT ECU, and guide this output pressure directly to the control valves B_1 , C_0 , and C_1 in order to regulate the line pressure that acts on the B_1 brake, C_0 and C_1 clutches. As a result, compact B_1 , C_0 and C_1 accumulators without a back pressure chamber have been realised.



Clutch Pressure Optimal Control

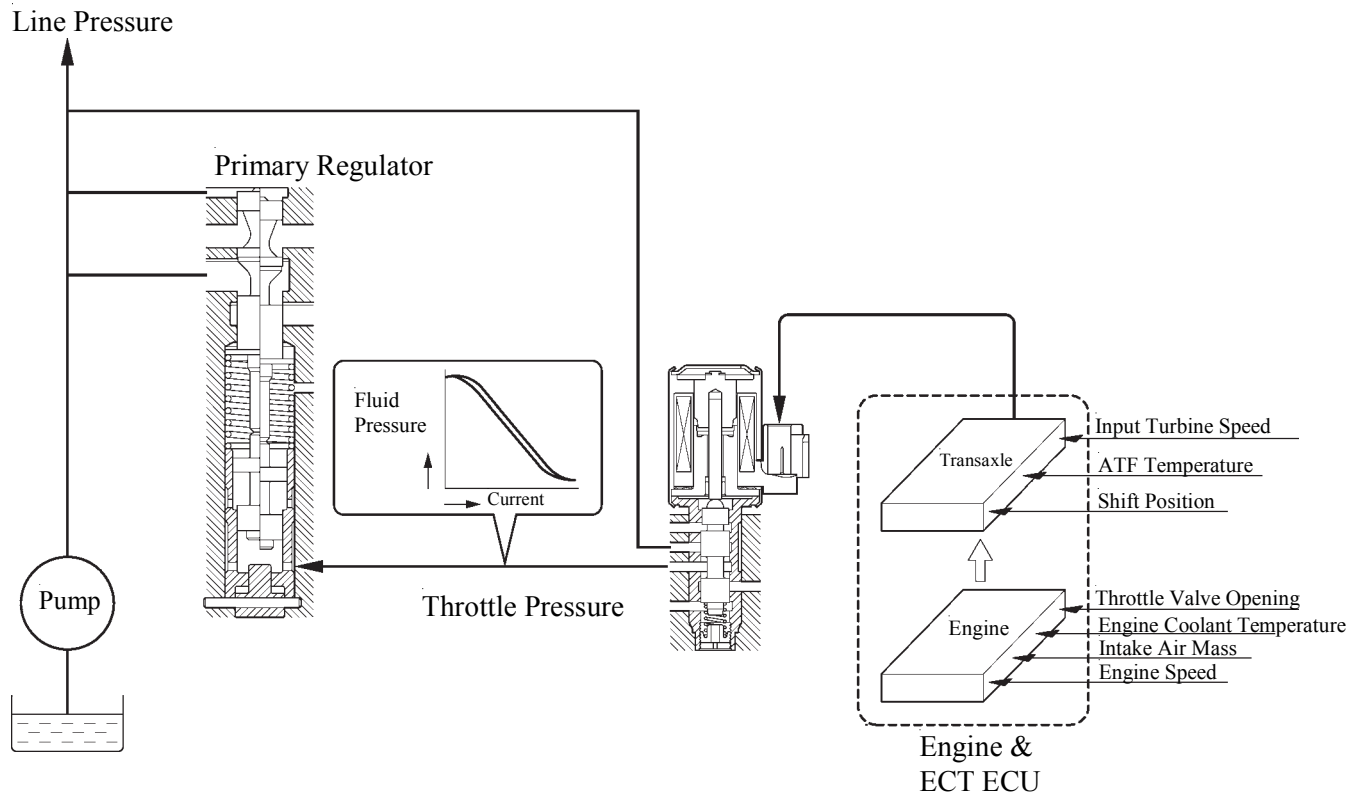
The engine & ECT ECU monitors the signals from various types of sensor such as the input turbine speed sensor, allowing shift solenoid valves SL1, SL2, and SL3 to minutely control the clutch pressure in accordance with engine output and driving conditions. As a result, smooth shift characteristics have been realised.



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6. Line Pressure Optimal Control

The line pressure is controlled by using solenoid valve SLT. Through the use of solenoid valve SLT, the line pressure is optimally controlled in accordance with the engine torque information, as well as with the internal operating conditions of the torque converter and the transaxle. Accordingly, the line pressure can be accurately controlled in accordance with the engine output, travelling condition, and the ATF temperature, thus realising smooth shift characteristics and optimising the workload of the oil pump.



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7. Shifting Control in Uphill/Downhill Travelling

General

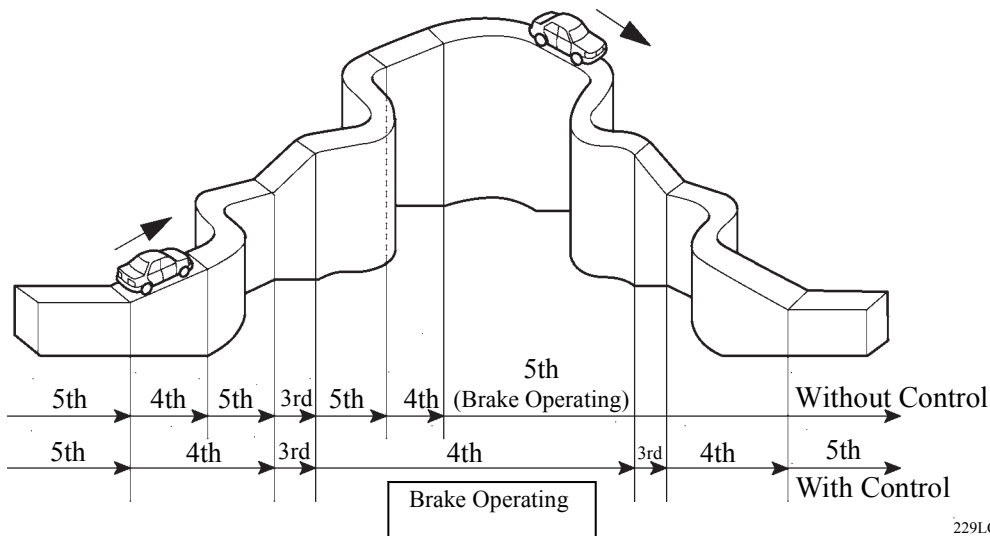
This control helps minimise the shifting of gears when the driver operates the accelerator pedal while driving on a winding road with ups and downs, in order to ensure a smooth drive.

Shift Control in Uphill Travelling

- When the engine & ECT ECU determines uphill travel, it prohibits the transaxle from shifting up into 5th after the transaxle has shifted down below 4th.
- When the engine & ECT ECU determines uphill travel with a steeper grade, it prohibits the transaxle from shifting up into 4th after the transaxle has shifted down below 3rd.

Shift Control in Downhill Travelling

- When the engine & ECT ECU determines downhill travel, it shifts down the transaxle from 5th to 4th in accordance with the brake operation signal that is input when the driver operates the brake pedal.
- When the engine & ECT ECU determines downhill travel with a steeper grade, and a brake operation signal is input again, the engine & ECT ECU shifts the transaxle down from 4th to 3rd.



Uphill/Downhill Judgment

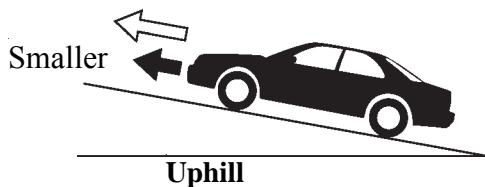
The actual acceleration calculated from the speed sensor signal is compared with the reference acceleration stored in the engine ECT ECU to judge uphill or downhill travelling.

Actual Acceleration < Reference Acceleration

Actual Acceleration > Reference Acceleration

← Reference acceleration

← Actual acceleration



8. Diagnosis

- When the engine & ECT ECU detects a malfunction, the engine & ECT ECU makes a diagnosis and memorises the information related to the fault. Furthermore, the check engine warning light in the combination meter illuminates or blinks to inform the driver of the malfunction.
- At the same time, the DTC (Diagnosis Trouble Code) are stored in the memory. The DTC can be read by connecting an intelligent tester II.
- For details, see the Camry Repair Manual.

9. Fail-safe

This function minimises the loss of operation when any abnormality occurs in a sensor or solenoid.

► Fail-safe Control List ◀

Malfunction Part	Function
Speed Sensor	During a speed sensor malfunction, the vehicle speed is detected through the signals from the counter gear speed sensor to affect normal control.
Counter Gear Speed Sensor	During a counter gear speed sensor malfunction, 5th up shift is prohibited.
ATF Temp. Sensor	During an ATF temperature sensor malfunction, 5th up shift is prohibited.
Solenoid Valve SL1, SL2, SL3, and S4	The current to the failed solenoid valve is cut off and control is affected by operating other solenoid valves with normal operation. Shift control is affected as described in the table in the next page, depending on the failed solenoid. Even if the engine starts under this condition, the gear position remains where it was before.

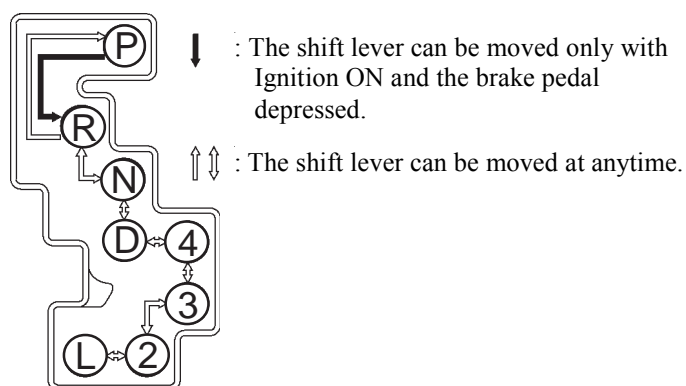
○: ON ✕: OFF

Normal	Solenoid Valve	SL1	○	✕	○	✕	✕
		SL2	○	○	✕	✕	✕
		SL3	✕	✕	✕	○	○
		S4	✕	✕	✕	✕	○
	Gear Position		1st	2nd	3rd	4th	5th
SL1 Malfunction (During driving at 1st or 2nd)	Solenoid Valve	SL1	✕				
		SL2	○	○	○	○	○
		SL3	✕	✕	✕	○ → ✕	○ → ✕
		S4	✕	✕	✕	✕	○ → ✕
	Gear Position		1st → 2nd	2nd	3rd → 2nd	4th → 2nd	5th → 2nd
SL1 Malfunction (During driving at 3rd)	Solenoid Valve	SL1	✕				
		SL2	○ → ✕	○ → ✕	✕	✕	✕
		SL3	✕	✕	✕	○ → ✕	○ → ✕
		S4	✕ → ○	✕ → ○	✕ → ○	✕ → ○	○
	Gear Position		1st → 4th	2nd → 4th	3rd → 4th	4th	5th → 4th
SL1 Malfunction (During driving at 4th or 5th)	Solenoid Valve	SL1	✕				
		SL2	○ → ✕	○ → ✕	✕	✕	✕
		SL3	✕ → ○	✕ → ○	✕ → ○	○	○
		S4	✕	✕	✕	✕	○
	Gear Position		1st → 4th	2nd → 4th	3rd → 4th	4th	5th
SL2 Malfunction	Solenoid Valve	SL1	○	✕ → ○	○	✕ → ○	✕ → ○
		SL2	✕				
		SL3	✕	✕	✕	○ → ✕	○ → ✕
		S4	✕ → ○	✕ → ○	✕ → ○	✕ → ○	○
	Gear Position		1st → 4th	2nd → 4th	3rd → 4th	4th	5th → 4th
SL3 Malfunction	Solenoid Valve	SL1	○	✕	○	✕ → ○	✕ → ○
		SL2	○	○	✕	✕	✕
		SL3	✕				
		S4	✕	✕	✕	✕ → ○	○
	Gear Position		1st	2nd	3rd	4th	5th → 4th
S4 Malfunction	Solenoid Valve	SL1	○	✕	○	✕	✕
		SL2	○	○	✕	✕	✕
		SL3	✕	✕	✕	○	○
		S4	✕				
	Gear Position		1st	2nd	3rd	4th	5th → 4th
SL1, SL2, SL3, and S4 Malfunction	Solenoid Valve	SL1	✕				
		SL2	✕				
		SL3	✕				
		S4	✕				
	Gear Position		1st → 4th	2nd → 4th	3rd → 4th	4th	5th → 4th

SHIFT CONTROL MECHANISM

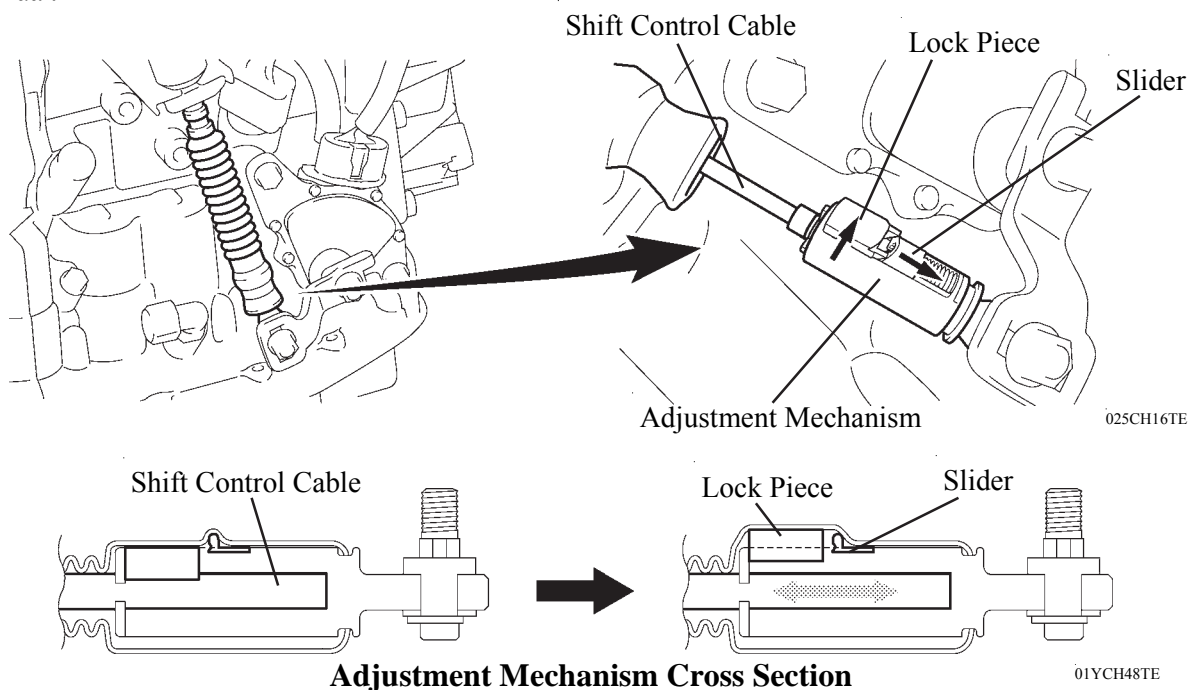
1. General

- A gate type shift lever is used in conjunction with the 5-speed automatic transaxle. With the gate type lever, the shift lever button and the overdrive switch of the straight type shift lever are discontinued. Similar functions are achieved through a single-shift operation (fore-aft and side-to-side).
- The shift control cable with a length adjustment mechanism is used.
- A shift lock system is used.



Service Tip

The shift control cable is fixed by the lock piece of the adjustment mechanism. Adjustment of the shift control cable is possible by releasing the lock piece from the cable. For details, see the Camry Repair Manual.



2. Shift Lock System

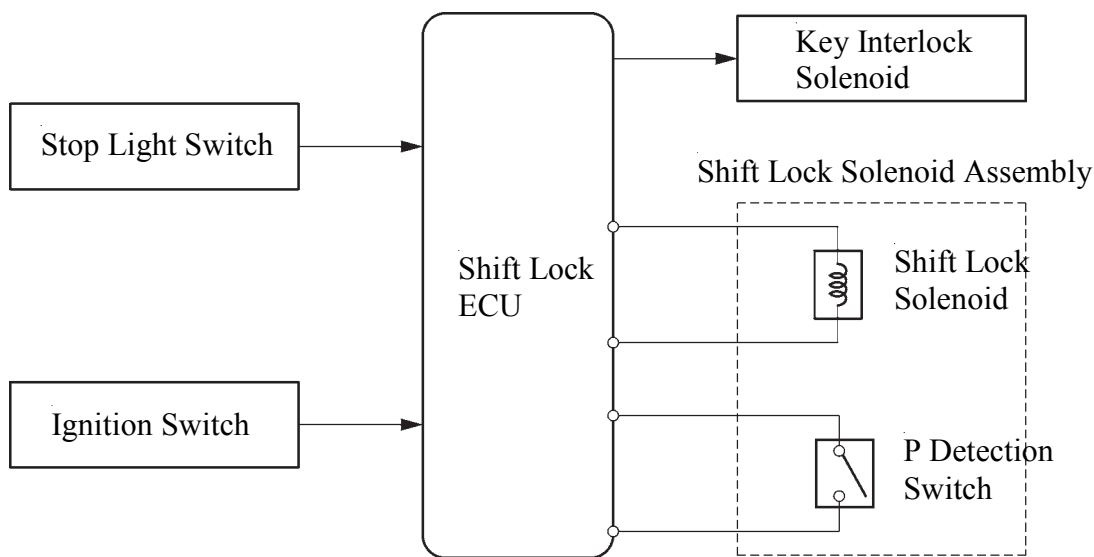
General

The shift lock system function setting is as follows:

Key Interlock	○
Shift Lock	○

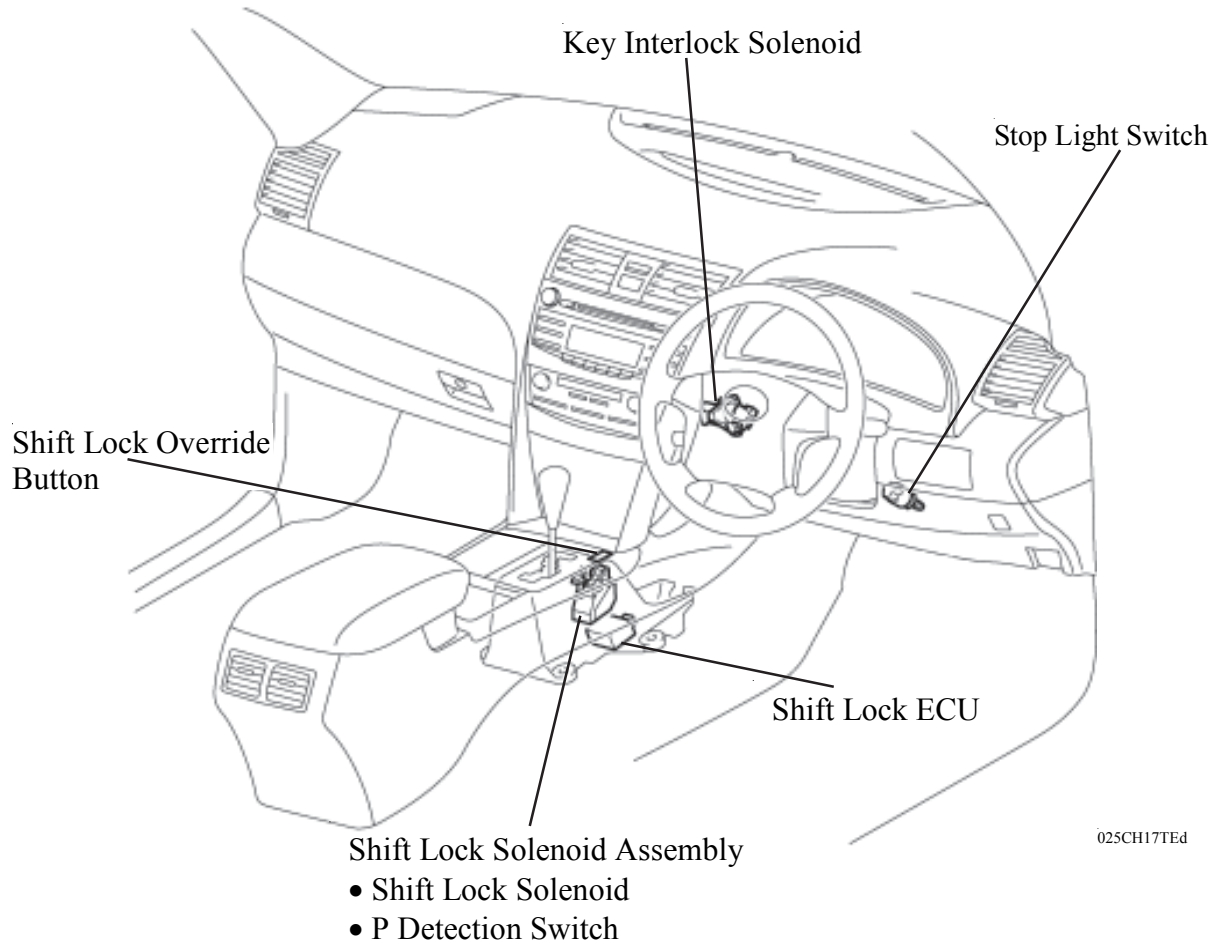
- The key interlock device prevents the key from being pulled out after the ignition switch is turned OFF, unless the shift lever is moved to the P position. Thus, the driver must park the vehicle in the P position.
- The shift lock mechanism prevents the shift lever from being shifted to any position other than the P position, unless the ignition switch is ON, and the brake pedal is depressed. This mechanism helps to prevent unintentional vehicle movement when shifting from the P (park) position.
- The shift lock system mainly consists of the shift lock ECU, shift lock solenoid, key interlock solenoid and shift lock override button.
- The shift lock solenoid has a built-in P detection switch.

▸ System Diagram ◀



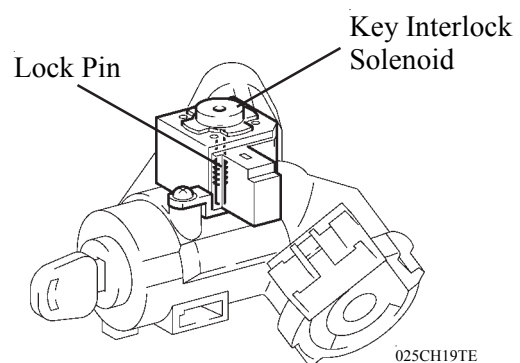
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Layout of Main Components



Key Interlock Solenoid

The activation of the key interlock solenoid that is mounted on the upper column bracket moves the lock pin to restrict the movement of the key cylinder. Therefore, if the shift lever is shifted to any position other than “P”, the ignition key cannot be moved from “ACC” to the “LOCK” position.



System Operation

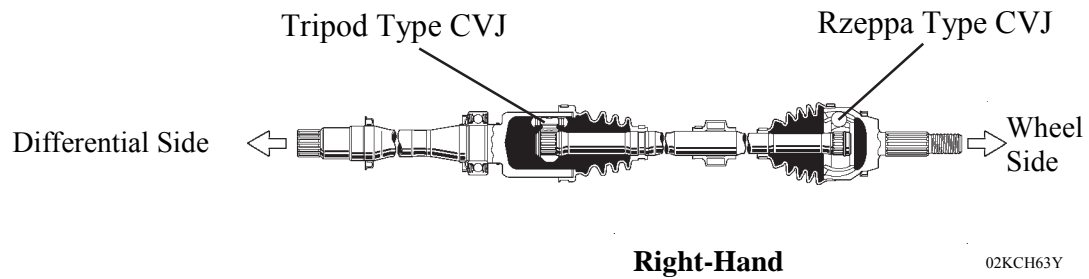
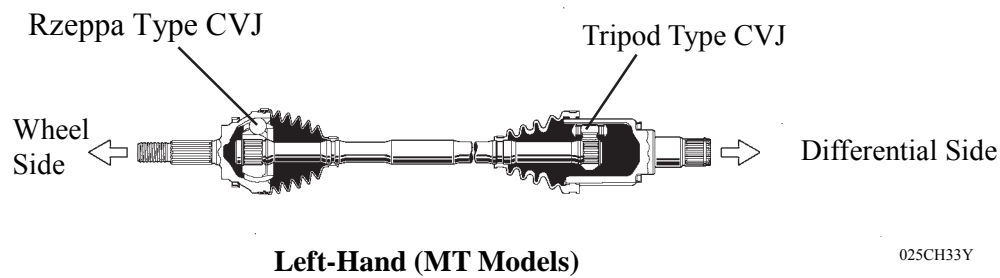
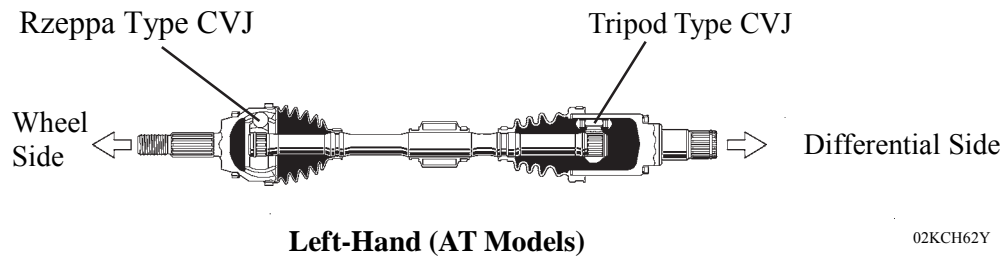
- The shift lock ECU uses the P detection switch to detect the shift lever position, and receives inputs from the stop light switch and the ignition switch. Upon receiving these signals, the shift lock ECU turns ON the key interlock solenoid and the shift lock solenoid in order to release the key interlock and shift lock.
- A shift lock override button, which manually overrides the shift lock mechanism, is used in case of failure.

DRIVE SHAFT



DESCRIPTION

The drive shaft uses a tripod type CVJ (Constant Velocity Joint) on the differential side, and Rzeppa type CVJ on the wheel side.

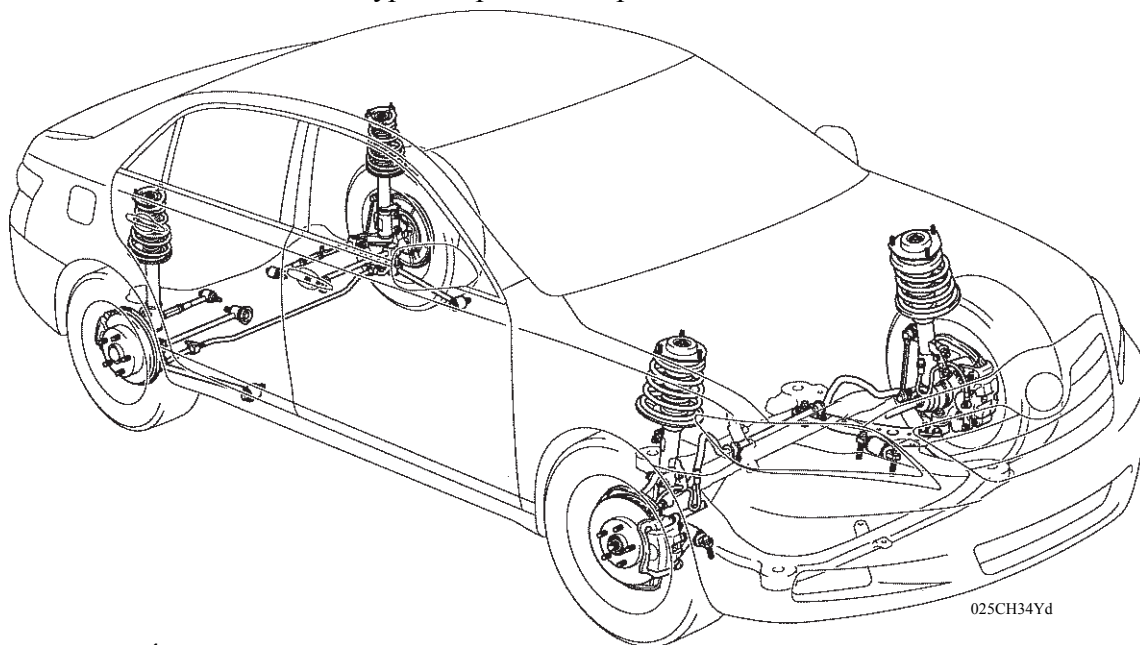


SUSPENSION AND AXLE

✱ SUSPENSION

1. General

- MacPherson strut type independent suspension is used for the front.
- Dual link MacPherson strut type independent suspension is used for the rear.



► Specifications ◀

Transaxle Type		E354	U250E
Front Wheel Alignment	Type	MacPherson Strut	←
	Tread* ¹ mm	1,575	←
	Caster* ¹ degrees	2°50',* ² 2°55'	2°40',* ² 2°45', 2°50',* ³
	Camber* ¹ degrees	-0°30',* ² -0°40'	-0°35',* ² -0°45'
	Toe-in* ¹ mm	0	←
	King Pin Inclination* ¹ degrees	11°55',* ² 12°10', 12°15',* ³	12°05',* ² 12°20'
Rear Wheel Alignment	Type	Dual Link MacPherson Strut	←
	Tread* ¹ mm	1,565	←
	Camber* ¹ degrees	1°19', 1°25',* ³	←
	Toe-in* ¹ mm	4	←

*¹ : Unloaded Vehicle Condition

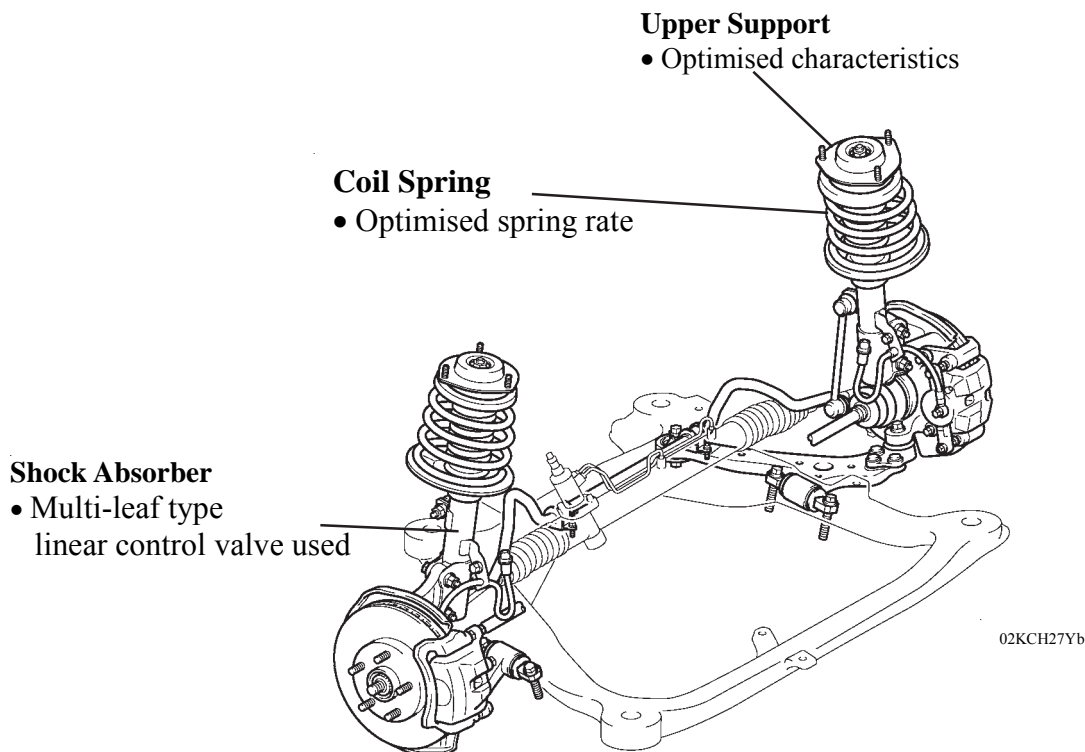
*² : Rough Road Package

*³ : Sportivo grade

2. Front Suspension

General

Through the optimal location of components, and the use of Nachlauf geometry, the front suspension provides excellent riding comfort and controllability.

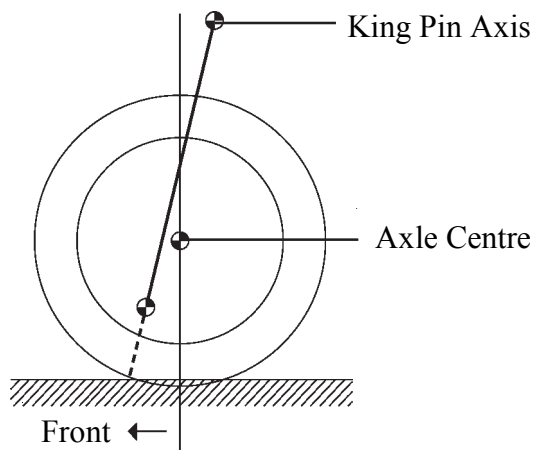


Service Tip

To prevent hazardous conditions, make sure to empty the gas from the shock absorber before discarding a low-pressure (N_2) gas sealed shock absorber. For details, see the Camry Repair Manual.

Nachlauf Geometry

The front suspension uses the Nachlauf geometry in which the king pin axis is located ahead of the axle centre. As a result, excellent straight-line stability and steering feel has been improved.



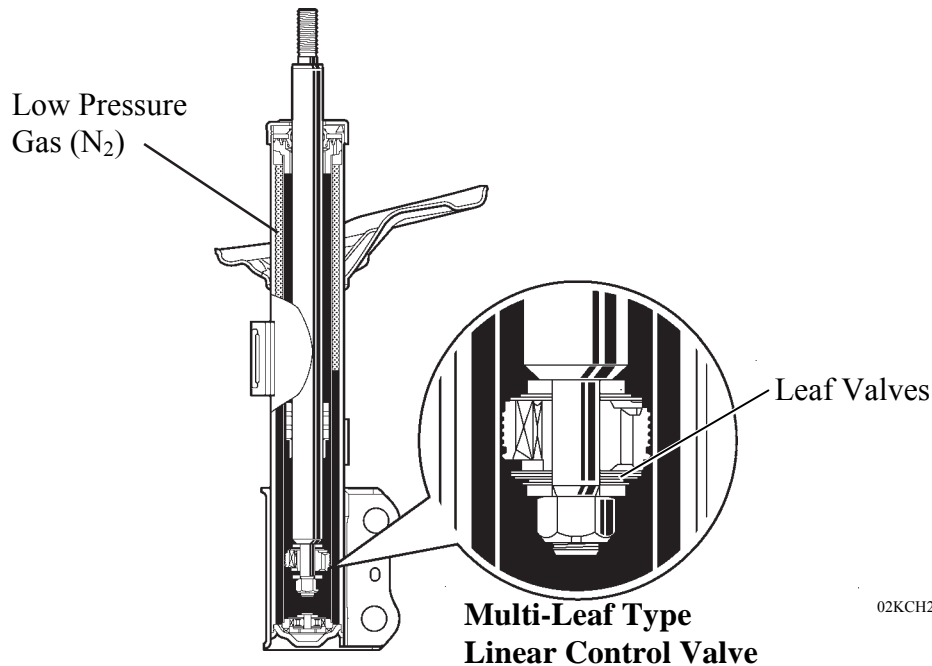
181CH22

Shock Absorber

1) General

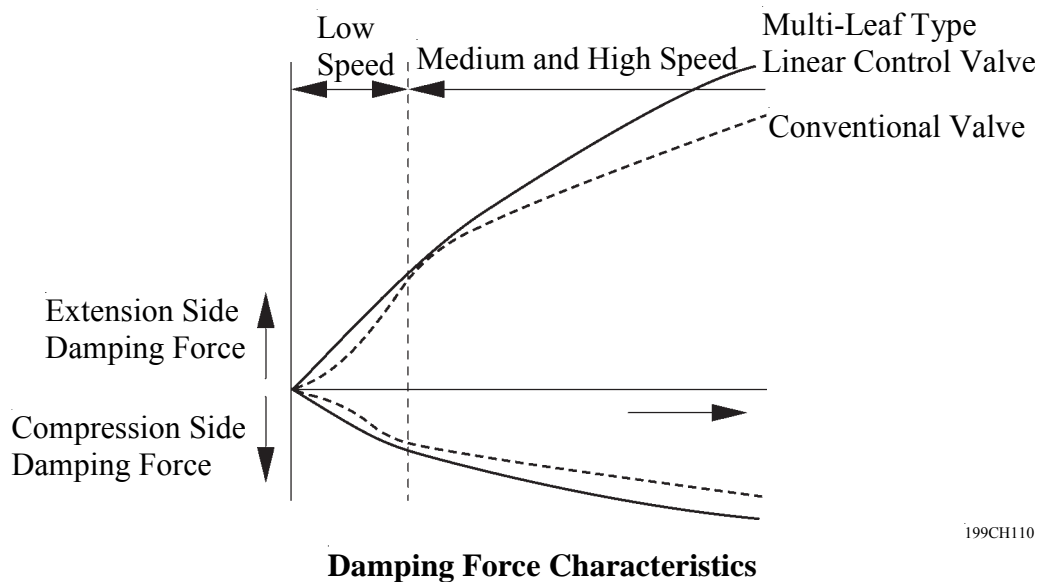
The two functions listed below are used for the shock absorber to realise both driving stability and riding comfort.

- A low-pressure (N_2) gas sealed type construction is used to suppress cavitation.
- A multi-leaf type linear control valve is used to attain linear damping force characteristics.



2) Construction of Multi-Leaf type Linear Control Valve

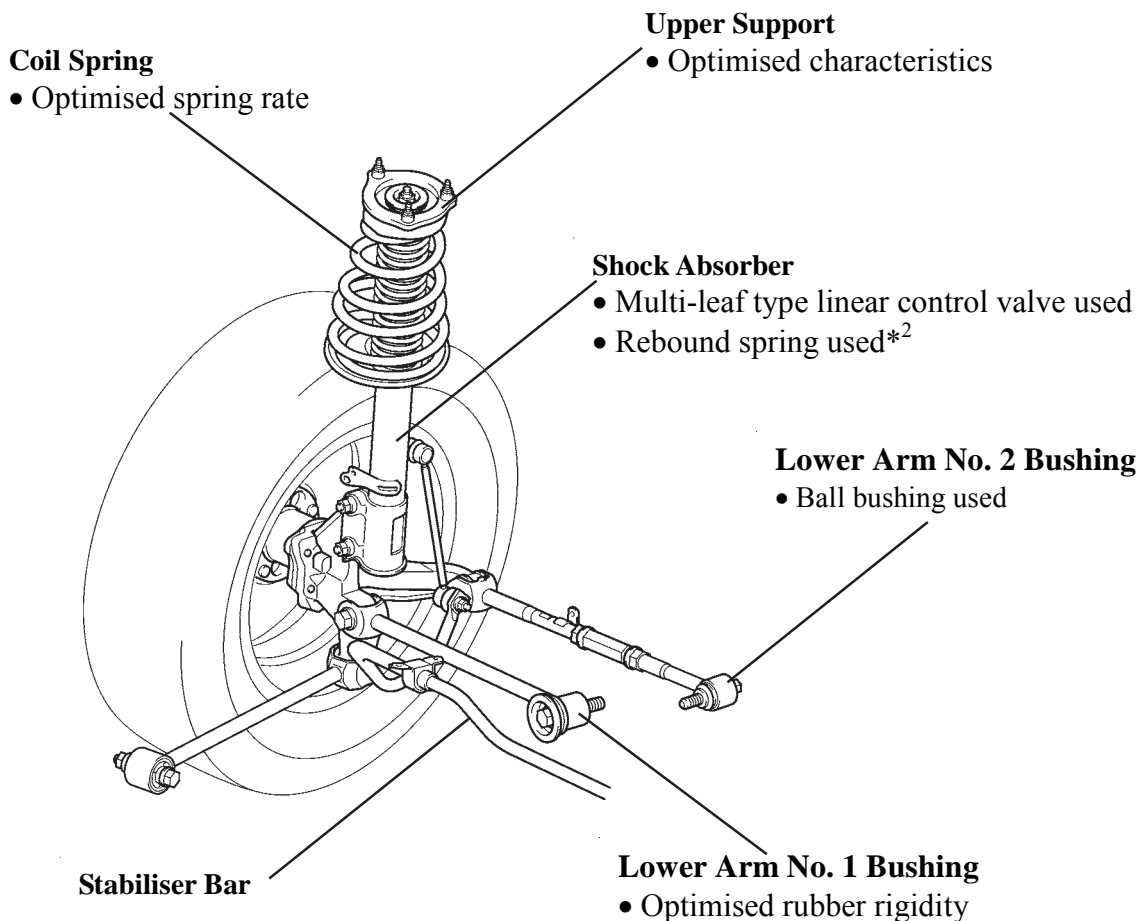
The multi-leaf type linear control valve has a structure consisting of several layered leaf valves with different diameters. Through use of the multi-leaf type linear control valve, changes in the damping force are made constant at low piston speeds, thus realising excellent riding comfort and controllability.



3. Rear Suspension

General

Excellent stability and controllability have been realised by optimising the suspension geometry and allocation of components.



02KCH29Y

*²: For Sportivo only

Service Tip

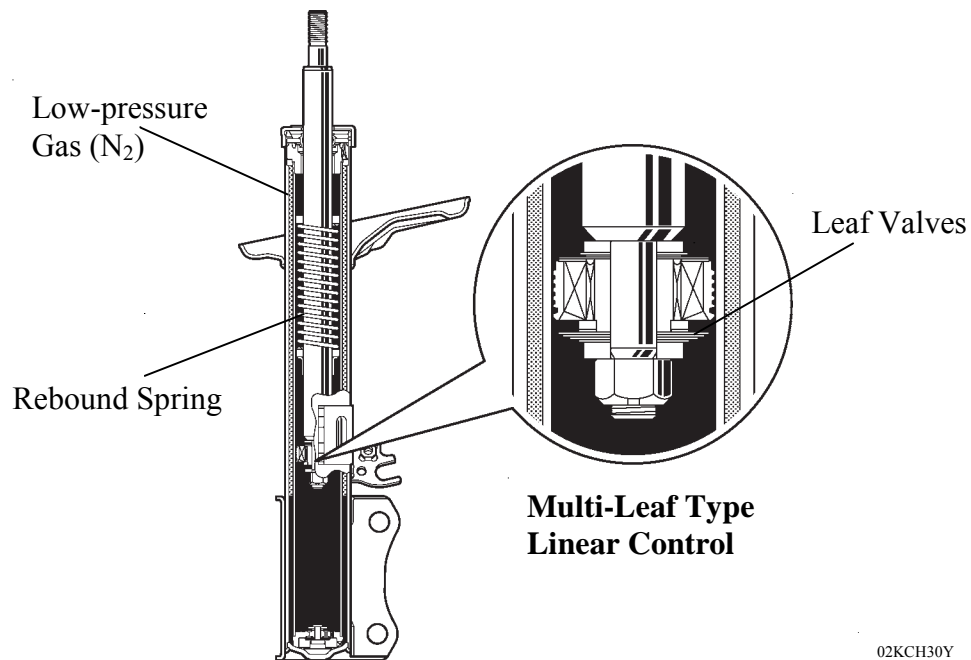
To prevent hazardous conditions, make sure to empty the gas from the shock absorber before discarding a low-pressure (N₂) gas sealed shock absorber. For details, see the Camry Repair Manual.

Shock Absorber

1) General

The three functions listed below are used for the shock absorber to realise both driving stability and riding comfort.

- A low-pressure (N_2) gas sealed type construction is used to suppress cavitation.
- A multi-leaf type linear control valve is used to attain linear damping force characteristics. For details, refer to Front Suspension section on page CH-39.
- A rebound spring is used on Sportivo grade models to improve vehicle stability during cornering.

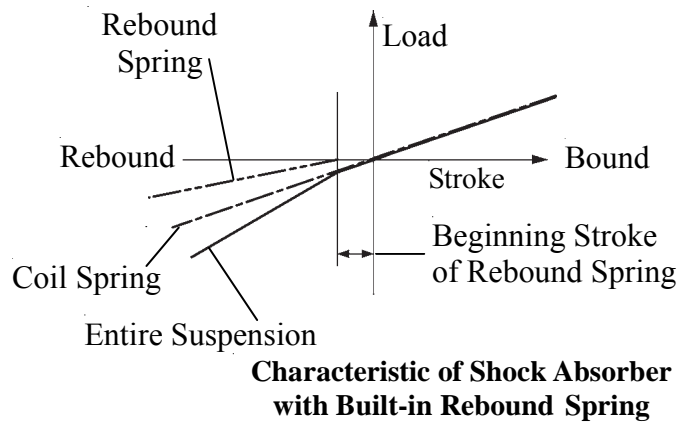


02KCH30Y

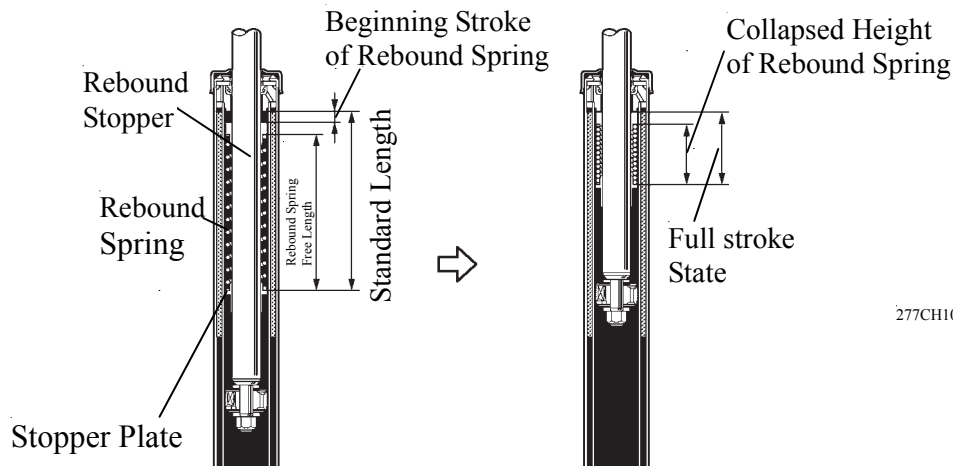
Sportivo Grades

2) Rebound Spring

The function of the built-in rebound spring is to combine with the function of the coil spring in order to restrain the elongation of the entire suspension during rebounds. Consequently, only the function of the coil spring is applied when the suspension stroke is small during normal driving, in order to realise a soft and comfortable ride. However, when the inner wheel makes large rebounds, such as when the vehicle is cornering, the functions of both the rebound spring and the coil spring are combined in order to reduce the elongation of the entire suspension. As a result, the vehicle has excellent manoeuvrability and stability.

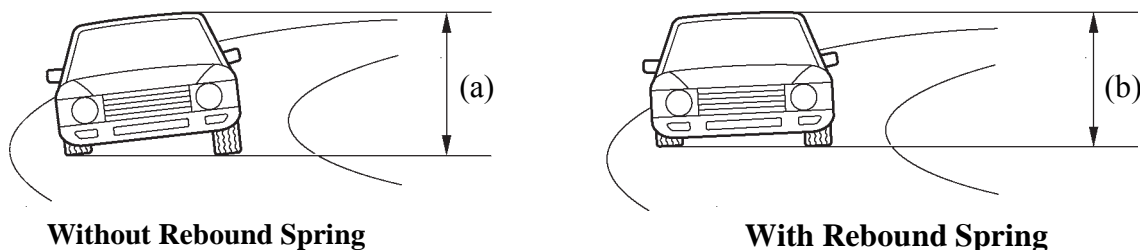


185CH16



277CH107

► During Cornering ◀

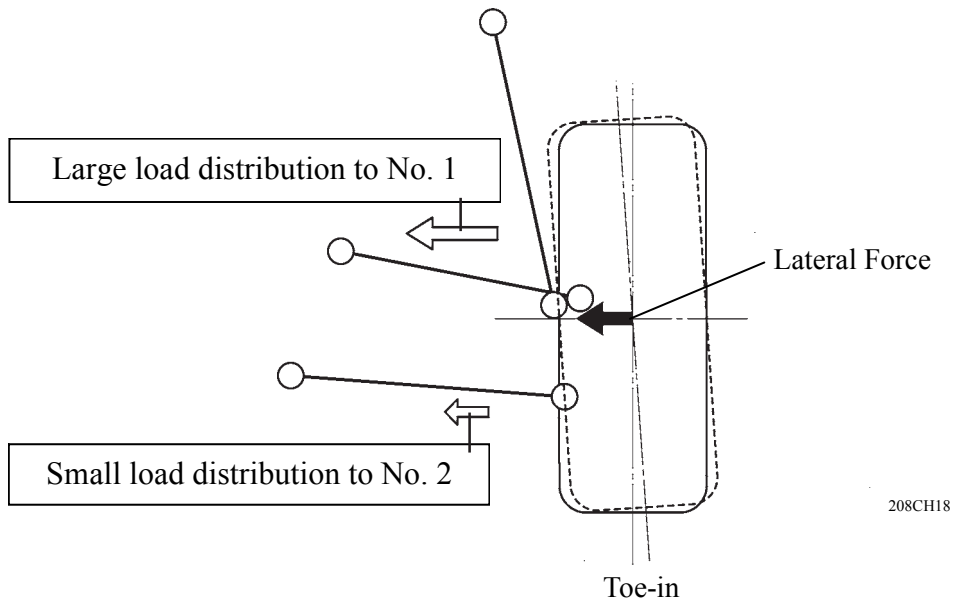


$(a) > (b)$

02KCH58Y

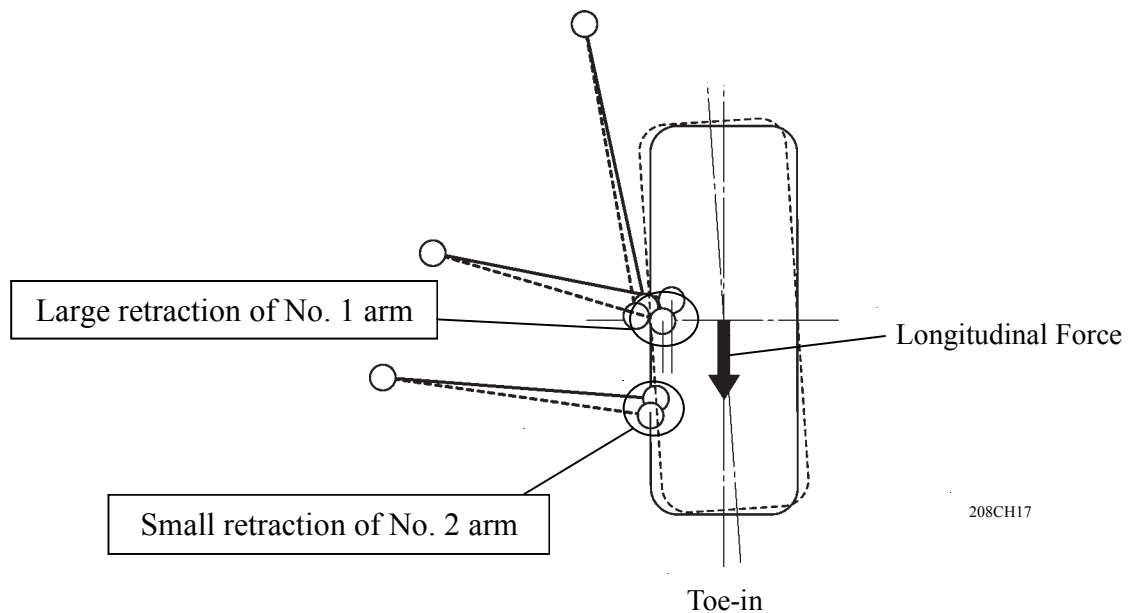
Cornering Geometry

When a lateral force is generated, the load becomes distributed to the No. 1 and No. 2 suspension arms. The illustration shown below indicates the lateral force distribution on suspension arms of the right side rear wheel during left cornering. This causes the wheels to toe-in, in order to ensure the proper stability of the rear suspension.



Braking Geometry

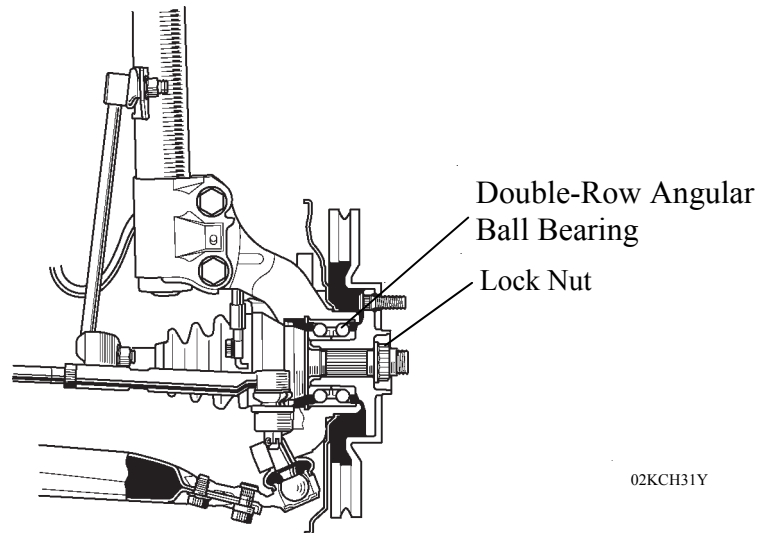
When the longitudinal force is generated, the displacement locus of the No. 1 and No. 2 suspension arms will toe-in as shown below, in order to ensure the stability of the vehicle.



✱ AXLE

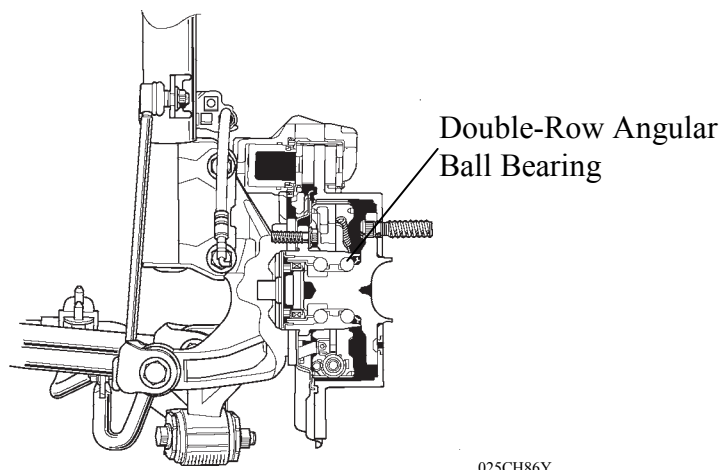
1. Front Axle

- The front axle uses compact and highly rigid double-row angular ball bearings. The bearings and the axle hub have been integrated to ensure high rigidity, thus realising excellent driving and braking stability.
- A lock nut (12-point) is used and staked in order to ensure that the axle hub is properly secured. Once removed, this nut cannot be reused.



2. Rear Axle

A compact and highly rigid double-row angular ball bearing is used on the front axle. The double-row angular ball bearing and the axle hub have been integrated to ensure high rigidity, thus realising excellent driving stability and braking stability.



BRAKE

DESCRIPTION

1. General

- Models with the brake control system consisting of ABS with EBD and Brake Assist use a mechanical type brake assist, which is integrated into the brake booster.
- Models with the brake control system consisting of ABS with EBD, Brake Assist, TRC and VSC use an electrical type brake assist, which effects brake assist control through the brake actuator.
- The new Camry has a brake system with the following specifications:

Front Brake Type	Ventilated Disc
Rear Brake Type	Solid Disc
Brake Control System	ABS with EBD, Brake Assist
	ABS with EBD, Brake Assist, TRC and VSC*
Parking Brake Lever Type	Lever Type

*: With various grades (refer to equipment list on page MO-24)

Specifications

Master Cylinder	Type	Tandem (Plunger type)
	Diameter mm	22.22
Brake Booster	Type	Single, Tie Rod Type
	Size in.	10
Front Disc Brake	Caliper Type	PBR63
	Wheel Cylinder Dia. mm	63.5
	Rotor Size (D×T)* mm	296 × 28
	Pad Material	NF107
Rear Disc Brake	Caliper Type	PBR38R
	Wheel Cylinder Dia. mm	38.1
	Rotor Size (D×T)* mm	286 × 10
	Pad Material	NF111
Parking Brake	Type	Banksia
	Drum Inner Dia. mm	190.0
Brake Actuator Supplier	For ABS with EBD	Bosch
	For ABS with EBD, Brake Assist, TRC and VSC	Bosch

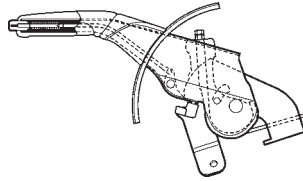
*: D: Outer Diameter, T: Thickness

Service Tip

- To ensure the performance and reliability of the plunger type master cylinder, it must not be disassembled. If it malfunctions, replace the entire assembly.
- Before removing the plunger type master cylinder from the brake booster, discharge the vacuum from the brake booster. Otherwise, the piston of the master cylinder may be left inside the brake booster. For details, see the Camry Repair Manual.

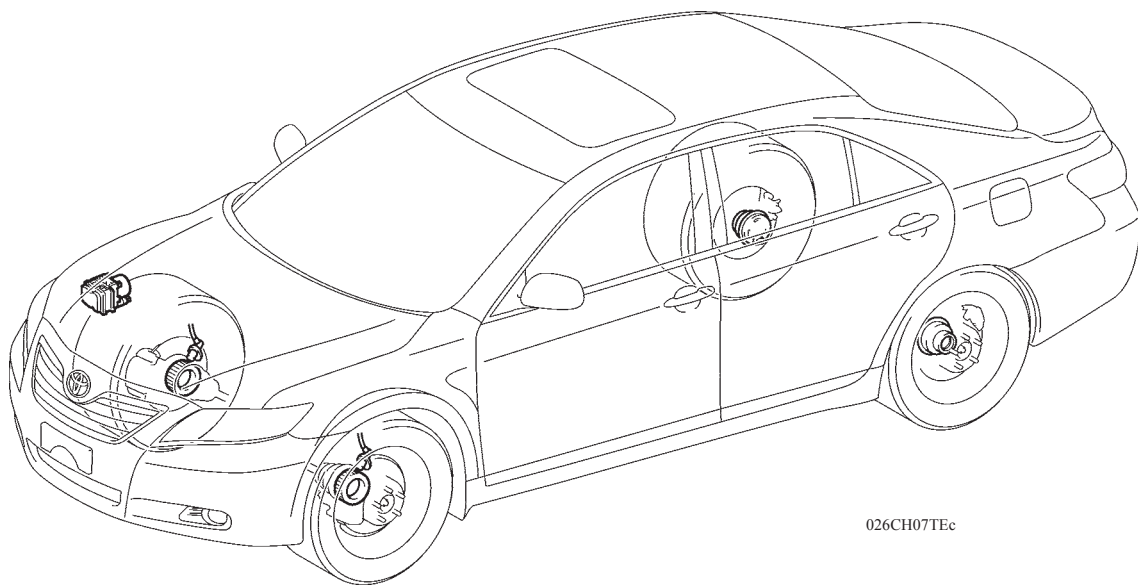
2. Component of Brake System

► Parking Brake ◄



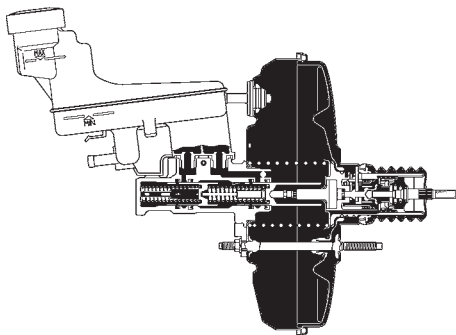
02KCH33TEa

Lever Type

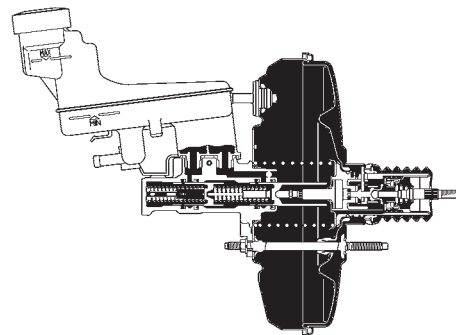


026CH07TEc

► Master Cylinder and Brake Booster ◄



Models with
mechanical type Brake assist

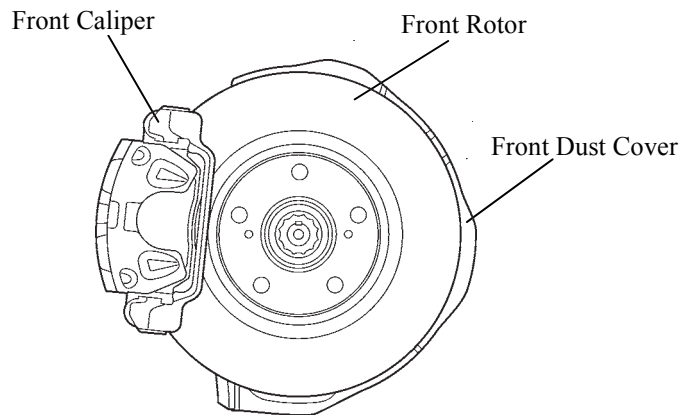


Except models with
mechanical type Brake assist

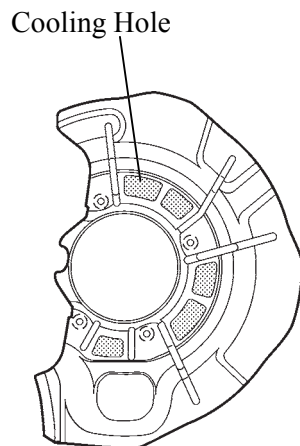
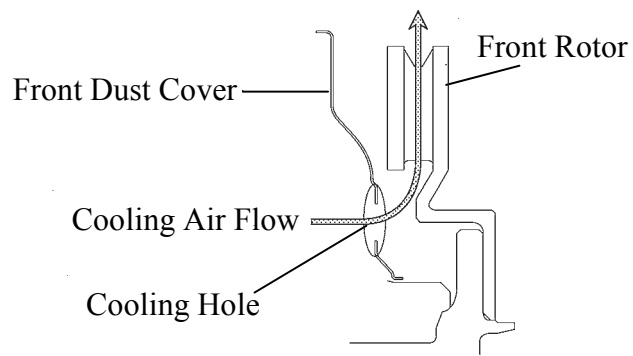
02KCH33TEc

✿ FRONT BRAKE

- The diameter of the front rotor is 296mm. The front rotor is the ventilated type that excels in heat dissipation to ensure reliability.
- The shape of the front dust cover has been optimised to efficiently direct cool air to the ventilated disc, thus ensuring excellent cooling performance.



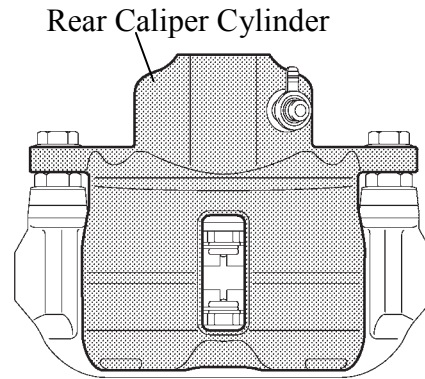
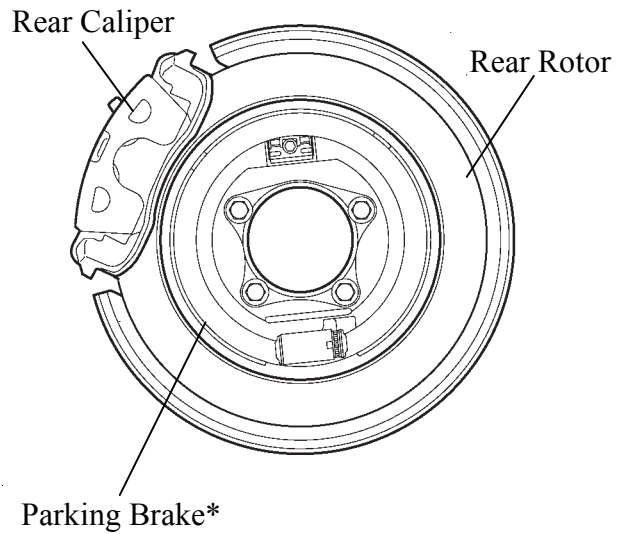
02KCH59TE

**Front Dust Cover****Cross Section**

02KCH60TE

✿ REAR BRAKE

- The diameter of the rear rotor is 286 mm. It has a drum in disc type parking brake.
- For weight reduction, a rear caliper cylinder made of aluminium is used.



Rear Caliper

*: Inside view of the parking brake drum



Rear Caliper & Disc

✱ BRAKE CONTROL SYSTEM (ABS with EBD)

1. General

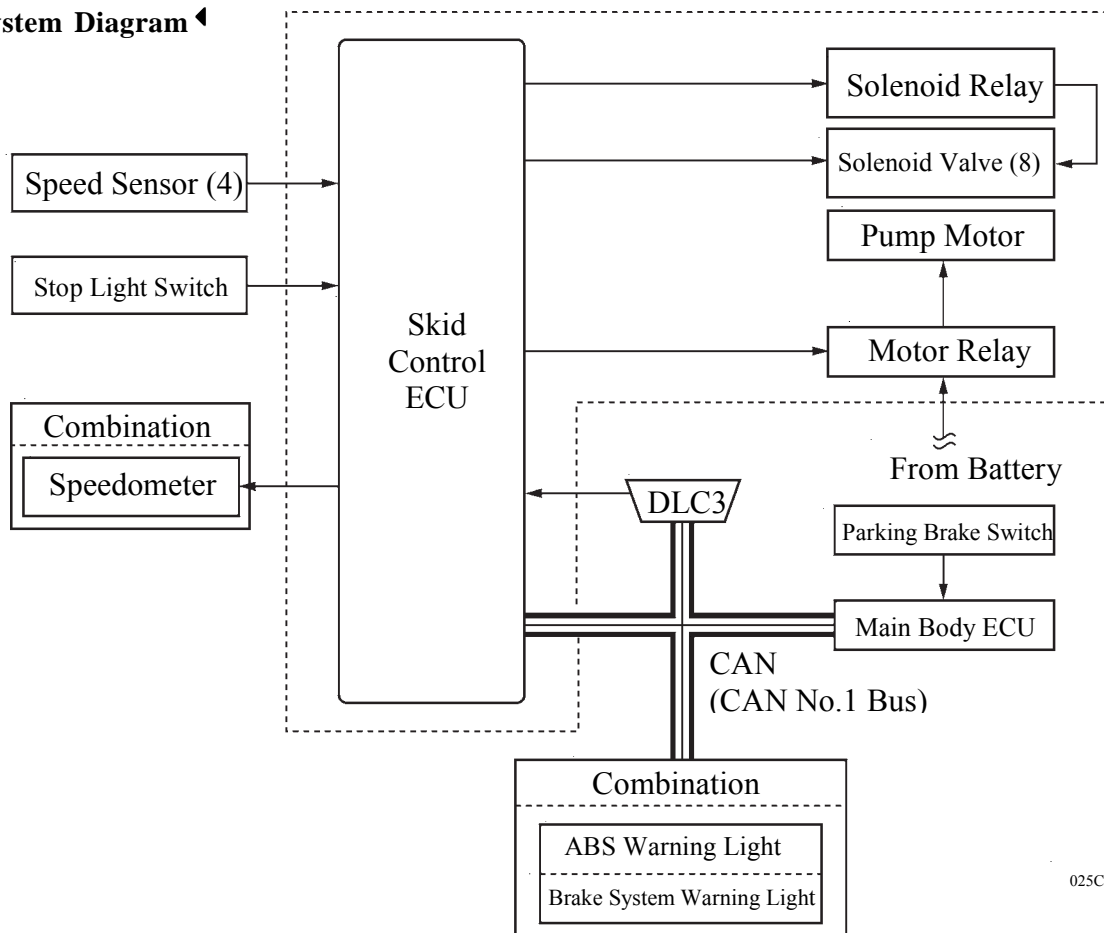
The brake control system (ABS with EBD) of new Camry has the following functions:

Function	Outline
ABS (Anti-lock Brake System)	The ABS helps prevent the wheels from locking when the brakes are applied firmly or when braking on a slippery surface.
EBD (Electronic Brake force Distribution)	The EBD control utilises ABS, realising the proper brake force distribution between front and rear wheels in accordance with the driving conditions. In addition, during cornering braking, it also controls the brake forces of right and left wheels, helping to maintain the vehicle behaviour.
Brake Assist (Mechanical Type)	The primary purpose of the Brake Assist is to provide an auxiliary brake force to assist the driver who cannot generate a large brake force during emergency braking, thus helping to realise the vehicle's brake performance.

Service Tip

When the brake control system is activated, the brake pedal could shudder, which is a normal occurrence of the system in operation, and should not be considered to be a malfunction.

► System Diagram ◀



025CH37P

2. Outline of EBD Control

General

The distribution of the brake force, which was performed mechanically in the past, is now performed under electrical control of the skid control ECU, which precisely controls the braking force in accordance with the vehicle's driving conditions.

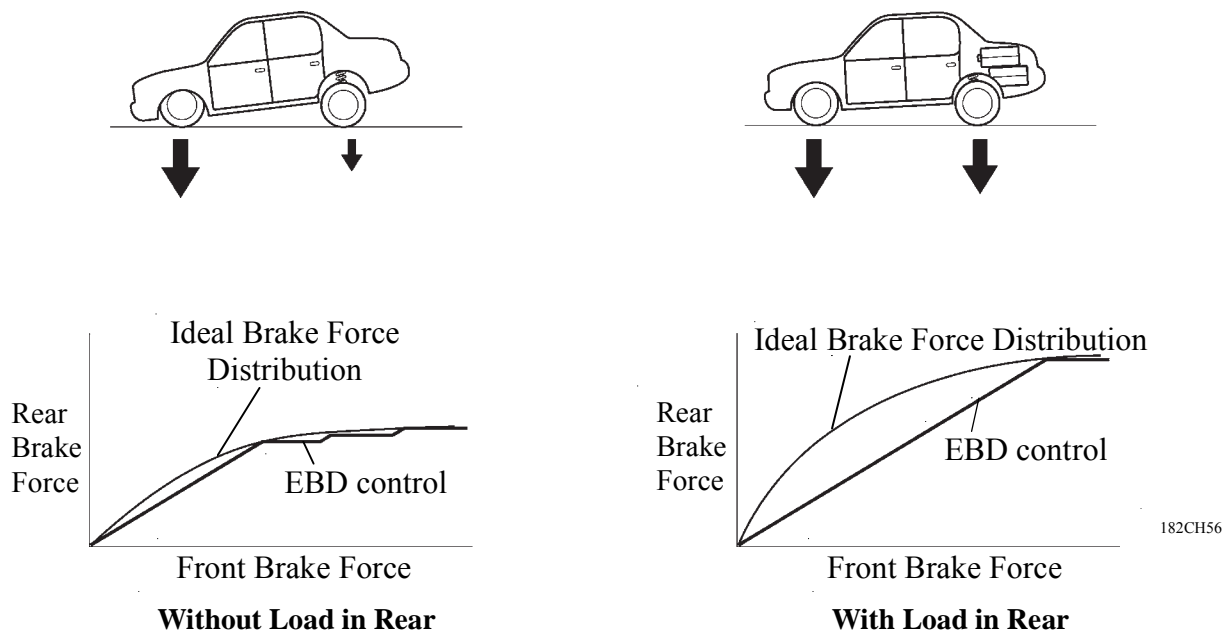
Front/ Rear Wheels Brake Force Distribution

If the brakes are applied while the vehicle is moving straight forward, the transfer of the road reduces the load that is applied to the rear wheels. The skid control ECU determines this condition by way of the signals from the wheel speed sensors, and the brake actuator regulates the distribution of the brake force of the rear wheels to optimally control.

For example, the amount of the brake force that is applied to the rear wheels during braking varies whether or not the vehicle is carrying a load. The amount of the brake force that is applied to the rear wheels also varies in accordance with the extent of the deceleration.

Thus, the distribution of the brake force to the rear is optimally controlled in order to effectively utilise the braking force of the rear wheels under these conditions.

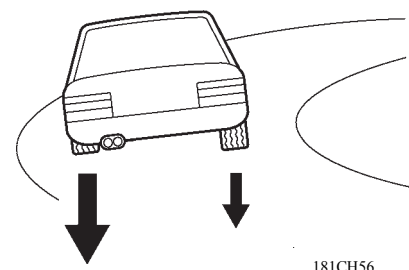
► EBD Control Concept ◀



Right/Left Wheels Brake Force Distribution (During Cornering Braking)

When the brakes are applied while the vehicle is cornering, the load that applied to the inner wheel decreases and the outer wheel increases.

The skid control ECU determines this condition by way of the signals from the wheel speed sensors, and the brake actuator regulates the brake force in order to optimally control the distribution of the brake force to the inner wheel and outer wheel.

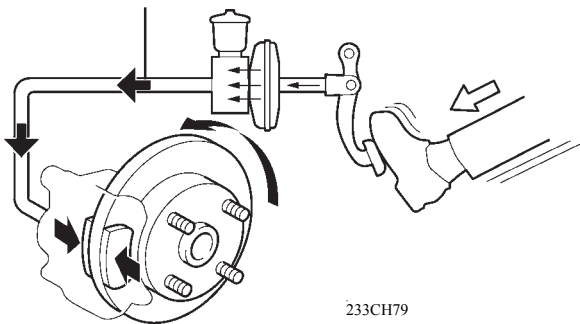


3. Outline of Brake Assist (Mechanical Type)

- The brake assist in combination with ABS helps improve the vehicle's brake performance.
- The brake assist interprets a quick push of the brake pedal as emergency braking and supplements the brake power applied if the driver has not stepped hard enough on the brake pedal. In emergencies, the driver, especially inexperienced ones, often panic and do not apply sufficient pressure on the brake pedal.
- A key feature of brake assist system is that the timing and the degree of braking assistance are designed to ensure that the driver does not discern anything unusual about the braking operation. When the driver intentionally eases up on the brake pedal, the system reduces the amount of assistance it provides.
- The mechanical type brake assist uses the brake assist mechanism in the brake booster to mechanically activate the brake booster function in order to increase the brake force. For details, see page CH-54.

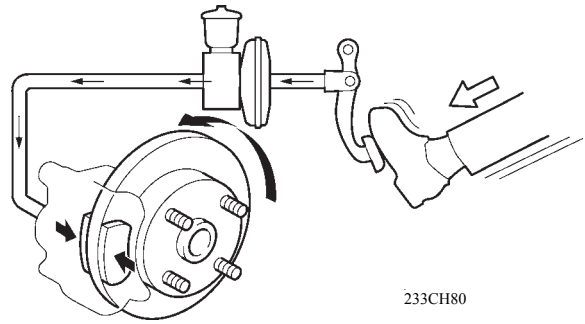
► In case that the driver's depressing force is small when applying emergency braking ◀

The fluid pressure is increased
by the brake booster



233CH79

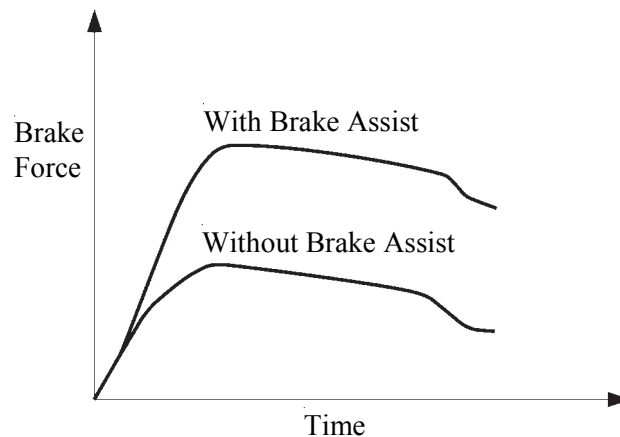
With Brake Assist



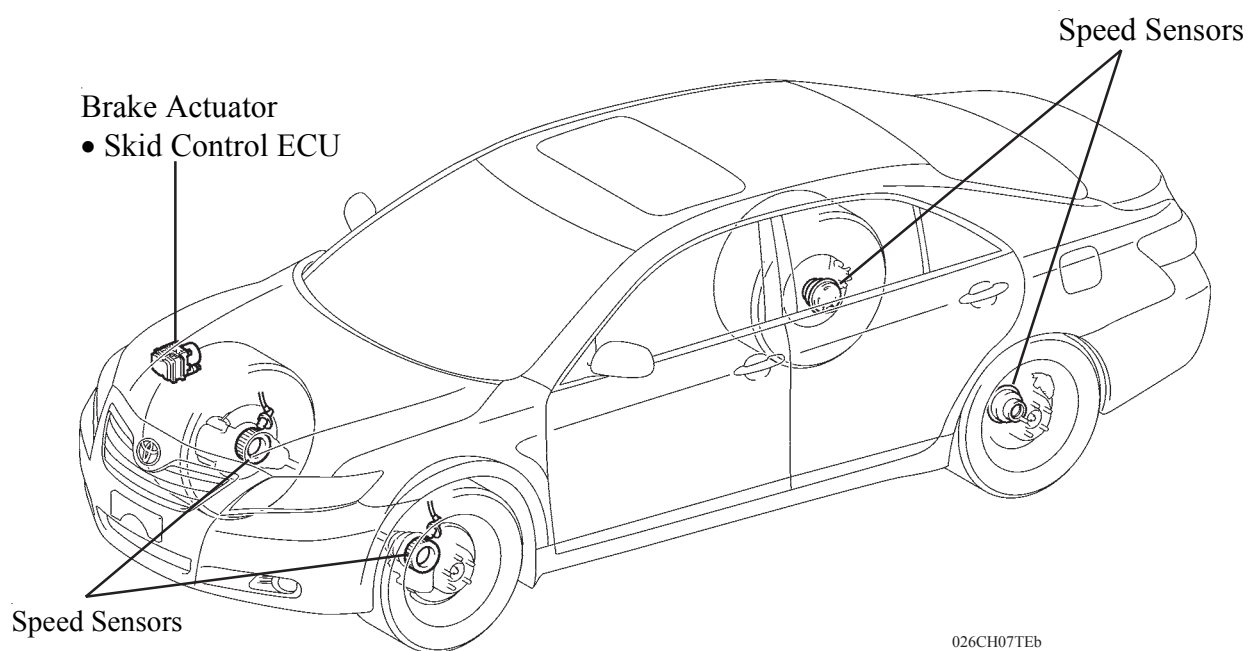
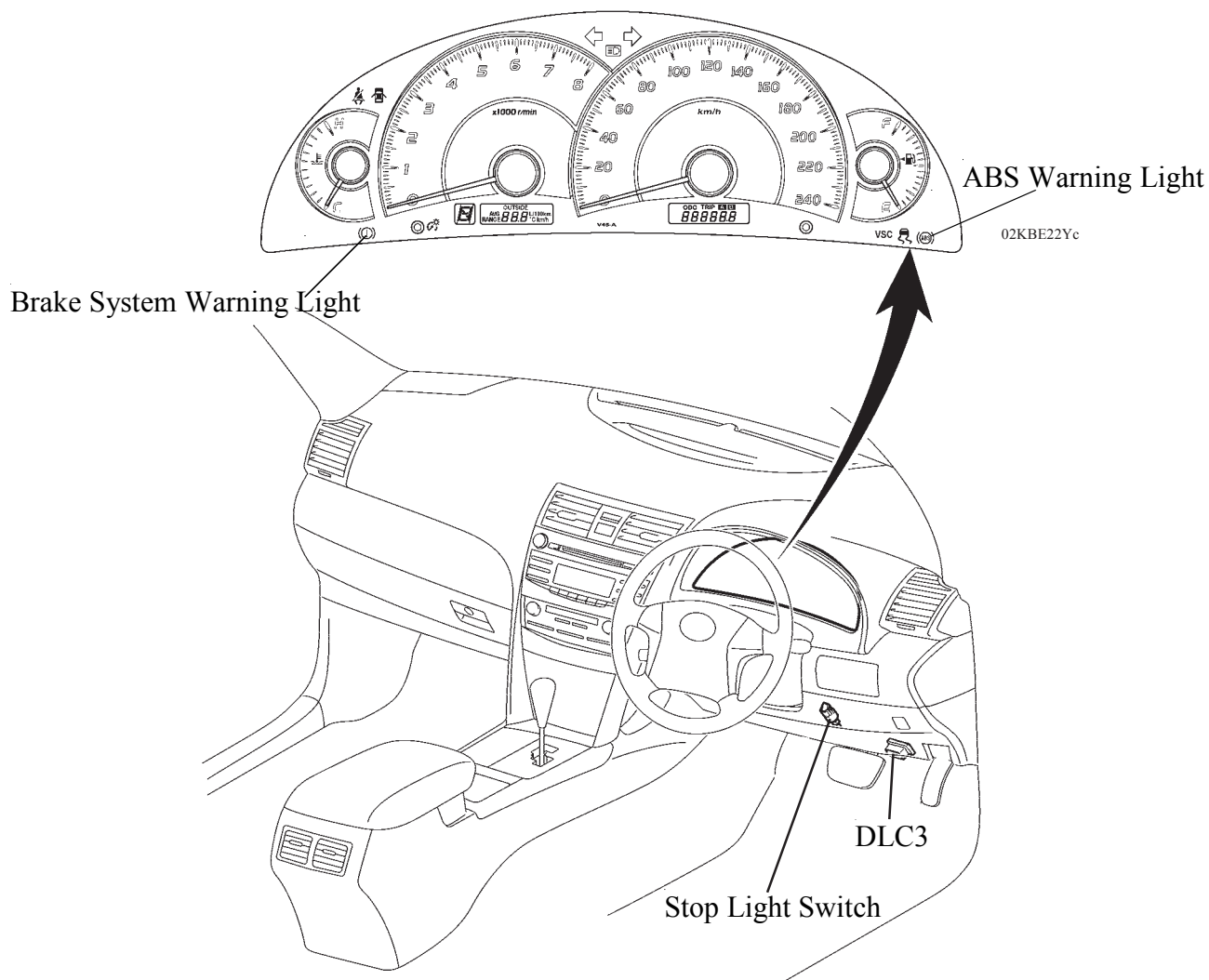
233CH80

Without Brake Assist*

*: The basic performance of the brake is the same as of the models with the brake assist system



170CH18



026CH07TEb

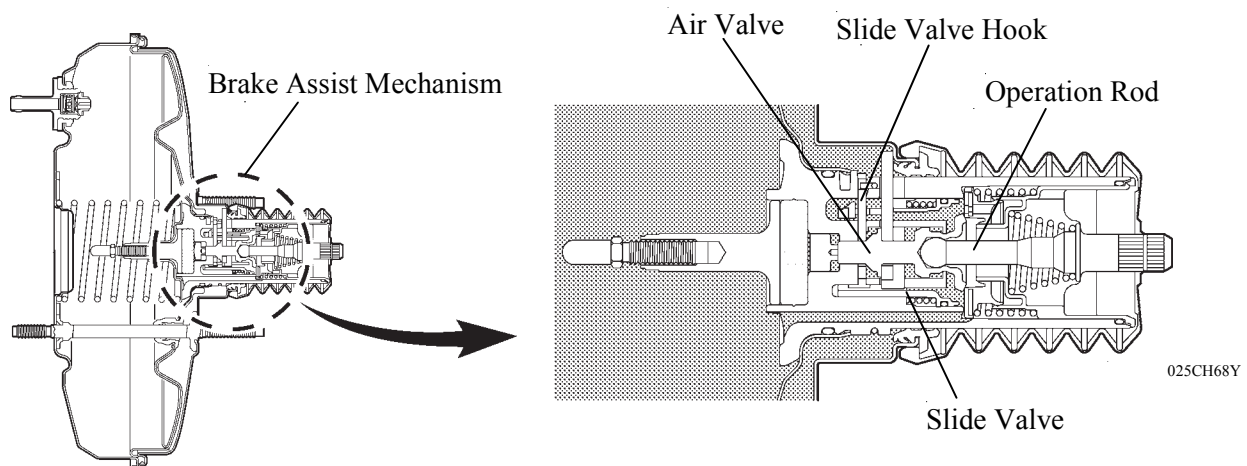
5. Function of Main Components

Component		Function
Combination Meter	Brake System Warning Light	<ul style="list-style-type: none"> • Lights up to alert the driver when a malfunction occurs in the EBD or skid control ECU. • Lights up to alert the driver when the brake fluid level is low. • Lights up to alert the driver when the parking brake is actuated.
	ABS Warning Light	Lights up to alert the driver when the skid control ECU detects a malfunction in the ABS or EBD System.
Brake Fluid Level Warning Switch		Detects the brake fluid level.
Speed Sensors		Detects the wheel speed of each of 4 wheels.
Stop Light Switch		Detects the brake pedal depressing signals.
Parking Brake Switch		Detects the parking brake actuation signals.
Brake Actuator	Actuator Portion	In charge of fluid path based on the signals from the skid control ECU during the operation of the ABS with EBD, in order to control the fluid pressure that is applied to the wheel cylinders.
	Skid Control ECU	Judges the vehicle driving condition based on the signals from each sensor, and sends brake control signals to the brake actuator.
	ABS solenoid relay	Supplies or cuts off power to solenoid valves in the brake actuator.
	ABS motor relay	Supplies or cuts off power to motor in the brake actuator.

6. Brake Booster (with Brake Assist Mechanism)

General

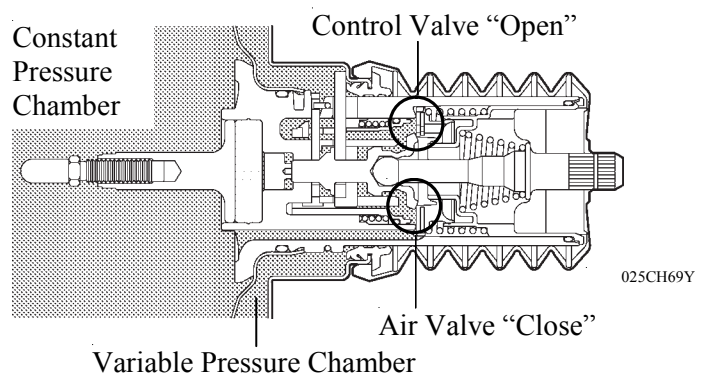
This brake booster consists of the conventional type brake booster to which a brake assist has been added. During a normal brake operation, the function of the brake booster is the same as that of the conventional type. The major difference in construction between this booster and the conventional type one is that the slide valve and the slide valve hook are added in the air valve in this booster.



Operation

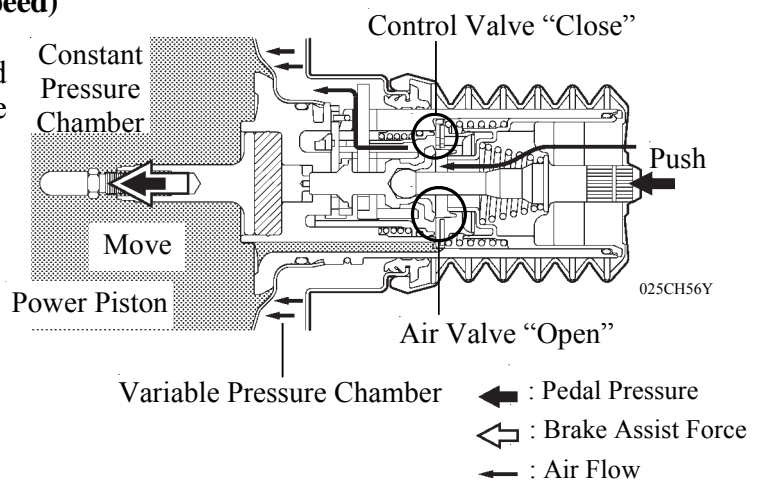
1) No Braking Condition

When the air valve closes and the control valve opens, the pressure in the constant pressure chamber and that in the variable pressure chamber become the same.



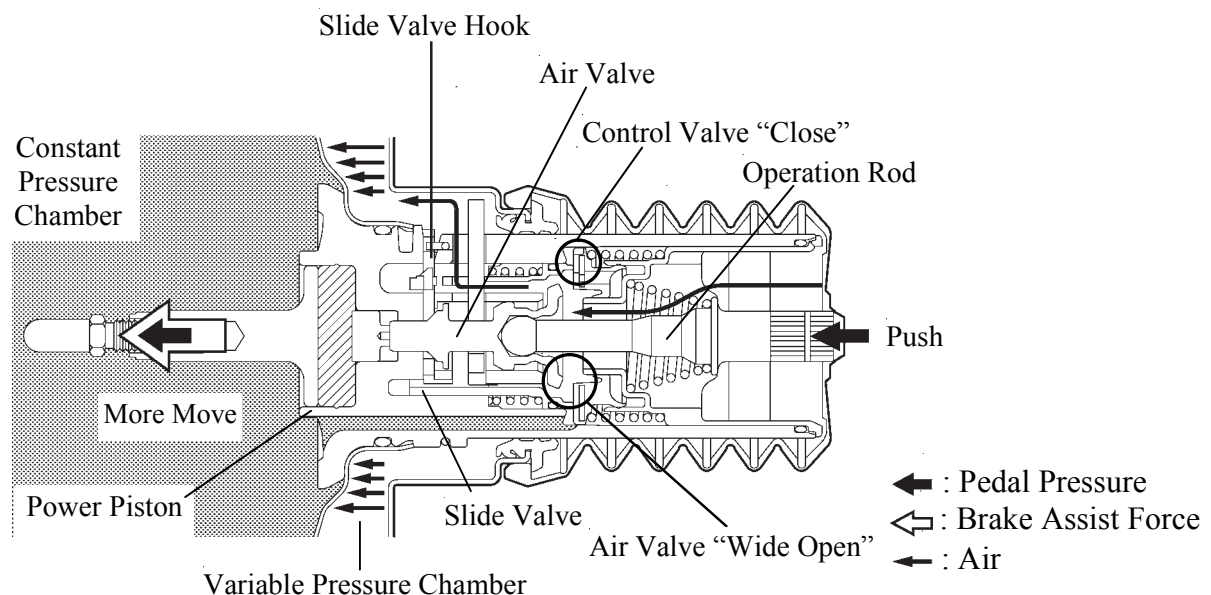
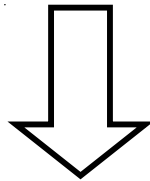
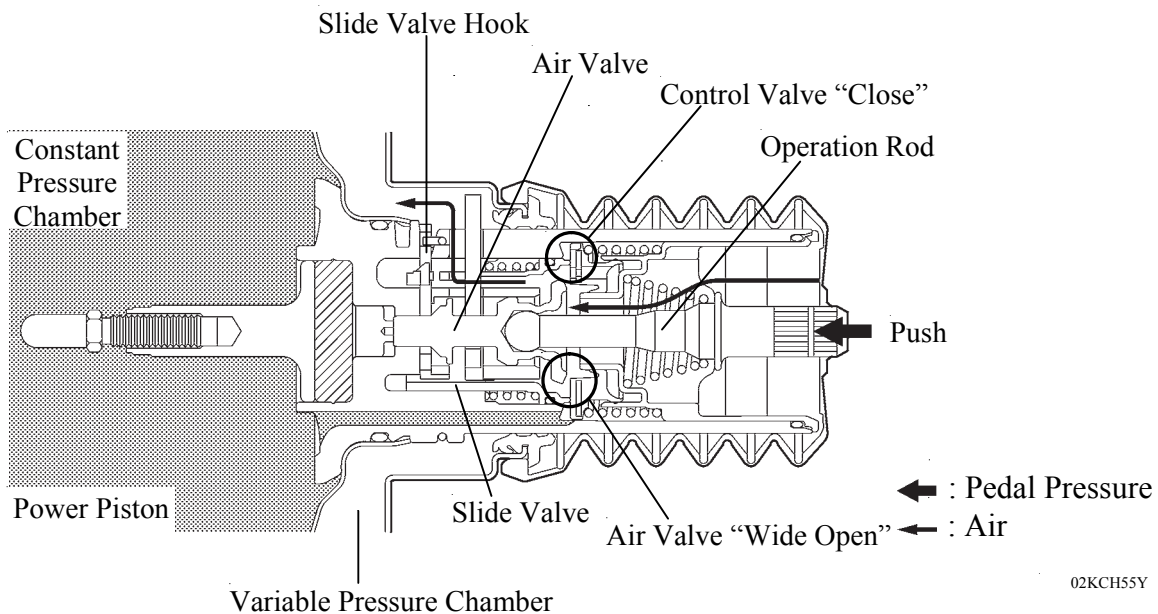
2) Normal Braking Condition (Operation Rod Speed = Power Piston Speed)

During normal braking, the air valve opens and the control valve closes to activate the brake booster function.



3) Brake Assist Condition (Operation Rod Speed > Power Piston Speed)

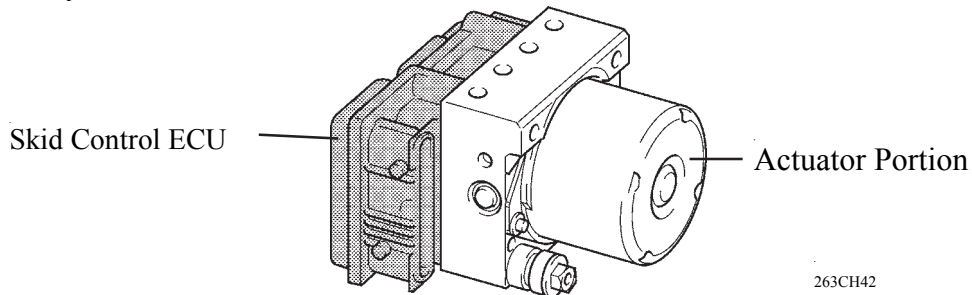
When the operation rod speed is faster than the power piston speed, the air valve pushes the slide valve hook. Consequently, the slide valve separates from the slide valve hook, the spring pushes the control valve, and the control valve closes. Thus, the opening of the air valve becomes enlarged and the air volume that is introduced increases. This results in a brake assist force to powerfully push the power piston.



7. Brake Actuator

General

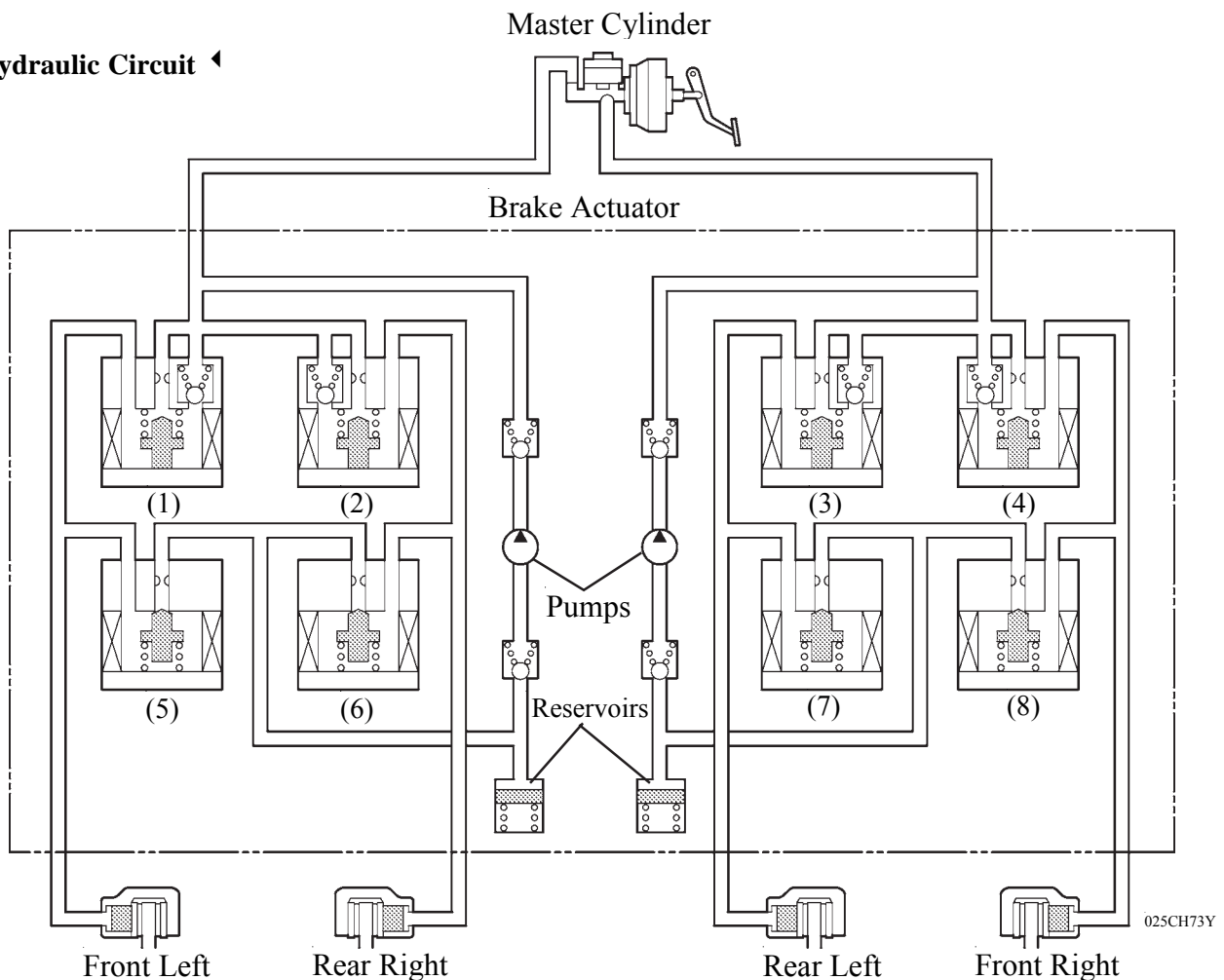
- The brake actuator consists of actuator portion, skid control ECU, ABS solenoid relay, and ABS motor relay.
- The 2 relays are built in the brake actuator.



Actuator Portion

The actuator portion consists of 8 two-position solenoid valves 1 motor, 2 pumps and 2 reservoirs. The 8 two-solenoid valves consist of 4 pressure holding valves [(1), (2), (3), (4)] and 4 pressure reduction valves [(5), (6), (7), (8)].

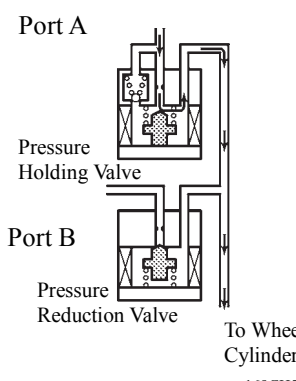
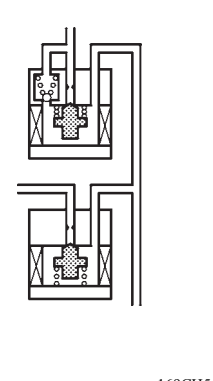
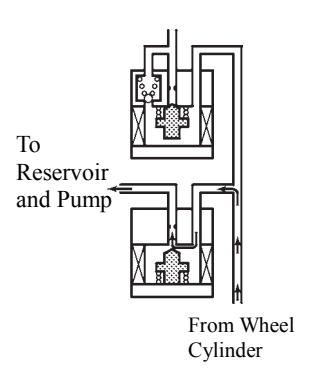
► Hydraulic Circuit ◀



8. System Operation

ABS with EBD Operation

Based on the signals received from the 4 wheel speed sensors, the skid control ECU calculates each wheel speed and deceleration, and checks wheel slipping conditions. And according to the slipping condition, the skid control ECU controls the pressure holding valve and pressure reduction valve in order to adjust the fluid pressure of the each wheel cylinder in the following 3 modes: pressure reduction, pressure holding, and pressure increase modes.

Not Activated	Normal Braking	—	—
Activated	Increase Mode	Holding Mode	Reduction Mode
Hydraulic Circuit	 <p>Port A</p> <p>Pressure Holding Valve</p> <p>Port B</p> <p>Pressure Reduction Valve</p> <p>To Wheel Cylinder</p> <p>169CH54</p>	 <p>169CH55</p>	 <p>To Reservoir and Pump</p> <p>From Wheel Cylinder</p> <p>169CH56</p>
Pressure Holding Valve (Port A)	OFF (Open)	ON (Close)	←
Pressure Reduction Valve (Port B)	OFF (Close)	←	ON (Open)
Wheel Cylinder Pressure	Increase	Hold	Reduction

Initial Check

After the ignition is turned ON, and the vehicle attains an approximate speed of 15 km/h or more only at first time, the skid control ECU performs the initial check.

The functions of each solenoid valve and pump motor in the brake actuator are checked in order.

9. Diagnosis

General

If the skid control ECU detects a malfunction in the brake control system (ABS with EBD), the ABS and brake system warning lights that correspond to the function in which the malfunction have been detected indicate or light up to alert the driver of the malfunction as indicated in the table below.

○: Light ON —: Light OFF

Item	ABS	EBD	Skid Control ECU
ABS Warning Light	○	○	○
Brake System Warning Light	—	○	○

- At the same time, the DTC (Diagnostic Trouble Code) are stored in the memory. The DTC can be read by connecting the SST (09843-18040) between the Tc and CG terminals of DLC3 and observing the blinks of the ABS warning light, or by connecting an intelligent tester II.
- This system has a sensor signal check (test mode) function. This function is activated by connecting the SST (09843-18040) between the Ts and CG terminal of the DLC3 or by connecting an intelligent tester II.
- If the skid control ECU detects a malfunction during a sensor signal check (test mode), it stores the DTC in its memory. These DTC can be read during a sensor check operation by connecting the SST (09843-18040) to the Tc and CG terminals of the DLC3 and observing the blinking of the ABS warning light or a connecting an intelligent tester II.

Diagnosis of CAN

- If a malfunction occurs on a CAN communication line, the skid control ECU is connected to the CAN communication lines and it will store the DTC (Diagnostic Trouble Code) in its memory.
- There are 2-digit DTC and 5-digit DTC for CAN communications related to the brake control system (ABS with EBD and brake assist).
 - 2-digit DTC can be read by connecting the SST (09843-18040) to Tc and CG terminals of the DLC3, and observing the diagnostic code indicated by the relevant warning light.
 - 5-digit DTC can be read by connecting an intelligent tester II to the DLC3.

Fail-Safe

- In the event of a malfunction in the ABS, the skid control ECU prohibits the ABS operation.
- In the event of a malfunction in EBD control, the skid control ECU prohibits EBD control. Thus, the brake will be operated in the same condition as the system without the ABS with EBD.

✱ BRAKE CONTROL SYSTEM (ABS with EBD, Brake Assist, TRC and VSC)

1. General

The brake control system (ABS with EBD, brake assist, TRC and VSC) of new Camry has the following functions:

Function	Outline
ABS (Anti-lock Brake System)	The ABS helps prevent the wheels from locking when the brakes are applied firmly or when braking on a slippery surface.
EBD (Electronic Brake force Distribution)	The EBD control utilises ABS, realising the proper brake force distribution between front and rear wheels in accordance with the driving conditions. In addition, during cornering braking, it also controls the brake forces of right and left wheels, helping to maintain the vehicle behaviour.
Brake Assist (Electrical Type)	The primary purpose of the brake assist is to provide an auxiliary brake force to assist the driver who cannot generate a large brake force during emergency braking, thus helping draw the vehicle's brake performance.
TRC (Traction Control)	The TRC system helps prevent the drive wheels from slipping if the driver presses the accelerator pedal excessively when starting off or accelerating on a slippery surface.
VSC (Vehicle Stability Control)	The VSC system helps prevent the vehicle from slipping sideways as a result of strong front wheel skid or strong rear wheel skid during cornering.

Service Tip

When brake control system is activated, the brake pedal could shudder, which is a normal occurrence of the system in operation and should not be considered a malfunction.

Brake Actuator



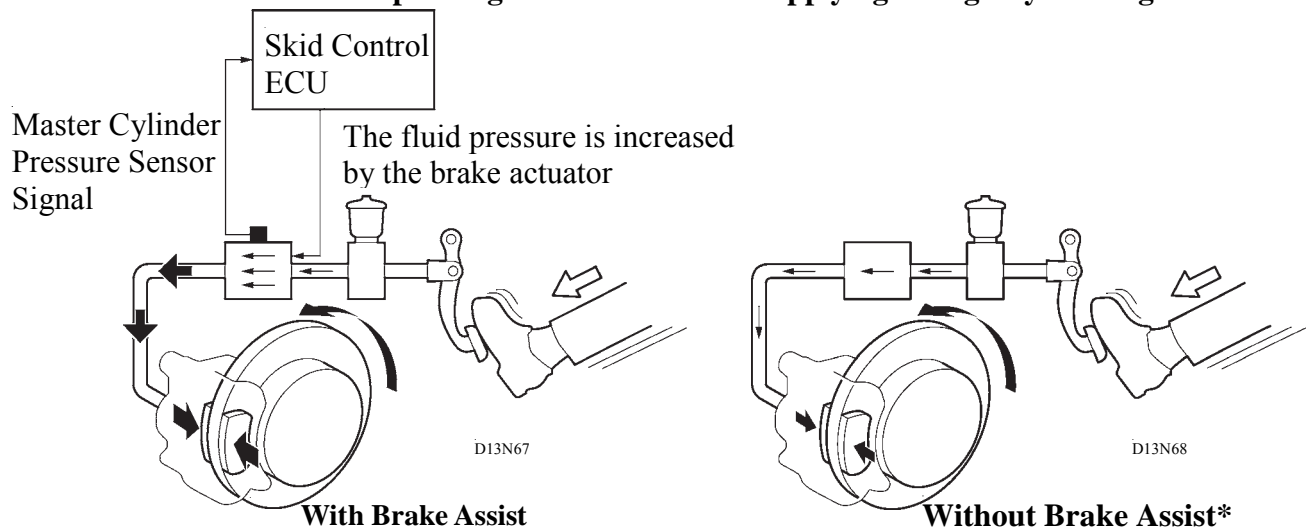
3. Outline of EBD Control Function

The detailed outline is the same as that of brake control system (ABS with EBD). For details, see page CH-49

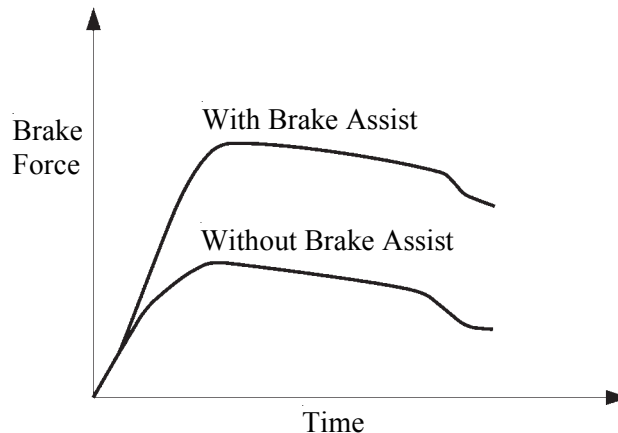
4. Outline of Brake Assist

- The brake assist in combination with ABS help to improve the vehicle's brake performance.
- The brake assist interprets a quick push of the brake pedal as emergency braking and supplements the brake power applied if the driver has not stepped hard enough on the brake pedal. In emergencies, some drivers, especially inexperienced ones, often panic and do not apply sufficient pressure on the brake pedal.
- A key feature of brake assist system is that the timing and the degree of braking assistance are designed to help ensure that the driver does not discern anything unusual about the braking operation. When the driver intentionally eases up on the brake pedal, the system reduces the amount of assistance it provides.
- Based on the signals from the master cylinder pressure sensor, the skid control ECU calculates the speed and the amount of the brake pedal application and then determines the intention of the driver to make an emergency braking. If the skid control ECU determines that the driver intends the emergency braking, the system activates the brake actuator to increase the brake fluid pressure, which increases the braking force.

► In case that the driver's depressing force is small when applying emergency braking ◀



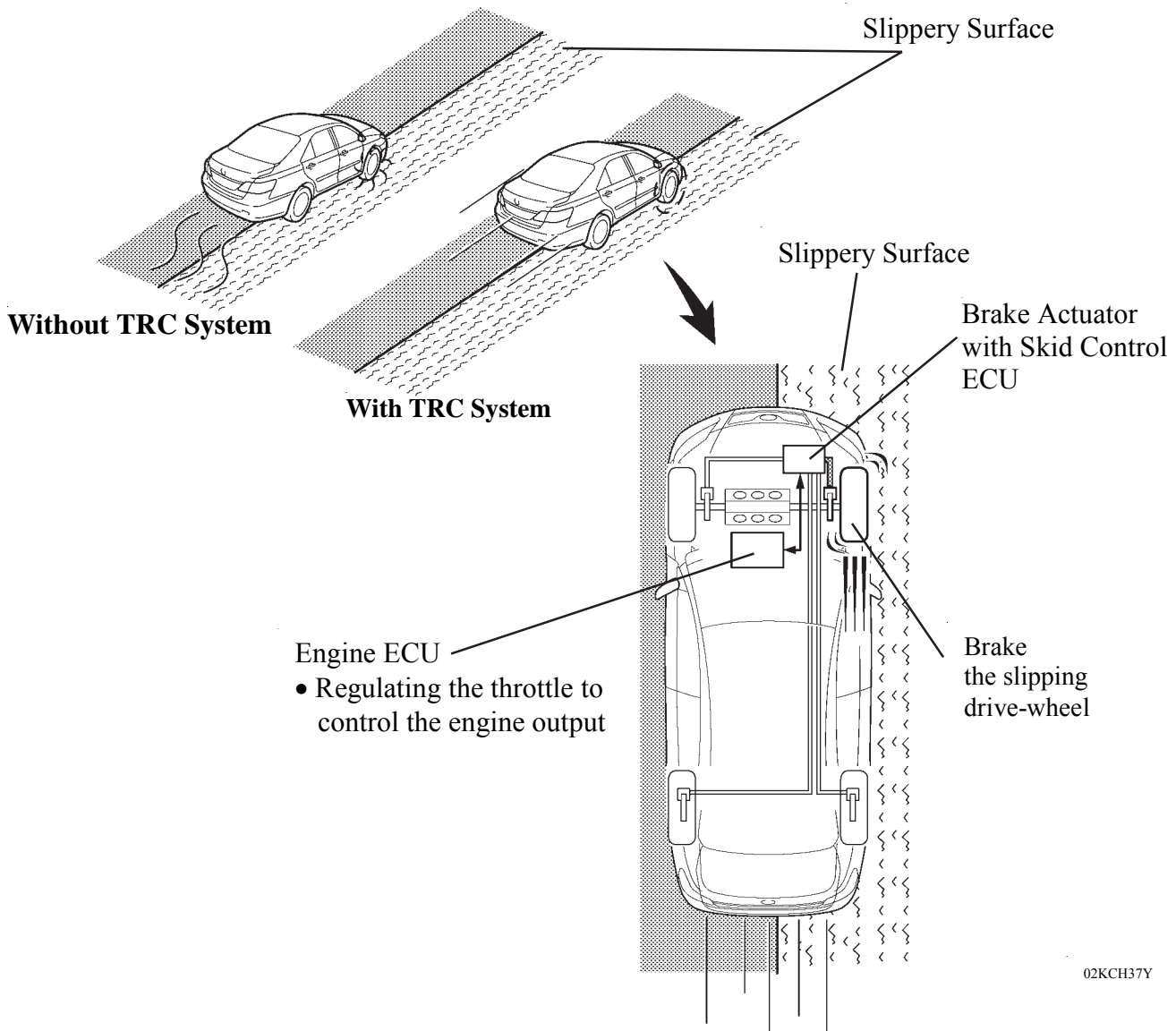
*: The basic performance of the brake is the same as of the models with the brake assist system



5. Outline of TRC Function

- If the driver presses the accelerator pedal aggressively when initially acceleration or when accelerating on a slippery surface, the drive wheels could slip due to the excessive amount of torque that is generated. By applying hydraulic brake control to the drive wheels and regulating the throttle to control the engine output, the TRC helps minimise the slippage of the drive wheels, thus generating the drive force that is appropriate for the road surface conditions.
- For example, a comparison may be made between two vehicles, one with the TRC function and the other without. If the driver of each vehicle operates the accelerator pedal in a rough manner while driving over a surface with different surface friction characteristics, the drive wheel on the slippery surface could slip as illustrated. As a result, the vehicle could become unstable. However, when the vehicle is equipped with the TRC function, the skid control ECU instantly determines the state of the vehicle and operates the brake actuator in order to apply the brake of the slipping drive wheel. Furthermore, the engine ECU receives the signals from the skid control ECU and regulates the throttle in order to control the engine output. Thus, this function can constantly maintain a stable vehicle posture.

► Driving condition on road with different surface friction characteristics ◄



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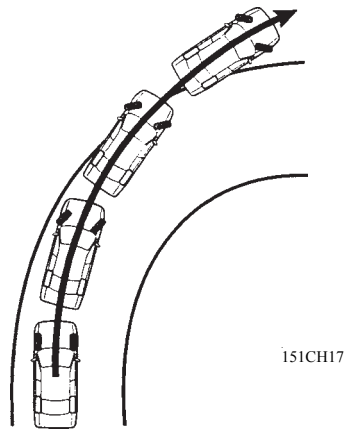
6. Outline of VSC Function

General

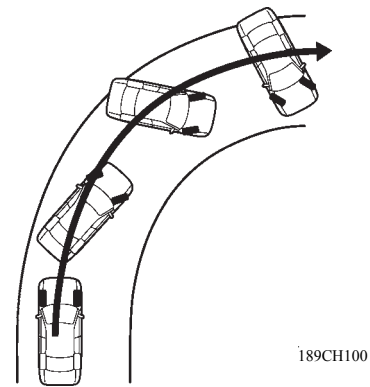
The followings are two examples that can be considered as circumstances in which the tires exceed their lateral grip limit.

The VSC function is designed to help control the vehicle behaviour by controlling the motive force and the brakes at each wheel when the vehicle is under one of the conditions indicated below.

- When the front wheels lose grip in relation to the rear wheels (front wheel skid tendency).
- When the rear wheels lose grip in relation to the front wheels (rear wheel skid tendency).



Front Wheel Skid Tendency



Rear Wheel Skid Tendency

Method for Determining the Vehicle Condition

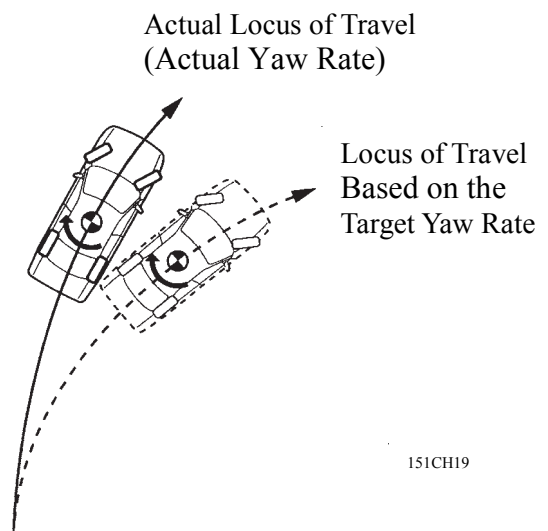
To determine the condition of the vehicle, sensors detect the steering angle, vehicle speed, vehicle's yaw rate, and the vehicle's lateral acceleration, which are then calculated by the skid control ECU.

1) Determining Front Wheel Skid

Whether or not the vehicle is in the state of front wheel skid is determined by the difference between the target yaw rate and the vehicle's actual yaw rate.

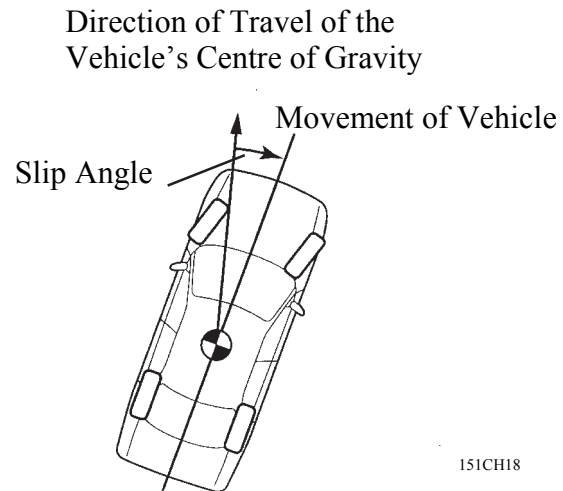
When the vehicle's actual yaw rate is smaller than the yaw rate (a target yaw rate that is determined by the vehicle speed and steering angle) that should be rightfully generated when the driver operates the steering wheel, it means the vehicle is making a turn at a greater angle than the locus of travel.

Thus, the skid control ECU determines that there is a large tendency to front wheel skid.



2) Determining Rear Wheel Skid

Whether or not the vehicle is in the state of rear wheel skid is determined by the values of the vehicle's slip angle and the vehicle's slip angular velocity (time-dependent changes in the vehicle's slip angle). When the vehicle's slip angle is large, and the slip angular velocity is also large, the skid control ECU determines that the vehicle has a large rear wheel skid tendency.



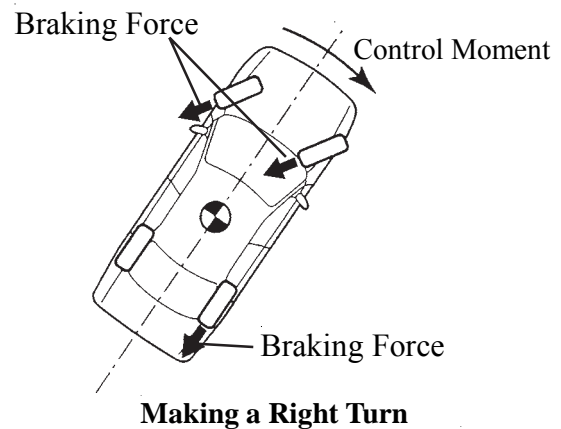
Method for VSC Operation

When the Skid Control ECU determines that the vehicle exhibits a tendency to front wheel skid or rear wheel skid, it decreases the engine output and applies the brake of a front or rear wheel to control the vehicle's yaw moment.

The basic operation of the VSC is described below. However, the control method differs depending on the vehicle's characteristics and driving conditions.

1) Dampening a Strong Front Wheel Skid

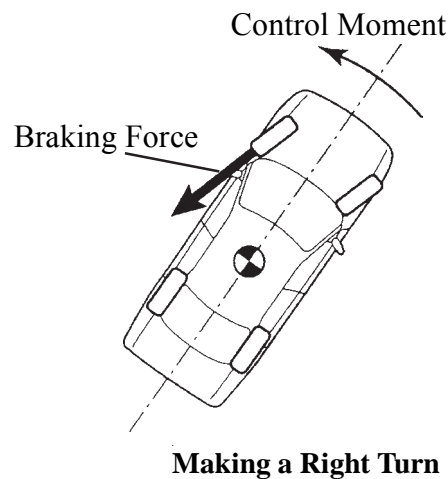
When the skid control ECU determines that there is a large front wheel skid tendency, it counteracts in accordance with the extent of that tendency. The skid control ECU controls the engine output and applies the brakes of the front wheels and rear wheel of the inner circle of the turn in order to help restrain the front wheel skid tendency.



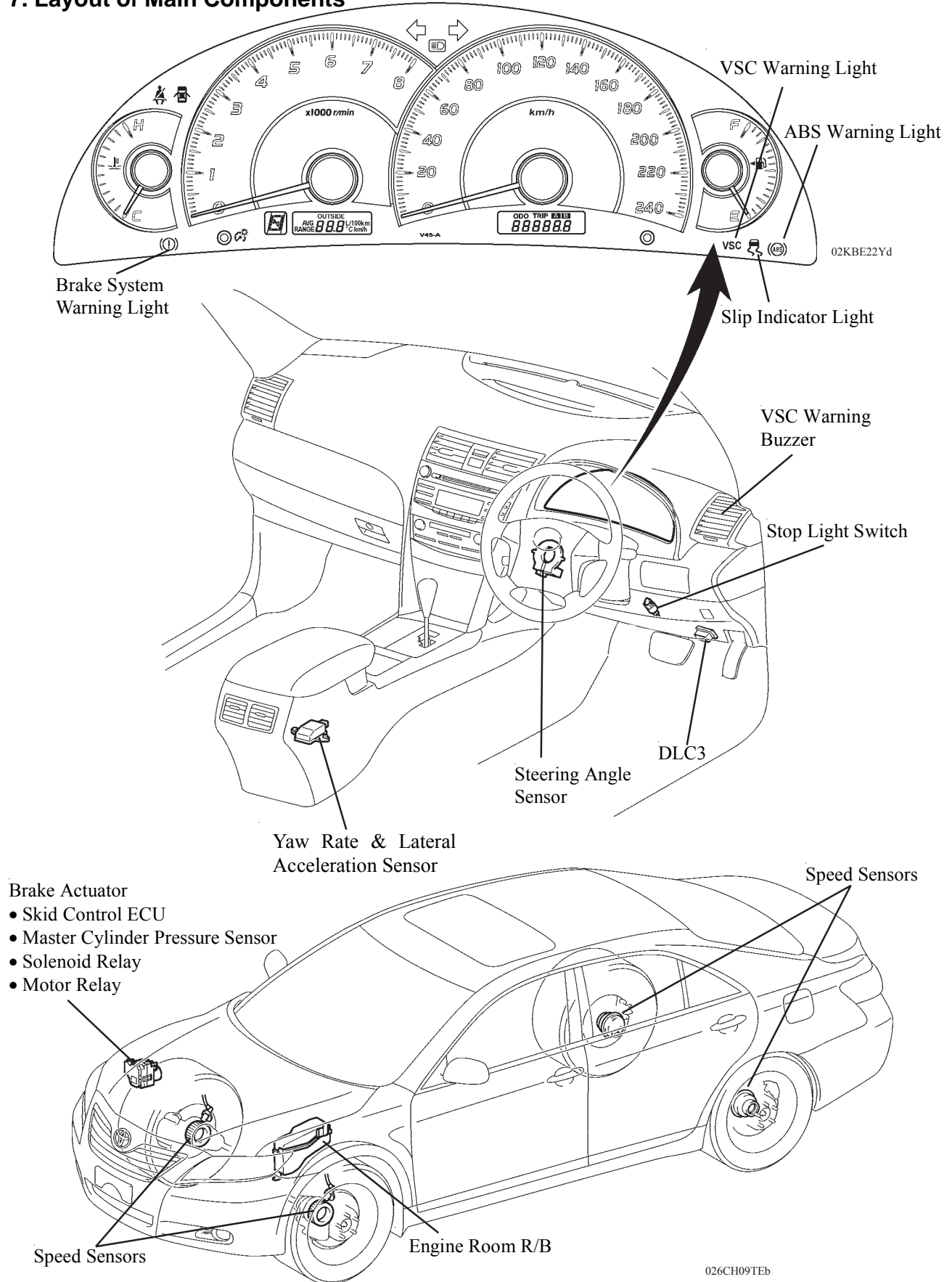
2) Dampening a Strong Rear Wheel Skid

When the skid control ECU determines that there is a large rear wheel skid tendency, it counteracts in accordance with the extent of that tendency. It applies the brakes of the front wheel of the outer circle of the turn, and generates an outward moment of inertia in the vehicle, in order to restrain the rear wheel skid tendency. Along with the reduction in the vehicle speed caused by the braking force, the excellent vehicle's stability is ensured.

In some cases, the skid control ECU applies the brake of the rear wheels, as necessary.



7. Layout of Main Components



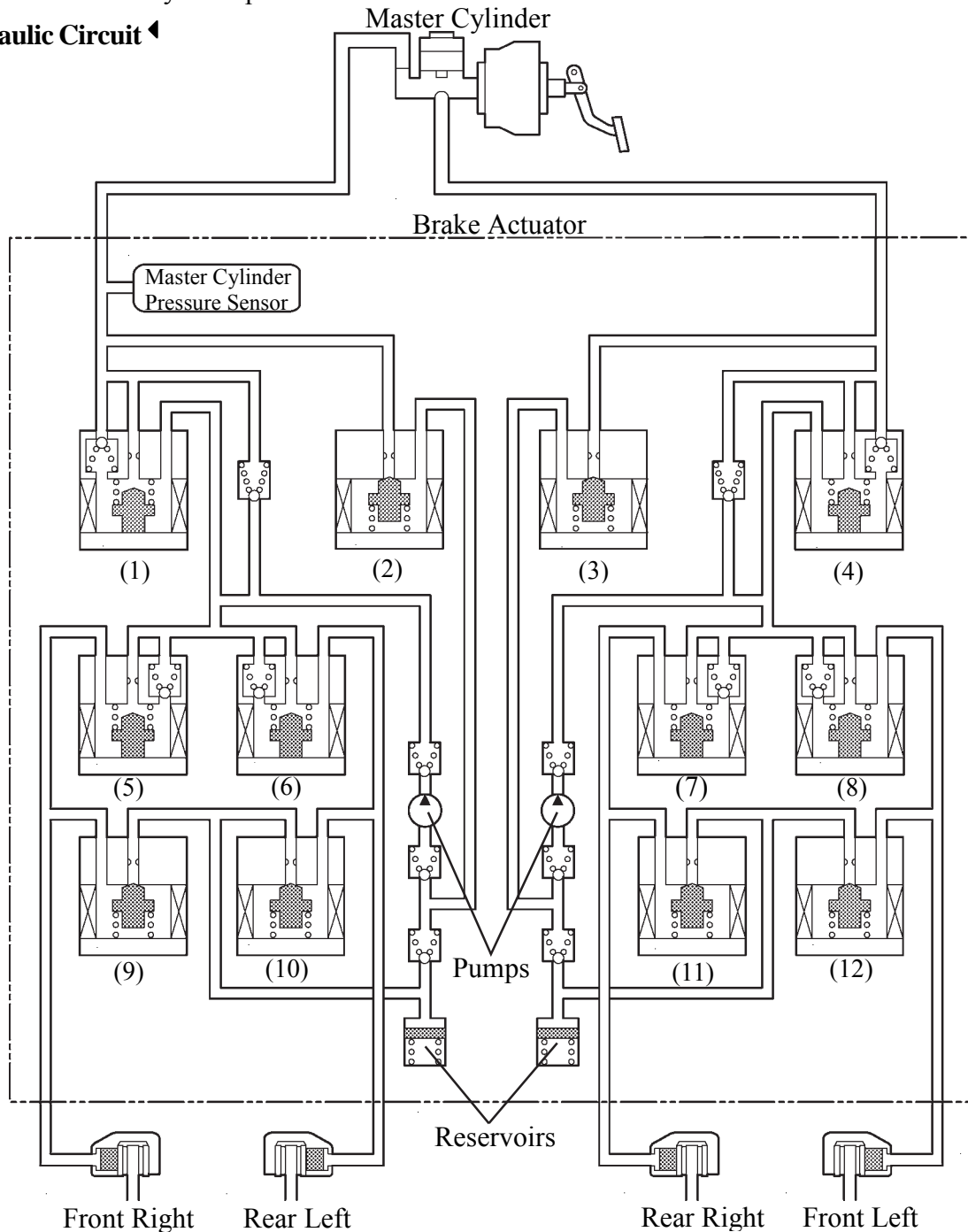
8. Function of Main Components

Component		Function
Combination Meter	ABS Warning Light	Lights up to alert the driver when the skid control ECU detects the malfunction in the ABS, EBD or Brake Assist system.
	Slip Indicator Light	<ul style="list-style-type: none"> • Blinks to inform the driver when the TRC system or the VSC system is operated.
	Brake System Warning Light	<ul style="list-style-type: none"> • Lights up together with ABS warning light to alert the driver when the skid control ECU detects the malfunction in the EBD control. • Lights up to inform the driver when the parking brake is ON or the brake fluid level is low.
	VSC Warning Light	Lights up to alert the driver when the skid control ECU detects the malfunction in the TRC or VSC system.
Engine ECU		<ul style="list-style-type: none"> • Sends the throttle valve angle signal, accelerator pedal position signal, engine speed signal, and shift lever position signal to the skid control ECU. • Receives the signal of throttle control request from the skid control ECU.
Parking Brake Switch		Detects when the parking brake lever is pulled up.
Speed Sensors		Detects the wheel speed of each 4 wheels.
Stop Light Switch		Detects the brake pedal depressing signal.
Brake Actuator		Changes the fluid path based on the signals from the skid control ECU during the operation of the ABS with EBD & brake assist & TRC & VSC system, in order to control the fluid pressure that is applied to the wheel cylinders.
	Master Cylinder Pressure Sensor	Assembled in the brake actuator and detects the master cylinder pressure.
	Skid Control ECU	Judges the vehicle driving condition based on signals from each sensor, and sends brake control signal to the brake actuator.
	Solenoid Relay	Supply power to the solenoid valves.
	Motor Relay	Supply power to the pump motor in the brake actuator.
VSC Warning Buzzer		Emits an intermittent sound to inform the driver that the skid control ECU detects the strong front skid tendency or strong rear skid tendency.
Yaw Rate & Lateral Acceleration Sensor		<ul style="list-style-type: none"> • Detects the vehicle's yaw rate. • Detects the vehicle's lateral acceleration.
Steering Angle Sensor		Detects the steering direction and angle of the steering wheel.

9. Brake Actuator

- The brake actuator consists of the actuator portion, skid control ECU, relays.
- The Bosch brake actuator consists of 12 solenoid valves, 1 pump motor, 2 pumps, 2 reservoirs and 1 master cylinder pressure sensor.

► Hydraulic Circuit ◀



025CH74Y

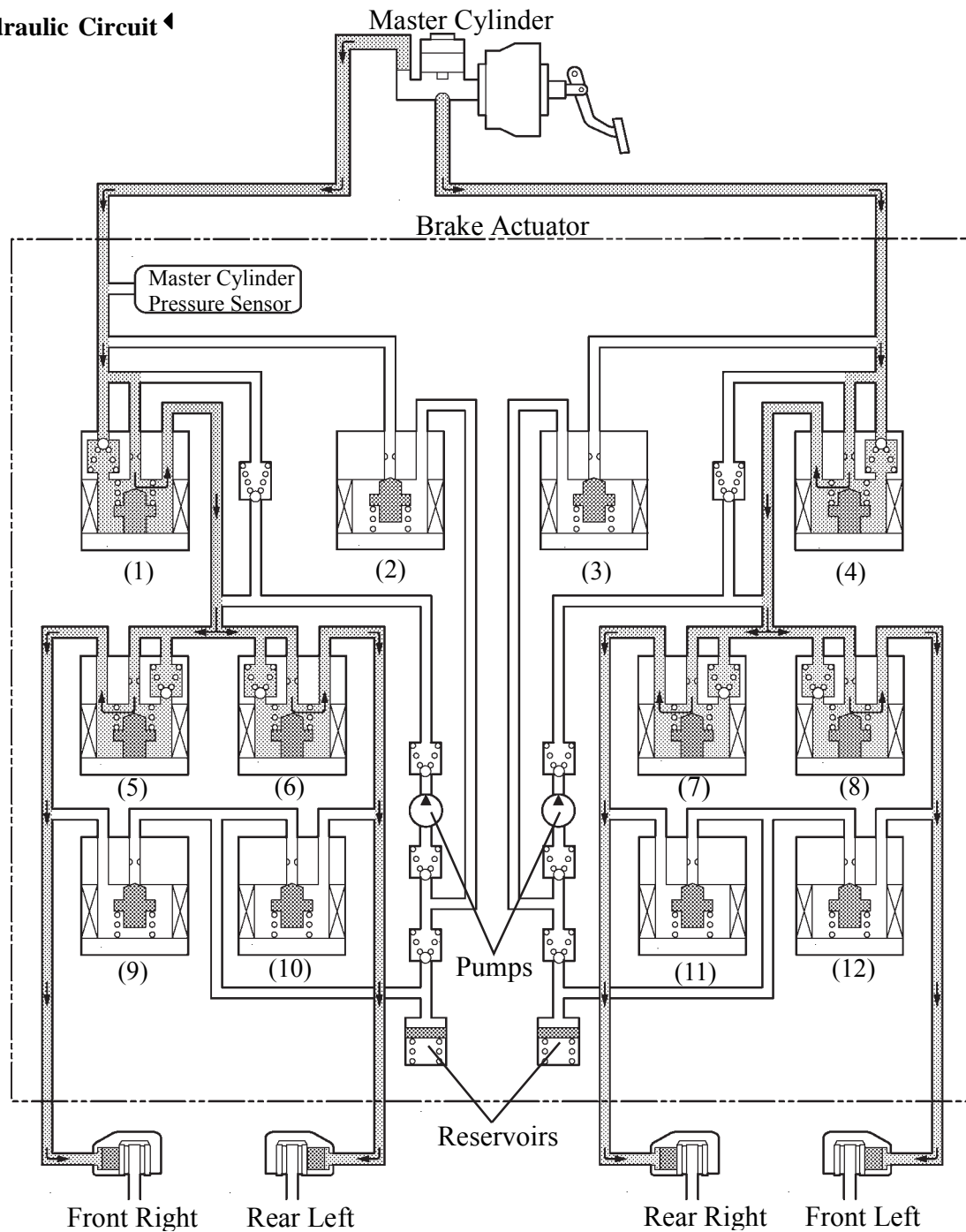
Component	
(1), (4)	Master Cylinder Cut Solenoid Valve
(2), (3)	Reservoir Cut Solenoid Valve
(5), (6), (7), (8)	Pressure Holding Valve
(9), (10), (11), (12)	Pressure Reduction Valve

10. System Operation

Normal Braking Operation

During normal braking, all solenoid valves are remained OFF.

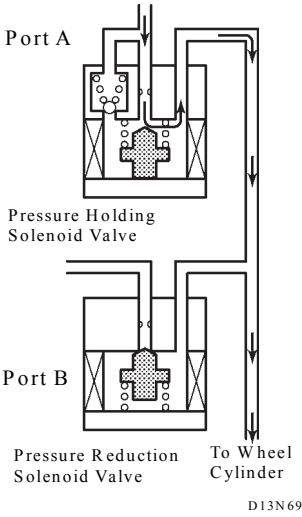
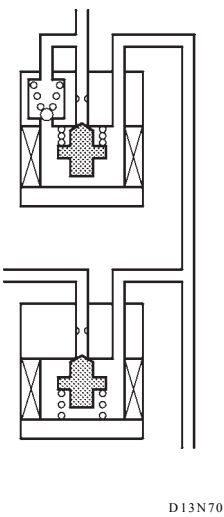
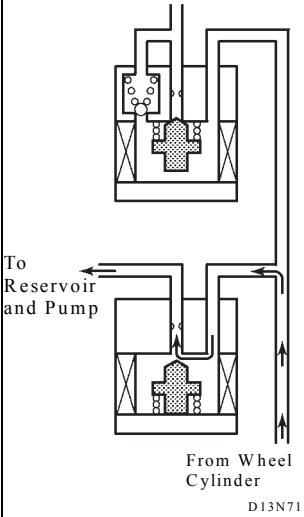
► Hydraulic Circuit ◀



025CH75Y

ABS with EBD Operation

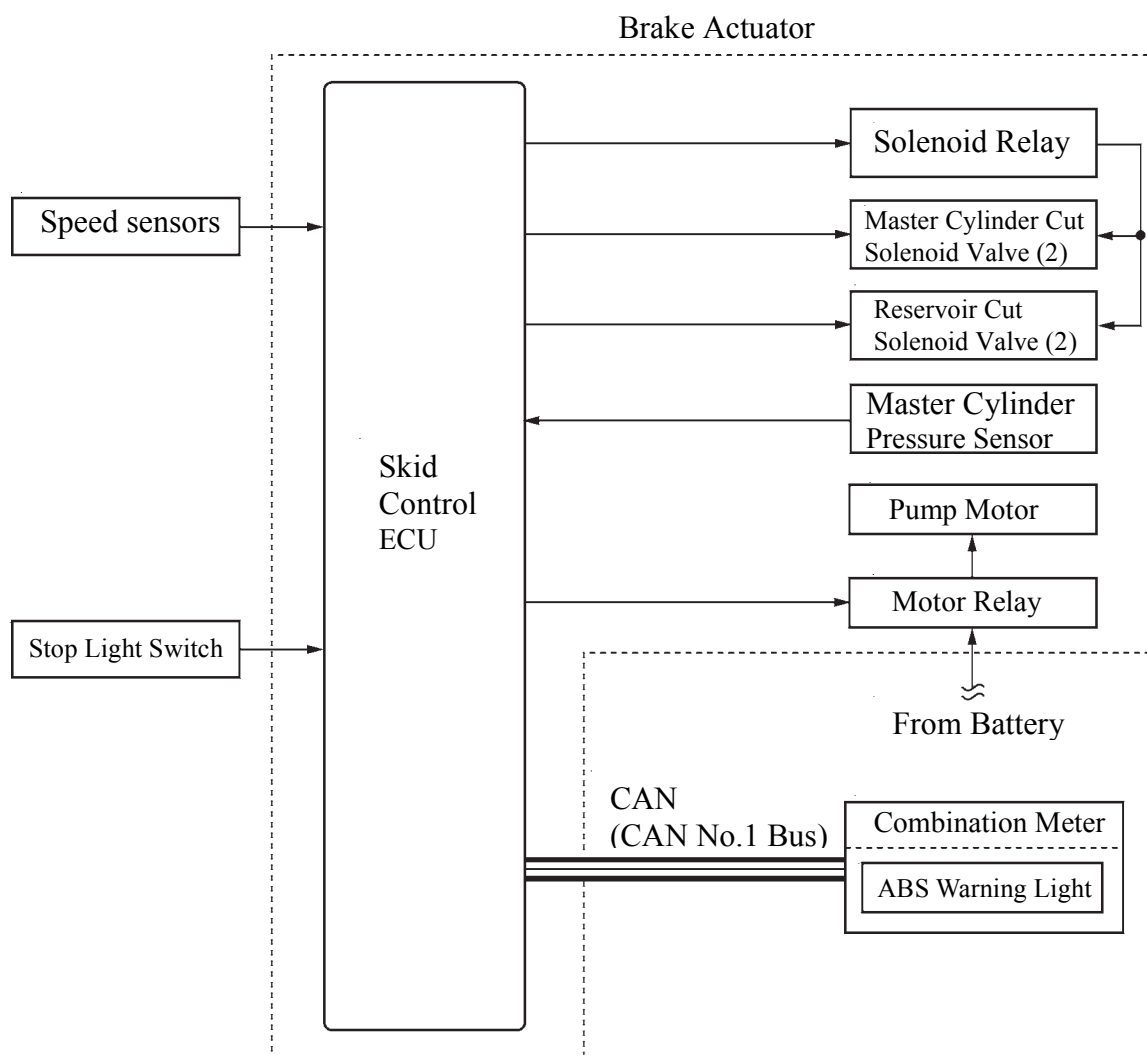
Based on the signals received from the 4 wheel speed sensors and yaw rate & lateral acceleration sensor, the skid control ECU calculates each wheel speed and deceleration, and checks wheel slipping condition. According to the slipping condition, the ECU controls the pressure holding solenoid valve and pressure reduction solenoid valve in order to adjust the fluid pressure of each wheel cylinder in the following three modes: pressure reduction, pressure holding, and pressure increase modes.

Not Activated	Normal Braking	—	—
Activated	Increase Mode	Holding Mode	Reduction Mode
Hydraulic Circuit	 <p>Port A</p> <p>Pressure Holding Solenoid Valve</p> <p>Port B</p> <p>Pressure Reduction Solenoid Valve</p> <p>To Wheel Cylinder</p> <p>D13N69</p>	 <p>D13N70</p>	 <p>To Reservoir and Pump</p> <p>From Wheel Cylinder</p> <p>D13N71</p>
Pressure Holding Valve (Port A)	OFF (Open)	ON (Close)	←
Pressure Reduction Valve (Port B)	OFF (Close)	←	ON (Open)
Wheel Cylinder Pressure	Increase	Hold	Reduction

Brake Assist Operation

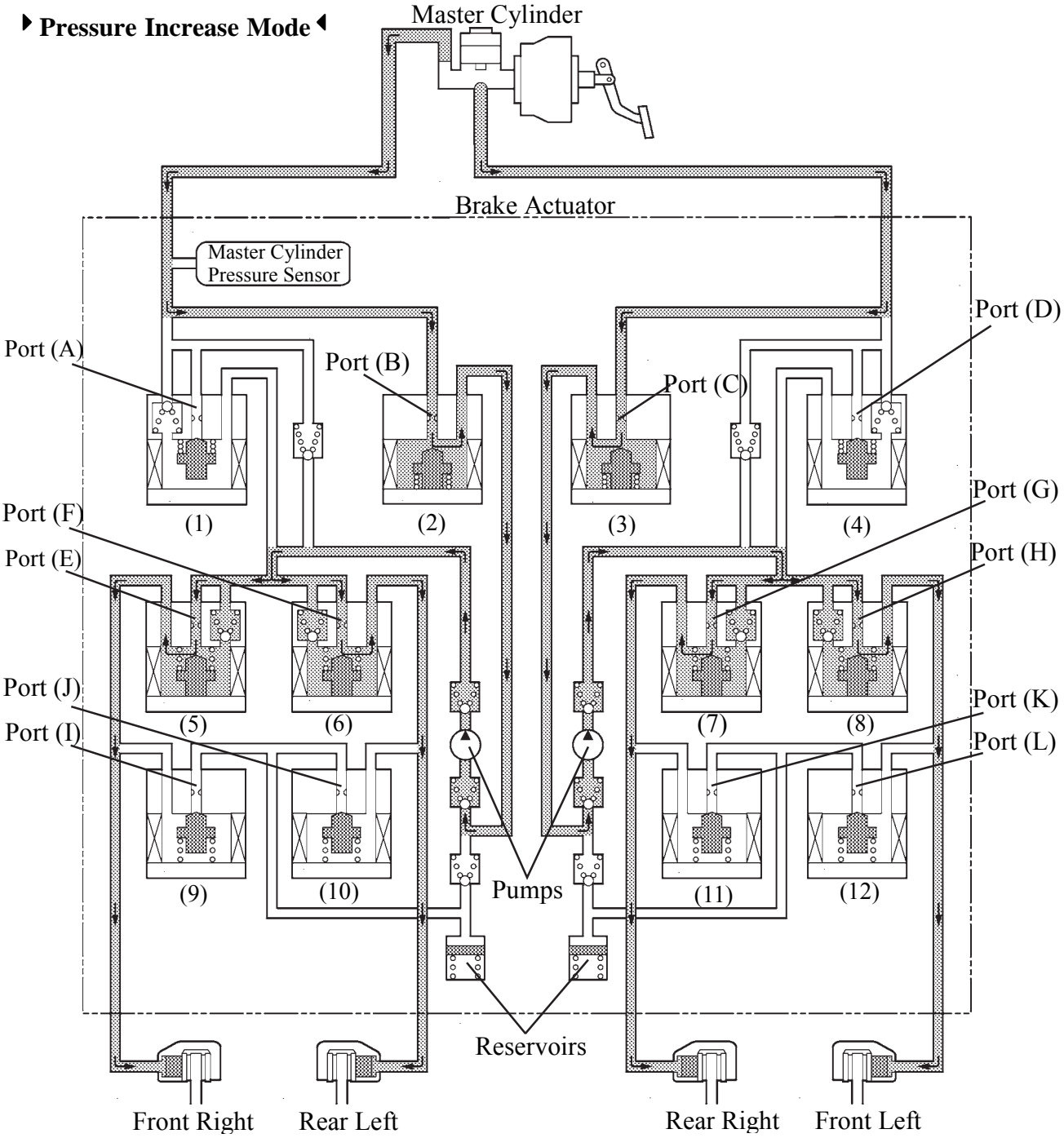
- In the event of emergency braking, the skid control ECU detects the driver's intention based on the speed of the pressure increase in the master cylinder determined by the pressure sensor signal. If the ECU judges the need for the additional brake assist, the fluid pressure is generated by the pump in the actuator and directed to the wheel cylinder to apply a greater fluid pressure than the master cylinder.
Also in the following cases, the skid control ECU provides brake assist.
- The brake assist system is activated; each solenoid operates as shown in the table on the next page.

► System Diagram ◀



025CH44P

► Pressure Increase Mode ◀



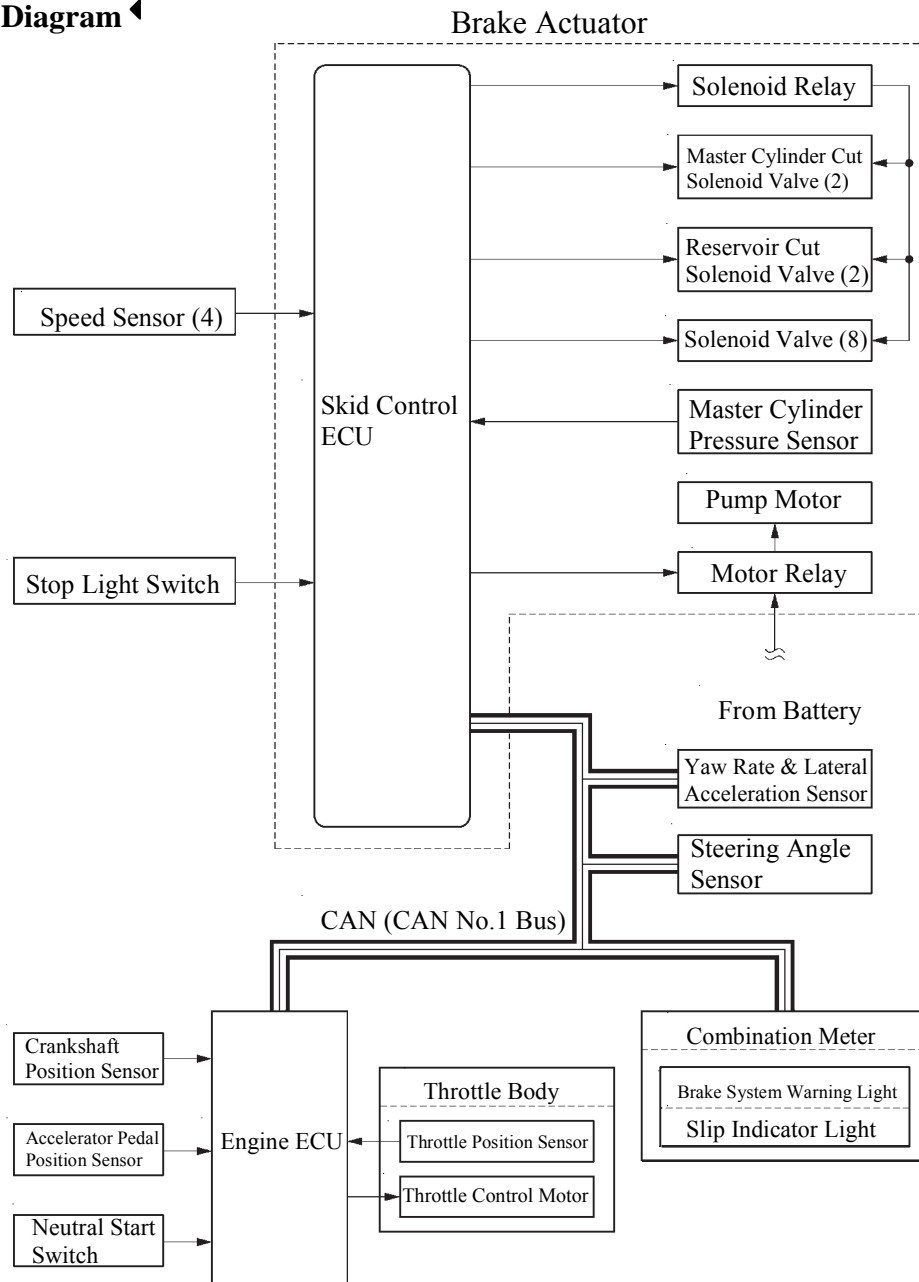
Brake Assist Activated

Item		Brake Assist Not Activated	Brake Assist Activated
(1), (4)	Master Cylinder Cut Solenoid Valve	OFF (Open)	ON (Close)
	Port: (A), (D)		
(2), (3)	Reservoir Cut Solenoid Valve	OFF (Close)	ON (Open)
	Port: (B), (C)		
(5), (6), (7), (8)	Pressure Holding Valve	OFF (Open)	←
	Port: (E), (F), (G), (H)		
(9), (10), (11), (12)	Pressure Reduction Valve	OFF (Close)	←
	Port: (I), (J), (K), (L)		

TRC Operation

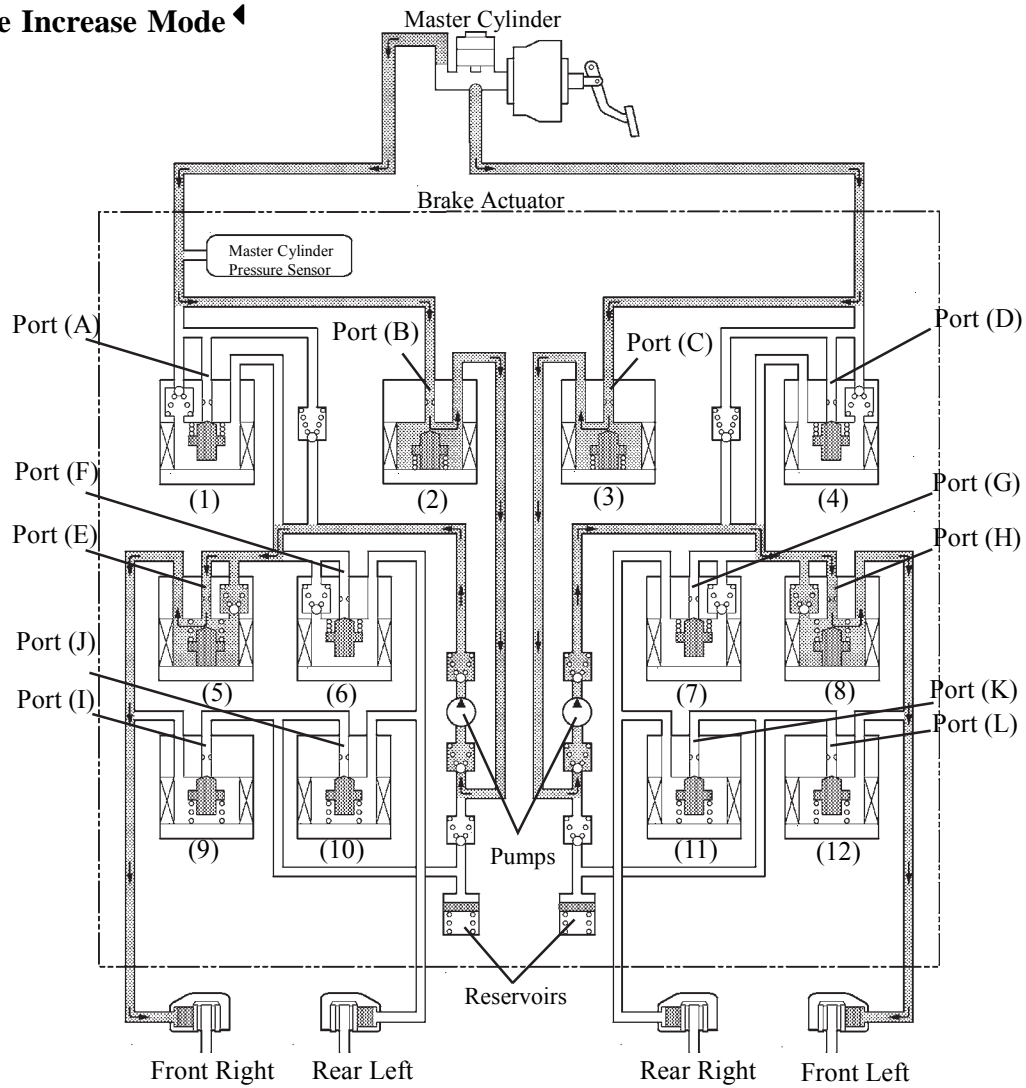
- The fluid pressure generated by the pump is regulated by the master cylinder cut solenoid valve to the required pressure. Thus, the wheel cylinders of the drive wheels are controlled in the following 3 modes: pressure reduction, pressure holding, and pressure increase modes, to control the slippage of the drive wheels.
- The diagram below shows the hydraulic circuit in the pressure increase mode when the TRC is activated.
- The pressure holding solenoid valve and the pressure reduction solenoid valve are turned ON/OFF according to the ABS operation pattern described earlier on page CH-69.
- The TRC is activated; each solenoid operates as shown in the table on the next page.

System Diagram



02KCH39TEb

► Pressure Increase Mode ◀



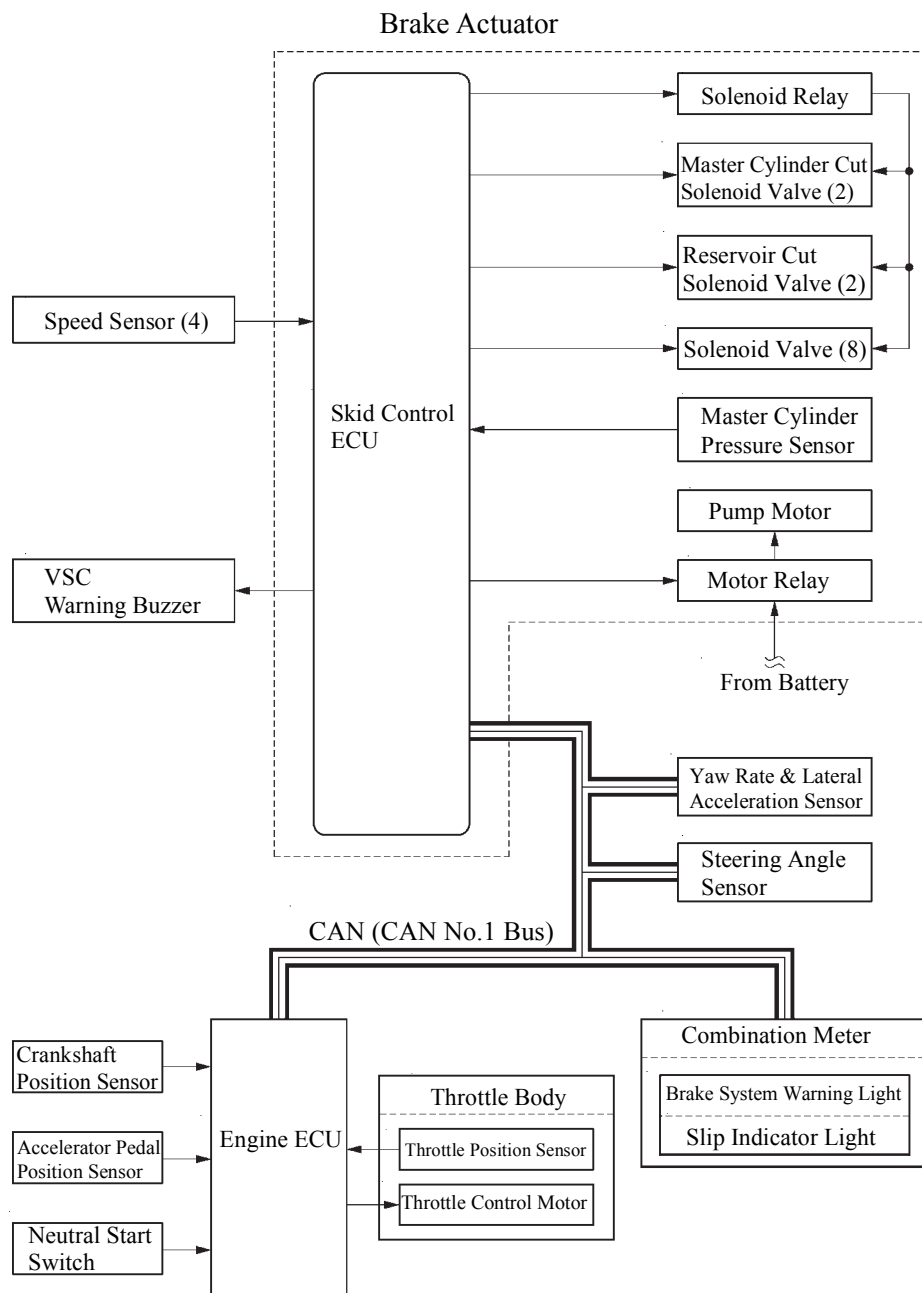
Item		TRC not Activated	TRC Activated		
			Increase Mode	Hold Mode	Reduction Mode
(1), (4)	Master Cylinder Cut Solenoid Valve	OFF/ Open	ON/ Close	←	←
	Port: (A), (D)				
(2), (3)	Reservoir Cut Solenoid Valve	OFF/ Close	ON/ Open	←	←
	Port: (B), (C)				
Front Brake	(5), (8) Pressure Holding Valve	OFF/ Open	←	ON/ Close	←
	Port: (E), (H)				
	(9), (12) Pressure Reduction Valve	OFF/ Close	←	←	ON/ Open
	Port: (I), (L)				
Wheel Cylinder Pressure		—	Increase	Hold	Reduction
Rear Brake	(6), (7) Pressure Holding Valve	OFF/ Open	ON/ Close	←	←
	Port: (F), (G)				
	(10), (11) Pressure Reduction Valve	OFF/ Close	←	←	←
	Port: (J), (K)				
Wheel Cylinder Pressure		—	—	—	—

VSC Operation

1) General

The VSC operation, by way of solenoid valves, controls the fluid pressure that is generated by the pump and applies it to the brake wheel cylinder of each wheel in the following 3 modes: pressure reduction, pressure holding, and pressure increase modes. As a result, the tendency to front wheel skid or rear wheel skid is controlled.

► System Diagram ◀

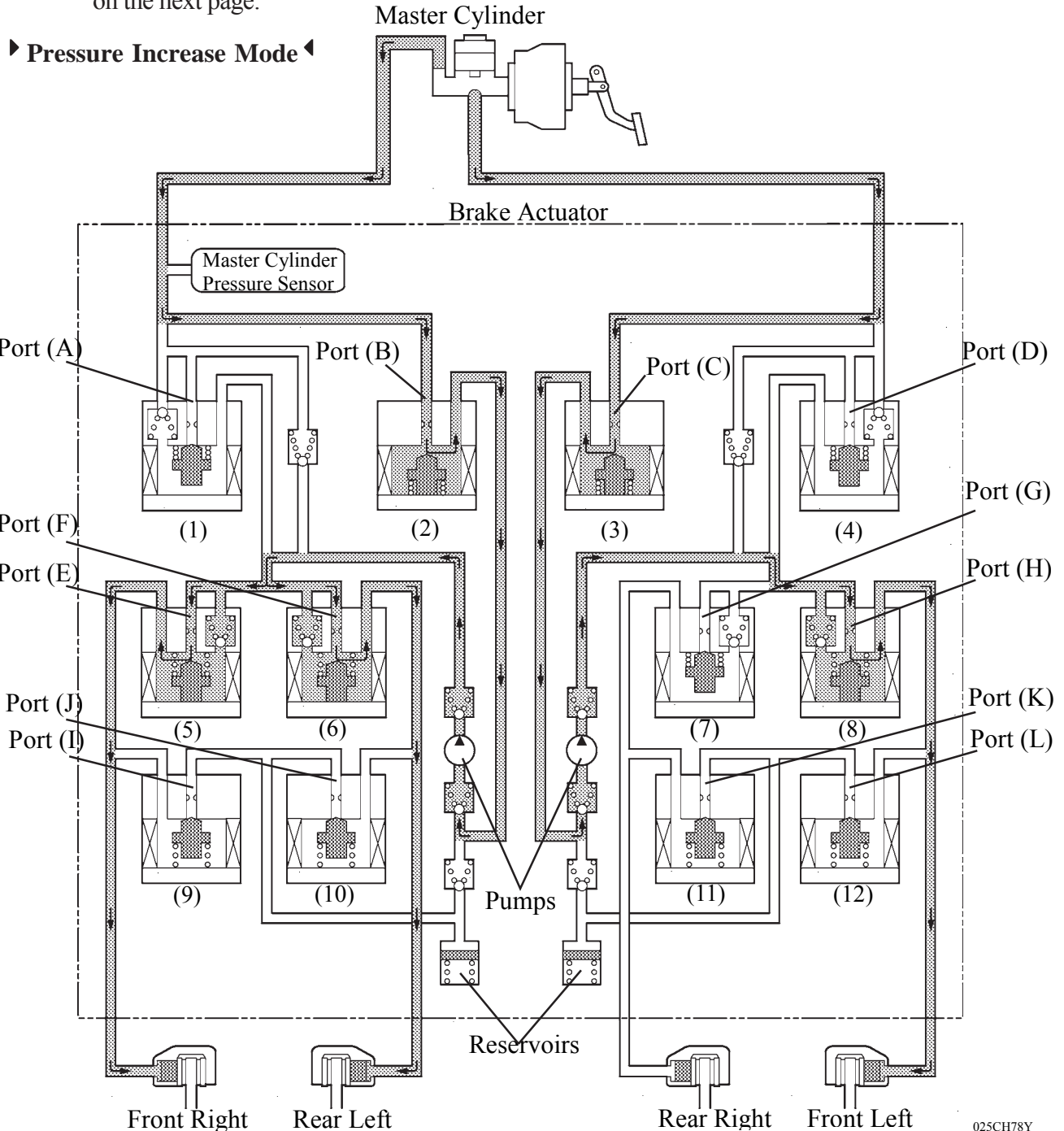


02KCH40TEb

2) Front Wheel Skid Restraining Control (Turn to the Right)

In the front wheel skid restraining control, the brakes of the front wheels and the rear wheel of the inner circle of the turn are applied. Also, depending on whether the brake is ON or OFF and the condition of the vehicle, there are circumstances in which the brake might not be applied to the wheels even if those wheels are targeted for braking.

- The diagram below shows the hydraulic circuit in the pressure increase mode, as it controls the front wheel skid condition while the vehicle makes a right turn.
- In other operating modes, the pressure holding valve and the pressure reduction valve are turned ON/OFF according to the ABS with EBD operation pattern.
- The front wheel skid restraining control is activated; each solenoid operates as shown in the table on the next page.

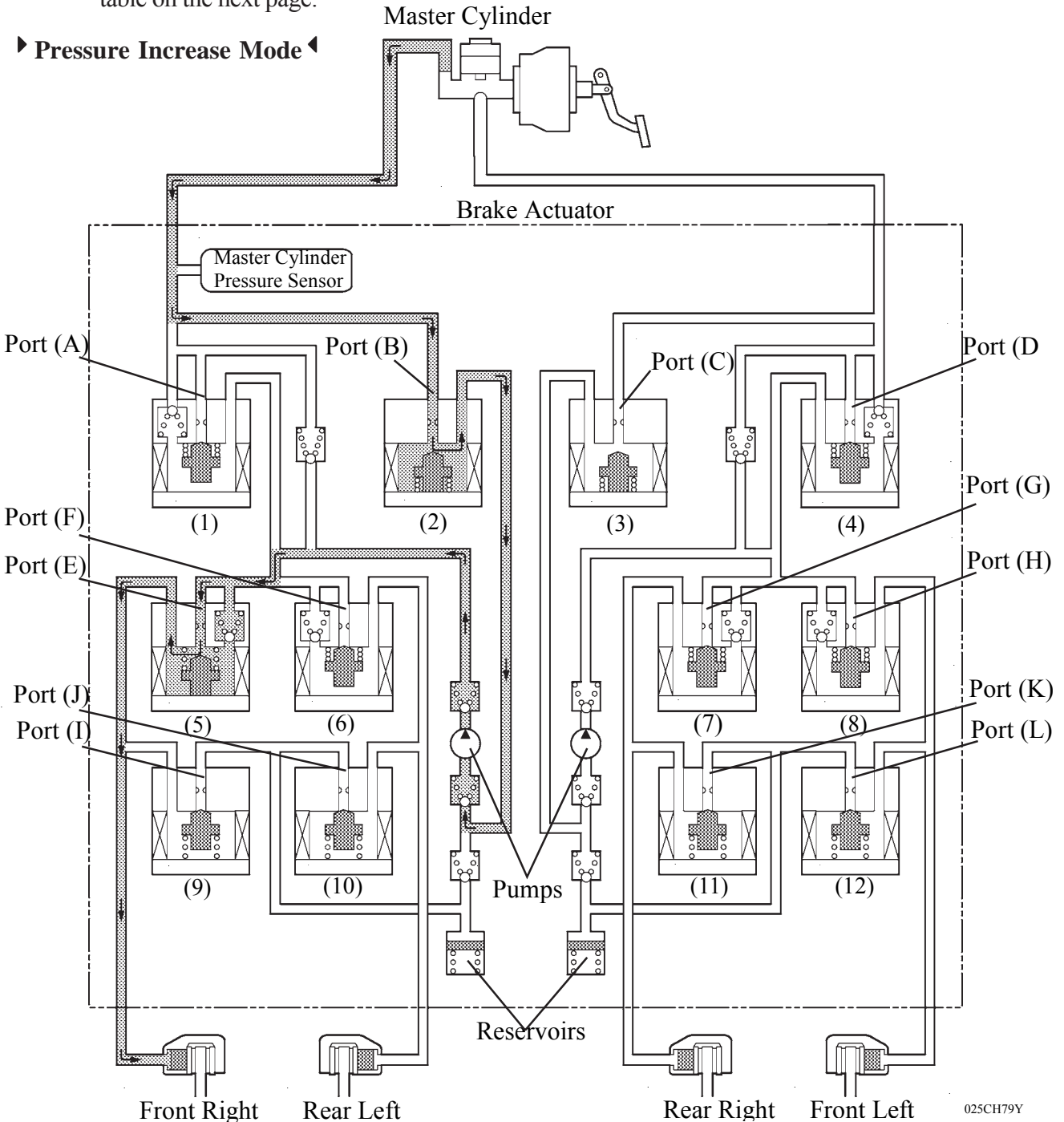


Item			VSC not Activated	VSC Activated			
				Increase Mode	Hold Mode	Reduction Mode	
(1), (4)	Master Cylinder Cut Solenoid Valve		OFF/ Open	ON/ Close	←	←	
	Port: (A), (D)						
(2), (3)	Reservoir Cut Solenoid Valve		OFF/ Close	ON/ Open	←	←	
	Port: (B), (C)						
Front Brake	(5), (8)	Pressure Holding Valve	OFF/ Open	←	ON/ Close	←	
		Port: (E), (H)					
	(9), (12)	Pressure Reduction Valve	OFF/ Close	←	←	ON/ Open	
		Port: (I), (L)					
	Wheel Cylinder Pressure		—	Increase	Hold	Reduction	
Rear Brake	(6)	Pressure Holding Valve (Rear Right)	OFF/ Open	←	ON/ Close	←	
		Port: (F)					
	(7)	Pressure Holding Valve (Rear Left)	OFF/ Open	ON/ Close	←	←	
		Port: (G)					
	(10)	Pressure Reduction Valve (Rear Right)	OFF/ Close	←	←	ON/ Open	
		Port: (J)					
	(11)	Pressure Reduction Valve (Rear Left)	OFF/ Close	←	←	←	
		Port: (K)					
	Wheel Cylinder Pressure		Right	—	Increase	Hold	Reduction
			Left	—	—	—	—

3) Rear Wheel Skid Restraining Control (Turn to the Right)

In rear wheel skid restraining control, the brake of the front wheel of the outer circle of the turn is applied. Also, depending on whether the brake is ON or OFF and the condition of the vehicle, there are circumstances in which the brake might not be applied to the wheels even if those wheels are targeted for braking.

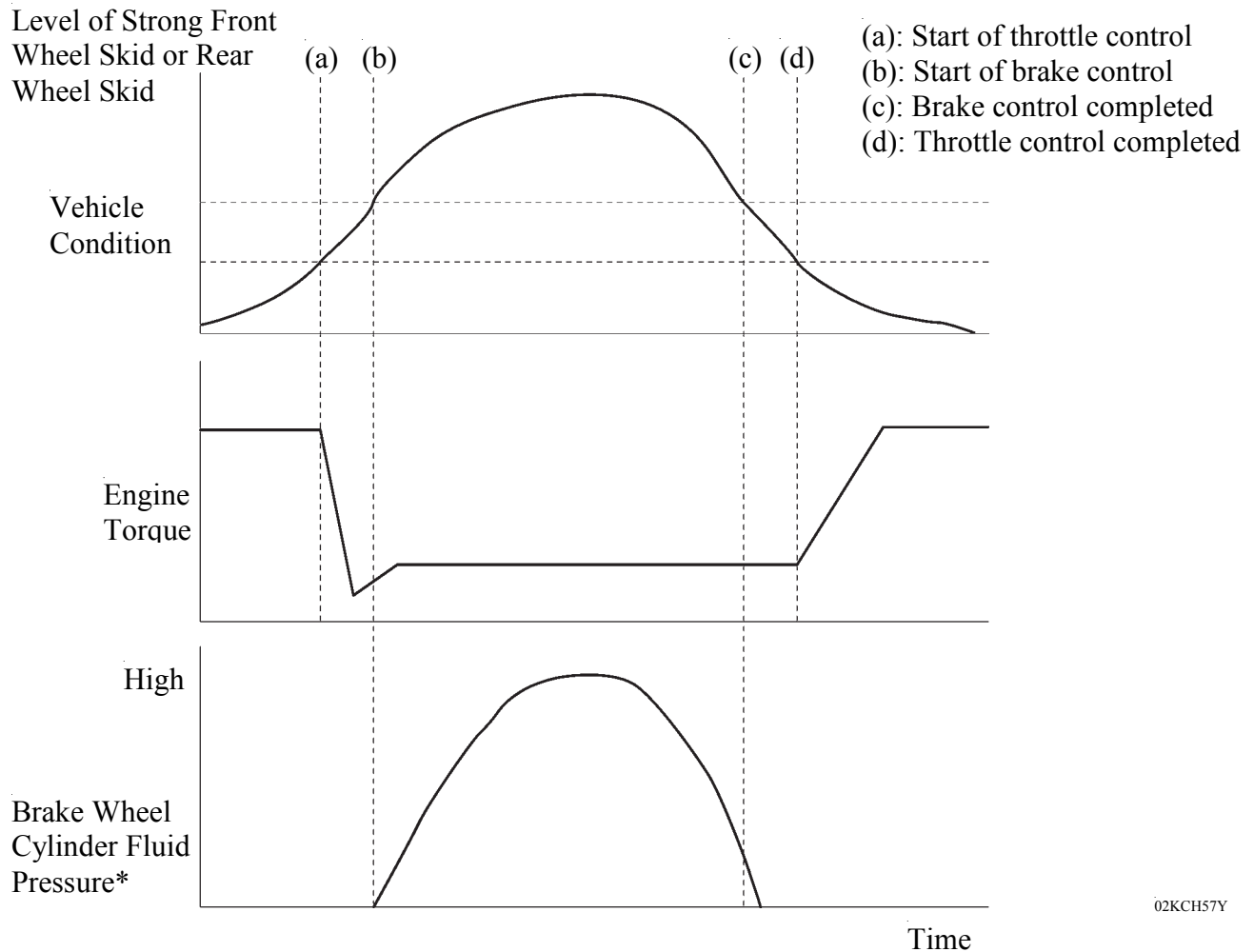
- The diagram below shows the hydraulic circuit in the pressure increase mode, as it controls the rear wheel skid condition while the vehicle make a right turn.
- In other operating modes, the pressure holding valve and the pressure reduction valve are turned ON/OFF according to the ABS with EBD operating pattern.
- The rear wheel skid restraining control system is activated; each solenoid operates as shown in the table on the next page.



Item				VSC not Activated	VSC Activated		
					Increase Mode	Hold Mode	Reduction Mode
(1), (4)	Master Cylinder Cut Solenoid Valve			OFF/ Open	ON/ Close	←	←
	Port: (A), (D)						
(2), (3)	Reservoir Cut Solenoid Valve			OFF/ Close	ON/ Open	←	←
	Port: (B), (C)						
Front Brake	(8)	Pressure Holding Valve (Front Right)		OFF/ Open	ON/ Close	←	←
		Port: (H)					
	(5)	Pressure Holding Valve (Front Left)		OFF/ Open	←	ON/ Close	←
		Port: (E)					
	(12)	Pressure Reduction Valve (Front Right)		OFF/ Close	←	←	←
		Port: (L)					
	(9)	Pressure Reduction Valve (Front Left)		OFF/ Close	←	←	ON/ Open
		Port: (I)					
	Wheel Cylinder Pressure		Right	—	—	—	—
			Left	—	Increase	Hold	Reduction
Rear Brake	(6)	Pressure Holding Valve (Rear Right)		OFF/ Open	ON/ Close	←	←
		Port: (F)					
	(7)	Pressure Holding Valve (Rear Left)		OFF/ Open	ON/ Close	←	←
		Port: (G)					
	(10)	Pressure Reduction Valve (Rear Right)		OFF/ Close	←	←	←
		Port: (J)					
	(11)	Pressure Reduction Valve (Rear Left)		OFF/ Close	←	←	←
		Port: (K)					
	Wheel Cylinder Pressure		Right	—	—	—	—
			Left	—	Increase	Hold	Reduction

Engine Output Control

During a VSC operation, the skid control ECU outputs a VSC operation signal to the engine ECU. Upon receiving this signal, the engine ECU effects throttle control to regulate the engine output.



02KCH57Y

*: The wheel cylinder that activates varies depending on the condition of the vehicle.

Initial Check

Each time the power source is IG-ON, and the vehicle reaches a speed of approximately 6 km/h or more, the skid control ECU performs an initial check. The functions of each solenoid valve and pump motor in the brake actuator are checked in sequence.

11. Service Mode

- A new service mode has been created for new Camry. In this mode, TRC and VSC functions can be forcibly turned OFF, either through the operation of an intelligent tester II or by operating the parking brake and the brake pedal together. Please refer to the following service tip for information regarding changing the service mode.

Service Tip

Transition to the service mode (TRC and VSC OFF mode).

The TRC and VSC systems can be turned off by following the procedures below:

- *When using the parking brake and brake pedal:*
 - 1) Check that the ignition is OFF and the shift lever is in position P.
 - 2) Start the engine .
 - 3) Operate the following steps 4 to 8 within 30 seconds of starting the engine.
 - 4) Turn the parking brake switch on.
 - 5) Depress and release the brake pedal twice.
 - 6) Turn the parking brake switch on and off twice while depressing the brake pedal.
 - 7) Depress and release the brake pedal twice while the parking brake switch is on.
Notice: Steps 6 and 7 should each be performed within 15 seconds.
 - 8) Check that the slip indicator light and VSC warning light are turned on. If not, repeat the procedure from the step 1.
 - 9) The brake control system can be returned to the normal mode by turning the Ignition ON from OFF.
- *When using the intelligent tester II:*
 - 1) Check that the ignition switch is OFF and the shift lever is in position P.
 - 2) Connect the intelligent tester II to the DLC3 and switch on.
 - 3) Start the engine .
 - 4) Operate the intelligent tester II to send signals of memory change function.
 - 5) The brake control system can be returned to the normal mode by turning the Ignition ON from OFF.

For details of the transition to service mode, see the Camry Repair Manual.

12. Diagnosis

General

If the skid control ECU detects a malfunction in the brake control system (ABS with EBD, brake assist, TRC and VSC), the ABS or brake or VSC system warning light that corresponds to the function for which the malfunction has been detected illuminates, as indicated in the table below, to alert the driver of the malfunction.

○: Illuminates

Item	ABS	EBD	Brake Assist	TRC	VSC
ABS Warning Light	○	○	○	—	—
Brake System Warning Light	—	○	—	—	—
VSC Warning Light	—*	—*	—*	○	○

* : Failure in the ABS, EBD, and brake assist systems prohibits operation of the TRC, VSC systems. Accordingly, the VSC light will be illuminated.

- At the same time, the DTC (Diagnostic Trouble Code) are stored in the memory. The DTC can be read by connecting SST (09843-18040) between the Tc and CG terminals of the DLC3, and observing the blinking of the ABS warning light or connecting an intelligent tester II.
- This system has a sensor signal check (test mode) function. This function is activated by connecting the SST (09843-18040) between the Ts and CG terminal of the DLC3 or by connecting an intelligent tester II. The ABS warning light and VSC warning light blinks at a 0.25-second interval. This check function performs lateral acceleration sensor check, yaw rate sensor check, master cylinder pressure sensor check, and speed sensor check.

- If the skid control ECU detects a malfunction during a sensor signal check (test mode), it stores the DTC in its memory. These DTC can be read during a sensor check operation by connecting the SST (09843-18040) to the Tc and CG terminals of the DLC3 and observing the blinking of the ABS warning light or connecting an intelligent tester II.

For details of the DTC that are stored in skid control ECU memory and the DTC that are output through the sensor signal check (test mode) functions, see the Camry Repair Manual.

Diagnosis of CAN

- If a malfunction occurs on a CAN communication line, the skid control ECU is connected to the CAN communication lines and it will store the DTC (Diagnostic Trouble Code) in its memory.
- There are 2-digit DTC and 5-digit DTC for CAN communications related to the brake control system (ABS with EBD, brake assist, TRC and VSC).
 - 2-digit DTC can be read by connecting the SST (09843-18040) to Tc and CG terminals of the DLC3, and observing the diagnostic code indicated on the VSC warning light.
 - 5-digit DTC can be read by connecting an intelligent tester II to the DLC3.

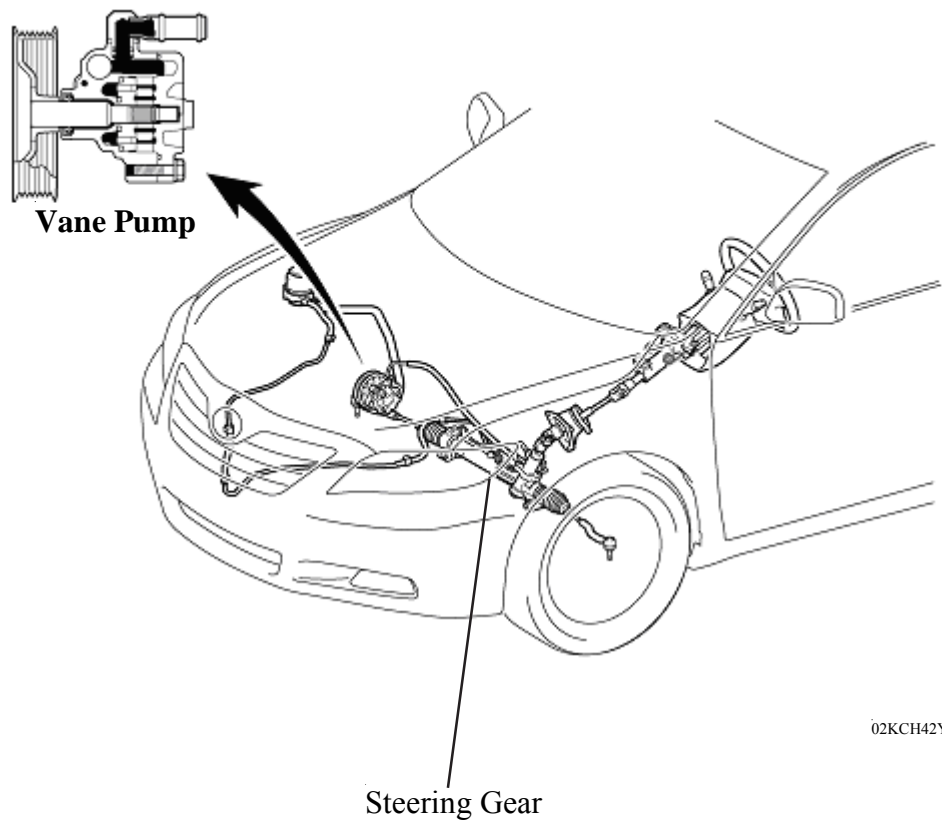
Fail-Safe

- In the event of a malfunction in the ABS and/or brake assist controls, the skid control ECU prohibits the ABS, brake assist, TRC and VSC operations.
- In the event of a malfunction in the EBD control, the skid control ECU prohibits the EBD operation. Even in this case, usual braking performance excluding the brake control system (ABS with EBD, brake assist, TRC and VSC) is secured.
- In the event of a malfunction in the TRC and/or VSC, the skid control ECU prohibits TRC and VSC operations.
- If a communication malfunction occurs between the skid control ECU, the steering angle sensor, the yaw rate & deceleration sensor (yaw rate & lateral acceleration sensor), or engine ECU, the skid control ECU stops the TRC and VSC.
- When the engine ECU detects the DTC, it will disable the TRC and VSC.

STEERING

DESCRIPTION

- A rack and pinion type steering gear with an engine speed sensing type power steering is used on all models.
- The pressure return type vane pump is used which makes the discharge pressure flow volume return at middle and high speed, thus ensuring a fine steering feeling.
- The steering column uses an energy absorbing mechanism.



Tilt & Power Telescopic Steering Column

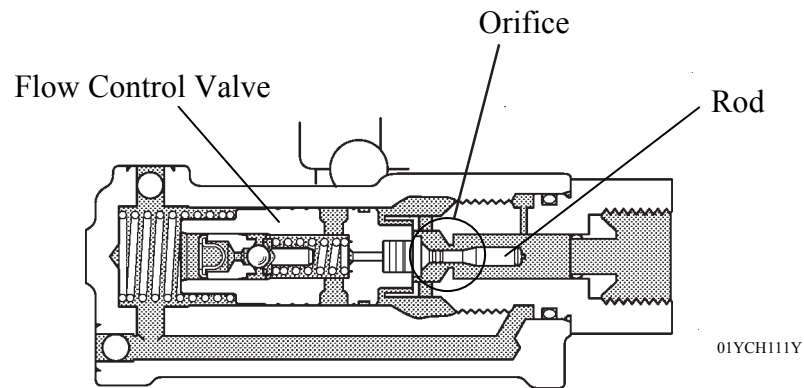
Specifications

Gear Ratio (Overall)		15.9
No. of Turns Lock to Lock		3.20
Rack Stroke	mm	156.0
Fluid Type		ATF Type DEXRON® II or III

✱ POWER STEERING VANE PUMP

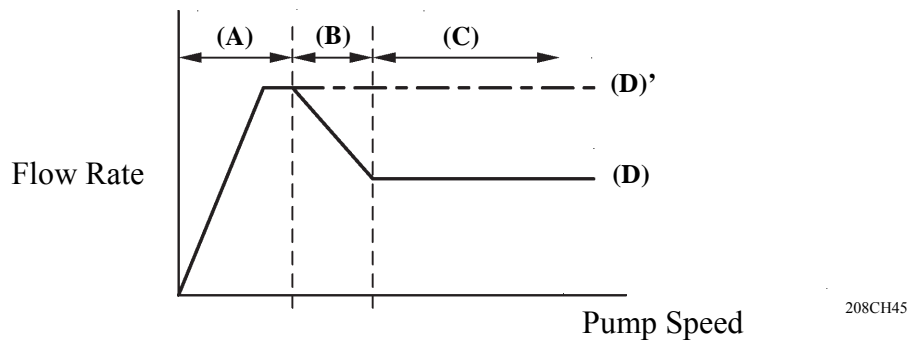
1. Construction

The rod type flow control valve, which adjusts flow rate according to the pump speed and load by moving the inside rod to change the opening area of the orifice, is used in this pump.



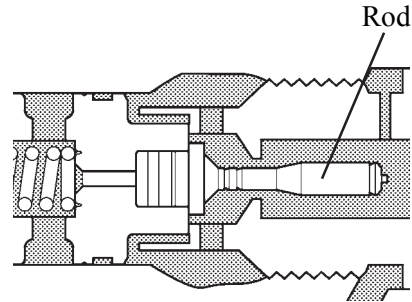
2. Operation

► Flow Rate Characteristics ◀



At Low Pump Speed Range (A)

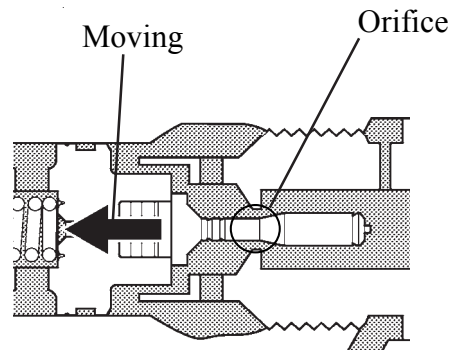
The flow rate increases proportionally to the pump speed.



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At Middle Pump Speed Range without Steering (B)

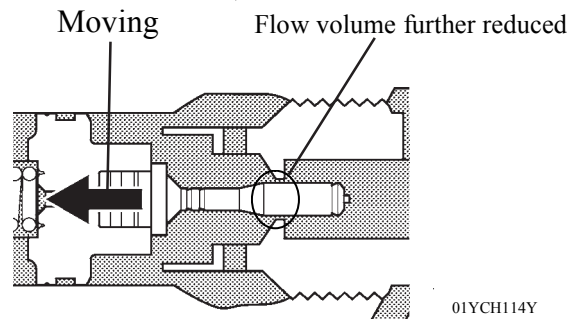
The flow control valve moves to the left, the flow rate is decreased due to the reduction in the orifice area, which is related to the rod shaft diameter at each position.



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At High Pump Speed Range without Steering (C)

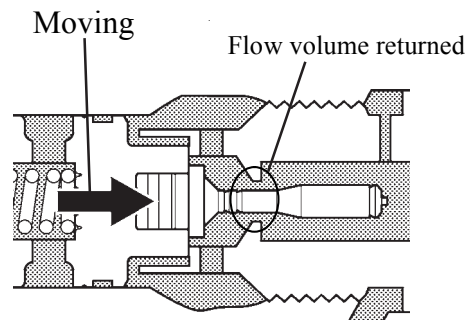
As the flow control valve moves further to the left, the flow rate is further reduced at the maximum rod shaft diameter.



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During Pressure Loading (D → D')

When operating the steering in the middle or high pump speed range, the pressure inside the vane pump is increased causing the flow control to move back to the right, which results in an increase in the flow rate.

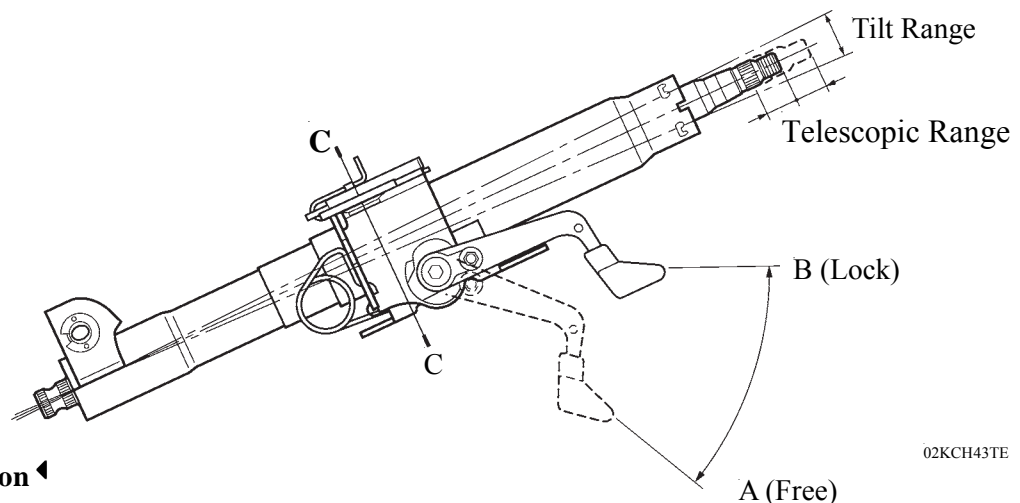


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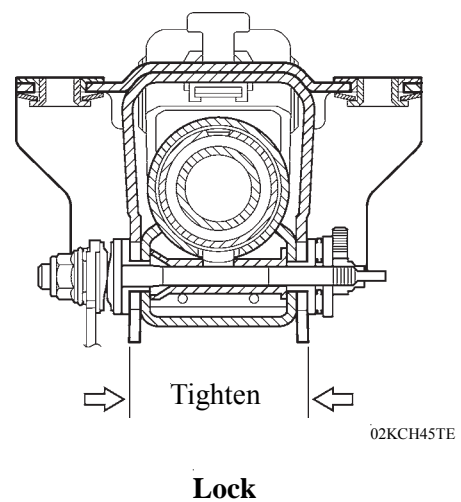
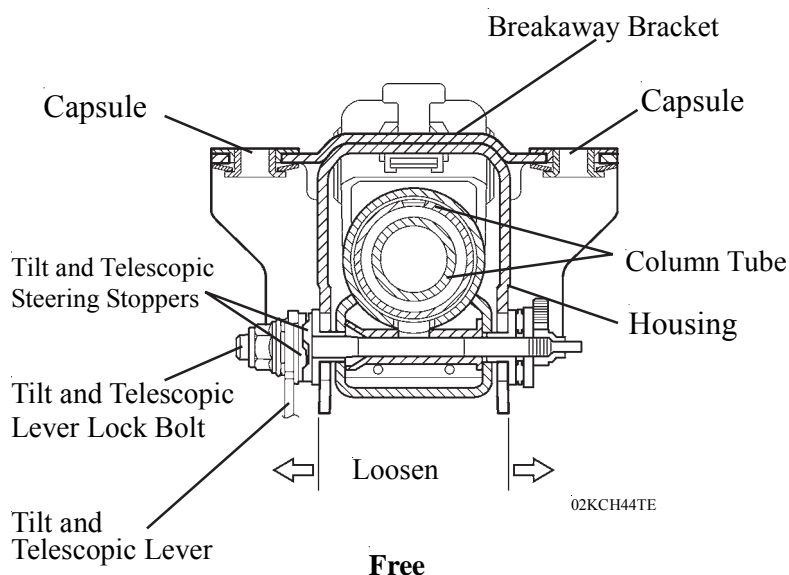
STEERING COLUMN

1. Manual tilt and Telescopic Steering Column

- The manual tilt and telescopic mechanism consists mainly of a tilt lever, steering column tube, breakaway bracket, tilt lever lock bolt, and tilt steering stoppers.
- The tilt lever controls the tilt and the telescope motion.
- With the tilt adjustment range of 3.2° (step less) and the telescopic adjustment range of 40 mm, the steering column can be adjusted to a position selected by the driver.
- When the tilt and telescopic mechanism is in its locked state, the tilt lever at position B causes the cam of the tilt and telescopic steering stoppers to tighten the steering column tube.
- When the tilt and telescopic mechanism is in its free state, the tilt lever at position A causes the cam of the tilt and telescopic steering stoppers to loosen the steering column tube.



► C – C Cross Section ◀



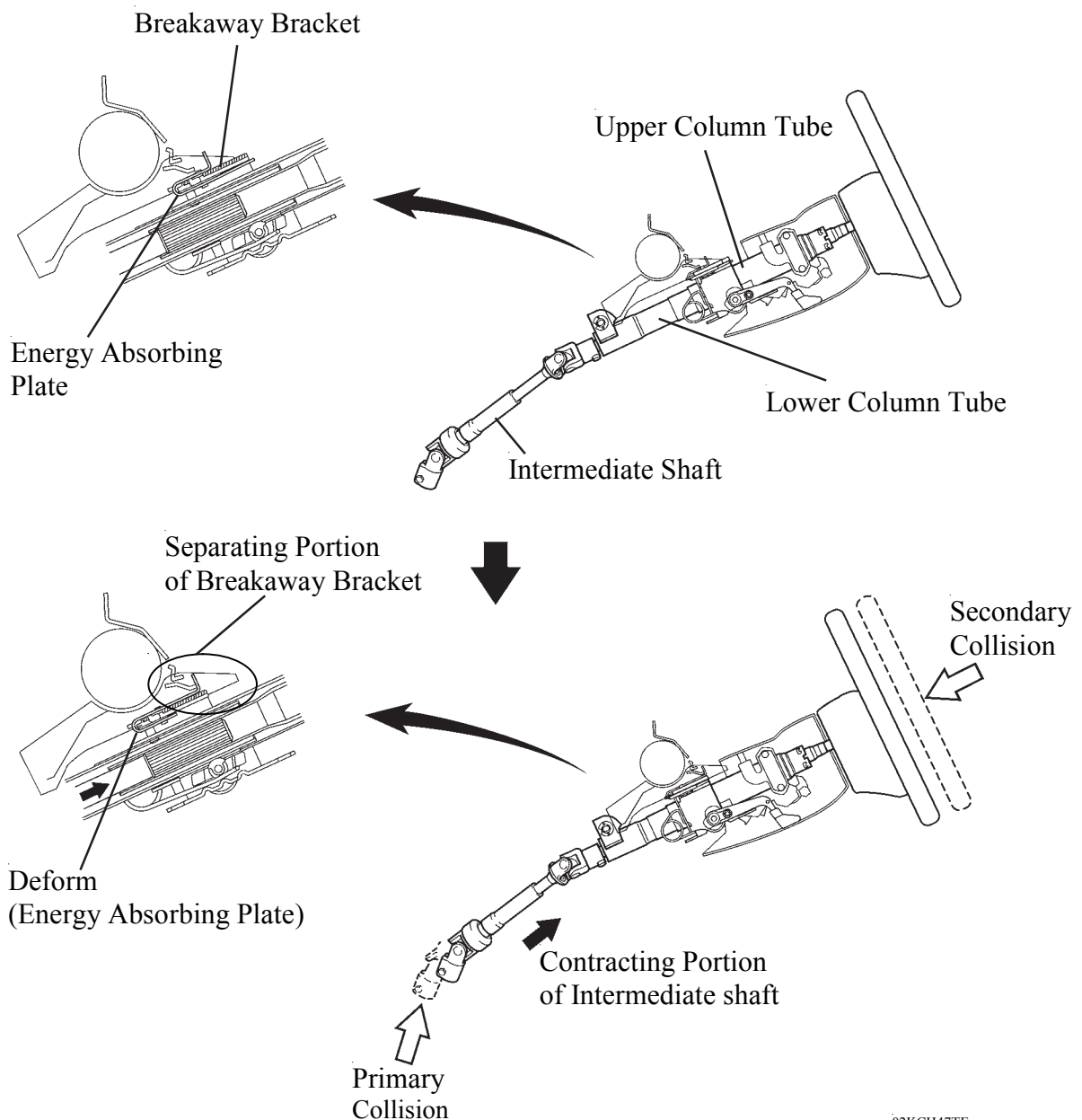
Drawings for Illustration Purposes Only

3. Energy Absorbing Mechanism

Manual Tilt and Telescopic Steering Column

- The energy absorbing mechanism consists mainly of a breakaway bracket, breakaway capsule, energy absorbing plate, upper column tube and lower column tube.
- When an impact is transmitted to the steering wheel during a collision (secondary collision), the steering wheel and the steering wheel pad help absorb the impact. In addition, the breakaway bracket and the reinforcement separate, and the upper and lower column tubes contract.
- At this time, the energy absorbing plate becomes deformed to help absorb the impact of the secondary collision.

► Energy Absorbing Mechanism ◀



Drawings for Illustration Purposes Only

02KCH47TE

BODY

BODY STRUCTURE

<i>Lightweight and Highly Rigid Body.....</i>	<i>BO-2</i>
<i>Safety Features.....</i>	<i>BO-5</i>
<i>Rust-resistant Body.....</i>	<i>BO-10</i>
<i>Low Vibration and Low Noise Body.....</i>	<i>BO-12</i>
<i>Aerodynamics.....</i>	<i>BO-16</i>

ENHANCEMENT OF PRODUCT APPEAL

<i>Parts with Low Repair Cost.....</i>	<i>BO-18</i>
<i>Washer Nozzle.....</i>	<i>BO-19</i>
<i>Wiper Arm & Blade.....</i>	<i>BO-19</i>
<i>Child Restraint System.....</i>	<i>BO-20</i>
<i>Seat Belt.....</i>	<i>BO-21</i>

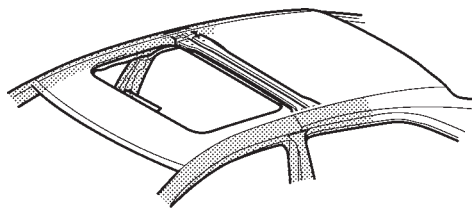
BODY


BODY STRUCTURE

✳ LIGHTWEIGHT AND HIGHLY RIGID BODY

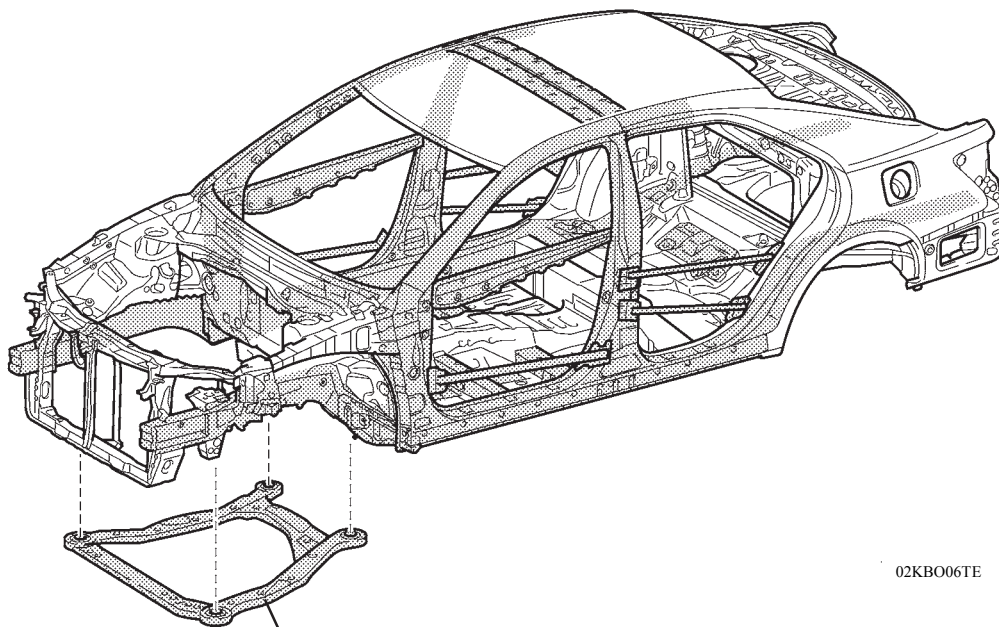
1. High Strength Sheet Steel

High strength sheet steel is used in order to ensure body rigidity and realize a lightweight body.



 : High Strength Sheet Steel

Models with Sliding Roof

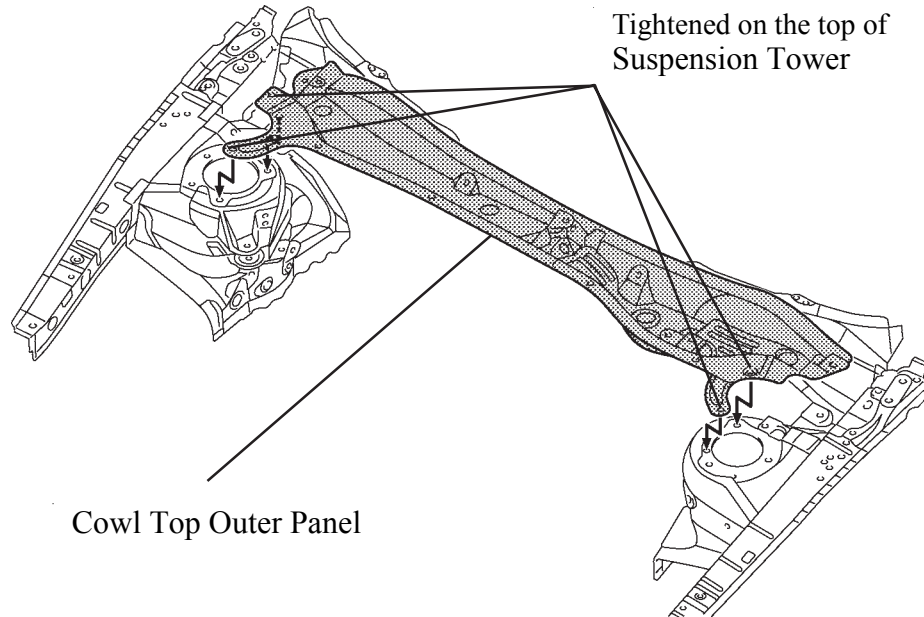


Front Sub Frame

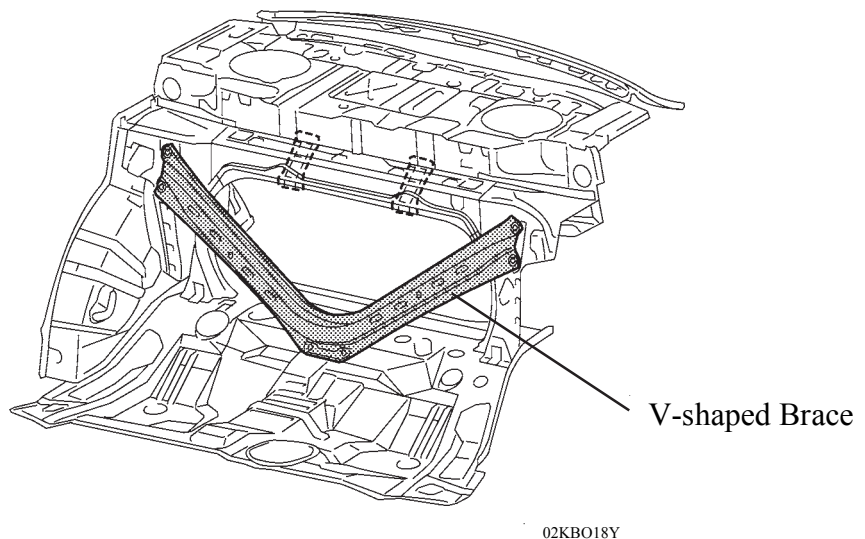
02KBO06TE

2. Brace

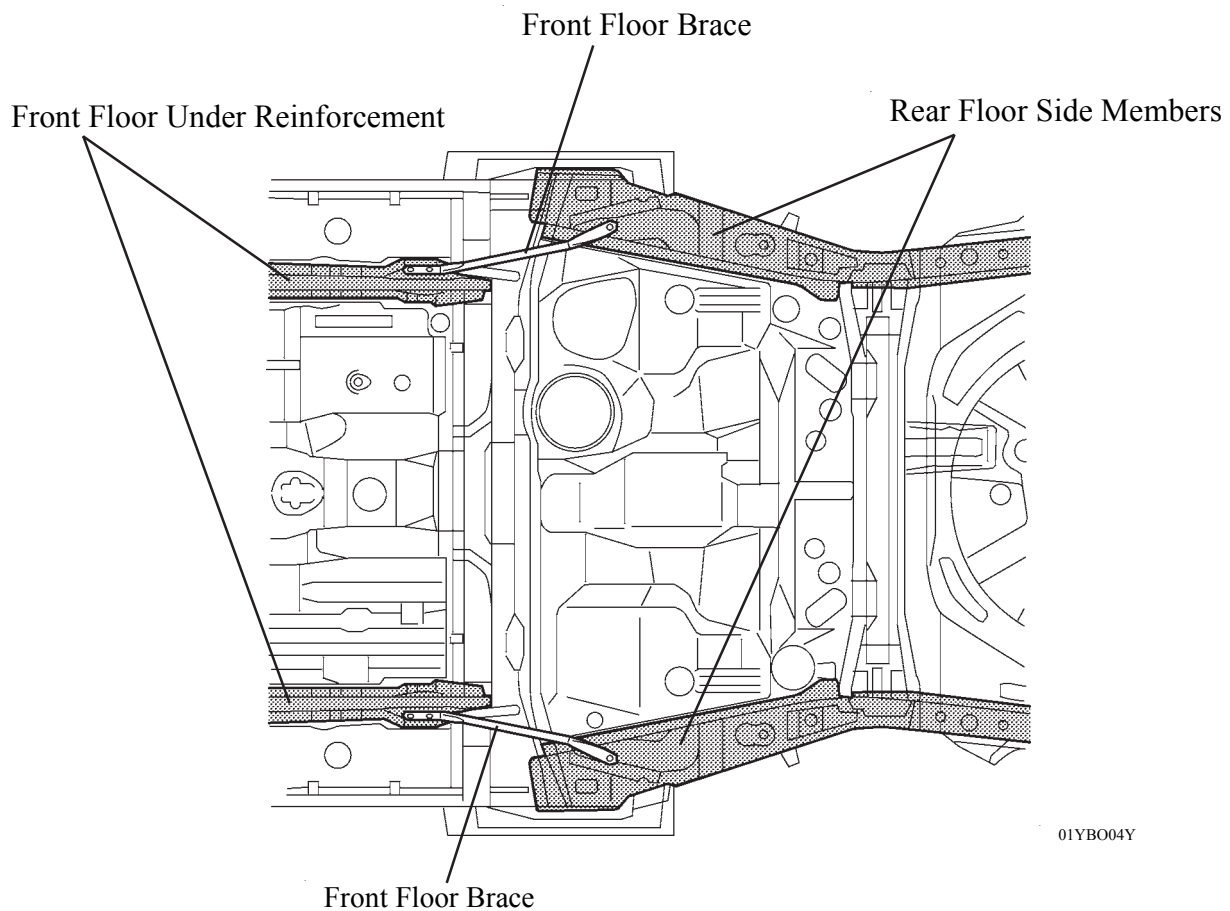
- Excellent manoeuvrability and stability has been achieved by providing a cowl top outer panel for the front suspension tower.



- On both models with fixed rear seats and those with reclining rear seats, a V-shaped brace has been provided between the rear suspension tower and the floor. As a result, the body rigidity has been enhanced and excellent manoeuvrability and stability have been achieved.



- On Sportivo grades, high body rigidity has been achieved through the use of front floor braces arranged between the front floor under reinforcement and rear floor side members.



View from Bottom Side

★ SAFETY FEATURES

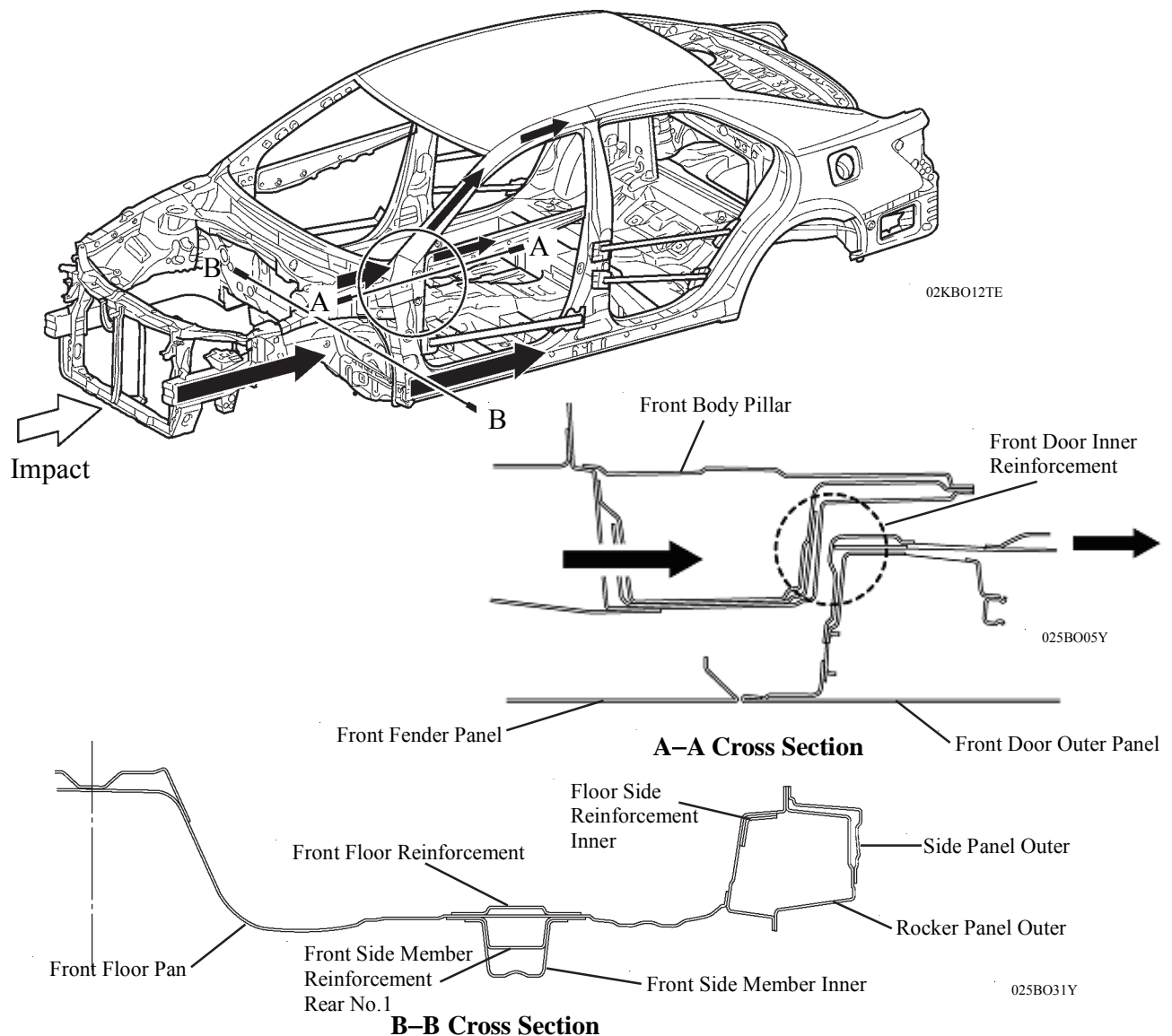
1. General

The impact absorbing structure of the new Camry minimizes cabin deformation by effectively helping to absorb the impact energy in the event of a front, side or rear collision. This provides high-performance occupant protection.

2. Impact Absorbing Structure for Front Collision

An optimal arrangement of the basic frame and reinforcements helps to minimize cabin deformation in the event of a collision.

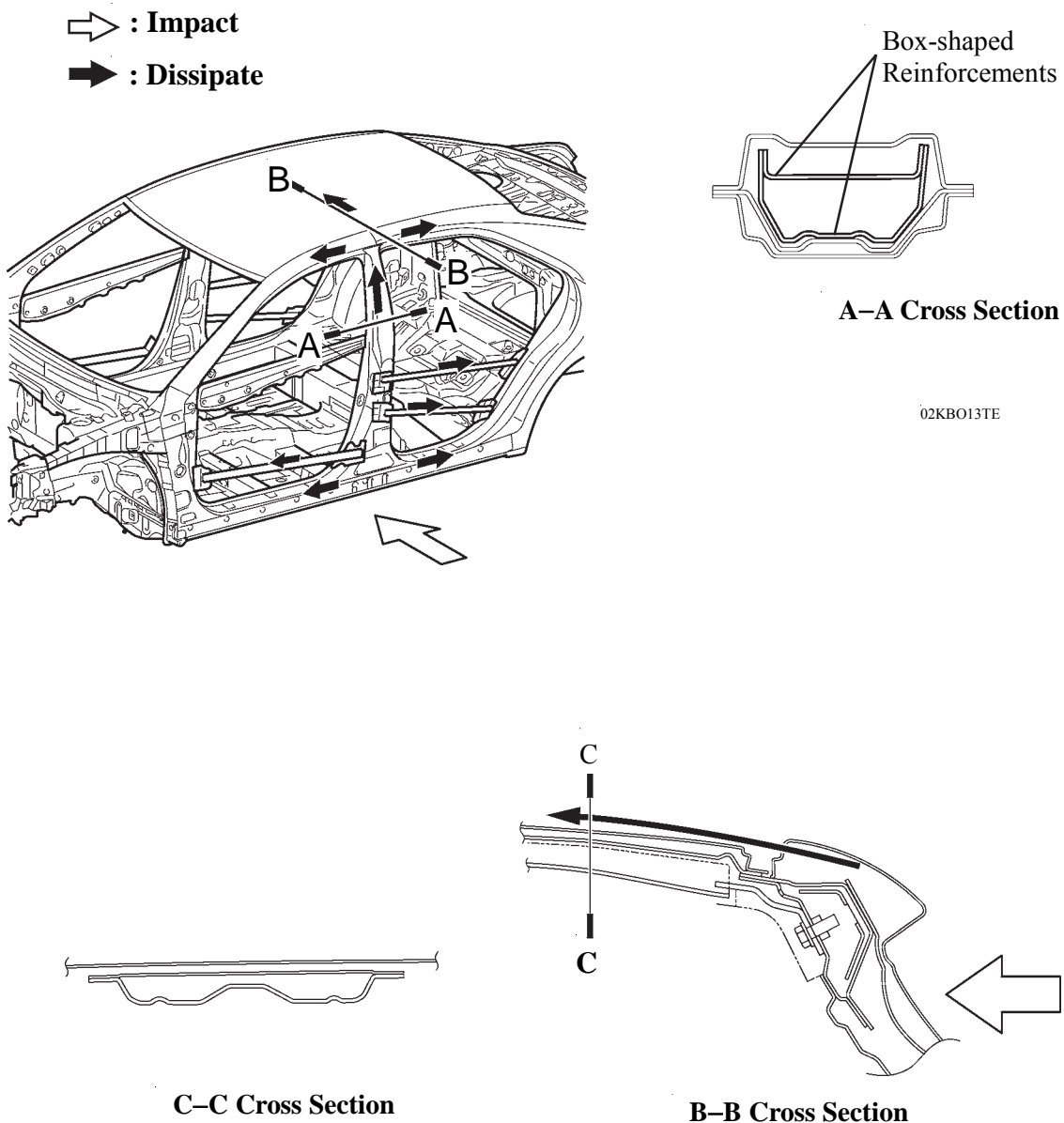
- The body disperses the impact force in the event of an offset frontal collision.
- The body strengthens inner door reinforcements and reduces the gap between the door inner panel and the pillar. This communicates impact load to the door belt line reinforcement, reducing the load on the pillar in the event of an offset frontal collision.
- The floor side of the front side member and the inside of the floor side member reinforcements have been used, minimizing the cabin deformation.



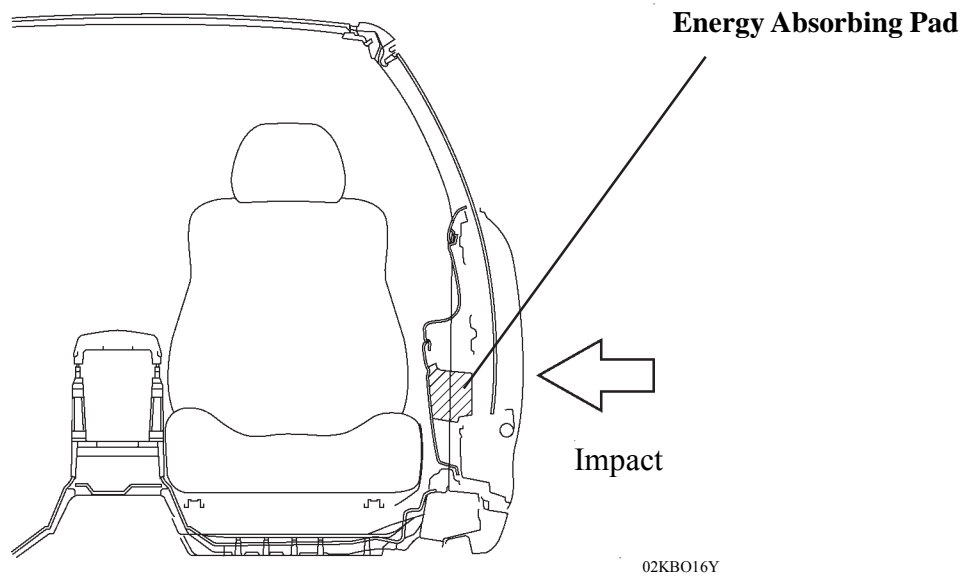
3. Impact Absorbing Structure for Side Collision

The impact energy of a side collision directed to the cabin area is dispersed throughout the body via the pillar reinforcements, side impact protection beams, and roof reinforcement, thus helping minimize the impact energy finally directed to the cabin.

- In order to obtain optimal bearing force, high strength sheet steel is employed in the centre pillar reinforcement as described on page BO-2, furthermore, box-shaped reinforcement is used inside the centre pillar (A-A cross section).
- High strength sheet steel is used in the roof reinforcement. In addition, the structure has been made to bear impact loads with both side rails (B-B cross section). This reduces the intrusion of the roof rail into the cabin in the event of a side collision.

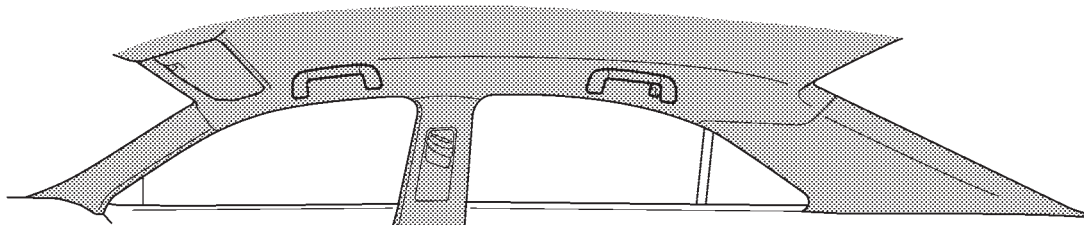


- Energy absorbing pads have been included in the door trims in order to reduce the impact on the chests and pelvises of occupant at the time of a side collision.



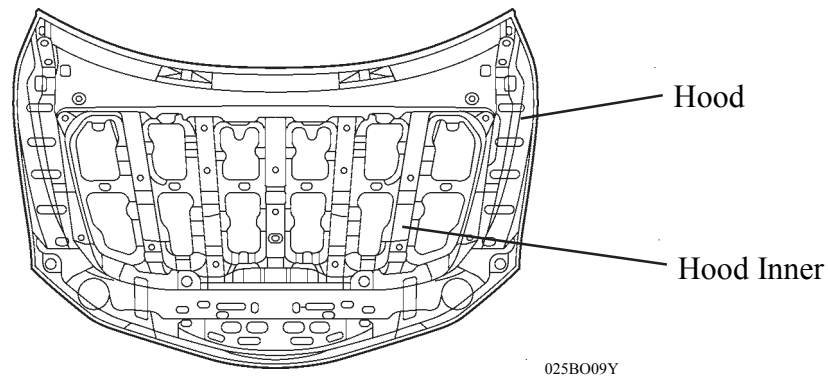
- A head impact protection structure is used. With this type of construction, if the occupant's head hits against the roof side rail or pillar due to a collision, the inner panels of the roof side rail, roof area and pillar collapse to help reduce the impact.

 : Head Impact Protection Structure

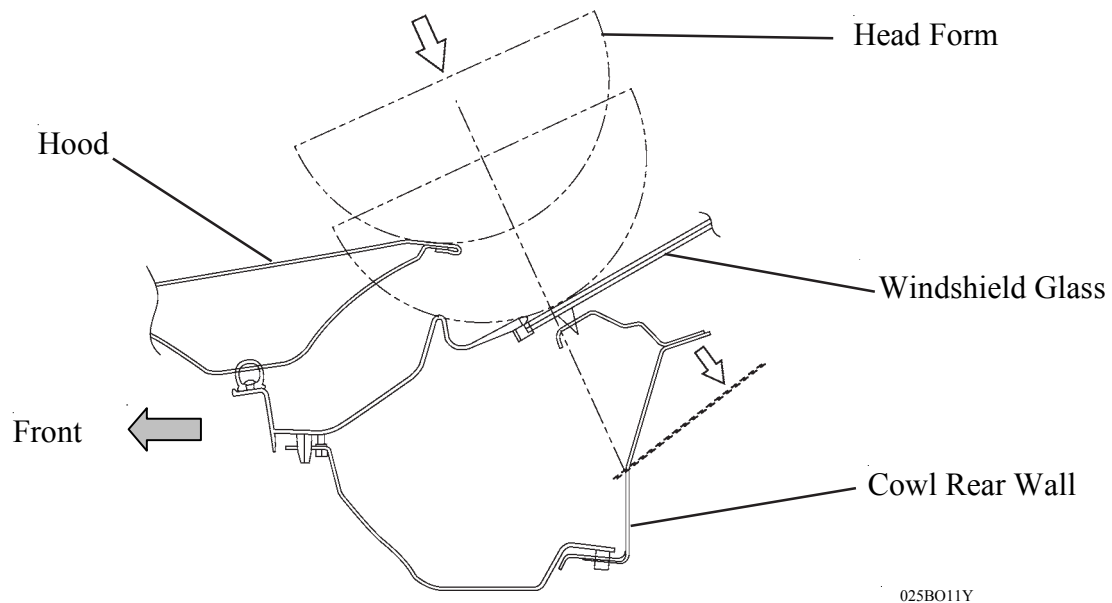


4. Reducing Pedestrian Head Injury

- A longitudinal frame is used as the principle structure of the hood inner, giving uniform rigidity to the hood surface.

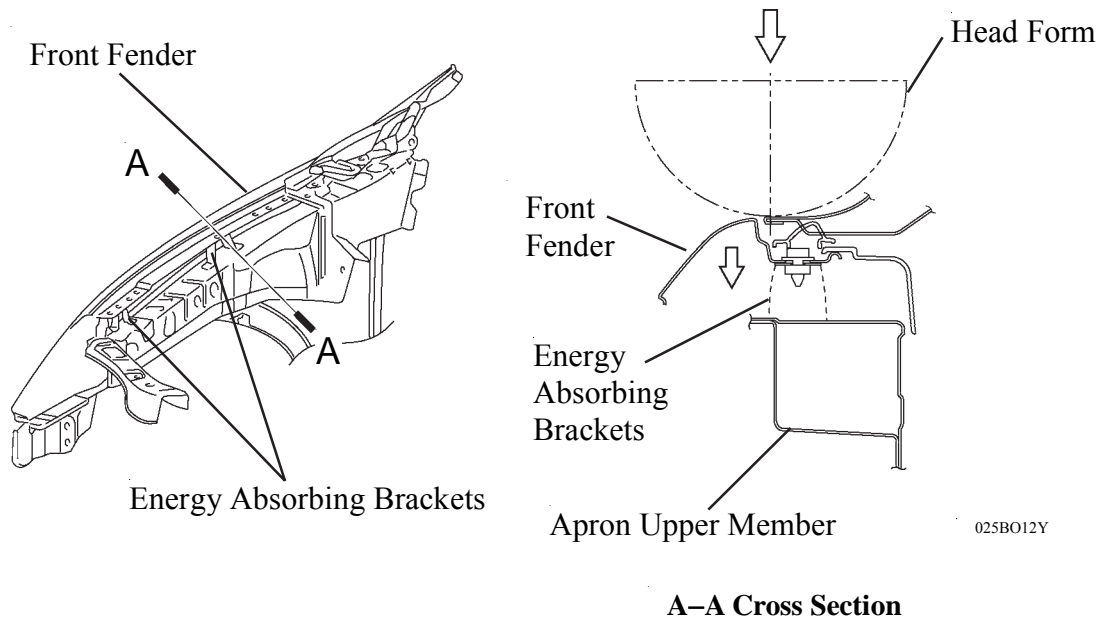


- The rear wall of the cowl has been opened, so that it can easily collapse in the direction of an impact. Thus, a completely collapsible structure has been achieved.



Cross Section at Lower Portion of Windshield Glass

- Energy absorbing brackets are used in the joint portion of the front fender. Thus, a certain deformation stroke in the event of a head form collision has been ensured, reducing the impact.



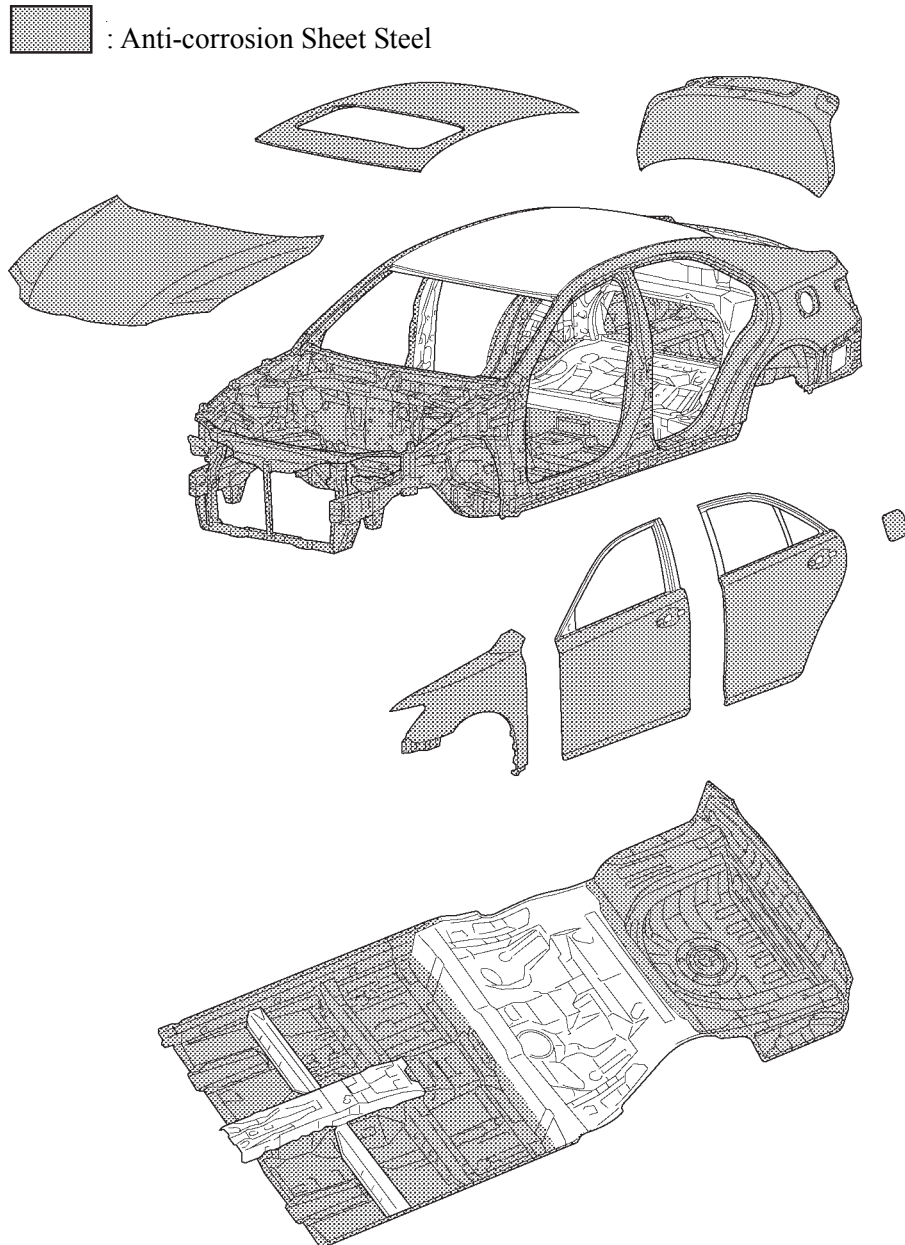
✱ RUST-RESISTANT BODY

1. General

Rust-resistant performance is enhanced extensively through the use of anti-corrosion sheet steel, as well as by an anti-corrosion treatment that includes the application of anti-rust wax, sealer and anti-chipping paint to easily corroded parts such as the hood and doors.

2. Anti-corrosion Sheet Steel

Anti-corrosion sheet steel is used as shown in the following illustration.






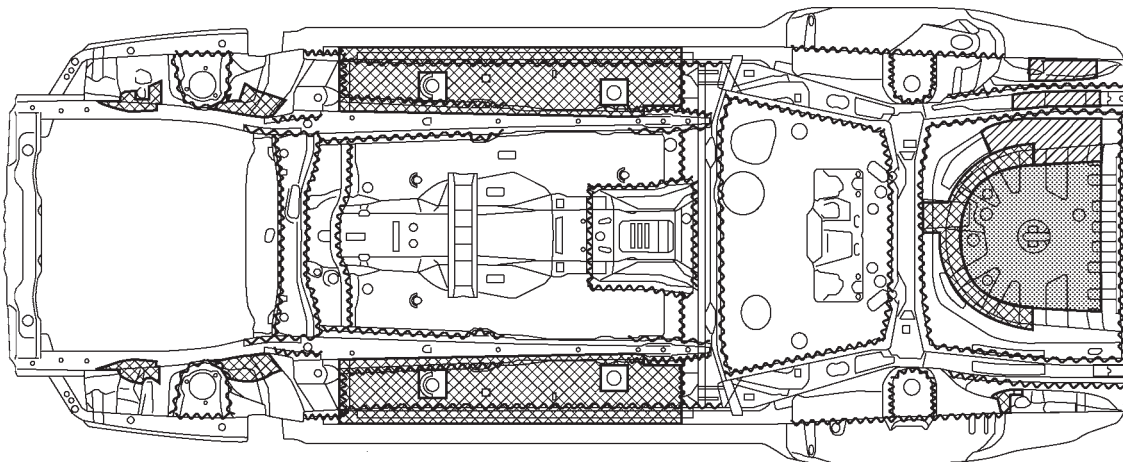
3. Wax and Sealer

Wax is applied to edge of the hood, door lower portion, door hinge and fuel filler lid hinge to improve rust-resistant performance. Sealer is applied to hemmed portions of the hood, door panels and luggage door.

4. Under Coat

Acrylic acid resin is applied to the under side of the body, inside the rear wheel housing and other parts that are susceptible to stone chipping damage, thus improving the rust-resistant performance of these areas.

- ~~~~~ : Edge Seal
-  : Acrylic Acid Resin Coating
-  : Acrylic Acid Resin Coating (Excluding Sportivo grades grade)
-  : Acrylic Acid Resin Coating

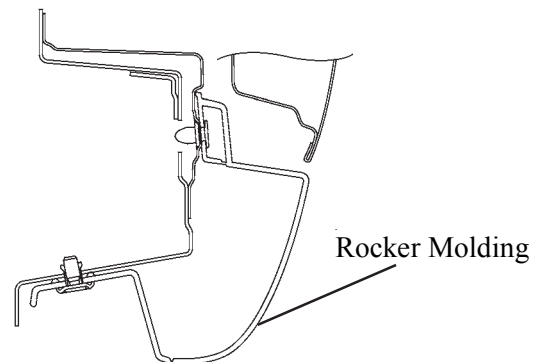
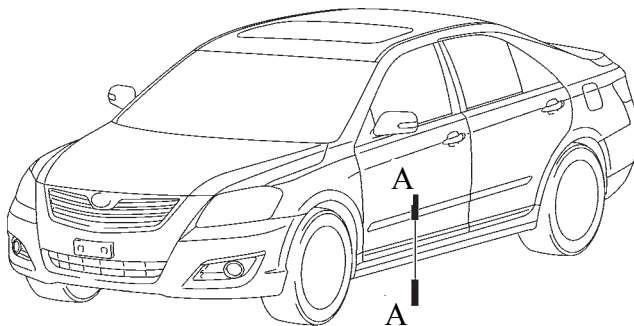


View from Bottom Side

02KBO15Y

5. Anti-chipping Application

Large rocker mouldings are fitted to the lower side of the vehicle, which is liable to suffer from stone-chipping in order to ensure chip resistance.



02KBO11Y

A-A Cross Section

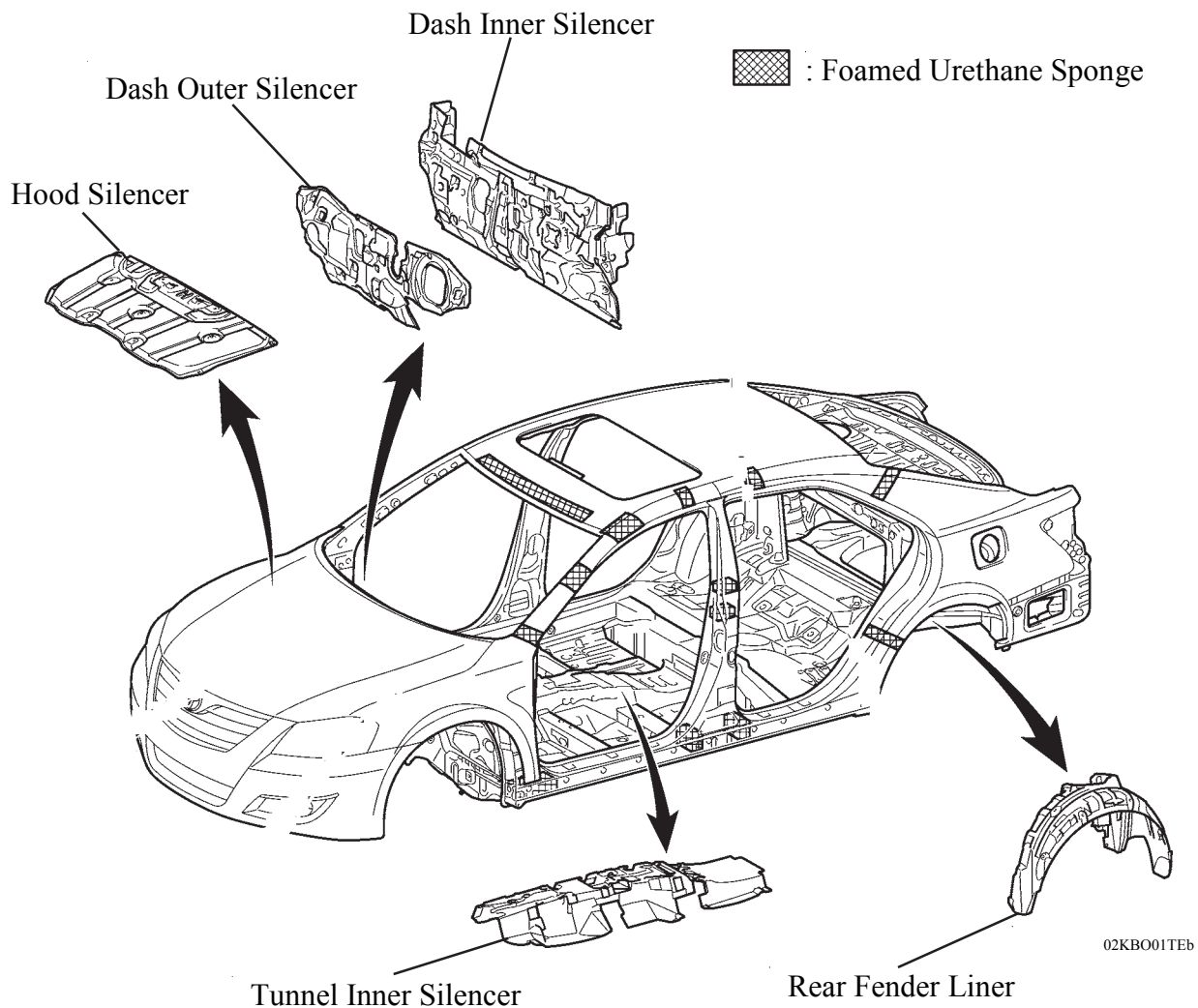
✱ LOW VIBRATION AND LOW NOISE BODY

1. General

Effective application of vibration damping and noise suppressant materials reduces engine and road noise.

2. Sound Absorbing and Vibration Damping Materials

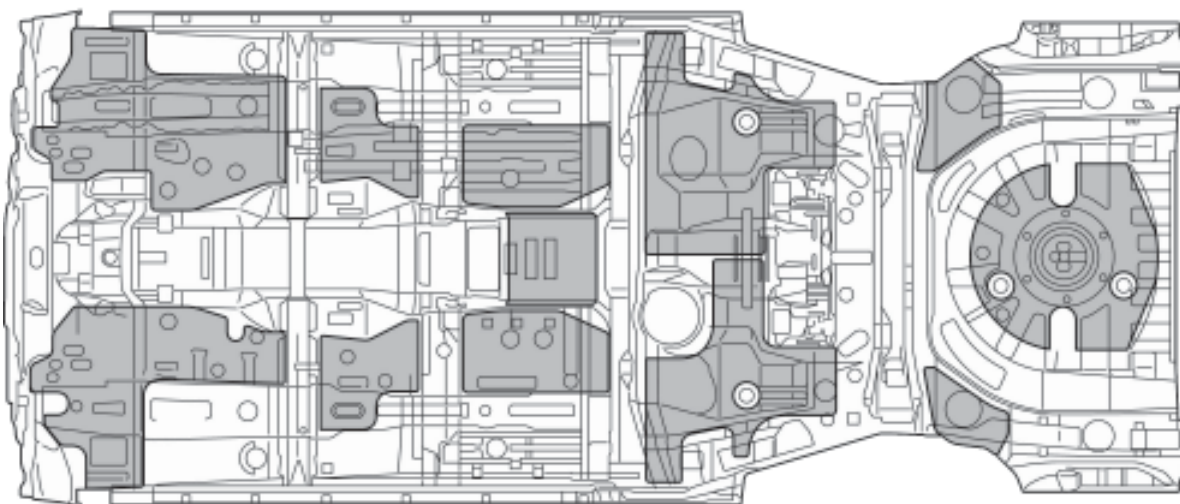
- Foamed urethane sponge and foamed sealing material are applied onto the roof panel and pillars to reduce wind and road noise.
- A large-size dash inner silencer, dash outer silencer, hood silencer, apron silencers and tunnel inner silencer are used to reduce engine and road noise and improve quietness inside the passenger compartment.
- The rear fender liner, which is made of non woven felt, is fitted inside the rear wheelhouse in order to minimise grit, water and road noises.



- The positions in which the asphalt sheets adhere to the floor have been optimized in order to reduce muffled sound and road noise, and therefore achieve a quiet ride.



: Used on all models

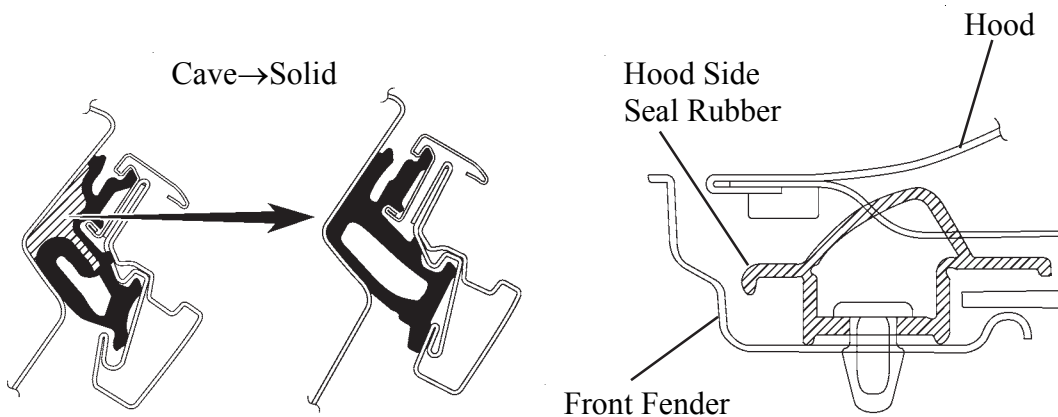
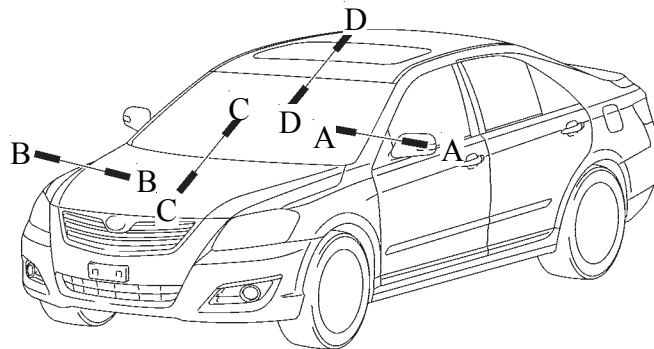


02KBO04Yb

View from Top Side

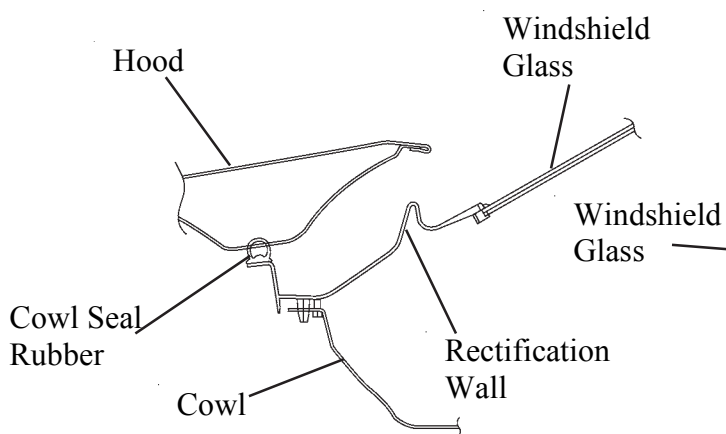
3. Reducing Wind Noise

- A structure that blocks the airflow is used in a portion of the door weather strip (at the front corner) in order to reduce wind noise (A-A cross section).
- The air turbulence has been eliminated through the use of the hood side seal rubber (B-B cross section).
- By streamlining the joins between the hood and windshield glass (C-C cross section) and between windshield glass and the roof (D-D cross section), air turbulence has been minimised.

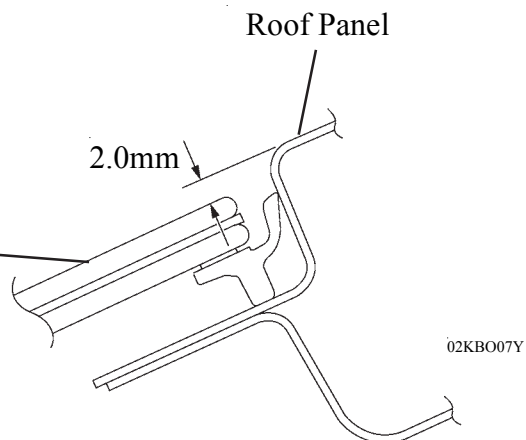


A-A Cross Section

B-B Cross Section

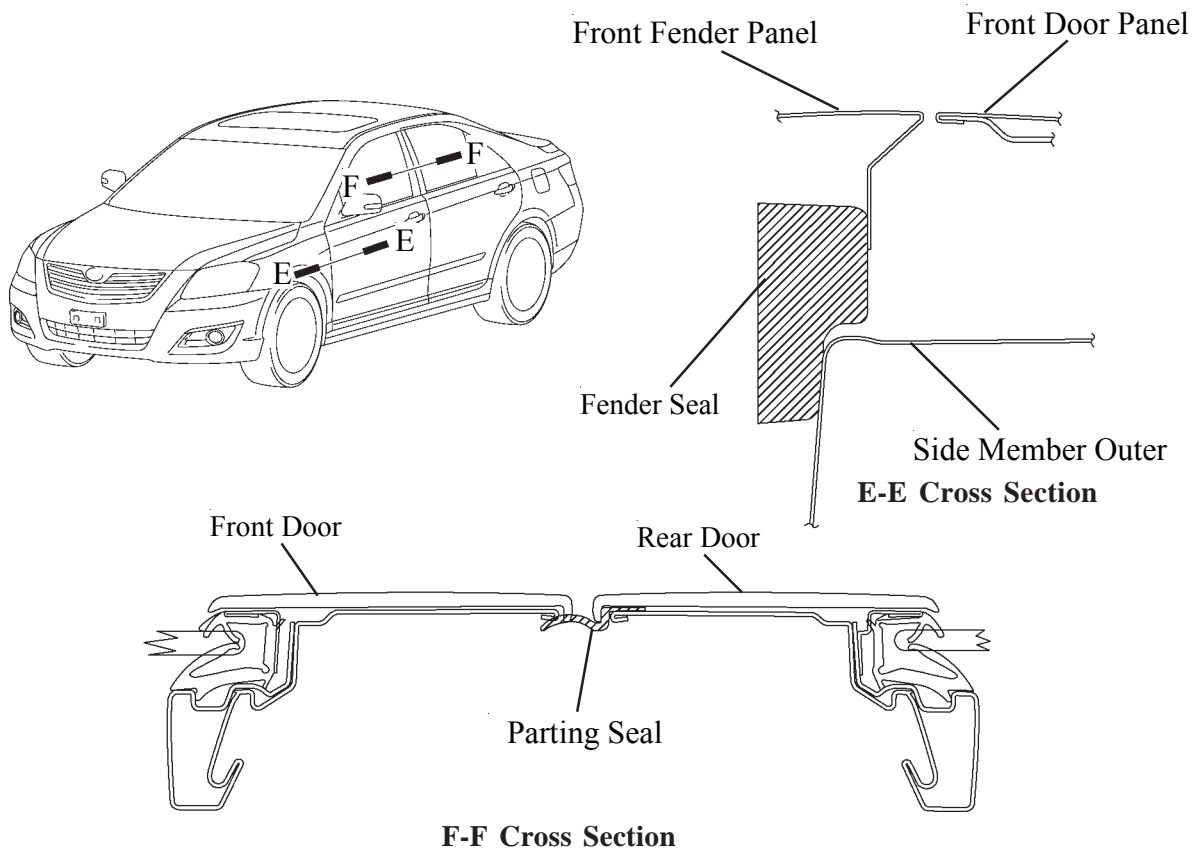


C-C Cross Section



D-D Cross Section

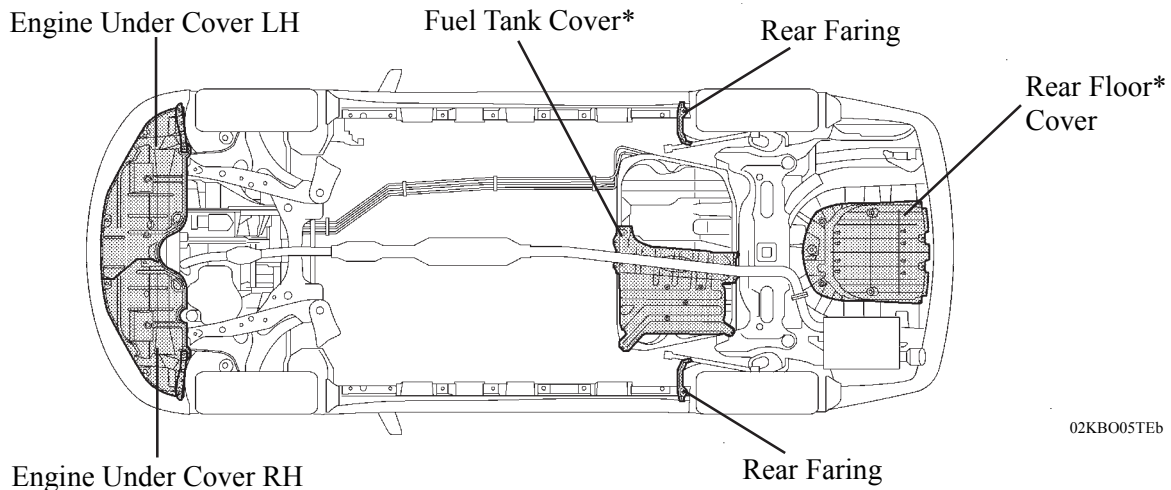
- Fender seals made of foamed resin are used between the front fender and the side member outer to prevent air from blowing through. (E-E cross section)
- Parting seals made of flexible resin are employed between the front and rear doors to eliminate air turbulence (F-F cross sections).



02KB008Y

✳ AERODYNAMICS

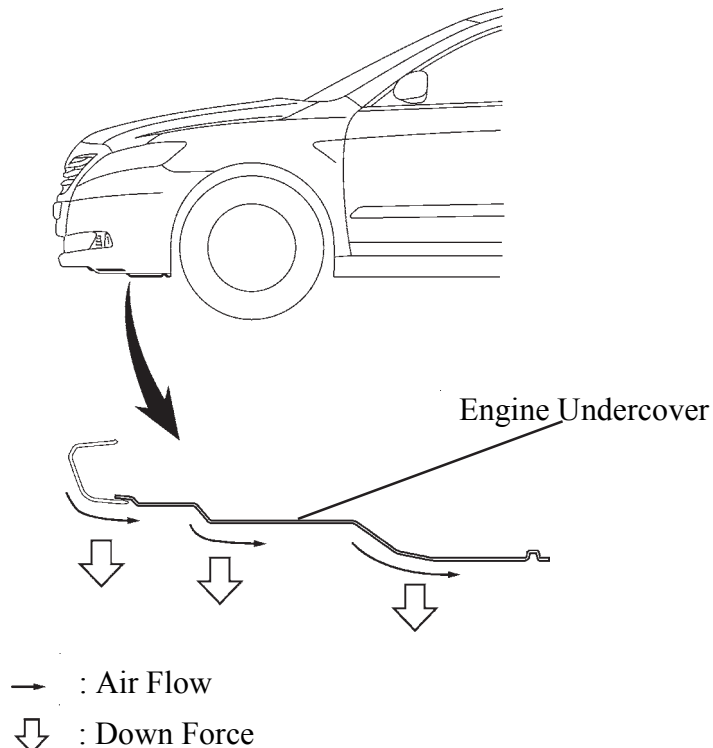
In order to achieve excellent steering stability and fuel economy, various rectifying parts have been used to regulate the airflow under the floor and the aerodynamic performance has been improved by flattening the underside of the vehicle.



*: Sportivo grades

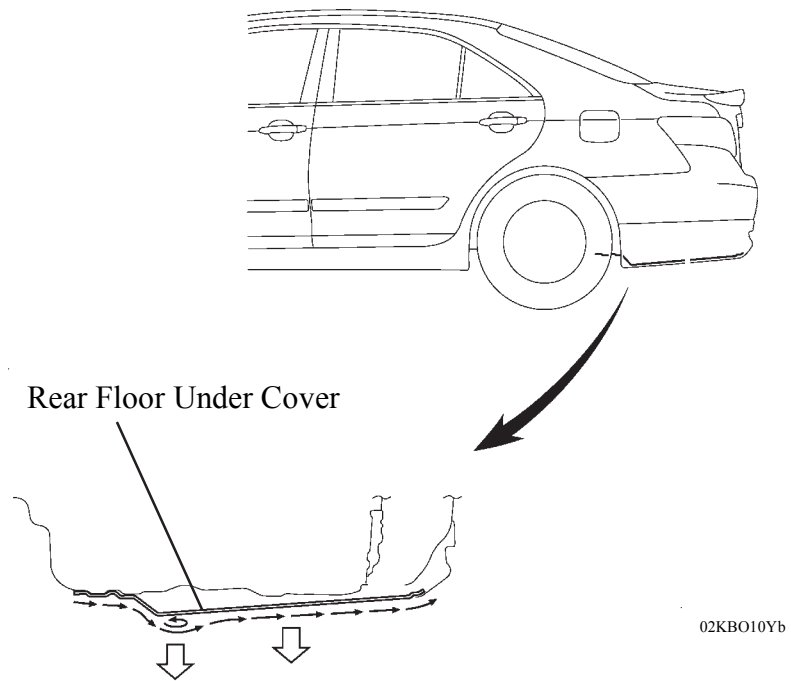
View from Bottom Side

- The engine undercover has been formed into a step shape to increase the velocity of the air flowing underneath the vehicle. This creates a vacuum and suppresses the lift force, thus excellent manoeuvrability and stability is achieved.



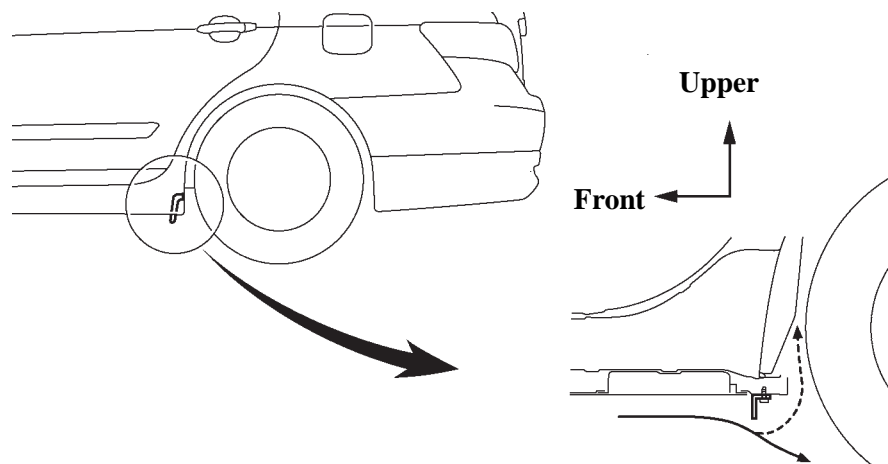
02KBO09Yb

- Excellent manoeuvrability and stability have been achieved by providing a rear floor under cover that is shaped to generate rectification and swirl effects on the rear floor

**Side View**

→ : Air Flow
↓ : Down Force

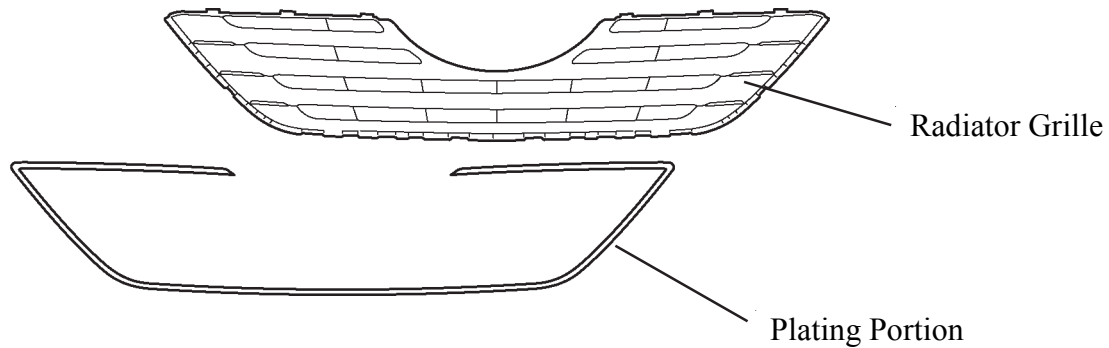
- The airflow disturbance has been reduced by using a rear faring to direct the airflow outside the tyre house, thus minimising the air resistance and improving the fuel economy.

**Side View**

ENHANCEMENT OF PRODUCT APPEAL

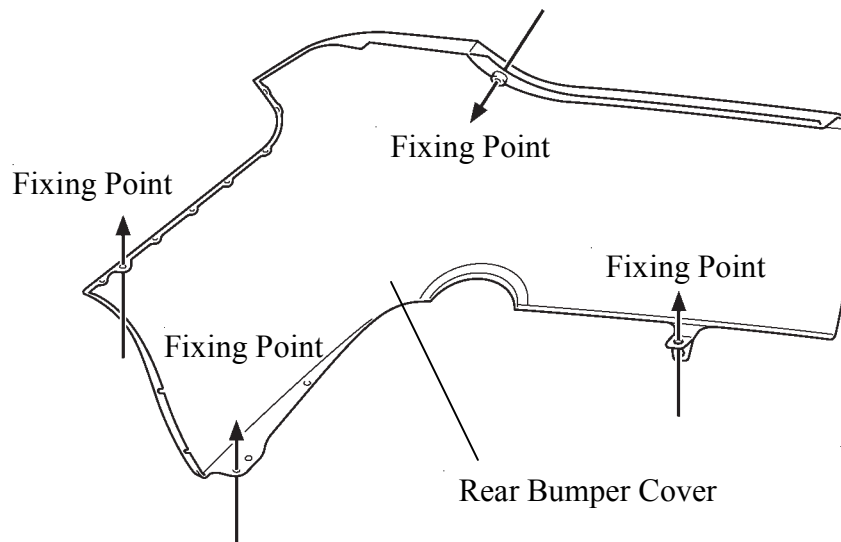
✱ PARTS WITH LOW REPAIR COST

- The plating portion of the front grille has been designed as an individual part. As a result, replacement of damaged parts only is possible, therefore reducing repair costs.



025B023Y

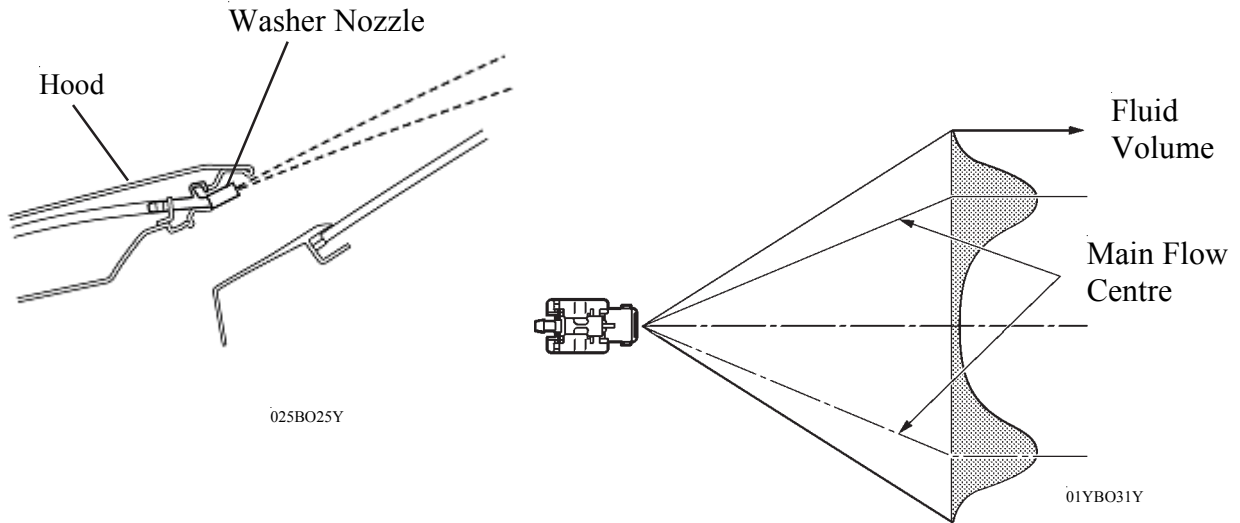
- By reducing the number of fixing points, from 18 to 8, used for installing the rear bumper cover onto the vehicle body, repair time has been shortened.



02HB019Y

WASHER NOZZLE

Spray type washer nozzles are located under the engine hood to ensure good appearance. These nozzles can spray windshield washer fluid over a wide area by spraying it in a fan shape. The washer fluid volume has been reduced so as not to hinder the driver's view when washer system is operated.



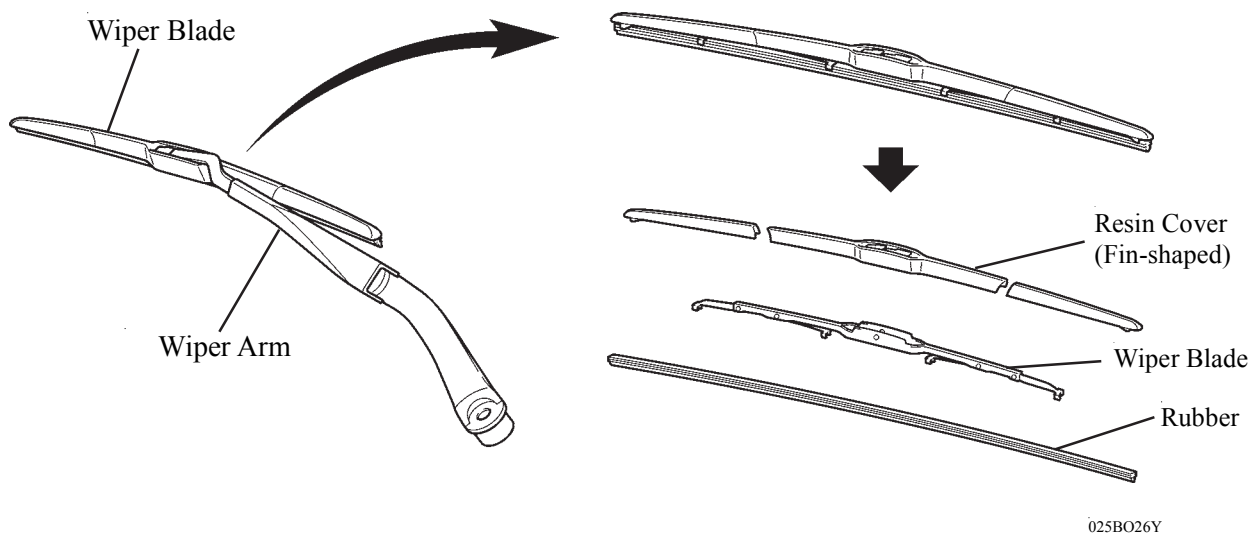
Service Tip

Spray type washer nozzles cannot be adjusted because of their structure. Do not attempt to adjust the nozzles as it could damage them.

If adjustment is necessary, adjust the nozzles after replacing them with those selected from five part numbers with different spray angles. For details, see the Camry Repair Manual .

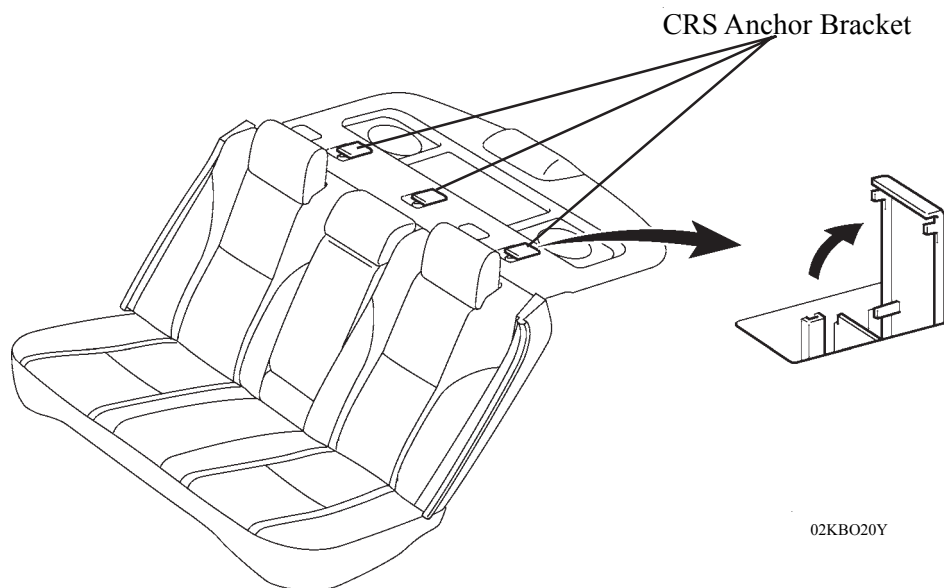
WIPER ARM & BLADE

The unified construction of the wiper blade and arm is used. A fin-shaped resin cover is used for the entire wiper blade. This ensures the effectiveness of the wipers even when travelling at high speeds.



✱ CHILD RESTRAINT SYSTEM

Three CRS anchor brackets for securing a child seat are provided above the package tray trim.



✱ SEAT BELT

1. General

The following types of seat belts are provided.

Seat Position	Seat Belt Type	Remarks
Driver	3-point ELR	Electrical Sensing Type Pre-tensioner, Force Limiter and Tension Reducer
Front Passenger	3-point ELR	Electrical Sensing Type Pre-tensioner & Force Limiter
Rear Passengers (Right, Left & Centre)	3-point ELR & ALR	—

ELR - Emergency Locking Retractor

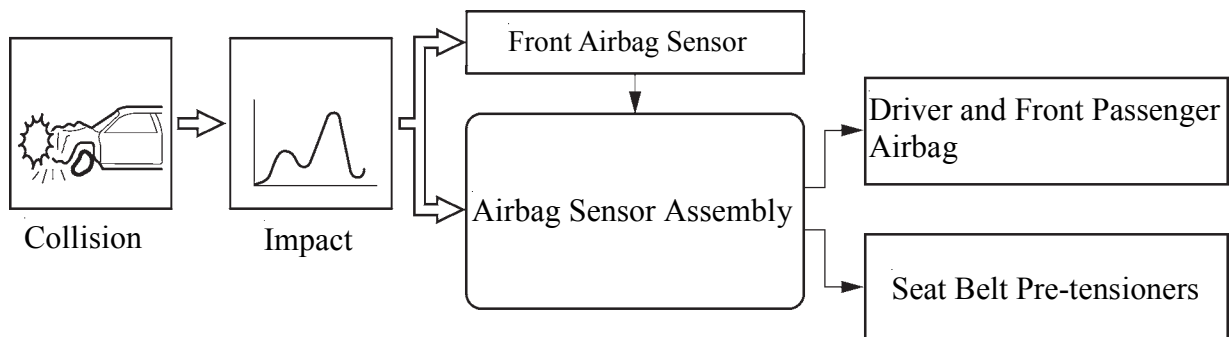
ALR - Automatic Locking Retractor

2. Pre-tensioner and Force Limiter

In accordance with the ignition signal from the airbag sensor assembly, the seat belt pre-tensioner activates simultaneously with the deployment of SRS airbag for the driver and front passenger.

In the beginning of the collision if the tension of the seat belt applied to the occupant reaches a predetermined level, the force limiter activates to control the force.

► Front Airbag Operation ◀



02KBO14TE

BODY ELECTRICAL

MULTIPLEX COMMUNICATION

Description.....	BE-3
Differences between CAN, AVC-LAN, and BEAN.....	BE-5
CAN.....	BE-7
Customised Body Electronics System.....	BE-11

POWER DISTRIBUTOR

Description.....	BE-14
------------------	-------

LIGHTING

Description.....	BE-15
Illuminated Entry System.....	BE-17
Automatic Light Control System.....	BE-20
Light Turn-off System.....	BE-21

METER

Combination Meter.....	BE-22
------------------------	-------

WIPER AND WASHER

Description.....	BE-27
Layout of Main Components.....	BE-29
Rain Sensing Function.....	BE-30
Washer-linked Wiper with Drip-prevention Function.....	BE-31

AIR CONDITIONER

Description.....	BE-32
Performance and Specification.....	BE-33
System Diagram.....	BE-34
Layout of Main Components.....	BE-36
Mode Position and Damper Operation.....	BE-38
Air Outlets and Airflow Volume.....	BE-40
Construction and Operation.....	BE-41
System Control.....	BE-52

NAVIGATION WITH AV SYSTEM

Description.....	BE-54
Layout of Main Components.....	BE-55
Construction and Operation.....	BE-56

HANDS-FREE SYSTEM

Bluetooth Hands-Free System.....	BE-61
----------------------------------	-------

POWER WINDOW SYSTEM

Description.....	BE-66
Layout of Main Components.....	BE-68
Jam Protection Function.....	BE-69

DOOR LOCK CONTROL SYSTEM

Description.....	BE-70
Layout of Main Components.....	BE-72

WIRELESS DOOR LOCK REMOTE CONTROL SYSTEM

Description.....	BE-73
System Diagram.....	BE-74
Layout of Main Components.....	BE-75
Function.....	BE-76

THEFT DETERRENT SYSTEM

Description.....	BE-78
System Diagram.....	BE-79
Layout of Main Components.....	BE-80
Function.....	BE-81
System Operation.....	BE-82

ENGINE IMMOBILISER SYSTEM

Description.....	BE-84
------------------	-------

SRS AIRBAG SYSTEM

Description.....	BE-85
Layout of Main Component.....	BE-86
Wiring Diagram.....	BE-87
Airbag for Frontal Collision.....	BE-89
Airbag for Side/ Rear of Side Collision....	BE-94
Improper Connection Prevention Lock Mechanism.....	BE-96
Airbag Sensor Assembly.....	BE-96
Diagnosis.....	BE-97

SEAT BELT REMINDER SYSTEM

Description.....	BE-98
Reminder Method.....	BE-99

CRUISE CONTROL SYSTEM

Description.....	BE-100
------------------	--------

POWER SEAT SYSTEM

Description.....	BE-105
------------------	--------

REAR WINDOW DEFOGGER SYSTEM

Description.....	BE-107
Layout of Main Components.....	BE-108

REAR SUNSHADE SYSTEM

Description.....	BE-109
Layout of Main Components.....	BE-110

SLIDING ROOF SYSTEM

Description.....	BE-111
Function.....	BE-112

TRUNK OPENER

Description.....	BE-115
Layout of Main Components.....	BE-115

STEERING PAD SWITCH

Description.....	BE-116
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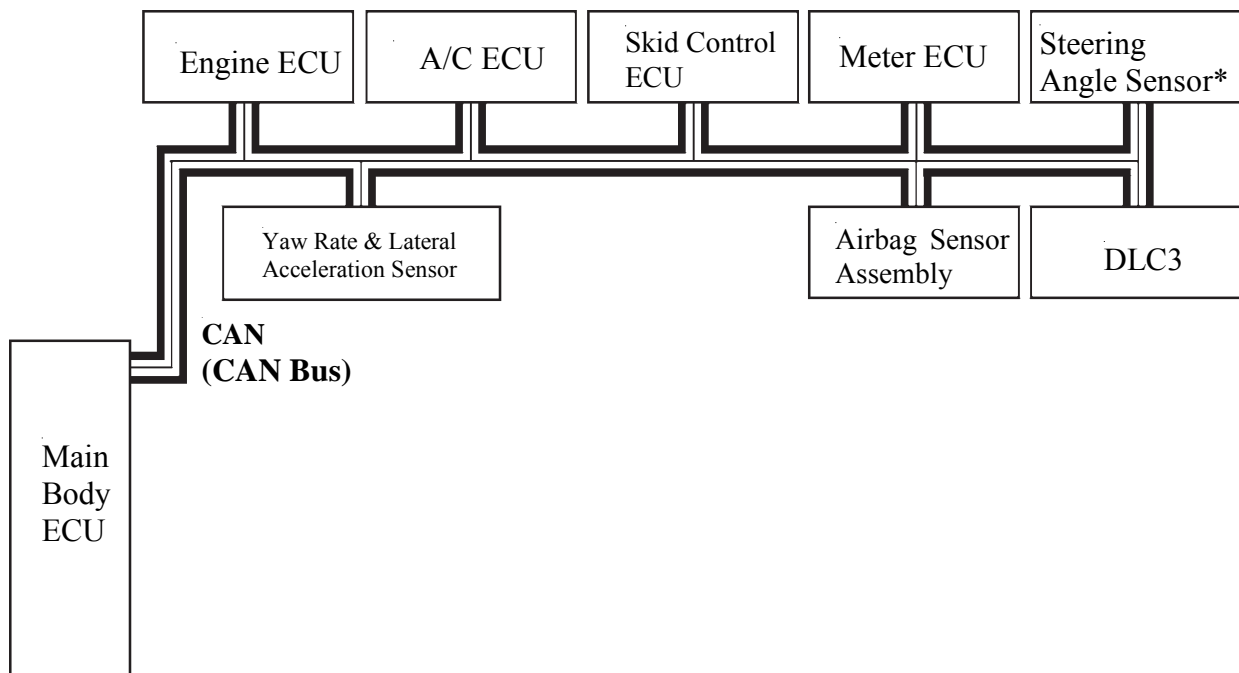
BODY ELECTRICAL

MULTIPLEX COMMUNICATION

✱ DESCRIPTION

- The multiplex communication system of the new Camry uses the CAN (Controller Area Network) to achieve a streamlined wiring harness configuration.
- The CAN (Controller Area Network) is classified into two types according to communication speed. The HS (High Speed)-CAN is used for the power train, chassis and body electrical systems, and the MS (Medium Speed)-CAN is used for the body electrical system.
- The HS-CAN (CAN bus) and the MS-CAN (MS bus). The main body ECU is used to transmit data between the buses.
- Due to the introduction of the CAN system for the power train, chassis and body electrical systems, the BEAN (Body Electronics Area Network) is no longer used on this model.
- A customised body electronics system is used, enabling the control functions of the ECU's to be set using an intelligent tester II. For details, see page BE-11.

► System Diagram ◀



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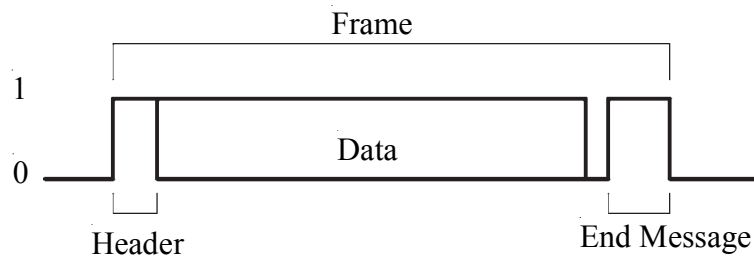
*: with vehicle stability control (VSC)

— REFERENCE —

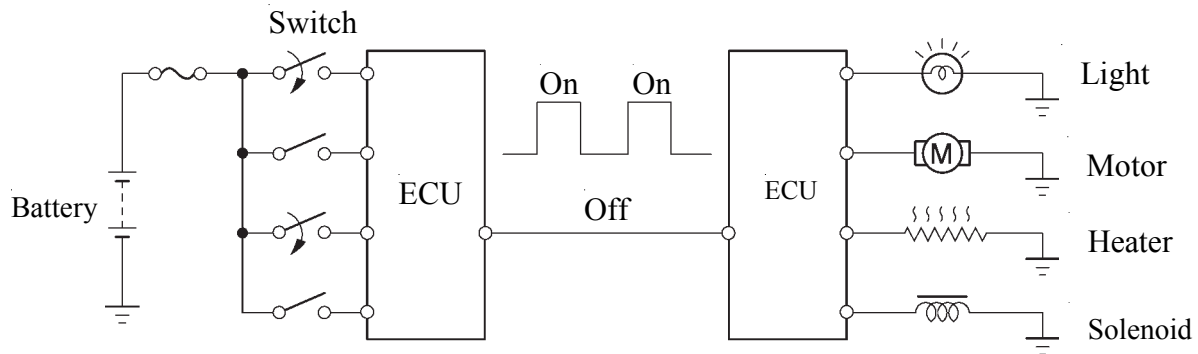
MPX communication uses serial communication data that consists of bits and frames in order to exchange information among the various ECU's. This allows a reduction of the amount of wiring on the vehicle.

- *A bit is the basic unit of communication that is used to represent information. A bit is represented by binary values of "0" or "1".*
- *A frame is a body of data that is transmitted together. A frame contains a header that indicates the beginning, and an end message that indicates the end.*

► Conceptual Drawing ◀



240BE03



240BE03

✱ DIFFERENCES BETWEEN CAN, AVC-LAN AND BEAN

1. General

- The protocols, which are the rules for establishing data communication, differ between the CAN, AVC-LAN*¹ and BEAN*². If the ECU's in the networks use different frameworks for their data, such as communication speed, communication wire, and signals, they will be unable to understand each other. Therefore, protocols (rules) must be established among them.
- Compared to the AVC-LAN*¹ and BEAN*², the CAN features high-speed data transmission. Therefore, the CAN is able to transmit larger amounts of data faster than the other protocols. This feature makes it possible to transmit data accurately in the power train and chassis control system, which requires large amounts of data to be transmitted in short periods of time.

*¹: AVC-LAN is used in the audio-visual system of some other TOYOTA models, but is not on the new Camry.

*²: The BEAN is used in the body electrical system of the previous Camry and some other TOYOTA models, but is not used on the new Camry.




Protocol	CAN (ISO Standard)	AVC-LAN (TOYOTA Original)	BEAN (TOYOTA Original)
Communication Speed	500 kbps*/ HS-CAN 250 kbps*/ MS-CAN (Max. 1 M bps)	Max. 17.8 kbps*	Max. 10 kbps*
Communication Wire	Twisted-pair Wire	Twisted-pair Wire	AV Single Wire
Drive Type	Differential Voltage Drive	Differential Voltage Drive	Single Wire Voltage Drive
Data Length	1-8 Byte (Variable)	0-32 Byte (Variable)	1-11 Byte (Variable)

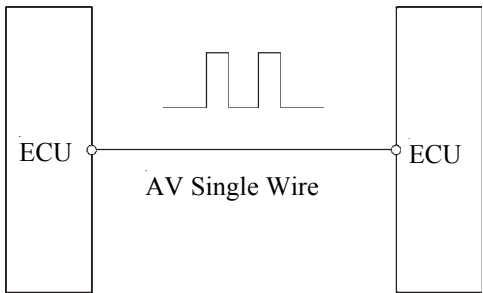
*: bps: abbreviation for “Bits per Second”, indicating the number of bits that can be transmitted per second.

2. Communication Wire

A twisted-pair wire is used for CAN and AVC-LAN*¹ communication. A single, AV (Automobile Vinyl) wire is used for BEAN*² communication.

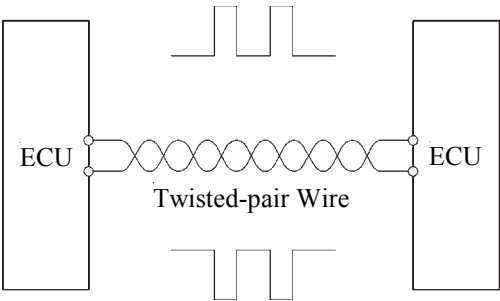
- *1: AVC-LAN is used in the audio-visual system on some other TOYOTA models, but is not used on the new Camry.
- *2: The BEAN is used in the body electrical system of the previous Camry and some other TOYOTA models, but is not used on the new Camry.

Communication Wire	Outline
<div>Twisted-pair Wire for CAN</div> <div></div> <div>241BE168</div>	<div>This communication wire is a pair of twisted lines.</div> <div>Communication is driven by applying voltage of 1.5 to 2.5 V and 2.5 to 3.5 V to the two lines in order to send a single signal.</div> <div>This system, which is called a “Differential Voltage Drive”, reduces noise.</div>
<div>Twisted-pair Wire for AVC-LAN</div> <div></div> <div>241BE168</div>	<div>This communication wire is a pair of twisted lines.</div> <div>Communication is driven by applying positive (+) and negative (-) voltages to the two lines in order to send a single signal.</div> <div>This system, which is called a “Differential Voltage Drive”, reduces noise.</div>
<div>AV Single Wire</div> <div></div> <div>240BE09</div>	<div>This is a lightweight single communication wire that consists of a single core line surrounded by insulation.</div> <div>Voltage is applied to this line in order to drive communication, and this system is called a “Single Wire Voltage Drive”.</div>



Single Wire Voltage Drive

240BE11



Differential Voltage Drive

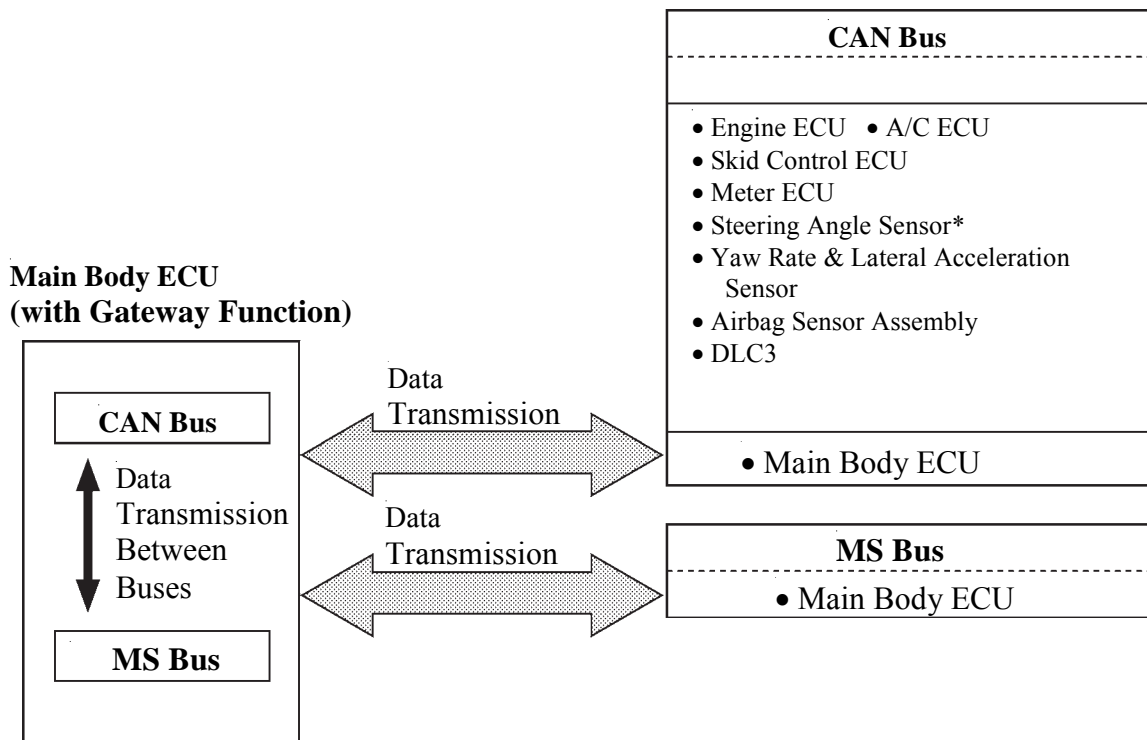
240BE12

CAN

1. General

- The new Camry uses two types of CAN that have different communication speeds: HS-CAN (500kbps) and MS-CAN (250kbps).
- The terminating resistors of the CAN bus are built into the engine ECU and meter ECU.
- ECU's with the gateway functions are used to transmit data between buses (the main body ECU is used between the CAN bus and the MS bus).

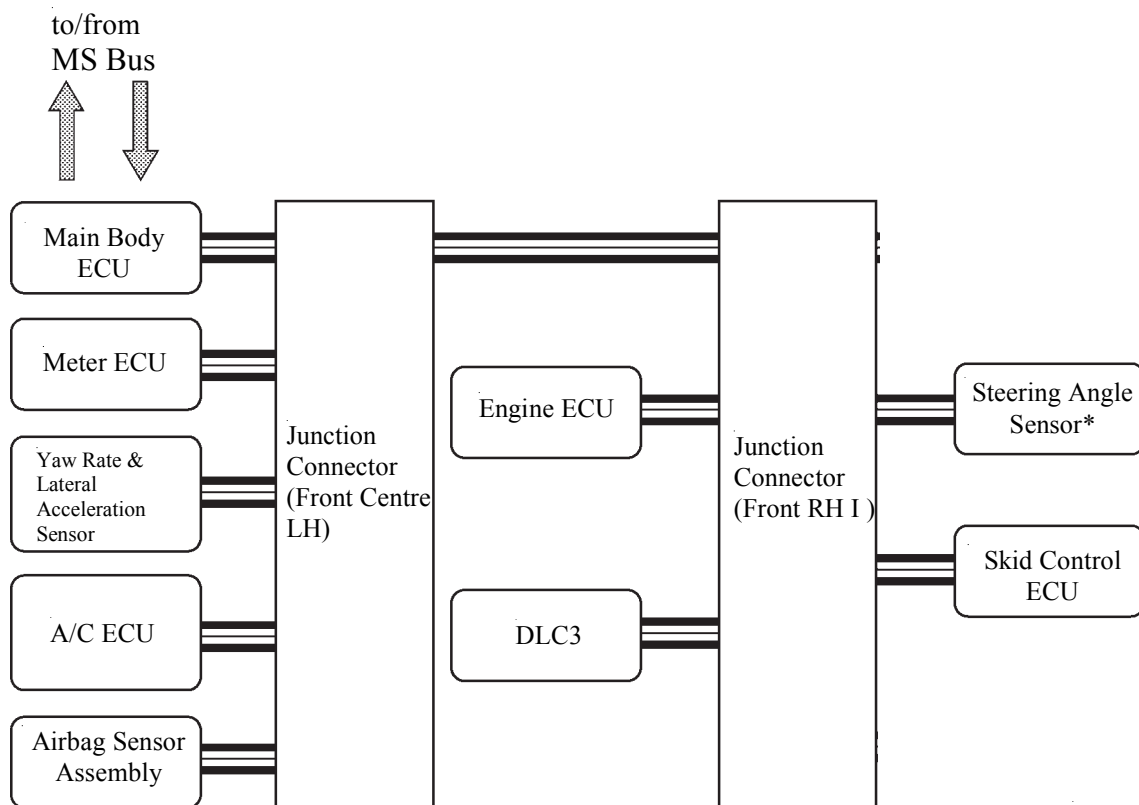
► Image of Data Transmission between Buses ◀



*: with vehicle stability

01YBE04Pb

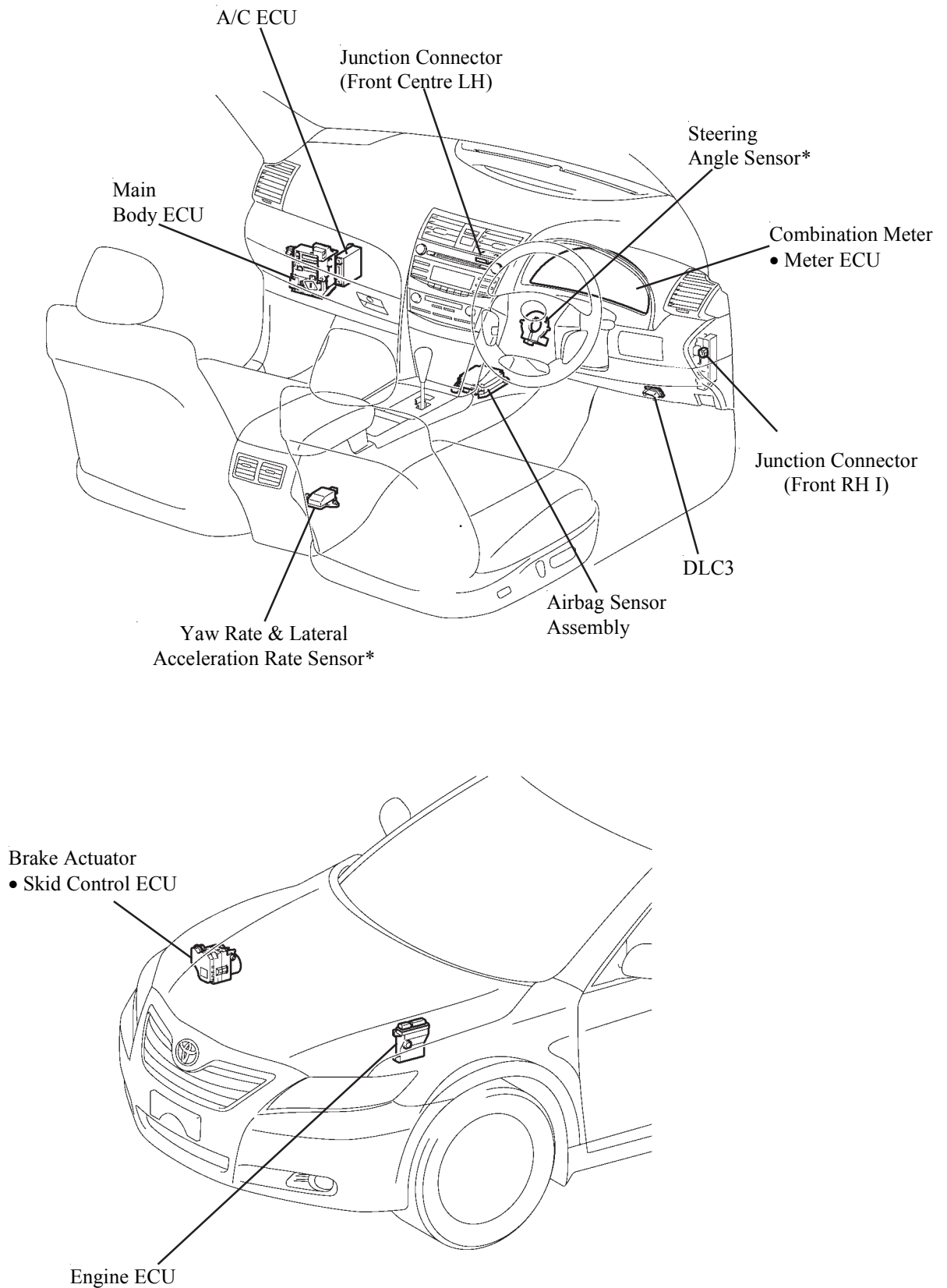
▶ CAN Bus ◀



02KBE127Yb

*: with vehicle stability control (VSC)

2. Layout of Main Components



*: with vehicle stability control (VSC)

3. Diagnosis

- If a malfunction occurs on the CAN communication line, the ECU that is connected to the CAN communication line stores the DTC (Diagnostic Trouble Code) in its memory.
- The 5-digit DTC can be read by connecting an intelligent tester II to the DLC3.
- The DLC3 is equipped with CAN-H and CAN-L terminals for CAN diagnosis. It is possible to determine if there is an open or short in the main wire of the CAN No.1 bus by measuring the resistance value between these terminals. For details, see the Camry Repair Manual.

✱ CUSTOMISED BODY ELECTRONICS SYSTEM

An intelligent tester II can be used to customise the system settings.

System	Intelligent Tester II Display Content	Contents	Default Setting	Available Setting
Wireless Door Lock	Trunk Lid Operation	To change the operation method of opening the trunk by the transmitter.	0.8s PR	1 TIME/ 2 TIMES / 0.8s PR / OFF
	Wireless Control	Function to turn ON/OFF of the wireless door lock.	ON	ON/OFF
	Hazard Answer Back	Function to turn ON/OFF of the hazard answer back of the wireless door lock.	ON	ON/OFF
	Wireless Buzzer Resp	Function to turn ON/OFF of the wireless buzzer response function.	ON	ON/OFF
	Open Door Warn	Function to make the buzzer sound for 10 seconds if the door is open when locking with the wireless door lock.	ON	ON/OFF
	Auto lock time	Function to change the time until re-locking after unlocking with the wireless door lock.	30 sec	30 sec /60 sec
	Unlock 2 Operation	Function to unlock the driver's door by pressing the unlock button of the transmitter once and to unlock all the doors by pressing it twice. In the OFF setting, pressing one time makes all the doors unlocked.	OFF	ON /OFF
Door Lock	Panic function	Function to operate the theft deterrent system by keeping pressing the lock button of the transmitter for 1.5 seconds. If there is the panic button, press the panic button instead of the lock button.	ON	ON/OFF
	Unlock Key Twice	Function to unlock only the driver's door by doing the key operation once and to unlock all the doors by doing it twice. In the OFF setting, operating the key "UNLOCK" once makes all the doors unlocked.	OFF	ON /OFF

System	Intelligent Tester II Display Content	Contents	Default Setting	Available Setting
Illuminated Entry	Lighting Time	Function to change the lighting time after closing the door. (It will quickly fade out in the event the power source/ignition switch is turned ON.)	15 sec	7.5 sec/ 15 sec/ 30 sec
	I/L when ACC OFF	Function to light up the interior lights when power source/ignition switch is turned from "ACC" to "OFF".	ON	ON/OFF
	I/L ON W/Door Unlock	Function to light up the interior lights when unlocking.	ON	ON/OFF
Warning	Seat Belt Warning	Function to change the seat-belt warning buzzer.	D ON	D/P ON/ D ON/ P ON/ D/P OFF
Light Control	Sensitivity	To adjust the sensitivity of the lighting illumination.	NORMAL	LIGHT 2/ LIGHT 1/ NORMAL/ DARK 1/ DARK 2
	Response Time	To change the delay timing of lighting the taillight when going into the tunnel in case that the light control switch is at AUTO position.	0.15 sec	1.0 sec/ 0.15 sec
	Disp EX ON Sen	To change the brightness of lowering the lights such as the indicator light of the combination meter, A/C indicator light, clock.	NORMAL	LIGHT 2/ LIGHT 1/ NORMAL/ DARK 1/ DARK 2
	Disp EX OFF Sen	To change the brightness of cancelling the lowering the lights such as the indicator light of the combination meter, A/C indicator light, clock.	NORMAL	LIGHT 2/ LIGHT 1/ NORMAL/ DARK 1/ DARK 2

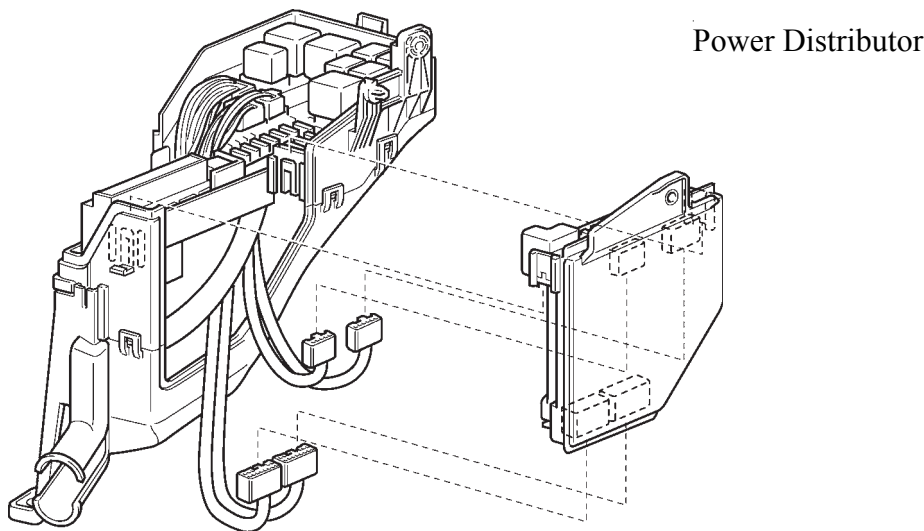
System	Intelligent Tester II Display Content	Contents	Default Setting	Available Setting
A/C	Set Temperature Shift	To control with the shifted temperature against the display temperature.	NORMAL	+2 °C/ +1 °C/ NORMAL/ -1 °C/ -2 °C
	Air Inlet Mode	In case of turning the A/C ON when you desire to make the compartment cool down quickly, this is the function to change the mode automatically to RECIRCULATED mode.	AUTO	MANUAL/ AUTO
	Compressor Mode	Function to turn the A/C ON automatically by pressing the AUTO button when the blower is ON and the A/C is OFF.	AUTO	MANUAL/ AUTO
	Compressor/Air Inlet DEF operation	Function to turn the A/C ON automatically linking with the FRONT DEF button when A/C OFF.	LINK	NORMAL/ LINK
	Evaporator Control	Function to set the evaporator control to the AUTOMATIC position (AUTO) to save power or to the coldest position (MANUAL) to dehumidify the air and to prevent the windows fogging up.	AUTO	MANUAL/ AUTO
	Foot/DEF Auto Mode	Function to turn the air flow from FOOT/DEF ON automatically when AUTO MODE is ON.	ON	OFF/ON
	Ambient Temperature Shift	To control with the shifted ambient temperature against the display ambient temperature.	NORMAL	+2 °C/ +1 °C/ NORMAL/ -1 °C/ -2 °C
	Foot/DEF Automatic Blow Up Function	Function to switch the blower level automatically when the defroster is ON.	ON	OFF/ON

POWER DISTRIBUTOR

DESCRIPTION

The power distributor is built into the engine room relay block, and uses a small mechanical relay and semiconductor relay for a compact and lightweight design.

Engine Room Relay Block



01YBE09Y

- The components of the power distributor are shown below.

Component	Relay
Mechanical Relay	<ul style="list-style-type: none">• Horn Relay• A/F Relay• Security Horn Relay• EFI Relay• Circuit Opening Relay• Headlight Relay (RH)• Headlight Relay (LH)
Semiconductor Relay	<ul style="list-style-type: none">• Headlight HI Beam Relay

LIGHTING

☀ DESCRIPTION

1. General

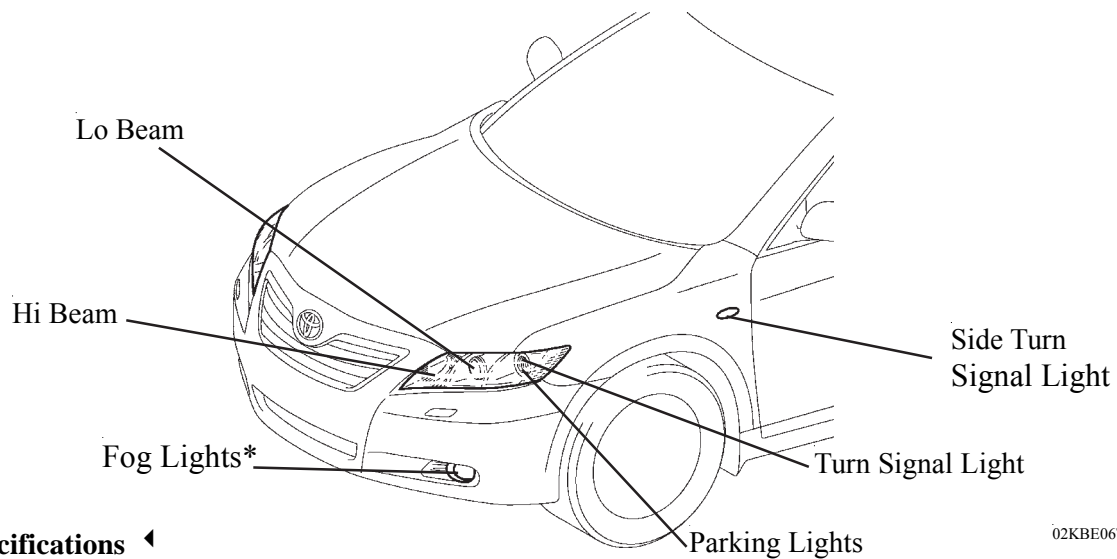
The lighting system includes the following equipment:

●: Standard

Front Fog Light		●*
Headlight	Halogen	●
Automatic Light Control System		●
Illuminated Entry		●
Light Turn-OFF System		●

*: Depending on grade. For details, see the equipment list in Model Outline (see page MO-24)

2. Front Exterior Light



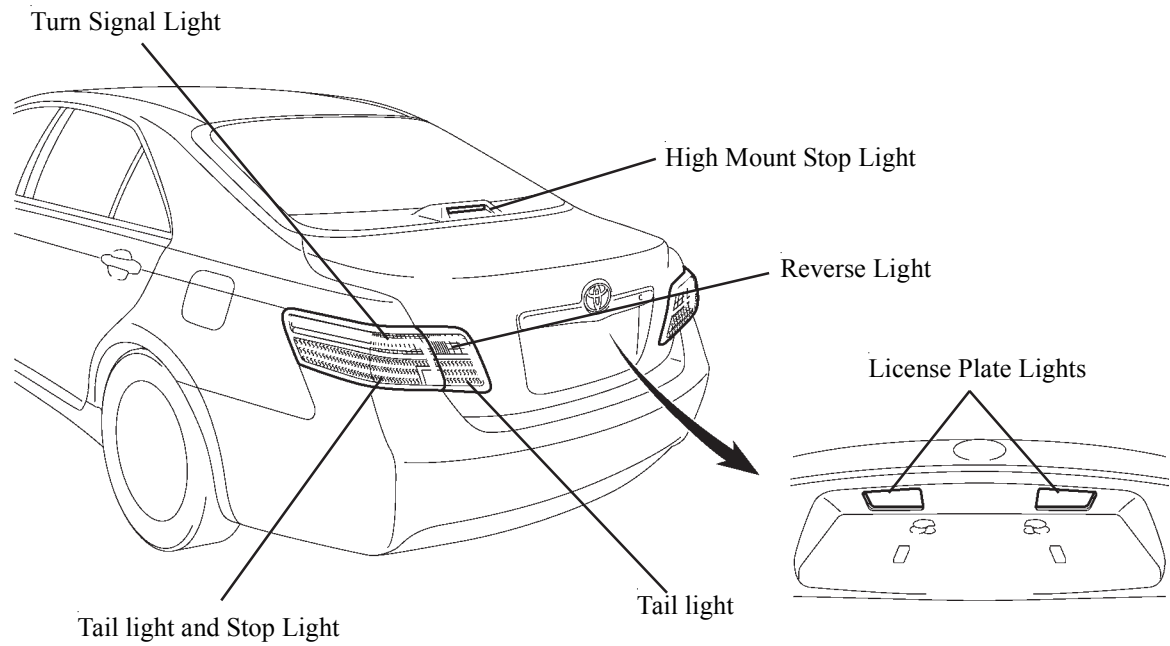
► Specifications ◀

02KBE06TEb

	Light	Type	Spec
Headlight Unit	Hi Beam	Halogen Bulb	65 W
	Lo Beam (Projector Type)	Halogen Bulb	55 W
	Turn Signal Light	Wedge Base Bulb (Amber)	21 W
	Parking Lights	Wedge Base Bulb (Clear)	5 W
Side Turn Signal Light	Front Fender	Assembly Unit (Amber)	5 W
Fog Lights*		Halogen Bulb	55 W

*: Depending on grade. For details, see the equipment list in Model Outline (see page MO-24)

3. Rear Exterior Light



02KBE07TEb

► Specifications ◀

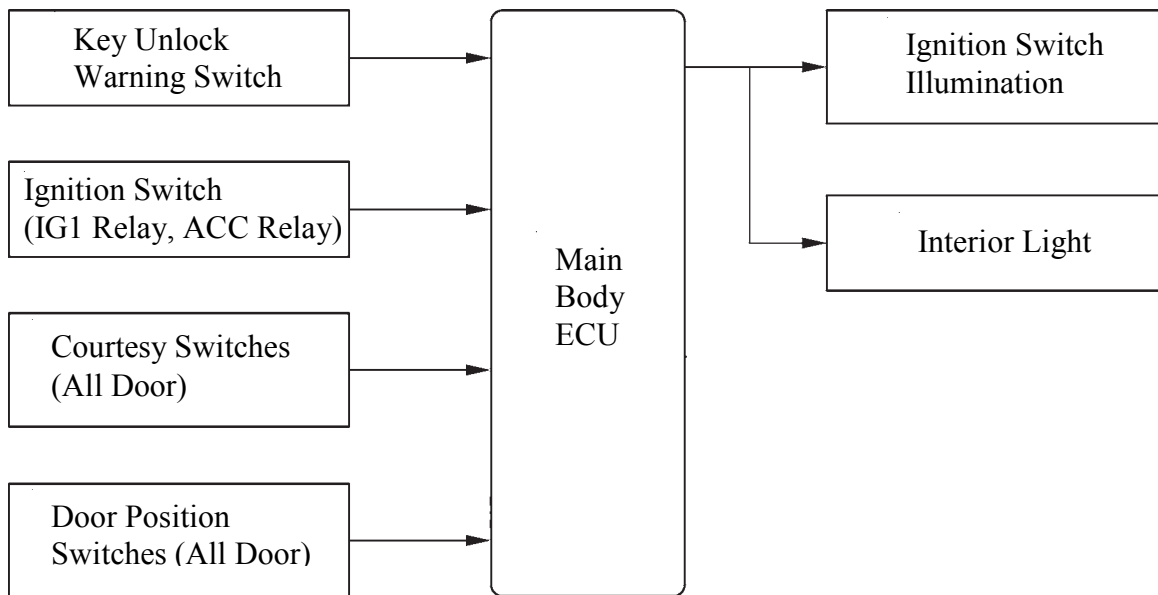
Light		Type	Spec
Combination Light	Tail light & Stop Light	Wedge Base Bulb (Clear)	5/21W
	Tail light	Wedge Base Bulb (Clear)	5W
	Turn Signal Light	Wedge Base Bulb (Amber)	21W
	Reverse Light	Wedge Base Bulb (Clear)	16W
License Plate Lights		Wedge Base Bulb (Clear)	5W
High Mount Stop Light		LED× 4	1.0W

❁ ILLUMINATED ENTRY SYSTEM

1. General

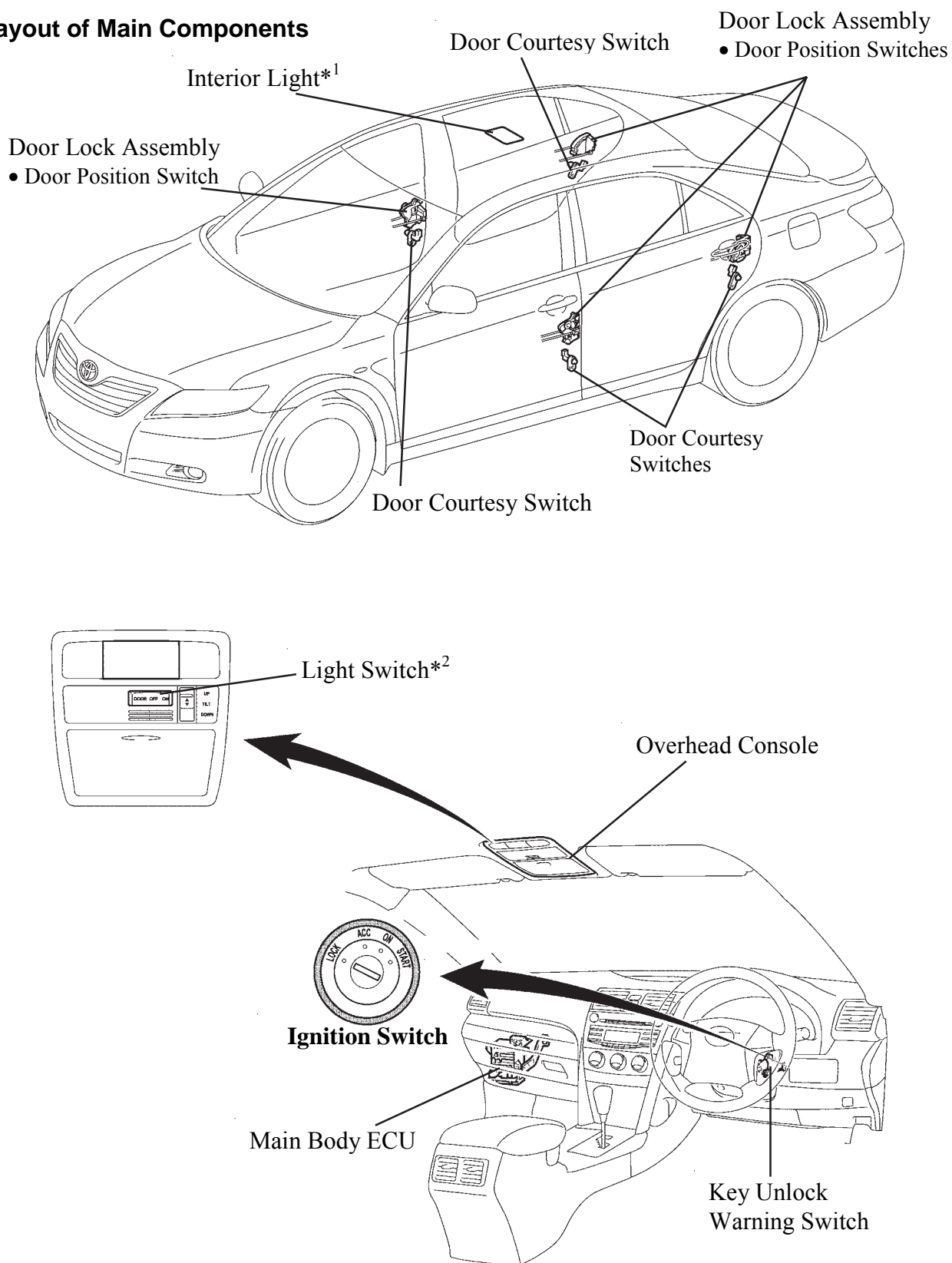
- The illuminated entry system of the new Camry controls 2 kinds of light: interior light and ignition switch.
- The interior light is operated when the light switch is in the DOOR position.

► System Diagram ◀



02KBE18Yb

2. Layout of Main Components

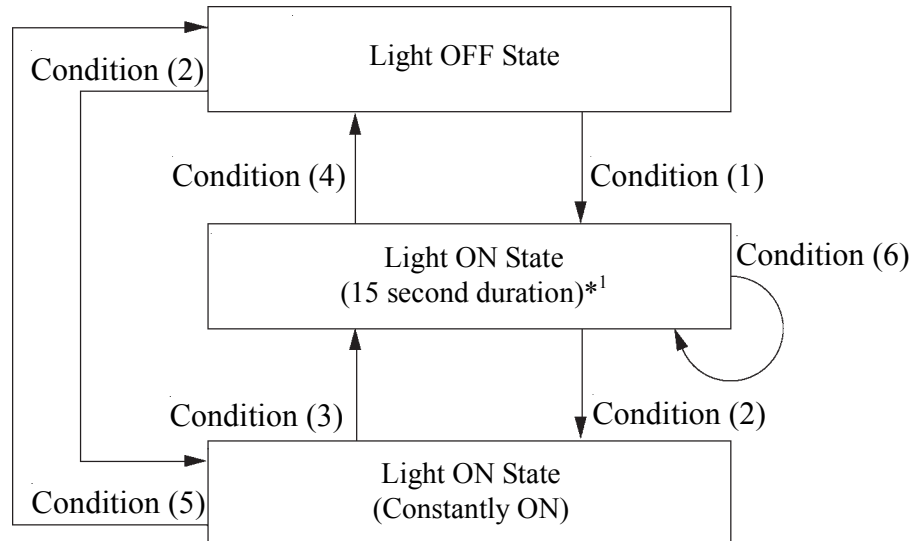


*¹: Only for models without the sliding roof system

*²: Only for models with the sliding roof system

3. Interior Light Control

- The interior light control (interior light and ignition switch illumination consists primarily of the fade-in/fade-out function and timer illumination function.
- The interior light control activates as described in the diagram below when one of items is in the respective state.
- This control is controlled by the main body ECU.



02KBE128Yb

Condition	Item
Condition (1)	<ul style="list-style-type: none"> • With power source*² OFF and all doors closed, any door is unlocked. • With all doors closed, power source*² is changed from ACC to OFF.
Condition (2)	<ul style="list-style-type: none"> • Any door is open.
Condition (3)	<ul style="list-style-type: none"> • With power source*² OFF and all doors are closed, any door is unlocked.
Condition (4)	<ul style="list-style-type: none"> • Power source*² is ACC or ON. • More than 15 seconds have elapsed since the Light ON State (15 second duration)*¹. • With power source*² OFF and all doors closed, all doors are locked.
Condition (5)	<ul style="list-style-type: none"> • With power source*² ACC or ON, all doors are closed or locked.
Condition (6)	<ul style="list-style-type: none"> • With power source*² OFF and all doors locked, any door is unlocked.

*¹: The function setting can be changed using the customised body electronics system. For details, refer to Customised Body Electronics System section on page BE-11.

*²: The power source condition can be changed by operating the ignition switch.

4. Battery Saving Control

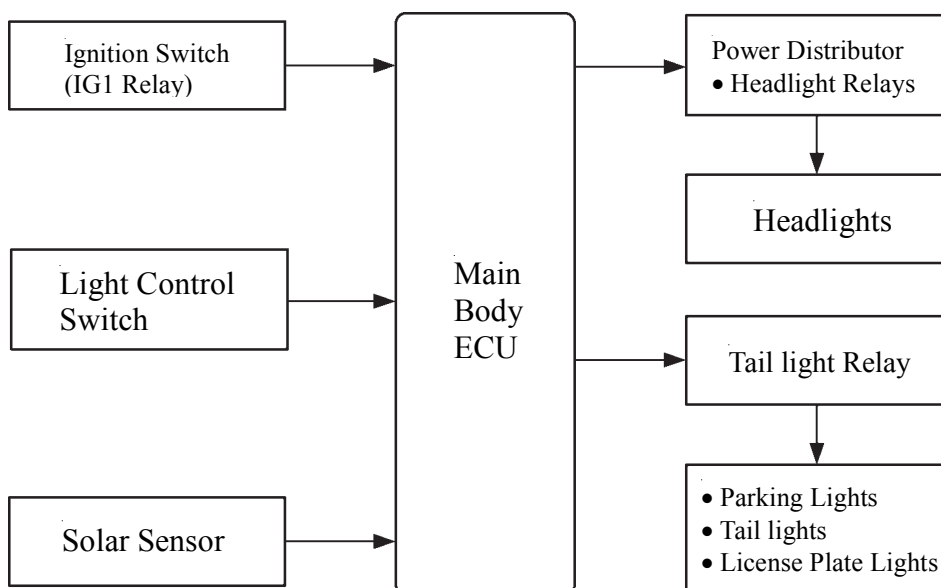
When the following two conditions have been met, battery saving control turns off the lights illuminated by the illuminated entry controls. Battery saving control is controlled by the main body ECU.

- The power source is OFF (models with smart entry and start system), or the ignition key is not in the ignition key cylinder (models without smart entry and start system).
- There is no change in the condition of the doors for 20 minutes.

☀ AUTOMATIC LIGHT CONTROL SYSTEM

- When the light control switch is in the AUTO position, the automatic light control system detects ambient light levels and controls the headlights and taillights (parking lights, taillights and license plate lights), or either of them.
- Ambient light levels are detected by the light control sensor that is integrated in the air conditioner system's solar sensor.
- The main body ECU controls this system.

► System Diagram ◀

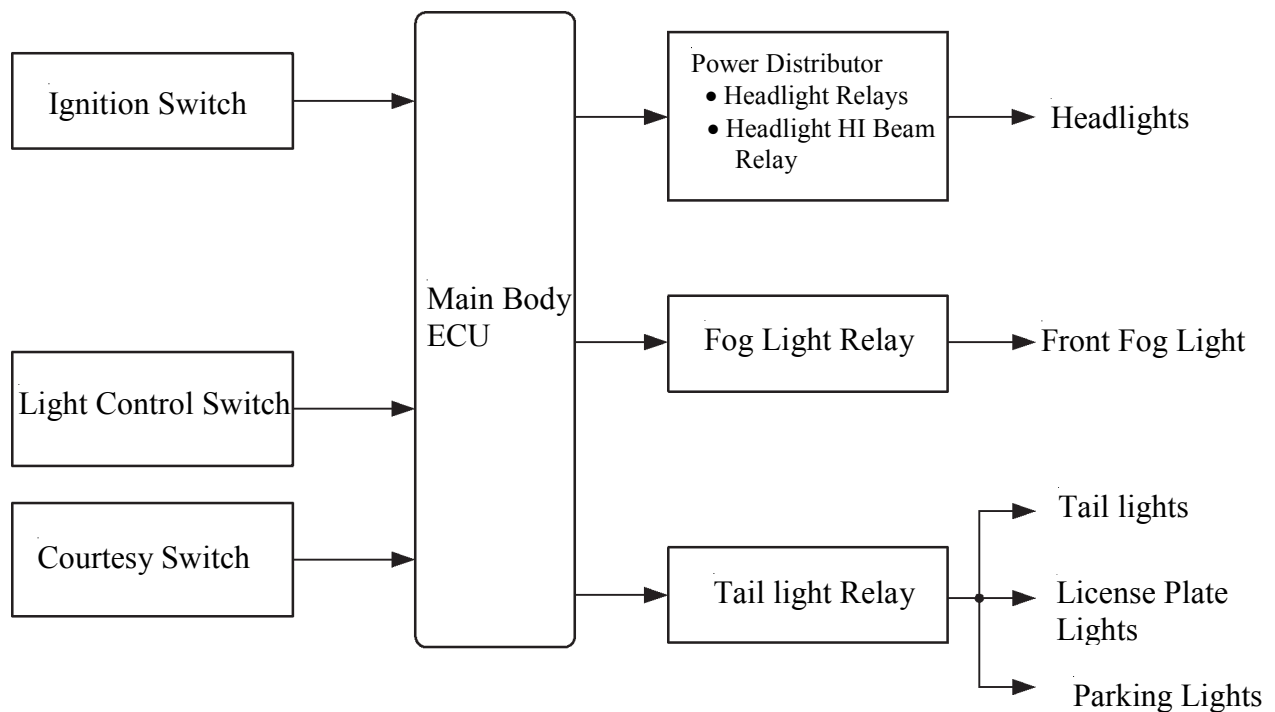


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☀ LIGHT TURN-OFF SYSTEM

- The light turn-off system is used to prevent the driver from leaving the vehicle with the headlights, fog lights, parking lights, taillights, or license plate lights on.
- When all of the following conditions are met, the exterior lights turn off.
 - Power source changes from IG-ON to OFF or ACC.
 - The light control switch is in any position except OFF.
 - The fog light switch is ON(Only for models with fog lights).
 - The driver's door is opened after the being closed.

► System Diagram ◀



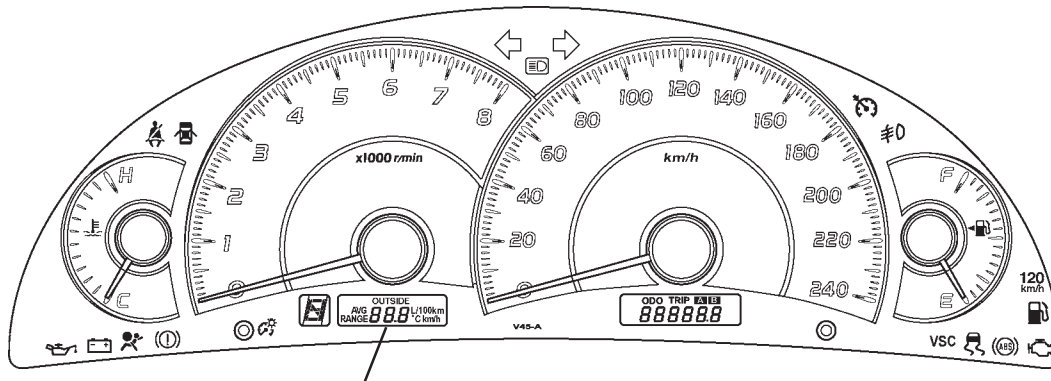
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METER

COMBINATION METER

1. General

- An analog type combination meter is used. In addition, an LCD (Liquid Crystal Display) type multi-information display has been provided below the tachometer on some grades.
- A meter ECU and buzzer are enclosed in the combination meter. This ECU maintains communication with other ECU's through the CAN (Controller Area Network).
- A step-motor type movement is used to actuate the indicators of the speedometer, the fuel gauge, the engine coolant temperature gauge and the tachometer.



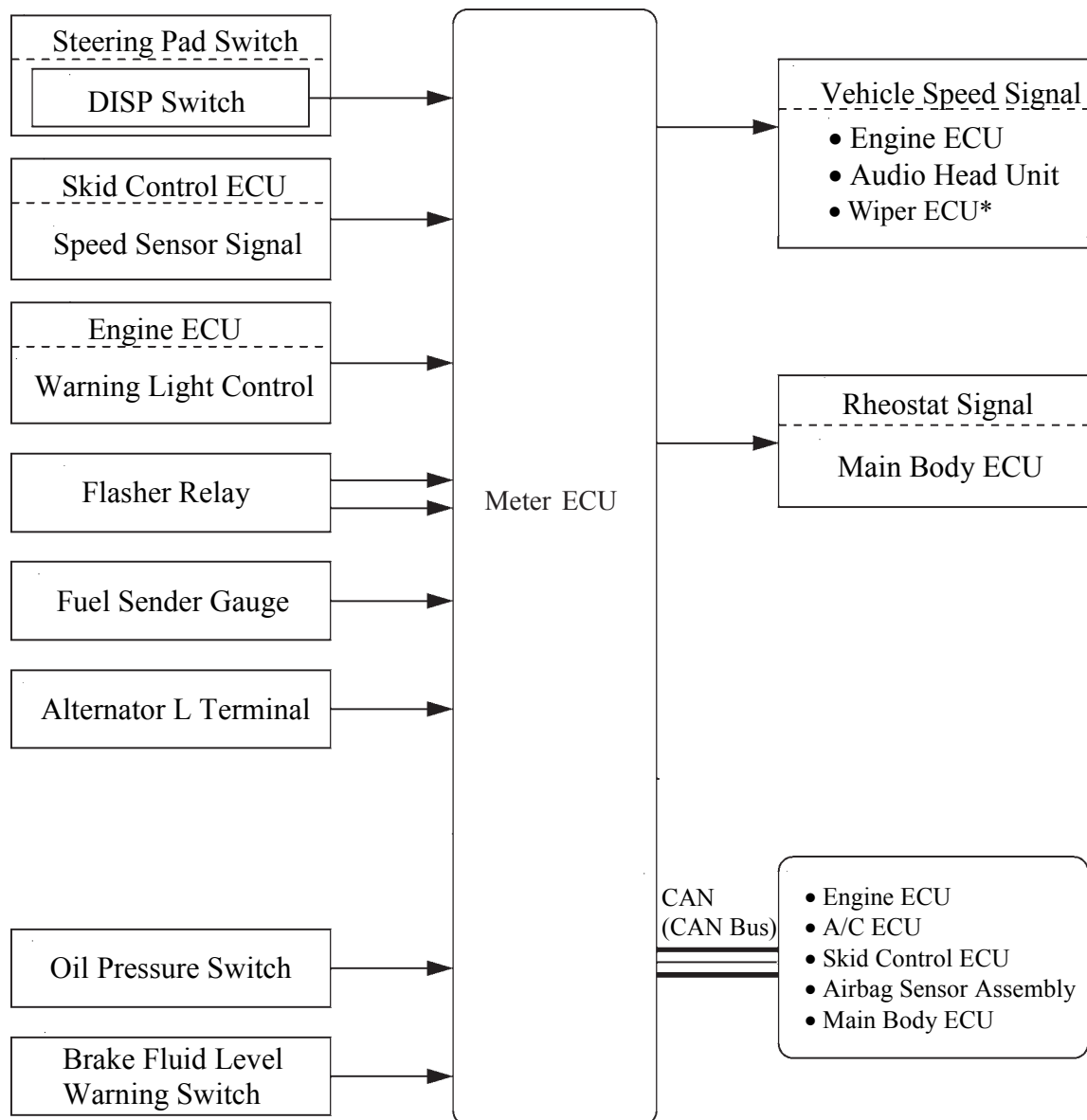
LCD (Liquid Crystal Display) Type Multi-information Display

02KBE22Y

Service Tip

If the LEDs malfunction, the entire combination meter assembly must be replaced. Refer to the Camry Repair Manual.

2. System Diagram



026BE17Pb

* With Rain Sensing Wipers

► **Input and output communication signals of the meter ECU** ◀

Protocol	ECU	Input Signal to meter ECU	Output Signal from meter ECU
CAN (CAN Bus)	Engine ECU	<ul style="list-style-type: none"> • Engine speed • Engine coolant temperature • Fuel injection volume • Starter condition • Shift position • Current range position • Buzzer sounding request • Indicator light control • Diagnosis (Cruise) • Engine type information 	-
	A/C ECU	Outside temperature	Vehicle speed
	Airbag Sensor Assembly	<ul style="list-style-type: none"> • Warning light control • Seat belt reminder control (D) • Diagnosis 	Vehicle speed
	Skid Control ECU	<ul style="list-style-type: none"> • Warning light control • Indicator light control • Vehicle Speed • Diagnosis 	-
	Main Body ECU	<ul style="list-style-type: none"> • Lighting status • Parking brake switch • Courtesy switch • Buzzer sounding request • Auto dimmer signal • Unlock Warning Switch • Warning display control • Diagnosis 	Vehicle Speed

3. Multi-information Display

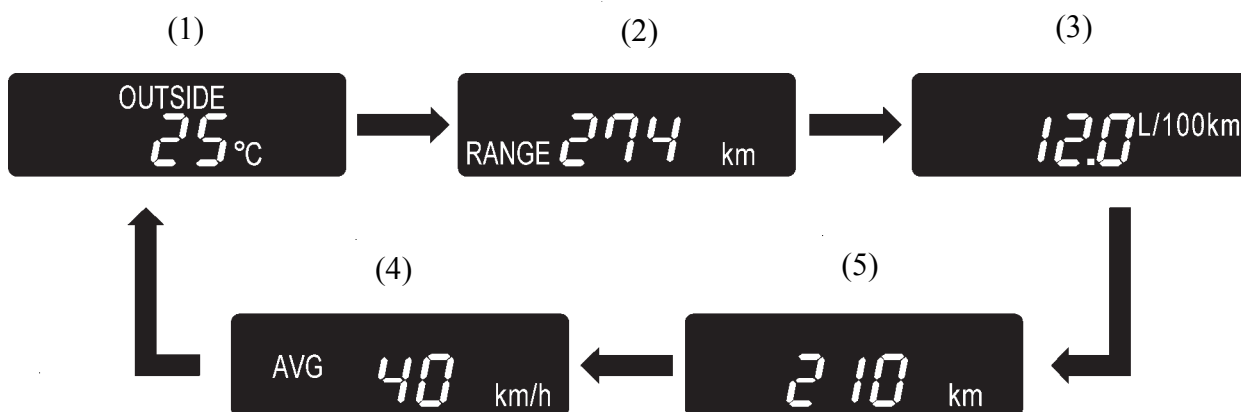
General

- The multi-information display has three modes:

Mode	Outline
Cruise Information	<ul style="list-style-type: none"> Five types of information can be displayed. The display can be switched by using the DISP switch. Analog type combination meter: outside temperature, driving range, average fuel consumption since refuelling, distance driven since engine start, and average speed since engine start.

Cruise Information Mode

The cruise information is displayed in the following order, changing each time the DISP switch is pressed. However, pressing the DISP switch for approximately 1 second or more changes the display to the outside temperature indication.



Information	Outline
(1)	Displays the outside temperature in accordance with the outside temperature sensor signal from the A/C ECU.
(2)	<ul style="list-style-type: none"> Displays the range, calculated by the combination meter which continuously monitors and stores fuel consumption data and the residual fuel volume when IG-ON has been selected. Updated every 1 seconds.
(3)	<ul style="list-style-type: none"> Displays the value calculated by the combination meter based on the distance driven since refuelling and the fuel consumption volume, which is calculated from the fuel injection signals from the No.1 injector. The combination meter determines the vehicle has been refuelled through the signal from the fuel sender gauge. Updated every 10 seconds.
(4)	<ul style="list-style-type: none"> Displays the value calculated by the combination meter based on the distance driven since engine start. Updated every 1 km.
(5)	<ul style="list-style-type: none"> Displays the average speed calculated by the combination meter based on the length of time and the distance driven since engine start. Updated every 10 seconds.

4. Buzzer

General

The table below shows the warning and reminder functions of the buzzer.

Function	Item
Reminder	<ul style="list-style-type: none">• Seat Belt Reminder (See page BE-98)

WIPER AND WASHER

☀ DESCRIPTION

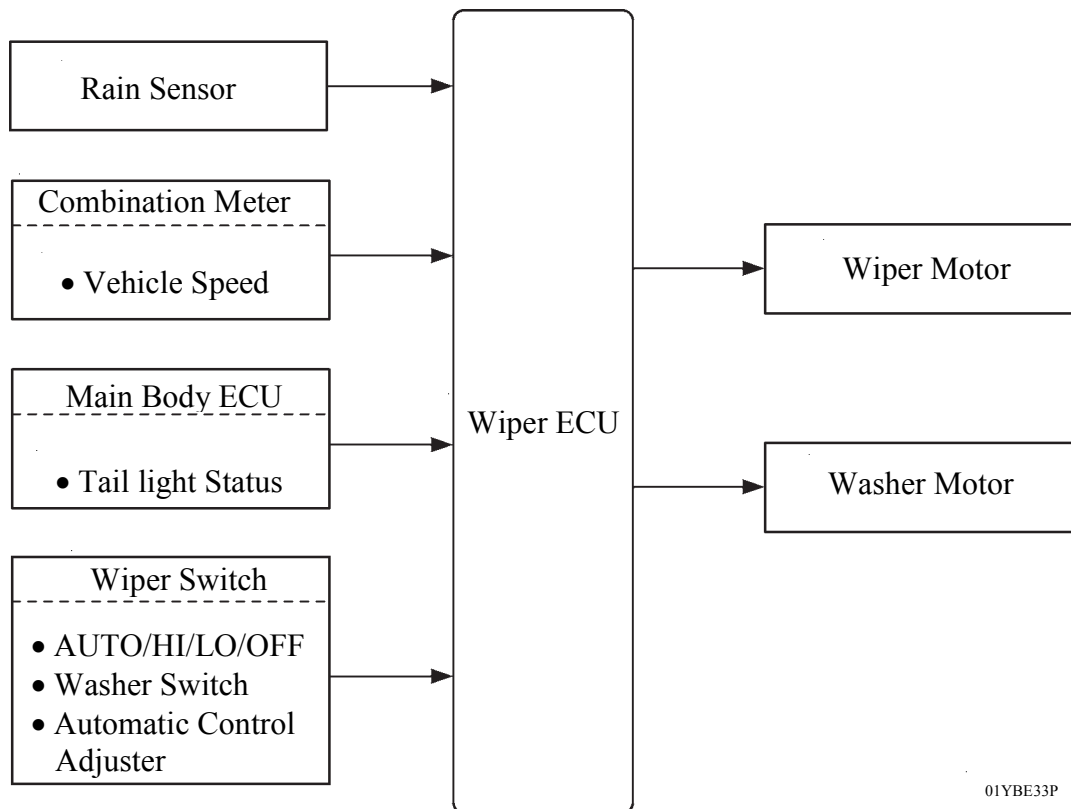
- A wiper system with a rain sensing function is available as standard equipment. Settings vary depending on the engine types and grade. For details, see the equipment list in Model Outline (page MO-24).
- This system has the following functions.

Function		Outline
Wiper	Rain Sensing	Controls the wiping interval and speed in accordance with the amount of rain, vehicle speeds and taillight signals when the wiper switch is in the AUTO position.
	Forced Wiping	When any one of the following conditions is met while wiping is controlled by the rain sensing function, the wiper ECU forcibly operates the wipers once. <ul style="list-style-type: none"> • The wiper switch is turned from OFF to AUTO when the power source is IG-ON. • The vehicle starts off. • The automatic control adjuster is turned to the + direction (to boost the sensitivity).
	Fail-safe	When the wiper motor malfunctions, the wiper ECU terminates both the rain sensing function and the wiper operation.
		When the rain sensor malfunctions, the wiper ECU sets the wiper interval depending on the vehicle speed and the automatic adjuster position, as follows: <ul style="list-style-type: none"> • While stationary: Approx. 4 to 13 sec, in accordance with the automatic control adjuster position. • At low speeds^{*1}: Approx. 3 to 11 sec, in accordance with the automatic control adjuster position. • At normal speeds^{*2}: Approx. 2 to 10 sec, in accordance with the automatic control adjuster position.
	Washer-linked Wiper with Drip-prevention	To prevent the fluid from dripping after the washer has been operated, this function operates the wipers once after they have operated in unison with the washer.

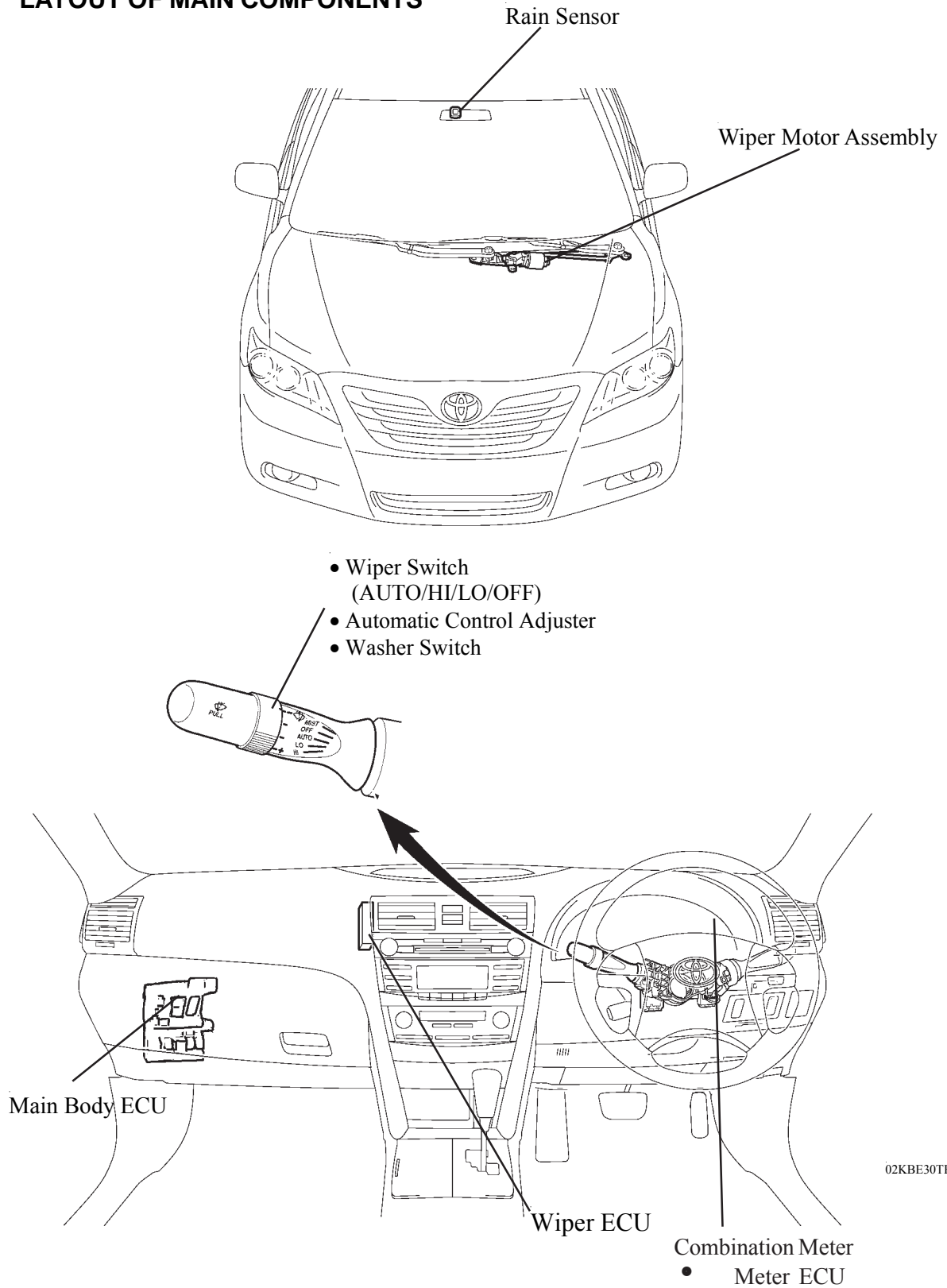
^{*1}: Approximately 6 to 23 km/h during acceleration. Approximately 4 to 16 km/h during deceleration.

^{*2}: Approximately 23 km/h or more during acceleration. Approximately 16 km/h or more during deceleration.

► System Diagram ◀

**Wiper and Washer**

● LAYOUT OF MAIN COMPONENTS



02KBE30TE

☀ RAIN SENSING FUNCTION

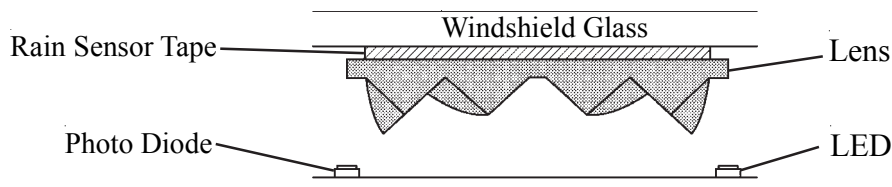
1. General

- The rain sensing function controls the wiping interval and speed in accordance with the amount of rain that strikes the windshield when the wiper switch is in the AUTO position.
- The wiper ECU controls the wiper operation by calculating the optimal wiping interval and speed in accordance with the following information:
 - Rainfall data transmitted by the rain sensor
 - Taillight status signals transmitted by the main body ECU (whether it is day or night)
 - Vehicle speed signals transmitted by the combination meter
 - Set values regarding the system sensitivity transmitted by the automatic control adjuster

2. Rain Sensor

General

The rain sensor consists of two LEDs (Light Emitting Diodes) that emit infrared rays, a photo diode that can receive those rays, a lens and rain sensor tape.



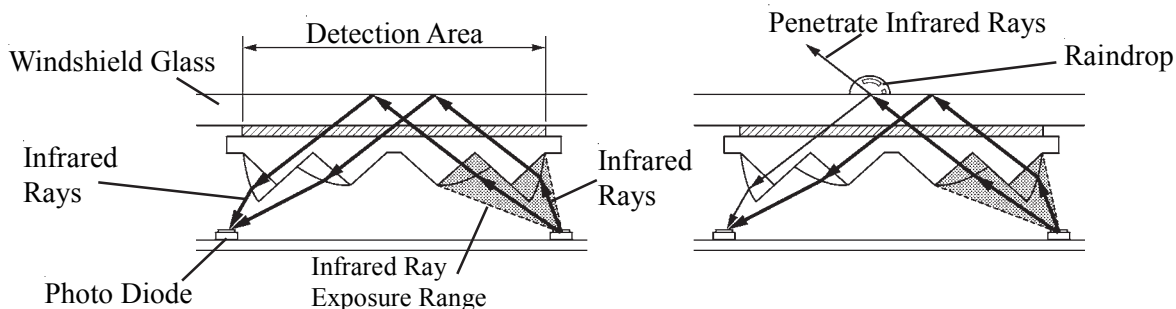
Rain Sensor Cross-section Image

Service Tip

If the rain sensor tape has been peeled off during a windshield glass replacement, be sure to affix new rain sensor tape. Failure to do so will lead to a system malfunction.

Operation

- If no rain is present in the detection area, the infrared rays emitted by the LED are all reflected by the outer surface of the windshield glass and are received by the photo diode.
- If rain is present in the detection area, a portion of the emitted infrared rays passes through the windshield glass due to the change in the difference between the refractive indexes of the glass and the area outside the windshield (the refractive difference between air and water). The ability of the windshield glass to reflect light back inside is reduced by the presence of the rain. This change in the internal reflection due to the presence of the water reduces the proportion of the infrared rays that are received by the photo diode. The extent of this reduction is used to determine the amount of rain falling on the windshield.



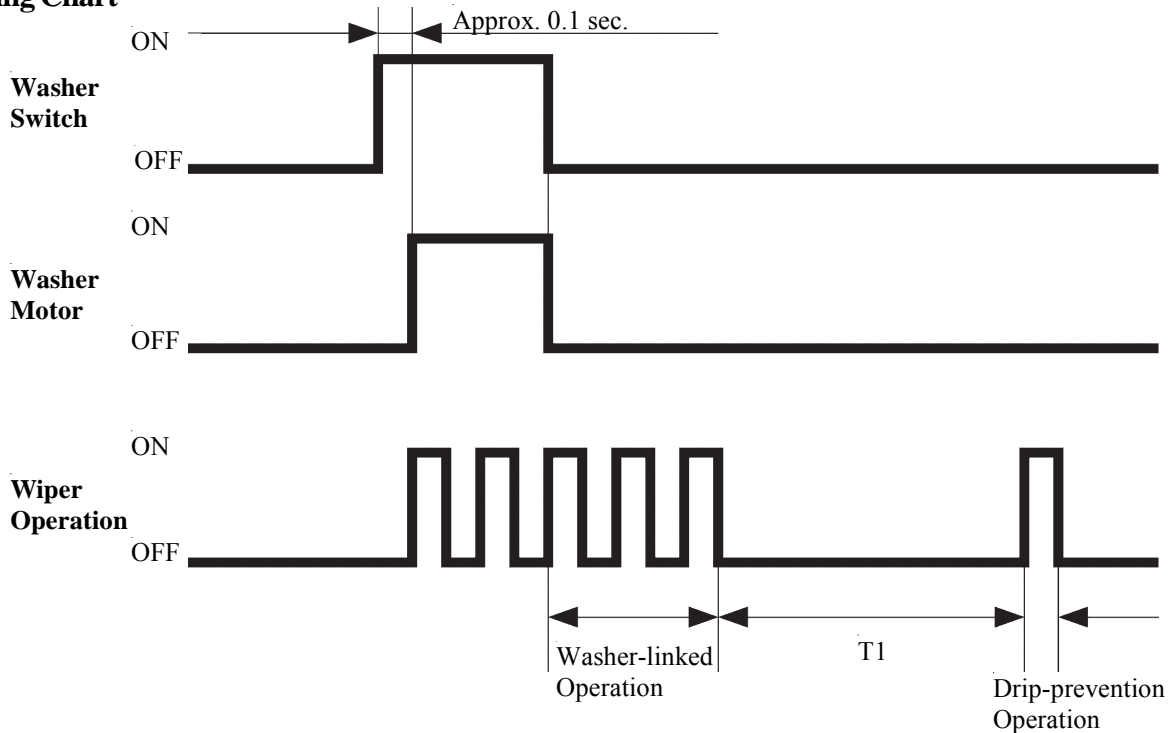
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WASHER-LINKED WIPER WITH DRIP-PREVENTION FUNCTION

When the wiper switch is set to OFF or AUTO and the washer switch is turned ON for approximately 0.1 seconds or more, the wipers start in LO at the same time as the washer fluid is sprayed.

- The wipers operate three times in LO after the washer switch is turned OFF.
- As shown in the following diagram, after the end of this operation, the wipers operate once more. They do so after an interval time determined by the vehicle speed, so that any washer fluid drips are wiped away.

▶ Timing Chart ◀



T1: From the interval time table

0140BE226C

▶ Interval Time Table ◀

Vehicle Speed km/h	Interval Time
Approx. 0 to 59	Approx. 3 sec.
Approx. 60 to 79	Approx. 5 sec.
Approx. 80 to 119	Approx. 7 sec.
Approx. 120 to 159	Approx. 5 sec.
Approx. 160 to 169	Approx. 3 sec.
Approx. 170 or more	No operation

AIR CONDITIONER



DESCRIPTION

- A manual air conditioner or automatic air conditioner using left/right independent temperature control and neural network is available as standard on the new Camry. The type of air conditioner available varies depending on the destination and model. For details, see the equipment list in Model Outline (page MO-24).
- The air conditioner has the following features:

Features	Outline	Automatic A/C	Manual A/C
High Performance	Neural network control is used so passengers can control the air conditioner accurately for maximum comfort.	○	—
	FACE mode for the rear seat is installed to blow warm air and ensure excellent heating performance.	○	○
	An Air Conditioner Filter is used.	○	○
	The blower control has seven levels for precise control.	○	○
Lightweight	A BUS connector with a built-in IC is used in a lightweight wire harness design with a reduced number of wires. The use of this connector means that pulse pattern type servo motors are used.	○	○
Compact	A blower motor with a built-in blower motor controller is used in a compact construction.	○	○
Others	<p>The following parts are used to ensure high cooling performance while realising a compact and lightweight construction.</p> <ul style="list-style-type: none"> • Semi-centre Location A/C Unit • RS (Revolutionary super-slim Structure) Evaporator • SFA (Straight Flow Aluminium)-II Heater Core • MF (Multi-Flow)-IV Sub -cool Condenser • Continuously Variable Capacity Type Compressor with DL (Damper Limiter) pulley. 	○	○

PERFORMANCE AND SPECIFICATION

1. Performance

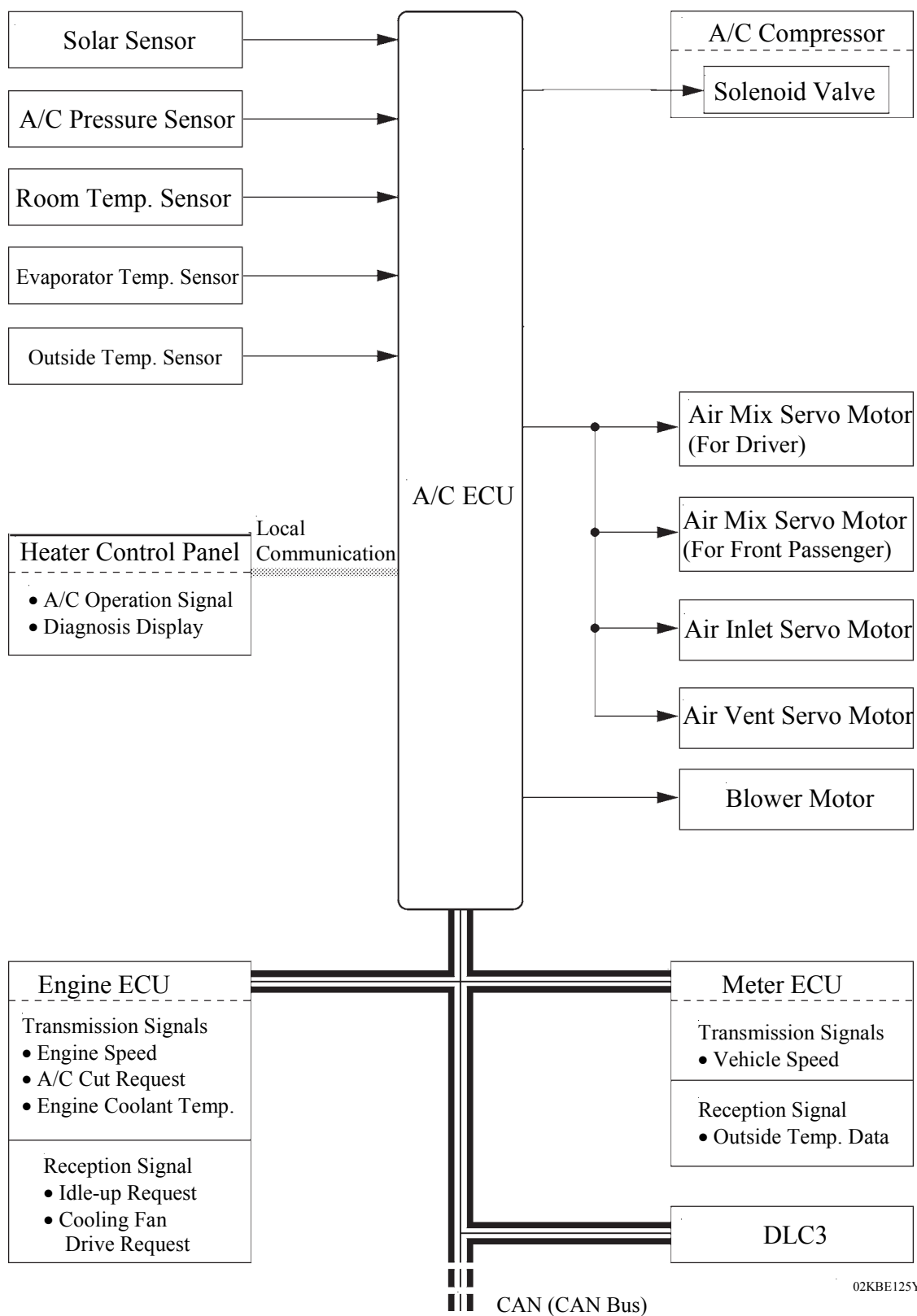
			Current (ACV36)	New (ACV40)
Heater	Heat Output	W	5200	6000
	Air Flow Volume	m ³ /h	360	←
	Power Consumption	W	Maximum 210	←
Air Conditioner	Cooling Capacity	W	5500	6100
	Air Flow Volume	m ³ /h	360	530
	Power Consumption	W	Maximum 260	←

2. Specifications

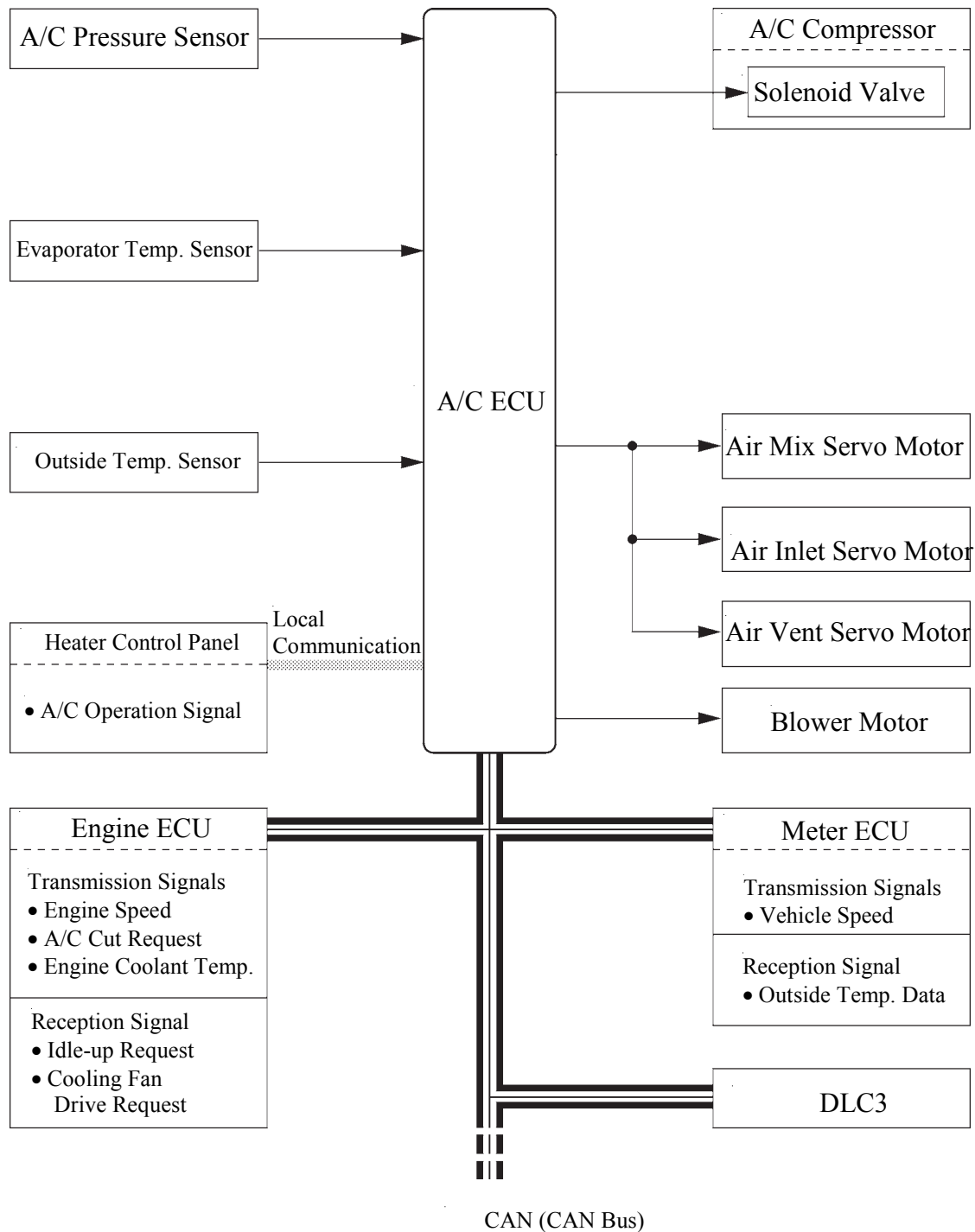
			Current (ACV36)	New (ACV40)
Ventilation and Heater Core	Heater Core	Type	SFA (Straight Flow Aluminium)	SFA (Straight Flow Aluminium) -II
		Size W×H×L mm	225 × 140 × 21	201.5 × 150 × 27
		Fin Pitch mm	2.25	1.5
	Blower	Motor Type	S80	K70 BMM
		Fan Type	Sirocco	Semi Sirocco
		Fan Size Dia.×H mm	190 × 75	165 × 70
Air Conditioner	Condenser	Type	Multi-Flow (Sub-cool)	MF (Multi-Flow) -IV
		Size W×H×L mm	670 × 387.8 × 16	720 × 370.2 × 16
		Fin Pitch mm	3.6	3.15
	Evaporator	Type	Multi-tank, Super-slim Structure	RS (Revolutionary super-slim Structure)
		Size W×H×L mm	266.2 × 255 × 56	266.3 × 251 × 38
		Fin Pitch mm	3.5	2.6
	Compressor	Type	10S17C	6SEU16
		Pulley	Magnetic Clutch	DL (Damper Limiter) without Magnetic Clutch
	Refrigerant	Type	HFC 134a	←
		Charge Volume g	580 ±50	500 ±50

SYSTEM DIAGRAM

▶ Automatic Air Conditioner ◀

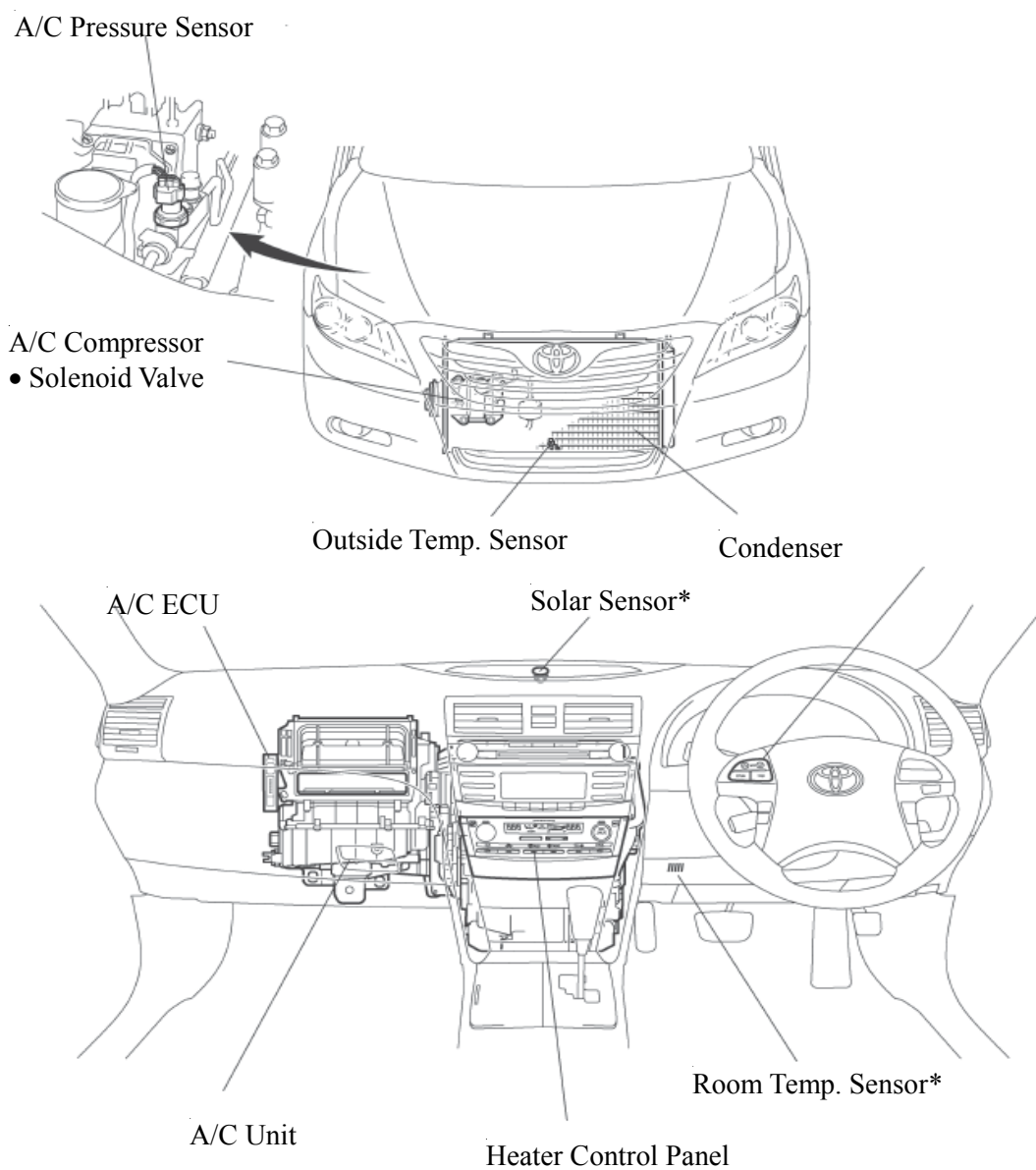


▶ Manual Air Conditioner ◀



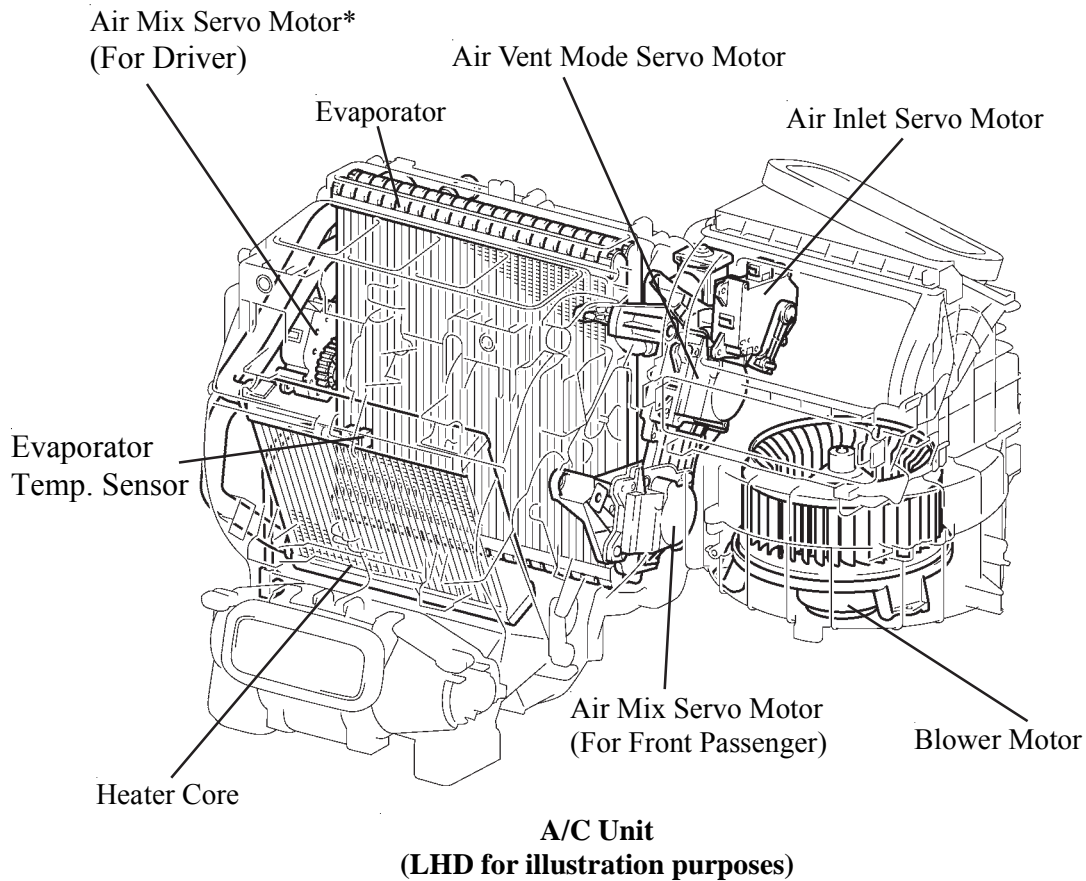
02KBE126Yb

☀ LAYOUT OF MAIN COMPONENTS



02KBE31TEe

*: Only for models with automatic air conditioner



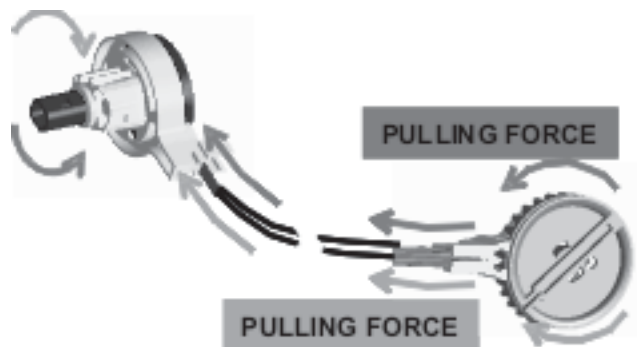
*: Only for models with the automatic air conditioner

01YBE48TE



Servo Module

Servo Module contains both Servo motors and Linkage for the Air Mix and the Air Distribution controls.

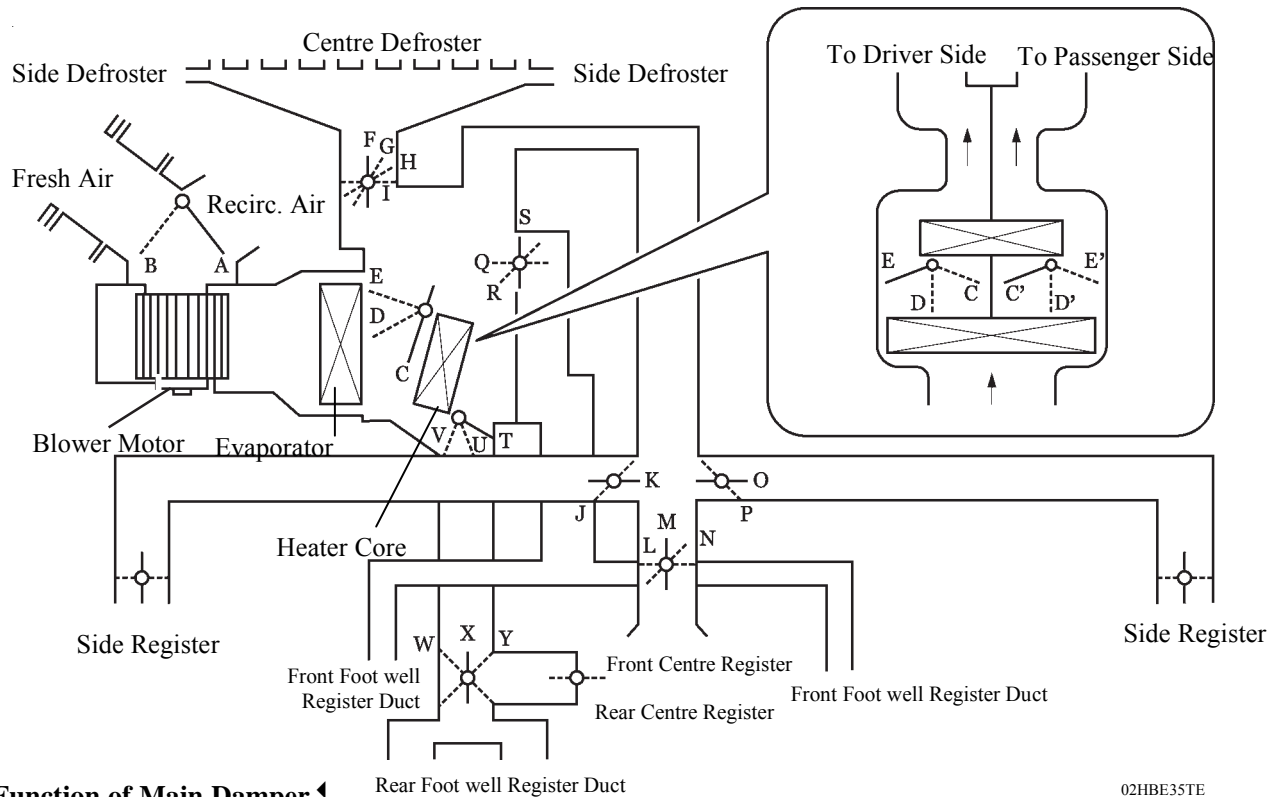


Pull Pull Control Cable

Pull Pull Cable is used to connect the linkage on the Servo Module to the Rear Duct Control.

☀ MODE POSITION AND DAMPER OPERATION

1. Automatic Air Conditioner



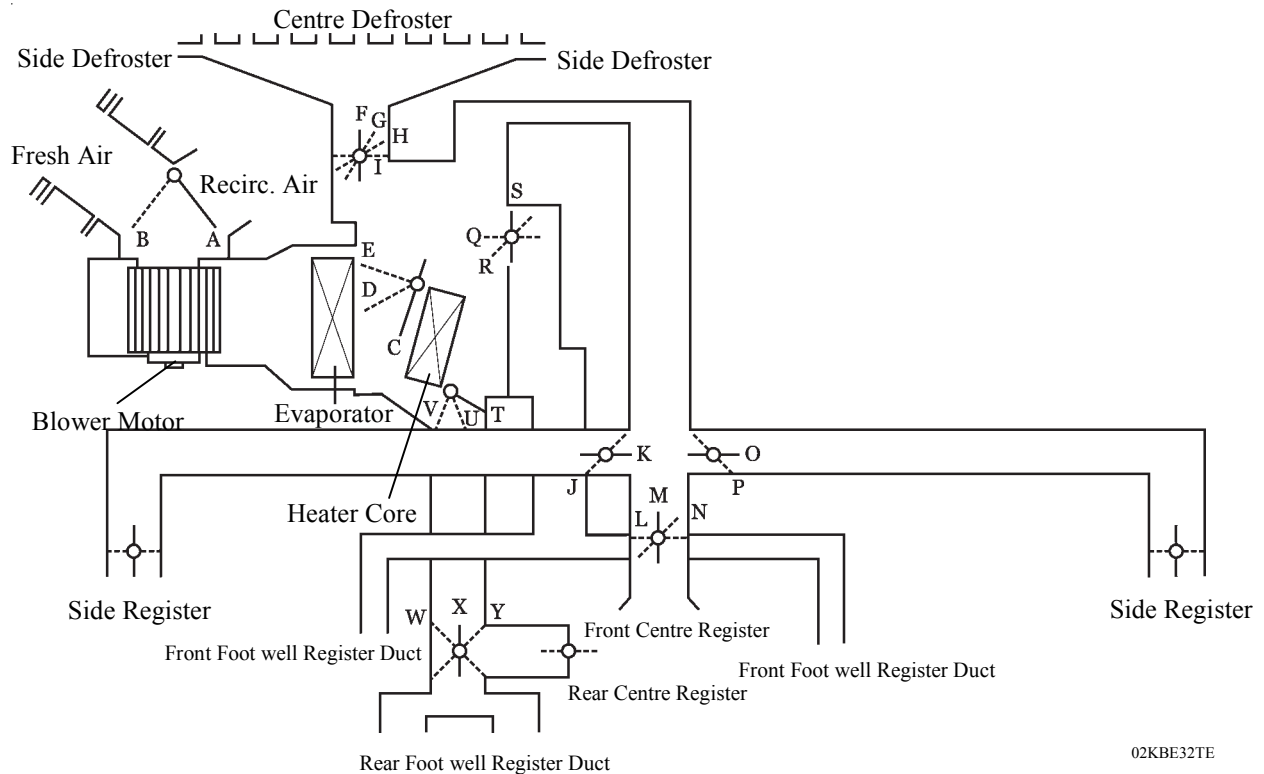
► Function of Main Damper ◀

Rear Foot well Register Duct

02HBE35TE

Control Damper	Operation Position	Damper Position	Operation
Air Inlet Control Damper	FRESH	A	Brings in fresh air.
	RECIRC	B	Recirculates internal air.
Air Mix Control Damper	MAX COLD to MAX HOT Temp. Setting	C – D – E (C' – D' – E') T – U – V	Varies the mixture ratio of the fresh air and the recirculated air in order to regulate the temperature continuously from HOT to COLD.
Mode Control Damper	DEF 187BE28	F, J, L, P, S, Y	Defrosts the windshield through the centre defroster, side defroster, and side register.
	FOOT / DEF 187BE27	G, J, L, P, Q, X	Defrosts the windshield through the centre defroster, side defroster, side register, and rear centre register, while air is also blown out from the front and rear foot well register ducts.
	FOOT 187BE26	H, J, L, P, Q, X	Air blows out of the foot well register duct, and side register. In addition, air blows out slightly from the centre defroster and side defroster.
	BI-LEVEL 187BE25	I, K, N, O, R, X	Air blows out of the front and rear centre registers, side register and front and rear foot well register ducts.
	FACE 187BE24	I, K, M, O, S, W	Air blows out of the front and rear centre registers, and side register.

2. Manual Air Conditioner

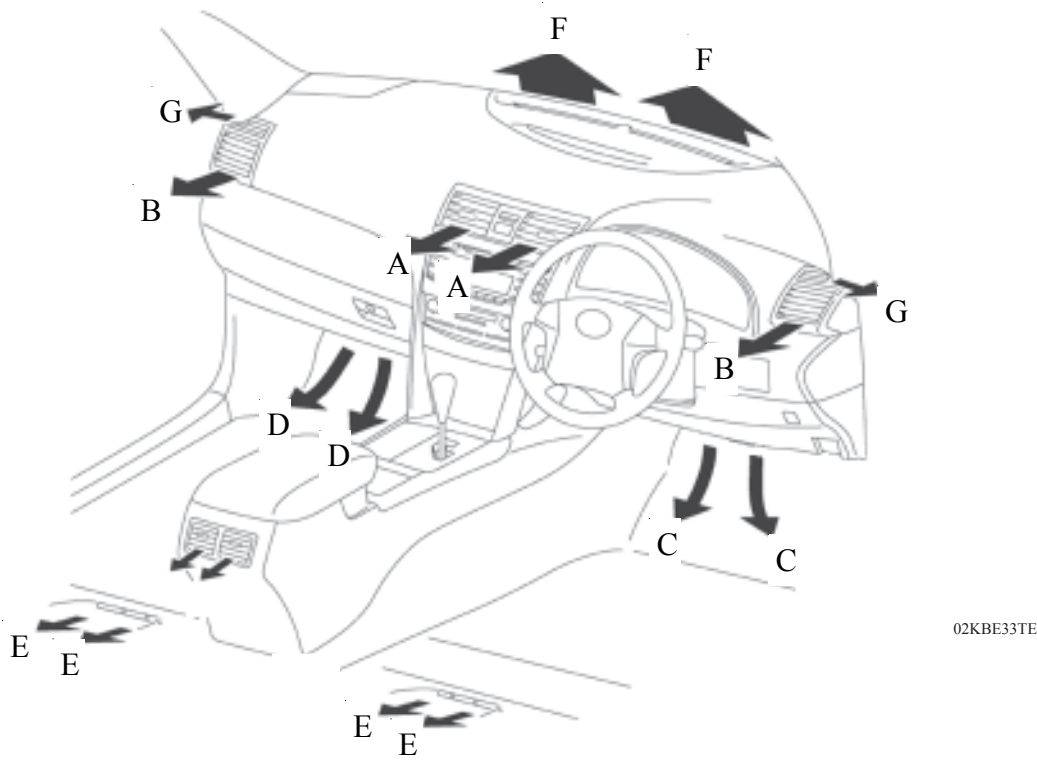


02KBE32TE

► Function of Main Damper ◀

Control Damper	Operation Position	Damper Position	Operation
Air Inlet Control Damper	FRESH	A	Brings in fresh air.
	RECIRC	B	Recirculates internal air.
Air Mix Control Damper	MAX COLD to MAX HOT Temp. Setting	C – D – E T – U – V	Varies the mixture ratio of the fresh air and the recirculated air in order to regulate the temperature continuously from HOT to COLD.
Mode Control Damper	DEF 187BE28	F, J, L, P, S, Y	Defrosts the windshield through the centre defroster, side defroster, and side register.
	FOOT / DEF 187BE27	G, J, L, P, Q, X	Defrosts the windshield through the centre defroster, side defroster, and side register, while air is also blown out from the front and rear foot well register ducts.
	FOOT 187BE26	H, J, L, P, Q, X	Air blows out of the foot well register duct, and side register. In addition, air blows out slightly from the centre defroster and side defroster.
	BI-LEVEL 187BE25	I, K, N, O, R, X	Air blows out of the front centre register, side register and front and rear foot well register ducts.
	FACE 187BE24	I, K, M, O, S, W	Air blows out of the front centre register and side register.

☀ AIR OUTLETS AND AIRFLOW VOLUME



INDICATION	MODE	SELECTION		FACE			FOOT		DEF	
				CTR	SIDE	RR	FR	RR	CTR	SIDE
		AUTO	MANUAL	A	B	C	D	E	F	G
	FACE	○	○	⊙	⊙	⊙	—	—	—	—
	B/L-U* ¹	○	○	⊙	⊙	⊙	○	○	—	—
	B/K-L* ²	○	—	○	○	○	⊙	⊙	—	—
	FOOT-F* ³	○	—	—	○	○	⊙	○	○	○
	FOOT-R* ⁴	○	○	—	○	○	⊙	⊙	○	○
	FOOT-D* ⁵	○	—	—	○	○	○	○	○	○
	F/D	○	○	—	○	○	⊙	⊙	○	○
	DEF	○	○	—	○	—	—	—	⊙	⊙

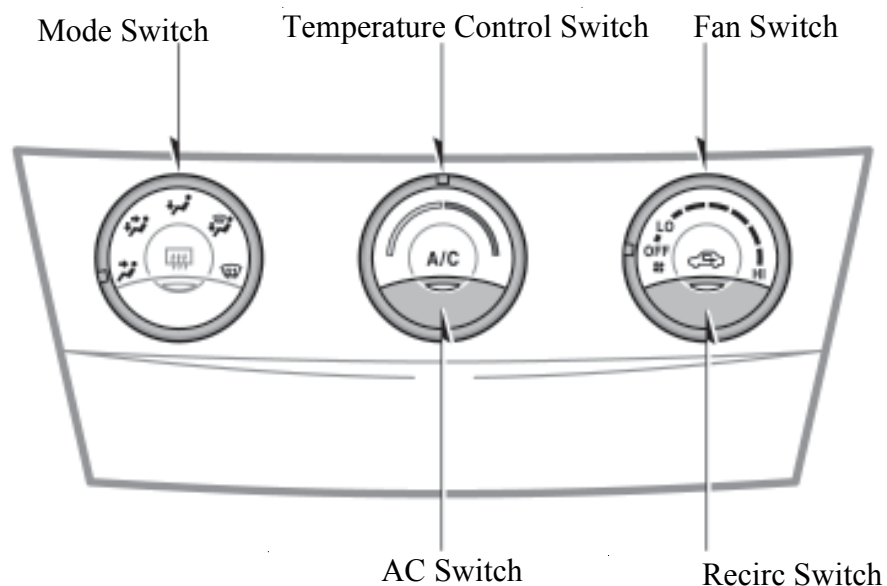
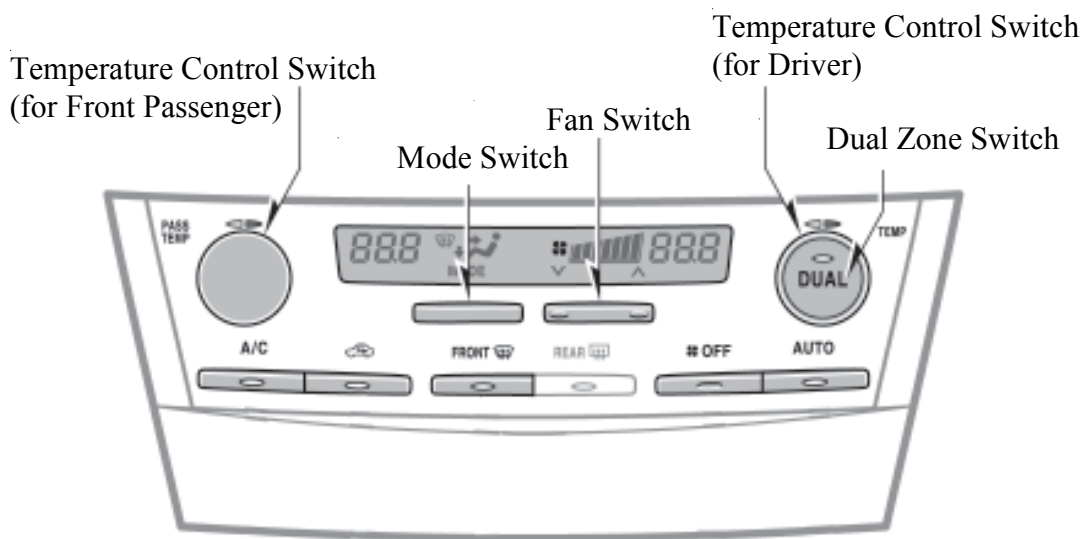
The size of the circle ○ indicates the proportion of airflow volume.

*¹: Greater airflow volume at the upper area. *²: Greater airflow volume at the lower area.
*³: Greater airflow volume at the front. *⁴: Greater airflow volume at the rear.
*⁵: Greater airflow volume at the defroster.
© TMCAL

CONSTRUCTION AND OPERATION

1. Heater Control Panel

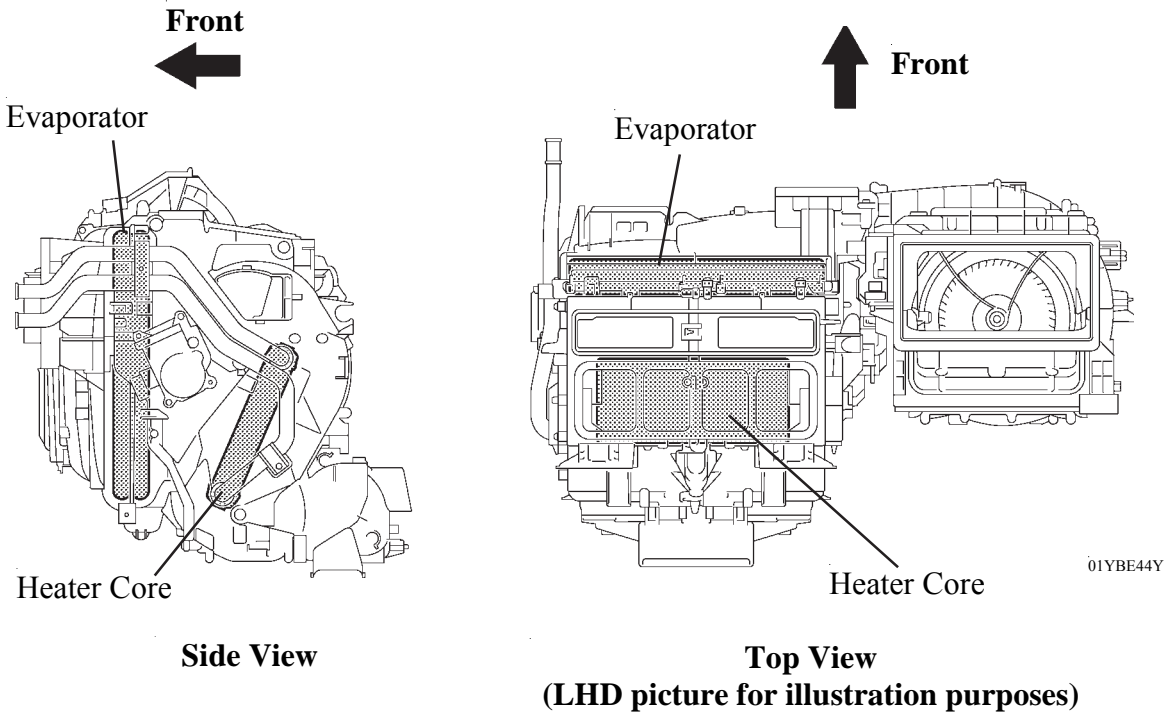
- 2 types of heater control panel are used on the new Camry, differing between models with the automatic air conditioner and those with the manual air conditioner.
- On models with the automatic air conditioner, the air conditioner status is displayed on an LCD (Liquid Crystal Display) panel.
- On models with the automatic air conditioner, as part of the right/left independent temperature control, the temperature control switches for the driver and the front passenger have been located closer to the respective seats for enhanced ease of use.



2. Air Conditioner Unit

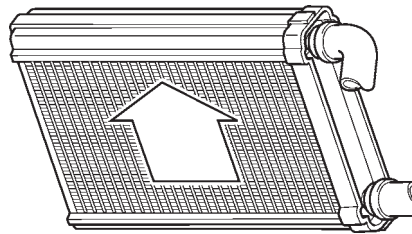
General

A semi-centre location air conditioner unit, in which the evaporator and heater core are placed in the vehicle's longitudinal direction, is used. As a result, the air conditioner unit has been made compact and lightweight.



Heater Core

A compact, lightweight, and highly efficient SFA (Straight Flow Aluminium)-II type heater core is used.



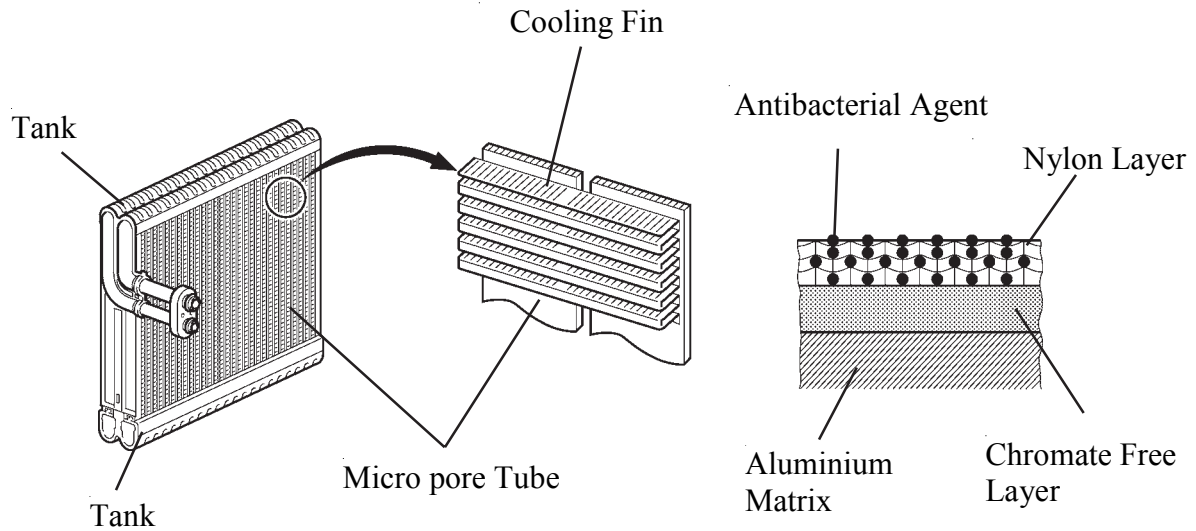
01YBE45Y

Evaporator

A semi-centre location air conditioner unit, in which the evaporator and heater core are placed in the vehicle's longitudinal direction, is used. As a result, the air conditioner unit has been made compact and lightweight.

- A revolutionary super-slim structure evaporator is used.
- By placing the tanks at the top and the bottom of the evaporator unit and adopting a micro pore tube construction, the following effects have been realised:
 - a) The heat exchanging efficiency has been improved.
 - b) The temperature distribution has been made more uniform.
 - c) The evaporator has been made thinner: 58 mm → 38 mm

- The evaporator body has been coated with a type of resin that contains an antibacterial agent in order to minimise the source of foul odor and the propagation of bacteria. The substrate below this coating consists of a chromate-free layer to help protect the environment.



Evaporator Temp. Sensor

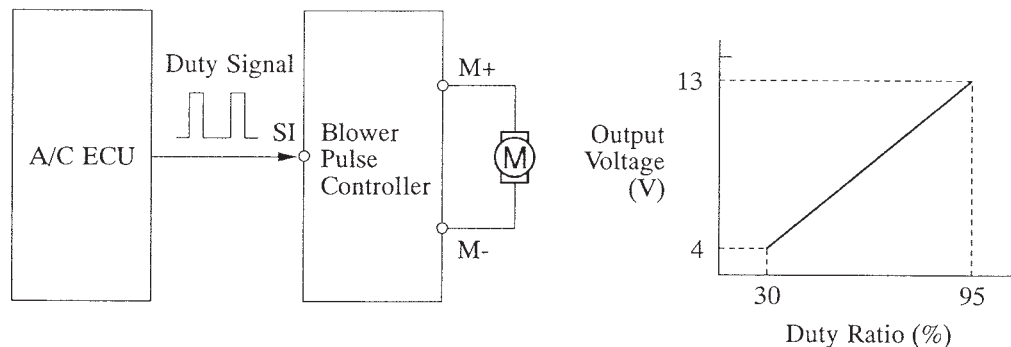
The evaporator temp. sensor detects the temperature of the cool air immediately past the evaporator by measuring resistance changes, and outputs it to the A/C ECU.

Blower Motor

The blower motor has an in-built blower controller, and is controlled with the duty control from the A/C ECU.

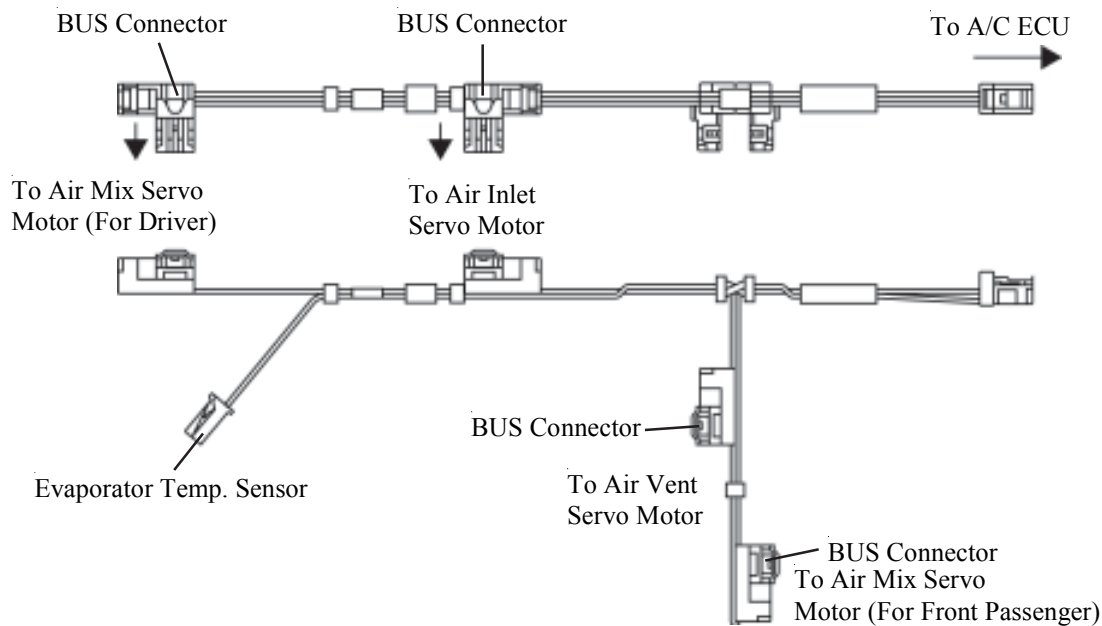
Blower Pulse Controller

The blower pulse controller control the voltage that is output to the blower motor in accordance with the duty cycle signals that are input by the A/C ECU.



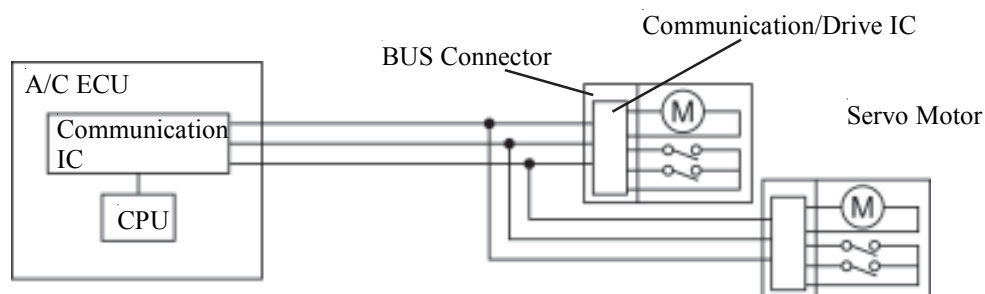
BUS Connector

- A BUS connector is used in the wire harness connection that connects the servo motor to the A/C ECU.



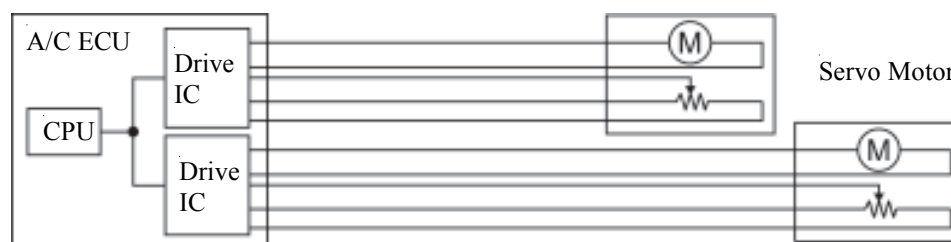
285BE43

- The BUS connector has a built-in communication/drive IC which communicates with each servo motor connector, actuates the servo motor, and has a position detection function. This enables bus communication for the servo motor wire harness, for a more lightweight construction and a reduced number of wires.



With BUS Connector

285BE44

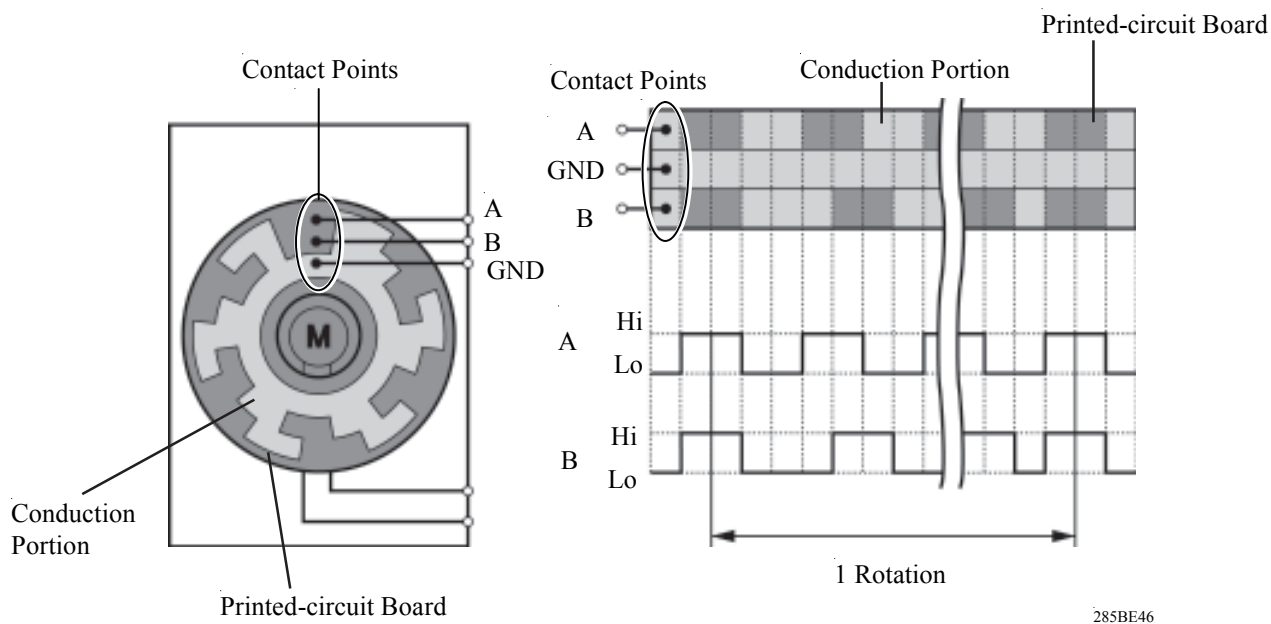


Without BUS Connector

285BE45

Servo Motor

The pulse pattern type servo motor consists of a printed circuit board and servo motor. The printed circuit board has three contact points, and transmits to the A/C ECU two ON-OFF signals for each change in the pulse phase. The smart connector detects the damper position and movement direction with this signal.



NOTE: When one of the following operations is conducted, the A/C ECU automatically performs the initialisation to detect the original positions of the servo motors. Although either the front DEF indicator*¹ or the rear DEF indicator*² on the heater control panel blinks during the initialisation, this does not indicate a malfunction.

- After the battery terminal has been disconnected, the ignition is switched on or the engine is started.
- The engine starts and stops repeatedly in a short period of time.
- The engine starts when the battery voltage is low.

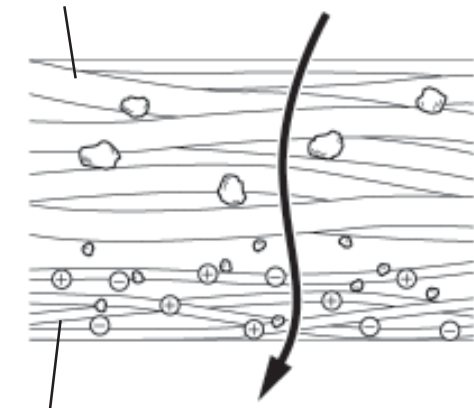
*¹: Models with the automatic air conditioner

*²: Models with the manual air conditioner

Air Conditioner Air Filter

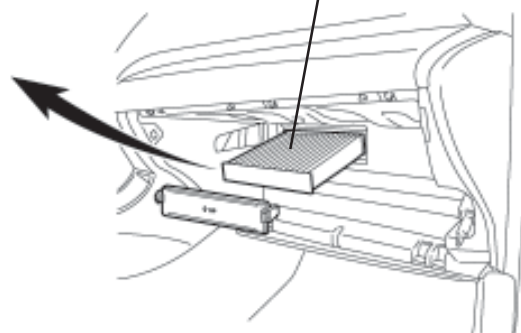
- A Pollen-removal type Air Conditioner air filter is used.
- The filter is made of polyester. Thus, it can be disposed of easily as a non hazardous combustible material, a feature that is provided in consideration of the environment.

Large Foreign Object
Filter Layer



Electret Layer
(Microscopic foreign object filtration)

Air Filter



025BE47Y

Service Tip

The replacement interval of the filter varies:

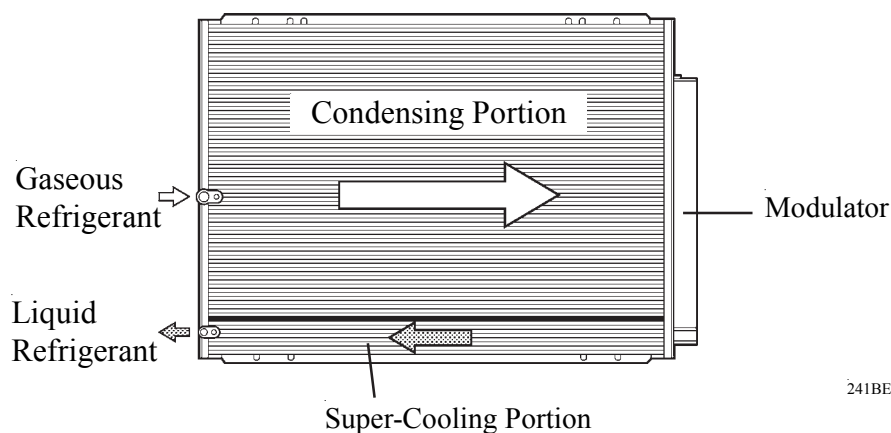
Cleaning Interval [km]		Replacement Interval [km]	
Normal Condition	Dusty Condition	Normal Condition	Dusty Condition
15,000	7,500	30,000	15,000

However, observation of these guidance lines should depend on the usage conditions (or environment).

3. Condenser

- An MF (Multi-Flow) type condenser is used. The condenser consists of two cooling portions; a condensing portion and a super-cooling portion, which are integrated together with a gas-liquid separator (modulator). This condenser uses a sub-cool cycle that offers excellent heat-exchange performance.
- In the sub-cool cycle, after the refrigerant passes through the condensing portion of the condenser, both the liquid refrigerant and the gaseous refrigerant that could not be liquefied are cooled again in the super-cooling portion. Thus, the refrigerant is sent to the evaporator in an almost completely liquefied state.

Note: For condenser fan control refer to EG-53

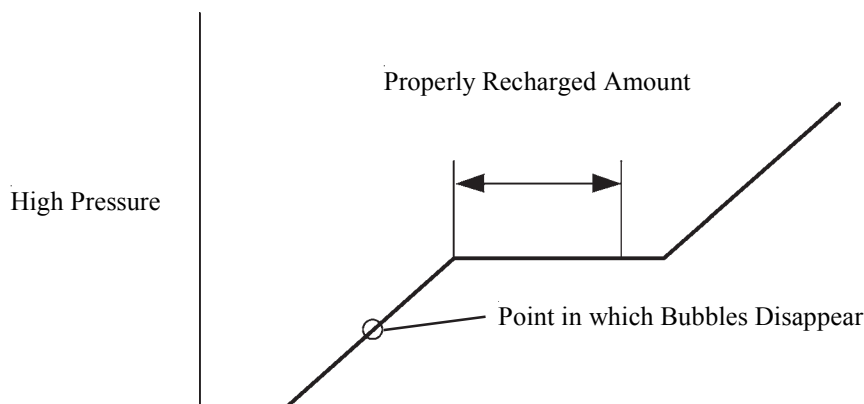


241BE166

Service Tip

The point at which the air bubbles disappear in the refrigerant of the sub-cool cycle is lower than the proper amount of refrigerant with which the system must be filled. Therefore, if the system is recharged with refrigerant based on the point at which the air bubbles disappear, the amount of refrigerant would be insufficient. As a result, the cooling performance of the system will be affected. If the system is overcharged with refrigerant, this will also lead to a reduced performance.

For the proper method of verifying the amount of the refrigerant and for instructions on how to recharge the system with refrigerant, see the Camry Repair Manual.

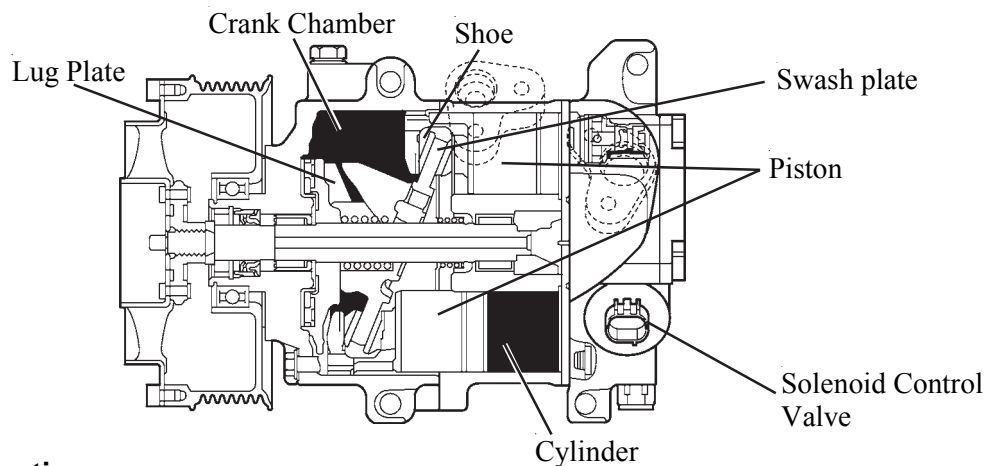


152BE40

4. A/C Compressor

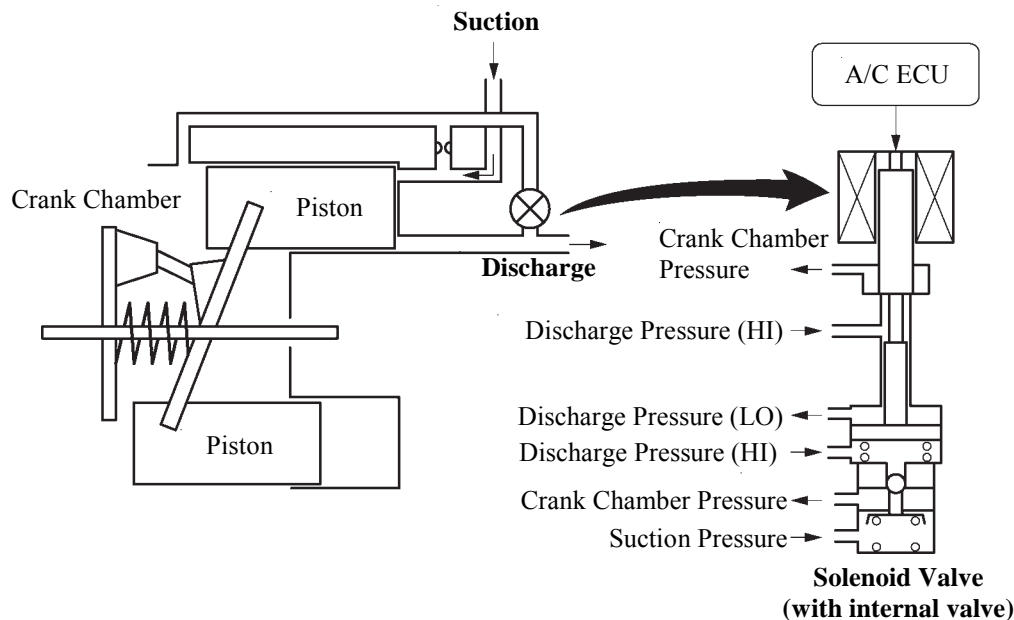
General

- The A/C compressor is a continuously variable capacity type, of which the capacity can be varied in accordance with the cooling load of the air conditioner.
- This compressor consists of the A/C pulley, shaft, lug plate, swash plate, piston, shoe, crank chamber, cylinder, and solenoid valve.
- The DL (Damper Limiter) type A/C pulley is used.
- A solenoid valve that adjusts the suction pressure so that the compressor capacity can be controlled as desired is provided.
- The internal valve is installed on all models to improve the A/C compressor durability at high speeds and under heavy thermal load conditions. The internal valve is integrated into the solenoid valve.



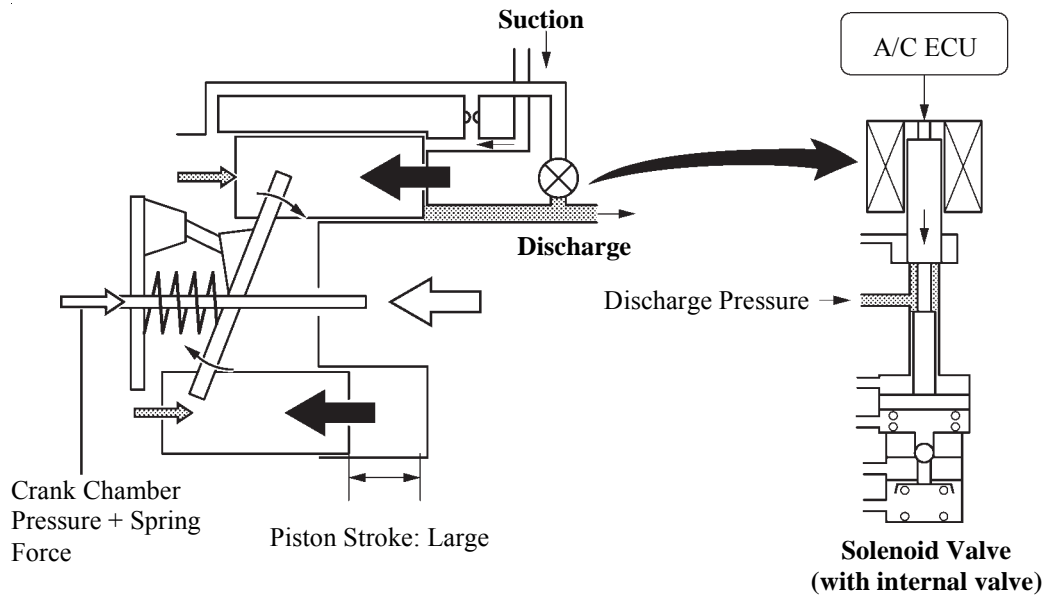
Solenoid Valve Operation

- The crank chamber is connected to the discharge passage. A solenoid valve is provided between the discharge passage (LO pressure) and the discharge passage (HI pressure).
- The solenoid valve operates under duty cycle control in accordance with the signals from A/C ECU.

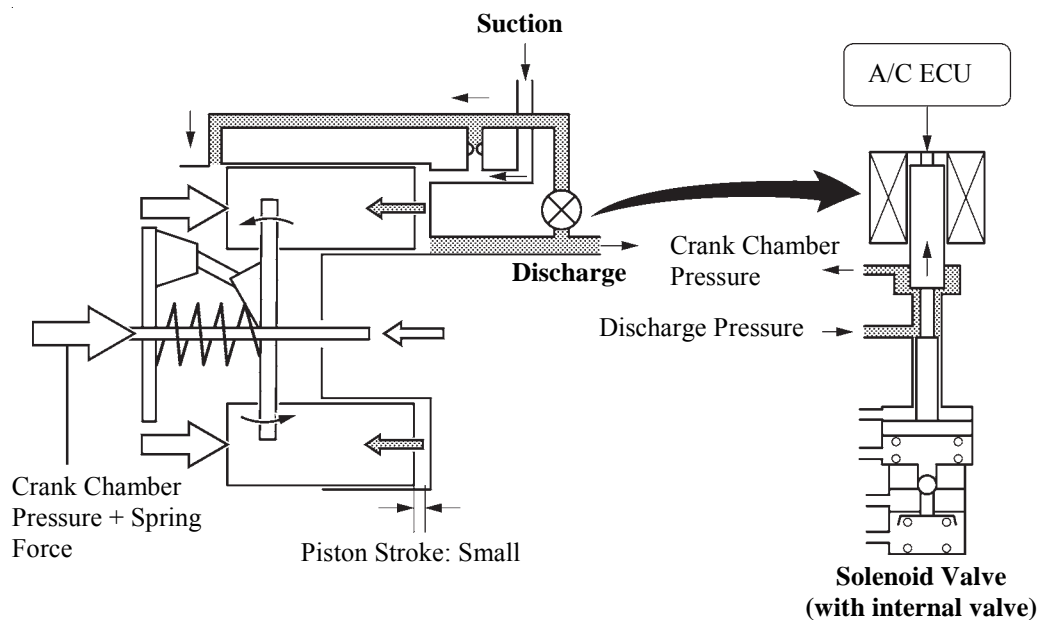


025BE56TE

- When the solenoid valve closes (the solenoid coil is energised), a difference in pressure is created and the pressure in the crank chamber decreases. Then, the pressure that is applied to the right side of the piston becomes greater than the pressure that is applied to the left side of the piston. This compresses the spring and tilts the swash plate. As a result, the piston stroke length increases and the discharge capacity increases.

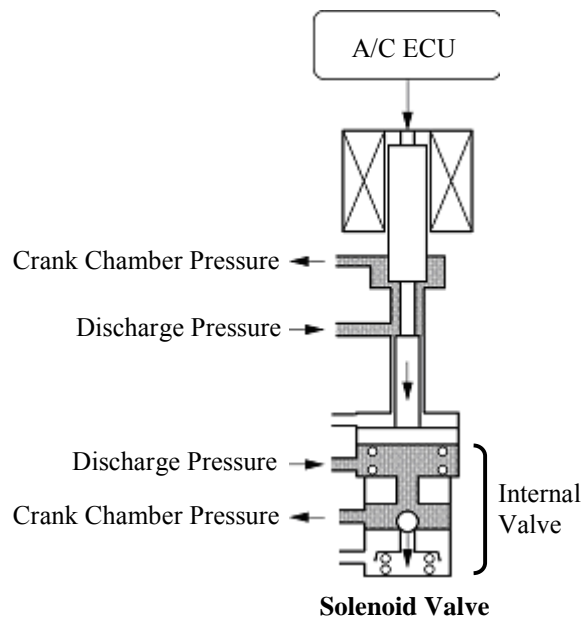


- When the solenoid valve opens (the solenoid coil is not energised), the difference in pressure disappears. Then, the pressure that is applied to the left side of the piston becomes the same as the pressure that is applied to the right side of the piston. Thus, the spring elongates and eliminates the tilt of the swash plate. As a result, there is no piston stroke and the discharge capacity is reduced.



Internal Valve Operation (Models with Internal Valve)

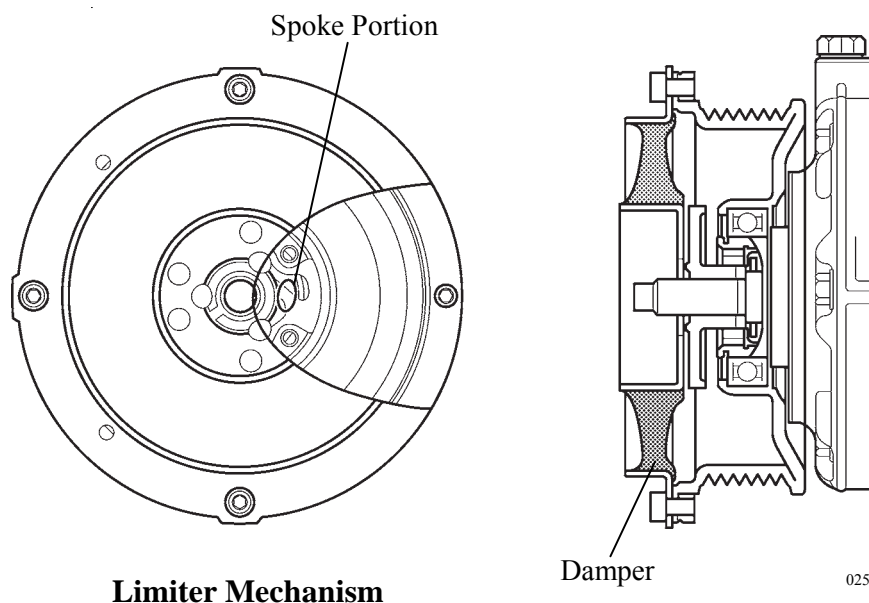
The internal valve operates when the A/C compressor speed has increased rapidly, the A/C compressor speed is high, or when the thermal load has suddenly changed. As a result, the A/C compressor capacity is reduced, increasing the durability of the A/C compressor.



0280BE11C

DL type A/C Pulley

This pulley contains a damper to absorb the torque fluctuations of the engine and a limiter mechanism to protect the drive belt in case the compressor locks. In the event that the compressor locks, the limiter mechanism causes the spoke portion of the pulley to break, thus separating the pulley from the compressor.



025BE49TE

5. A/C Pressure Sensor

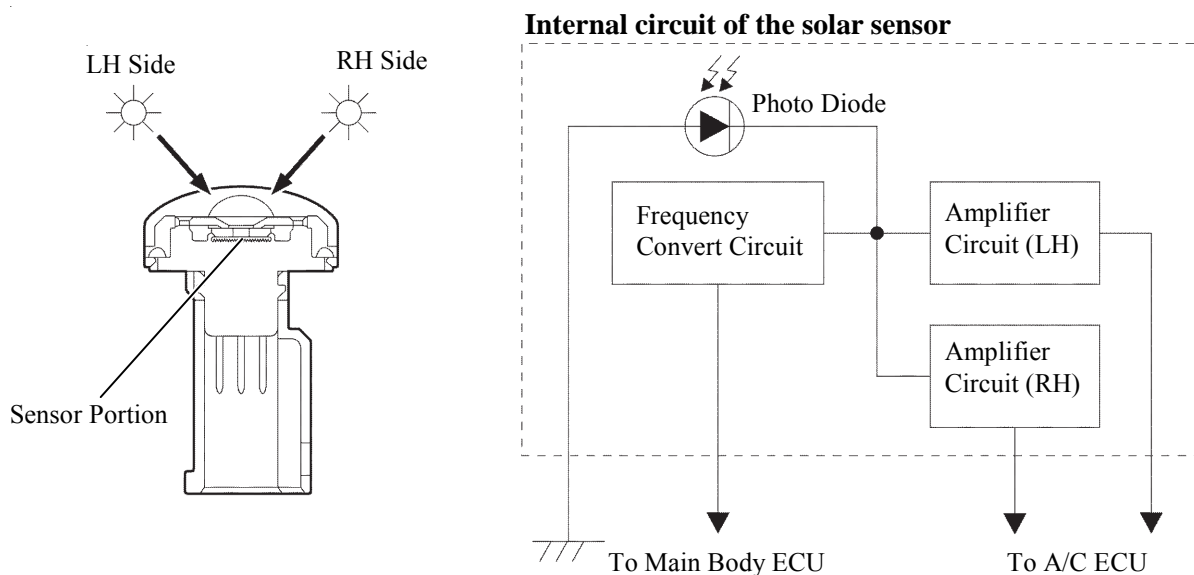
The A/C pressure sensor detects the refrigerant pressure and outputs it to the A/C ECU in the form of voltage changes.

6. Room Temp. Sensor and Outside Temp. Sensor

- The room temperature sensor detects the room temperature based on changes in the resistance of its built-in thermistor and sends a signal to the A/C ECU. This sensor is used on models with automatic air conditioner.
- The outside temperature sensor detects the outside temperature based on changes in the resistance of its built-in thermistor and sends a signal to the A/C ECU.

7. Solar Sensor

- The solar sensor consists of a photo diode, two amplifier circuits for the solar sensor, and a frequency converter circuit for the light control sensor. This sensor is used on models with automatic air conditioner.
- A solar sensor detects (in the form of changes in the current that flows through the built-in photo diode) the changes in the amount of sunlight from the LH and RH sides (2 directions) and outputs these sunlight strength signals to the A/C ECU.



0140BE235C

SYSTEM CONTROL

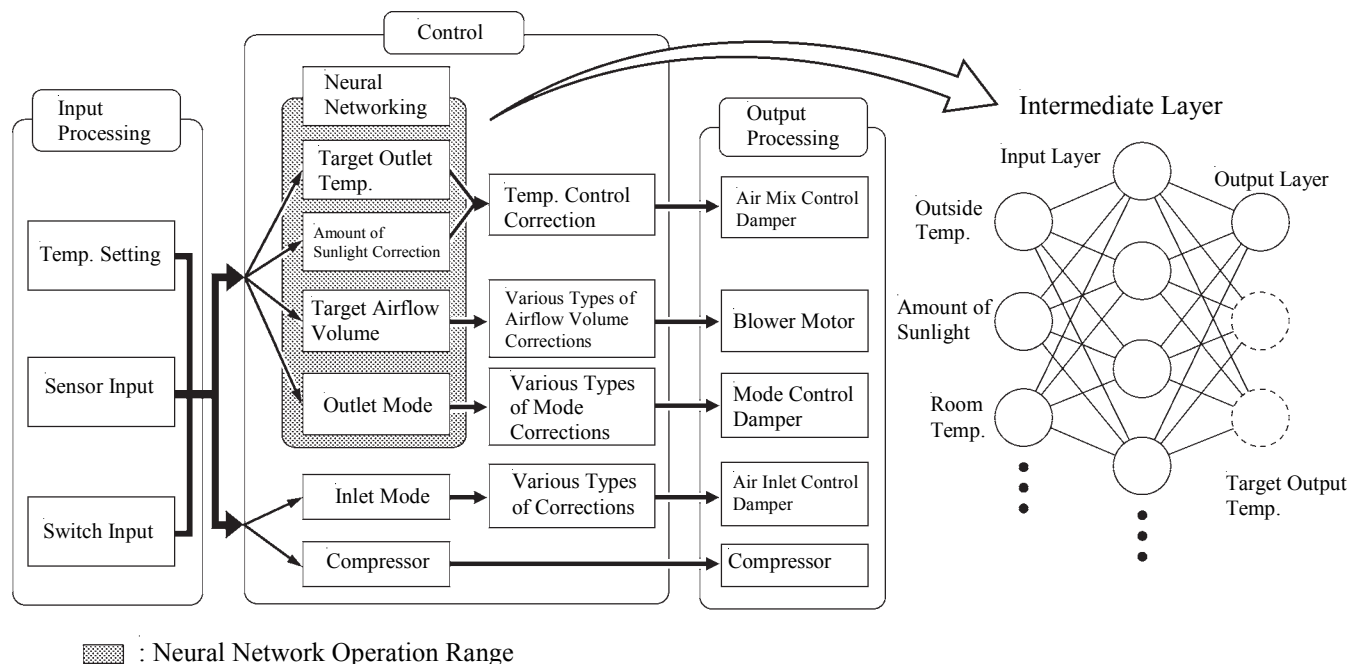
1. General

The air conditioner system has the following controls.

Control	Outline	Automatic A/C	Manual A/C
Neural Network Control [See page BE-53]	This control is capable of effecting complex control by artificially simulating the information processing method of the nervous system of living organisms in order to establish a complex input/output relationship that is similar to a human brain.	○	—
Manual Control	The A/C ECU controls the damper positions (air inlet control damper, air mix control damper and mode control damper) and blower speed in accordance with the positions of the switches (temperature control switch, blower switch, mode select switch and air inlet control switch).	—	○
Outlet Air Temp. Control	Based on the temperature set at the temperature control switch, the neural network control calculates the outlet air temperature based on the input signals from various sensors.	○	—
	The temperature settings for the driver and front passenger are controlled independently in order to provide separate vehicle interior temperatures for the right and left sides of the cabin. Thus, an air conditioner that accommodates the occupants' preferences has been realised.	○	—
Blower Control	Controls the blower motor in accordance with the airflow volume that has been calculated by the neural network control based on the input signals from various sensors.	○	—
Air Outlet Control	Automatically switches the air outlets in accordance with the outlet mode that has been calculated by the neural network control based on the input signals from various sensors.	○	—
	In accordance with the engine coolant temperature, outside air temperature, amount of sunlight, required blower, outlet temperature, and vehicle speed conditions, this control automatically switches the blower outlet to FOOT / DEF mode to prevent the windows from becoming fogged when the outside air temperature is low.	○	—
Air Inlet Control	Automatically controls the air inlet control damper to achieve the calculated required outlet air temperature.	○	—
Compressor Control	Through the calculation of the target evaporator temperature based on various sensor signals, the A/C ECU optimally controls the discharge capacity by regulating the opening extent of the A/C compressor solenoid valve.	○	○
Rear Window Defogger Control [See page BE-106]	Switches the rear defogger and outside rear view mirror heaters on for 15 minutes to 60 minutes when the rear defogger button is pressed. Switches them off if the button is pressed again while they are operating.	○	○
Outside Temperature Indication Control	Calculates the outside temperature using signals transmitted by the outside temperature sensor. Calculated values are corrected by the A/C ECU and then indicated on the multi-information display.	○	○
Self-Diagnosis [See page BE-53]	A DTC (Diagnostic Trouble Code) is stored in the memory when the A/C ECU detects a problem with the air conditioner system.	○	○

2. Neural Network Control

- In previous automatic air conditioner systems, the A/C ECU determined the required outlet air temperature and blower air volume in accordance with the calculation formula that has been obtained based on information received from the sensors. However, because the senses of a person are rather complex, a given temperature is sensed differently, depending on the environment in which the person is situated. For example, a given amount of solar radiation can feel comfortably warm in a cold climate, or extremely uncomfortable in a hot climate. Therefore, as a technique for effecting a higher level of control, a neural network is used in the automatic air conditioner system. With this technique, the data that has been collected under varying environmental conditions is stored in the A/C ECU. The A/C ECU can then effect control to provide enhanced air conditioner comfort.
- The neural network control consists of neurons in an input layer, intermediate layer, and output layer. The input layer neurons process the input data of the outside temperature, the amount of sunlight, and the room temperature based on the outputs of the switches and sensors, and output them to the intermediate layer neurons. Based on this data, the intermediate layer neurons adjust the strength of the links among the neurons. The sum of these is then calculated by the output layer neurons in the form of the required outlet temperature, solar correction, target airflow volume, and outlet mode control volume. Accordingly, the A/C ECU controls the servo motors and blower motor in accordance with the control volumes that have been calculated by the neural network control.



3. Self-Diagnosis

- The A/C ECU has a self-diagnosis function. It stores any operation failures in the air conditioner system memory in the form of DTC (Diagnostic Trouble Code).
- There are two methods for reading DTC. One is to use an intelligent tester II, and the other is to read DTC indicated on the heater control panel display (Only for models with automatic air conditioner).
- For details, see the Camry Repair Manual.

NAVIGATION WITH AV SYSTEM



DESCRIPTION

- The navigation with AV system is used for the new Camry. The settings vary in accordance with the destinations and grade. For details, see the equipment list in Model Outline (see page MO-24).
- The design of the screen has been improved in the navigation with AV system in order to improve its visibility. Furthermore, new functions have been added for improved convenience.
- A hands-free function for Bluetooth-compatible mobile phones is used. (see Bluetooth Hands-Free System section on page BE-61).
- The major specifications of the navigation with AV system are shown in the table below:

▸ Specifications ◀

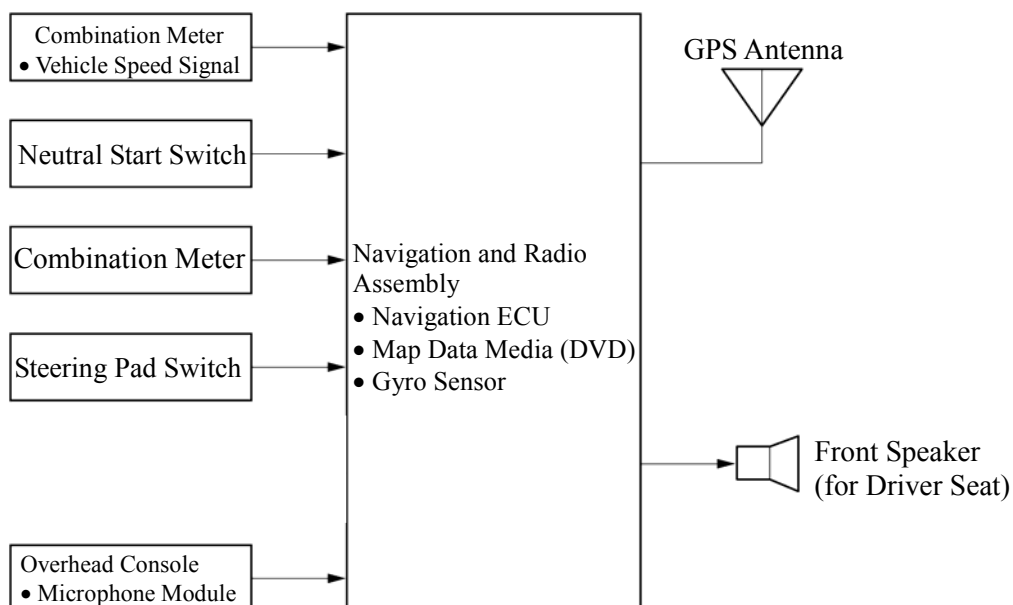
Display	7.0-inch wide LCD	
	Pressure Sensitive Touch Panel	
	Manufactured by Fujitsu Ten	
Navigation System	GPS	
Languages Supported	Voice Guidance	English
Map Data Media	DVD	
Bluetooth Hands-Free System (see page BE-61)		
Navigation ECU	Manufactured by Fujitsu Ten	
	Gyro Sensor	Piezoelectric Ceramic Piece



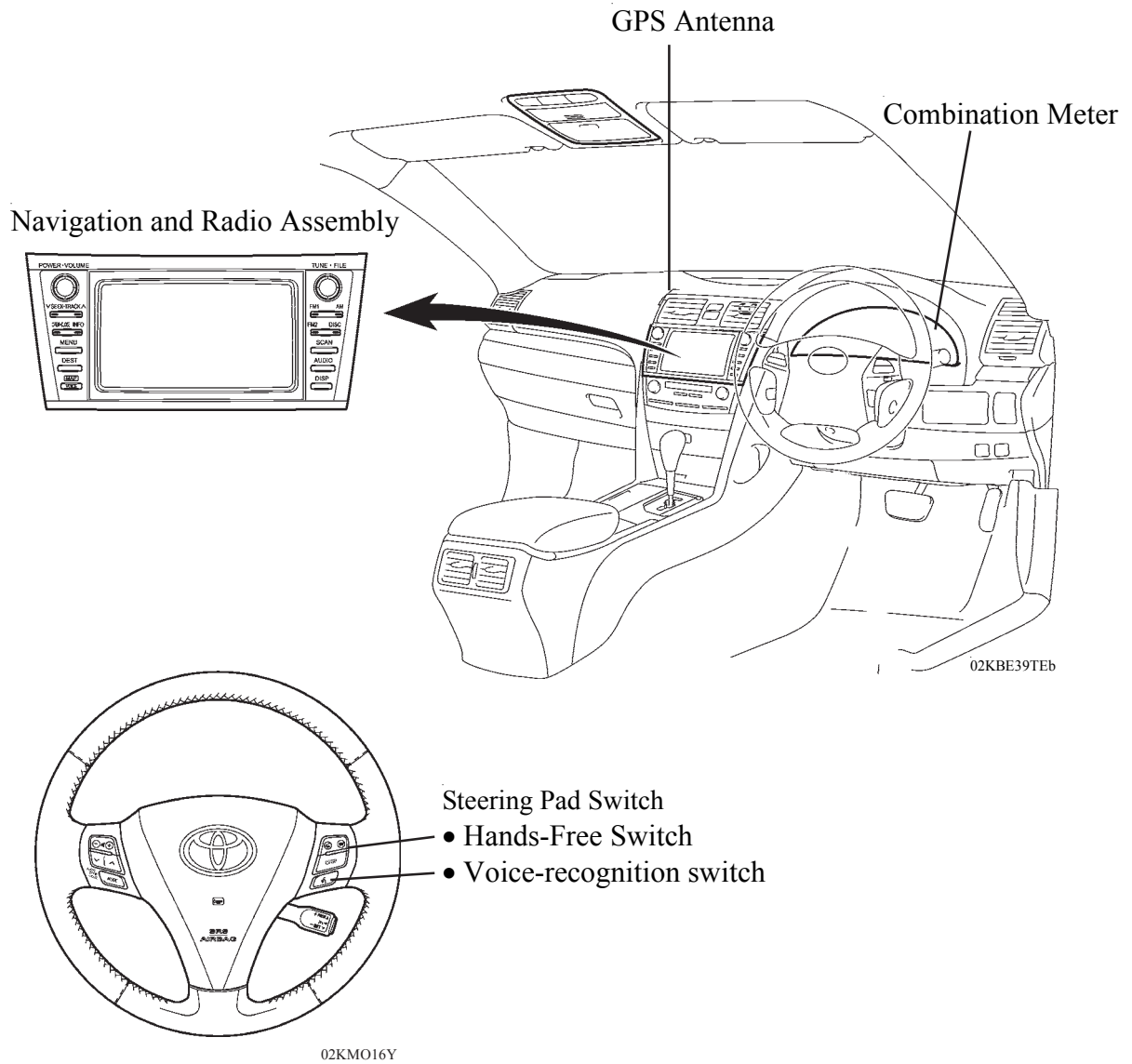
001S150Y

Bluetooth is a trademark owned by Bluetooth SIG, Inc.

▸ System Diagram ◀



☀ LAYOUT OF MAIN COMPONENTS



CONSTRUCTION AND OPERATION

1. General

The main functions of the navigation system are listed below:

Function	Outline
Navigation Screen Display	<ul style="list-style-type: none"> • Enlargement / reduction, rotation and movement of map. • Indication of current position and direction of travel. • Correction of current position. • Setting change and indication of route. • Voice guidance.
Audio/ Video System	Displays the following three operations: <ul style="list-style-type: none"> • Radio Operation • CD Changer Operation (Only for Australian model)
Telephone Operation Screen Display	When a Bluetooth-compatible mobile telephone is registered on the navigation and radio assembly, the driver can make and receive calls or talk hands-free on the mobile telephone by operating the switches on the screen or the steering pad.
Maintenance Information	Can be used to inform the driver of inspection or replacement timing of the following items based on the calendar function and vehicle speed signal. <p>Engine Oil: Replace engine oil</p> <p>Oil Filter: Replace engine oil filter</p> <p>Rotation: Rotate tires</p> <p>Tyres: Replace tyres</p> <p>Battery: Replace battery</p> <p>Brake Pad: Replace brake linings</p> <p>Wipers: Replace wiper blades</p> <p>LLC: Replace engine coolant</p> <p>Brake Oil: Replace brake fluid</p> <p>ATF: Replace ATF</p> <p>Service: Scheduled maintenance</p> <p>Air Filter: Replace air filter</p> <p>Personal: New information items can be created separately from provided ones</p>
Calendar with Memo	It is possible to enter memos for particular dates on the calendar.
Speech Command System	Operates the navigation system based on voice commands.
Help Screen	The help screen can show the command list and operation guide.
Screen Adjustment	The brightness or contrast of the screen can be adjusted to suit the brightness of surroundings.
Screen Setting	The following screen settings are available: <p>Automatic transition: Enables automatic return to the navigation screen from the audio screen.</p> <p>Switch colour: Colour of touch-screen button can be selected.</p>

Function	Outline
Delete Personal Data	<p>The following personal data can be deleted or returned to their default settings:</p> <ul style="list-style-type: none">• Maintenance conditions• Maintenance information “off” setting• Memory points• Areas to avoid• Previous points• Route trace• User selection settings• Phone book data• Dialed numbers and received calls• Speed dial• Bluetooth phone data• Security code
Beep Setting	Beep sound off
Select Language	<p>The language of the touch-screen buttons, pop-up messages and the voice guidance can be changed.</p> <ul style="list-style-type: none">• Except Chinese models: English• Only for Chinese models: Chinese
Diagnosis Screen Display	<ul style="list-style-type: none">• Service Check Menu• Display Check• Navigation Check• Bluetooth TEL Check

2. Navigation Screen Display

- Based on the map data on the DVD, signals from GPS satellites, signals from the built-in gyro sensor, and signals from the vehicle's speed sensor, the vehicle's present position, direction of travel, and driven distance are calculated and displayed on the navigation display.
- The functions of the navigation screen display are shown below:

Item		Function
Map Display	Linear Touch Scroll	Enables smooth scrolling by connecting the touch points on the screen.
	On-route Scroll	Scrolls the centre of the cursor forward and backward along the route.
	Heading Up	Displays the map so that the direction of the route progression heads up the screen during route guidance.
	Map Colour Change	Depending on the position of the headlight switch, the screen changes to day mode or night mode.
	Front Wide	Displays a map in the direction of travel of the vehicle in an enlarged form. (Heading up only)
	Step-less Scale Display	Changes the scale of the map from the basic 13 steps to an even finer display.
	Direct Scale Change	Directly selects and displays the map scale.
	Multi-step Scale Display	Changes and displays the map scale in 13 stages.
	Split-view Display	Displays different modes on a screen that is split into two views.
	Points-of-Interest Display	Displays selected types of marks on the map.
	Taillight-interlocked Map Colour Change	Changes the display colour of the map screen when the taillights are turned ON.
	Road Number Sign Board Display	Displays the road number on the map.
	Compass Mode Screen	Displays the direction of travel and detailed data of the present location.
	Map Coverage Info Screen	Displays the map area that is recorded on the DVD.
	Street Name Indication on Scrolled Map	Displays the street name and the city name even when the map screen is being scrolled.
	Building Tenant Information (for foot print map areas)	Displays information on the tenants in the building.
	Arrival Time	Displays the expected time of arrival at the destination.
	Route Trace	Displays the route on the map.

(Continued)

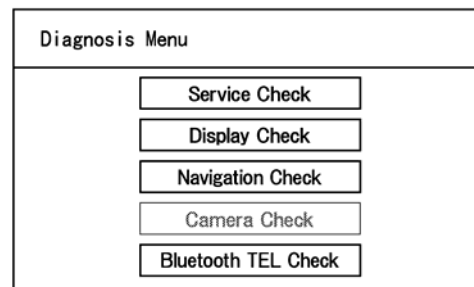
	Item	Function
Destination Search	Last Destination Memory	Stores 20 locations of coordinates, names and times that have been set as destinations in the past.
	Hybrid Points-of-interest Search	Narrows the search by names of the points-of-interest, category, and areas.
	Points-of-interest Pinpoint Display	Pinpoints and displays the positions of points-of-interest.
	House Number Search	Searches for a house number.
	Special Memory Point	Sets a pre-registered point as a destination point while driving.
	Nearest Point-of-interest Search List Display	Searches nearest points-of-interest and displays a list.
	Intersection Search	By specifying two streets, the point at which they intersect is set as the destination point.
	Emergency Search	Performs a specific search for hospitals, police stations and car dealers.
	Motorway Entrance / Exit Search	Searches for the destination by the name of the street that connects to a Motorway entrance/exit.
	Coordinate search	User can input destination by its coordinates.
	Telephone number search	Searches a facility by its telephone number.
	POI, brand icon indication	Displays icons for points of interest.
	Voice-recognition Address Search	The driver can set the destination by saying the city name or street name.
Route Search	Multiple Destination Setting	Sets multiple destinations. It can also rearrange the sequence of the destinations.
	Route Search	Searches for multiple routes.
	Search Condition Designation	Searches for the recommended, shortest, and other routes.
	Regulated Road Consideration	Performs search while considering regulated roads.
	Avoidance Area	Avoids a designated area when searching for a route.
	Motorway mode screen	Displays information on facilities in the vicinity of the Motorway exits and entrances.
Guidance	Destination Direction Arrow Display	Uses arrows along the road to display the direction of the destination during route guidance.
	Off-Route Arrow Display	Uses arrows to display the direction of the destination during off-route driving.
	Rotary Guidance	Guidance that renders the entry and exit into a rotary as a single branching point.
	Right or Left Turn Guidance	Voice guidance to instruct the direction of travel to be taken.
	Motorway Direction of Travel Guidance	Voice guidance to instruct the direction of travel to take on the Motorway.
	Distance Display Destination	Displays the distance from the present location to the destination.
	Motorway Branch Type Specimen Guidance	Type specimen for guidance to a Motorway branch.
	Intersection Zoom-in Display	Zoom-in display when approaching an intersection.
	Turn List Display	Displays a turn list on the right side of the two-screen display.
	Calendar	Anniversary or appointment dates can be input and displayed.
	Function Help	Explains the functions of the switches on the main screens, such as the destination and menu.

3. Diagnosis Screen Display

The navigation system is equipped with a self-diagnosis function and can display the diagnosis menus shown on the right.

The diagnosis menu contains the following four items.

- a) Service Check Menu
- b) Display Check
- c) Navigation Check
- d) Bluetooth TEL Check

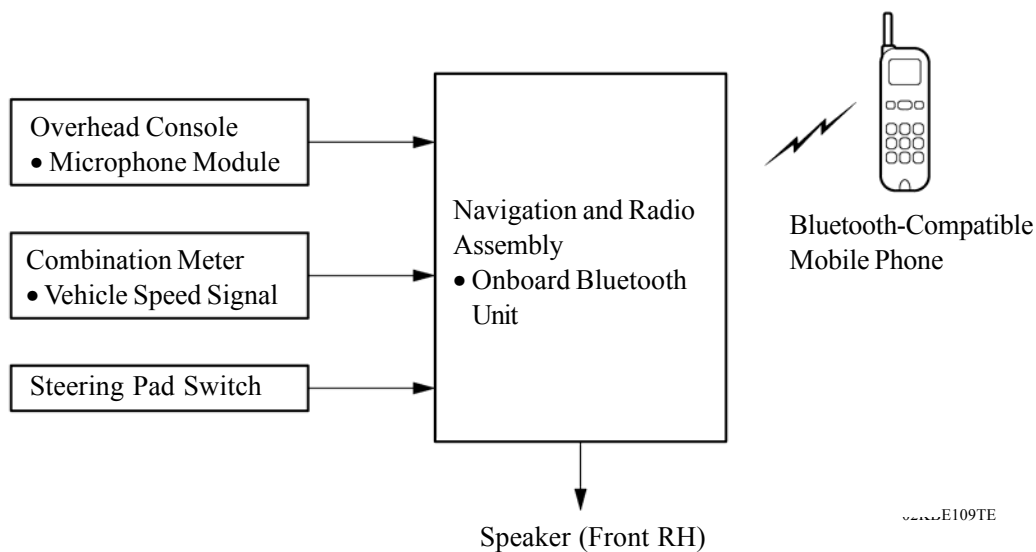


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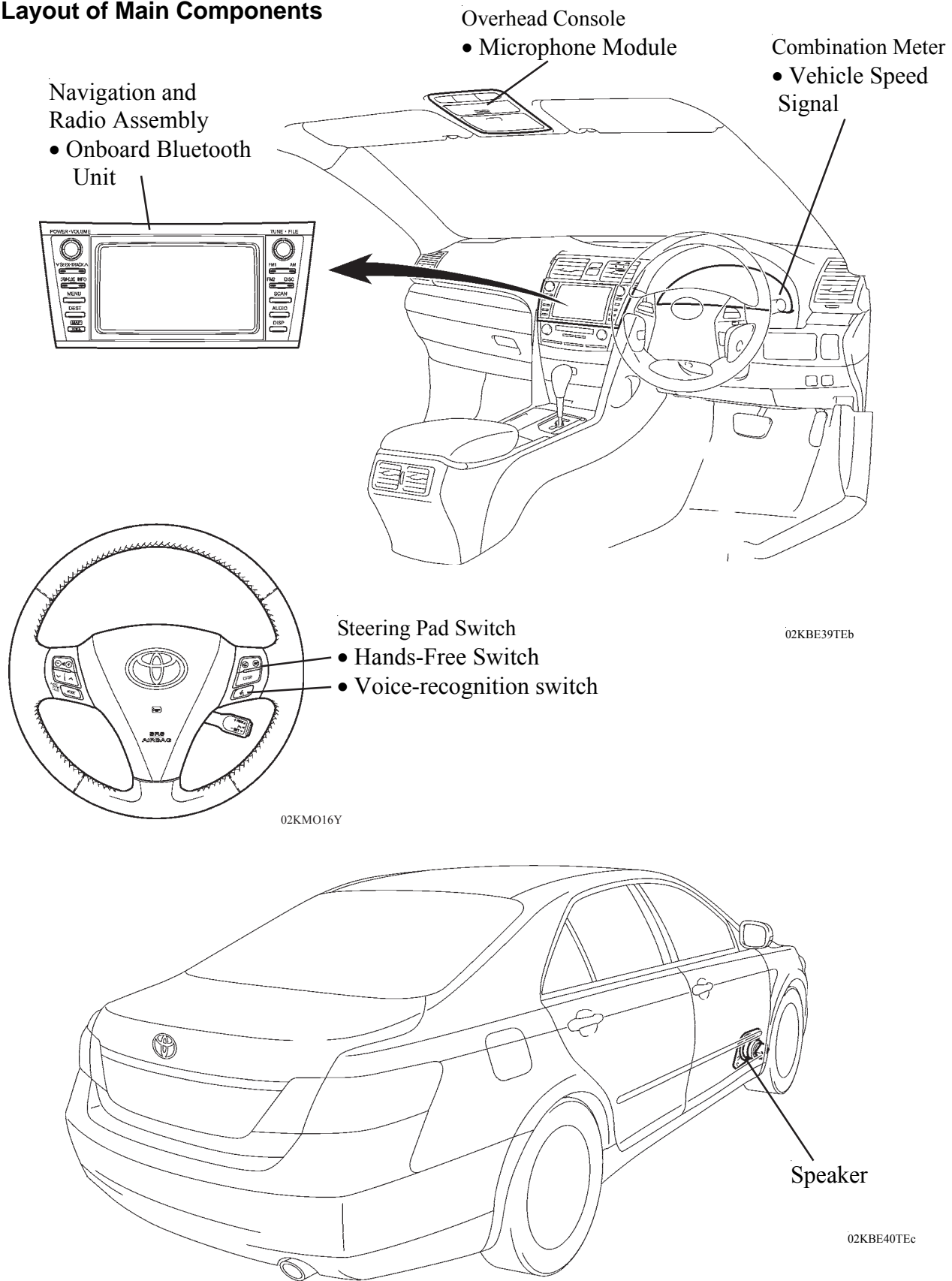
For details on the procedure required to enter the diagnosis menu screen, see the Camry Repair Manual.

HANDS-FREE SYSTEM**✱ BLUETOOTH HANDS-FREE SYSTEM****1. General**

- A Bluetooth hands-free system has been provided for the new Camry. The settings vary in accordance with the destinations and engine types. For details, see the equipment list in Model Outline (see page MO-24).
- Bluetooth is a short-distance, high-speed wireless data communication system that uses the 2.4GHz frequency band prescribed by the Bluetooth SIG (Special Interest Group).
- This system enables drivers to place or receive phone calls using a mobile phone without releasing their hands from the steering wheel.
- The Bluetooth hands-free system can be operated by touching icons indicated on the navigation and radio assembly and radio assembly.

2. System Diagram

3. Layout of Main Components



4. Hands-Free Functions

The Bluetooth hands-free system has the following functions. However, for safety, some functions may not be selectable when the vehicle is being driven.

Function		Outline
Call with Bluetooth phone	By dial	The user can call by inputting a telephone number.
	By phonebook	The user can call by using the phonebook data that have been transferred from the user’s Mobile phone. The user can register up to 1000 numbers in the phonebook.
	By dialled numbers	The user can call by selecting a previously dialled number. The system remembers up to five dialled numbers. If more than five numbers have been dialled, the oldest number will no longer be remembered.
	By received calls	The user can call by selecting the telephone number of a received call. When a call is received, the system will remember the last five numbers. If more than five calls have been received, the oldest number will no longer be remembered.
	By speed dial*	The user can call by using registered telephone numbers that the user selects from the phonebook, dialled numbers or received calls.
	By voice recognition (Dialling by name)	The user can call by giving a name registered in the phonebook.
	By voice recognition (Dialling by phone number)	The user can call by giving a desired number.
	By POI (Point of Interest) call	The user can call by operating a switch when “Call” is displayed on the screen of the navigation system.
Receive call with Bluetooth phone		When a call is received, the receive screen is displayed with a sound.
Talk on the Bluetooth phone		While user is talking on the phone, the talking screen is displayed.
Change the settings of the Bluetooth phone	Registering the speed dial	The user can register the desired telephone number from the phonebook, dialled numbers or received calls. Up to 17 speed-dial numbers can be registered.
	Setting the volume	The user can set the volume.
		Automatic volume settings for high speed: When the vehicle speed is over 80 km/h (50 mph), the volume automatically increases by 3 dB from the volume set by the user. When the vehicle speed decreases to 70 km/h (44 mph) or lower, the volume returns to the previous volume setting.
		Initialising the settings: The user can initialise the settings.
	Setting the screen	Receiving call display: The user can select the receiving call display.
		Auto answer: When a call is received, the display automatically changes to the talking screen and user can start to talk on the phone (without touching any switch) after a preset time.
		The Bluetooth connection status at start up: When the user turns the power source to ACC or IG-ON and the Bluetooth is automatically connected, the connection check is displayed.
		Initialising the settings: The user can initialise the settings.

*: The user can operate it while driving.

(Continued)

Function		Outline
Change the setting of the Bluetooth phone	Setting the phonebook	Registering phone number: The user can register phone numbers in the phonebook.
		Transferring a telephone number: The user can transfer the telephone numbers from the user's Bluetooth phone to the system. Up to 1,000 pieces of data (up to 2 numbers per entry) can be registered in the phonebook.
		Registering the phonebook data: The user can register the phonebook data.
		Editing the name: If no name has been inputted, the number is displayed.
		Editing the phone number: The user can register a phone number in "TEL1" and "TEL2" separately. Up to 2 numbers per phonebook entry can be registered.
		Selecting the group: The user can set a group for a contact. It will then be easier for the user to find this contact when needed, by using the grouping display.
		Setting the voice recognition: The user can set the voice recognition. Up to 20 numbers can be registered to allow voice recognition.
		Adding data to the phonebook: The user can add data to the phonebook.
		Editing the data: The user can edit the registered data.
		Deleting the data: The user can delete the data.
		Deleting all the phone data: The user can delete all the phone data.
		Registering group names: The user can register 20 groups
		Selecting group icons: The user can select the desired icon.
		Editing a group name: The user can input the name with the software keyboard.
		Deleting a group name: The user can delete the group names individually or all at once.
		Deleting the log data: The user can delete the log data individually or all at once.
Change the settings of the Bluetooth phone	Setting the security	By setting the security, the user can prevent people from using some functions of the hands-free system. It is useful when the user leaves the car with a hotel or valet parking or the user doesn't want others to see the data that the user has registered.
		Changing the security code: The security code is 4 digits and the default is "0000". Choose a new code that is hard for other people to guess.
		Phone book lock: The user sets the phonebook lock.
		Initialising the security code: The user can initialise the settings.

(Continued)

Function		Outline
Set a Bluetooth phone	Enter the Bluetooth phone	In order to use the hands-free function of a Bluetooth phone, it is necessary to register it in the audio head unit. Once a phone is registered, the hands-free function becomes available automatically. The user can register up to 6 Bluetooth phones.
	Select the Bluetooth phone	When two or more registered Bluetooth phones are in the cabin, it is necessary to select which phone to use to prevent the lines from being crossed. Only the selected phone is available for use as a hands-free phone. The phone registered last is automatically selected.
	Indicate and change Bluetooth information	The user can set, change and initialize the information of the Bluetooth phone displayed on the screen.
	Deleting a Bluetooth phone	A registered Bluetooth phone can be unregistered from the multi display.
	Displaying the information of the Bluetooth phone user delete	The user can display the information about a Bluetooth phone before deleting it and can ensure that the correct telephone will be deleted.

POWER WINDOW SYSTEM



DESCRIPTION

- The power window motor with built-in ECU on the driver side door has the one-touch auto up-and-down and jam protection functions only for the driver side door.
- The power window motor without built-in ECU for all doors has the one-touch auto down functions only for the driver side door.
- The power window system has the following functions:

Function	Outline
Manual up-and-down (All Doors)	This function causes the driver door window to open or close while the power window switch is being pulled halfway up or pushed halfway down. Windows other than the driver door window can be opened or closed by fully pulling up or fully pushing down the switch. The window stops as soon as the switch is released.
One-touch auto up-and-down (Driver Door)	The one-touch auto up-and-down function enables the window to be fully opened or closed with a single touch of the power window switch.
Jam Protection (Driver Door)	A jam protection function automatically stops the power window and moves it downward if a foreign object gets jammed in the window during one-touch auto-up operation.
Remote Control (All Doors)	The power window master switch can control the up-and-down operations of the windows.
Window Lock	Power window operation of the 3 passenger windows is disabled when the window lock switch is pressed.
Key Off Operation	This function makes it possible to operate the power windows for approximately 43 seconds after the power source is turned to OFF, if the driver door or the front passenger door is not opened.
Diagnosis	When the power window ECU detects the following conditions, the self-diagnosis function switches the ECU to failsafe mode. The illumination (LED) of either the power window master switch or the power window switches flashes to inform the user. <ul style="list-style-type: none"> • An abnormality in the Hall IC that detects the position, speed and direction of the window. • An error in the window detection position and the upper limit position recorded in the power window ECU.
Fail-Safe	If the Hall IC in the power window ECU malfunctions, some power window functions will be prohibited by the failsafe mode: <ul style="list-style-type: none"> • Power windows can be operated using the power window switches within 40 seconds of failsafe mode being entered. • Each power window operates when the corresponding power window switch is fully pushed down or pulled up and held in that position.

Service Tip

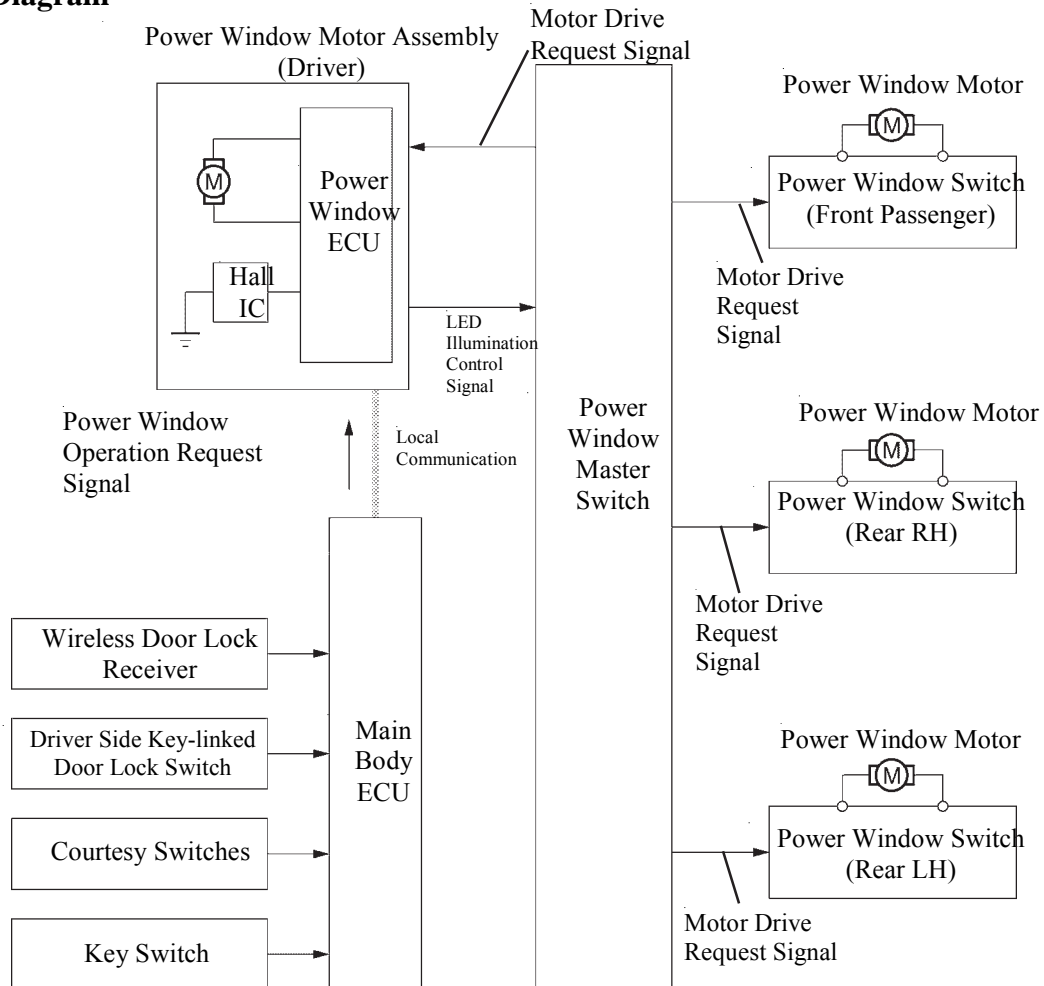
The power window motor assembly with a jam protection function stores the initial position of each door window. The memory is not cleared if battery terminals, fuses or power window motor assembly connectors are disconnected. However, after the power window motor assembly and power window regulator assembly are replaced, the stored initial position data must be cleared and the initialisation of the power window motor assembly must be performed. When necessary, perform the initialisation as follows:

Initial Position Memory Erasure Procedure

- Turn the power supply off (for example, remove a power window motor assembly connector or fuse) while the power window motor is operating.
- Check that the power window switch illumination blinks after the power source is turned on.

Initialisation procedure

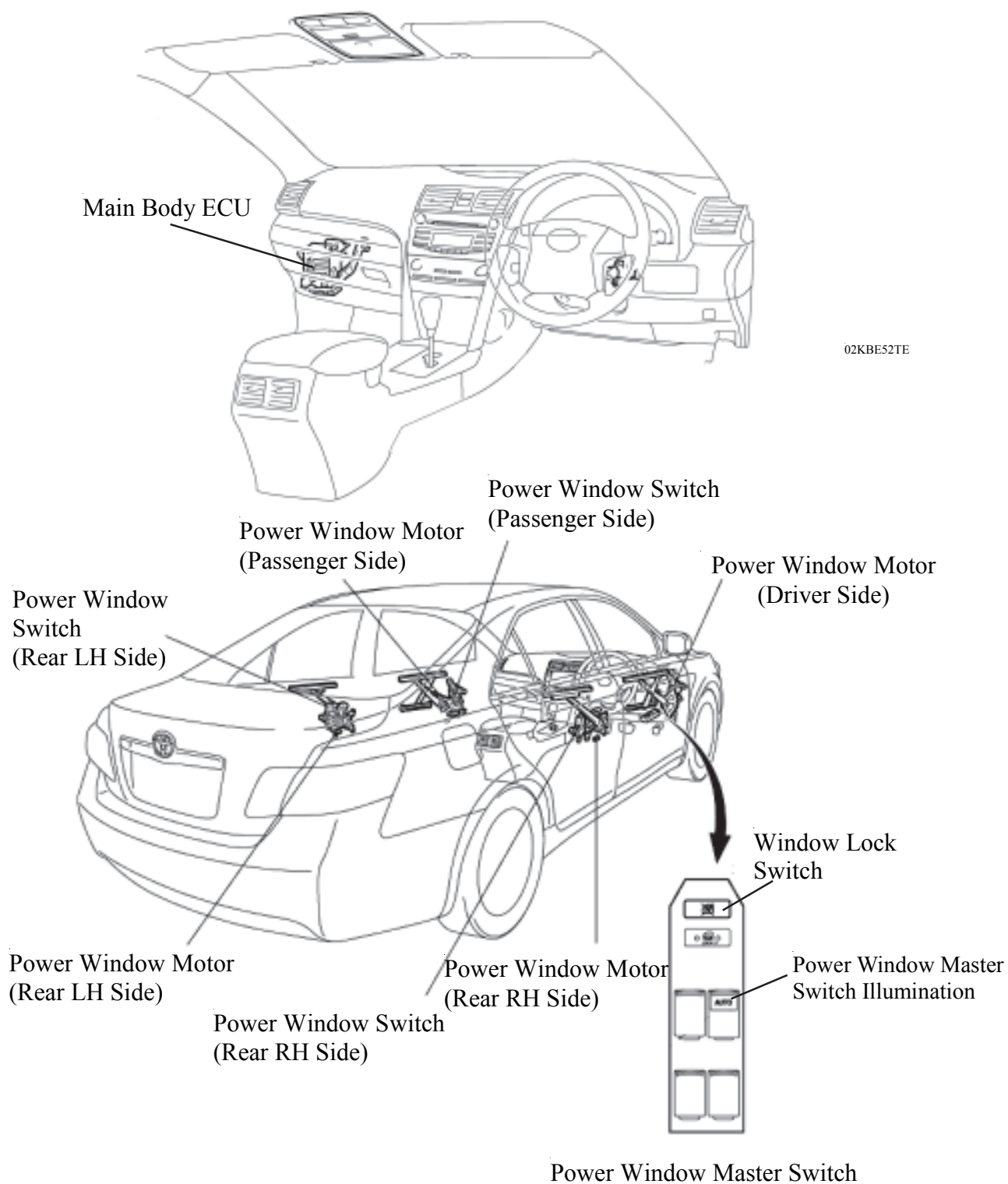
- Pull up the power window switch to the AUTO UP position and hold it until the window is fully closed.
- Hold the power window switch in the AUTO UP position for at least 1 second after the window is fully closed.
- Make sure that the window opens and closes automatically using the one touch function. For details, see the Camry Repair Manual.

System Diagram

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Driver door with jam protection function

☀ LAYOUT OF MAIN COMPONENTS

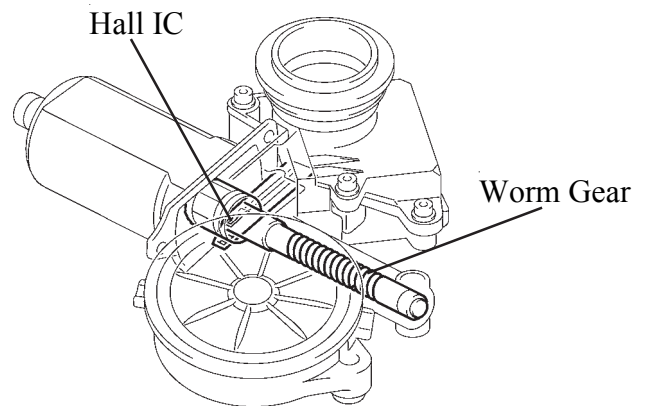


☀ JAM PROTECTION FUNCTION

- A jam protection function automatically stops the power window and moves it downward if a foreign object gets jammed in the door window during one-touch auto up operation.
- The operation of the jam protection function is described below.

Door window distance from fully closed position	Operation
200 mm or more	Down operation of 50 mm or one second.
200 mm or less	Down operation until door window operation of 200 mm is reached or five seconds.

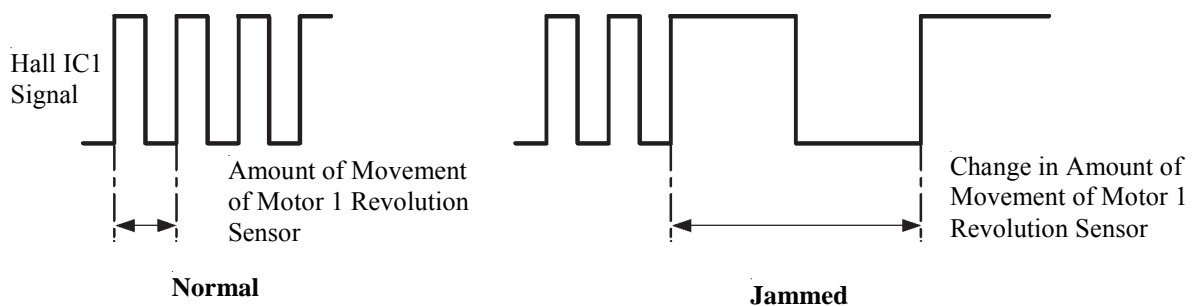
- The worm gear and Hall IC in the power window motor assembly are used to enable the power window jam protection.



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- The Hall IC converts the changes in the magnetic flux that occur through the rotation of the worm gear into pulse signals and outputs them to the power window ECU.
- To control the jam protection function, the ECU determines the amount of movement and jamming of the window glass based on the pulse signals from the Hall IC.

▶ Judgment of Movement and Jamming ◀



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DOOR LOCK CONTROL SYSTEM

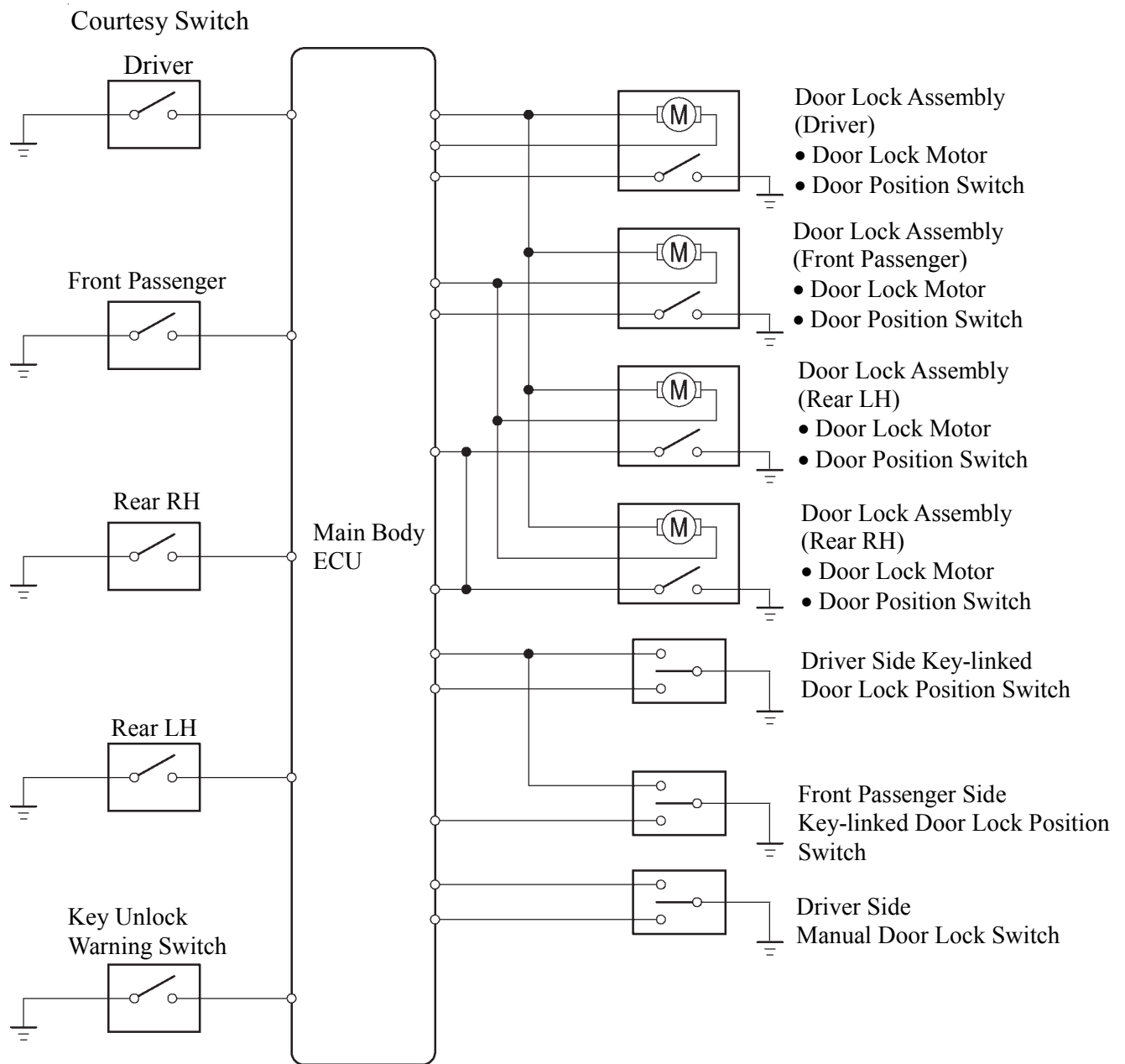


DESCRIPTION

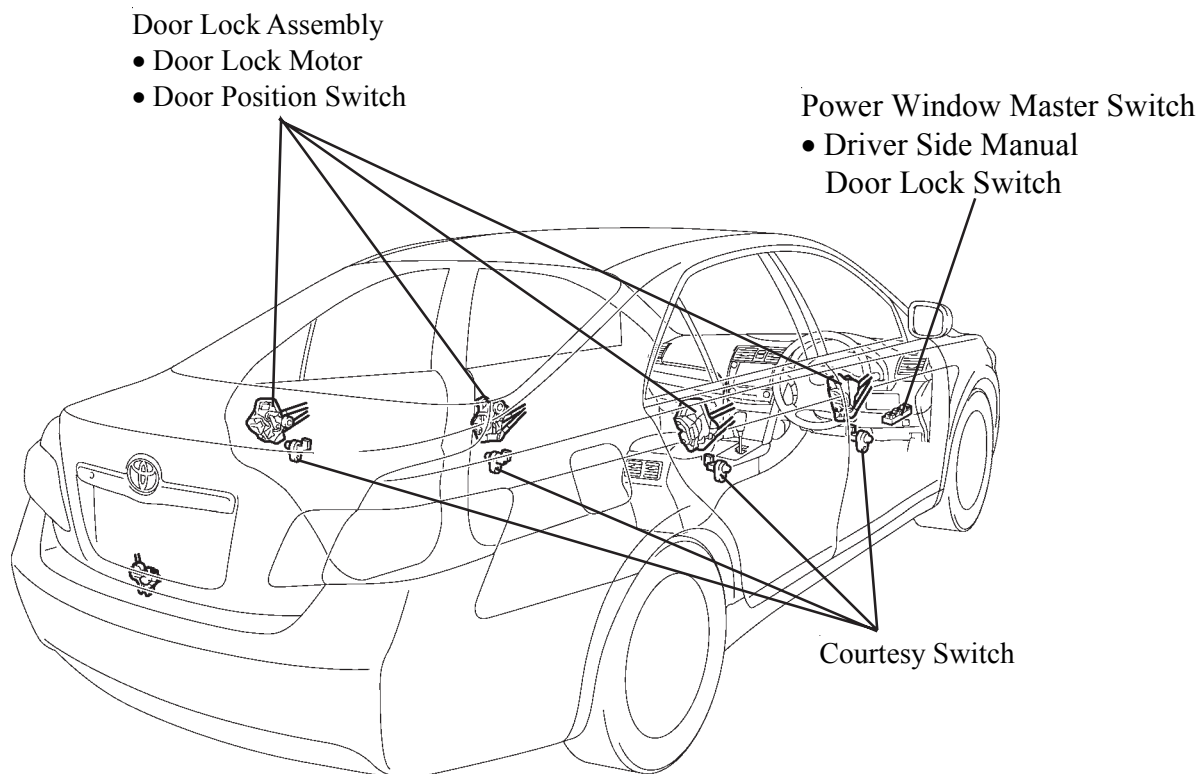
The door lock control system has the following functions:

Function	Outline
Manual unlock prohibition function	Performing the door lock operation with a transmitter (wireless remote) or a key prohibits the unlock operation by the door lock control switch (door mounted interior lock switch).
One-motion open	When the door is locked, this function enables the door to be unlocked by merely pulling the inside handle lever of the door.
Key-linked lock and unlock function	This function, which is linked with the door key cylinder, can lock or unlock all the doors when a lock or unlock operation is effected using the mechanical key.
2-step unlock function* ¹	This function is provided to unlock the driver's door by turning the key cylinder first and to unlock remaining doors by turning it a second time.
Key confine prevention function	When the key is inserted into the ignition key cylinder, if the door lock operation is performed with the driver's door open, all the doors are unlocked.

*¹: The 2-step unlock function is initially set to OFF. The setting functions can be changed using the customised body electronics system. For details, refer to Customised Body Electronics System section on page BE-11.



☀ LAYOUT OF MAIN COMPONENTS



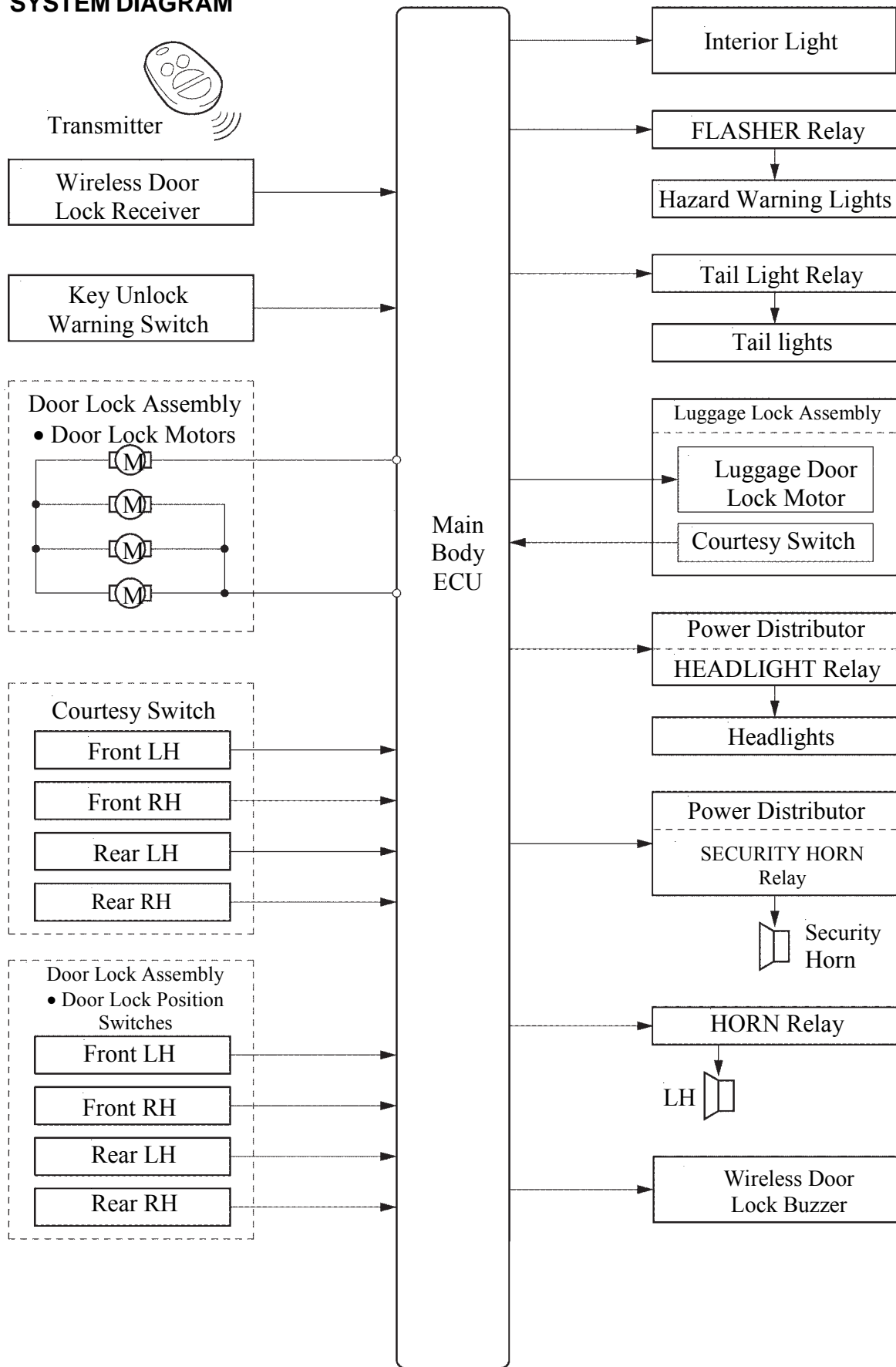
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WIRELESS DOOR LOCK REMOTE CONTROL SYSTEM

☀ DESCRIPTION

- The wireless door lock remote control system is used as standard on all grades.
- This system is controlled mainly by the main body ECU.
- This system is a convenient system for locking and unlocking all the doors from a distance. It has the following features:
 - The wireless door lock receiver performs the code identification process and sends the lock or unlock signal to the main body ECU. Then the main body ECU effects the door lock control.
 - A transmitter without a key is used, and it incorporates the following four buttons: LOCK, UNLOCK, TRUNK and PANIC.

SYSTEM DIAGRAM



☀ **LAYOUT OF MAIN COMPONENTS**

Door Lock Assembly

Luggage Lock Assembly

- Luggage Door Lock Motor
- Courtesy Switch

Power Distributor

- HEADLIGHT Relay
- SECURITY HORN Relay

Security
Horn

LOCK Button

UNLOCK
Button

TRUNK
Button

PANIC
Button

Wireless
Door Lock
Buzzer

Horn

Interior Light*²

Wireless Door Lock
Receiver (clock)

Main Body ECU

FLASHER Relay

*¹: Models without sliding roof system

*²: Models with sliding roof system

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FUNCTION

1. General

The wireless door lock remote control system has the following functions:

Function	Outline
All Doors Lock	Pressing the LOCK button of the key or transmitter locks all doors.
All Doors Unlock	Pressing the UNLOCK button of the key unlocks all doors.
All Doors Unlock (2-step Unlock)* ¹	Pressing the UNLOCK button on the transmitter once unlocks the driver's door. If the UNLOCK button is pushed again within 3 seconds, all doors unlock.
Trunk Opener* ²	Keeping the TRUNK button of the key pressed for longer than about 0.6 seconds opens the trunk lid.
Answer Back* ²	<ul style="list-style-type: none"> • The hazard lights flash once when locking and twice when unlocking, to inform that the operation has been completed. • The wireless door lock buzzer sounds once when locking, and sounds twice when unlocking, to inform that the operation has been completed.
Panic Alarm	Keeping the PANIC button of the key pressed for longer than about 1 second causes the following alarms to activate. <ul style="list-style-type: none"> • Sounds the horn, security horn. • Flashes the hazard warning lights, head lights, and tail lights. • Illuminates the interior light.
Automatic Lock* ²	If none of the doors are opened within 30 seconds of being unlocked by the wireless door lock remote control, all the doors are locked again automatically.
Repeat	If a door is not locked in response to the locking operation of the key, the main body ECU outputs a lock signal after the unlock operation.
Illuminated Entry* ²	When all the doors are locked, pressing the UNLOCK button causes the interior lights to illuminate simultaneously with the unlock operation.
Transmitter Recognition Code Registration Function	Enables the registering (writing or storing) of or 4 types of key recognition codes in the EEPROM that is contained in the integration relay.

*¹: The 2-step unlock function is initially set to OFF. The setting function can be changed using the customised body electronics system. For details, refer to Customised Body Electrical System section on page BE-11.

*²: The setting function can be changed using the customised body electronics system. For details, refer to Customised Body Electrical System section on page BE-11.

2. Transmitter Recognition Code Registration Function

The table below shows the 4 special code ID registration function modes through which up to 4 different codes can be registered. The codes are electrically registered (written to and stored) in the EEPROM. For details of the recognition code registration procedure, refer to the Camry Repair Manual.

Mode	Function
Rewrite Mode	Erases all previously registered codes and registers only the newly received codes. This mode is used whenever a key or the wireless door lock receiver is replaced.
Add Mode	Adds a newly received code while preserving any previously registered codes. This mode is used when adding a new key. If the number of codes exceeds 4, the oldest registered code is erased first.
Confirm Mode	Confirms how many codes are currently registered. When adding a new code, this mode is used to check how many codes already exist.
Prohibit Mode	To delete all the registered codes and to prohibit the wireless door lock function. This mode is used when the key is lost.

THEFT DETERRENT SYSTEM

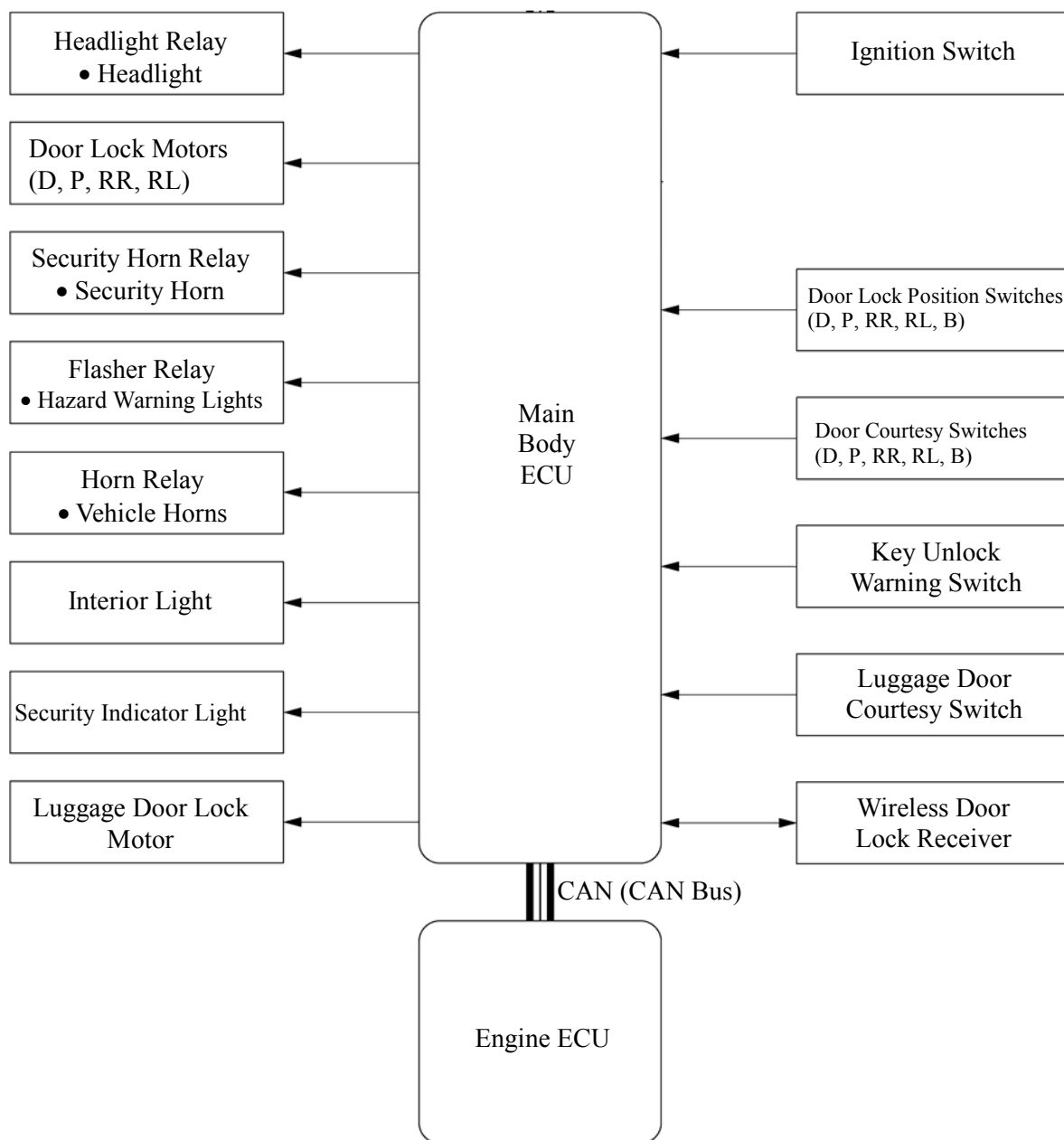
☀ DESCRIPTION

- The theft deterrent system sounds an alarm when any of the following activates are detected:
 - The vehicle being forcibly entered.
 - The engine hood or trunk lid being opened.
 - A door or trunk lid being unlocked without the key.
 - The battery terminals are removed and reconnected (with the engine hood closed).
- The system consists of door lock control system parts, wireless door lock remote control system parts, security horn, and security indicator light.
- The main body ECU controls this system on all models.
- The warning methods and timing of the system are listed below.

Warning Method	Interior Light	Illuminates
	Hazard Light	Flashing
	Head Light	Flashing
	Tail light	Flashing
	Vehicle Horn	Sound (approx. 0.4 second cycles)
	Security Horn	Sound (approx. 0.4 second cycles)
	Door Lock Motor	Locking
Warning Time		approx. 30 seconds

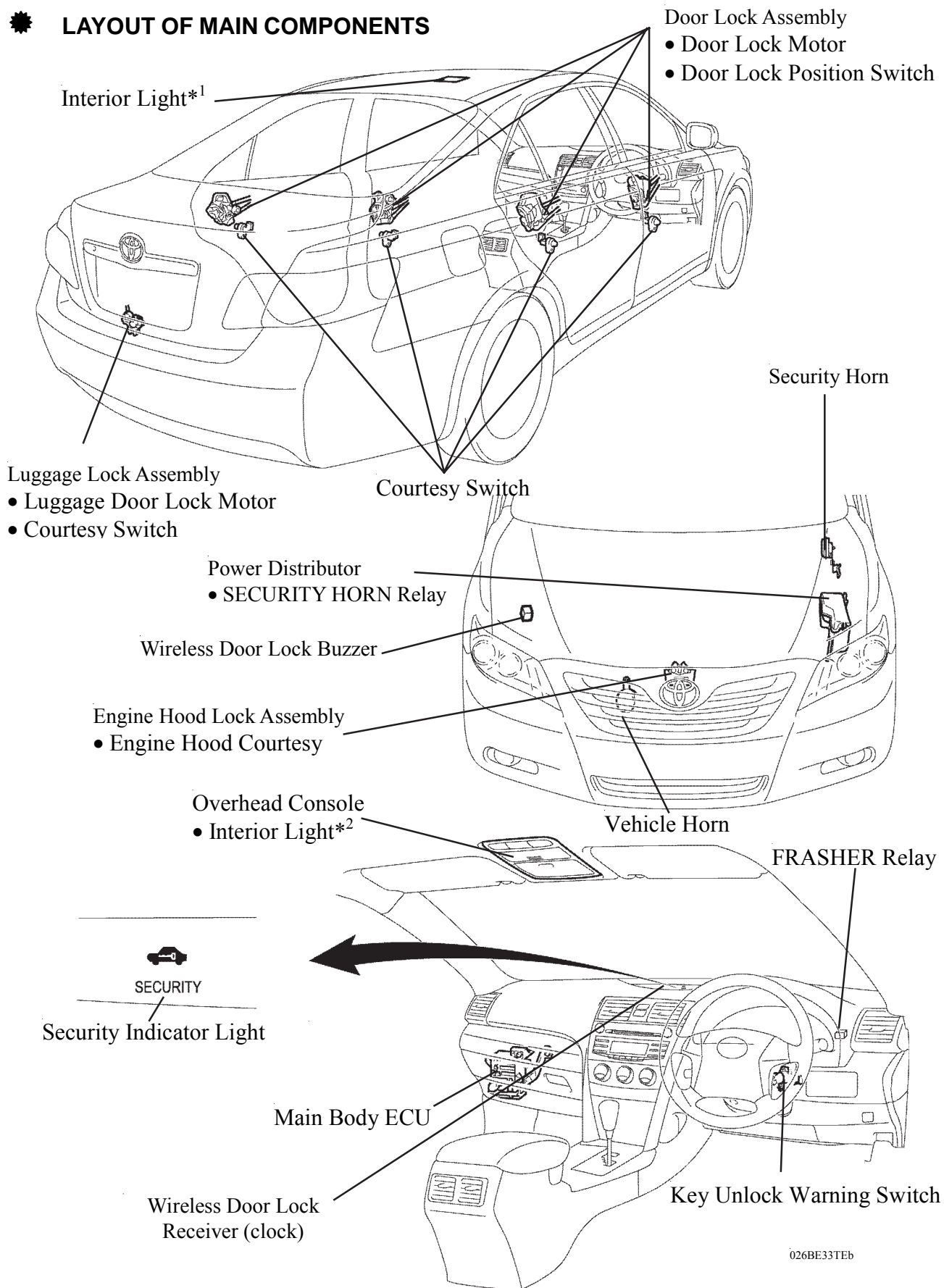


SYSTEM DIAGRAM



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LAYOUT OF MAIN COMPONENTS



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FUNCTION

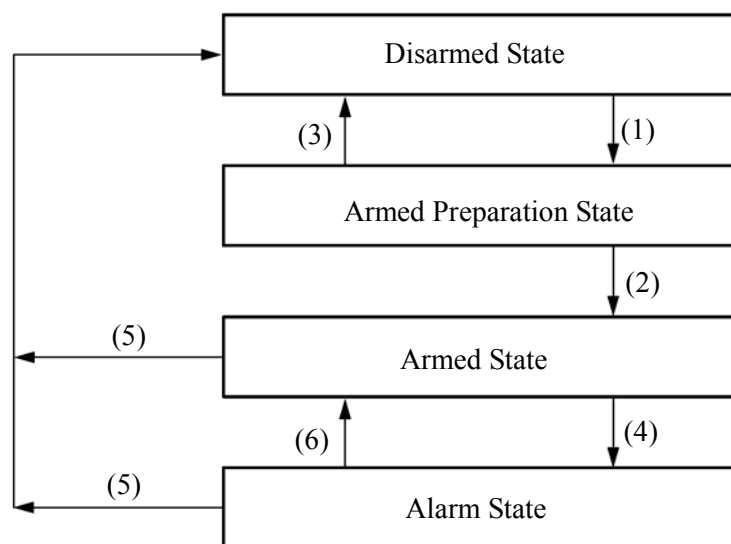
The theft deterrent system has the following function:

Function	Outline
Alarm	When the theft deterrent system enters the alarm state, the warning items (interior light, hazard warning lights, head lights, tail lights, security horn and) are operated for approximately 30 seconds.
Vehicle Horn Alarm	When the theft deterrent system enters the alarm state, the vehicle horn is operated for approximately 30 seconds.
Alarm Indicator	When the state of the theft deterrent system enters the armed preparation or alarm state, the security indicator light is illuminated to inform the user. This indicator is also the engine immobiliser indicator, and it blinks when the engine immobiliser is in an engaged state.
Forced Door Lock	<p>The main body ECU transmits a door lock signal to all the doors when all the following conditions are satisfied.</p> <ul style="list-style-type: none"> • The theft deterrent system is in the alarm state. • The key is not inserted into the ignition key cylinder. • Either front door is unlocked without using the mechanical key. <p>The function stops when one of the following conditions is met.</p> <ul style="list-style-type: none"> • All doors are locked (lock function of door lock or transmitter is operated). • The warning ends after approximately 30 seconds. • The key is inserted into the ignition key cylinder.

SYSTEM OPERATION

The states of the theft deterrent system are as follows:

State	Description	Theft detection
Disarmed State	The theft deterrent system is not set by the user.	—
Armed Preparation State	The standby state before the theft deterrent system activates when the system has already set.	—
Armed State	The theft deterrent system is being activated. (Theft can be detected.)	○
Alarm State	Theft has been detected and the warning operation activates.	○



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The theft deterrent system activates as described in the diagram below when one of items in the chart occurs in order to cause the system to enter the respective state.

Condition	Item
(1)	<ul style="list-style-type: none"> • There is no ignition key in the ignition key cylinder. • All doors, engine hood and trunk lid are closed. • All doors are locked using the transmitter lock button, or mechanical key.
(2)	<ul style="list-style-type: none"> • The system state is switched when the doors, engine hood, and trunk lid are all closed and locked, and 30 seconds have elapsed.
(3)	<p>The system state is switched when one of the following conditions is met.</p> <ul style="list-style-type: none"> • Any door, engine hood, or trunk lid is opened. • Any door is unlocked using the transmitter unlock button, or mechanical key. • The ignition key is inserted in the ignition key cylinder. • A terminal is disconnected from the battery and reconnected.

(Continued)

Condition	Item
(4) *	<p>The system state is switched when one of the following conditions is met.</p> <ul style="list-style-type: none"> • Any door or engine hood is opened. • Any door or trunk lid is unlocked using the transmitter unlock button or the smart entry and start system. • The intrusion sensor has detected an intruder. • The ignition switch is turned ON without using the ignition key. • A terminal is disconnected from the battery and reconnected. (The vehicle horn and security horn will sound and the hazard warning lights, interior lights, head lights and tail lights will flash as a warning in the alarm state.)
(5)	<p>The system state is switched when one of the following conditions is met.</p> <ul style="list-style-type: none"> • Any door is unlocked using the transmitter unlock button. • The trunk lid is opened using the transmitter trunk button. • The engine is started. (The power source is IG ON.)
(6)	The system state is switched after the alarm time elapses.

*: If detection of the apparent theft continues, the warning resumes 5 seconds after the previous warning ends and is repeated a maximum of 10 times.

ENGINE IMMOBILISER SYSTEM

DESCRIPTION

The engine immobiliser system compares the ID code that is registered in the transponder key ECU with the ID code of the transponder chip that is embedded in the ignition key. The system disables if these ID codes match. Thus, the transponder key ECU and the engine ECU communicate with each other to authorise fuel injection and ignition, enabling the engine to start.

- The system is standard equipment on all models.

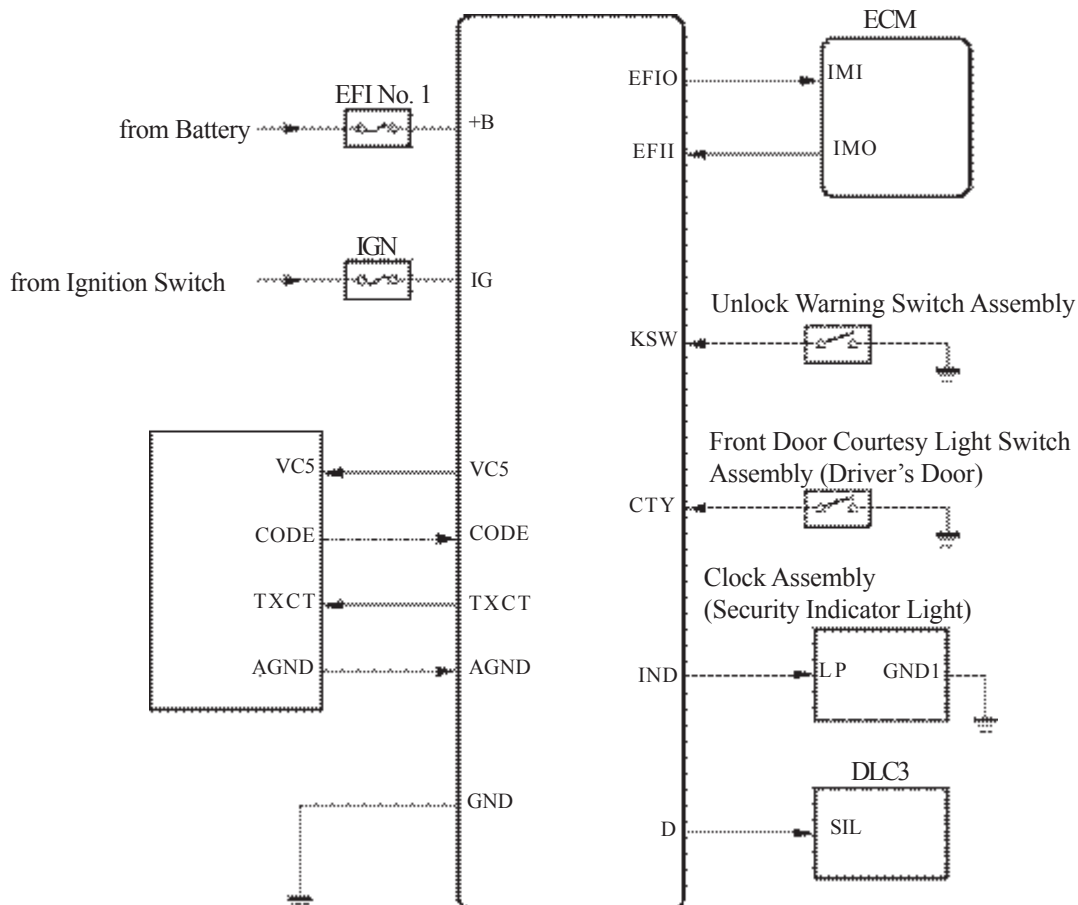
Service Tip

When replacing the transponder key ECU or making a new ignition key, and the key's recognition code must be registered.

- When the transponder key ECU has been replaced, the automatic registration mode begins. At this time, the total number of keys that can be registered is three (master key: two, sub key: one).
- The recognition code of additional keys must be registered. At this time, the total number of keys that can be registered is eight (master key: five, sub key: three).

For details, see the Camry Repair Manual.

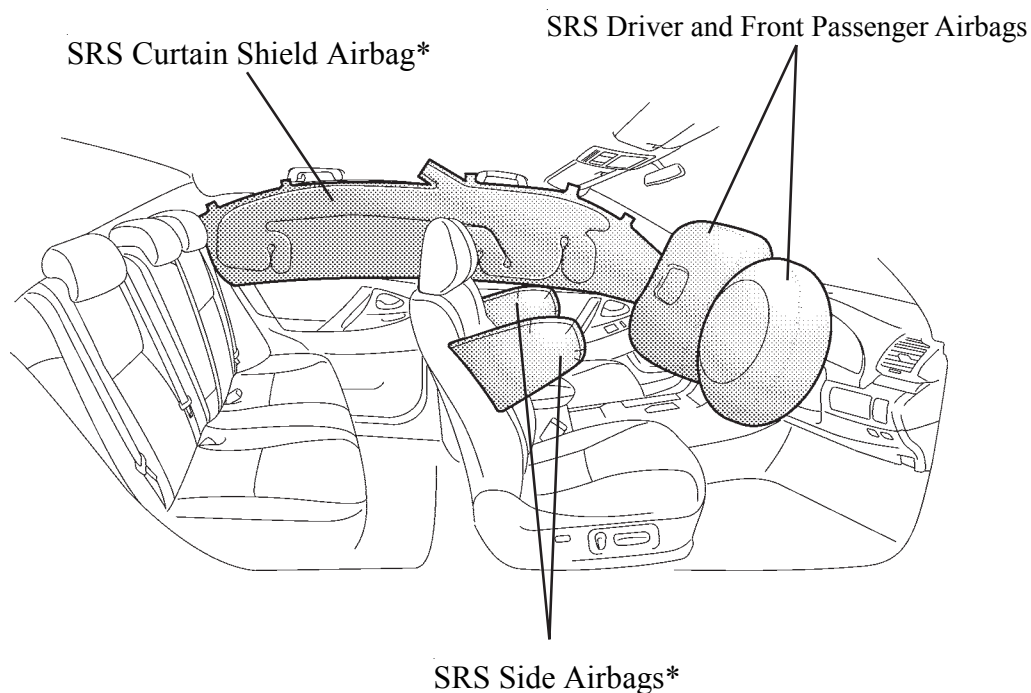
Transponder Key ECU Assembly



SRS AIRBAG SYSTEM

☀ DESCRIPTION

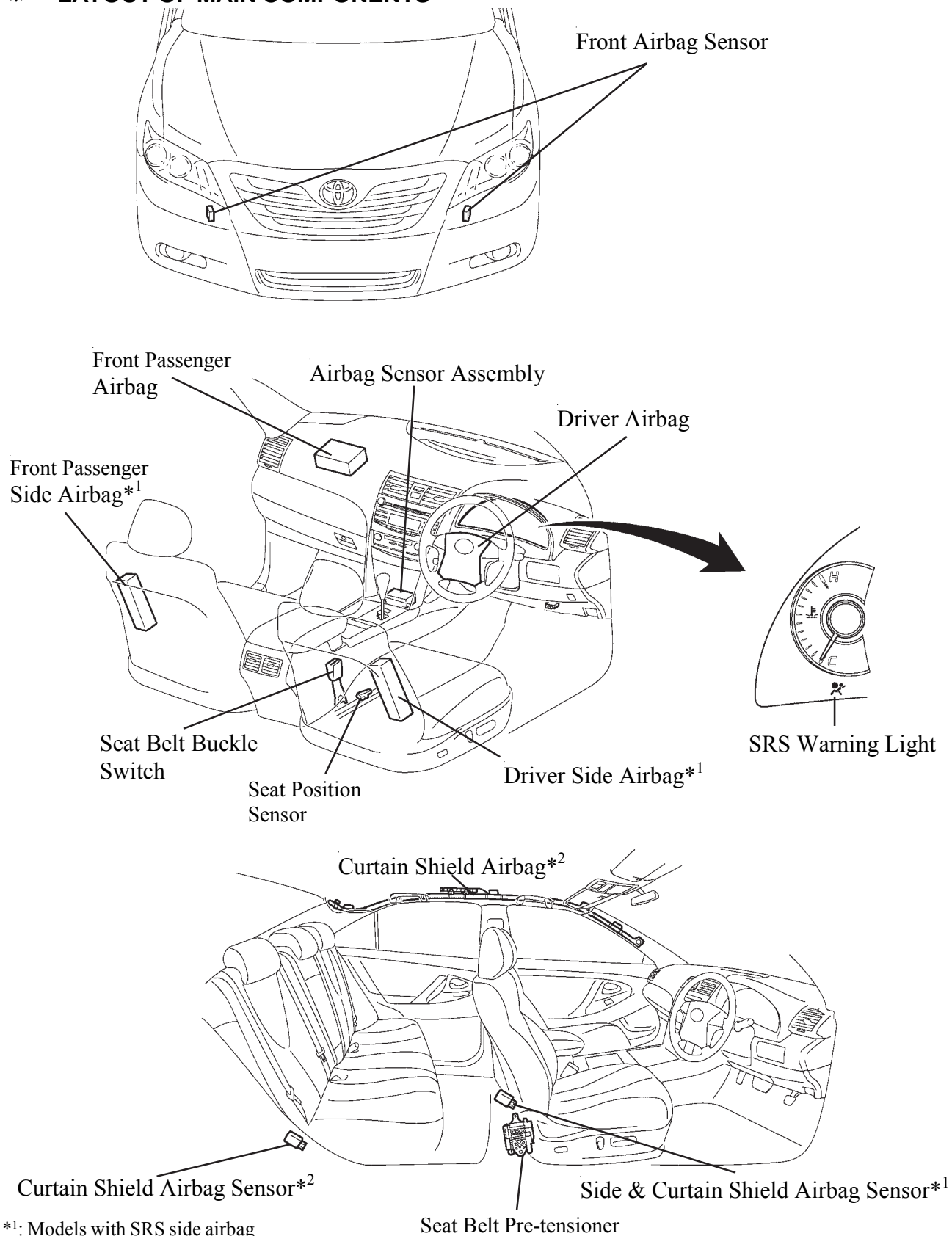
- The driver and front passenger SRS (Supplemental Restraint System) airbags supplement the seat belts to help to reduce impacts to the heads and chests of the driver and front passenger in the event of a frontal collision. On some models with driver and passenger airbags, a dual-stage SRS airbag system is used.
- The SRS side and curtain shield airbags help to reduce the shocks to the head and chest of the driver, and the front passenger in the event of a side collision.
- The front passenger airbag door is designed to be invisible. This means that when the airbag inflates, the instrument panel will split along the cleavage line.
- A fuel cut control that stops the fuel pump when any airbags are deployed, is used. For details, see page EG-52.



02KBE175TEb

*: The settings of the SRS airbag system vary depending grades and/or options. For details, see the equipment list in Model Outline (see page MO-24).

★ LAYOUT OF MAIN COMPONENTS

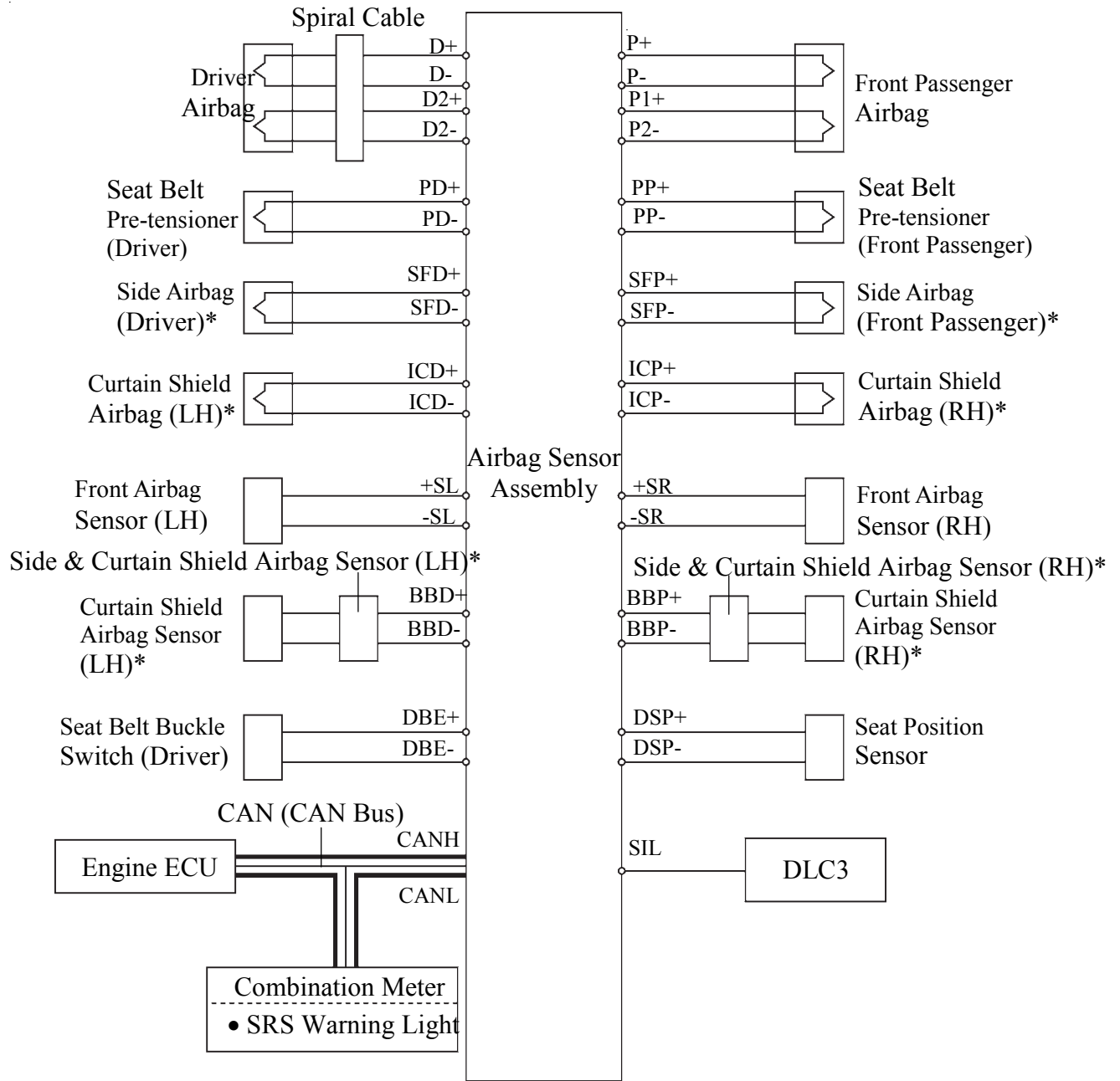


*¹: Models with SRS side airbag

*²: Models with SRS curtain shield airbag

02KBE176TEb

❄ **WIRING DIAGRAM**

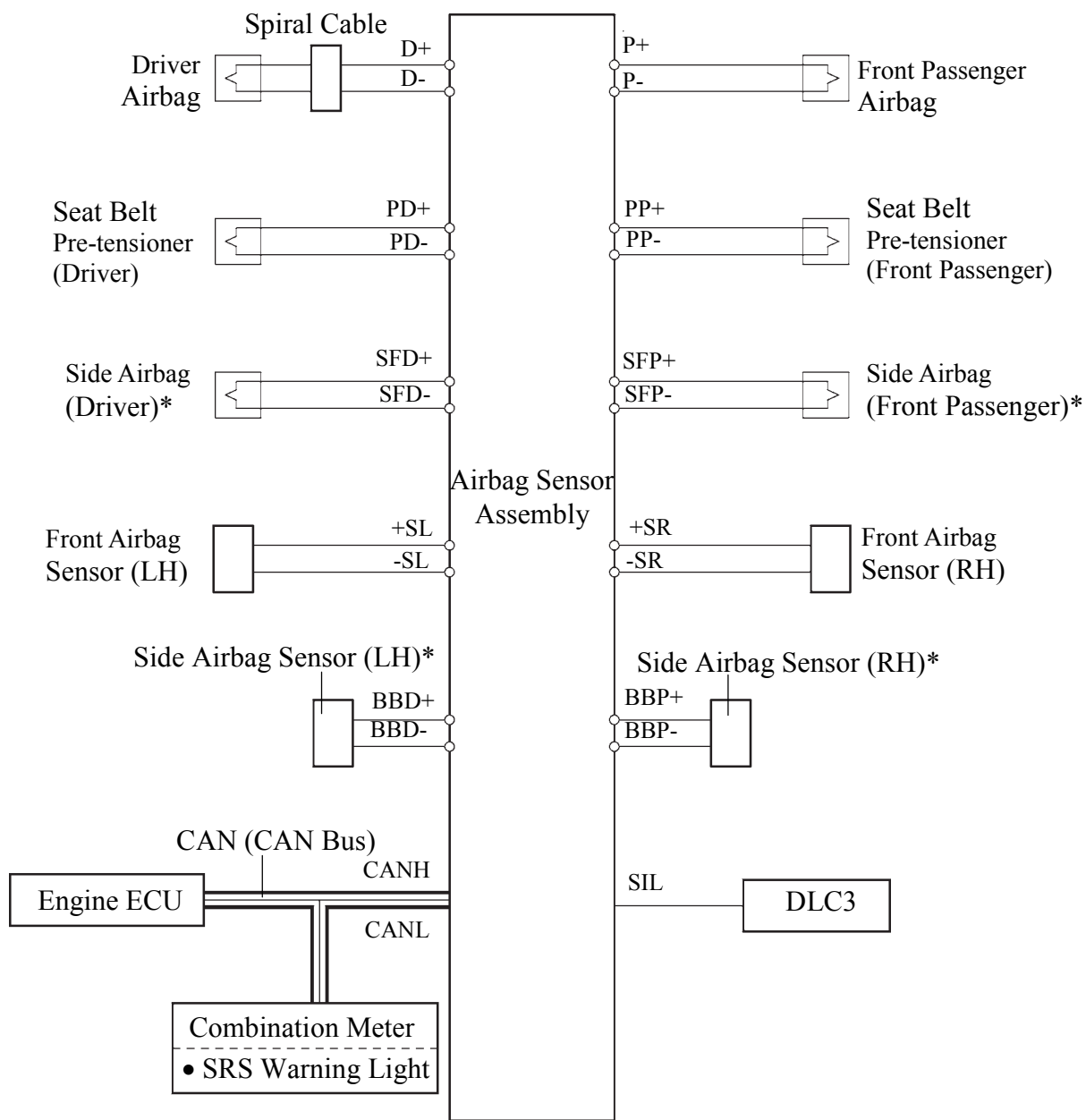


026BE36P

Models with Dual-stage SRS Airbag

*: Models with SRS side & curtain shield airbag.

(Continued)



02KBE177TE

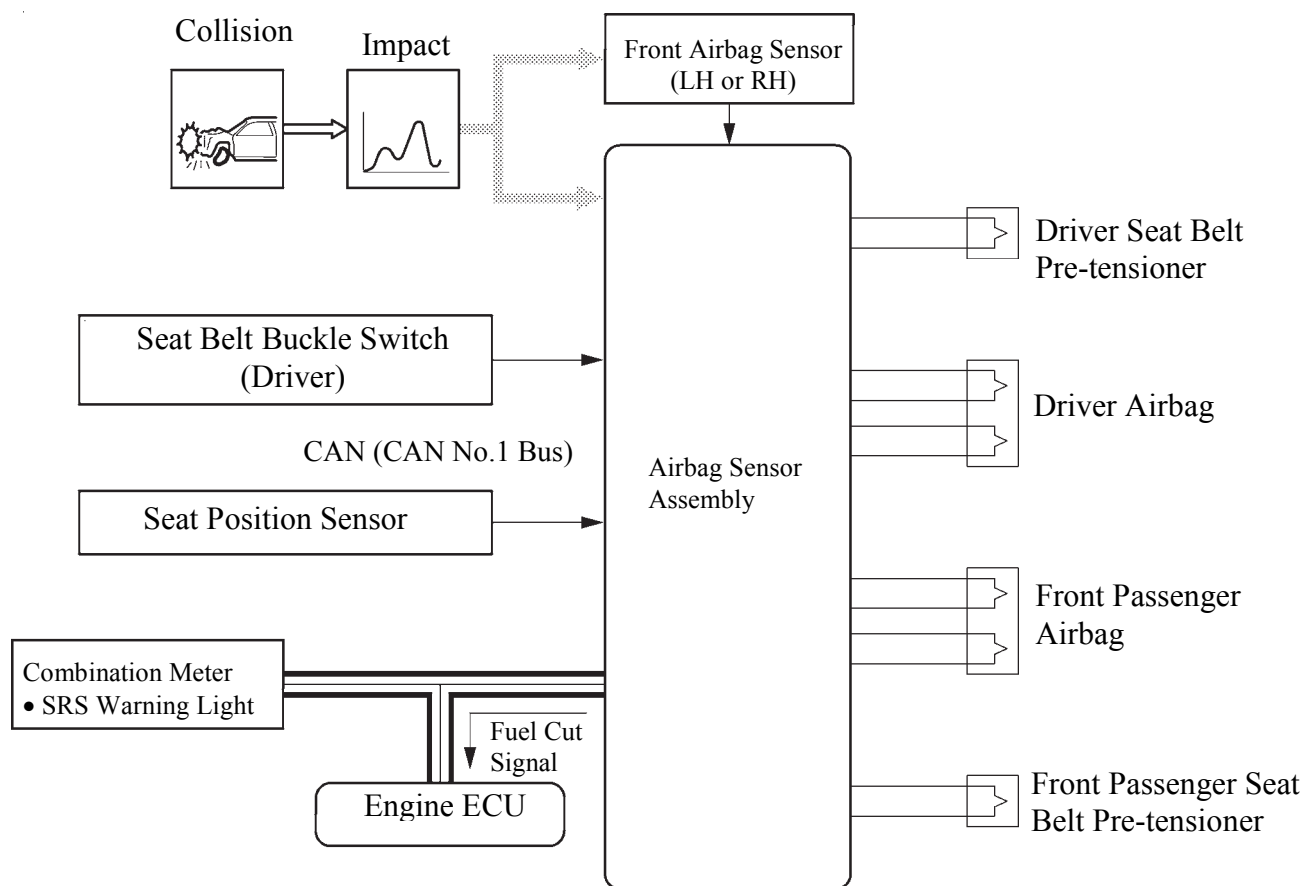
Models without Dual-stage SRS Airbag System

✱ AIRBAG FOR FRONTAL COLLISION

1. General

- In conjunction with their impact absorbing structure for frontal collisions, the driver and front passenger SRS airbags deploy simultaneously, and are supplements to the seat belts. The driver and front passenger dual-stage SRS airbags have been designed to help reduce injuries to the head and chest in the event of a frontal collision.
- The deceleration sensor is enclosed in the front airbag sensor. Due to the deceleration of the vehicle during a front collision, a distortion is created in the sensor and converted into an electrical signal. Accordingly, the extent of the initial collision can be detected in detail.

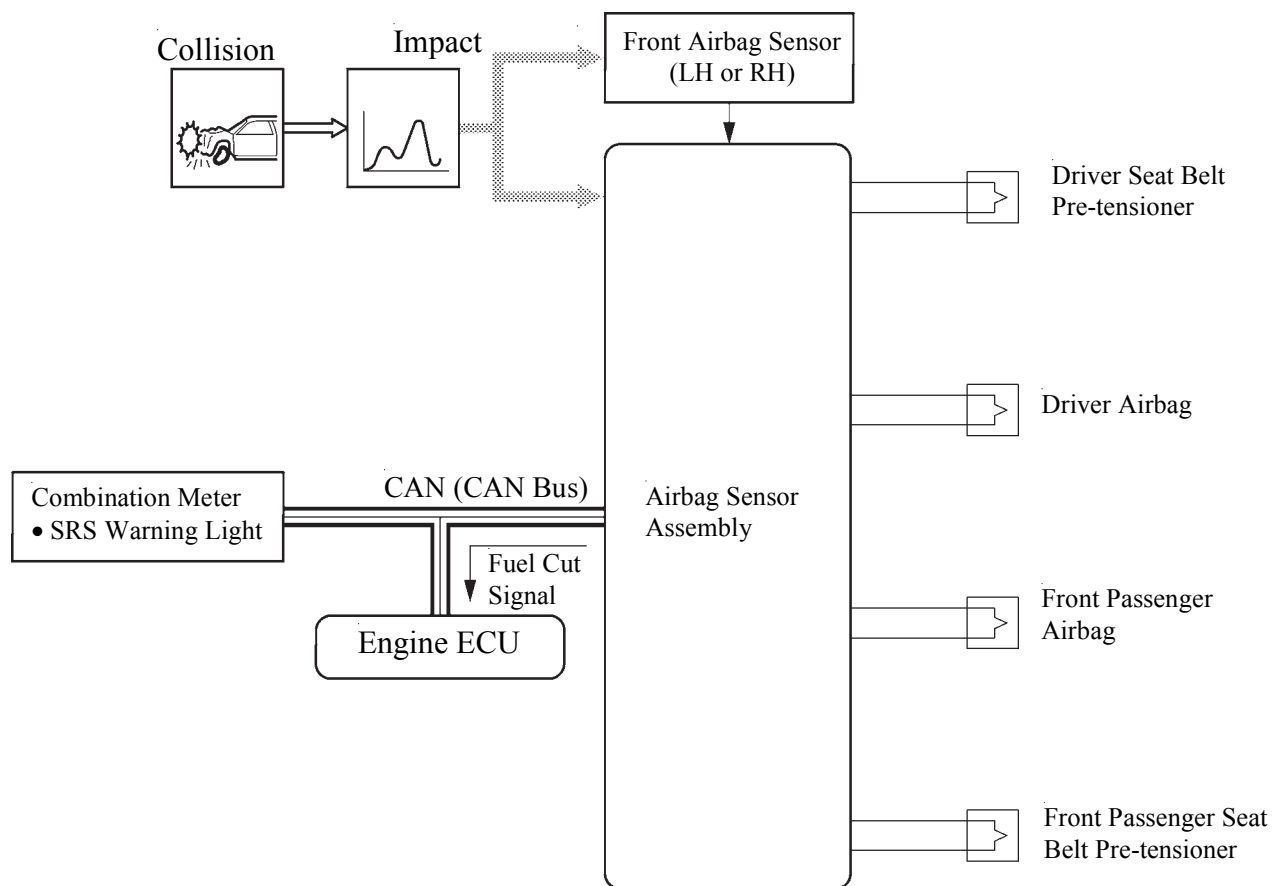
► Front Airbag Operation ◀



Models with Dual-stage SRS Airbag System

026BE37TE

(Continued)



Models without Dual-stage SRS Airbag System

02KBE178TE

2. Dual-stage SRS Airbag System

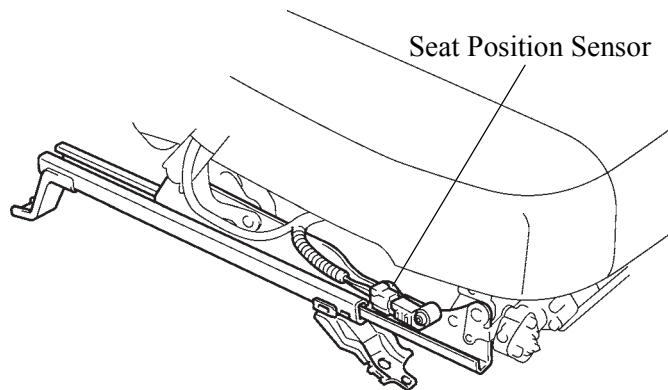
General

In this system, when the front airbag sensors and airbag sensor assembly detect a front collision, the airbag sensor assembly judges the extent of impact, seat position and whether or not the seat belts are fastened, thus optimizing the airbag inflating output by delaying the inflation timing of the 2nd initiator and the 1st initiator.

Seat Position Sensor

1) General

The seat position sensor is mounted on the upper rail portion of the driver seat rail, and includes a Hall IC and a magnet. This sensor is used to detect the sliding position of the driver seat.

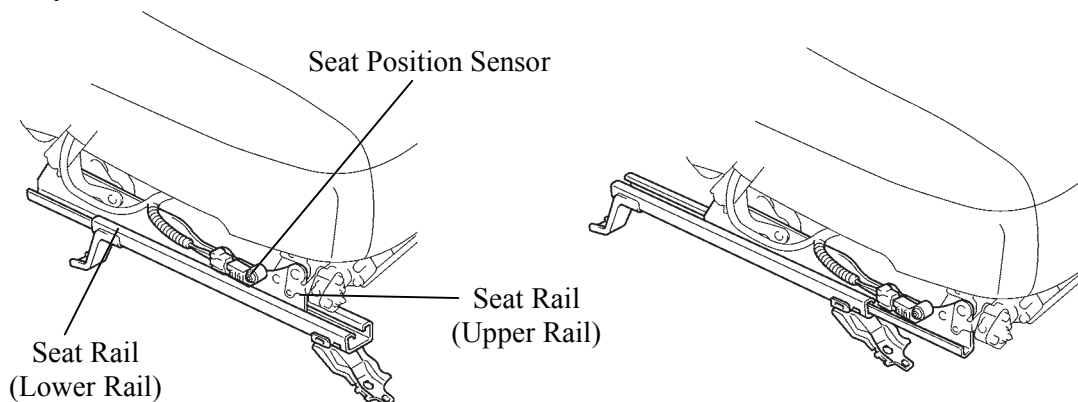


01YBE111Y

2) Operation

When the seat is in the rearward position, the lower rail portion of the seat rail is close to the seat position sensor. When it is in the forward position, the distance between the lower rail portion and the sensor becomes larger.

Thus, the magnetic flux of the magnet inside the seat position sensor varies depending on the seat position. The Hall IC detects this variation and outputs signals to the airbag sensor assembly.



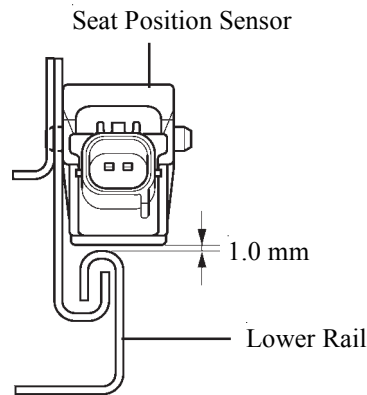
01YBE93Y

Seat position is rearward**Seat position is forward**

Service Tip

Follow the procedure indicated below to install the seat position sensor.

- 1) Insert a 1.0 mm feeler gauge between the seat position sensor and the lower rail portion.
 - 2) Tighten the mounting bolt to the specified torque with the seat position sensor pushed down as shown.
- For details, see the Camry Repair Manual.

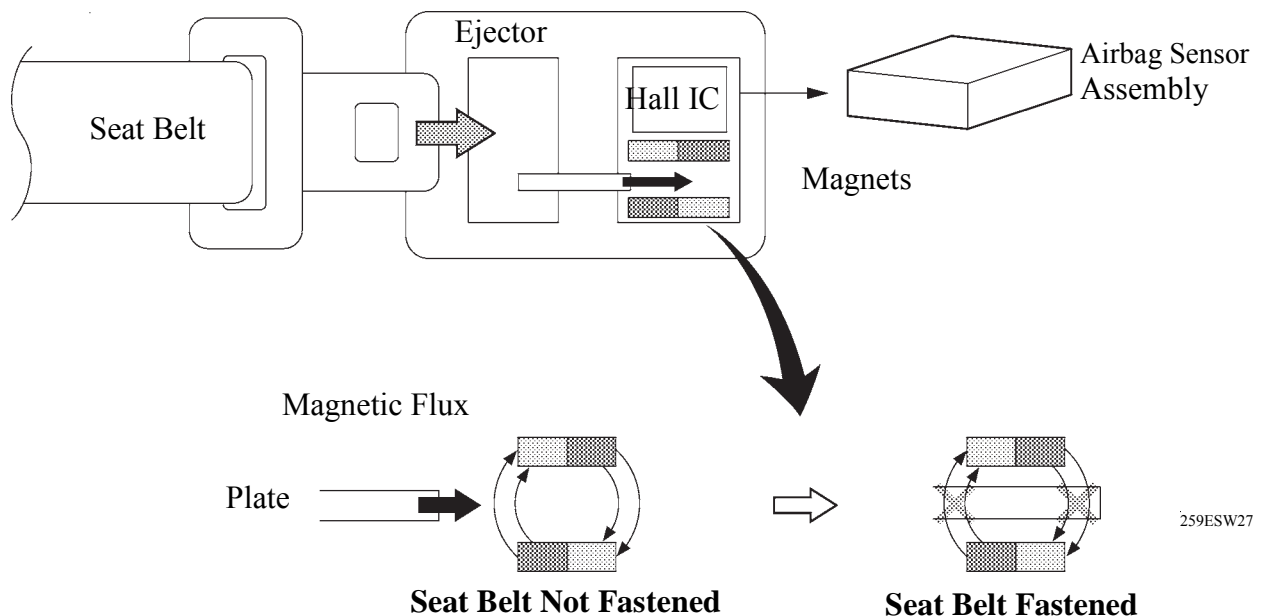


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Seat Belt Buckle Switch

The seat belt buckle switch detects whether or not the seat belt is fastened.

- The non-contact type switch is composed of a Hall IC and two magnets, installed into the front seat inner belt assembly.
- The ejector inside the front seat inner belt assembly and the plate installed to the ejector move when the seat belt is removed or inserted. The movement of the plate changes the magnetic flux density of the magnet.
- The Hall IC detects the changes in the magnetic flux density in accordance with the seat belt removal or insertion, and outputs a signal to the airbag sensor assembly (for driver seat) and occupant classification ECU (for front passenger seat).



259ESW27

3. SRS Driver and Front Passenger Airbags

Dual-stage SRS driver and front passenger airbags contain two sets of initiators and propellants. The airbag sensor assembly helps optimize the airbag inflation speed by controlling the inflation timing of these initiators.

4. Front Airbag Sensor

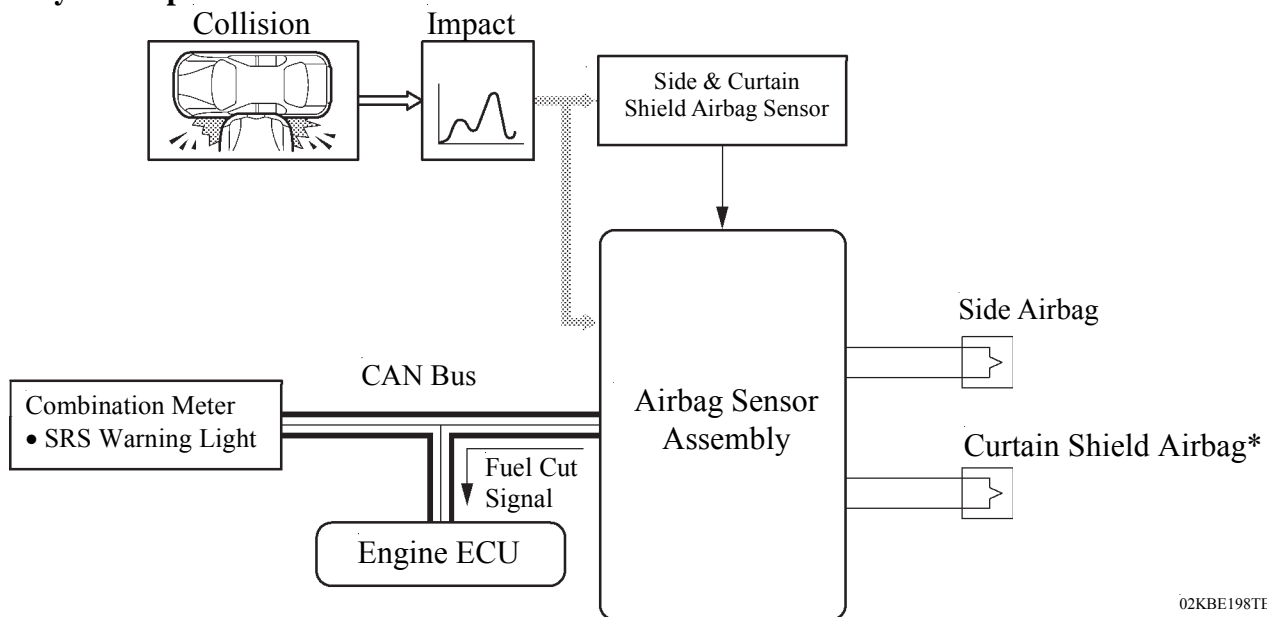
Front airbag sensor uses an electrical type deceleration sensor. Based on the deceleration of the vehicle during a frontal collision, distortion is created in the sensor and converted into an electrical signal. Accordingly, the extent of the initial collision can be accurately detected.

✱ AIRBAG FOR SIDE/ REAR OF SIDE COLLISION

1. General

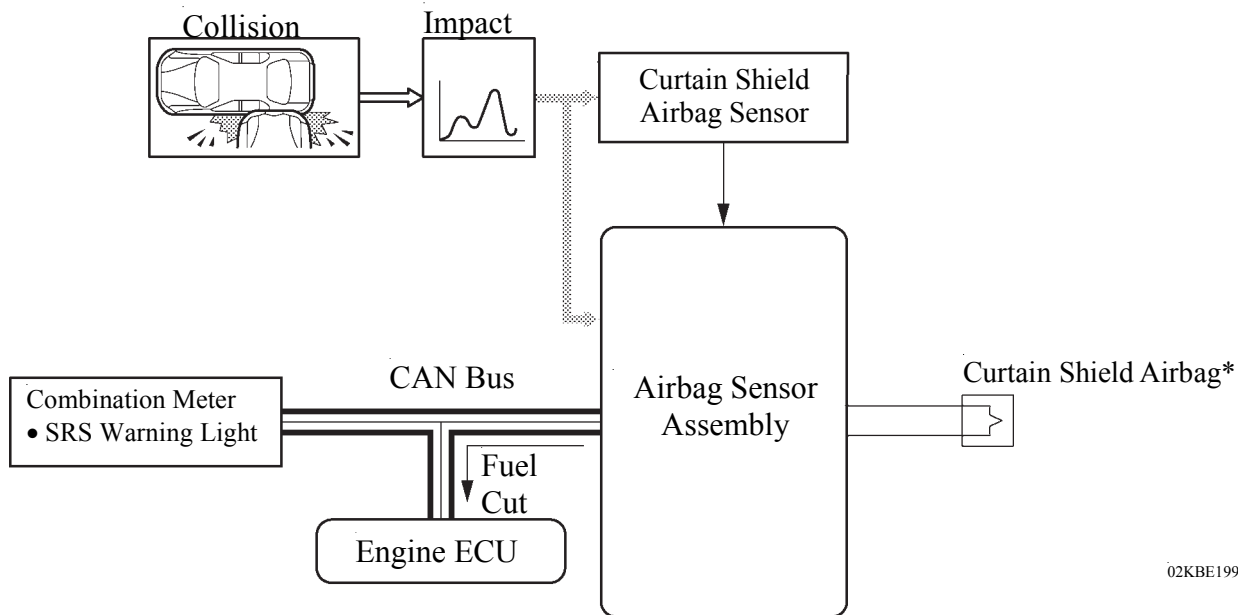
- With the airbag for side collisions, if the side & curtain shield airbag sensor detects an impact, the airbag sensor assembly causes the front side and curtain shield airbags to be deployed simultaneously.
- With the airbag for rear of side collisions, if the curtain shield airbag sensor detects an impact, the airbag sensor assembly causes the curtain shield airbag to be deployed.

► System Operation ◀



Airbags for Side Collision

*: Models with SRS curtain shield airbag



Airbags for Side Collision

*: Models with SRS curtain shield airbag

2. SRS Side Airbag

SRS side airbags are installed in the backs of the driver seat and the front passenger seat. The SRS airbag is a one-piece design, consisting of an inflator, a bag, and a cover.

3. SRS Curtain Shield Airbag

SRS curtain shield airbags are located in the areas that extend from the driver's and front passenger's front pillars to the rear pillars in the rear seat areas. Each SRS airbag is a one-piece design, consisting of an inflator, a bag, and a cover.

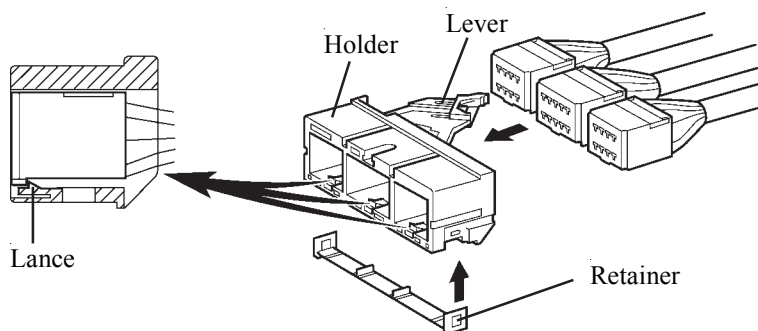
4. Side & Curtain Shield Airbag Sensors

Side & curtain shield airbag sensor uses an electrical type deceleration sensor. Based on the deceleration of the vehicle during a side or rear* of side collision, distortion is created in the sensor and converted into an electrical signal. Accordingly, the extent of the initial collision can be accurately detected.

*: Models with SRS curtain shield airbag

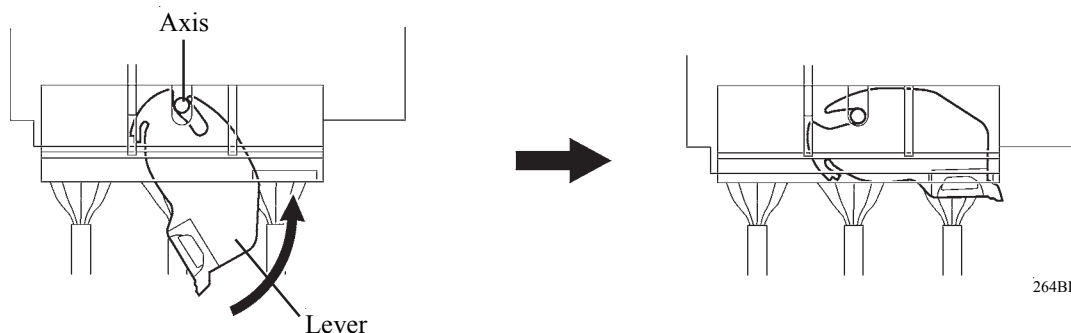
✱ IMPROPER CONNECTION PREVENTION LOCK MECHANISM

- This improper connection prevention lock mechanism consists of the airbag sensor assembly and the holder.
- The airbag sensor assembly has a connector lock pin.
- The holder has a lever with a lock groove. The holder and the connectors are locked via a retainer and a lance.



264BE45

- When connecting the holder and connectors to the airbag sensor assembly, the lever is pushed into position end by rotating it around the axis of the connector lock pin in order to lock the holder securely.



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✱ AIRBAG SENSOR ASSEMBLY

- It reaches a deploy judgment to deploy the driver's and front passenger's airbags and pretensioners based on the signals received from the front airbag sensor and the airbag sensor assembly. In addition, it can reach a deploy judgment to deploy the SRS side airbags and SRS curtain shield airbags based on signals received from the side & curtain shield airbag sensors and curtain shield airbag sensors. Furthermore, it is equipped with a diagnosis function to perform self-diagnosis in case of system malfunctions.
- Each signal is transmitted as follows:

Target ECU	Signal	Communication path
Engine ECU	Fuel Cut Signal	CAN communication circuit
Combination Meter	SRS Warning Light ON Demand Signal Seat Belt Remainder Light ON Demand Signal	CAN communication circuit

DIAGNOSIS

If the airbag sensor assembly detects a malfunction in the SRS airbag system, the airbag sensor assembly stores the malfunction data in memory, in addition to illuminating the SRS warning light.

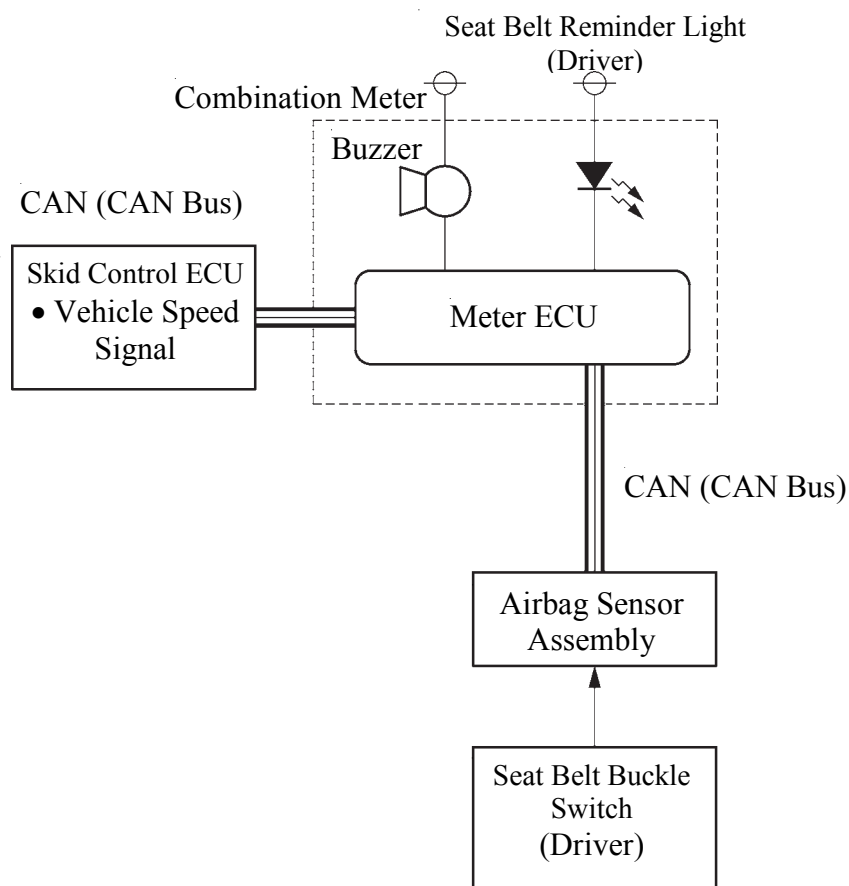
- There are 2 types of DTC for the SRS airbag system: 5-digit and 2-digit.
- The 5-digit DTC can be read by connecting an intelligent tester II to DLC3.
- The 2-digit DTC can be read by connecting the SST (09843-18040) to the Tc and CG terminals of the DLC3 and reading the blinking of the SRS warning light.
- If the SRS airbags deploy, the airbag sensor assembly will turn ON the SRS warning light. However, differing from the ordinary diagnosis function, a DTC will not be memorised. The SRS warning light can be turned OFF only by replacing the airbag sensor assembly with a new one.
- For details, refer to see the Camry Repair Manual.

SEAT BELT REMINDER SYSTEM

☀ DESCRIPTION

- If a seat belt is not fastened, this system flashes the seat belt reminder light and sounds the buzzer in the combination meter as a reminder.
- When the ignition switch is turned ON, this system detects the condition of the seat belts based on the signal from the seat belt buckle switch (for the driver).

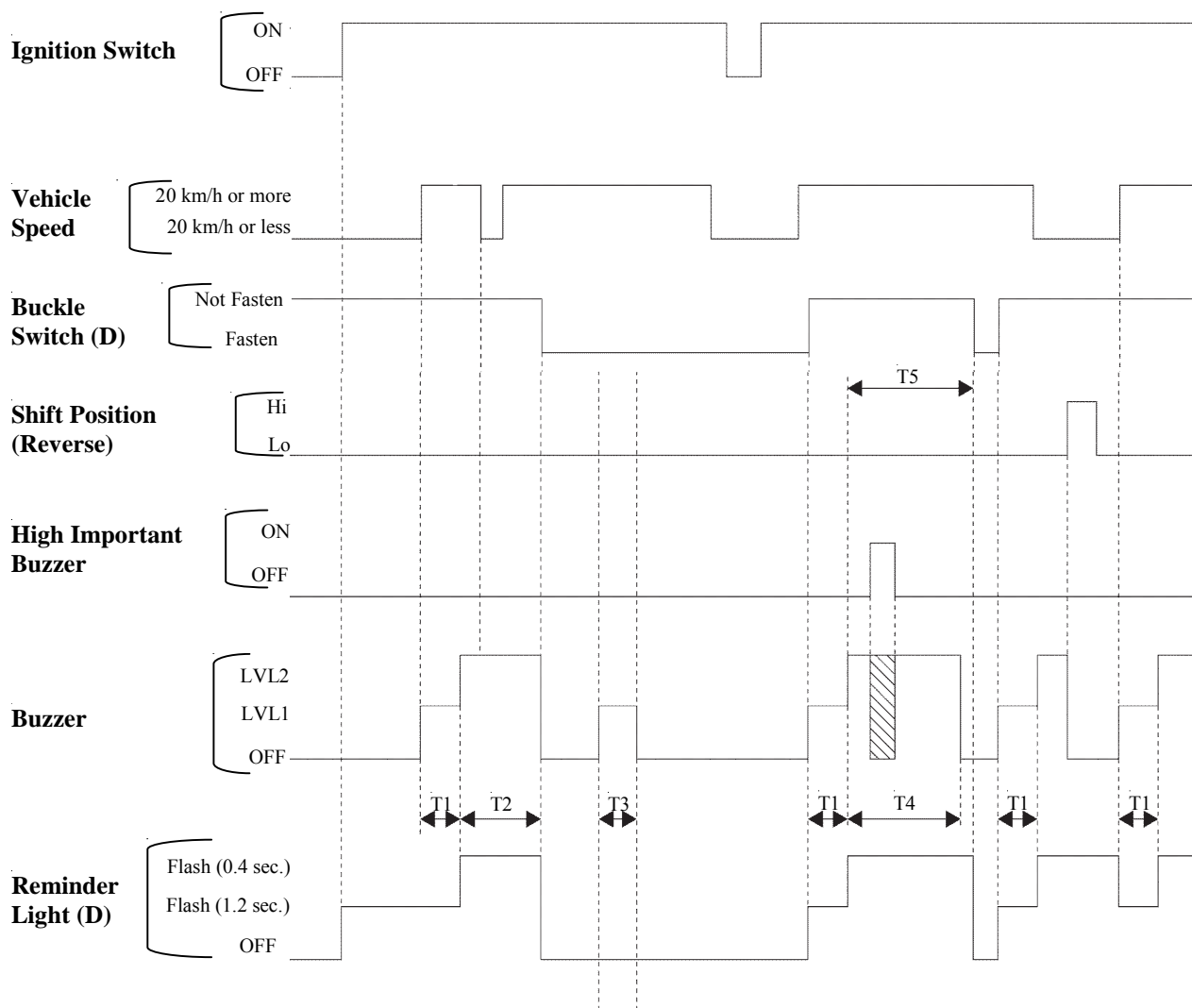
► System Diagram ◀



02KB204TEb

REMINDER METHOD

The timing chart of the buzzer and details of the reminder method are shown below.



0150BE50Cb

T1: About 30 sec. T4: About 90 sec.
 T2: About 90 sec. or less T5: About 90 sec. or more
 T3: About 30 sec. or less

Note:

If the vehicle speed drops below the setting level for seat belt warning after a buzzer begins to sound, the buzzer will continue to sound.

CRUISE CONTROL SYSTEM

DESCRIPTION

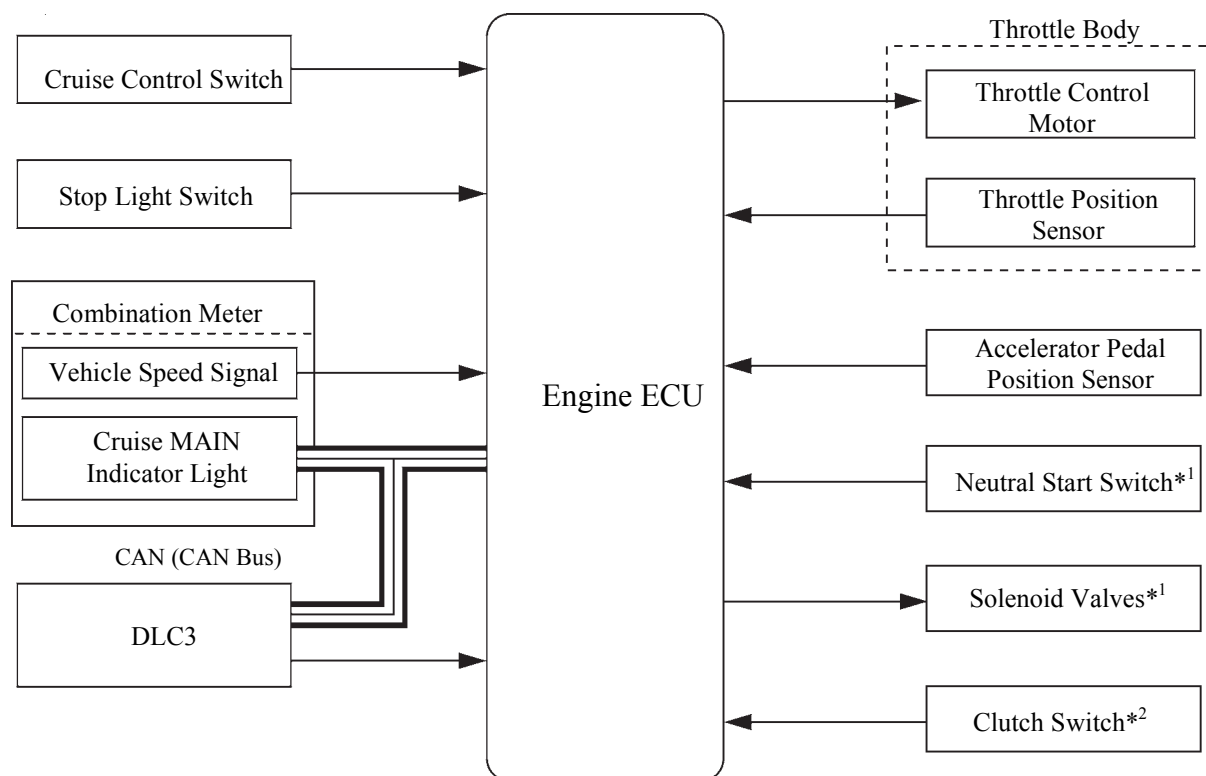
Cruise Control maintains the vehicle speed set by the driver.

1. General

When the system is set to a desired vehicle speed, the throttle valve position is adjusted automatically to maintain the vehicle speed without the driver having to depress the accelerator pedal.

This system effects control through the ETCS-i (Electronic Throttle Control System-intelligent).

Models with U250E Automatic Transaxle and E354 Manual Transaxle

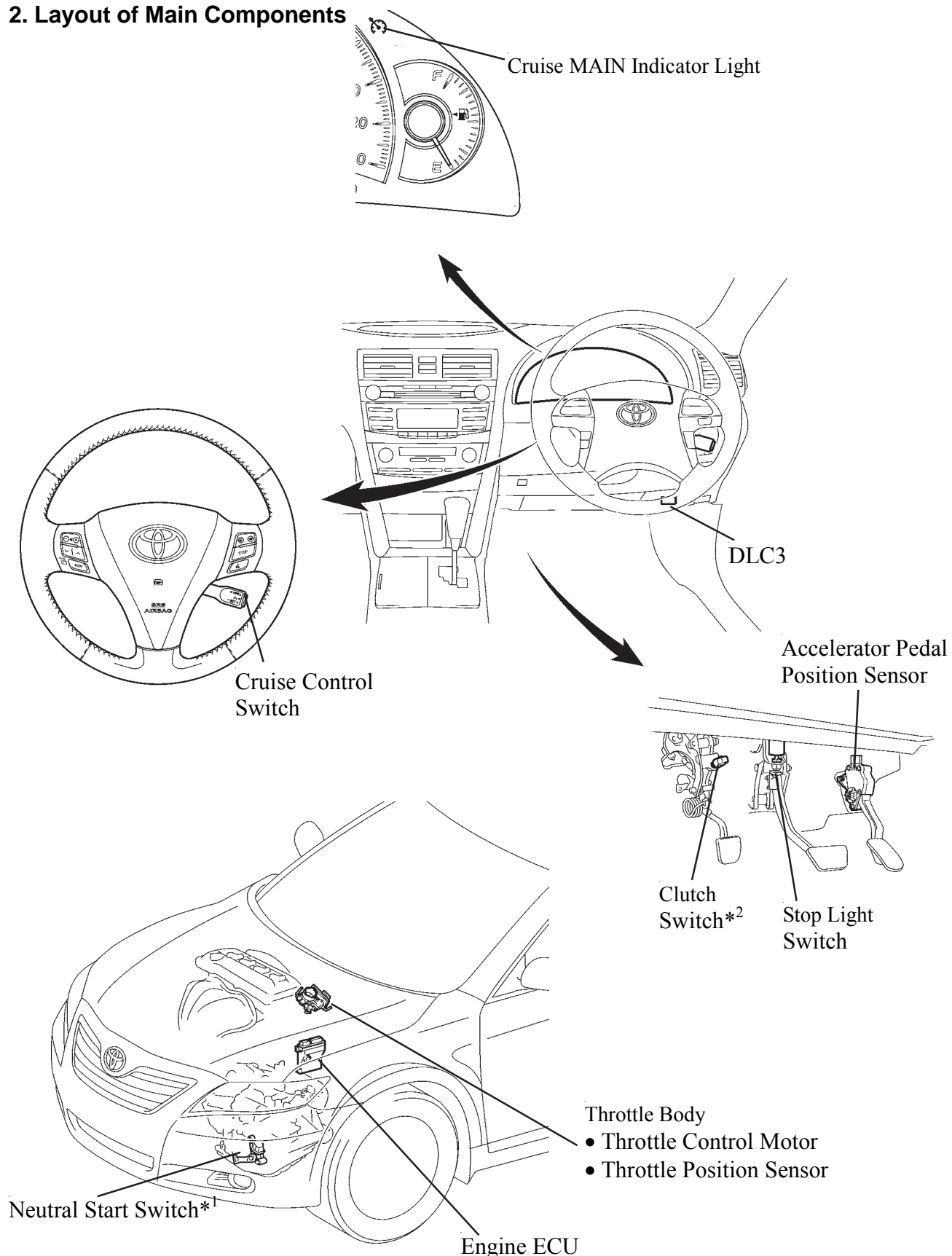


*1: Models for U250E automatic transaxle

*2: Only for E354 manual transaxle

025BE117P

2. Layout of Main Components



*¹: U250E Automatic Transaxle Model

*²: E354 Manual Transaxle Model

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3. System Control

General

The cruise control has the following control.

Control	Outline
Constant Speed Control	The engine ECU compares the actual vehicle speed and the set speed and if the vehicle speed is higher than the set speed, it uses the throttle control motor to decrease the throttle opening. If the actual vehicle speed is lower than the set speed, it uses the throttle control motor to increase the throttle opening.
Set Control	While this system fulfils the following conditions, and the cruise control switch is pressed to the SET/ - side and released when the ON-OFF button on the cruise control switch has been pressed to turn the system on, the engine ECU stores the vehicle speed and maintains the vehicle constantly at that speed. <ul style="list-style-type: none"> • The vehicle is running at a vehicle speed of about 40 km/h or more.
Low Speed Limit Control	The low speed limit is the lowest speed that cruise control can be set at and it is designed to be approx. 40 km/h. The cruise control cannot be set below that speed. If the vehicle speed drops below that speed while running in the cruise control, the cruise control will be cancelled automatically. However the set speed in the memory is kept.
COAST Switch Control	While the cruise control switch is held to the SET/ - side, the vehicle speed and the set vehicle speed change as follows. <ul style="list-style-type: none"> • The vehicle decelerates constantly. • The set vehicle speed changes to the speed that the vehicle is travelling at when the COAST switch is released.
Tap Down Control	When the cruise control switch is pushed momentarily (approx. 0.6 sec.) to the SET/ - side, the vehicle speed and the vehicle setting speed change as follows. <ul style="list-style-type: none"> • The vehicle will decelerate in increments of approx. 1.6 km/h for each time the switch was pressed. • However, if the difference between the actual vehicle speed and the vehicle setting speed is greater than 5 km/h, the vehicle setting speed will change to the speed at which the vehicle was being driven at the time the switch was released.
ACC Switch Control	When the cruise control switch is pushed to the RES/ + side and held, the vehicle speed and the vehicle setting speed change as follows. <ul style="list-style-type: none"> • The vehicle accelerates constantly. • The set vehicle speed changes to the speed as which the switch is releases.
Tap Up Control	When the cruise control switch is pushed momentarily (approx. 0.6 sec.) to the RES/ + side, the vehicle speed and the vehicle setting speed change as follows. <ul style="list-style-type: none"> • The vehicle accelerates in increments of approx. 1.6 km/h for each time the switch was pressed. • However, if the difference between the actual vehicle speed and the vehicle setting speed is greater than 5 km/h, the vehicle setting speed does not change.

(Continued)

Control	Outline
RES Switch Control	If cruise control is cancelled for any reason other than a malfunction or main switch operation and vehicle speed is more than the low speed limit, the vehicle speed is returned to the speed before the cancellation of cruise operation by setting the cruise control switch to the RES/+ side. The cruise control mode can be resumed even if the vehicle speed drops below the low speed limit, because the speed in the memory is not cleared.
Shift Down Control	ECT ECU incorporated into engine ECU (U250E Automatic Transaxle): When the vehicle is cruising uphill, shift-down control may be performed by the ECT (Electronic Control Transmission). When the engine ECU judges the end of cruising uphill based on the throttle valve angle, the shift-down control will turn on again. There is a case where the shift-down control turns off during ACC or RES switch control.
Manual Cancel Control	When any of the following conditions occur during cruise control driving, the cruise control is cancelled. <ul style="list-style-type: none"> • The clutch switch ON signal is sent to the engine ECU when the clutch pedal is depressed (only for M/T). • The stop light switch ON signal is sent to the engine ECU when the brake pedal is depressed. • The CANCEL switch ON signal is sent to engine ECU when the cruise control switch moved to CANCEL side. • The cruise control OFF signal is sent to the engine ECU when the cruise control switch ON-OFF button is pushed off. • The shift lever is moved from the D position to the N position.
Automatic Cancel Control	When any of the following conditions occur during cruise control operation, the speed that is set in the memory is cleared and the cruise control is cancelled. <ul style="list-style-type: none"> • Stop light switch open or short circuit • The vehicle speed signal is not input for a predetermined period of time. • ETCS-i malfunction Furthermore, the cruise MAIN indicator light will blink until the ON-OFF button on the cruise control switch is used to turn the system off, and the operation of the cruise control will be disabled until the ON-OFF button is turned ON again.
	When any of the following conditions occur during cruise control driving, the speed that is set in the memory is cleared and the cruise control is cancelled. <ul style="list-style-type: none"> • Stop light switch input signal is abnormal. • Cruise control switch input signal is abnormal. Furthermore, the cruise MAIN indicator light will blink until the ON-OFF button on the cruise control switch is used to turn the system off, and the operation of the cruise control will be disabled until the ignition switch is turned ON again.

(Continued)

Control	Outline
Automatic Cancel Control	<p>When any of the following conditions occur during cruise control driving, the cruise control is cancelled.</p> <ul style="list-style-type: none"> • Vehicle speed is below the low speed limit (approx. 40 km/h) or less. • Vehicle speed decreases by 16 km/h or more below the speed at which the cruise control was set. • The VSC is activated.
Diagnosis	<p>When the engine ECU does not receive a vehicle speed signal for a predetermined period of time during cruising, or when cruise control is cancelled (automatic cancel) due to a malfunction of the cruise control, stop light switch or vehicle speed signal, the engine ECU immediately blinks the cruise MAIN indicator light due to the malfunction. The contents relating to the malfunction will be stored in the engine ECU.</p>

Diagnosis

If a malfunction occurs in the cruise control system, during cruise control operation, the engine ECU actuates the automatic cancel control and blinks the cruise MAIN indicator light to inform the driver of a malfunction. At this time, the engine ECU memorizes the malfunction in the form of 5-digit and 2-digit DTC (Diagnostic Trouble Code).

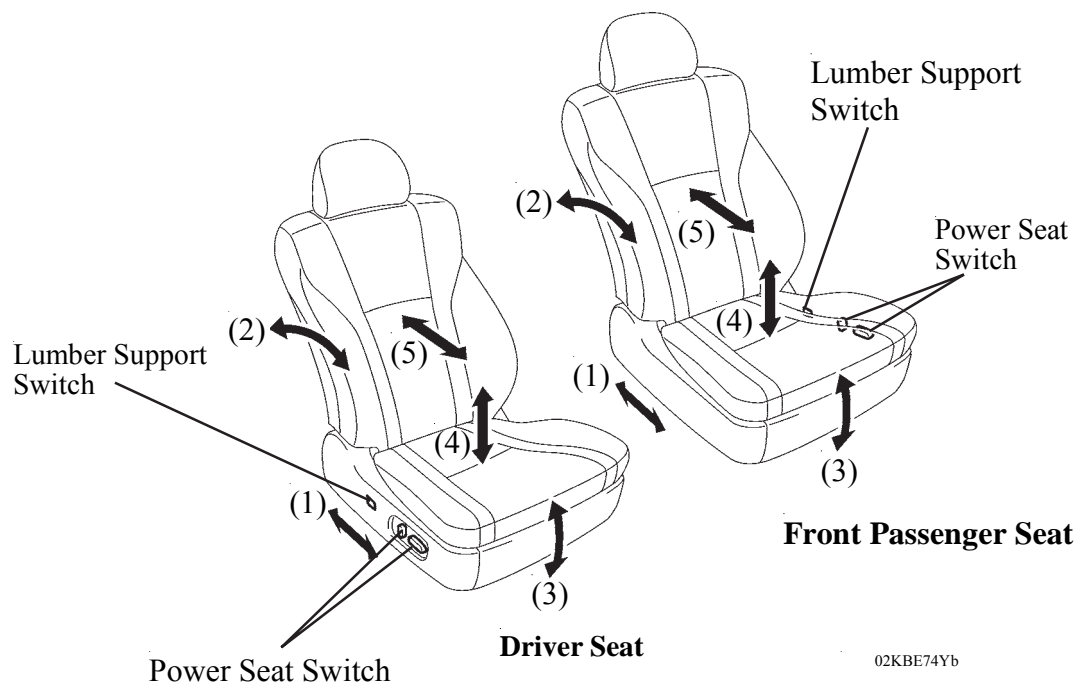
- The 5-digit DTC can be read by connecting an intelligent tester II to the DLC3.
- The 2-digit DTC is output to the cruise MAIN indicator light when the Tc and CG terminals of the DLC3 connector are connected through the use of the SST (09843-18040). Thus, these DTC are obtained by counting the number of blinks of the cruise MAIN indicator light.

POWER SEAT SYSTEM

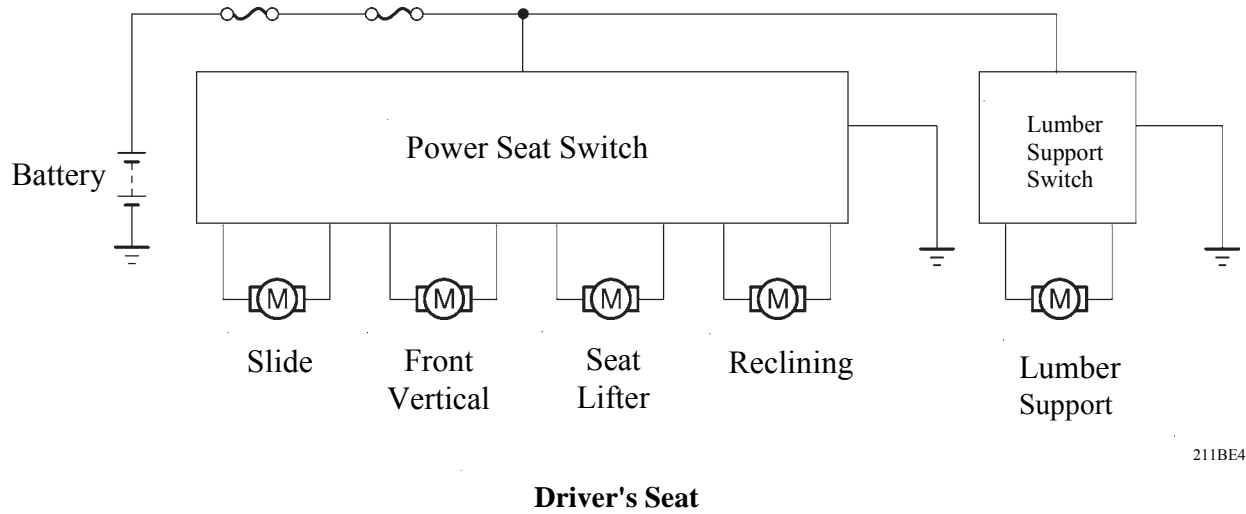
✱ DESCRIPTION

- The settings of the power seat system vary depending on the grade. For details, see the equipment list in model outline (see page MO-24).
- The power seat system for the driver and front passenger seats has the following functions:

Function		Stroke	
		Driver	Front Passenger
(1)	Seat Slide	260 mm	
(2)	Reclining	78 degrees	
(3)	Front Vertical	24 mm	-
(4)	Rear Vertical (Lifter)	45 mm	-
(5)	Lumbar Support	21 mm	



► System Diagram ◀

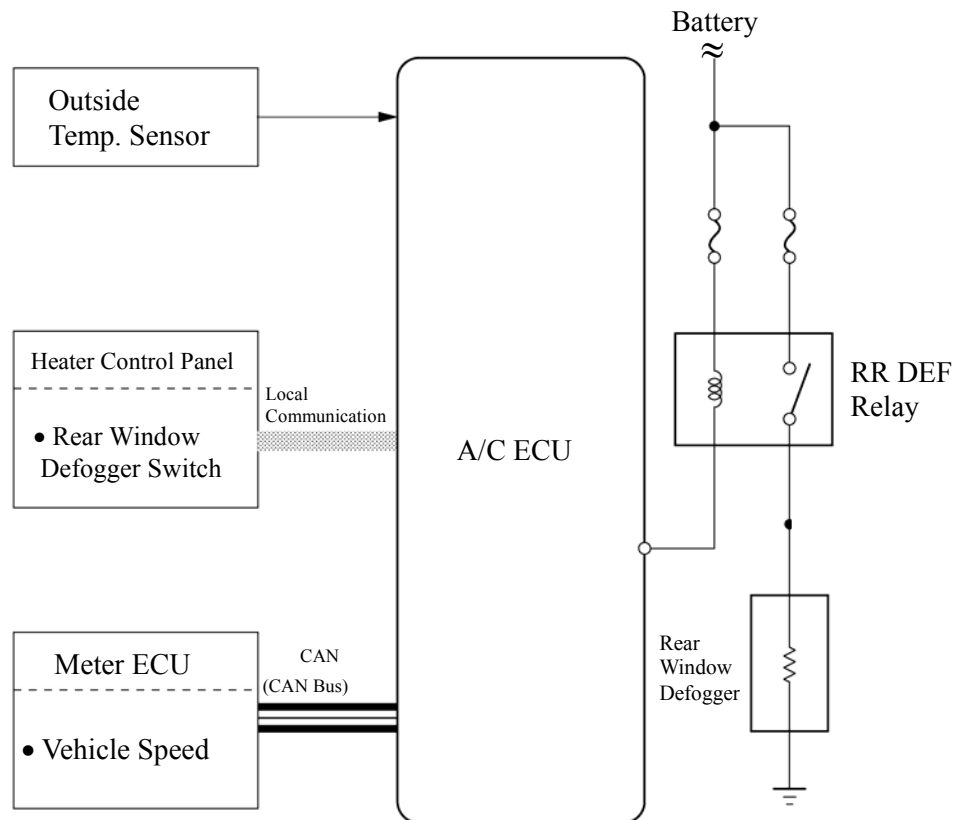


REAR WINDOW DEFOGGER SYSTEM

DESCRIPTION

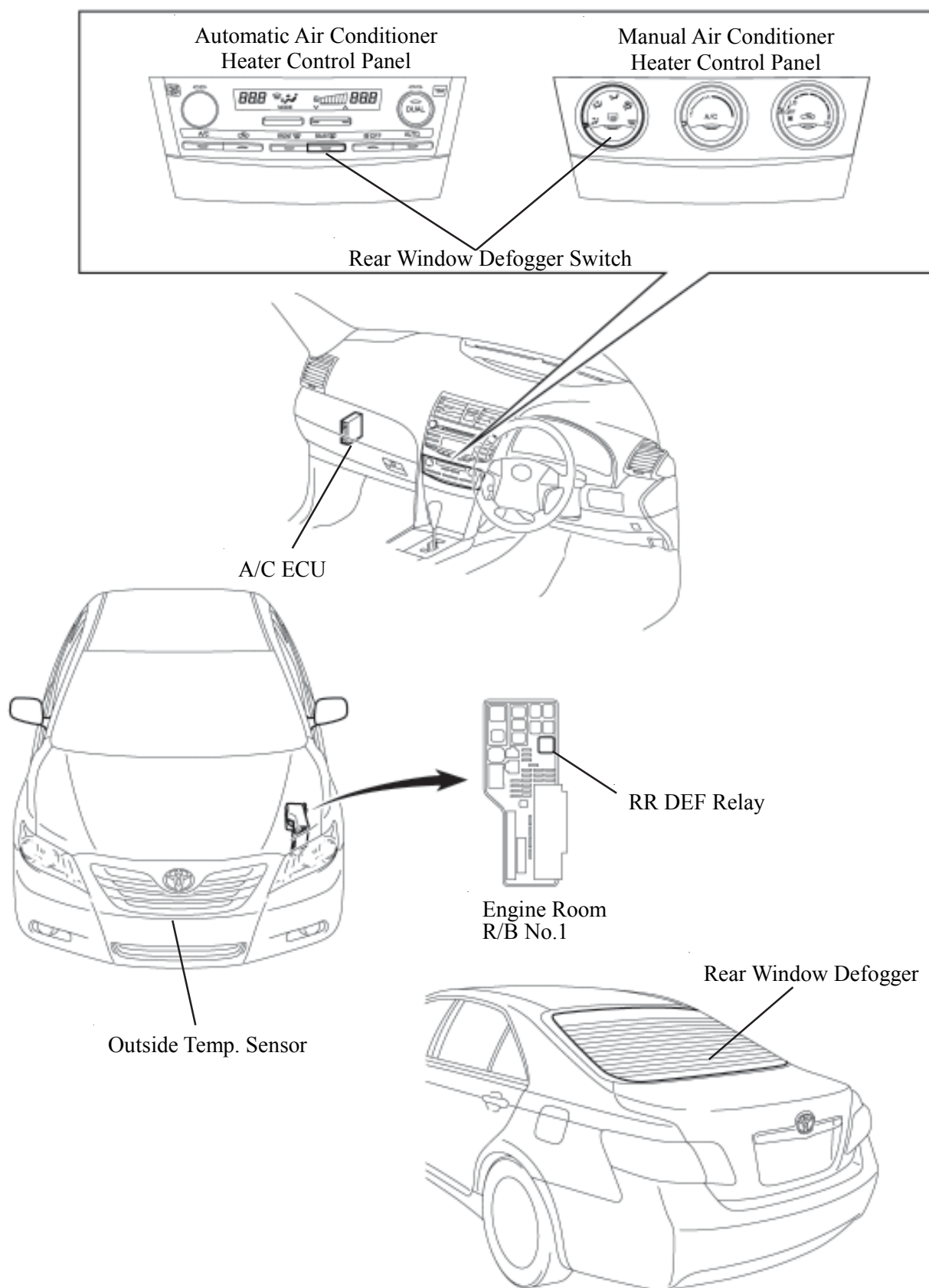
- The rear window defogger system uses the heater wire on the rear window glass to defog the rear window glass.
- This system is standard equipment on all models.
- This system is activated when the power source is turned on and the rear window defogger switch is pushed. This switch is provided with a timer function to turn off the defogger after approx. 15 minutes. The operation period of the timer may extend to approximately 45 minutes depending on the outside air temperature and vehicle speed.

System Diagram



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☀ LAYOUT OF MAIN COMPONENTS



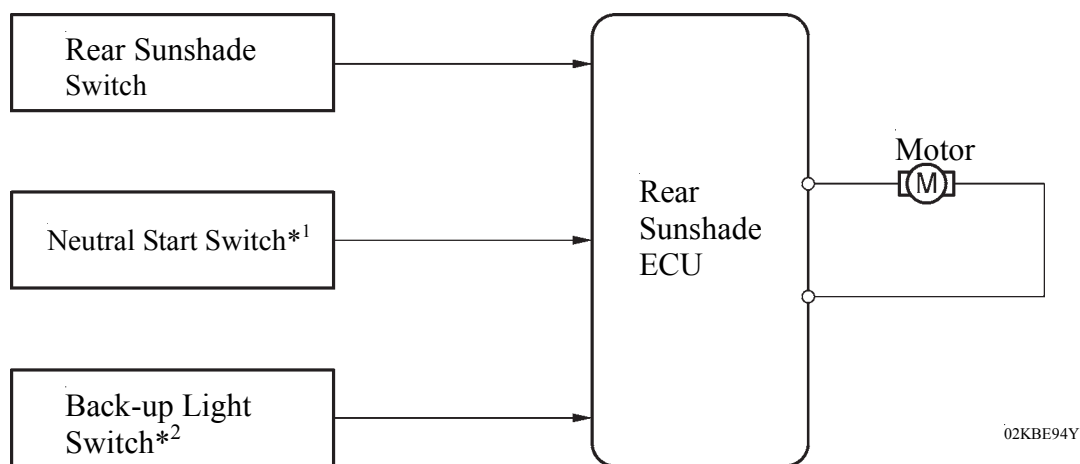
REAR SUNSHADE SYSTEM

☀ DESCRIPTION

An electrically-operated rear sunshade system blocks direct sunlight from entering through the rear window in order to ensure the comfort of the rear seat passengers.

- This system is used as standard equipment on Grande & GLX for New Zealand.
- This system is control by the sunshade ECU.
- This system has the following functions.

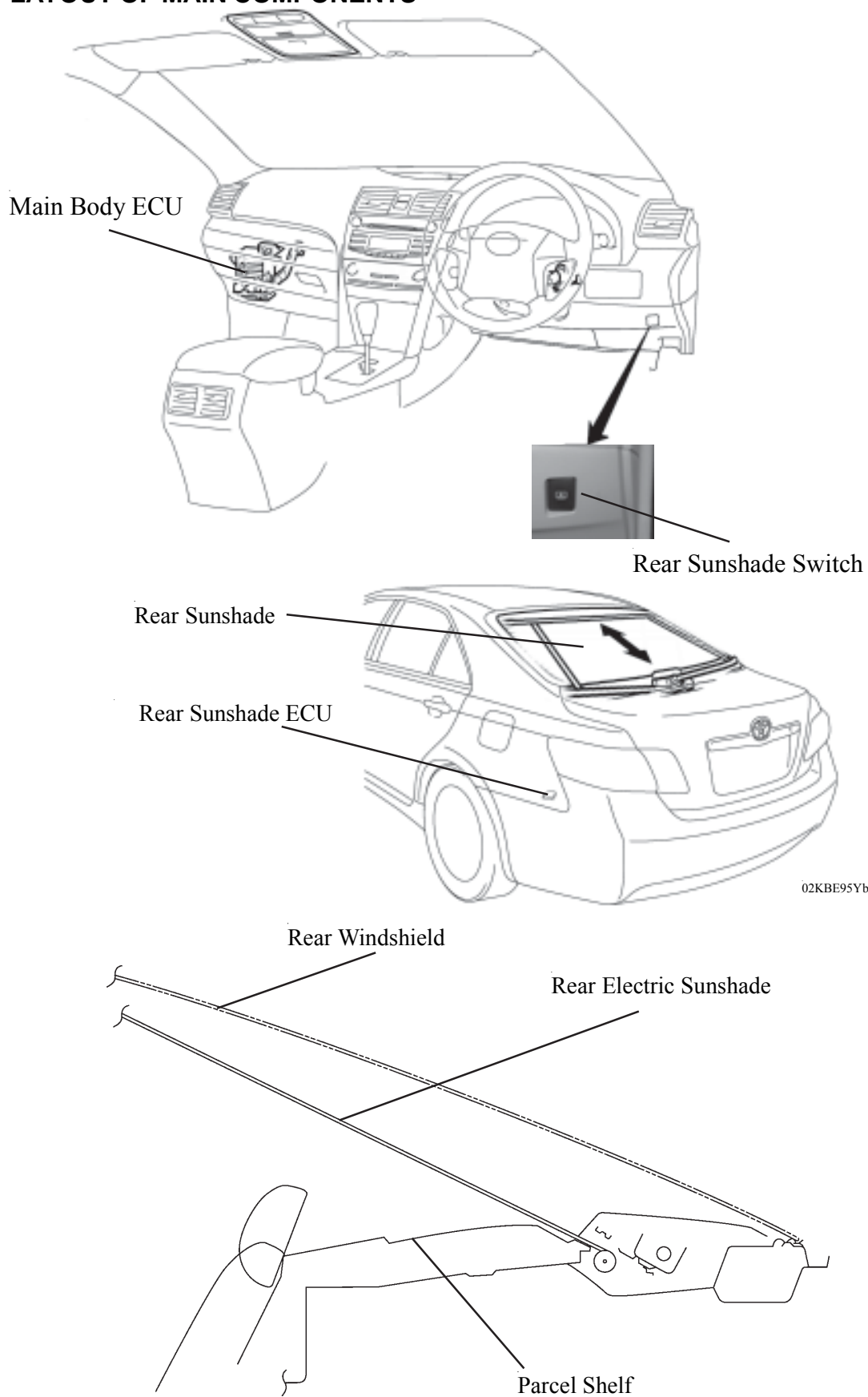
Function	Outline
Manual Up / Down	Moves the rear sunshade up or down in accordance with the rear sunshade switch operation.
Reverse-linked Auto-down	Moves the rear sunshade down automatically in accordance with the reverse signal.



*1: A/T models

*2: M/T models

☀ LAYOUT OF MAIN COMPONENTS

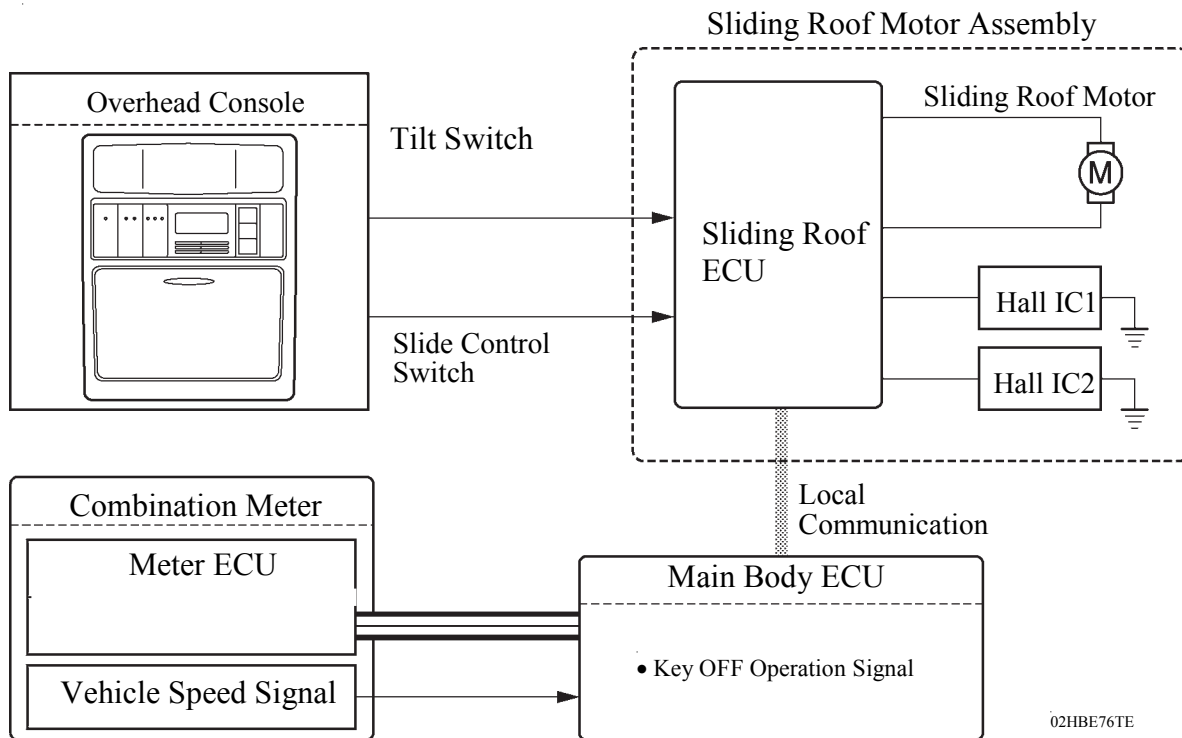


SLIDING ROOF SYSTEM

DESCRIPTION

- The sliding roof system available on some grades. For details, see the equipment list in Model Outline (see page MO-24).
- The sliding roof ECU uses 2 type Hall ICs to detect the position of the sliding roof. Sliding roof ECU and the 2 Hall ICs are integrated into the sliding roof motor assembly.

System Diagram



Service Tip

The memory is not cleared if battery terminals are disconnected. However, initialisation is necessary after the sliding roof motor assembly is replaced. Perform the initialisation as follows:

- 1) Keep pressing the TILT UP or SLIDE CLOSE switch until the initialisation completely. This will enable the sliding roof ECU to start initialising and perform the tilt up, tilt down, open, and close operations of the sliding roof in sequence.
- 2) Keep the switch pressed for 1 second after the tilt-up operation is completed.
- 3) The sliding roof ECU performs the tilt down, open, and close operations.
- 4) The initialisation process ends when the close operation is completed.

Keep the tilt-up or slide close switch pressed during initialisation. If the tilt up or close switch is released during initialisation, the system will not be able to complete the initialisation. If this occurs, perform the steps from the beginning again.

For details, see the Camry Repair Manual.

FUNCTION

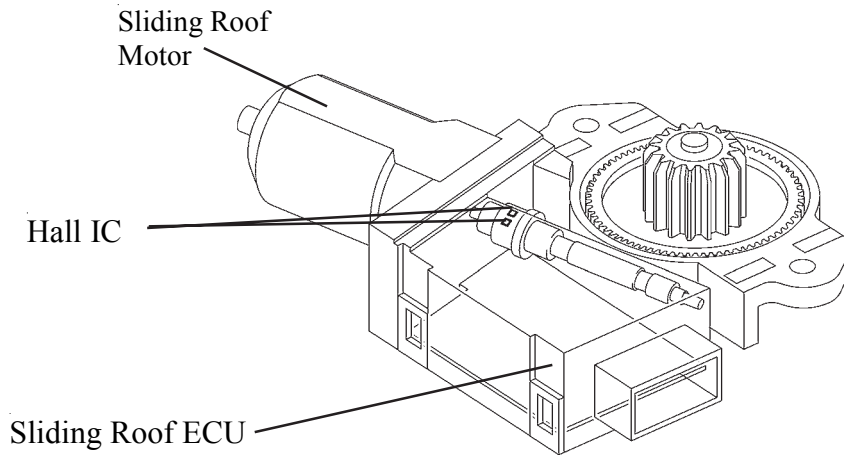
1. General

This sliding roof system has the following functions:

Function	Outline
Manual open-and-close	This function causes the sliding roof to open (or close) while the SLIDE OPEN switch (or SLIDE CLOSE switch) is momentarily pressed. The sliding roof stops as soon as the switch is released.
One touch auto open-and-close	This function enables the sliding roof to be fully opened (or closed) by a 0.3 sec. or longer press of the SLIDE OPEN switch (or SLIDE CLOSE switch).
Manual tilt up-and-down	This function causes the sliding roof to tilt up (or tilt down) while the TILT UP switch (or TILT DOWN switch) is momentarily pressed. The sliding roof stops as soon as the switch is released.
One touch auto tilt up-and-down	This function enables the sliding roof to be fully tilted up (or down) by a 0.3 sec. or long press of the TILT UP switch (or TILT DOWN switch).
Jam protection	The "jam protection" function automatically stops the sliding roof and moves it open half way (or fully tilt up) if a foreign object gets jammed in the sliding roof during close or tilt down operation.
Key-off operation	The "key-off operation" function makes it possible to operate the sliding roof for approximately 43 seconds after the ignition switch is turned to the ACC or OFF position, if the front doors are not opened.
Sliding roof open warning (See Page BE- 114)	When the power source is changed from IG-ON to OFF and the driver door is opened with the sliding roof open, the buzzer in the combination meter sounds once.

2. Jam Protection Function

- The Hall IC converts the changes in the magnetic flux that occur due to the rotation of the worm gear into pulse signals and outputs them to the ECU.

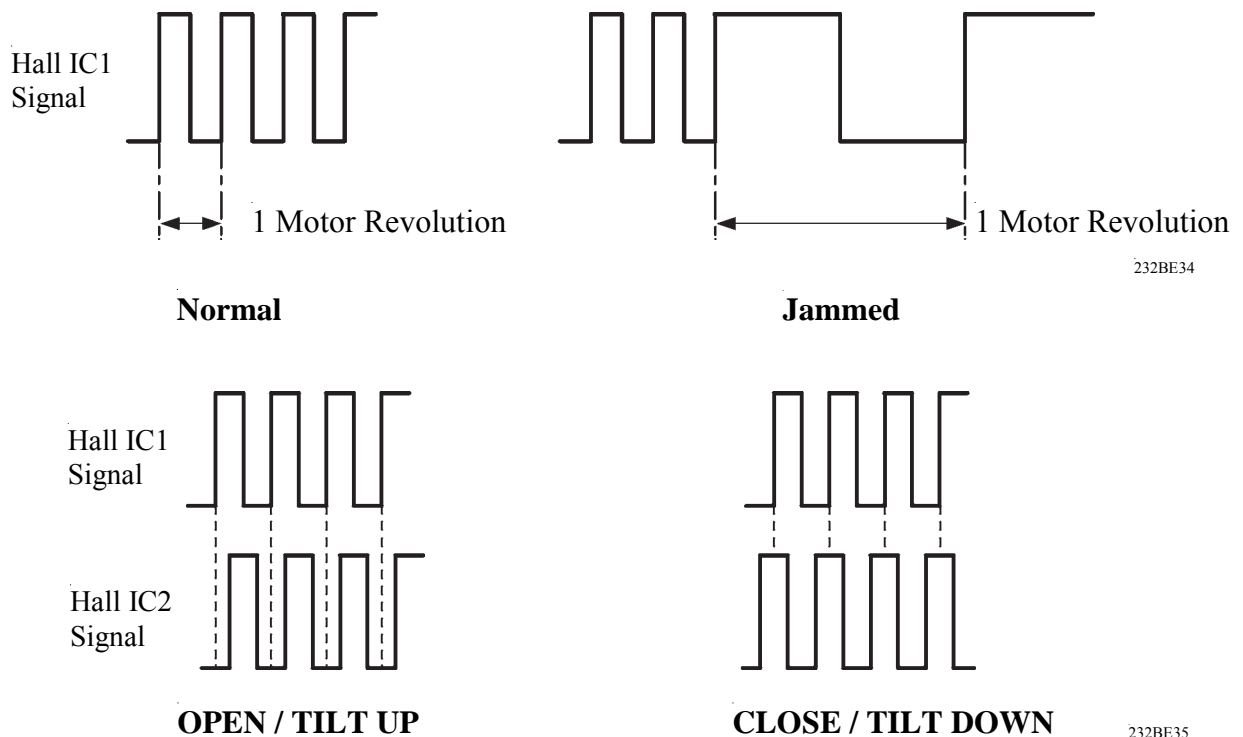


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Sliding Roof Motor Assembly

- To control the jam protection function, the ECU monitors the amount of movement and judges jamming of the moon roof based on the pulse signals from the Hall IC1, and the moving direction of the moon roof from the phase difference between the pulsed from the Hall IC1 and Hall IC2.

▶ Monitoring Amount of Movement Judgment of Jamming ◀



232BE34

232BE35

3. Sliding Roof Open Warning

When the power source is changed from ON to OFF and the driver door is opened when the sliding roof is open, the sliding roof ECU sounds the buzzer in the combination meter. Then, a warning message appears on the multi-information display.

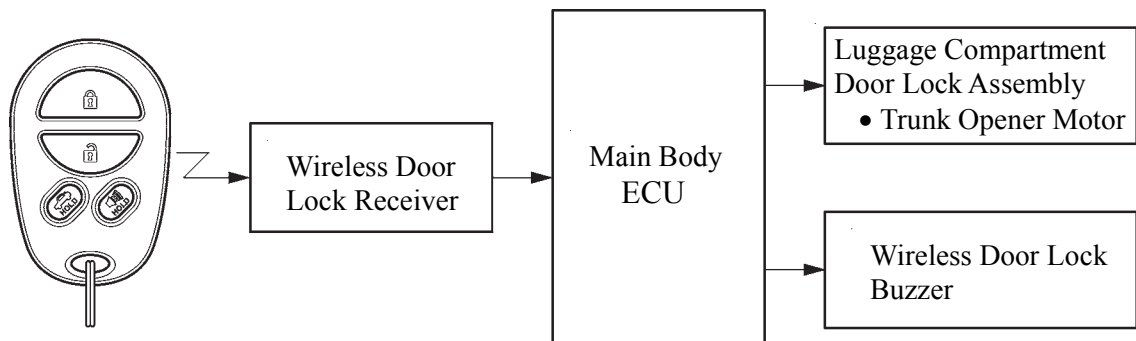
Warning Condition		The warning is activated if all of the following conditions are met: <ul style="list-style-type: none"> • Sliding roof is not fully closed. • Power source is "OFF" • Driver door is opened.
Combination Meter	Buzzer	Sounds once
Warning Stop Condition		The warning is stopped when one of the following conditions is met. <ul style="list-style-type: none"> • 8 seconds have elapsed after the warning condition is detected • Power source* is "ON" • Driver door is closed. • Sliding roof is closed.

TRUNK OPENER

DESCRIPTION

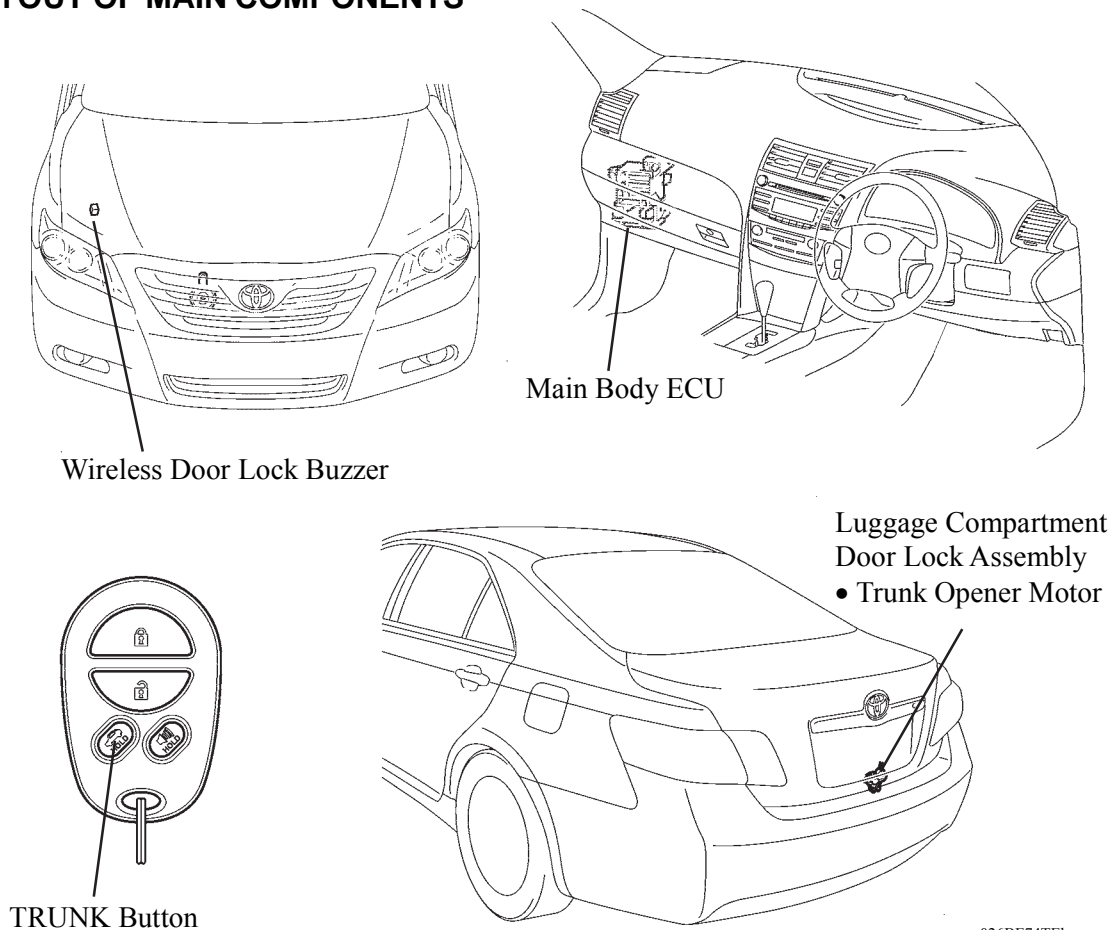
The trunk opener can be operated through the transmitter or lever. For models equipped with the wireless door lock remote control system, see page BE-73.

System Diagram



02KBE93TEb

LAYOUT OF MAIN COMPONENTS



026BE74TEb

STEERING PAD SWITCH

☀ DESCRIPTION

- The settings of the steering pad switches vary depending on the destinations and optional equipment.
- For systems can be operated by the steering pad switches, refer to the following table.

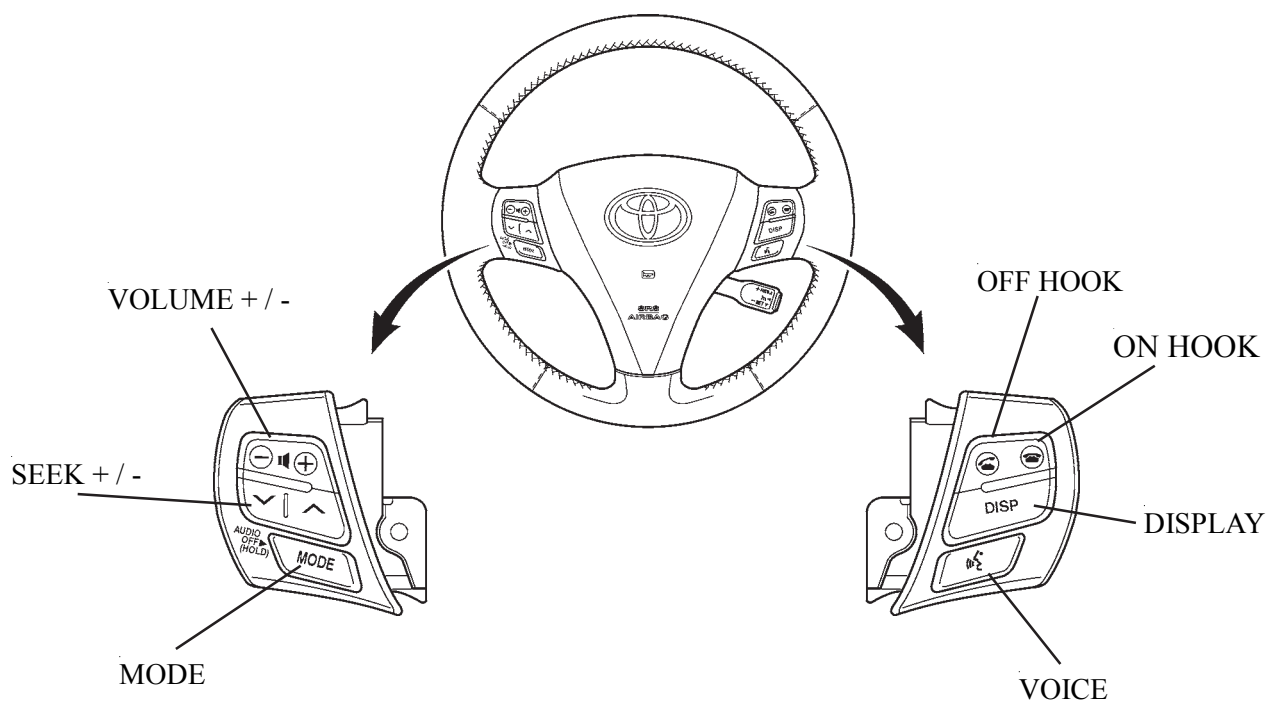
System	Switch
Audio* ¹	<ul style="list-style-type: none"> • VOLUME +/- • SEEK +/- • MODE
Multi-information Display (Combination Meter)* ²	DISP
Voice Recognition* ³	VOICE
Telephone* ⁴	<ul style="list-style-type: none"> • ON HOOK • OFF HOOK

*¹: Models with audio system

*²: Models with multi-information display

*³: Models with navigation with AV system

*⁴: Models with Bluetooth® hands-free system



3 Spoke Steering Wheel

02KBE98Y

APPENDIX

MAJOR TECHNICAL SPECIFICATIONS

Vehicle Grade			Altise / GL(New Zealand)	Altise / GL(New Zealand)	Ateva
Model Code			ACV40R-DEMDKQ	ACV40R-DEADKQ	ACV40R-DEANKQ
Major Dimensions & Vehicle Weights	Overall	Length mm (in.)	4805 (189.2)	4805 (189.2)	4805 (189.2)
		Width mm (in.)	1820 (71.7)	1820 (71.7)	1820 (71.7)
		Height mm (in.)	1470(57.9)	1470(57.9)	1470(57.9)
	Wheel Base mm (in.)		2775 (109.3)	2775 (109.3)	2775 (109.3)
	Tread	Front mm (in.)	1575 (62.0)	1575 (62.0)	1575 (62.0)
		Rear mm (in.)	1565 (61.6)	1565 (61.6)	1565 (61.6)
	Room	Length mm (in.)	2130 (83.8)	2130 (83.8)	2130 (83.8)
		Width mm (in.)	1525 (60.0)	1525 (60.0)	1525 (60.0)
		Height mm (in.)	1200 (47.2)	1200 (47.2)	1200 (47.2), 1140 (44.9) ^{§1}
	Overhang	Front mm (in.)	945 (37.2)	945 (37.2)	945 (37.2)
		Rear mm (in.)	1085 (42.7)	1085 (42.7)	1085 (42.7)
	Min. Running Ground Clearance mm (in.)		150 (5.9)	150 (5.9)	150 (5.9)
	Angle of Approach degrees		—	—	—
	Angle of Departure degrees		—	—	—
	Curb Weight	Front kg (lb)	850 to 845 (1874 to 1863)	890 (1962)	895 to 900 (1973 to 1984)
		Rear kg (lb)	610 to 615 (1345 to 1356)	605 to 610 (1334 to 1345)	610 to 630 (1345 to 1389)
		Total kg (lb)	1460 (3219)	1495 to 1500 (3296 to 3307)	1505 to 1530 (3318 to 3373)
	Gross Vehicle Weight	Front kg (lb)	925 (2039)	970 (2138)	990 (2183)
		Rear kg (lb)	1050 (2315)	1045 (2304)	1025 (2260)
		Total kg (lb)	1975 (4354)	2015 (4442)	2015 (4442)
Performance	Fuel Tank Capacity US.gal, Imp .gal		70 (18.5, 15.5)	70 (18.5, 15.5)	70 (18.5, 15.5)
	Luggage Capacity (VDA) m ³ (cu.ft.)		0.535 (18.9)	0.535 (18.9)	0.535 (18.9)
	Max. Speed km/h		200	200	200
	Max. Cruising Speed km/h		—	—	—
	Acceleration	0 to 100 km/h sec.	—	—	—
		0 to 400 m sec.	—	—	—
	Max. Permissible Speed	1st Gear km/h	53	53	53
		2nd Gear km/h	93	95	95
		3rd Gear km/h	142	148	148
		4th Gear km/h	195	—	—
		5th Gear km/h	—	—	—
	Min. Turning Radius	Tyre m	5.5	5.5	5.5
		Body m	5.9	5.9	5.9
Engine	Engine Type		2AZ-FE	2AZ-FE	2AZ-FE
	Valve Mechanism		16-valve, DOHC with VVT-i	16-valve, DOHC with VVT-i	16-valve, DOHC with VVT-i
	Bore x Stroke mm (in.)		88.5 x 96.0 (3.48 x 3.78)	88.5 x 96.0 (3.48 x 3.78)	88.5 x 96.0 (3.48 x 3.78)
	Displacement cm ³ (cu.in)		2362 (144.1)	2362 (144.1)	2362 (144.1)
	Compression Ratio		9.6:1	9.6:1	9.6:1
	Carburetor Type		EFI	EFI	EFI
	Research Octane No. RON		91 or higher	91 or higher	91 or higher
	Max. Output (EEC) kW @ rpm		117 @ 5700	117 @ 5700	117 @ 5700
	Max. Torque (EEC) N m @ rpm		218 @ 4000	218 @ 4000	218 @ 4000
Engine Electrical	Battery Capacity (SHR) Voltage & Amp.hr.		12-48	12-48	12-48
	Alternator Output Watts		960	960	960
	Starter Output kW		1.6	1.6	1.6
Chassis	Clutch Type		Dry, Single	—	—
	Transaxle Type		E354	U250E	U250E
	Gear Ratio	In First	3.538	3.943 ^{§2}	3.943 ^{§2}
		In Second	2.045	2.197 ^{§2}	2.197 ^{§2}
		In Third	1.333	1.413 ^{§2}	1.413 ^{§2}
		In Fourth	1.028	0.975 ^{§2}	0.975 ^{§2}
		In Fifth	0.820	0.703 ^{§2}	0.703 ^{§2}
		In Reverse	3.583	3.145 ^{§2}	3.145 ^{§2}
	Differential Gear Ratio		3.944	3.391	3.391
	Brake Type	Front	Ventilated Disc	Ventilated Disc	Ventilated Disc
		Rear	Solid Disc	Solid Disc	Solid Disc
	Parking Brake Type		Banksia	Banksia	Banksia
	Brake Booster Type and Size		Single, 10"	Single, 10"	Single, 10"
	Proportioning Valve Type		—	—	—
	Suspension Type	Front	MacPherson Strut	MacPherson Strut	MacPherson Strut
		Rear	MacPherson Strut	MacPherson Strut	MacPherson Strut
	Stabilizer Bar	Front	Standard	Standard	Standard
		Rear	Standard	Standard	Standard
	Steering Gear Type		Rack & Pinion	Rack & Pinion	Rack & Pinion
	Power Steering Type		Hydraulic Type	Hydraulic Type	Hydraulic Type

^{§1}: With sliding roof

^{§2}: Counter gear ratio included

MAJOR TECHNICAL SPECIFICATIONS

Vehicle Grade				Grande / GLX (New Zealand)	Sportivo	Sportivo
Model Code				ACV40R-DEAGKQ	ACV40R-DEMVKQ	ACV40R-DEAVKQ
Major Dimensions & Vehicle Weights	Overall	Length	mm (in.)	4805 (189.2)	4805 (189.2)	4805 (189.2)
		Width	mm (in.)	1820 (71.7)	1820 (71.7)	1820 (71.7)
		Height	mm (in.)	1470 (57.9)	1470 (57.9)	1470 (57.9)
	Wheel Base		mm (in.)	2775 (109.3)	2775 (109.3)	2775 (109.3)
	Tread	Front	mm (in.)	1575 (62.0)	1575 (62.0)	1575 (62.0)
		Rear	mm (in.)	1565 (61.6)	1565 (61.6)	1565 (61.6)
	Room	Length	mm (in.)	2130 (83.8)	2130 (83.8)	2130 (83.8)
		Width	mm (in.)	1525 (60.0)	1525 (60.0)	1525 (60.0)
		Height	mm (in.)	1140 (44.9)	1200 (47.2), 1140 (44.9) ^{sl}	1200 (47.2), 1140 (44.9) ^{sl}
	Overhang	Front	mm (in.)	945 (37.2)	945 (37.2)	945 (37.2)
		Rear	mm (in.)	1085 (42.7)	1085 (42.7)	1085 (42.7)
	Min. Running Ground Clearance		mm (in.)	150 (5.9)	150 (5.9)	150 (5.9)
	Angle of Approach		degrees	—	—	—
	Angle of Departure		degrees	—	—	—
	Curb Weight	Front	kg (lb)	905 (1995)	855 to 865 (1885 to 1907)	900 to 905 (1984 to 1995)
		Rear	kg (lb)	620 to 625 (1367 to 1378)	620 to 630 (1367 to 1389)	615 to 630 (1356 to 1389)
		Total	kg (lb)	1525 to 1530 (3362 to 3373)	1475 to 1495 (3252 to 3296)	1515 to 1535 (3340 to 3384)
	Gross Vehicle Weight	Front	kg (lb)	995 (2194)	955 (2105)	995 (2194)
		Rear	kg (lb)	1020 (2249)	1020 (2249)	1020 (2249)
		Total	kg (lb)	2015 (4442)	1975 (4354)	2015 (4442)
Performance	Fuel Tank Capacity		(US.gal, Imp .gal)	70 (18.5, 15.5)	70 (18.5, 15.5)	70 (18.5, 15.5)
	Luggage Capacity (VDA)		m ³ (cu.ft.)	0.535 (18.9)	0.504 (17.8)	0.504 (17.8)
	Max. Speed		km/h	200	200	200
	Max. Cruising Speed		km/h	—	—	—
	Acceleration	0 to 100 km/h	sec.	—	—	—
		0 to 400 m	sec.	—	—	—
	Max. Permissible Speed	1st Gear	km/h	53	53	53
		2nd Gear	km/h	95	93	95
		3rd Gear	km/h	148	142	148
		4th Gear	km/h	—	195	—
		5th Gear	km/h	—	—	—
	Min. Turning Radius	Tyre	m	5.5	5.5	5.5
		Body	m	5.9	5.9	5.9
Engine	Engine Type			2AZ-FE	2AZ-FE	2AZ-FE
	Valve Mechanism			16-valve, DOHC with VVT-i	16-valve, DOHC with VVT-i	16-valve, DOHC with VVT-i
	Bore × Stroke		mm (in.)	88.5 x 96.0 (3.48 x 3.78)	88.5 x 96.0 (3.48 x 3.78)	88.5 x 96.0 (3.48 x 3.78)
	Displacement		cm ³ (cu.in)	2362 (144.1)	2362 (144.1)	2362 (144.1)
	Compression Ratio			9.6:1	9.6:1	9.6:1
	Carburetor Type			EFI	EFI	EFI
	Research Octane No.		RON	91 or higher	91 or higher	91 or higher
	Max. Output (EEC)		kW @ rpm	117 @ 5700	117 @ 5700	117 @ 5700
Engine Electrical	Max. Torque (EEC)		N · m @ rpm	218 @ 4000	218 @ 4000	218 @ 4000
	Battery Capacity (5HR)	Voltage & Amp.hr.		12-48	12-48	12-48
	Alternator Output	Watts		960	960	960
	Starter Output	kW		1.6	1.6	1.6
Chassis	Clutch Type			—	Dry, Single	—
	Transaxle Type			U250E	E354	U250E
	Gear Ratio	In First		3.943 ^{sl}	3.538	3.943 ^{sl}
		In Second		2.197 ^{sl}	2.045	2.197 ^{sl}
		In Third		1.413 ^{sl}	1.333	1.413 ^{sl}
		In Fourth		0.975 ^{sl}	1.028	0.975 ^{sl}
		In Fifth		0.703 ^{sl}	0.820	0.703 ^{sl}
		In Reverse		3.145 ^{sl}	3.583	3.145 ^{sl}
	Differential Gear Ratio			3.391	3.944	3.391
	Brake Type	Front		Ventilated Disc	Ventilated Disc	Ventilated Disc
		Rear		Solid Disc	Solid Disc	Solid Disc
	Parking Brake Type			Banksia	Banksia	Banksia
	Brake Booster Type and Size			Single, 10"	Single, 10"	Single, 10"
	Proportioning Valve Type			—	—	—
	Suspension Type	Front		MacPherson Strut	MacPherson Strut	MacPherson Strut
		Rear		MacPherson Strut	MacPherson Strut	MacPherson Strut
	Stabilizer Bar	Front		Standard	Standard	Standard
		Rear		Standard	Standard	Standard
	Steering Gear Type			Rack & Pinion	Rack & Pinion	Rack & Pinion
	Power Steering Type			Hydraulic Type	Hydraulic Type	Hydraulic Type

*1: With sliding roof

*2: Counter gear ratio included