PE14-001

TOYOTA

3/26/2014

ATTACHMENT 1

RESPONSE 2

Attachment-Response 2

[CONFIDENTIAL BUSINESS INFORMATION]

Attachment-Response 2

Extended Warranty for Vehicles

		EXTENDED WARRANTY TYPE			
MODEL	MODEL YEAR	GOLD	PLATINUM	POWERTRAIN	TCUV
CAMRY HYBRID	2007	[CONFIDENTIAL BUSINESS INFORMATION]			
	2008				

PE14-001

TOYOTA

3/26/2014

ATTACHMENT 1

RESPONSE 2

Extended Warranty Option

TOYOTA
FINANCIAL SERVICES

Toyota Reference Guide

Vehicle Service Agreements

Toyota Extra Care – **Platinum, Gold and Powertrain**

	Platinum — NEW Plans	**Platinum** — USED Plans	**Gold** — NEW Plans	**Gold** — USED Plans	**Powertrain** — NEW Plans	**Powertrain** — USED Plans
Qualifying Criteria	Vehicles are eligible for a "New Vehicle" VSA for 3 years or 36,000 miles, whichever comes first. Time is effective from date of first use. Mileage is effective at zero.	Vehicles qualify if within current plus 9 model years and less than 125,000 miles. Used vehicle plans must be purchased at the time of used vehicle sale ONLY.	Vehicles are eligible for a "New Vehicle" VSA for 3 years or 36,000 miles, whichever comes first. Time is effective from date of first use. Mileage is effective at zero.	Vehicles qualify if within current plus 9 model years and less than 125,000 miles. Used vehicle plans must be purchased at the time of used vehicle sale ONLY.	Vehicles are eligible for a "New Vehicle" VSA for 3 years or 36,000 miles, whichever comes first. Time is effective from date of first use. Mileage is effective at zero.	Vehicles qualify if within current plus 12 model years and less than 100,000 miles. Used vehicle plans must be purchased at the time of used vehicle sale ONLY.
Plans Offered *See Rate Binder for details.* VSA expires at expiration mileage or date, whichever comes first.	**Years/** Miles **3 years/** 50,000, 80,000 miles **4 years/** 65,000, 100,000, 125,000 miles **5 years/** 60,000, 80,000, 100,000, 125,000 miles **6 years/** 75,000, 100,000, 125,000 miles **7 years/** 75,000, 100,000, 125,000 miles **8 years/** 75,000, 100,000, 125,000 miles	**Plan Term – Mileage*** Max. Mileage at Purchase **1 year – 12,000** 30,000, 50,000, 70,000, 85,000, 100,000, 125,000 miles **2 years – 24,000** 30,000, 50,000, 70,000, 85,000, 100,000 miles **3 years – 36,000** 30,000, 50,000, 70,000, 85,000, 100,000 miles **4 years – 50,000** 30,000, 50,000, 70,000, 85,000, 100,000 miles **5 years – 60,000** 30,000, 50,000, 70,000, 85,000 miles	**Years/** Miles **3 years/** 50,000, 80,000 miles **4 years/** 65,000, 100,000, 125,000 miles **5 years/** 60,000, 80,000, 100,000, 125,000 miles **6 years/** 75,000, 100,000, 125,000 miles **7 years/** 75,000, 100,000, 125,000 miles **8 years/** 75,000, 100,000, 125,000 miles	**Plan Term – Mileage*** Max. Mileage at Purchase **1 year – 12,000** 30,000, 50,000, 70,000, 85,000, 100,000, 125,000 miles **2 years – 24,000** 30,000, 50,000, 70,000, 85,000, 100,000 miles **3 years – 36,000** 30,000, 50,000, 70,000, 85,000, 100,000 miles **4 years – 50,000** 30,000, 50,000, 70,000, 85,000, 100,000 miles **5 years – 60,000** 30,000, 50,000, 70,000, 85,000 miles	**Years/** Miles **6 years/** 100,000 miles	**Plan Term – Mileage*** Max. Mileage at Purchase **1 year – 12,000** 30,000, 50,000, 70,000, 85,000, 100,000 miles **2 years – 24,000** 30,000, 50,000, 70,000, 85,000, 100,000 miles
Towing Benefits**	Unlimited towing reimbursement to the nearest dealership or authorized repair facility	Unlimited towing reimbursement to the nearest dealership or authorized repair facility	Up to $50 per occurrence	Up to $50 per occurrence	Up to $50 per occurrence	Up to $50 per occurrence
Substitute Transportation** *Requires prior approval of Administrator.*	Up to $50 per day for a maximum of 5 days per occurrence	Up to $50 per day for a maximum of 5 days per occurrence	Up to $35 per day for a maximum of 5 days per occurrence	Up to $35 per day for a maximum of 5 days per occurrence	Up to $35 per day for a maximum of 5 days per occurrence	Up to $35 per day for a maximum of 5 days per occurrence
Travel Protection Benefits: Lodging and Meals** Must be more than 150 miles from home. *Requires prior approval of Administrator.*	Up to $100 per day for a maximum of 5 days over the life of the Agreement	Up to $100 per day for a maximum of 5 days over the life of the Agreement	Up to $50 per day for a maximum of 4 days over the life of the Agreement	None	Up to $50 per day for a maximum of 4 days over the life of the Agreement	None
Deductible Options*** Depending on selected plan.	$0 or $50 per eligible repair visit	$0 or $50 per eligible repair visit	$0 or $50 per eligible repair visit	$0 or $50 per eligible repair visit	$0 or $50 per eligible repair visit	$0 or $50 per eligible repair visit
Transferability Between private parties only. Excludes Retail Outlets.	Transferable one time, from the original new car owner to the next owner, for a $50 processing fee.	Transferable one time, from the original used car owner to the next owner, for a $50 processing fee.	Transferable one time, from the original new car owner to the next owner, for a $50 processing fee.	Transferable one time, from the original used car owner to the next owner, for a $50 processing fee.	Transferable one time, from the original new car owner to the next owner, for a $50 processing fee.	Transferable one time, from the original used car owner to the next owner, for a $50 processing fee.
Cancellation Please refer to actual Vehicle Service Agreement contract for state-specific policy.	Within 30 days, full refund less a $25 processing fee. Pro-rata refund beyond 30 days, or if benefits have been paid. (Joint payee if release of lien is not attached).	Within 30 days, full refund less a $25 processing fee. Pro-rata refund beyond 30 days, or if benefits have been paid. (Joint payee if release of lien is not attached).	Within 30 days, full refund less a $25 processing fee. Pro-rata refund beyond 30 days, or if benefits have been paid. (Joint payee if release of lien is not attached).	Within 30 days, full refund less a $25 processing fee. Pro-rata refund beyond 30 days, or if benefits have been paid. (Joint payee if release of lien is not attached).	Within 30 days, full refund less a $25 processing fee. Pro-rata refund beyond 30 days, or if benefits have been paid. (Joint payee if release of lien is not attached).	Within 30 days, full refund less a $25 processing fee. Pro-rata refund beyond 30 days, or if benefits have been paid. (Joint payee if release of lien is not attached).

Coverage is subject to exclusions and limitations set forth in the Vehicle Service Agreement.
Note: The benefits and covered operations stated here are subject to change or may vary slightly based upon the purchase date of the Agreement.
* Coverage expires upon reaching your selected time or mileage of the coverage period, whichever occurs first.
** Available if vehicle is inoperable due to the mechanical failure of a covered component. Valid receipts will be required for reimbursement.
*** Plans feature $0 or $50 deductible options. Deductible applies to each eligible repair visit.

Toyota Certified Used Vehicles

	Toyota Certified Used Vehicle Warranty		Toyota Certified Vehicle Service Agreement	
	Limited Powertrain Warranty	Comprehensive Warranty	Platinum	Gold
Qualifying Criteria	Vehicles that are of current plus 6 model years old and with less than 85,000 total vehicle miles and meet the requirements of Certification established by Toyota.	Vehicles that are of current plus 6 model years old and with less than 85,000 total vehicle miles and meet the requirements of Certification established by Toyota.	Vehicle must have a Toyota Certified Used Vehicle Limited Powertrain Warranty and be a Toyota Certified Used Vehicle to be eligible for the Toyota Certified Used Vehicle Service Agreement. Available at the time of Toyota Certified Used Vehicle purchase ONLY.	Vehicle must have a Toyota Certified Used Vehicle Limited Powertrain Warranty and be a Toyota Certified Used Vehicle to be eligible for the Toyota Certified Vehicle Service Agreement. Available at the time of Toyota Certified Used Vehicle purchase ONLY.
Plans Offered* *See Rates and Reference Guide for details.*	Certified Used Vehicle Limited Powertrain Warranty provided by Toyota. Coverage effective until 7 years after vehicle's date of first use as a new vehicle or 100,000 total vehicle miles, whichever occurs first.	Certified Comprehensive Warranty provided by Toyota. Coverage effective for 12 months or 12,000 miles from date of purchase of the Certified Used Vehicle, whichever occurs first.	Plan Options: 7 years / 100,000 miles 7 years / 125,000 miles 8 years / 100,000 miles 8 years / 125,000 miles Coverage effective as of vehicle's date of first use as a new vehicle.*	Coverage effective until 7 years after vehicle's date of first use as a new vehicle or 100,000 total vehicle miles, whichever occurs first.
Roadside Assistance *Includes towing, flat tire, lockout, jump start and fuel delivery services (up to 3 gallons). Ask customers to call 1-800-297-0486 24 hours a day, 365 days a year within the US and Canada.*	Roadside Assistance is provided for 1 year from the date of Certified Used Vehicle purchase, whichever comes first.	Provided under Certified Limited Powertrain Warranty.	Coverage is effective throughout the life of the Agreement.	Coverage is effective throughout the life of the Agreement.
Towing Benefits	Beyond the Roadside Assistance period, towing to the nearest Toyota dealership is provided for covered repairs at $50 per occurrence.** Coverage effective until 7 years after vehicle's date of first use as a new vehicle or 100,000 total vehicle miles, whichever occurs first.	Towing provided under Certified Limited Powertrain Warranty.	Towing to the nearest Toyota dealership.	Towing to the nearest Toyota dealership.
Substitute Transportation** *Requires prior approval of Administrator.*	Up to $35 per day for a maximum of 5 days per occurrence.	Up to $50 per day for a maximum of 5 days per occurrence.	Up to $50 per day for a maximum of 5 days per occurrence.	Up to $35 per day for a maximum of 5 days per occurrence.
Travel Protection Benefits: Lodging and Meals** Must be more than 150 miles from home. *Requires prior approval of Administrator.*	Up to $50 per day for a maximum of 4 days over the life of the Agreement.	Up to $100 per day for a maximum of 5 days over the life of the Agreement.	Up to $100 per day for a maximum of 5 days over the life of the Agreement.	Up to $50 per day for a maximum of 4 days over the life of the Agreement.
Deductible Options*** Depending on selected plan.	$50 per eligible repair visit. Deductible is waived under Platinum plan.	$50 per eligible repair visit. Deductible is waived under Platinum plan.	$0 per eligible repair visit.	$50 per eligible repair visit.
Transferability Between private parties only. Excludes Retail Outlets.	Toyota Certified Used Vehicle Limited Powertrain Warranty transfers with the vehicle until Warranty expiration. See the Toyota Certified Policies and Procedures Manual for specific details.	Non-transferable.	Transferable one time, from the original used car owner to the next owner, for a $50 processing fee.	Transferable one time, from the original used car owner to the next owner, for a $50 processing fee.
Cancellation Please refer to actual Vehicle Service Agreement contract for state-specific policy.	Toyota Certified Used Vehicle Limited Powertrain Warranty can be cancelled (called an "Unwind") by the dealer only. The dealer must receive approval from Toyota. If cancellation is within 90 days and no claims have been paid, the dealer receives a full refund, less a $25 processing fee. Please contact your Regional Toyota Certified Used Vehicle Manager for details.	Toyota Certified Used Vehicle Comprehensive Warranty can be cancelled (called an "Unwind") by the dealer only. The dealer must receive approval from Toyota. If cancellation is within 90 days and no claims have been paid, the dealer receives a full refund, less a $25 processing fee. Please contact your Regional Toyota Certified Used Vehicle Manager for details.	Within 30 days, full refund less $25 processing fee. Pro-rata refund beyond 30 days, or if benefits have been paid. (Joint payee if release of lien is not attached). Please refer to actual Vehicle Service Agreement contract for state-specific policy.	Within 30 days, full refund less $25 processing fee. Pro-rata refund beyond 30 days, or if benefits have been paid. (Joint payee if release of lien is not attached). Please refer to actual Vehicle Service Agreement contract for state-specific policy.

Coverage is subject to exclusions and limitations set forth in the Vehicle Service Agreement.

Note: The benefits and covered operations stated here are subject to change or may vary slightly based upon the purchase date of the Agreement.

* Coverage expires upon reaching your selected time or mileage of the coverage period, whichever occurs first.

** Available if vehicle is inoperable due to the mechanical failure of a covered component. Valid receipts required for reimbursement.

*** Plans feature $0 or $50 deductible options. Deductible applies to each eligible repair visit.

COMPONENTS

The components listed on these pages are examples of those covered under the TFS VSA Plans, the Toyota Certified Used Vehicle (TCUV) Comprehensive Warranty and TCUV Limited Powertrain Warranty.

Description	Platinum/ Certified Platinum/TCUV Comprehensive Warranty	Gold/ Certified Gold	Powertrain/ TCUV Ltd. Powertrain Warranty
AIR CONDITIONING / HEATING			
Air Conditioning Lines and Tubes	•	•	
Air Conditioning Pressure Switches	•	•	
Air Temperature Control Programmer	•	•	
Blower Motor	•	•	
Blower Motor Resistor	•	•	
Compressor	•	•	
Compressor Clutch Assembly	•	•	
Compressor Pulley	•	•	
Condenser	•	•	
Condenser Fan and Motor	•	•	
Cooler Control Switch	•		
Cooler Unit	•		
Damper Servo	•		
Defroster Control Cable	•		
Evaporator	•	•	
Evaporator Temperature Sensor	•	•	
Expansion Valve	•	•	
Heater Control Head	•		
Heater Control Valve	•	•	
Heater Core	•	•	
Idler Pulley	•	•	
Pressure Regulator Assembly	•	•	
Receiver/Dryer	•	•	
Schrader Valve	•	•	
Seals and Gaskets	•	•	
AUTOMATIC TRANSMISSION*			
Transfer Case Components (ALL internally lubricated components) and:			
Hoses, Lines and Tubes	•	•	•
Seals and Gaskets	•	•	•
Shift Lever Knob	•		
Shift Linkage and Cables	•	•	•
Solenoids	•	•	•
Torque Converter	•	•	•
Transfer/Transmission Case	•	•	•
Transmission Mounts	•	•	•
Vacuum Modulator	•	•	•
AXLE ASSEMBLY*			
(Front, Rear, Four-Wheel, and All-Wheel Drive): ALL internally lubricated components and:			
4x4 Actuators	•	•	•
Axles and Bearings	•	•	•
Center Support Bearing	•	•	•
Constant Velocity Joints and Boots	•	•	•
Differential Carrier Assembly	•		
Drive Axle Housing	•	•	•
Drive Shaft	•	•	•
Hubs	•	•	•
Locking Hubs	•	•	•
Seals and Gaskets	•	•	•
Thrust Washers	•	•	•
Universal Joints	•	•	•
Viscous Coupling	•	•	•

Description	Platinum/ Certified Platinum/TCUV Comprehensive Warranty	Gold/ Certified Gold	Powertrain/ TCUV Ltd. Powertrain Warranty
BRAKES			
Anti-Lock Braking/Traction Control Actuator, Pump and Motor	•	•	
Brake Booster	•	•	
Brake Hoses, Lines and Tubes	•	•	
Brake Pedal Subassembly	•		
Disc Brake Calipers	•	•	
Load-Sensing Proportioning Valve	•	•	
Master Cylinder	•	•	
Parking Brake Cable	•	•	
Parking Brake Control Handle Assembly	•		
Parking Brake Lever Subassembly	•		
Parking Brake Pedal Subassembly	•		
Proportioning Valve	•	•	
Rear Brake Backing Plate	•		
Seals and Gaskets	•	•	
Wheel Cylinders	•	•	
COMPUTERS AND ELECTRONICS			
Airbag Sensors	•		
Antenna Cord	•		
Anti-Lock Braking/Traction Control Computer and Sensors	•	•	
Automatic Shoulder Belt Computer	•	•	
Body Control Module	•	•	
Circuit Opening Relay	•		
Compact Disc (CD) Player	•		
Cruise Control Computer	•	•	
Driver's Side and Passenger's Side Airbags	•		
Electronic Ignition Unit	•	•	
Electronically Controlled Transmission/ Transfer Case Computer and Sensors	•	•	
Electronically Modulated Suspension Computer	•	•	
Engine Control Computer**	•	•	•
Front Seat Airbag Assembly	•		
Graphic Equalizer	•		
Knock Sensor	•	•	
Navigation System	•		
Power Mirror Electronic Control Unit	•	•	
Power Seat Computer	•	•	
Progressive Power Steering Computer	•	•	
Radio Tuner	•		
Side Impact Airbag	•		
Steering Sensor	•		
Stereo Component Amplifier	•		
Sunroof Control Computer and Relay	•	•	
Tape Player	•		
Tilt/Telescoping Steering Computer	•	•	
Traction Control Computer	•		
Trip Computer	•	•	
Variable Induction System	•		
Vehicle Security Computers and Sensor	•	•	
Wiper Module	•	•	

Exact determination of coverage will be made by the Administrator. For questions, please call toll free: 1-800-228-8559.

* For Toyota Certified Used Vehicles, Axle Assembly, Automatic Transmission, Manual Transmission and Engine Components are covered under the Toyota Certified Used Vehicle Limited Powertrain Warranty.

** Fuel Pump and Engine Control Computer for hybrid vehicles are covered under the Toyota Certified Used Vehicle Limited Powertrain Warranty, not the Certified VSAs.

Description	Platinum/ Certified Platinum/TCUV Comprehensive Warranty	Gold/ Certified Gold	Powertrain/ TCUV Ltd. Powertrain Warranty
COOLING SYSTEM			
Coolant Level Sensor/Tank	•		
Cooling Fan Relay	•	•	
Cooling Fan Sensor	•	•	
Engine Coolant Temperature Switch or Sensor (at radiator)	•		
Engine Cooling Fan Motor	•	•	
Engine Fan	•	•	
Engine Fan Clutch	•	•	
Engine Fan Motor	•	•	
Engine Fan Shroud	•	•	
Equipment Drive Pulley	•		
Fan Bracket Subassembly	•	•	
Radiator	•	•	
Radiator Fan Relay	•		
Seals and Gaskets	•	•	
Thermostat	•		
ELECTRICAL			
Alternator	•	•	
Automatic-Off Headlamp Sensor, Timer and Switches	•	•	
Automatic Shoulder Belt Motor and Switches	•	•	
Automatic Temperature Control Unit	•	•	
Back-up Light Switch	•		
Battery to Ground Cable	•		
Battery to Starter Cable	•		
Blower Motor	•	•	
Blower Motor Resistor	•	•	
Charge Warning Relay	•		
Clutch Starter Interlock Switch	•	•	
Convertible Top Motor	•	•	
Cruise Control Actuator/Servo	•	•	
Cruise Control Sensors and Switches	•	•	
Cruise Control Vacuum Motor	•	•	
Defogger Relay	•	•	
Distributor	•	•	
Door Control Relay	•		
Engine Coolant Temperature Gauge and Sending Unit	•		
Engine Coolant Temperature Receiver Gauge and Sending Unit	•		
Engine Cooling Fan Motor	•	•	
Engine Tachometer	•		
Fuel Gauge and Sending Unit	•		
Fuel Receiver Gauge and Sending Unit	•		
Guide Rail Limit Switch	•		
Headlamp Washer	•	•	
Headlight Control Relay	•		
Horn	•		
Horn (for theft deterrent)	•		
Ignition Coil	•	•	
Ignition Switch Lock Cylinder and Key Set	•		

Description	Platinum/ Certified Platinum/TCUV Comprehensive Warranty	Gold/ Certified Gold	Powertrain/ TCUV Ltd. Powertrain Warranty
ELECTRICAL *(continued)*			
Integration Relay	•		
Lamp Failure Indicator Sensor	•	•	
License Plate Light Assembly	•		
Lock Cylinder Set	•		
Main Relay	•		
Manually Operated Switches	•	•	
Oil Pressure Receiver Gauge and Sending Unit	•		
Power Antenna Motor and Cable	•	•	
Power Door Lock Actuator	•	•	
Power Mirror Defogger	•	•	
Power Mirror Motor	•	•	
Power Seat Motors	•	•	
Power Sliding Door Motor	•	•	
Power Window Motor/Regulator	•	•	
Rear Shock Absorber Control Actuator	•		
Retractable Headlamp Motor	•	•	
Shoulder Belt Drive Motor	•		
Smart Entry and Start System Switch, Sensor and Electronic Control Unit	•	•	
Spark Plug Resistive Cord	•		
Speedometer	•		
Starter Motor	•	•	
Starter Solenoid	•	•	
Stop Light Switch	•	•	
Sunroof Cables	•		
Sunroof Motor	•	•	
Taillight Control Relay	•		
Turn Signal Flasher	•		
Unlock Warning Buzzer	•		
Windshield Washer Pump	•	•	
Windshield Wiper Link Assembly	•		
Wiper Control Relay	•		
Wiper Motor	•		
Wiring Harnesses	•		
ENGINE			
ALL internally lubricated components and:			
Air Control Valve (ACV)	•		
Air Pump	•		
Balance Shaft	•	•	•
Belt Tensioner	•		
Camshaft	•	•	•
Crankcase Ventilation Valve	•		
Crankshaft	•	•	•
Crankshaft Pulley	•	•	•
Cylinder Heads	•	•	•
Engine Block	•	•	•
Engine Mounts	•	•	•

Exact determination of coverage will be made by the Administrator. For questions, please call toll free: 1-800-228-8559.

* For Toyota Certified Used Vehicles, Axle Assembly, Automatic Transmission, Manual Transmission and Engine Components are covered under the Toyota Certified Used Vehicle Limited Powertrain Warranty.

COMPONENTS

The components listed on these pages are examples of those covered under the TFS VSA Plans, the Toyota Certified Used Vehicle (TCUV) Comprehensive Warranty and TCUV Limited Powertrain Warranty.

Description	Platinum/ Certified Platinum/TCUV Comprehensive Warranty	Gold/ Certified Gold	Powertrain/ TCUV Ltd. Powertrain Warranty
ENGINE *(Continued)*			
Engine Oil Reservoir	•	•	•
Engine Oil Reservoir Pump	•	•	•
Equipment Drive Shaft	•	•	•
Exhaust Gas Recirculation Valve	•		
Exhaust Manifolds	•	•	•
Exhaust Manifold Heat Insulator	•		
Exhaust Pipe Gasket	•		
Flexplate	•	•	•
Flywheel	•	•	•
Idler Pulley	•	•	•
Intake Air Control Valve (IACV)	•		
Intake Manifold	•	•	•
Mixture Control Valve	•		
Oil Cooler	•		
Oil Filter Bracket Subassembly	•		
Oil Pan	•	•	•
Oil Pressure Switch	•	•	•
Oil Pump	•	•	•
Oil Sending Unit	•	•	•
Pair Valve (Reed Valve)	•		
Piston	•	•	•
Seals and Gaskets	•	•	•
Supercharger	•	•	•
Supercharger Bypass Valve	•		
Supercharger Intercooler	•	•	•
Supercharger Relay	•		
Tensioners	•	•	•
Thermal Vacuum Valve	•		
Thermostatic Valve	•		
Three-way Catalyst Converter	•		
Timing Belt	•	•	•
Timing Belt Idler	•		
Timing Chain	•	•	•
Timing Cover	•	•	•
Timing Gears	•	•	•
Turbo Intercooler	•	•	•
Turbo Wastegate	•	•	•
Turbocharger	•	•	•
Vacuum Switch	•		
Vacuum Switching Valve	•		
Vacuum Transmitting Valve	•		
Valve Covers	•	•	•
Water Pump	•	•	•

Description	Platinum/ Certified Platinum/TCUV Comprehensive Warranty	Gold/ Certified Gold	Powertrain/ TCUV Ltd. Powertrain Warranty
FUEL SYSTEM			
Air Flow Meter	•	•	
Carburetor	•	•	
Charcoal Canister	•		
Diesel Fuel Injection Pump	•	•	
Electric Fuel Pump	•	•	
Electronic Fuel Injection System	•	•	
Fuel Filler Opening Lid Hinge Spring	•		
Fuel Injectors	•	•	
Fuel Pressure Regulator	•	•	
Fuel Pump**	•	•	
Fuel Sending Unit	•	•	
Fuel Sensors	•	•	
Fuel Tank	•	•	
Throttle Body	•	•	
HYBRID			
Actuator Assembly Shift Control	•	•	
Battery Computer Assembly	•	•	
Battery Current Sensor	•	•	
Circuit Breaker Sensor	•	•	
Combination Meter Assembly	•	•	
Combination Meter Computer	•	•	
Engine Control Computer	•	•	
Hybrid Vehicle Battery Blower Assembly	•	•	
Hybrid Vehicle Battery Blower Motor Control	•	•	
Hybrid Vehicle Battery Thermistor	•	•	
Hybrid Vehicle Control Computer	•	•	
Hybrid Vehicle Generator Assembly	•	•	•
Hybrid Vehicle Motor Assembly	•	•	•
Hybrid Vehicle Transaxle Assembly	•	•	•
Inverter Assembly With Converter	•	•	
Main Switch Assembly	•	•	
Power Source Control	•	•	
Computer Assembly	•		
Power Steering Electronic Control Unit Assembly	•	•	
Power Steering Gear Assembly	•	•	
Shift Lever Position Sensor	•	•	
Skid Control Computer Assembly	•	•	
Steering Column Assembly	•	•	
Transmission Control Module	•	•	
Transmission Input Damper Assembly	•	•	•

Exact determination of coverage will be made by the Administrator. For questions, please call toll free: 1-800-228-8559.

* For Toyota Certified Used Vehicles, Axle Assembly, Automatic Transmission, Manual Transmission and Engine Components are covered under the Toyota Certified Used Vehicle Limited Powertrain Warranty.

** Fuel Pump and Engine Control Computer for hybrid vehicles are covered under the Toyota Certified Used Vehicle Limited Powertrain Warranty, not the Certified VSAs.

Description	Platinum/ Certified Platinum/TCUV Comprehensive Warranty	Gold/ Certified Gold	Powertrain/ TCUV Ltd. Powertrain Warranty
MANUAL TRANSMISSION			
Transfer Case Components (ALL internally lubricated components) and:			
Clutch Master Cylinder	•	•	•
Clutch Pedal Subassembly	•		
Clutch Release Cylinder	•	•	•
Control Position Indicator Subassembly	•		
Gears and Shafts	•	•	•
Hoses, Lines and Tubes	•	•	•
Master Cylinder Reservoir	•		
Radial Ball Bearing (for Clutch Release) and/or Clutch Fork	•		
Seals and Gaskets	•	•	•
Shift Lever Boot and/or Retainer	•		
Shift Lever Knob	•		
Shift Lever Subassembly	•		
Shift Linkage and Cables	•	•	•
Transfer/Transmission Case	•	•	•
Transmission Mounts	•	•	•
STEERING			
Gear Box internal components and:			
Bushings/Bearings	•	•	
Center Link	•	•	
Horn Contact Ring	•		
Hoses, Lines, and Tubes	•	•	
Idler Arm	•	•	
Knuckle Stopper Cover	•		
Pitman Arm	•	•	
Power Steering Pump	•	•	
Power Steering Pump Pulley	•		
Rack and Pinion	•	•	
Seals and Gaskets	•	•	
Steering Column	•	•	
Steering Column Coupling	•	•	
Steering Column Shaft	•	•	
Steering Dampener	•	•	
Steering Gear Box and Pump Housings	•	•	
Tie Rod End	•	•	
SUSPENSION			
(Front and Rear):			
Bushings/Bearings	•	•	
Control Arm Shafts	•	•	
Electronic Suspension Actuator/Motor and Compressor	•	•	
Front and Rear Coil Springs	•		
Front and Rear Stabilizer Bar	•		
Front Leading Arm	•		
Front Spring Assembly	•		
Front Spring Shackle	•		
Radius Arm	•	•	
Spindle	•	•	
Spindle Support	•	•	
Steering Knuckle	•	•	

Description	Platinum/ Certified Platinum/TCUV Comprehensive Warranty	Gold/ Certified Gold	Powertrain/ TCUV Ltd. Powertrain Warranty
SUSPENSION *(Continued)*			
Strut Rod	•		
Sway Bar Link	•	•	
Torsion Bar Spring	•		
Upper and Lower Ball Joints	•	•	
Upper and Lower Control Arms	•	•	
Upper Arm Shaft	•		
ADDITIONAL COMPONENTS			
Accelerator Pedal and/or Bracket Subassembly	•		
Accelerator Pedal Rod Assembly	•		
Back Door Lock Assembly	•		
Convertible Roof Hook	•		
Door Lock Cylinder	•		
Front and Rear Door Lock Assembly	•		
Front Seat Belt	•		
Glove Compartment Door Lock Cylinder	•		
Glove Compartment Door Latch Subassembly	•		
Hood Lock Assembly	•		
Hood Lock Control Cable Assembly	•		
Hood Support Assembly	•		
Rear Seat Belt	•		
Reclining Seat Back Adjuster	•		
Removable Roof Lock Handle	•		
Seat Track Assembly	•		
Shoulder Belt Guide Rail Assembly	•		
Sliding Roof Drive Cable	•		
Sliding Roof Guide Rail	•		
Tail Gate Lock Assembly	•		
Tilt Roof Lock Handle Assembly	•		

Exact determination of coverage will be made by the Administrator. For questions, please call toll free: 1-800-228-8559.

* For Toyota Certified Used Vehicles, Axle Assembly, Automatic Transmission, Manual Transmission and Engine Components are covered under the Toyota Certified Used Vehicle Limited Powertrain Warranty.

** Fuel Pump and Engine Control Computer for hybrid vehicles are covered under the Toyota Certified Used Vehicle Limited Powertrain Warranty, not the Certified VSAs.

Toyota Extra Care **VSA Service Coverage**

Claim Information 1-800-228-8559

Prior approval is required for all Toyota Financial Services (TFS) Vehicle Service Agreements and Toyota Certified Used Vehicle Limited Powertrain Warranty claims.

Follow the steps outlined below for prior claim authorization:

1. Check Vehicle

Diagnose the vehicle's malfunction.

2. Verify Coverage

Call Toyota Financial Services for Claim Authorization and Agreement verification at:

Toyota Financial Services	1-800-228-8559
Monday – Friday	7am – 7pm Central Time
Saturday	8am – 1pm Central Time

a. Verify the VIN on the VSA or Certified Warranty matches the vehicle's VIN.
b. Verify that the owner of the vehicle is also the owner of the VSA or Certified Warranty, as coverage will only apply to the owner.
c. Verify with TFS that the Agreement is active.
d. Verify with TFS that the odometer reads less than the Agreement expiration mileage.
e. Verify coverage for the component requiring replacement or repair.
f. Obtain and record the authorization number given by the Claims Operations Specialist on the Repair Order.

3. Complete Repair

a. After verification of coverage with TFS, repair the vehicle.
b. Collect the deductible, if any, from the customer.
c. Provide the customer a copy of the Repair Order.
d. Provide a copy of the Repair Order to TFS, if required.

4. Repair Order

The dealership must retain the repair order in their files for a period of seven (7) years from the date of the repairs.

Note: TFS may request an inspection of the vehicle by an independent third party prior to the claim authorization. A claims representative will advise the dealership of the results of the inspection and authorize the repair, if applicable.

Platinum, Certified Platinum VSA, TCUV Comprehensive Warranty and TCUV Limited Powertrain Warranty Plan Coverage

All manufacturer-original equipment parts installed by the manufacturer or a Toyota Dealer are covered for mechanical failures, unless otherwise excluded.

The items below are NOT covered:

Accessory Drive Belts
Batteries
Body Panels
Brake Linings, Pads and Shoes, Rotors and Drums
Bumpers
Carpet
Chrome
Clutch Friction Disc and Pressure Plate
Dash Cover and Pad
Door Trim, Handles, and Fabric
Filters
Fluids
Glass (including Windshields)
Headliner
Heating Hoses, Lines, and Tubes
Hinges
Hoses
Hybrid Vehicle Battery Pack*
Hybrid Vehicle Battery Plug Assembly*
Hybrid Vehicle Relay Assembly*
Hybrid Vehicle Supply Battery Assembly*
Interior and Exterior Trim and Moldings (including but not limited to Ash Trays, Covers, Cup Holders, and Vents)
Lamps (Back-up, Fog Light, Side Marker, and Turn Signal Light Assemblies)
Light Bulbs
Nuts, Bolts, Clips, Retainers, and Fasteners
Paint
Rust and Corrosion Damage
Seat Covers
Sheet Metals
Shiny Metals
Spark Plugs
Structural Framework and Welds
Tires
Vacuum Hoses, Lines, and Tubes
Weather Stripping
Wheels and Rims
Windshield Wiper Blades (Rubber Component)

* Covered under the Toyota Hybrid System Warranty. Refer to Owner's Warranty and Maintenance Guide for details.

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RESPONSE 6

Total Count for Claims

Total count for warranty, extended warranty, and goodwill claims

Model	MY	Warranty	Extended	Goodwill	Total
CAMRY HV	2007	326	381	417	1,124
	2008	143	80	40	263
Total Claims		469	461	457	1,387

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RESPONSE 7

Search Criteria, Operation & Problem Codes

The search criteria for identifying claims

Part Number	Part Description
44050-*****	ACTUATOR ASSY, BRAKE W/FLUID
89540-*****	COMPUTER ASSY, SKID CONTROL
47220-*****	RESERVOIR ASSY, MASTER CYLINDER
89510-*****	SENSOR ASSY, BRAKE PEDAL STROKE
47207-*****	CYLINDER SUB-ASSY, BRK STROKE SIMULATOR
47201-*****	CYLINDER SUB-ASSY, BRAKE MASTER

List of problem codes included in warranty search result.

Problem Code	Problem Code Description
01	Engine Cranks-No Start
04	Stumble, Hesitation, Poor Acceleration
05	Lack/Loss Of Power
06	Excessive Knocking
30	Check Engine Light
38	Poor Brake Performance (Excludes Parking Brake)
40	Improper Free Play
41	Improper Stroke (Excludes Parking Brake)
43	Poor Recovery
44	Excess Vibration
46	Brakes Drag (Excludes Parking Brake)
47	Brakes Lock Wheel(S) Prematurely
4A	Parking Brake Does Not Hold Vehicle
60	Abnormal Smell
64	Leaks-Other (Air, Fuel, Exhaust Gas, Refrigerant)
65	Oil Or Grease Leak, Oil Entering
66	Water Leak, Water Entering
72	Inoperative When Switched 'On'
73	Inaccurate (Meter, Gauge, Clock Etc.)
76	Poor Sound (Horn, Radio, Buzzer Etc.)
81	Will Not Maintain 'On' Or 'Off'
82	Continues To Operate When Switched 'Off'
84	Improper Coming Out Lighter, Antenna, Audio
87	Erroneous Behavior
8A	Engine Check Lamp 'On' / Mil On
8B	Tire Pressure Warning Lamp 'On'
8C	Warning Or Indicator Lamp 'On'
91	Abnormal Or Excessive Noise
93	Grabs
94	Interference (Resulting In Damage)
95	Inoperative
97	High Operating Effort
98	Poor Feeling Of Switches Or Controls
99	Others
9B	Shudder, Vibration, Pulse (Other Than Code=2a,34)

List of labor operation codes included in warranty search result.

<First five digits>

Labor Op	Labor Op Description
01109	CYLINDER HEAD - OTHERS
01119	CYLINDER BLOCK - OTHERS
04349	FRONT AXLE - OTHERS
04619	BRAKE MASTER CYLINDER - OTHERS
04621	ADJUSTMENT OPERATION TIME - PARKING BRAKE
04639	BRAKE MASTER CYLINDER - OTHERS
04649	BRAKE TUBE-HOSE - OTHERS
04659	PARKING BRAKE - OTHERS
04679	BRAKE PEDAL - OTHERS
04739	DISC BRAKE - OTHERS
04749	LOAD SENSING PROPORTIONING VALVE - OTHERS
08109	HEADLIGHT-TURN SIGNAL LIGHT - OTHERS
08209	WIRING HARNESS - OTHERS
08329	SWITCH REGULATOR - OTHERS
08339	MONITORING SYSTEM - OTHERS
08509	WINDSHIELD WIPER - OTHERS
08629	HORN - OTHERS
08909	HYBRID VEHICLE SYSTEM - OTHERS
08929	MULTIPLEX (MPX) COMMUNICATION SYSTEM - OTHERS
08939	AIR BAG SYSTEM - OTHERS
08959	EFI - OTHERS
08969	ABS AND TRAC SYSTEM - OTHERS
43460	FRONT AXLE - FRONT DRIVE SHAFT ASSEMBLY
46110	BRAKE MASTER CYLINDER - TANDEM MASTER CYLINDER ASSEMBLY
46120	BRAKE MASTER CYLINDER - MASTER CYLINDER RESERVOIR SET
46540	PARKING BRAKE - PARKING BRAKE PEDAL SUBASSEMBLY
46701	BRAKE PEDAL - BRAKE PEDAL SUBASSEMBLY
47302	DISC BRAKE - FRONT DISC (ON-VEHICLE)
82099	TFS SPECIAL OP CODE - REPAIR WIRING HARNESS
83210	SWITCH REGULATOR - STOP LIGHT SWITCH ASSEMBLY
83213	SWITCH REGULATOR - PARK/NEUTRAL POSITION SWITCH ASSEMBLY
83327	MONITORING SYSTEM - STROKE SENSOR
89601	ABS AND TRAC SYSTEM - SKID CONTROL COMPUTER ASSEMBLY
89605	ABS AND TRAC SYSTEM - ABS ACTUATOR ASSEMBLY
RNR99	RENTAL - NO REPAIR

<The sixth digit>

Labor Op	LABOR OP DESCRIPTION
1	REMOVE AND REINSTALL OR REPLACE
2	OVERHAUL
3	INSPECT, CLEAN AND/OR LUBRICATION
4	ADJUST
5	GRIND
7	STALL TEST OR OIL PRESSURE TEST

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ATTACHMENT 1

RESPONSE 8

ABS/VSC DTC C1247 - Stroke Sensor Detection Logic Update

Service Category Brake

Section Brake Control/Dynamic Control System **Market** USA

Toyota Supports ASE Certification

Applicability

YEAR(S)	MODEL(S)	ADDITIONAL INFORMATION
2007 – 2011	Camry HV	
2004 – 2009	Prius	

Introduction

Some 2007 – 2011 model year Camry HV and 2004 – 2009 model year Prius vehicles' Brake systems may exhibit a MIL "ON" and brake warning lights (ABS/VSC) illuminated in the Instrument Panel with the Diagnostic Trouble Code (DTC) C1247 (Stroke Sensor Malfunction) stored in the ABS/VSC Electronic Control Unit (ECU). This DTC may set as a result of overly sensitive monitoring logic without any other ABS/VSC system issue. Follow the procedure in this bulletin to properly diagnose the system and, if necessary, replace the ABS/VSC ECU with an ECU containing updated monitoring logic.

Production Change Information

This bulletin applies to the following vehicles:

- All 2004 – 2009 MY Prius vehicles.
- All Japan built 2007 – 2011 MY Camry HV vehicles.
- TMMK built 2007 – 2011 MY Camry HV vehicles produced **BEFORE** the Production Change Effective VIN shown below.

MODEL	PLANT	PRODUCTION CHANGE EFFECTIVE VIN
Camry HV	TMMK	4T1BB3EK#BU140816

Parts Information

MODEL	MODEL YEAR	PREVIOUS PART NUMBER	CURRENT PART NUMBER	PART NAME	QTY
Camry HV	2007–2009	89540-33390	Same	Computer Assy, Skid Control	1
	2010–2011	89540-33400	Same		1
Prius	2004	89540-47060	Same		1
	2005–2009	89540-47130	Same		1

ABS/VSC DTC C1247 - Stroke Sensor Detection Logic Update

Warranty Information

OP CODE	DESCRIPTION	TIME	MODEL	OFP	T1	T2
896011	R & R Skid Control Computer	2.1	Camry HV	89540-33390 89540-33400	8A	99
		2.0	Prius	89540-47060 89540-47130		

APPLICABLE WARRANTY

- **This repair is covered under the Toyota Basic Warranty. This warranty is in effect for 36 months or 36,000 miles, whichever occurs first, from the vehicle's in-service date.**
- **Warranty application is limited to occurrence of the specified condition described in this bulletin.**

Required Tools & Equipment

REQUIRED EQUIPMENT	SUPPLIER	PART NUMBER	QTY
TIS Techstream* or Techstream Lite NOTE: Software version 7.20.041 or later is required.	ADE	TSPKG1 or TSLITEDLR01	1

* Essential SST.

NOTE

Additional Techstream units may be ordered by calling Approved Dealer Equipment (ADE) at 1-800-368-6787.

ABS/VSC DTC C1247 - Stroke Sensor Detection Logic Update

Repair Procedure

1. Using Techstream, perform a Health Check and confirm that DTC C1247 is present in the ABS/VSC ECU.
2. Follow the diagnostics for this DTC.

   Refer to the Technical Information System (TIS), applicable model and model year Repair Manual:

   - 2007 Camry HV:
     Brake – Brake Control/Dynamic Control System – "Brake Control: Electronically Controlled Brake System: C1247/47, C1346/71, C1392/48: Stroke Sensor Malfunction (to 10/2006) / (from 10/2006)"
   - 2008 / 2009 / 2010 / 2011 Camry HV:
     Brake – Brake Control/Dynamic Control System – "Brake Control: Electronically Controlled Brake System: C1247/47, C1346/71, C1392/48: Stroke Sensor Malfunction"
   - 2004 / 2005 Prius:
     Brake – Brake Control/Dynamic Control System – "Electronically Controlled Brake System: C1247/47, C1392/48 Un-correction of A Zero Point of the Stroke Sensor"
   - 2006 / 2007 / 2008 / 2009 Prius:
     Brake – Brake Control/Dynamic Control System – "Brake Control: Electronically Controlled Brake System: C1247/47, C1392/48: Stroke Sensor Malfunction"
3. In the event that NO problem can be found for this DTC, replace the ABS/VSC ECU.

   Refer to TIS, applicable model and model year Repair Manual:

   - 2007 Camry HV:
     - *Brake – Brake Control/Dynamic Control System – "Brake Control: Skid Control ECU (for TMMK made): Removal / Installation"*
     - *Brake – Brake Control/Dynamic Control System – "Brake Control: Skid Control ECU (for TMC made): Removal / Installation"*
   - 2008 Camry HV:
     - *Brake – Brake Control/Dynamic Control System – "Brake Control: Skid Control ECU (for TMMK made): Removal / Installation"*
     - *Brake – Brake Control/Dynamic Control System – "Brake Control: Skid Control ECU (for TMC made): Removal / Installation"*
   - 2009 Camry HV:
     - *Brake – Brake Control/Dynamic Control System – "Brake Control: Skid Control ECU (for TMMK made): Removal / Installation"*
     - *Brake – Brake Control/Dynamic Control System – "Brake Control: Skid Control ECU (for TMC made): Removal / Installation"*

ABS/VSC DTC C1247 - Stroke Sensor Detection Logic Update

Repair Procedure (Continued)

- 2010 Camry HV:
  - *Brake – Brake Control/Dynamic Control System – "Brake Control: Skid Control ECU (for TMMK made): Removal / Installation"*
  - *Brake – Brake Control/Dynamic Control System – "Brake Control: Skid Control ECU (for TMC made): Removal / Installation"*
- 2011 Camry HV:
  - *Brake – Brake Control/Dynamic Control System – "Brake Control: Skid Control ECU (for TMMK made): Removal / Installation"*
  - *Brake – Brake Control/Dynamic Control System – "Brake Control: Skid Control ECU (for TMC made): Removal / Installation"*
- 2004 Prius:
  Brake – Brake Control/Dynamic Control System – "Skid Control ECU Assy: Replacement"
- 2005 Prius:
  Brake – Brake Control/Dynamic Control System – "Skid Control ECU Assy: Replacement"
- 2006 Prius:
  Brake – Brake Control/Dynamic Control System – "Brake Control: Skid Control ECU: Removal / Installation"
- 2007 Prius:
  Brake – Brake Control/Dynamic Control System: – "Brake Control: Skid Control ECU: Removal / Installation"
- 2008 Prius:
  Brake – Brake Control/Dynamic Control System – "Brake Control: Skid Control ECU: Removal / Installation"
- 2009 Prius:
  Brake – Brake Control/Dynamic Control System – "Brake Control: Skid Control ECU: Removal / Installation"

4. Clear any stored DTCs.
5. Disconnect Techstream.
6. Test drive vehicle to confirm the condition has been corrected.

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RESPONSE 10

Modifications/Changes

Part	a. Implementation Date in Production	b. Description of change	c. Reason for change	d. P/N of original component	e. P/N of modified component	f. Old component withdrawn?	g. Service availability
CONFIDENTIAL BUSINESS INFORMATION REDACTED							

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ATTACHMENT 1

RESPONSE 12

Attachment-Response 12-1

BRAKE

■DESCRIPTION

1. General

The ’07 Camry Hybrid model has a brake system with the following specifications:

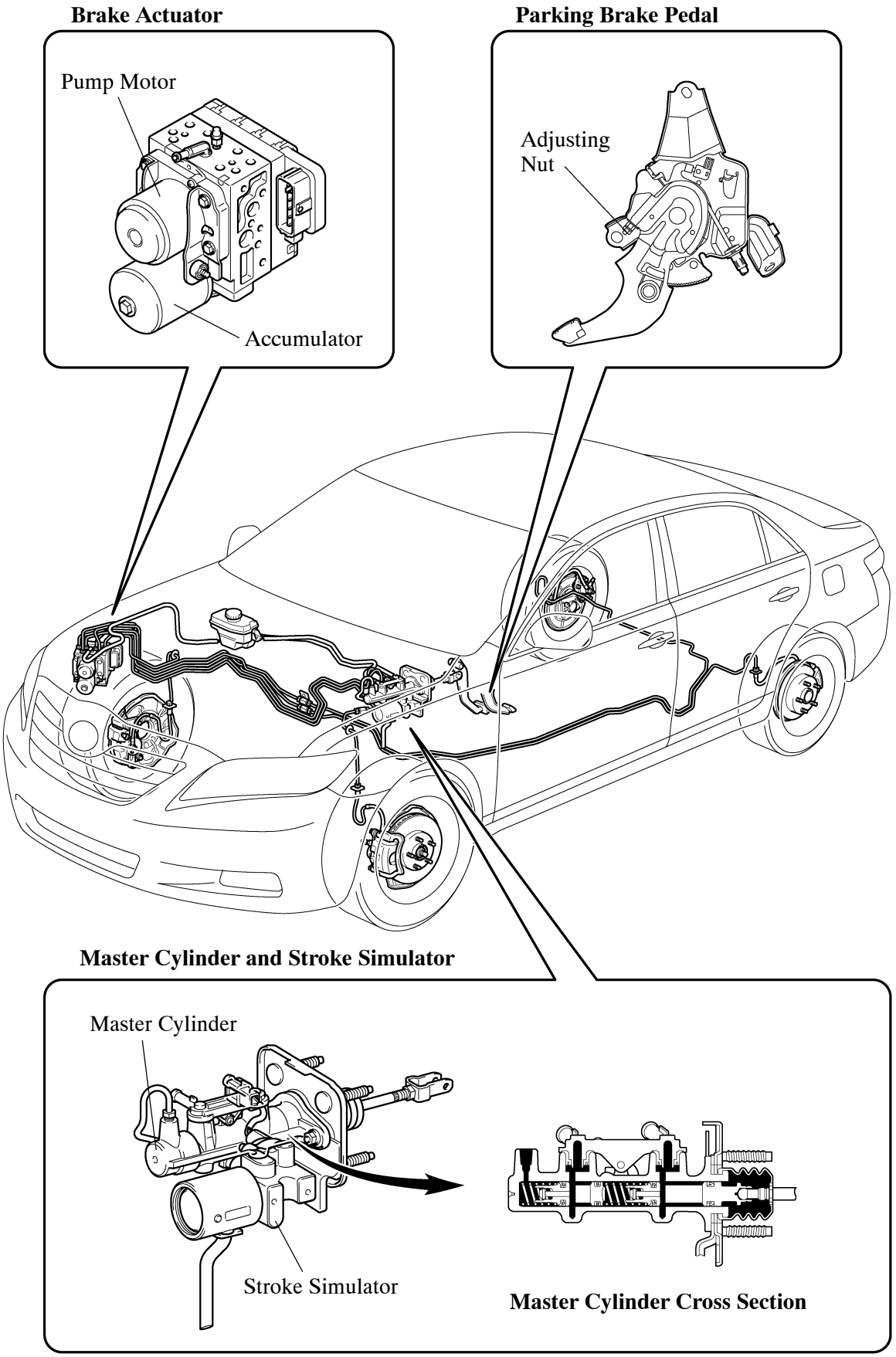
Front Brake Type	Ventilated Disc
Rear Brake Type	Solid Disc
● VDIM (Vehicle Dynamics Integrated Management) ● ECB (Electronically Controlled Brake System)	Standard
Parking Brake Lever Type	Pedal

▶ Specifications ◀

Master Cylinder	Type		Tandem (Portless + Portless)
	Diameter	mm (in.)	19.05 (0.75)
Front Disc Brake	Caliper Type		PE63
	Wheel Cylinder Dia.	mm (in.)	63.5 (2.50)
	Rotor Size (D x T)*	mm (in.)	296 x 28 (11.65 x 1.10)
	Pad Material		PN562H
Rear Disc Brake	Caliper Type		PEAL38
	Wheel Cylinder Dia.	mm (in.)	38.1 (1.50)
	Rotor Size (D x T)*	mm (in.)	281 x 10 (11.06 x 0.39)
	Pad Material		D6234
Parking Brake	Type		Duo Servo
	Drum Inner Dia.	mm (in.)	170.0 (6.69)
Brake Actuator Manufacturer			TOYOTA (In-house Sourcing Parts)

*: D: Outer Diameter, T: Thickness

2. Component of Brake System



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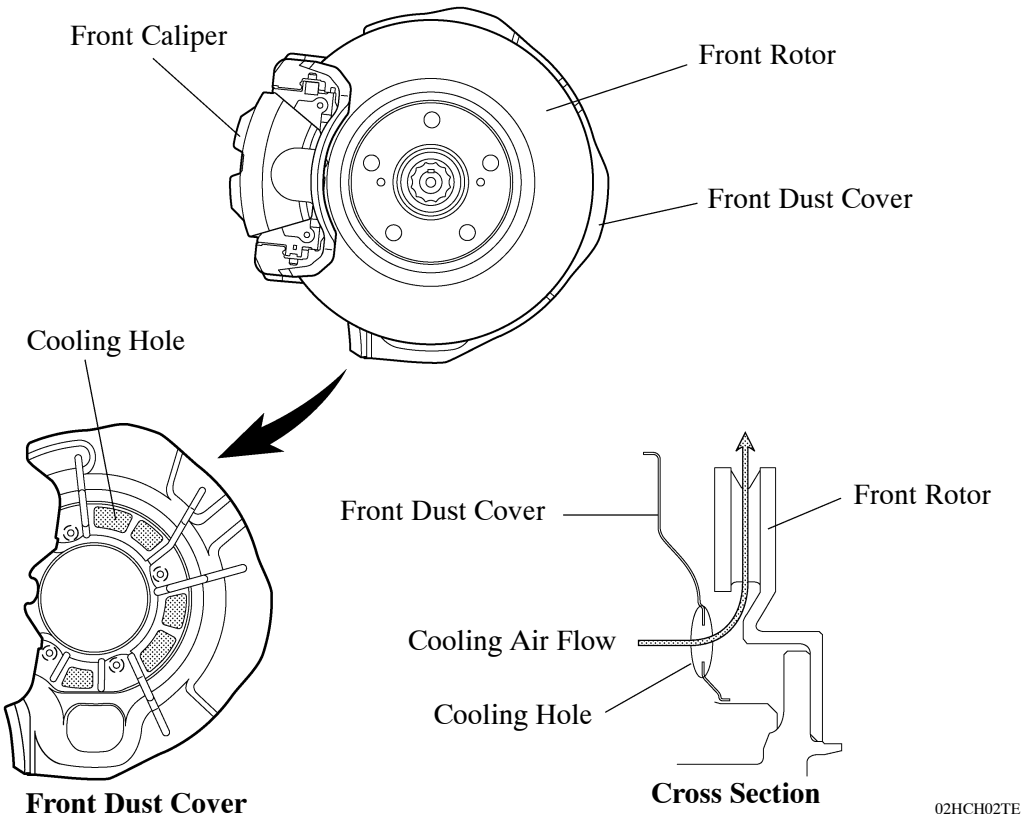
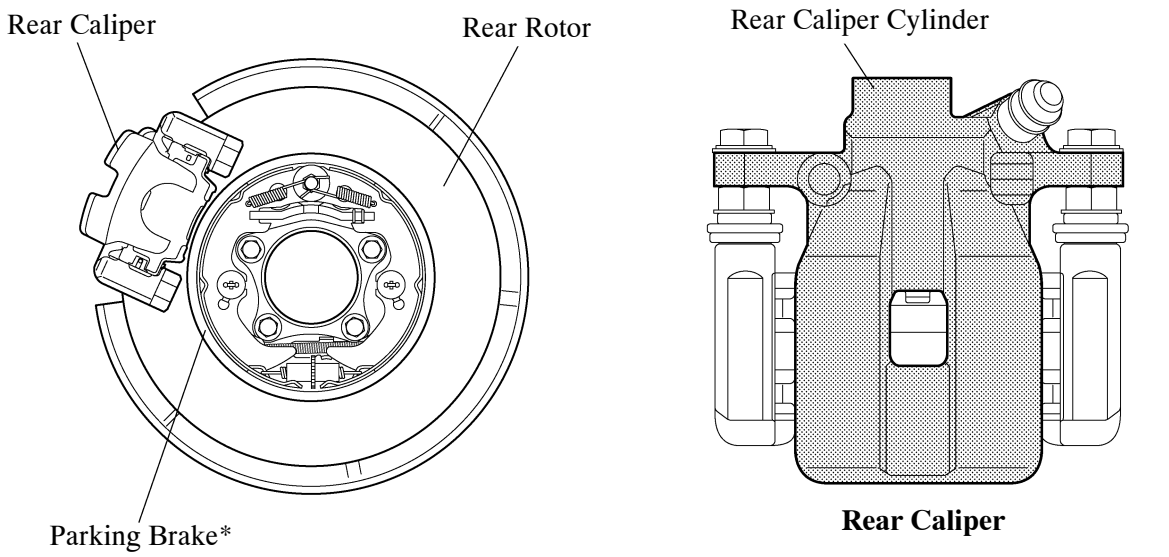
■FRONT BRAKE

- The diameter of the front rotor is 296 mm (11.65 in.). The front rotor is the ventilated type that excels in heat dissipation to ensure reliability.
- The shape of the front dust cover has been optimized to efficiently direct cool air to the ventilated disc, thus ensuring excellent cooling performance.



■REAR BRAKE

- The diameter of the rear rotor is 281 mm (11.06 in.). It has a built-in duo servo type parking brake.
- For weight reduction, a rear caliper cylinder made of aluminum is used.



*: Inside view of the parking brake drum

■BRAKE CONTROL SYSTEM

1. General

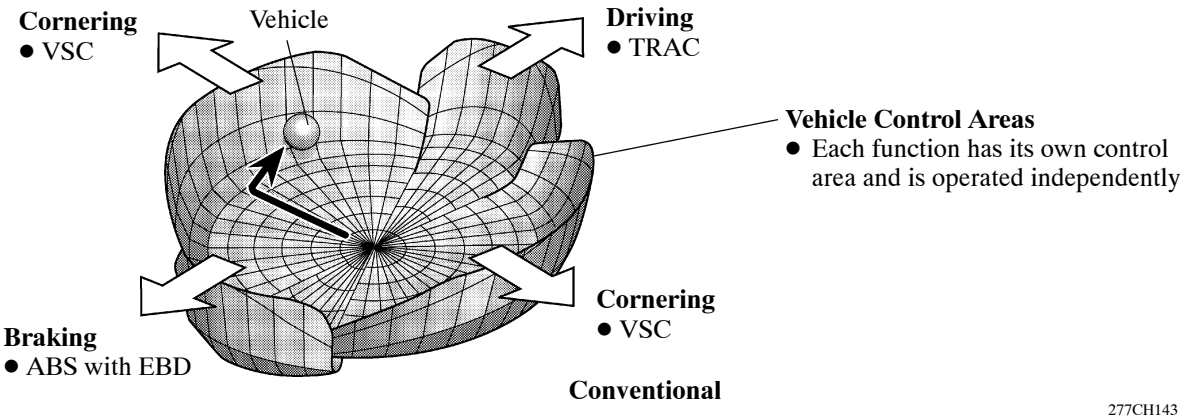
- A brake management function, VDIM (Vehicle Dynamics Integrated Management), which delivers comprehensive vehicle movement control, is used.
- An ECB (Electronically Controlled Brake System) is used.
- The brake control system is controlled by the skid control ECU.

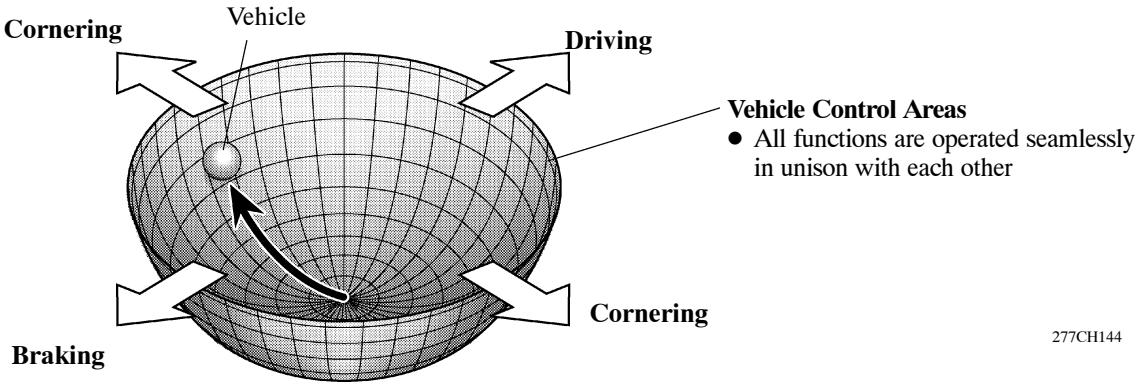
2. VDIM (Vehicle Dynamics Integrated Management)

General

- The VDIM manages all functions, such as the ABS with EBD, the Brake Assist, the TRAC, and the VSC. And is operated by the ECB (Electronically Controlled Brake System), which regulates brake fluid pressure. In addition, the regenerative brake cooperative control and power steering cooperative control functions are also available, thus allowing the VDIM to perform the comprehensive management.
- Conventional brake control systems begin to control either the braking or motive force in order to stabilize the vehicle motion, when it becomes unstable due to loss of tire traction. In contrast, in order to maintain stable vehicle control, the VDIM commences controlling the brake, hybrid and steering systems in accordance with changes in balance before the vehicle becomes unstable. As a result, maintenance smooth vehicle control is achieved.
- Conventional brake control systems manage all related functions, such as the ABS with EBD, the Brake Assist, the TRAC and the VSC, independently, according to the vehicle dynamics. In contrast, the VDIM provides smooth control by seamlessly integrating all brake control related functions.

▶ Conceptual Diagram of Control Management ◀





VDIM

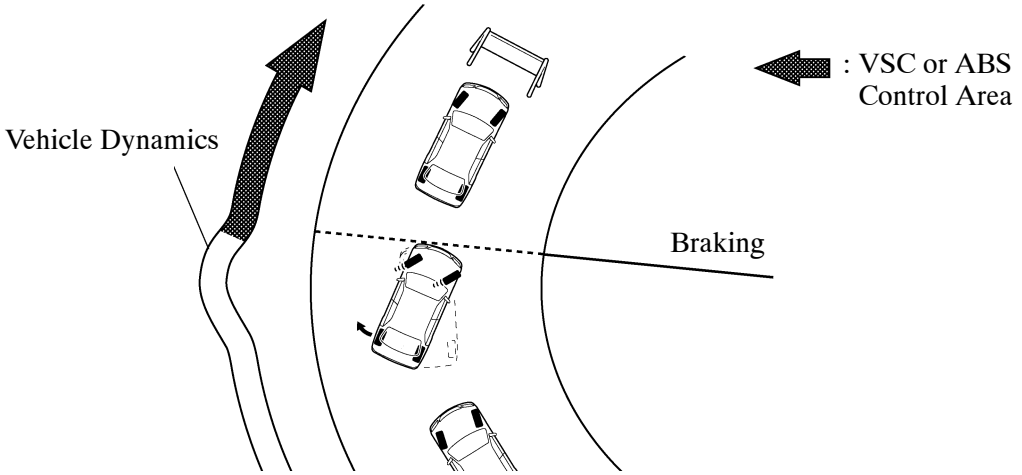
Examples of Control Operation

1) General

The difference in vehicle control during harsh braking situations while cornering, with the VDIM and conventional brake control systems, is as follows:

2) Conventional

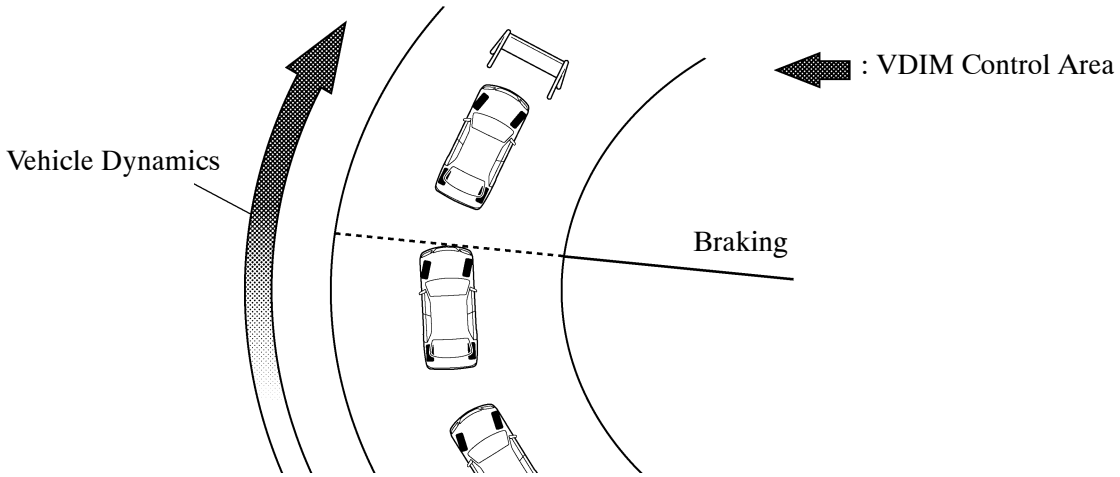
Conventional brake control systems calculate vehicle motion based on signals transmitted by yaw rate and deceleration sensors, the speed sensors and the steering sensor, and activates VSC systems when vehicles are determined to be skidding. If the driver brakes suddenly, brake control systems perform assisting control to stabilize the vehicle dynamics, by activating the ABS system when a locked wheel is detected, or by affecting the VSC system when skidding is detected.



Harsh Braking

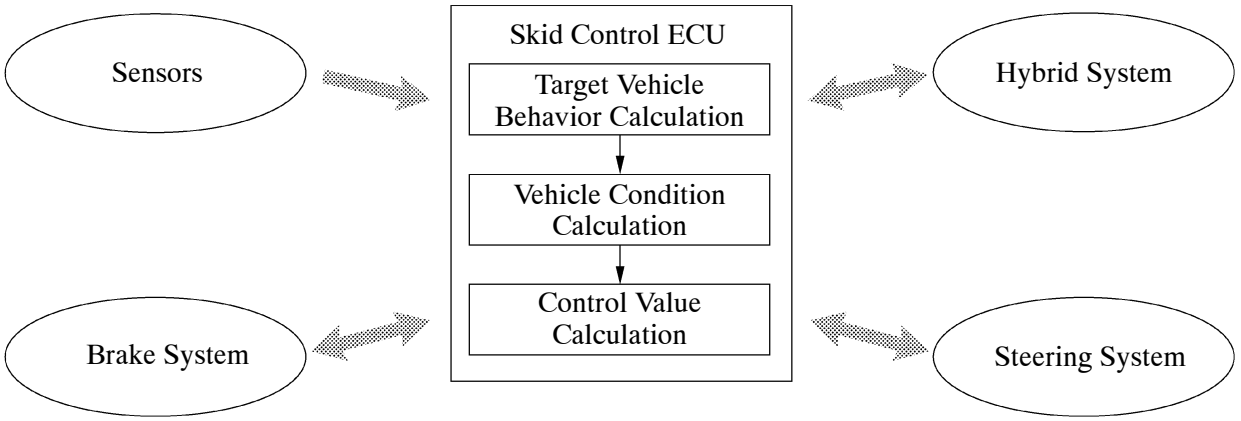
3) VDIM

The VDIM also calculates vehicle motion based on signals from the yaw rate and deceleration sensor, speed sensors and steering sensor. When the calculations indicate that the vehicle is likely to skid, the VDIM begins vehicle control with the VSC function. In addition, if the driver brakes suddenly, the VDIM reduces vehicle instability to a minimum and assists in achieving optimum driving stability by seamlessly delivering a suitable combination of the VSC and ABS functions.



Harsh Braking

Control Configuration of VDIM



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Function

The brake control system of the ’07 Camry Hybrid model has a following function:

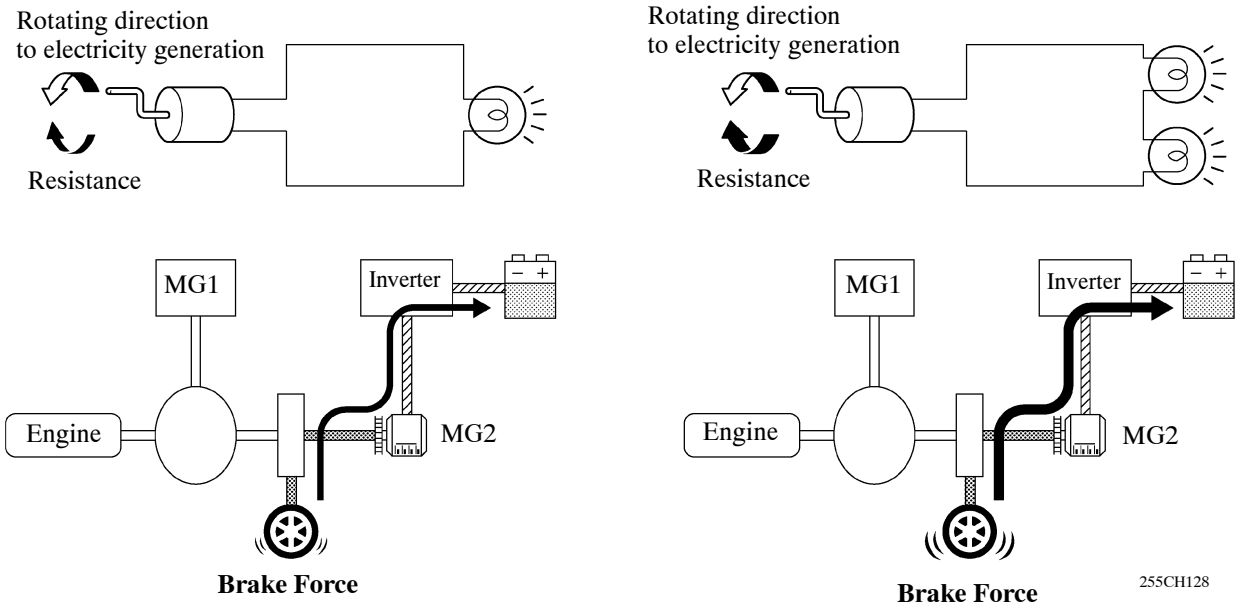
Brake Control System	Function		Outline
VDIM	Regenerative Brake Cooperative Control		Controls hydraulic braking in order to recover electrical energy by utilizing the regenerative brake of the THS II as much as possible.
	Power Steering Cooperative Control		Effects cooperative control with the EPS ECU in order to provide steering assist in accordance with the operating conditions of the vehicle.
	ECB*		● This system electrically detects the operation information for the brake pedal and generates an appropriate amount of hydraulic brake. ● Executes the hydraulic control of the brake control functions based on the VDIM.
		VSC (Vehicle Stability Control)	The VSC function helps prevent the vehicle from slipping sideways as a result of strong front wheel skid or strong rear wheel skid during cornering.
		TRAC (Traction Control)	The TRAC function helps prevent the drive wheels from slipping if the driver presses the accelerator pedal excessively when starting off or accelerating on a slippery surface.
		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 utilizes ABS, realizing 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 behavior.
		Brake Assist	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 the vehicle’s brake performance.

*: ECB (Electronically Controlled Brake System)

Outline of Regenerative Brake Cooperative Control Function

1) General

- Regenerative brake consists of a resistance force that is generated at the rotational axle in the reverse direction of the rotation of the generator (MG2) that is generating electricity. The greater the generated amperage (battery charging amperage), the greater will be the resistance force.

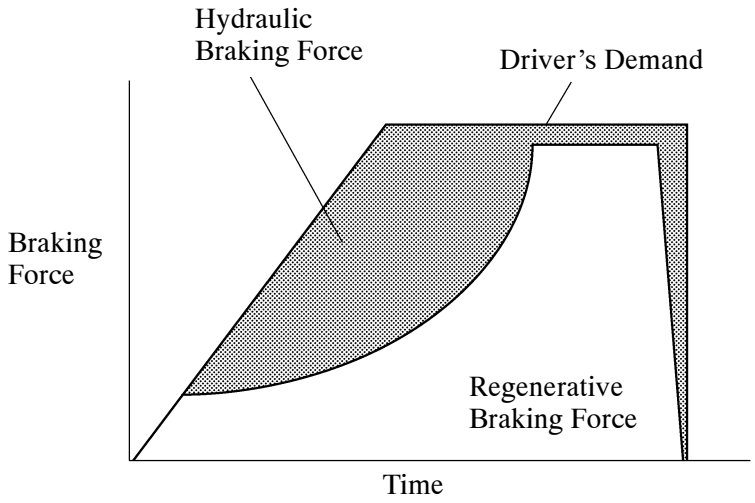


- The drive axle and MG2 are joined mechanically. When the drive wheels rotate MG2 and cause it to operate as a generator, a regenerative brake force of MG2 is transmitted to the drive wheels. This force is controlled by the THS II, which controls the generation of electricity.
  The regenerative brake cooperative control does not rely solely on the braking force of the hydraulic brake system to supply the brake force required by the driver. Instead, by effecting cooperative control with the THS II, this control provides a joint braking force provided by the regenerative brake and the hydraulic brake. As a result, this control minimizes the loss of the kinetic energy associated with the normal hydraulic brake, and recovers this energy by converting it into electrical energy.

2) Apportioning of the Brake Force

- The apportioning of the brake force between the hydraulic brake and the regenerative brake varies by the vehicle speed and time.
- The apportioning of the brake force between the hydraulic brake and the regenerative brake is accomplished by controlling the hydraulic brake so that the total brake force of the hydraulic brake and the regenerative brake matches the brake force required by the driver.
- If the regenerative brake becomes inoperative due to a malfunction in the THS II, the brake system effects control so that the entire brake force required by the driver is supplied with the hydraulic brake system.

▶ Imagery Drawing ◀



Changes in Braking Force Apportionment

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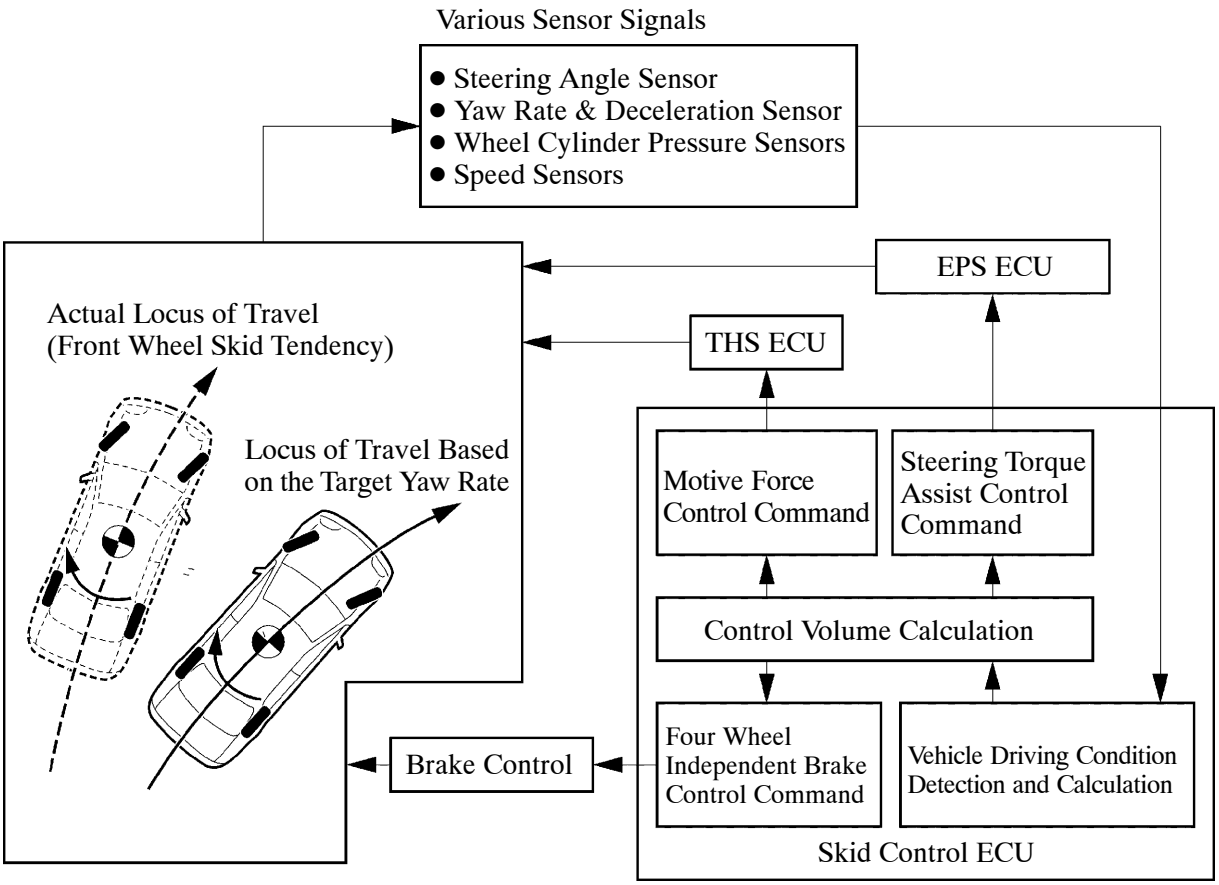
Outline of Power Steering Cooperative Control Function

1) General

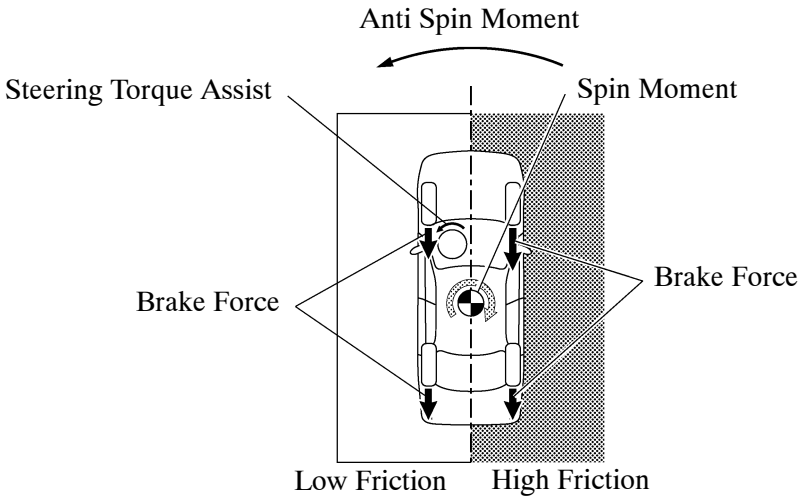
- The VDIM effects coordinated control consisting of the ECB (Electronically Controlled Brake System) and EPS. By integrating these preventive safety functions, the VDIM ensures excellent driving stability and maneuverability of the vehicle.
- The VDIM coordinates the EPS and ECB (Electronically Controlled Brake System) to perform braking control on split friction roads and front and rear wheel skid tendency controls.
- If the vehicle loses stability due to wheel slippage, this function effects brake control by applying brake pressure to the wheels. At the same time, the EPS provides steering torque assist control to facilitate the driver's steering maneuver.



0140CH127C

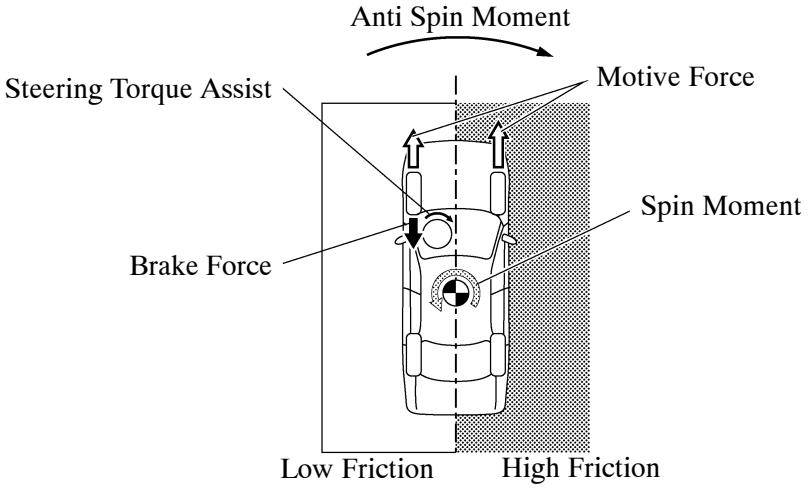
2) Operation in Braking on Split Friction Roads

When braking on a split friction road, the vehicle tends to deflect toward the higher friction side due to the difference between the braking forces on the left and right sides. In the VDIM, the EPS ECU receives command signals from the skid control ECU. Based on these signals, the EPS ECU operates the motor for the EPS to reduce the effect of the difference between the braking forces on the left and right sides, assisting steering operation. This enables the driver to operate the steering wheel to make steering corrections easily.



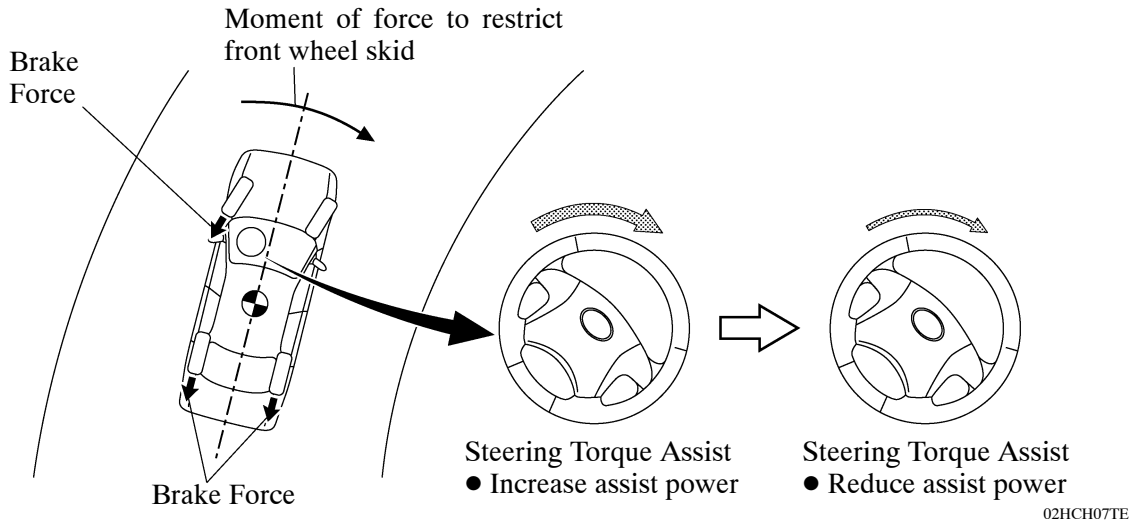
3) Operation in Accelerating on Split Friction Roads

When accelerating on a split friction road, the vehicle tends to deflect toward lower friction side due to the drive torque difference between the left and right sides. In the VDIM, the skid control ECU performs braking control of the drive wheel on the low friction side (TRAC function) and transmits command signals to the EPS ECU. Based on these signals, the EPS ECU operates the motor for the EPS to reduce the effect of the motive force difference between the left and right sides, assisting steering operation. As a result, the proper motive force and vehicle stability have been ensured.



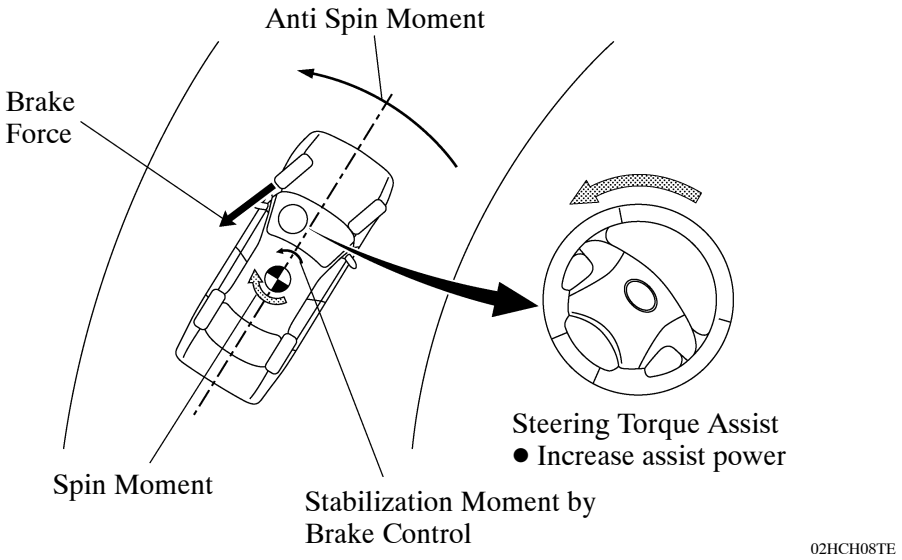
4) Operation in Front Wheel Skid Tendency Control

- When front wheel skidding is detected, motive force is limited and braking control is performed based on the amount of front wheel skid tendency. Accordingly, a moment of force is generated in the vehicle turning direction to limit front wheel skid tendency. (VSC function)
- In the case of a front wheel skid tendency, the steering torque will be light as a signal to the driver.
- With the VDIM, if the driver turns the steering wheel excessively, the EPS ECU will receive command signals from the skid control ECU. Based on these signals, the EPS ECU will operate to reduce the steering assist. This prevents the driver from increasing the front wheel skid tendency.



5) Operation in Rear Wheel Skid Tendency Control

- When rear wheel skidding is detected, motive force is limited and braking control is performed based on the amount of rear wheel skid tendency. Accordingly, an anti-spin moment is generated to limit the rear wheel skid tendency. (VSC function)
- With the VDIM, the EPS ECU receives command signals from the skid control ECU. Based on these signals, the EPS ECU operates the motor for the electric power steering to provide steering assist to help the driver compensate for the rear wheel skid tendency. This enables the driver to operate the steering wheel easily.

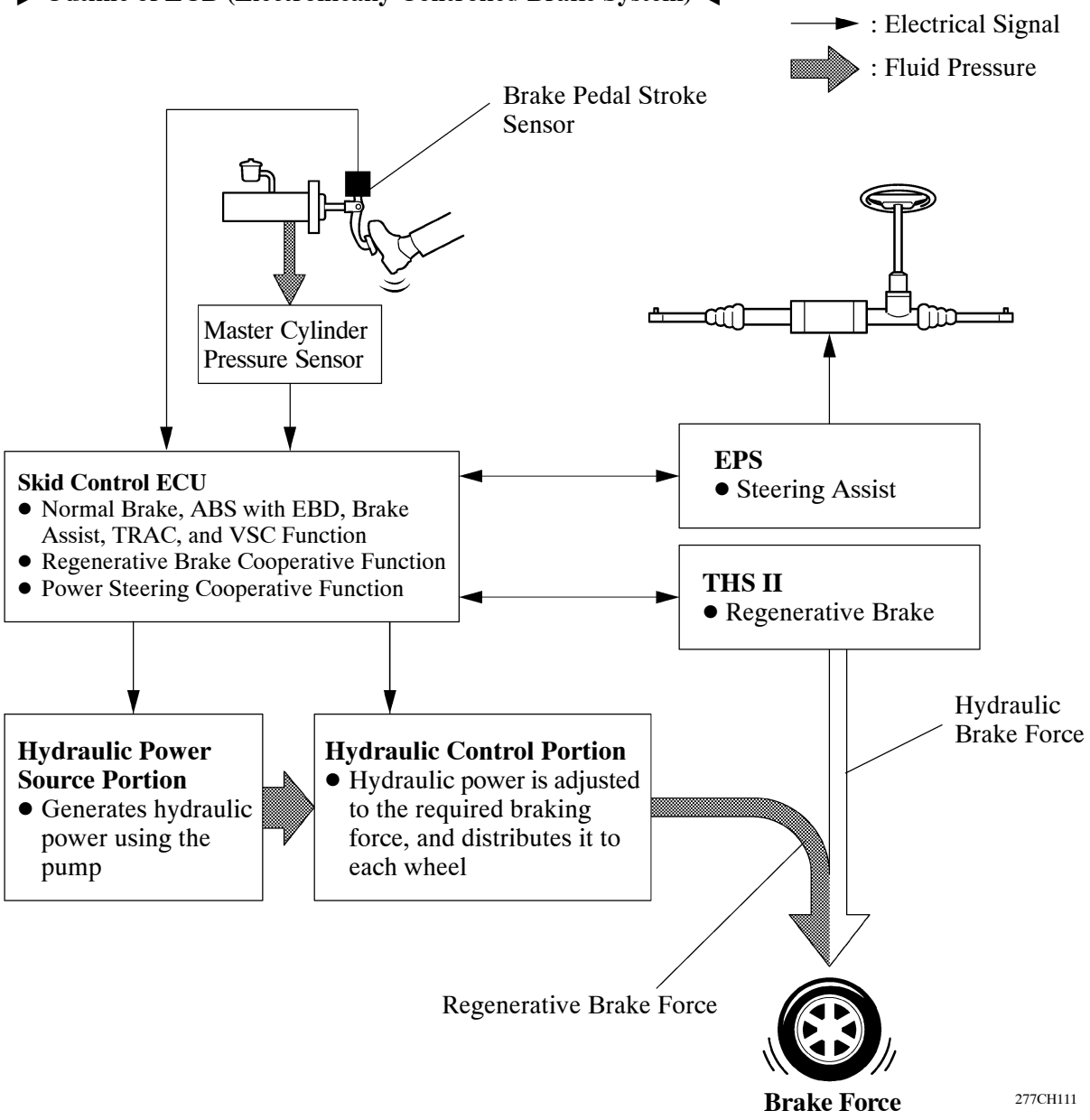


3. ECB (Electronically Controlled Brake System)

General

- In this system, the conventional brake booster portion has been discontinued. Instead, it consists of brake input, power supply, and hydraulic pressure control portions.
- During normal braking, the fluid pressure generated by the master cylinder does not directly actuate the wheel cylinders, but serves as a hydraulic pressure signal. Instead, the actual control pressure is obtained by regulating the fluid pressure of the hydraulic power source in the brake actuator, which actuates the wheel cylinders.
- The ECB (Electronically Controlled Brake System) executes the hydraulic control of the ABS with EBD, brake assist, TRAC, and VSC function in accordance with information provided by the sensors and ECUs.
- The power source backup unit is used as an auxiliary power source, to supply power to the brake system in a stable manner.

▶ Outline of ECB (Electronically Controlled Brake System) ◀



Outline of EBD Control Function

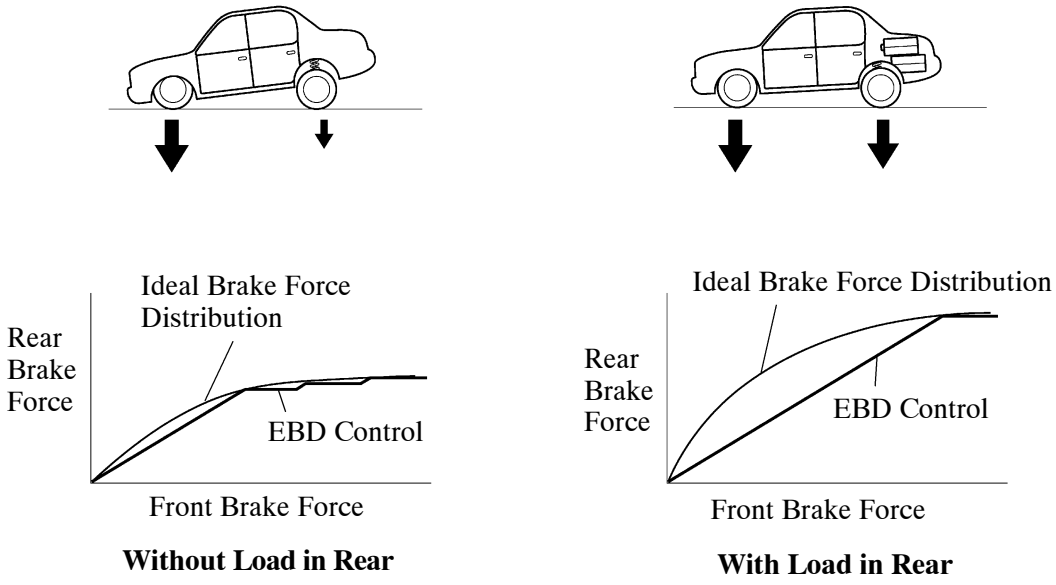
1) General

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.

2) 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 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 utilize the braking force of the rear wheels under these conditions.

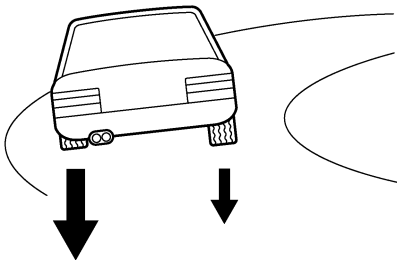
▶ EBD Control Concept ◀



182CH56

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

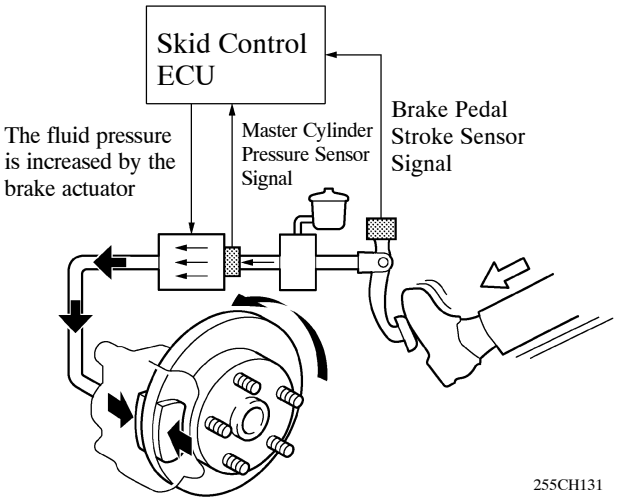
When the brakes are applied while the vehicle is cornering, the load that applied to the inner wheel decreases and the outer wheel increases.
The skid control ECU determines this condition by way of the signals from the speed sensors, and the brake actuator regulates the brake force in order to optimally control the distribution of the brake force to the inner wheel and outer wheel.



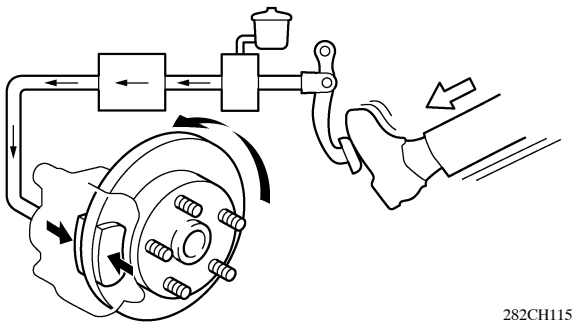
181CH56

Outline of Brake Assist Function

The brake assist function interprets a quick push of the brake pedal as emergency braking and supplements the braking power applied if the driver has not stepped hard enough on the brake pedal. In emergencies, drivers, especially inexperienced ones, often panic and do not apply sufficient pressure on the brake pedal. Based on the signals from the master cylinder pressure sensors and the brake pedal stroke 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 emergency braking, the function activates the brake actuator to increase the brake fluid pressure. The brake assist function in combination with ABS helps ensure the vehicle's brake performance.
A key feature of Brake Assist function 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 function reduces the amount of assistance it provides.

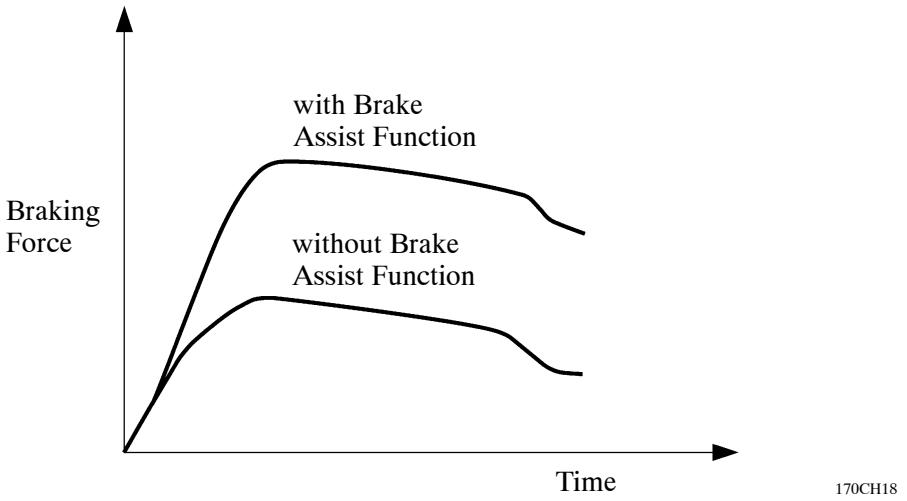


with Brake Assist Function



without Brake Assist Function

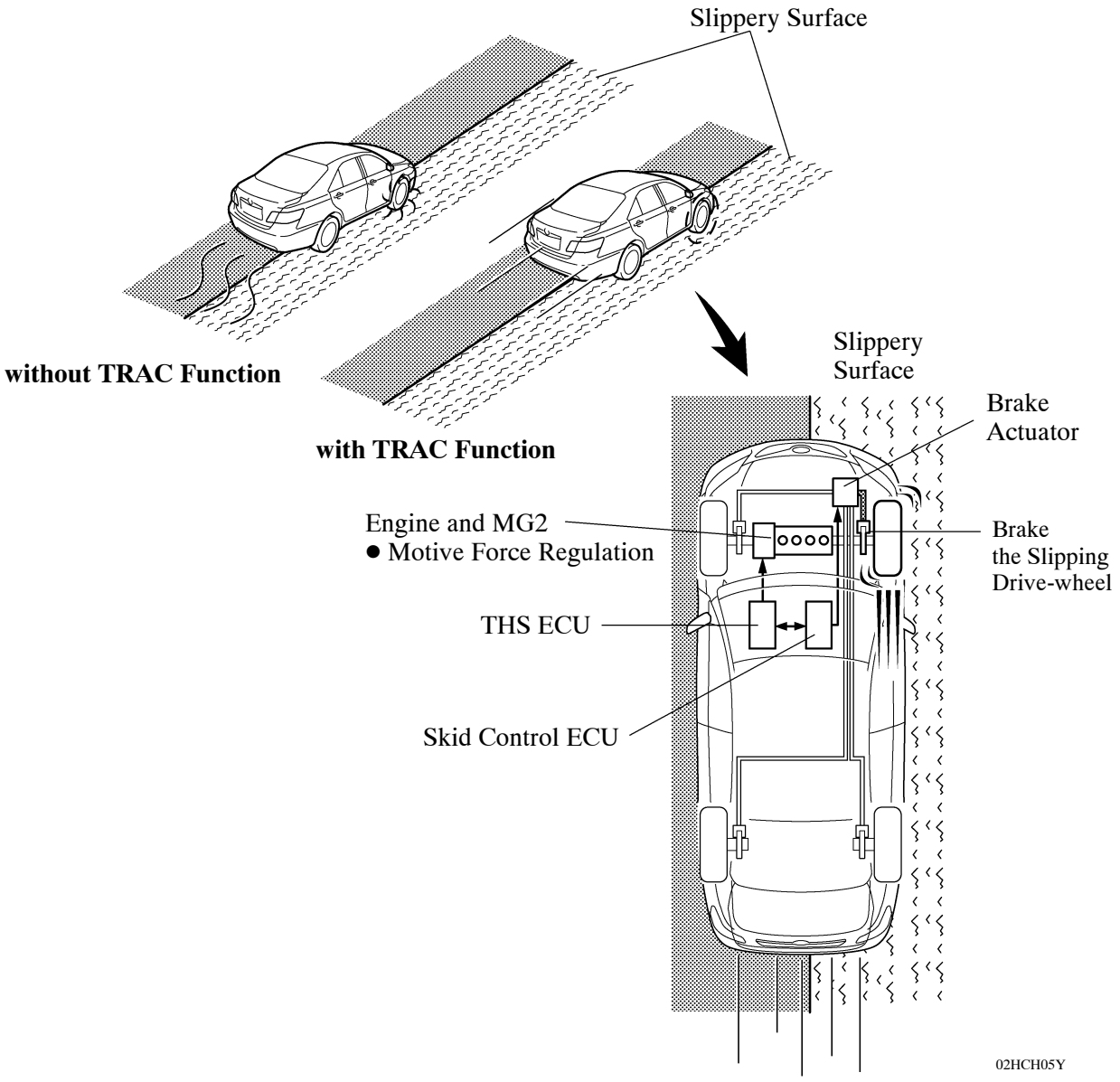
◆: There is no difference of the maximum brake performance between the vehicles with and without brake assist function.



Outline of TRAC Function

- If the driver presses the accelerator pedal aggressively when starting off or accelerating on a slippery surface, the drive wheel could slip due to the excessive amount of torque that is generated. The adjustment of the motive force and the control of the hydraulic brakes of the drive wheels accomplished by THS II allow the TRAC function to help minimize the slippage of the drive wheels, and generate the drive force that is appropriate for the road surface conditions.
- For example, a comparison may be made between two vehicles, one with the TRAC 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 TRAC 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. Simultaneously, the skid control ECU effects cooperative control with the THS ECU, in order to adjust the motive force. Thus, this function can constantly maintain a stable vehicle posture.

▶ Driving condition on road with different surface friction characteristics ◀



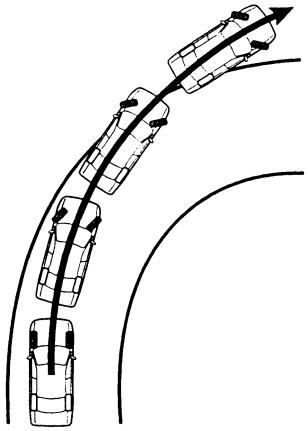
Outline of VSC Function

1) General

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

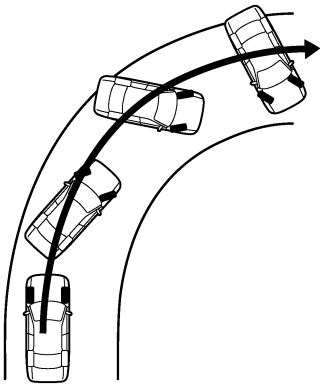
The VSC function is designed to help control the vehicle behavior by controlling the motive force and the brakes at each wheel when the vehicle is under one of the conditions indicated below.

- 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

151CH17



Rear Wheel Skid Tendency

189CH100

2) Method for Determining the Vehicle Condition

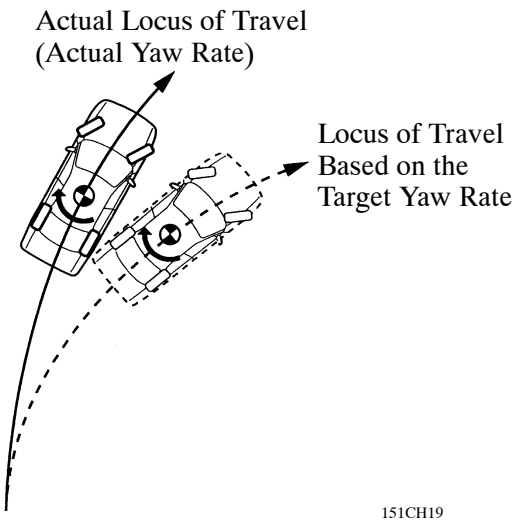
To determine the condition of the vehicle, sensors detect the steering angle, vehicle speed, vehicle's yaw rate, and the vehicle's lateral acceleration, which are then calculated by the skid control ECU.

a. 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.

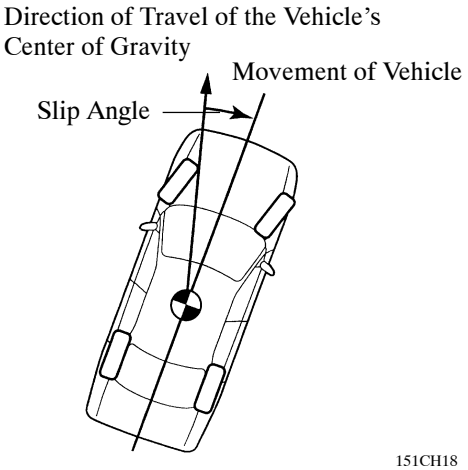
Thus, the skid control ECU determines that there is a large tendency to front wheel skid.



151CH19

b. 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.

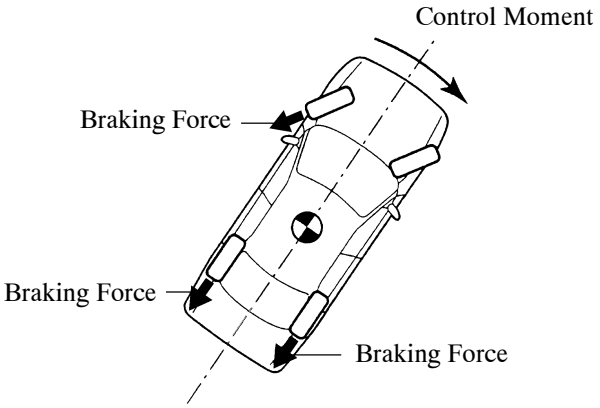


3) Method for VSC Operation

When the skid control ECU determines that the vehicle exhibits a tendency to front wheel skid or rear wheel skid, it decreases the motive force 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.

a. Dampening a Front Wheel Skid

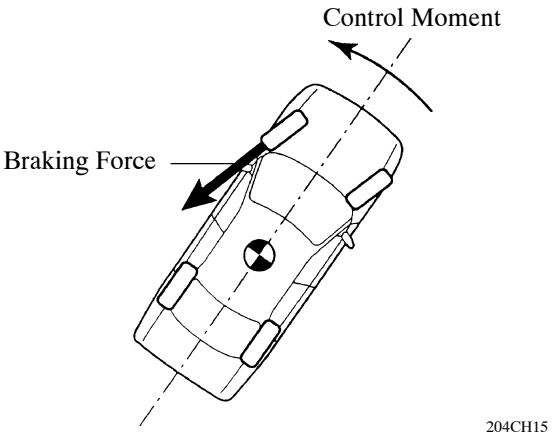
When the skid control ECU determines that there is a large front wheel skid tendency, it counteracts in accordance with the extent of that tendency. The skid control ECU controls the motive power output and applies the brakes of the front wheel of the outer circle in the turns and rear wheels in order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



Making a Right Turn

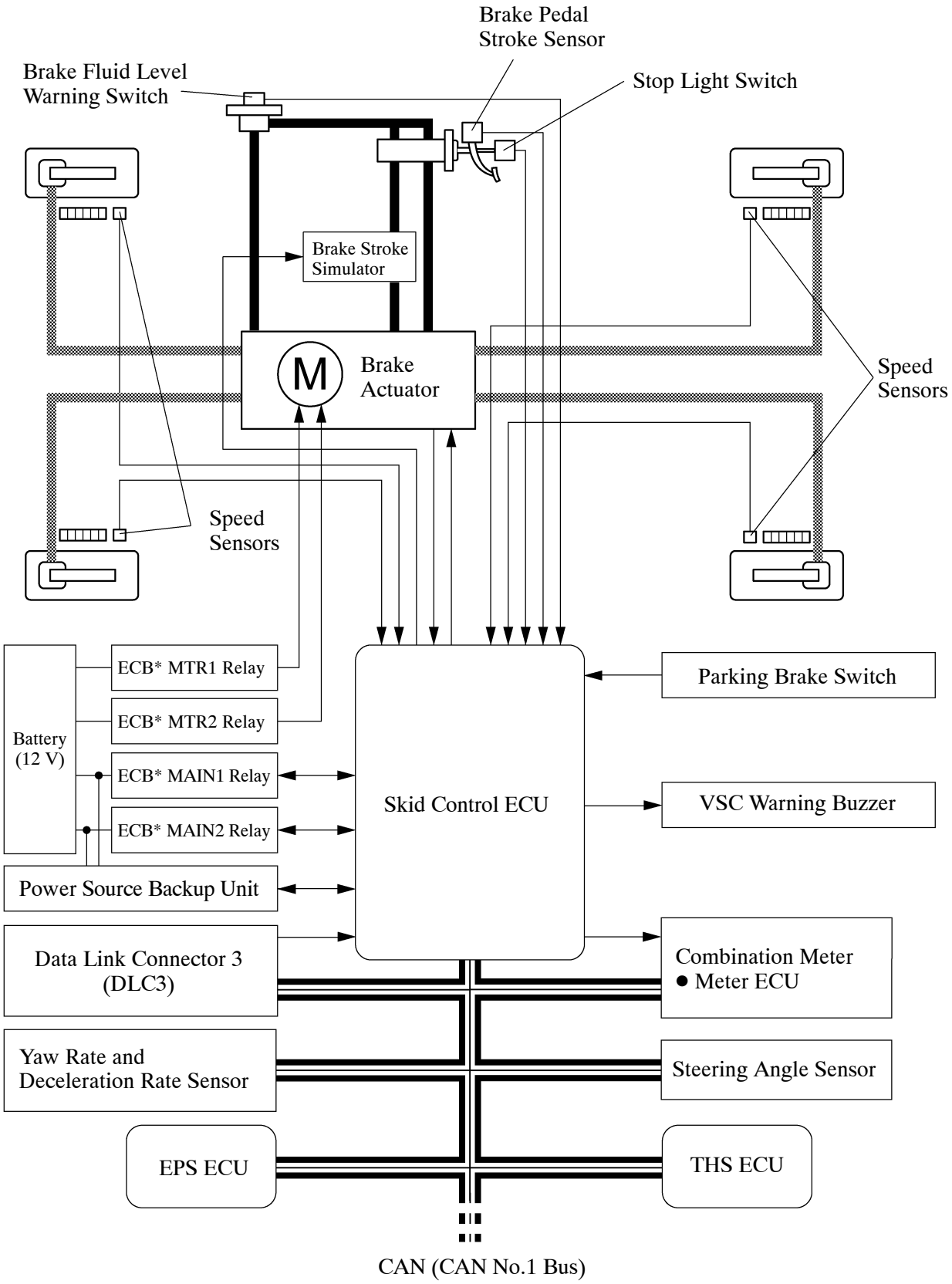
b. Dampening a Rear Wheel Skid

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.



Making a Right Turn

System Diagram



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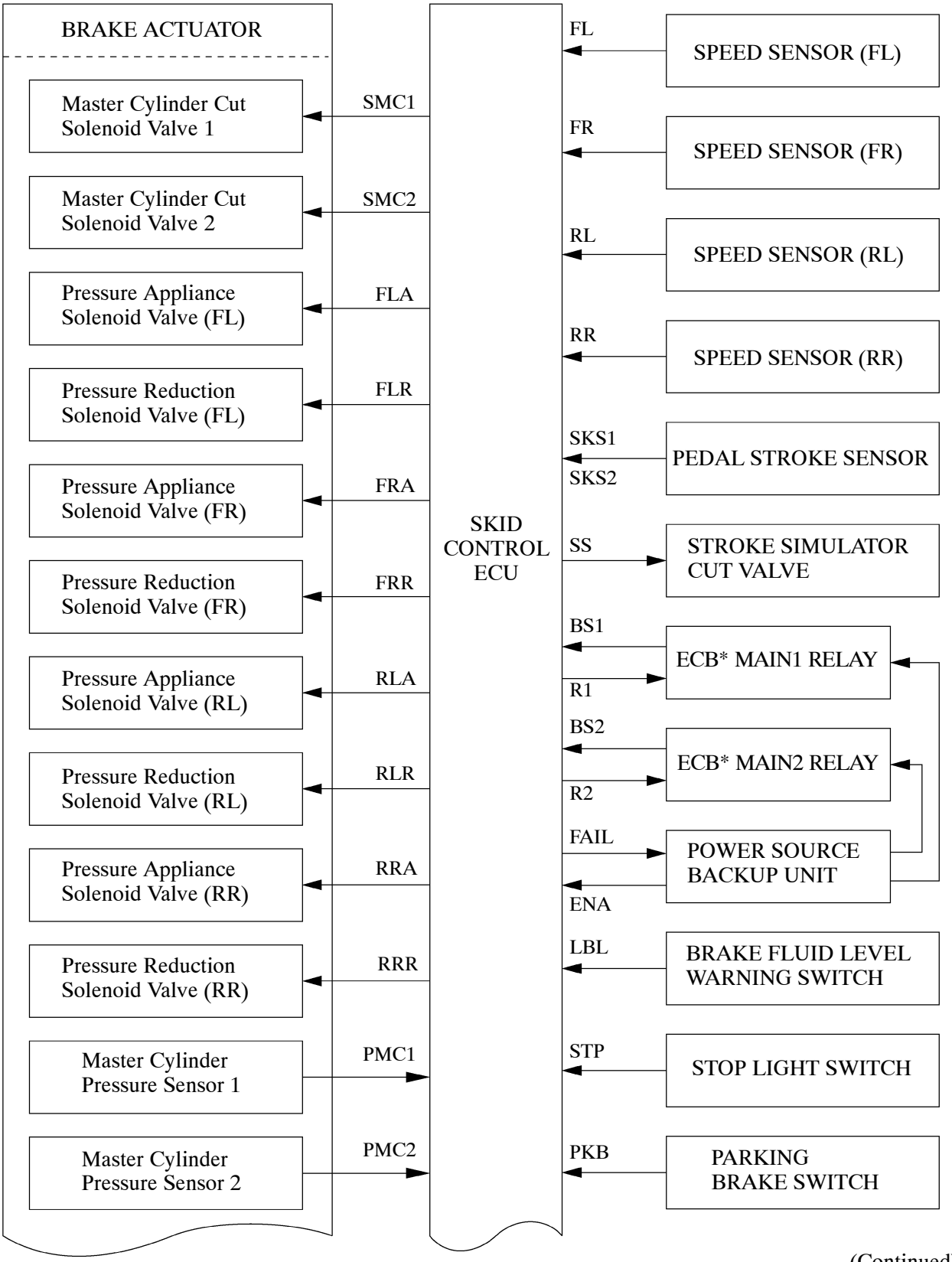
*: ECB (Electronically Controlled Brake System)

Construction

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



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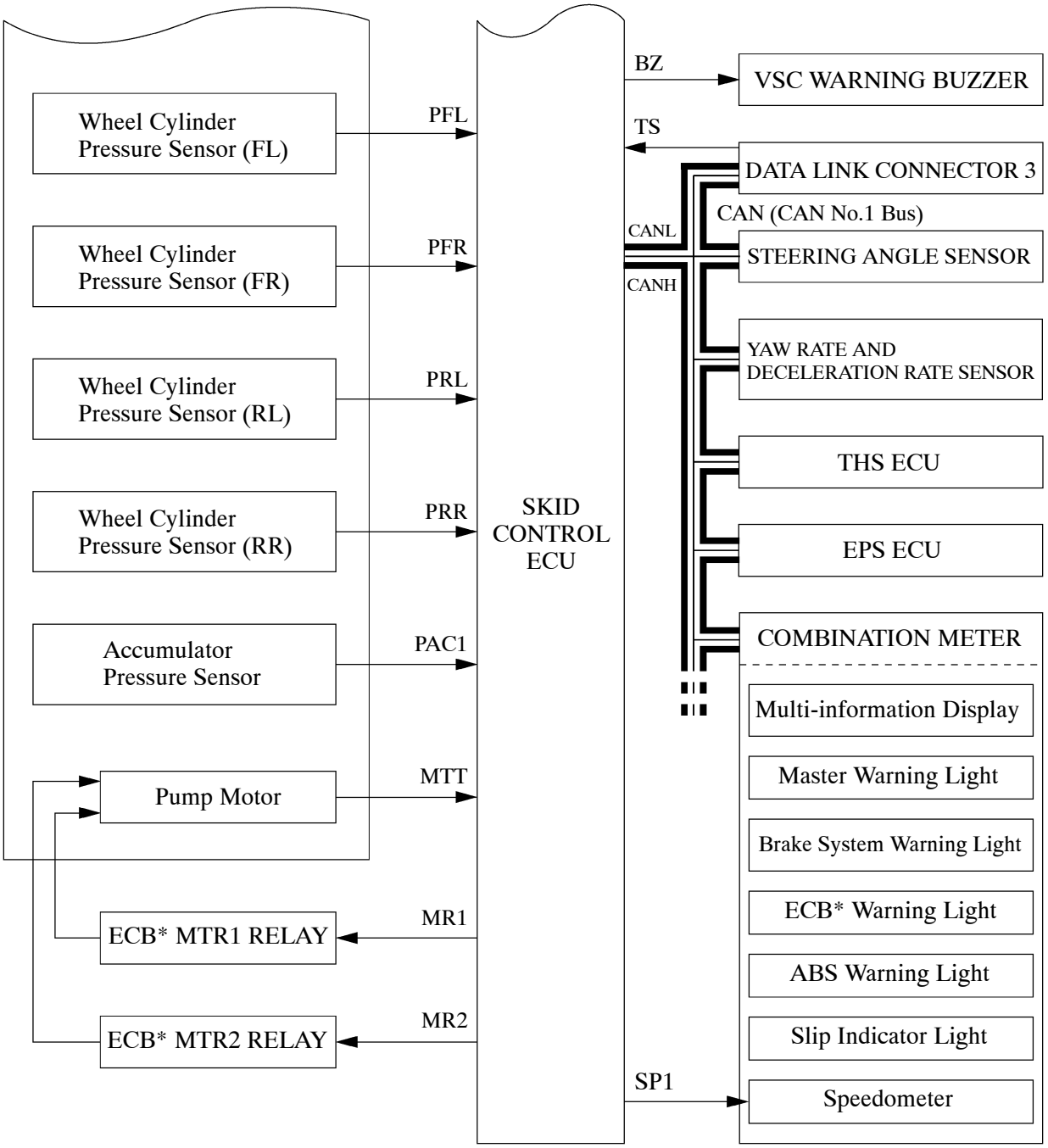
*: ECB (Electronically Controlled Brake System)

277CH117



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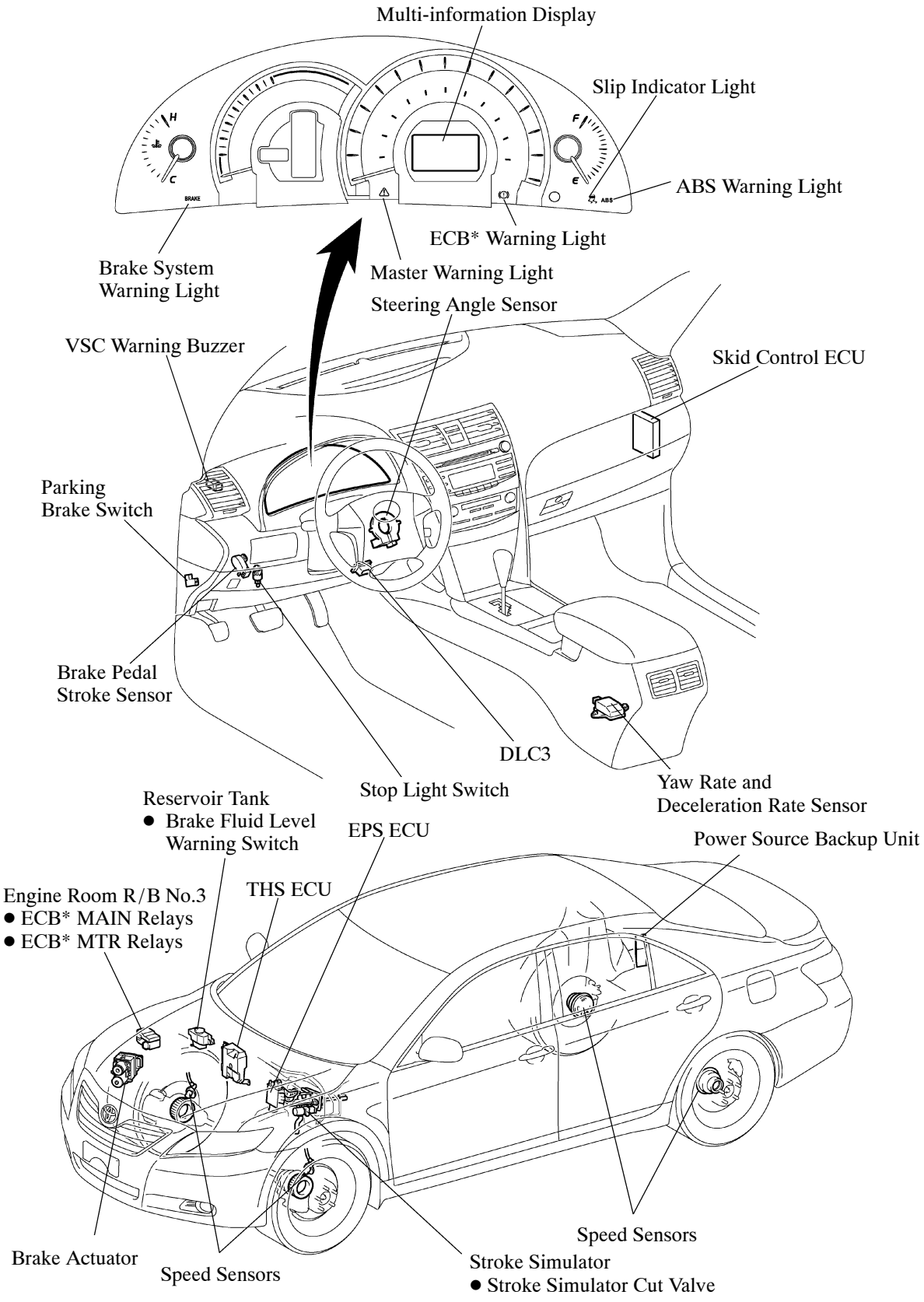
*: ECB (Electronically Controlled Brake System)

Layout of Main Components



*: ECB (Electronically Controlled Brake System)

Function of Main Components

Component		Function
Brake Actuator (See Page CH-45)	Hydraulic Power Source Portion	● Consists of a pump, pump motor, accumulator, and relief valve, and generates and stores the hydraulic pressure, which the skid control ECU uses for controlling braking. ● The accumulator pressure sensor is installed in the brake actuator.
	Hydraulic Control Portion	● Consists of 2 master cylinder cut solenoid valves, 4 pressure appliance solenoid valves, and 4 pressure reduction solenoid valves. ● The 2 master cylinder cut solenoid valves, which are the two-position type, are controlled by the skid control ECU to open and close the passage between the master cylinder and the wheel cylinders. ● The 4 pressure appliance solenoid valves and the 4 pressure reduction solenoid valves are the linear type. They are controlled by the skid control ECU to increase and decrease the fluid pressure in the wheel cylinders. ● The master cylinder pressure sensors and the wheel cylinder pressure sensors are installed in the brake actuator.
Skid Control ECU		Monitors the driving conditions of the vehicle in accordance with the signals received from the sensors and through cooperative control with the THS ECU and EPS ECU, calculates the required amount of braking force, and controls the brake actuator.
Brake Master Cylinder		● Generates hydraulic pressure in accordance with the amount of effort applied to the brake pedal by the driver. ● When a malfunction occurs in the power supply portion, the brake master cylinder supplies the fluid pressure (which is generated by the brake pedal effort) directly to the wheel cylinders.
Brake Pedal Stroke Sensor (See Page CH-50)		Directly detects the extent of the brake pedal stroke operated by the driver.
Stroke Simulator (See Page CH-51)		Generates a pedal stroke during braking in accordance with the driver's pedal effort.
	Stroke Simulator Cut Valve	Allows the fluid pressure generated by the master cylinder to flow into the stroke simulator while the ECB* operates.
Combination Meter	Multi-information Display and Master Warning Light	Informs the driver of a failure in the VSC function by displaying a message on the multi-information display in the combination meter and blinking the master warning light.
	ABS Warning Light	Lights up to alert the driver that the skid control ECU detects the malfunction in the ABS, EBD, or Brake Assist function.
	Slip Indicator Light	Blinks to inform the driver that the ABS function, the VSC function or the TRAC function is operated.
	ECB* Warning Light	Lights up to alert the driver that a minor malfunction occurs in the brake system, which does not affect the braking force (such as a malfunction in the regenerative brake).
	Brake System Warning Light	● Lights up to alert the driver that the skid control ECU detects the malfunction in the apportioning of the brake. ● Lights up to inform the driver that the parking brake is ON or the brake fluid level is low.

*: ECB (Electronically Controlled Brake System)

(Continued)

Component		Function
VSC Warning Buzzer		● Sounds continuously to inform the driver that there is a malfunction in the hydraulic pressure or a failure in the power supply. ● Sounds intermittently to inform the driver of the vehicle skidding.
THS ECU		● Actuates the regenerative brake on receiving a signal from the skid control ECU. ● Sends the actual regenerative brake control value to the skid control ECU. ● Controls the motive force based on an output control request signal received from the skid control ECU while the VSC function or TRAC function is operating.
Reservoir Tank		Stores the brake fluid.
	Brake Fluid Level Warning Switch	Detects the low brake fluid level.
Stop Light Switch		Detects the brake pedal-depressing signal.
Yaw Rate and Deceleration Rate Sensor (See Page CH-51)		● Detects the vehicle's yaw rate. ● Detects the vehicle's acceleration in the forward, rearward, and lateral.
Steering Angle Sensor (See Page CH-52)		Detects the steering direction and angle of the steering wheel.
Speed Sensor		Detects the wheel speed of each of 4 wheels.
ECB* MTR Relays		● Two types of pump motor relays with different pump actuation speeds. ● If one relay fails, the other relay operates to actuate the pump.
ECB* MAIN Relays		Controlled by the skid control ECU, and supply or stop power to the solenoid valves in the brake actuator and the skid control ECU.
Power Source Backup Unit (See Page CH-52)		● An auxiliary power supply to provide stable power to the brake system. ● Complements the supply of power to the brake system by discharging the electric charge that is stored in the unit when the voltage of the (12 V) power supply of the vehicle is low.

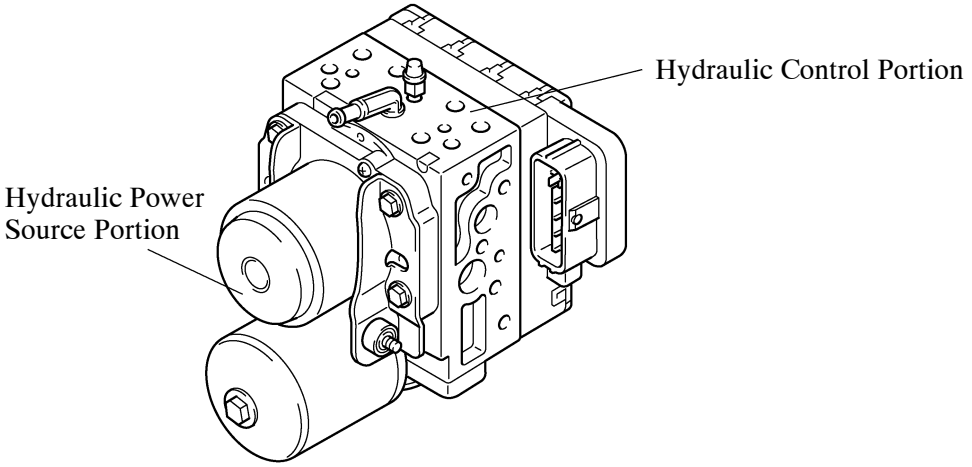
*: ECB (Electronically Controlled Brake System)

Construction and Operation of Main Components

1) Brake Actuator

a. General

- The brake actuator consists of hydraulic control and hydraulic power source portions.
- The two master cylinder pressure sensors, four wheel cylinder pressure sensors, and an accumulator pressure sensor are installed in the brake actuator.



▶ Function of Main Components ◀

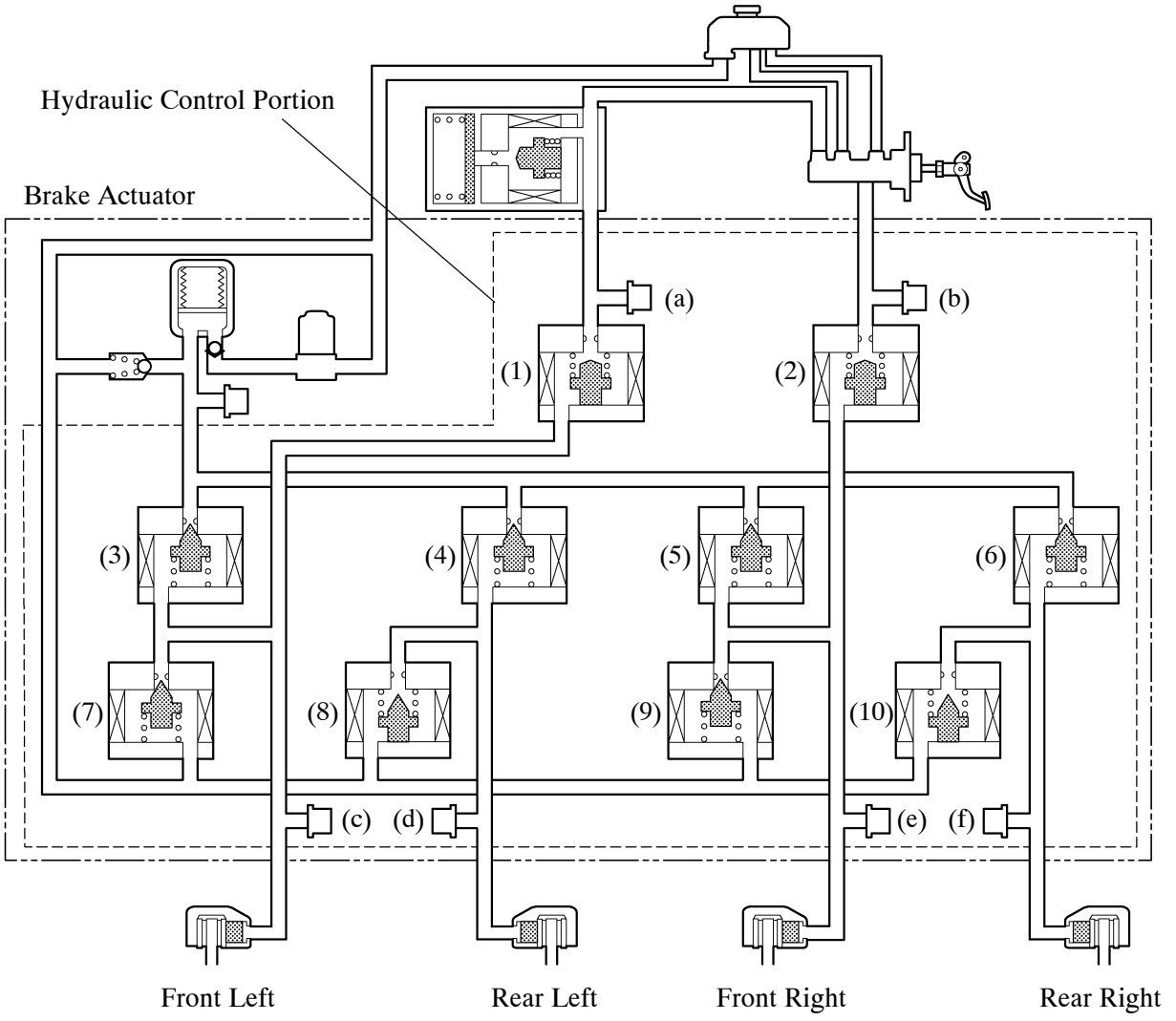
Component	Function
Master Cylinder Cut Solenoid Valve (2-position Type)	● When the brake system is started, this valve cuts the hydraulic passage between the master cylinder and the wheel cylinder. ● When the brake system is stopped or a failure occurs in the hydraulic power source portion, the valve opens to maintain the hydraulic passage to the front wheel cylinders and ensure braking. However, a greater effort than normal is required to press the brake pedal.
Pressure Appliance Solenoid Valve (Linear Type)	This valve, which is controlled by the skid control ECU, regulates the fluid pressure from the accumulator in order to amplify the fluid pressure to the wheel cylinder.
Pressure Reduction Solenoid Valve (Linear Type)	This valve, which is controlled by the skid control ECU, regulates the fluid pressure in order to reduce the fluid pressure to the wheel cylinder.
Master Cylinder Pressure Sensors	The master cylinder pressure sensor converts the fluid pressure generated by the master cylinder into electrical signals and transmits them to the skid control ECU. Accordingly, the skid control ECU determines the braking force required by the driver.
Wheel Cylinder Pressure Sensors	These sensors detect the fluid pressure that acts on the respective wheel cylinders and transmits them to the skid control ECU in the form of feedback. Accordingly, the skid control ECU monitors the fluid pressure of the wheel cylinders and controls the pressure appliance solenoid valve and the pressure reduction solenoid valve, in order to achieve the optimal wheel cylinder pressures.
Accumulator Pressure Sensor	The accumulator pressure sensor constantly detects the brake fluid pressure in the accumulator and transmits the signals to the skid control ECU. Accordingly, the skid control ECU controls the pump motor.
Pump and Pump Motor	Draws up the brake fluid from the reservoir tank and provides high hydraulic pressure to the accumulator.
Accumulator	Stores the hydraulic pressure that was generated by the pump. The accumulator is filled with high pressure nitrogen gas.
Relief Valve	Returns the brake fluid to the reservoir tank to prevent excessive pressure if the pump operates continuously due to a malfunction of the accumulator pressure sensor.

b. Hydraulic Control Portion

The 10 solenoid valves and 6-pressure sensors consists of the following:

- 2 master cylinder cut solenoid valves [(1), (2)]
- 4 pressure appliance valves [(3), (4), (5), (6)]
- 4 pressure reduction valves [(7), (8), (9), (10)]
- 2 master cylinder pressure sensors [(a), (b)]
- 4 wheel cylinder pressure sensors [(c), (d), (e), (f)]

▶ Hydraulic Circuit ◀



256CH107

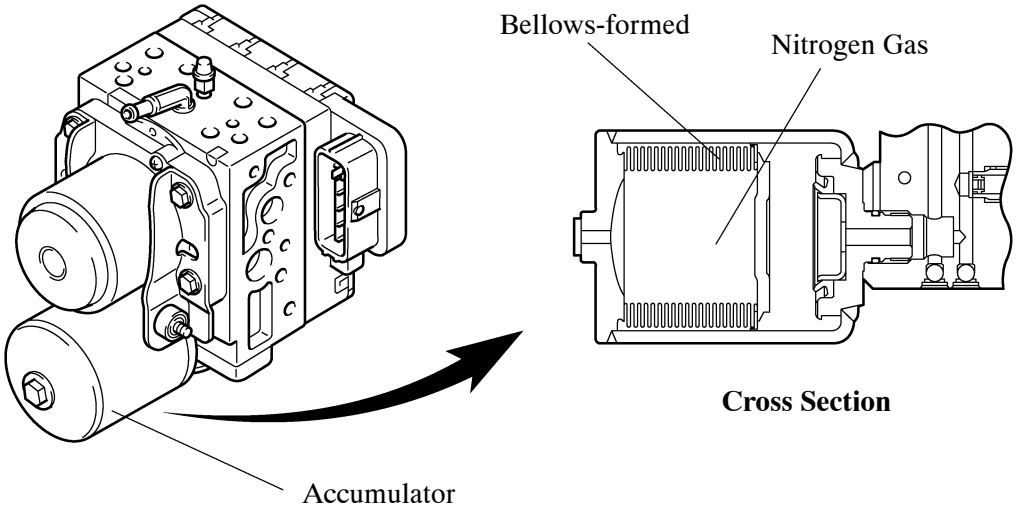
c. Hydraulic Power Source Portion

i) General

The hydraulic power source portion consists of pump, pump motor, accumulator, relief valve, 2 motor relays, and accumulator pressure sensor.

ii) Accumulator

Inside the accumulator, the high-pressurized nitrogen gas is charged and sealed. In addition, metallic bellows-formed tube is used, in order to enhance the gastight performance of the accumulator.



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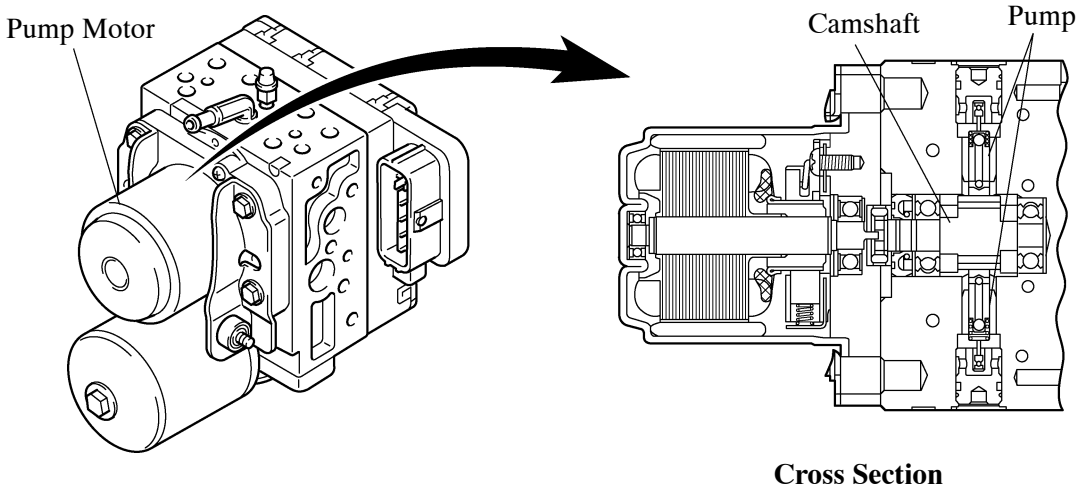
iii) Pump and Pump Motor

A plunger type pump is used. This pump is operated by the rotation of the camshaft driven by the motor, and then supplies high-pressurized fluid to the accumulator.



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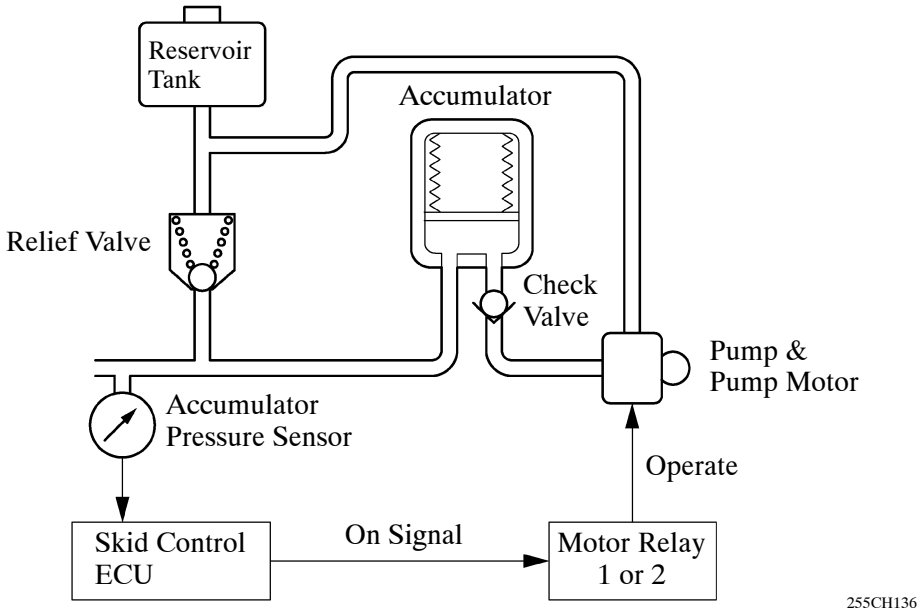
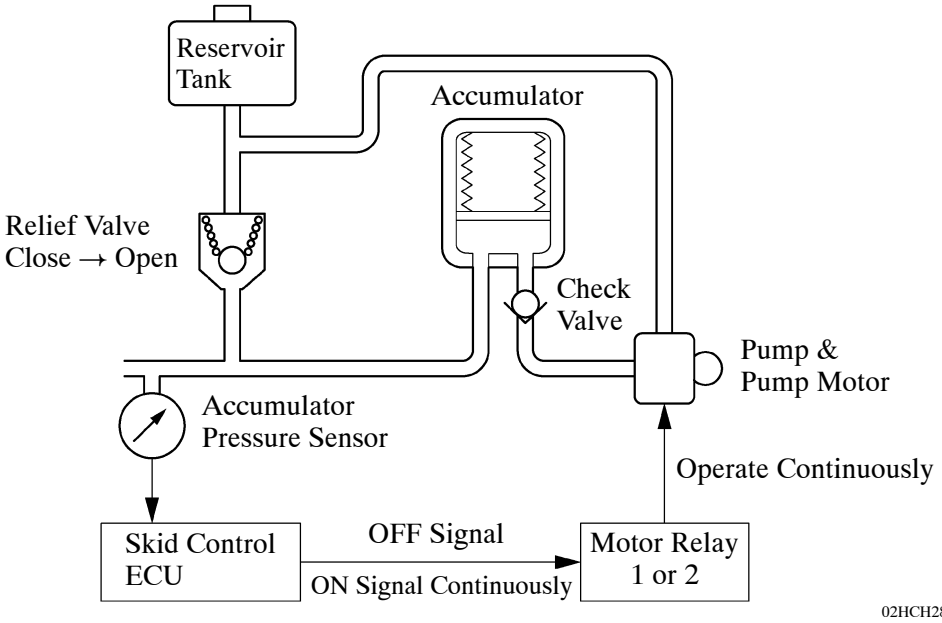
iv) Operation

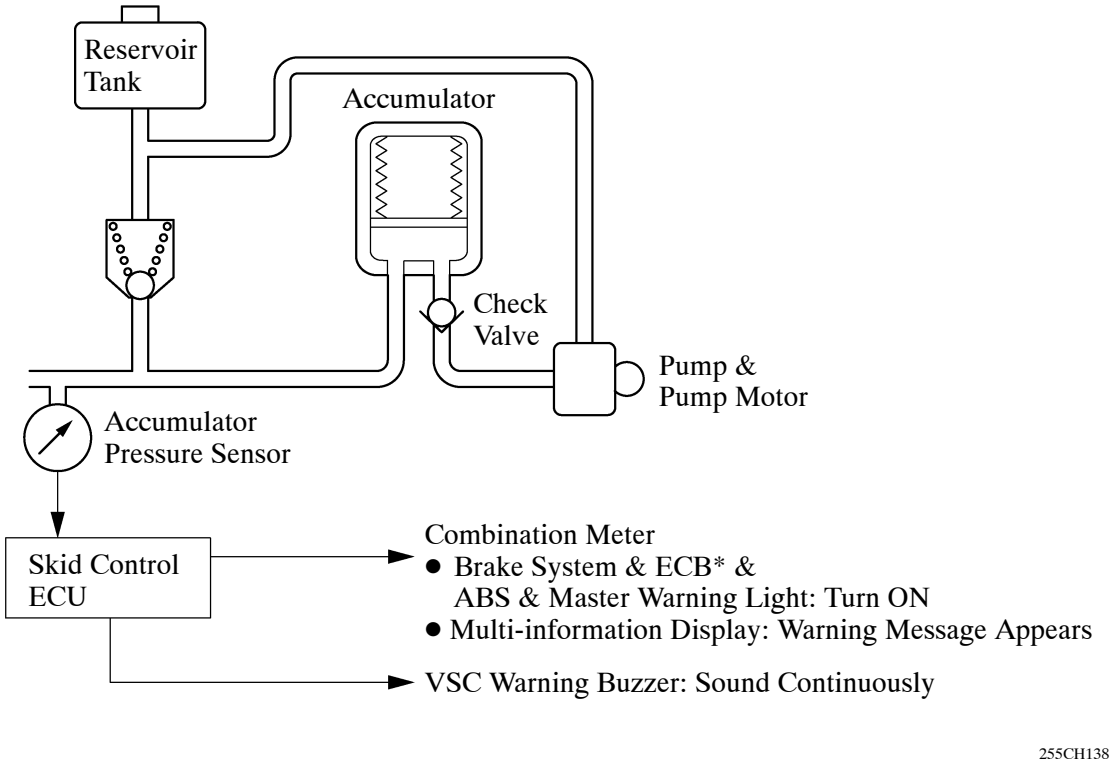
- The brake fluid that is discharged by the pump passes through the check valve and is stored in the accumulator. The hydraulic pressure that is stored in the accumulator is used for providing the hydraulic pressure that is needed for normal braking and for operating the brake control.
- The motor relays consist of the following relays with different pump actuation speeds: relay 1 (low speed) and relay 2 (high speed). Normally, relay 1 with the slow pump speed is used. When the fluid pressure drops quickly because more fluid pressure is required, such as in ABS fluid pressure control, relay 2 with the fast pump speed is used. If one of the relays malfunctions, the other is used for actuating the pump.
- The accumulator pressure sensor constantly monitors the pressure in the accumulator and transmits it to the skid control ECU. If the accumulator pressure drops below the set pressure, the skid control ECU sends an activation signal to the motor relay in order to actuate the pump motor until the pressure in the accumulator reaches the set pressure.



- If the pump and the pump motor continue to operate unintendedly, and the accumulator sensor failed, a high pressure would be created in the accumulator. At this time, the relief valve will open. To return the brake fluid to the reservoir tank, to reduce the accumulator pressure.



- If the accumulator pressure drops abnormally to a level below the pressure set at the ECU, the skid control ECU illuminates the brake system warning light, the ECB* warning light, ABS warning light and the master warning light. Then, a warning message appears on the multi-information display in the combination meter, and the VSC warning buzzer sounds to alert the driver of the abnormal hydraulic pressure.

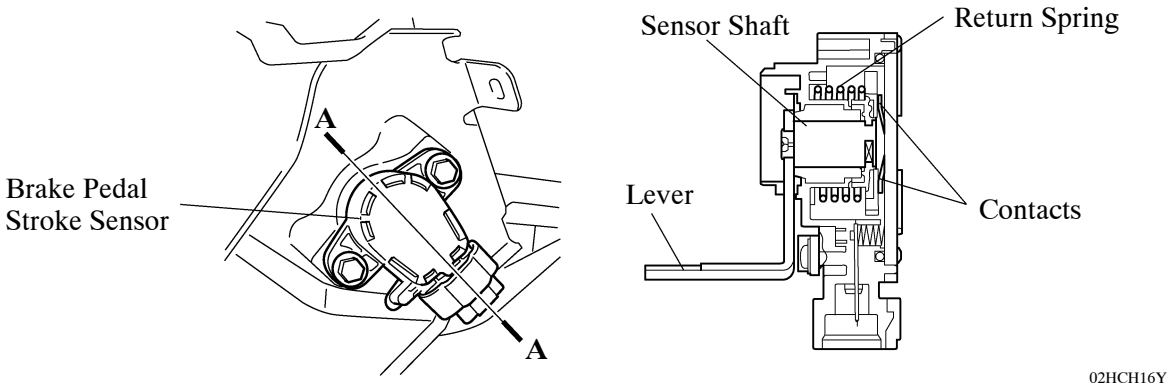


255CH138

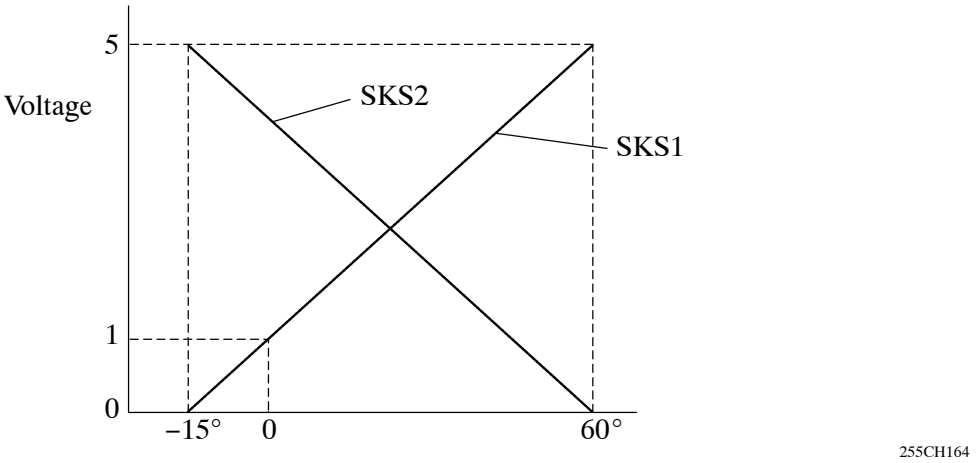
*: ECB (Electronically Controlled Brake System)

2) Brake Pedal Stroke Sensor

This sensor, which contains a contact type variable resistor, detects the extent of the brake pedal stroke and transmits it to the skid control ECU.



A – A Cross Section



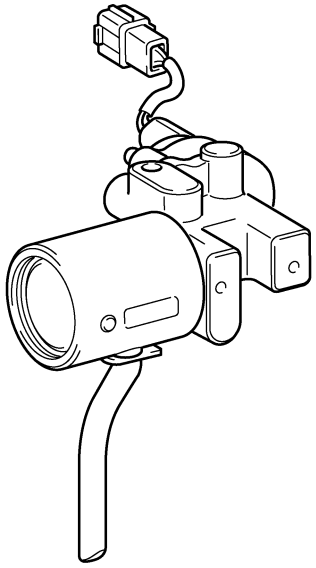
Sensor Lever Rotational Angle

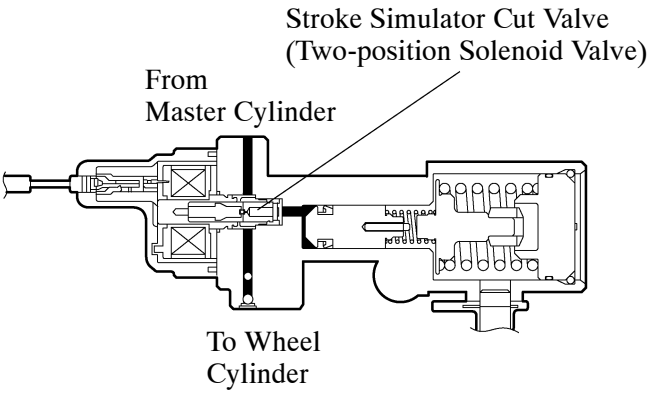
Service Tip

- To install a brake pedal stroke sensor, which is available as a service part, perform as follows:
  - The sensor lever is secured with a pin to “0” stroke. (Do not detach the pin until the installation has been completed.)
  - In this state, install the sensor on the brake pedal (in the OFF state) on the vehicle.
  - After completing the installation, firmly press the brake pedal once to break off the pin that is securing the sensor in place.
  - Make sure the broken pin does not remain in the sensor lever.
- After replacing the brake pedal stroke sensor, initialization of brake pedal stroke sensor must be required on the skid control ECU side.
- For the actual procedure, refer to the 2007 Camry Hybrid Vehicle Repair Manual (Pub. No. RM02H0U).

3) Stroke Simulator

- The stroke simulator is mounted between the master cylinder and the brake actuator. The fluid pressure generated by the master cylinder is introduced to the stroke simulator through the built-in stroke simulator cut valve.
- The stroke simulator generates a pedal stroke in accordance with the driver's pedal effort during braking. Containing two types of coil springs with different spring constants, the stroke simulator provides pedal stroke characteristics in two stages in relation to the master cylinder pressure.



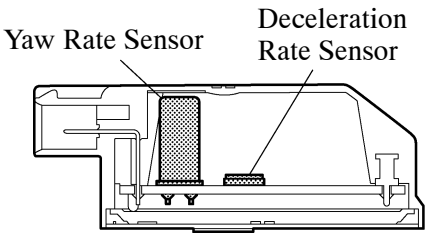


Cross Section

02HCH18Y

4) Yaw Rate and Deceleration Rate Sensor

A deceleration rate sensor is built into the yaw rate sensor. This sensor detects the yaw rate and lateral acceleration, and sends this signal to the skid control ECU.



Cross Section

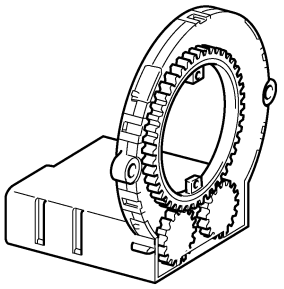
02HCH17TE

Service Tip

After replacing the yaw rate and deceleration rate sensor, or the skid control ECU, initialization of the yaw rate and deceleration rate sensor is required.
For the actual procedure, refer to the 2007 Camry Hybrid Vehicle Repair Manual (Pub. No. RM02H0U).

5) Steering Angle Sensor

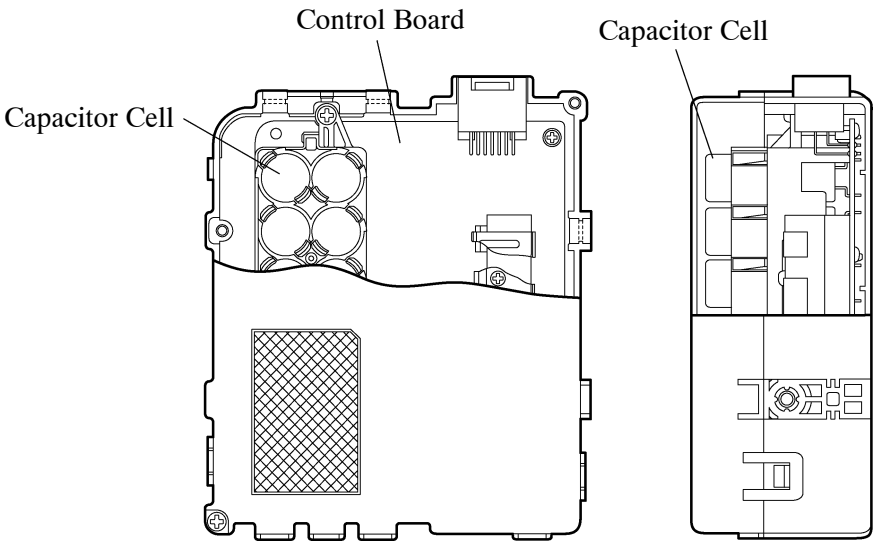
- The steering angle sensor detects the steering direction and angle, and sends this signal to the skid control ECU.
- The sensor contains two gears for detecting the rotational movement. The magnetic field of the MRE (Magnetic Resistance Element), which is built into these gears, changes as the gears rotate. The change in the magnetic field causes the resistance of the sensor to change, which is detected by the skid control ECU in the form of the rotational angle of the steering.



02HCH19Y

6) Power Source Backup Unit

- The power source backup unit is used as an auxiliary power source, in order to supply power to the brake system in a stable manner.
- This unit contains 12 capacitor cells, which store an electrical charge provided by the (12 V) vehicle power supply. When the voltage of the (12 V) vehicle power supply drops, the electrical charge stored in the capacitor cells is used as an auxiliary power supply to the brake system.



02HCH20TE

Service Tip

Immediately after the power switch is turned OFF, this unit is in the discharging state, and some voltage remains in the capacitors. Therefore, make sure to check for residual voltage and discharge it if necessary, before removing the power source backup unit from the vehicle or opening and inspecting the inside of the power source backup unit case.
For details, refer to the 2007 Camry Hybrid Vehicle Repair Manual (Pub. No. RM02H0U).

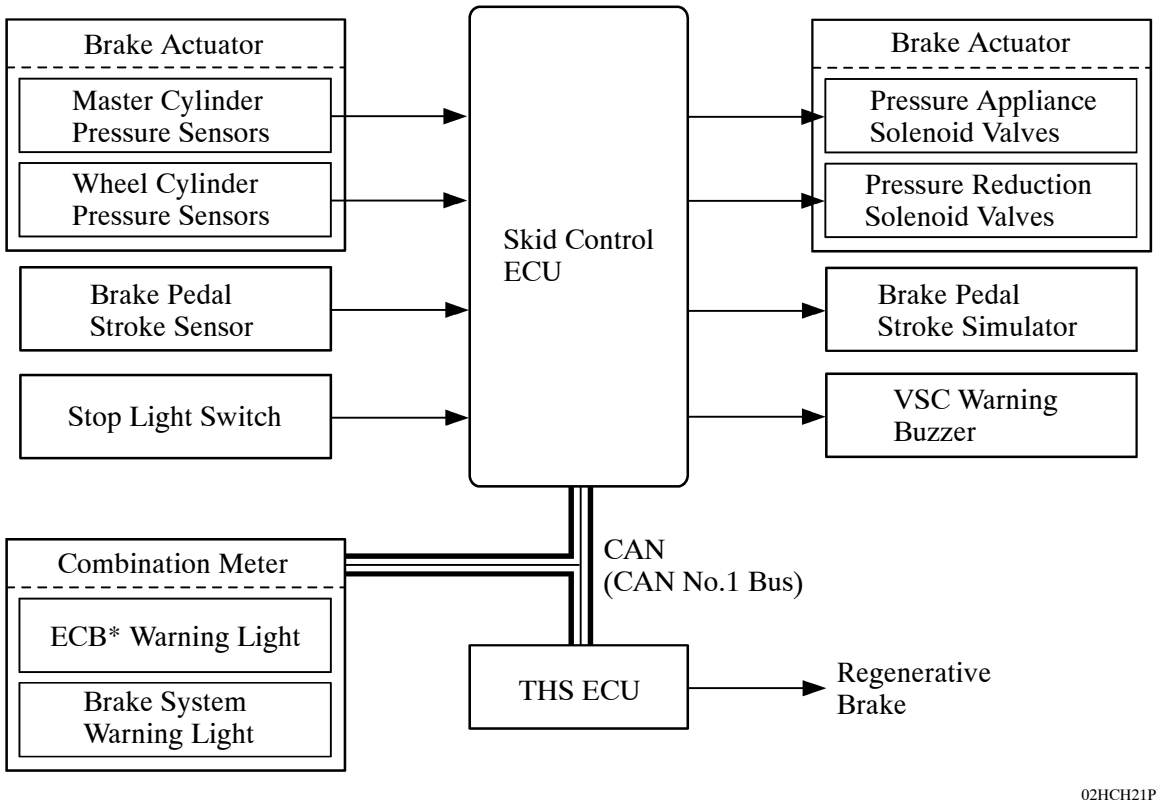
System Operation

1) Normal Brake Operation (with Regenerative Brake Cooperative Control)

a. General

- During normal braking, the master cylinder cut solenoid valves are closed and the fluid pressure circuits to the wheel cylinders remain independent. Accordingly, the fluid pressure generated by the master cylinder will not directly cause the wheel cylinders to actuate.
- The skid control ECU calculates the braking force required by the driver in accordance with the signals received from the master cylinder pressure sensors and the brake pedal stroke sensor. Then, the skid control ECU calculates the regenerative brake force value out of the required brake force and transmits the calculated value to the THS ECU. Upon receiving the value, the THS ECU generates a regenerative brake force. At the same time, the THS ECU transmits the actual regenerative brake force value to the skid control ECU. The skid control ECU controls the solenoid valves in order to cause the hydraulic brake system to generate a brake force value (which is obtained by subtracting the regenerative brake force from the brake force value required by the driver).

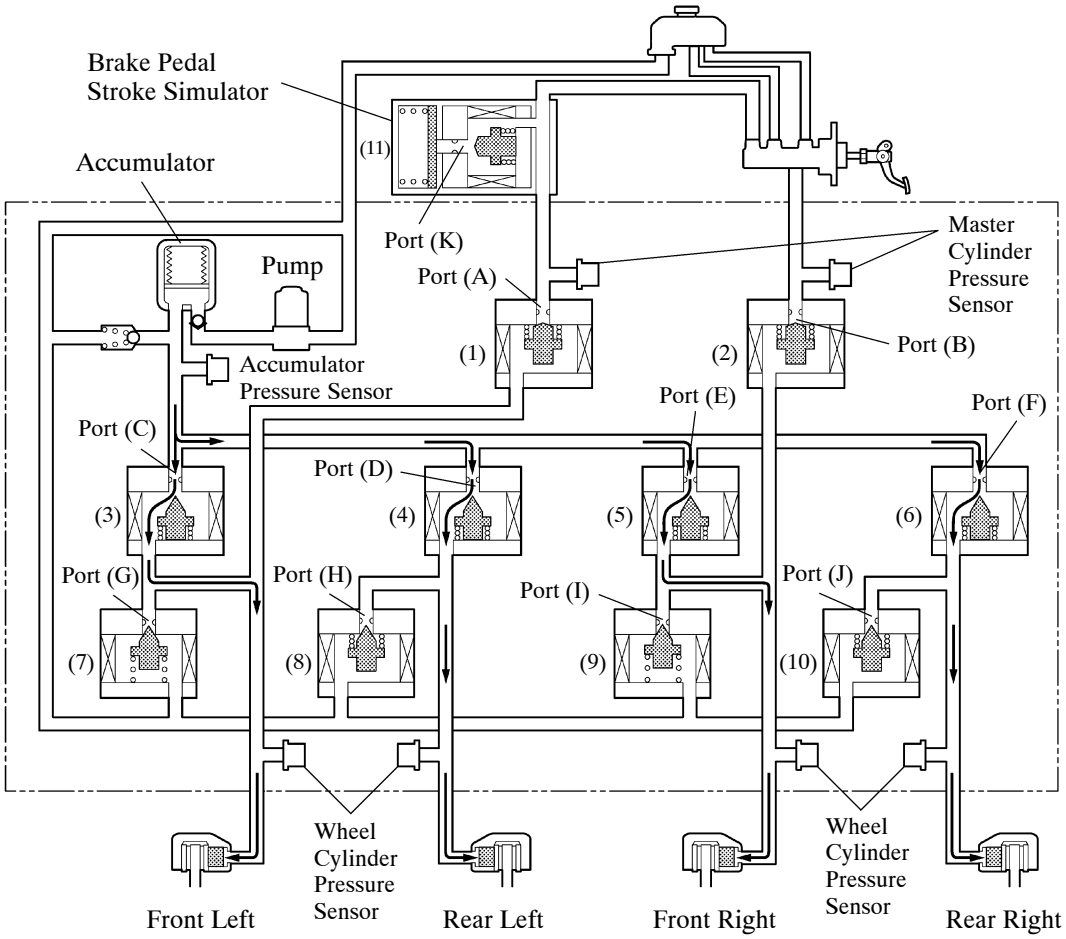
▶ System Diagram ◀



*: ECB (Electronically Controlled Brake System)

b. Pressure Increase

The skid control ECU calculates the target wheel cylinder pressure (equivalent to the brake force required by the driver) in accordance with the signals received from the master cylinder pressure sensor and the brake pedal stroke sensor. The skid control ECU compares the wheel cylinder pressure sensor signal and the target wheel cylinder pressure. If the target wheel cylinder pressure is lower, the skid control ECU boosts the pressure in the brake actuator. Accordingly, the fluid pressure in the accumulator is fed into the wheel cylinder. Moreover, this operation is the same when the hydraulic brake force must be increased in order to effect cooperative control in accordance with the changes in the regenerative brake force.



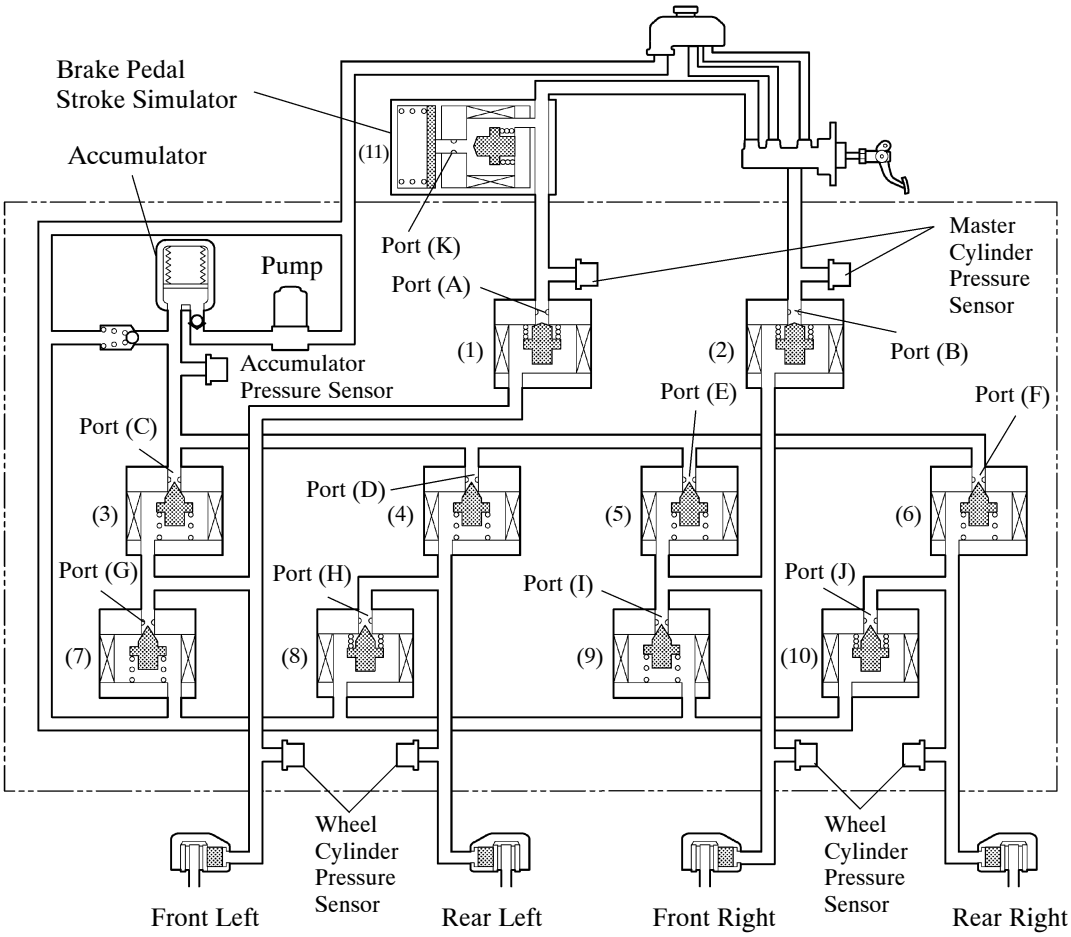
256CH108

Item		Normal Braking Increase Mode
(1), (2)	Master Cylinder Cut Solenoid Valve	ON (Close)
	Port: (A), (B)	
(3), (4), (5), (6)	Pressure Appliance Solenoid Valve	ON (Half-Open*)
	Port: (C), (D), (E), (F)	
(7), (9)	Pressure Reduction Solenoid Valve	OFF (Close)
	Port: (G), (I)	
(8), (10)	Pressure Reduction Solenoid Valve	ON (Close)
	Port: (H), (J)	
(11)	Stroke Simulator Cut Solenoid Valve	ON (Open)
	Port: (K)	

*: The solenoid valve constantly regulates the amount of opening of the port in accordance with the use conditions in order to control the fluid pressure.

c. Holding

The skid control ECU calculates the target wheel cylinder pressure (equivalent to the brake force required by the driver) in accordance with the signals received from the master cylinder pressure sensor and the brake pedal stroke sensor.
The skid control ECU compares the wheel cylinder pressure signal with the target wheel cylinder pressure. If they are equal, the skid control ECU controls the brake actuator in the hold state.
Accordingly, the wheel cylinder will be held at a constant pressure.

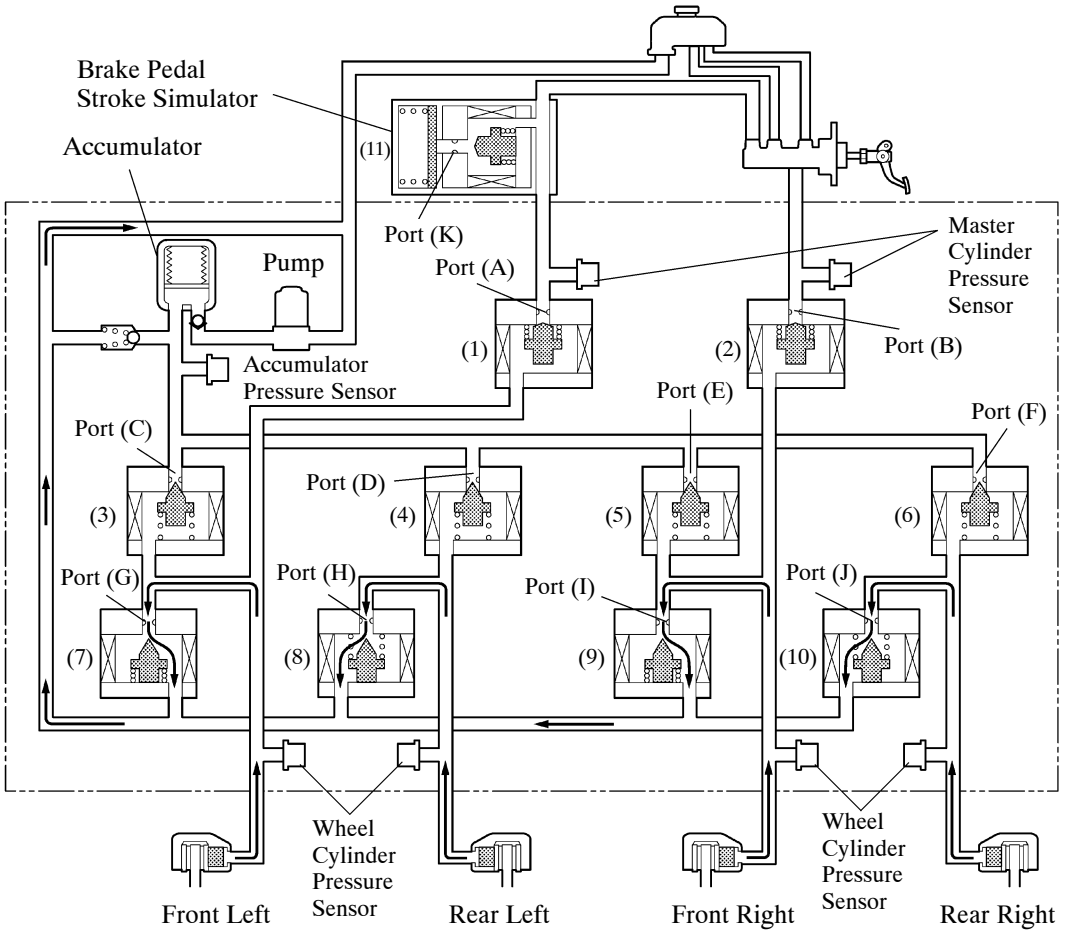


256CH109

Item		Normal Braking Holding Mode
(1), (2)	Master Cylinder Cut Solenoid Valve	ON (Close)
	Port: (A), (B)	
(3), (4), (5), (6)	Pressure Appliance Solenoid Valve	OFF (Close)
	Port: (C), (D), (E), (F)	
(7), (9)	Pressure Reduction Solenoid Valve	OFF (Close)
	Port: (G), (I)	
(8), (10)	Pressure Reduction Solenoid Valve	ON (Close)
	Port: (H), (J)	
(11)	Stroke Simulator Cut Solenoid Valve	ON (Open)
	Port: (K)	

d. Pressure Reduce

The skid control ECU calculates the target wheel cylinder pressure (equivalent to the brake force required by the driver) in accordance with the signals received from the master cylinder pressure sensor and the brake pedal stroke sensor.
The skid control ECU compares the wheel cylinder pressure signal with the target wheel cylinder pressure. If the target wheel cylinder pressure is higher, the skid control ECU reduces the pressure in the brake actuator. Accordingly, the pressure in the wheel cylinder decreases.
Moreover, this operation is the same when the hydraulic brake force must be decreased in order to effect cooperative control in accordance with the changes in the regenerative brake force.



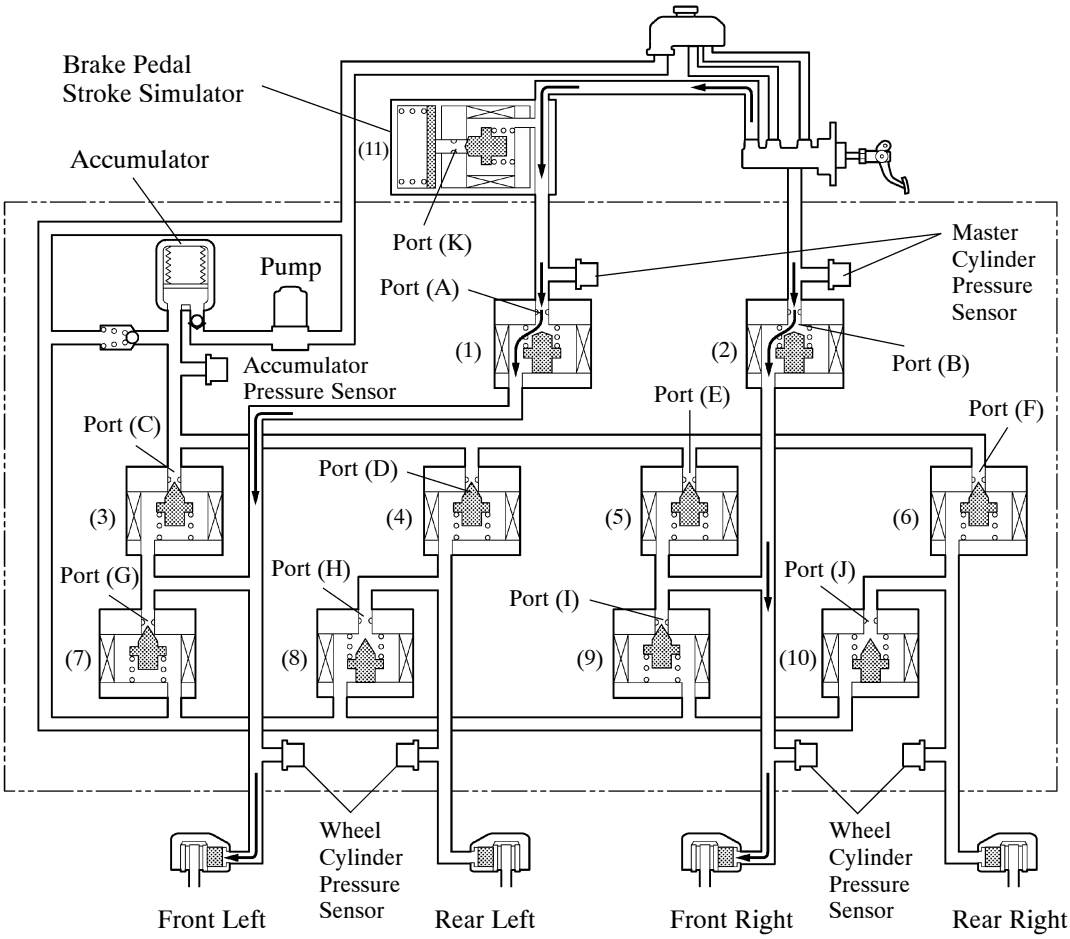
256CH110

Item		Normal Braking Reduction Mode
(1), (2)	Master Cylinder Cut Solenoid Valve	ON (Close)
	Port: (A), (B)	
(3), (4), (5), (6)	Pressure Appliance Solenoid Valve	OFF (Close)
	Port: (C), (D), (E), (F)	
(7), (9)	Pressure Reduction Solenoid Valve	ON (Half-Open*)
	Port: (G), (I)	
(8), (10)	Pressure Reduction Solenoid Valve	ON (Half-Open*)
	Port: (H), (J)	
(11)	Stroke Simulator Cut Solenoid Valve	ON (Open)
	Port: (K)	

*: The solenoid valve constantly regulates the amount of opening of the port in accordance with the use conditions in order to control the fluid pressure.

e. Brake System Stops or During Power Supply Malfunction

If the brake system stops or no accumulator pressure is supplied due to some malfunction, the skid control ECU operates the fail-safe function. This function opens the master cylinder solenoid valve in the brake actuator, in order to secure a fluid passage between the master cylinder and the wheel cylinder. Thus, the brakes can be applied by operating only the front wheel cylinders under the fluid pressure generated by the master cylinder. At this time, port (K) of the stroke simulator cut solenoid valve closes in order to prevent the fluid pressure generated by the master cylinder from being negatively affected by the operation of the stroke simulator.



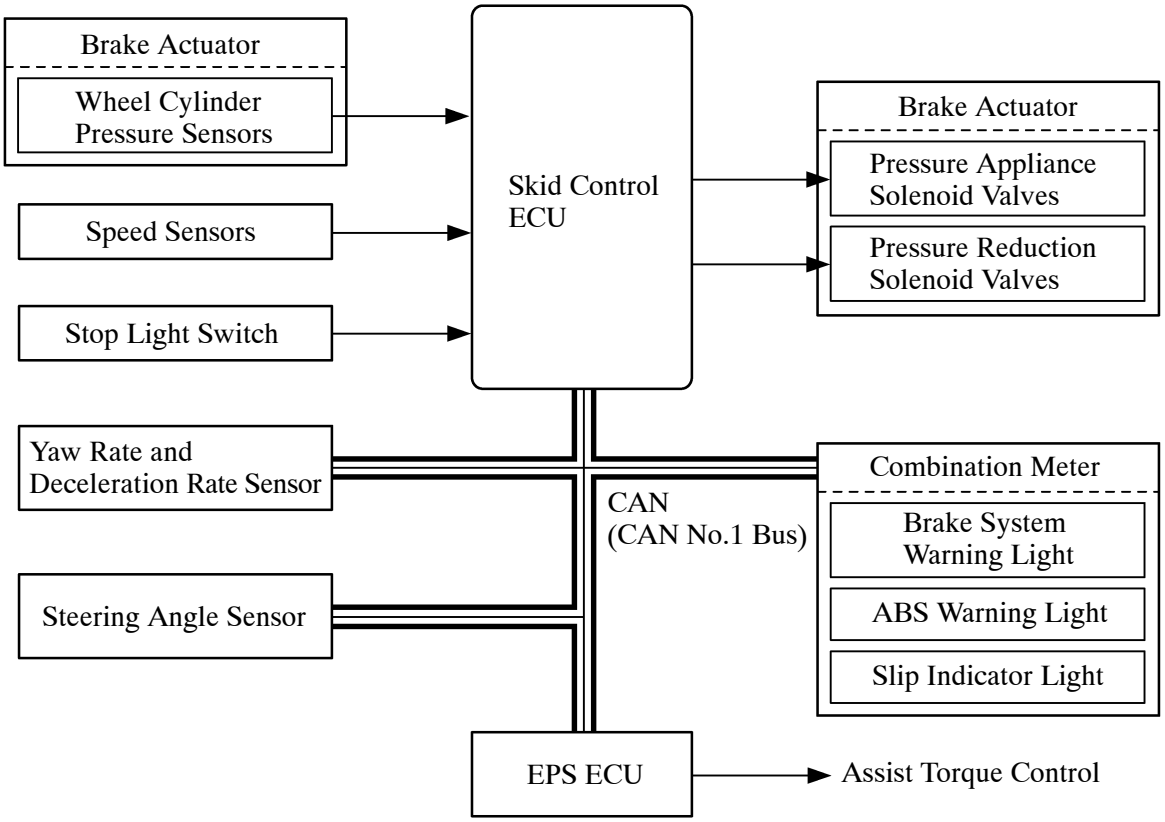
256CH111

Item		System OFF & Fail-Safe Mode
(1), (2)	Master Cylinder Cut Solenoid Valve	OFF (Open)
	Port: (A), (B)	
(3), (4), (5), (6)	Pressure Appliance Solenoid Valve	OFF (Close)
	Port: (C), (D), (E), (F)	
(7), (9)	Pressure Reduction Solenoid Valve	OFF (Close)
	Port: (G), (I)	
(8), (10)	Pressure Reduction Solenoid Valve	OFF (Open)
	Port: (H), (J)	
(11)	Stroke Simulator Cut Solenoid Valve	OFF (Close)
	Port: (K)	

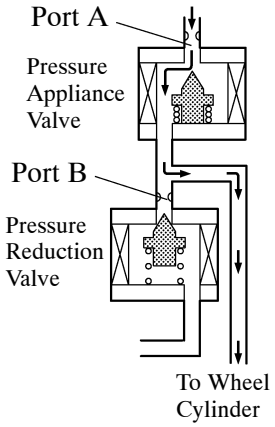
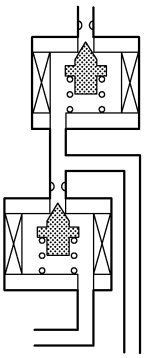
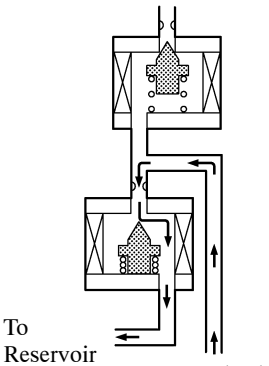
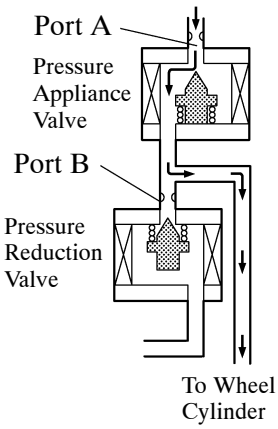
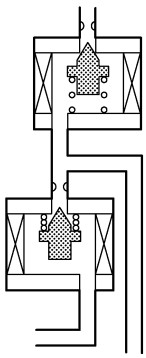
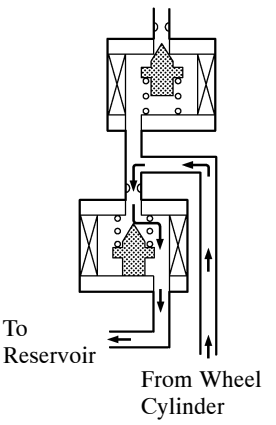
2) ABS with EBD Operation

Based on the signals received from the four 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 increase 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, pressure increase modes.

▶ System Diagram ◀



02HCH22P

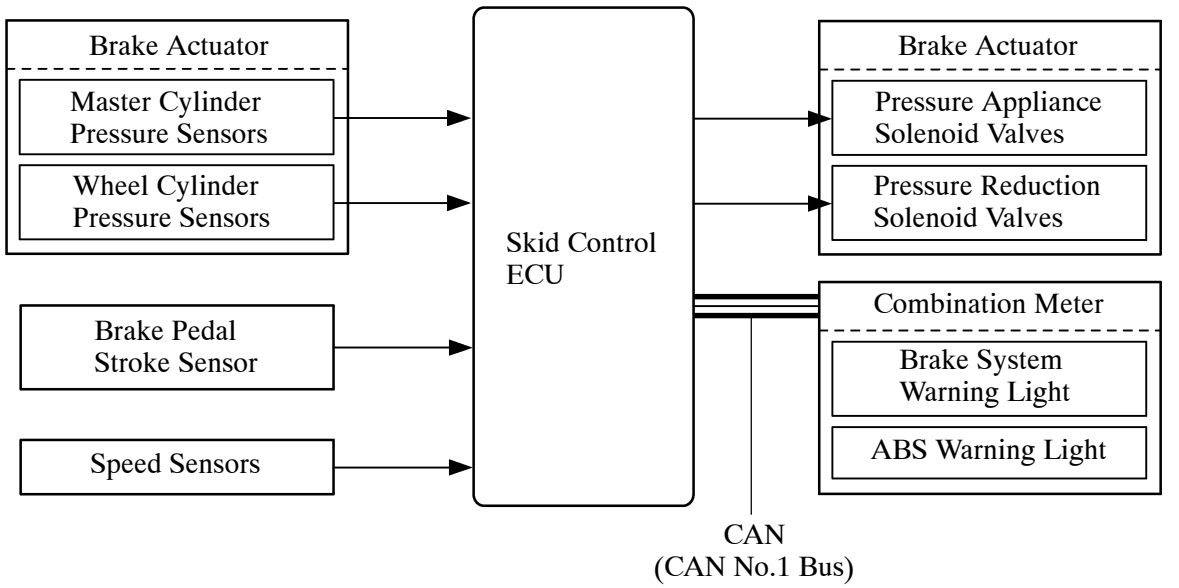
Not Activated		Normal Braking	—	—
Activated		Increase Mode	Holding Mode	Reduction Mode
Hydraulic Circuit		 255CH151	 255CH152	 255CH153
Front	Pressure Appliance Solenoid Valve (Port A)	ON (Half-Open*)	OFF (Close)	OFF (Close)
	Pressure Reduction Solenoid Valve (Port B)	OFF (Close)	OFF (Close)	ON (Half-Open*)
Hydraulic Circuit		 255CH159	 255CH160	 255CH161
Rear	Pressure Appliance Solenoid Valve (Port A)	ON (Half-Open*)	OFF (Close)	OFF (Close)
	Pressure Reduction Solenoid Valve (Port B)	ON (Close)	ON (Close)	ON (Half-Open*)
Wheel Cylinder Pressure		Increase	Hold	Reduction

*: The solenoid valve constantly regulates the amount of opening of the port in accordance with the use conditions in order to control the fluid pressure.

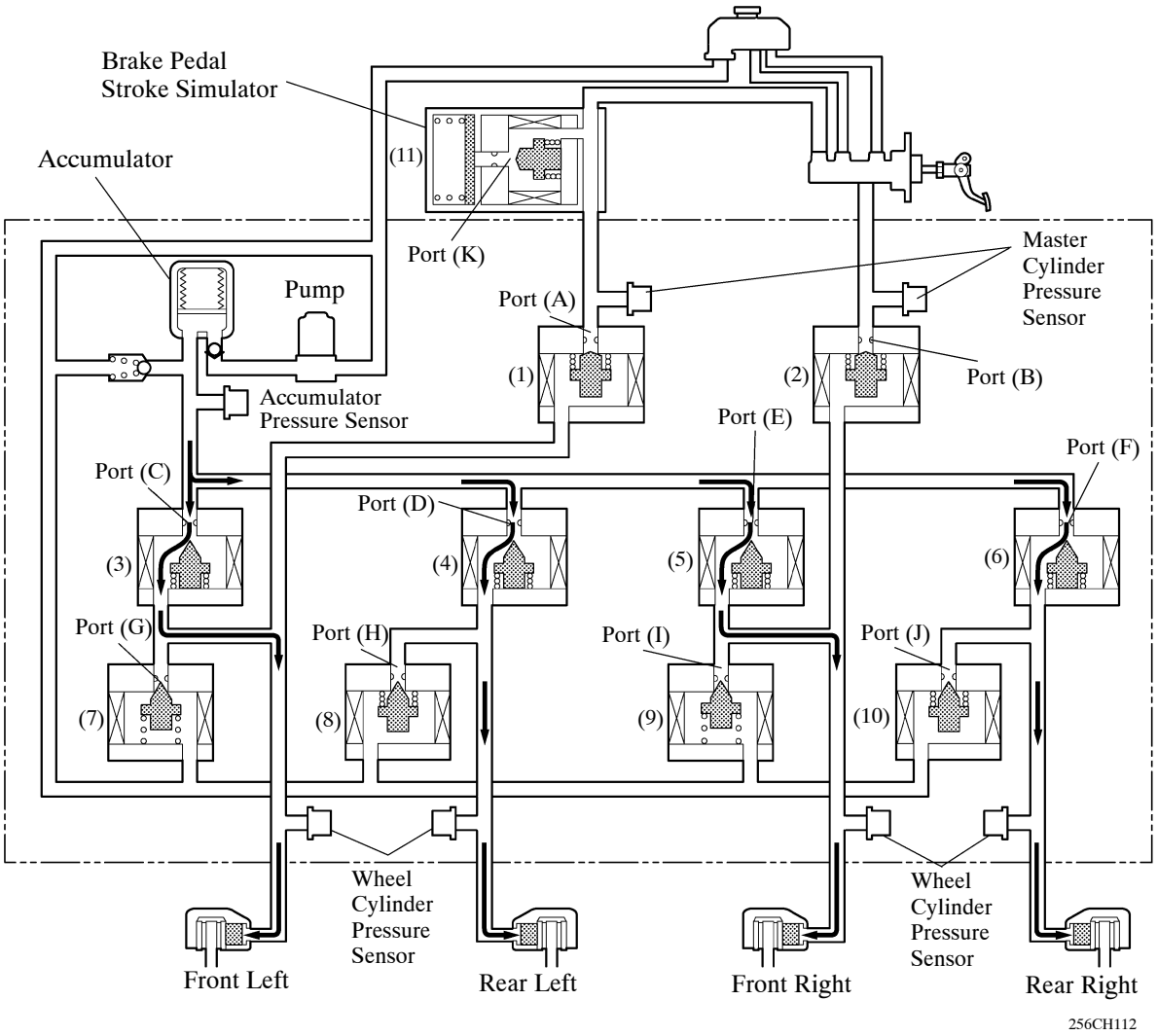
3) Brake Assist Operation

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, additional fluid pressure is generated by the pump in the actuator and directed to the wheel cylinders.

▶ System Diagram ◀



02HCH23P



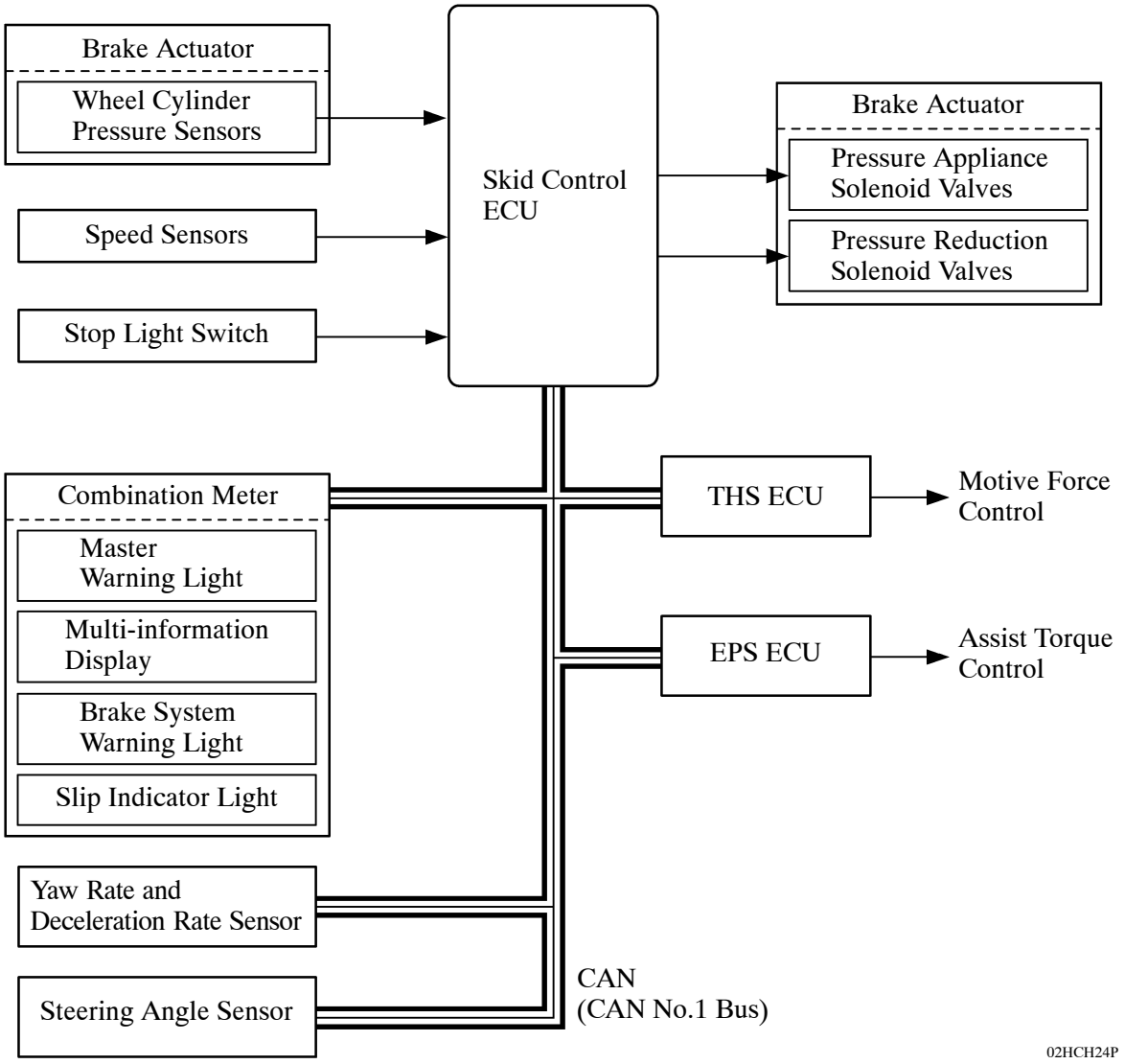
Item		Normal Braking Increase Mode	Brake Assist Activated
(1), (2)	Master Cylinder Cut Solenoid Valve Port: (A), (B)	ON (Close)	ON (Close)
(3), (4), (5), (6)	Pressure Appliance Solenoid Valve Port: (C), (D), (E), (F)	ON (Half-Open*)	ON (Half-Open*)
(7), (9)	Pressure Reduction Solenoid Valve Port: (G), (I)	OFF (Close)	OFF (Close)
(8), (10)	Pressure Reduction Solenoid Valve Port: (H), (J)	ON (Close)	ON (Close)
(11)	Stroke Simulator Cut Solenoid Valve Port: (K)	ON (Open)	ON (Open)

*: The solenoid valve constantly regulates the amount of opening of the port in accordance with the use conditions in order to control the fluid pressure.

4) TRAC Operation

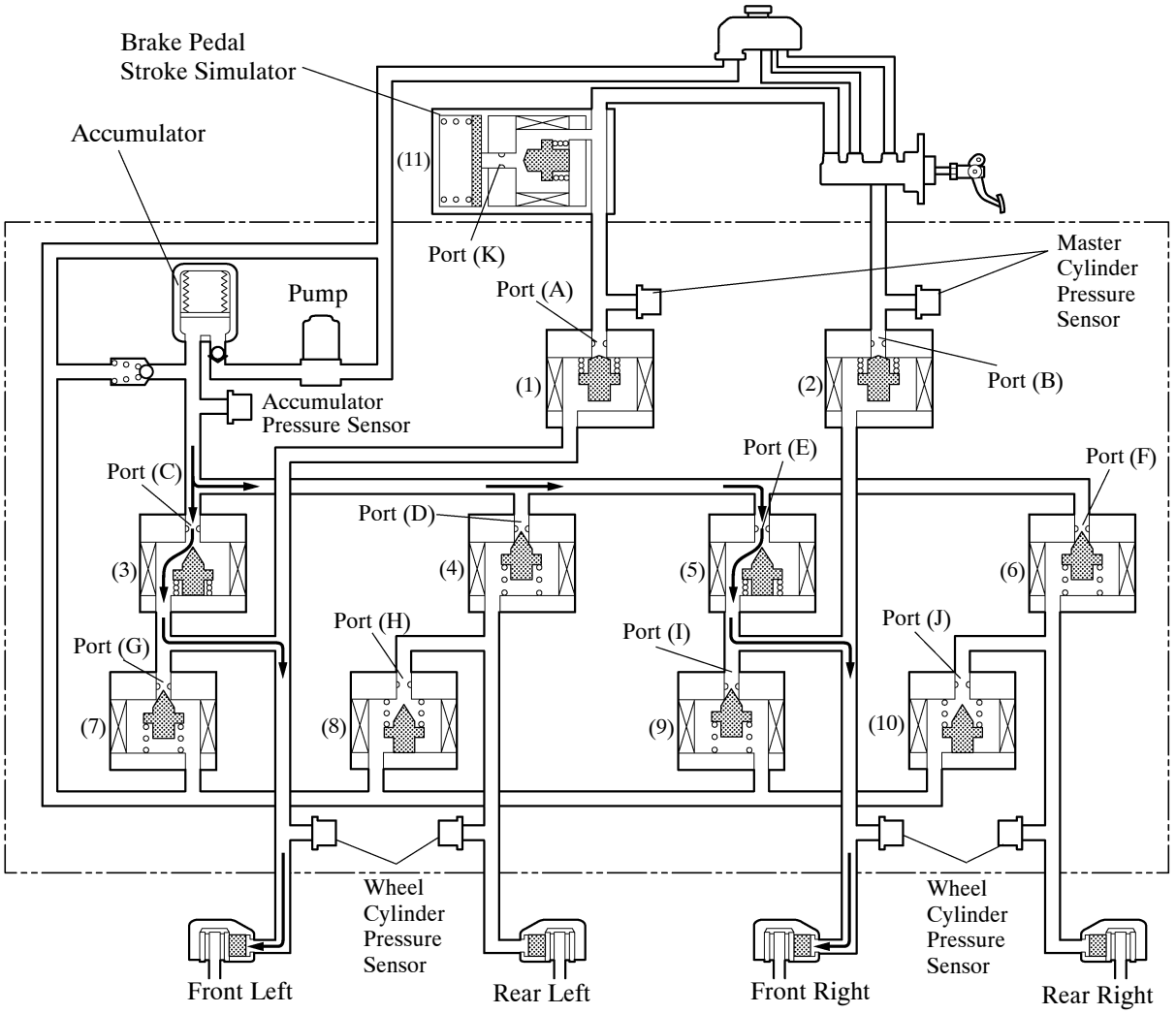
- The fluid pressure generated by the pump is regulated by the pressure appliance solenoid valve and pressure reduction solenoid valve to the required pressure. Thus, the wheel cylinders of the drive wheels are controlled in the following 3 modes: pressure reduction, pressure holding, and pressure increase modes, to restrain the slippage of the drive wheels.
- The pressure appliance valve and the pressure reduction valve are turned ON/OFF according to the ABS operation pattern.
- The diagram on the next page shows the hydraulic circuit in the pressure increase mode when the TRAC function is activated.

▶ System Diagram ◀



Service Tip

A service mode has been created for ’07 Camry Hybrid model. In this mode, TRAC and VSC functions can be forcibly turned OFF, either through the operation of a hand-held tester or by operating the shift lever and depressing the accelerator pedal.
For details, refer to the 2007 Camry Hybrid Vehicle Repair Manual (Pub. No. RM02H0U).



Increase Mode

277CH155

Item			TRAC not Activated	TRAC Activated		
				Increase Mode	Holding Mode	Reduction Mode
(1), (2)	Master Cylinder Cut Solenoid Valve		ON (Close)	ON (Close)	ON (Close)	ON (Close)
	Port: (A), (B)					
Front Brake	(3), (5)	Pressure Appliance Solenoid Valve	OFF (Close)	ON (Half-Open*)	OFF (Close)	OFF (Close)
		Port: (C), (E)				
	(7), (9)	Pressure Reduction Solenoid Valve	OFF (Close)	OFF (Close)	OFF (Close)	ON (Half-Open*)
		Port: (G), (I)				
	Wheel Cylinder Pressure		—	Increase	Hold	Reduction
Rear Brake	(4), (6)	Pressure Appliance Solenoid Valve	OFF (Close)	OFF (Close)	OFF (Close)	OFF (Close)
		Port: (D), (F)				
	(8), (10)	Pressure Reduction Solenoid Valve	OFF (Open)	OFF (Open)	OFF (Open)	OFF (Open)
		Port: (H), (J)				
	Wheel Cylinder Pressure		—	—	—	—
(11)	Stroke Simulator Cut Solenoid Valve		ON (Open)	ON (Open)	ON (Open)	ON (Open)
	Port: (K)					

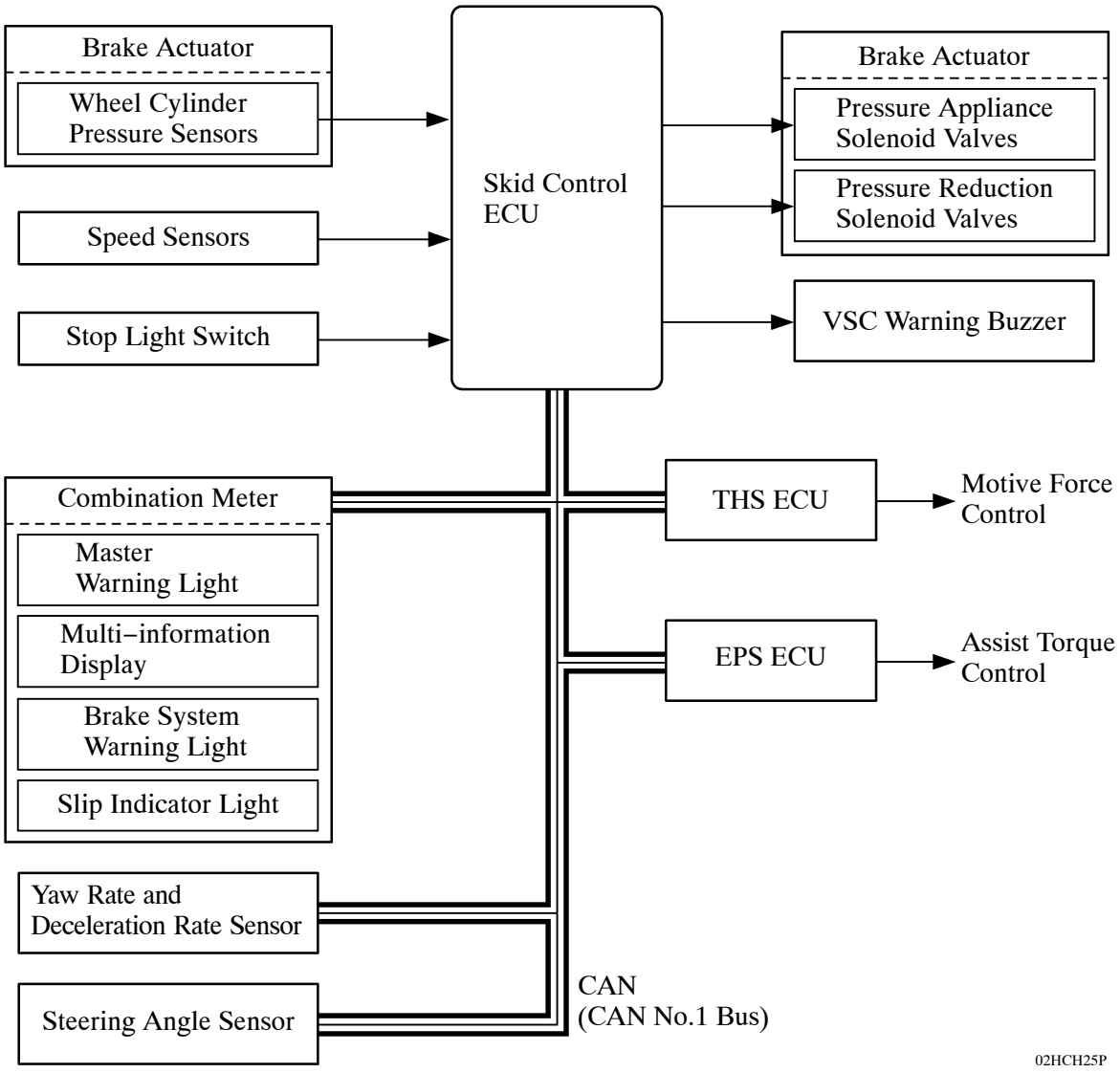
*: The solenoid valve constantly regulates the amount of opening of the port in accordance with the use conditions in order to control the fluid pressure.

5) VSC Operation

a. General

The VSC function controls the solenoid valves in order to send the fluid pressure stored in the accumulator to the brake wheel cylinders at the respective wheels, through routes that are different from those used during normal braking. Thus, the function operates in the following 3 modes: pressure reduction, pressure holding, and pressure increase. As a result, the tendency of the front wheels or the rear wheels to skid is restrained.

▶ System Diagram ◀

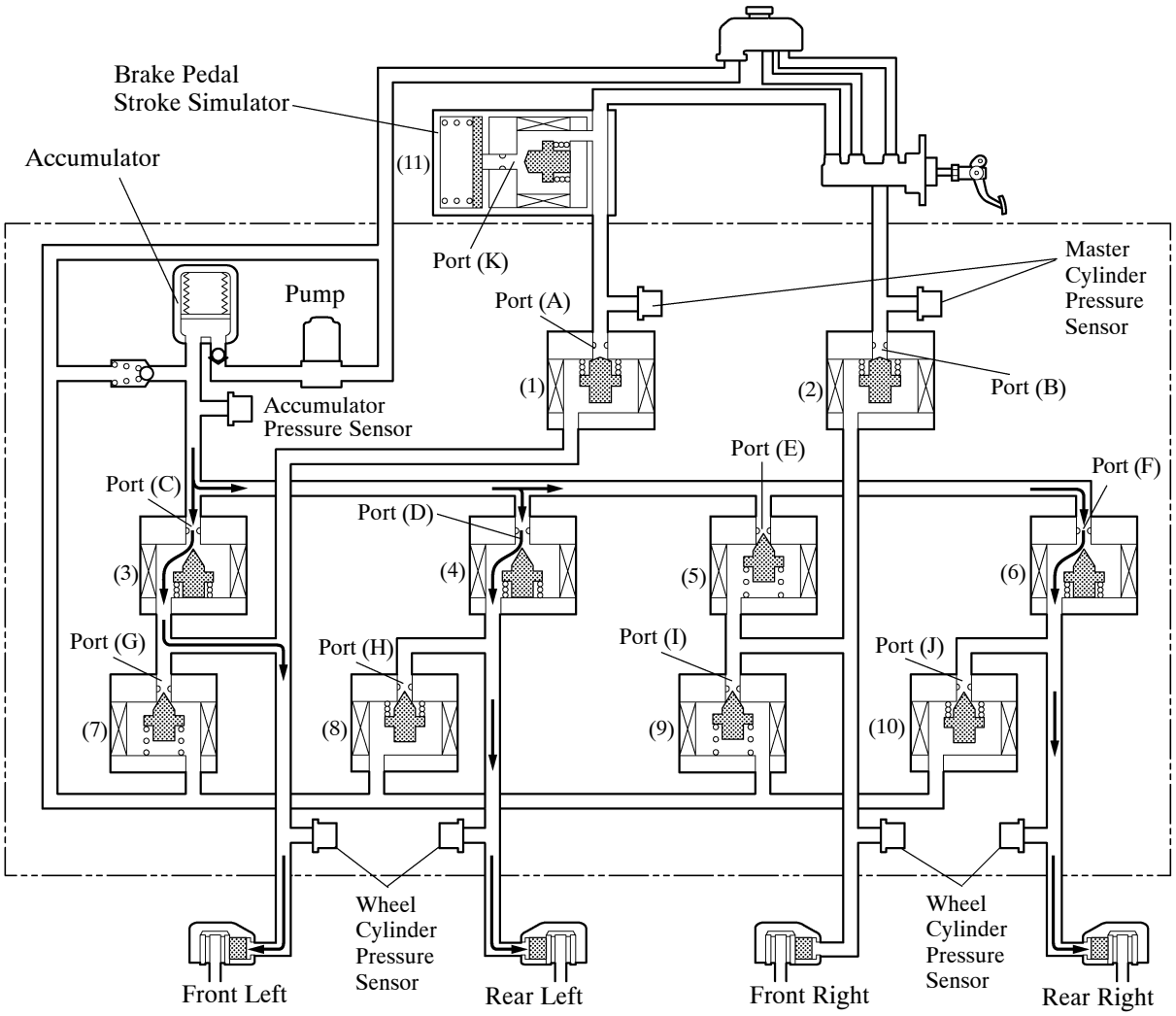


Service Tip

A service mode has been created for ’07 Camry Hybrid model. In this mode, TRAC and VSC functions can be forcibly turned OFF, either through the operation of a hand-held tester or by operating the shift lever and depressing the accelerator pedal.
For details, refer to the 2007 Camry Hybrid Vehicle Repair Manual (Pub. No. RM02H0U).

b. Front Wheel Skid Restraint Control (Turning to the Right)

- In the front wheel skid tendency, this management function applies the brake to the rear wheels and front wheel of the outer side of the turn. 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 restrains the front wheel skid condition while the vehicle makes a right turn.
- The pressure appliance valve and the pressure reduction valve are turned ON/OFF according to the ABS operation pattern.



Increase Mode

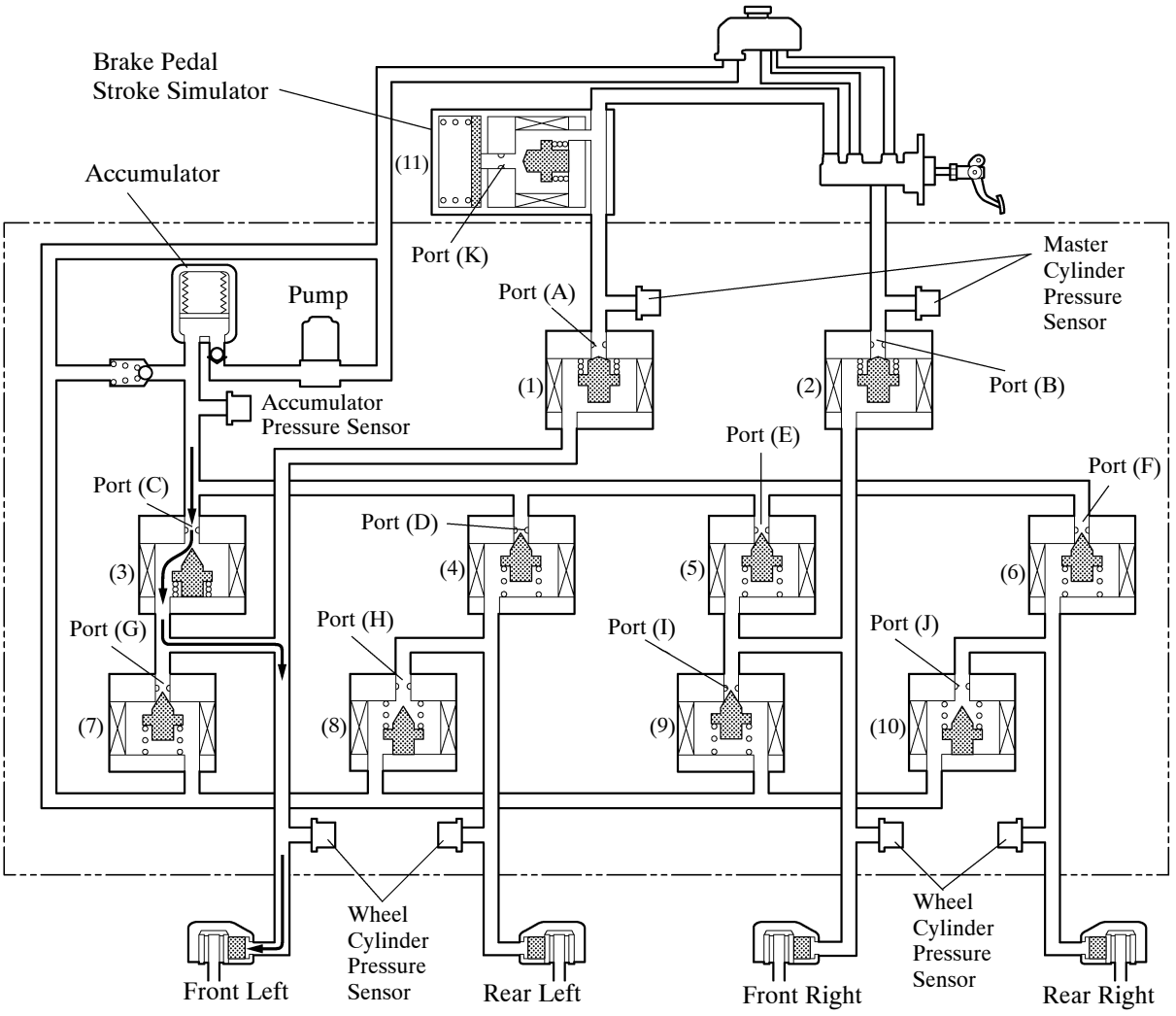
277CH153

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

*: The solenoid valve constantly regulates the amount of opening of the port in accordance with the use conditions in order to control the fluid pressure.

c. Rear Wheel Skid Restraint Control (Turning to the Right)

- In rear wheel skid tendency, this management function applies the brake to the front wheel of the outer circle of the turn. In some cases, the skid control ECU applies the brake to the rear wheels, as necessary. As an example, the diagram below shows the hydraulic circuit in the pressure increase mode, as it restrains the rear wheel skid condition while the vehicle makes a right turn.
- As in front wheel skid restraint control, the pressure appliance valve and the pressure reduction valve are turned ON/OFF according to the ABS operating pattern.



Increase Mode

256CH114

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

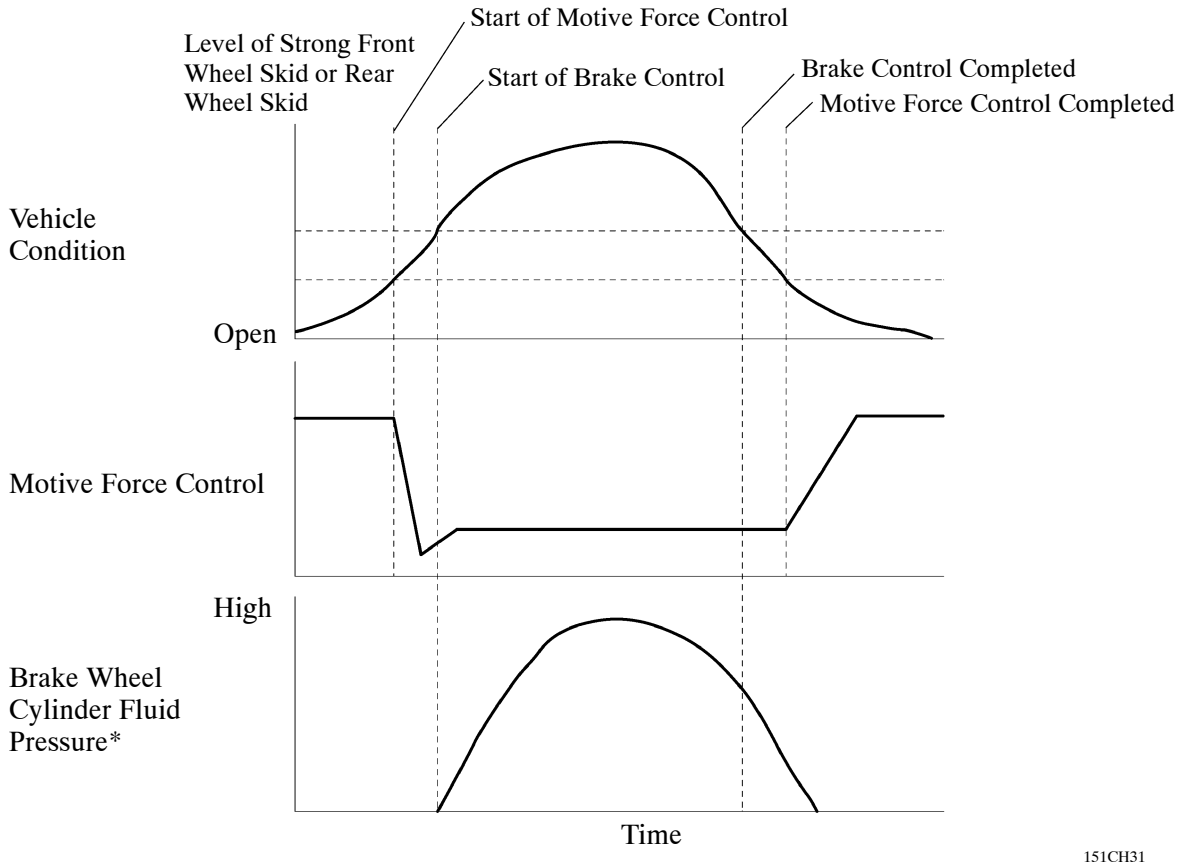
*1: The solenoid valve constantly regulates the amount of opening of the port in accordance with the use conditions in order to control the fluid pressure.

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

Skid Control ECU

1) Motive Force Control

During a brake control operation (TRAC or VSC function), the skid control ECU outputs a motive force control request signal to the THS ECU. Upon receiving this signal, the THS ECU effects motive force control.



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

2) Diagnosis

- If a failure occurs in one of the sensors or actuators in the brake system, the skid control ECU informs the driver of the failure in the brake system by illuminating the ECB* warning light, brake system warning light, or ABS warning light in the combination meter, or displaying a VSC warning message/“CHECK VSC SYSTEM” (on the multi-information display).
- At the same time, a DTC (Diagnostic Trouble Code) is stored in memory. The DTC can be accessed by connecting the SST (09843-18040) between the Tc and CG terminals of the DLC3 connector and checking the blinking of the ABS warning light, ECB* warning light, or the “DIAG VSC” that appears on the multi-information display. Another way to access the DTC is to connect a hand-held tester and read the code that appears on the tester.
- 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 terminals of the DLC3 or by connecting a hand-held tester.
- If the CAN has communication error ECU or sensors, multiple DTCs are output simultaneously to indicate the malfunction location.
- Three-digit information codes have been provided in the conventional DTC as subset of a primary five-digit code. This enables the troubleshooting procedure to further narrow down a trouble area to identify a problem.
- For details on the DTC that are stored in skid control ECU memory and the DTC that are output through the sensor signal check function, see the 2007 Camry Hybrid Vehicle Repair Manual (Pub. No. RM02H0U).

*: ECB (Electronically Controlled Brake System)

▶ Display example of the multi-information display ◀

Normal system code is displayed

025CH50P

DTC is displayed

025CH56P

Service Tip

The skid control ECU uses the CAN protocol for diagnostic communication. Therefore, a hand-held tester and a dedicated adapter [CAN VIM (Vehicle Interface Module)] are required for accessing diagnostic data. For details, see the 2007 Camry Hybrid Vehicle Repair Manual (Pub. No. RM02H0U).

3) Fail-Safe

- If a failure occurs in the skid control ECU, sensors, and/or brake actuators, the system continues effecting brake control by excluding the failed area and using only the areas that are operating normally.
- If the regenerative brake becomes unusable due to a failure in communication with the THS ECU, the skid control ECU uses the hydraulic brake force to control the entire braking force.

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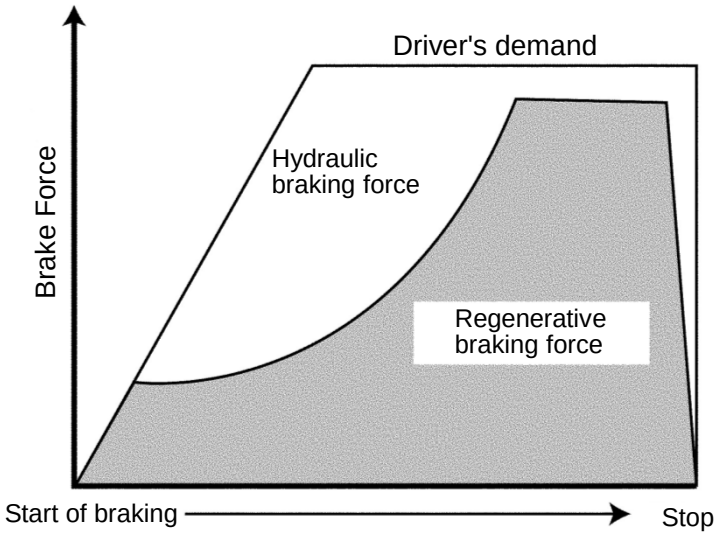
ATTACHMENT 1

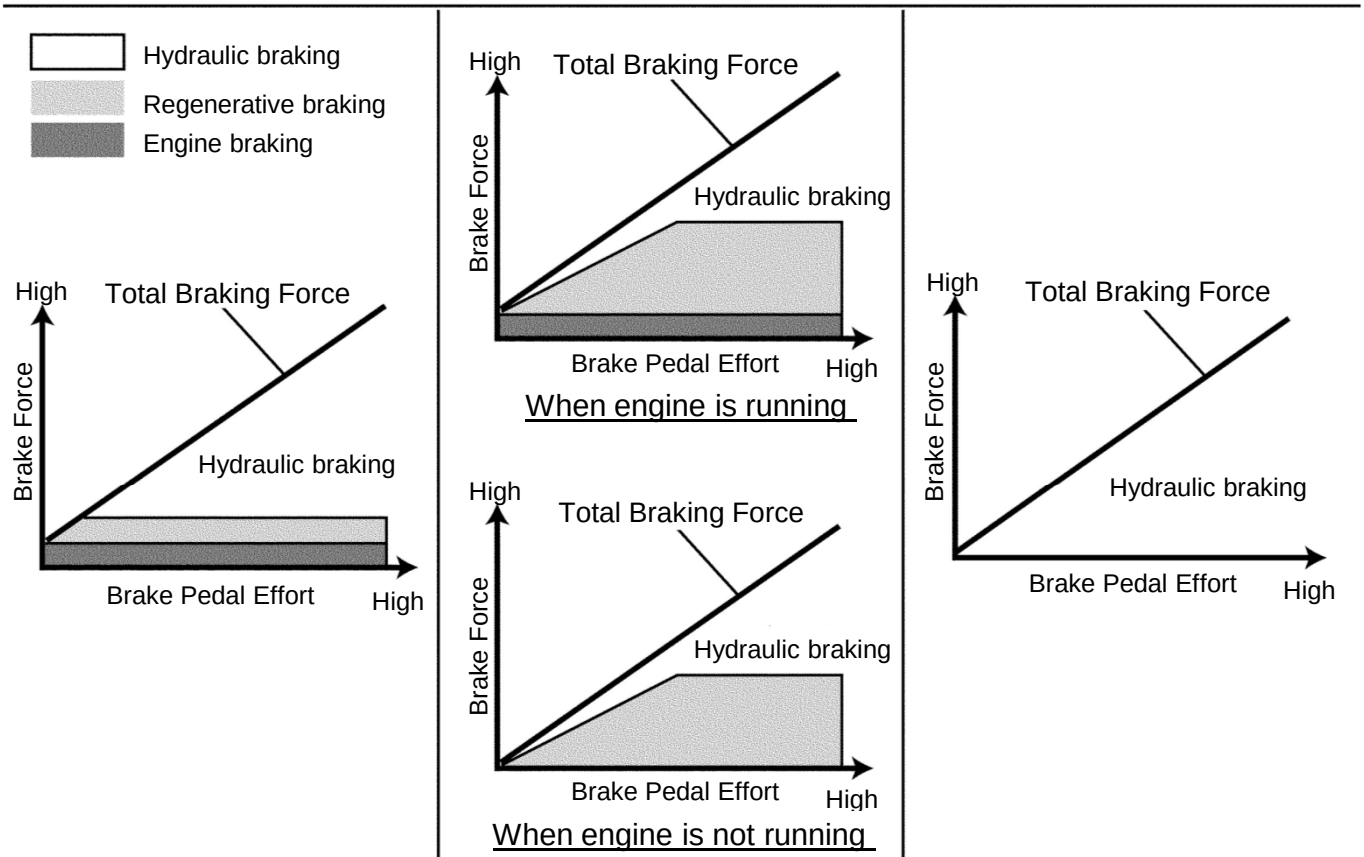
RESPONSE 12

Attachment-Response 12-2

Apportioning of brake force between the hydraulic brake and the regenerative brake



Cooperative Control Imagery Drawing



High Speed Operation	Medium/Low Speed Operation	Very low Speed Operation or Shift position "N"

Comparison of vehicle speed

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ATTACHMENT 1

RESPONSE 12

Attachment-Response 12-3_E

ENTIRE PAGE CONFIDENTIAL BUSINESS INFORMATION

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ATTACHMENT 1

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ATTACHMENT 1

RESPONSE 12

Attachment-Response 12-5

[CONFIDENTIAL BUSINESS INFORMATION]

DTC Code	Detection Item	Detection Condition	Detection Timing	Trouble Area

CONFIDENTIAL BUSINESS INFORMATION REDACTED
Pages 1 to 2