05MN4–01

SYSTEM DESCRIPTION

1. PRE–CRASH SAFETY SYSTEM

(a) The pre–crash safety system optimizes and activates occupant protection equipment (see below) to attempt to reduce crash damage.

(b) Outline of pre–crash safety system.

Operating Condition	Control	Transmitting ECU	Receiving ECU	Part Operated
Operates according to sensor detection	Pre–crash seat belts	Cruise control ECU assy (Distance control ECU)	Seat belt control ECU	Front seat outer belts
Operates according to sensor detection	Pre–crash brake assist	Cruise control ECU assy (Distance control ECU)	ABS & traction actuator assy (Skid control ECU)	Brake assist system
Operates according to sensor detection	Damping force control	Cruise control ECU assy (Distance control ECU)	Suspension control ECU	Shock absorbers
Operates when sudden braking occurs	Pre–crash seat belts	ABS & traction actuator assy (Skid control ECU)	Seat belt control ECU	Front seat outer belts

(1) When operating according to sensor detection:
The pre–crash sensor (millimeter wave radar sensor) detects vehicles and objects in front of the user's vehicle. The cruise control ECU (distance control ECU) determines if a crash is unavoidable based on object position, speed and track information. If the cruise control ECU determines that a crash is unavoidable, it transmits this information to the following areas through CAN communication.

- Seat belt control ECU (initiates control of pre–crash seat belts)
- ABS & traction actuator (skid control ECU) (activates pre–crash brake assist system)
- Suspension control ECU (tightens the suspension as much as possible)

(2) When operating as a result of sudden braking:
The ABS & traction actuator uses brake pressure information and other data to determine if the driver has suddenly applied the brakes. If so, the ABS & traction actuator sends a signal to the seat belt control ECU through CAN communication and the pre–crash seat belt activates.

2. OUTLINE OF PRE–CRASH SEAT BELT CONTROL

(a) The pre–crash seat belt operates depending on what the sensor detects, or whether or not sudden braking has occurred. The pre–crash seat belt motor tightens the seat belt to optimize occupant restraint performance.

(b) Operative condition

(1) Refer to steps 1–(b) (1) and (2).

3. OUTLINE OF PRE–CRASH BRAKE ASSIST SYSTEM

(a) The pre–crash brake assist system operates depending on what the sensor detects. The system then enters standby mode before a crash. When the driver depresses the brake pedal, brake fluid pressure is increased to improve fluid pressure response and improve vehicle speed reduction rate.

(b) Operative condition

(1) Refer to step 1–(b) (1).

(2) When the driver depresses the brake pedal after the cruise control ECU determines that a crash is unavoidable:
Brake fluid pressure is increased at the same time the driver depresses the brake pedal.

(3) When the driver depresses the brake pedal before the cruise control ECUdetermines that a crash is unavoidable:
Brake fluid pressure is increased at the same time that the cruise control ECU receives a pre–crash sensor signal (indicating that other vehicles or objects are in front of the vehicle).

4. OUTLINE OF DAMPING FORCE CONTROL

(a) The damping force control operates depending on what the sensor detects. The system then tightens the suspension as much as possible to reduce crash damage.

(b) Operative condition

(1) Refer to step 1–(b) (1).

5. OPERATIVE CONDITION AND INOPERATIVE CONDITION OF EACH CONTROL (REVIEW)

	Pre–crash seat belts*1	Pre–crash seat belts*2	Pre–crash brake assist*2	Damping force control*2
Ignition switch is in LOCK or ACC position	–	–	–	–
When a warning message is displayed on multi–information display*3	*4	*4	*4	*4
When seat belt(s) is/are fastened	*5	*5	○	○
When own vehicle speed is 30 km/h (19 mph) or more, regardless of relative speed	○	–	–	–
When own vehicle speed is 5 km/h (3 mph) or more and relative speed is 30 km/h (19 mph)	–	○	○	○
When vehicle collides with an object outside detection range of millimeter wave radar sensor (side crash, rear crash, etc.)	*6	–	–	–
When millimeter wave radar sensor cannot detect a possible crash object	*6	–	–	–

HINT:

*1: Operates when brakes are suddenly applied

*2: Operates according to sensor detection

*3: Fail–safe function (see page 05–97)

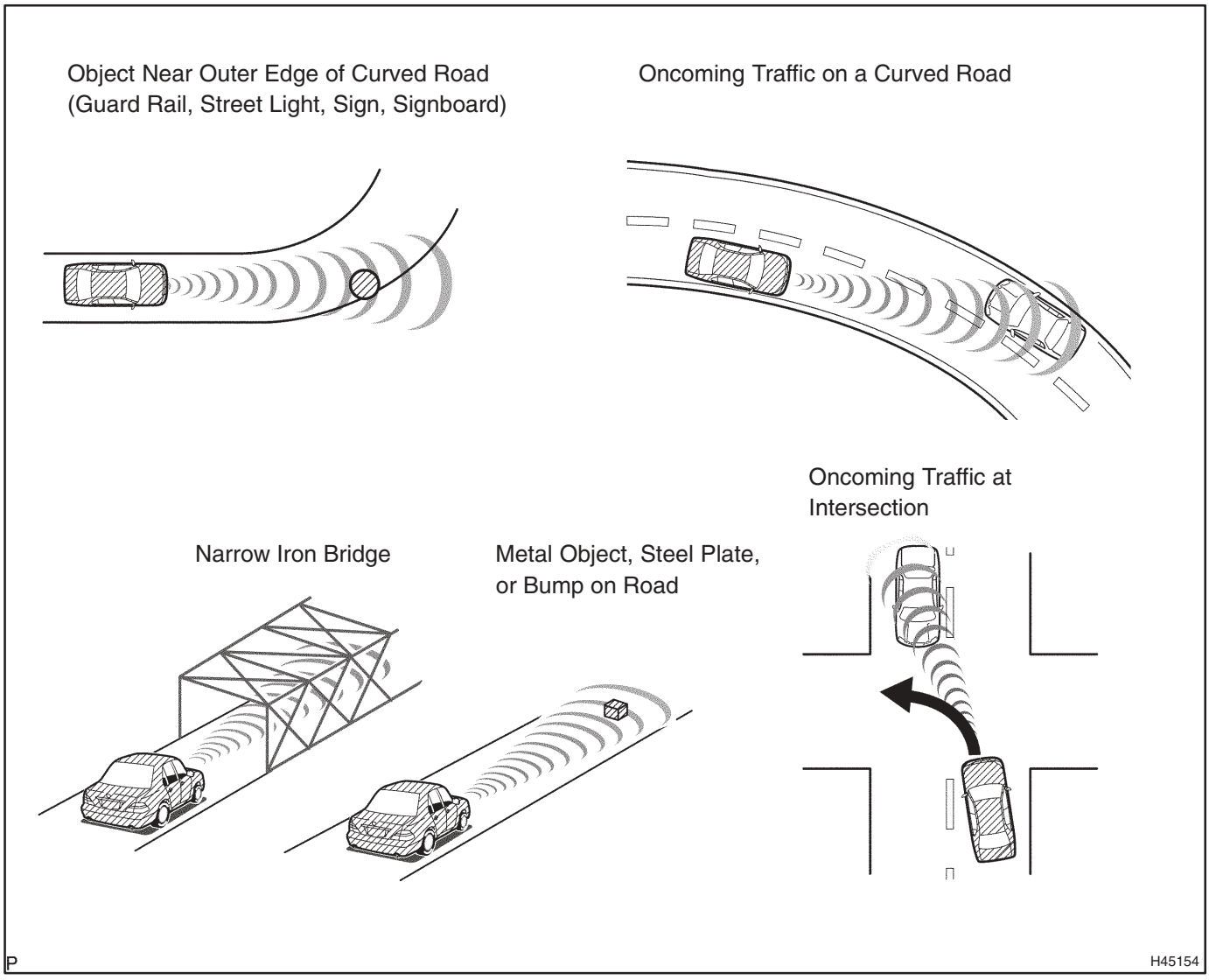
*4: Inoperative parts are different depending on malfunction areas

*5: Only operates when seat belt is fastened

*6: Pre–crash seat belts may operate when the brakes are suddenly applied.

6. PRECAUTION FOR PRE–CRASH SAFETY SYSTEM OPERATION

(a) When the pre–crash sensor detects an object in front of the vehicle under the conditions described on the previous page, the cruise control ECU may determine that a crash is unavoidable and activate the pre–crash safety system. If the system operates under the conditions in the illustration below, a malfunction may occur.



HINT:

- The pre–crash safety system will not activate when the pre–crash sensor detects safety cones and other plastic objects.
- The pre–crash safety system may or may not activate when the pre–crash sensor detects the following objects: people, bicycles, motorcycles, trees, animals and snow fences.