MANUAL TRANSMISSION

97U0JX-501

OUTLINE

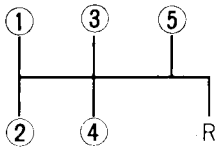
OUTLINE OF CONSTRUCTION

The basic construction is the same as that of the 1988 RX-7 M-type and R-type transmissions, but various modifications have been made to improve drivability.

1. A dynamic damper unit is installed in all M-type and R-type transmissions to prevent gear noise.
2. The gear ratios were chosen to provide the best fuel economy and power.
3. A synchronization mechanism like that of the R-type transmission is used for reverse gear of the M-type transmission.

97U0JX-502

SPECIFICATIONS

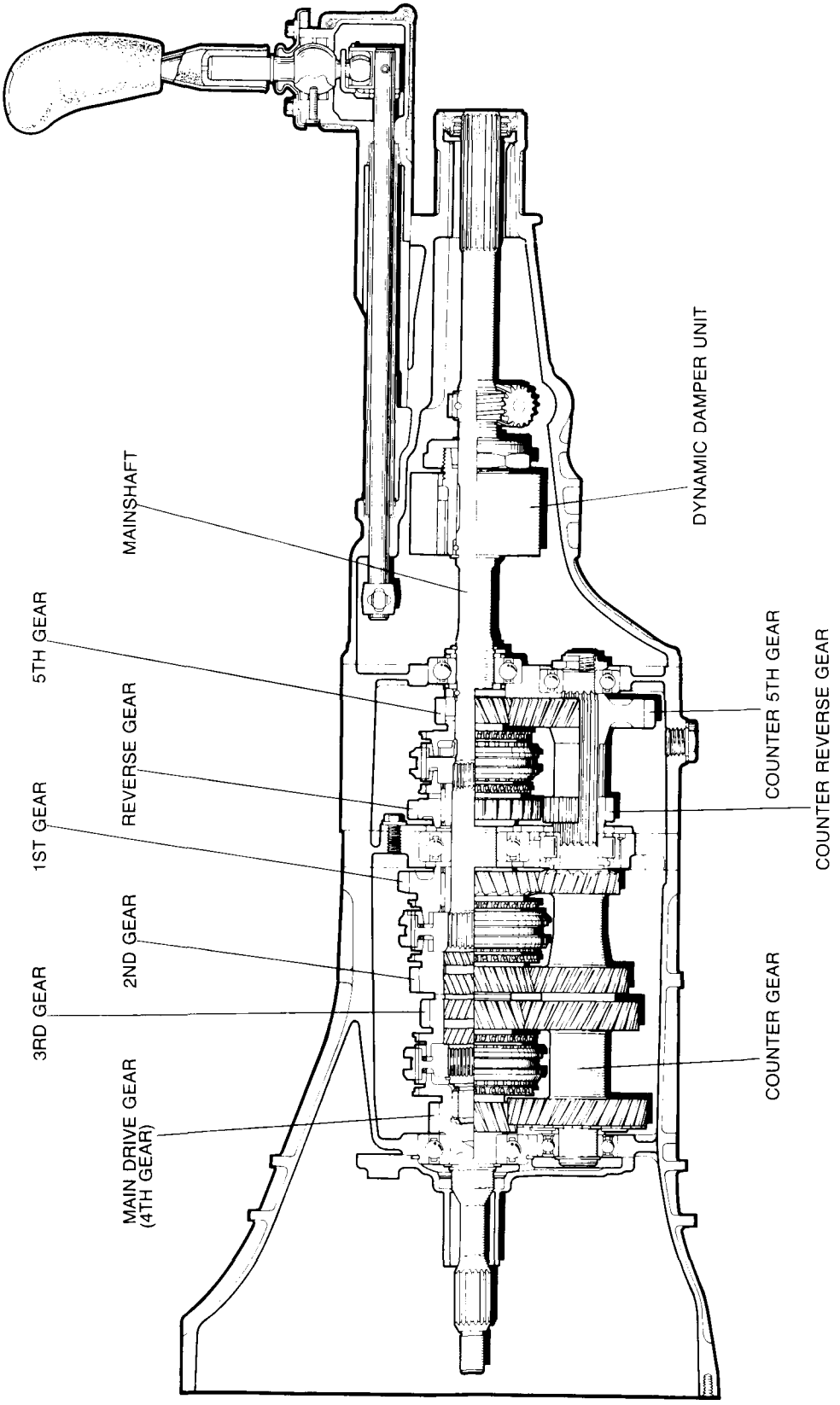
Item \ Model			Non-Turbo (M-type)		Turbo (R-type)	
			'88 RX-7	'89 RX-7	'88 RX-7	'89 RX-7
Synchronization mechanism	Forward		Synchromesh			
	Reverse		Constant-mesh	Synchromesh		
Shift type			5-speed, floor shift			
Shift pattern						
Gear ratio	1st		3.475		3.483	
	2nd		2.002		2.015	
	3rd		1.366		1.391	
	4th		1.000		1.000	
	5th		0.697	0.697, 0.756*	0.762	0.719
	Reverse		3.493		3.288	
Oil	Grade		API service GL-4 or GL-5			
	Viscosity	All-season	SAE 80W-90	SAE 75W-90	SAE 80W-90	SAE 75W-90
		Above −18°C (0°F)	SAE 90	—	SAE 90	—
		Below −18°C (0°F)	SAE 80W	—	SAE 80W	—
		Above 10°C (50°F)	—	SAE 80W-90	—	SAE 80W-90
	Capacity liters (US qts, Imp qts)		2.0 (2.1, 1.8)	2.5 (2.6, 2.2)	2.5 (2.6, 2.2)	

* With viscous limited slip differential.

97U0JX-503

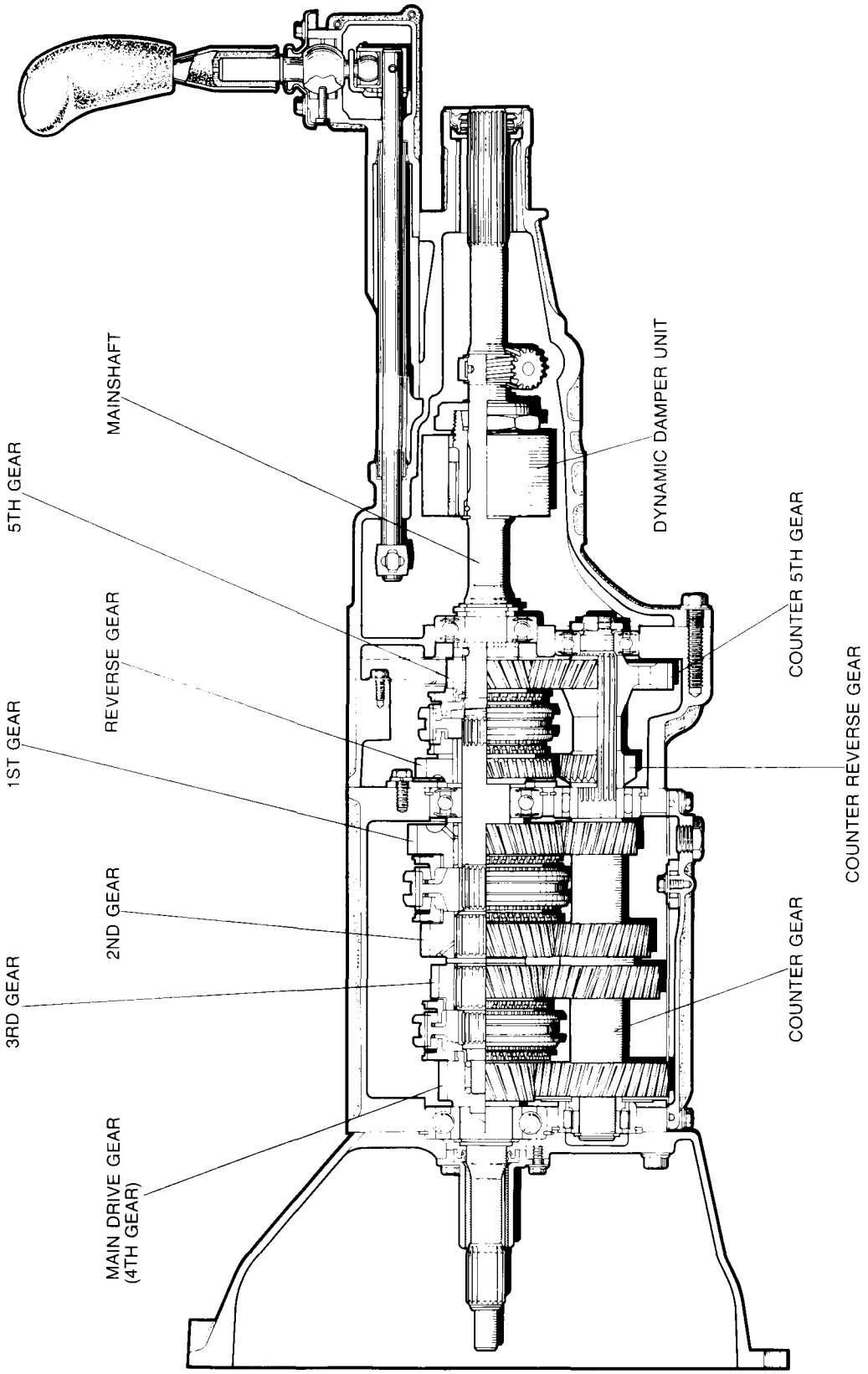
STRUCTURAL VIEW

NON-TURBO



STRUCTURAL VIEW (CONT'D)

TURBO



97U0JX-505

INTERCHANGEABILITY OF MAJOR COMPONENTS

Parts interchangeability and differences between the 1989 RX-7 and the 1988 RX-7 with the M type transmission are shown below.

Part name	Interchangeability	Remark
Gear shift lever	X	Shape, length
Control lever	X	Shape
Transmission case	X	Shape
Extension housing	X	Shape
Countershaft gear assembly	X	Different components
Counter reverse gear	○	
Counter fifth gear	○	Except viscous limited slip differential equipped m
1st gear	○	
2nd gear	X	Shape, width of gear teeth
3rd gear	○	
Main drive gear	○	
5th gear	○	Except viscous limited slip differential equiped m
Reverse gear	X	Shape, material
Reverse idler gear	○	
Mainshaft	X	Shape
Clutch hub assembly (1st/2nd)	○	
Clutch hub assembly (3rd/4th)	○	
Clutch hub assembly (5th/Reverse)	X	Shape
Shift fork (1st/2nd)	X	Shape
Shift fork (3rd/4th)	○	
Shift fork (5th/Reverse)	○	
Shift rod (1st/2nd)	X	Shift detent ramp angle increased, shape
Shift rod (3rd/4th)	X	Shift detent ramp angle increased, shape
Shift rod (5th/Reverse)	X	Shape, length

Symbols
○ Interchangeable
X Not interchangeable

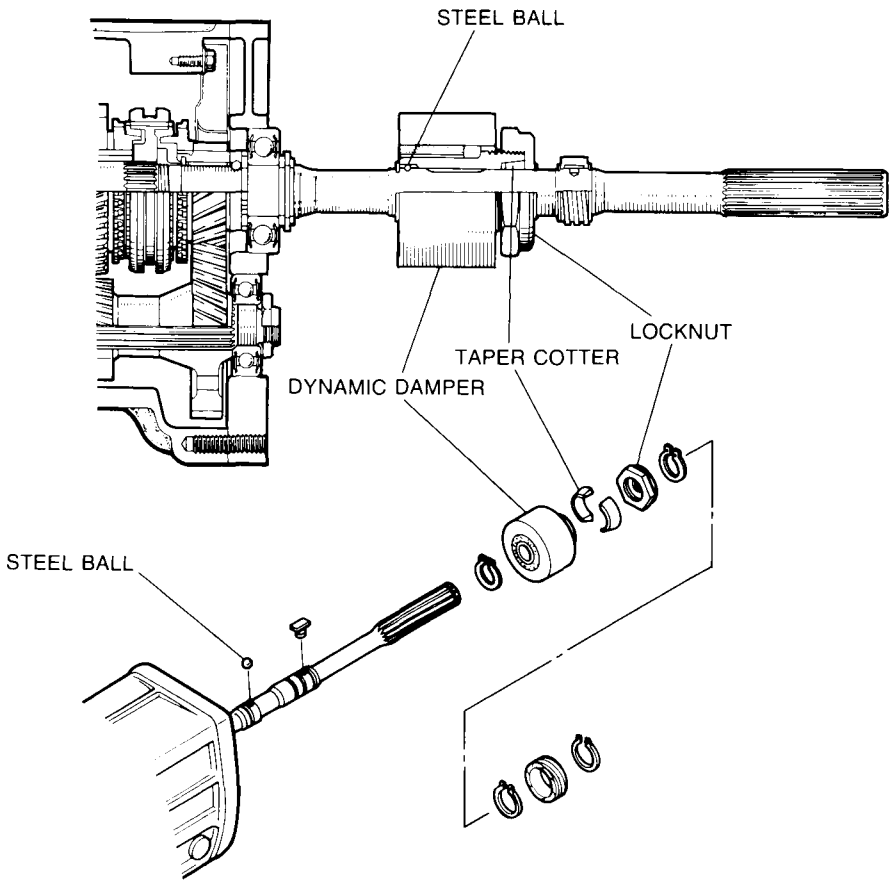
Parts interchangeability and differences between the 1989 RX-7 and the 1988 RX-7 with the R-type transmission are shown below.

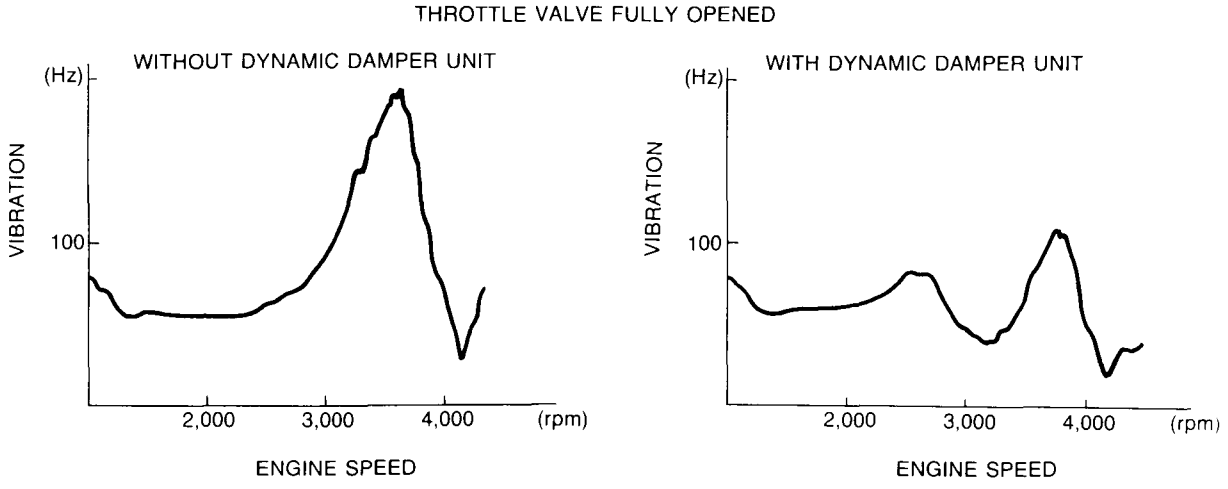
Part name	Interchangeability	Remark
Gear shift lever	X	Shape, length
Control lever	○	
Clutch housing	X	Shape
Transmission case	X	Shape
Extension housing	X	Shape
Countershaft gear assembly	○	
Counter reverse gear	X	Specifications of gear teeth
Counter fifth gear	X	Number of gear teeth, outer diameter
1st gear	X	Surface treatment process
2nd gear	X	Specifications of gear teeth
3rd gear	X	Width of gear teeth
Main drive gear	○	
5th gear	X	Number of gear teeth, outer diameter
Reverse gear	X	Specifications of gear teeth
Reverse idler gear	X	Specifications of gear teeth
Mainshaft	X	Shape
Clutch hub assembly (1st/2nd)	○	
Clutch hub assembly (3rd/4th)	○	
Clutch hub assembly (5th/Reverse)	○	
Shift fork (1st/2nd)	○	
Shift fork (3rd/4th)	○	
Shift fork (5th/Reverse)	X	Width
Shift rod (1st/2nd)	X	Shape
Shift rod (3rd/4th)	X	Shape
Shift rod (5th/Reverse)	○	

97U0JX-507

Symbols
○ : Interchangeable
X : Not interchangeable

DYNAMIC DAMPER UNIT





The dynamic damper unit is installed between the mainshaft rear bearing and the speedometer drive gear for reduction of gear noise while driving.

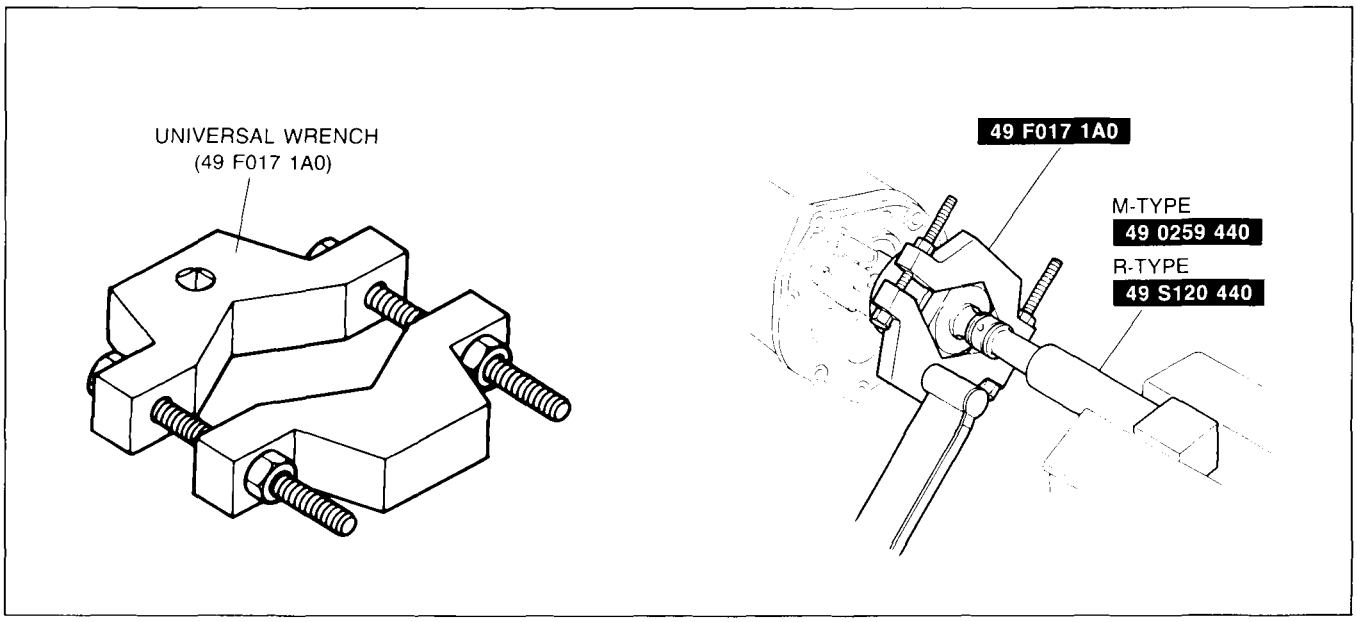
The dynamic damper unit consists of snap rings, locknut, taper cotter, steel ball, and dynamic damper. The principal cause of gear noise while the vehicle is travelling is transmission mainshaft torsional vibration produced as a result of torque fluctuation of the engine.

When torque fluctuations of the engine are transmitted to the mainshaft, a condition develops whereby gear teeth clatter together as result of gear play caused by such factors as gear backlash, thrust clearance, etc. This causes noise which emanate through the transmission case.

A method to absorb such torsional vibration is to increase the momentum of inertia (which means increasing mass) around the mainshaft axis. Also, torsional force produced on the mainshaft is absorbed as shearing force by the rubber in the dynamic damper.

SERVICE POINTS

SST



97U0JX-509

To remove and install the dynamic damper locknut, a new **SST universal wrench** (49 F017 1A0) is established. Connect the **mainshaft holder** (49 0259 440: M-type, 49 S120 440: R-type) to the mainshaft and tighten it securely in a vice. Tighten the locknut with the **SST** (49 F017 1A0).

Tightening torque (without SST): 157—206 N·m (16—21 m-kg, 116—152 ft-lb)

Tightening torque (with SST):

Torque wrench length (in)	Tightening torque with SST (N·m, m-kg, ft-lb)	
	M-type	R-type
18 1/2	141—184, 15—19, 104—136	140—184, 14—19, 104—136
18 11/16	141—185, 15—19, 104—137	140—184, 14—19, 104—136
18 3/4	141—185, 15—19, 104—137	140—184, 14—19, 104—136
20 5/8	142—186, 15—19, 105—137	142—186, 15—19, 105—137
21 1/2	143—187, 15—19, 106—138	142—186, 15—19, 105—137
22	143—188, 15—19, 106—139	142—187, 15—19, 105—138
23	144—188, 15—19, 106—139	143—188, 15—19, 106—139
23 3/4	144—189, 15—19, 106—139	143—188, 15—19, 106—139

AUTOMATIC TRANSMISSION (Electronically-Controlled)

97U0KX-501

OUTLINE

OUTLINE OF CONSTRUCTION

To provide smooth comfortable driving and improved fuel economy, the 1989 RX-7 is available with an electronically controlled automatic transmission (EC-AT) (N4A-EL).

1. The transmission is basically the same as the 1989 929 automatic transmission.
2. To improve drivability, electronic control system components, electronically-controlled OD, and lockup control are modified.
3. The 1989 RX-7 automatic transmission also has a shift-lock system for improved safety.

SPECIFICATIONS

Item	Model		'89 RX-7	'89 929
Torque converter	Stall torque ratio		1.900	
	Lockup mechanism		Equipped	
Gear ratio	1st		2.841	
	2nd		1.541	
	3rd		1.000	
	OD (4th)		0.720	
	Reverse		2.400	
Number of drive/driven plates	Direct clutch		2/2	
	Front clutch		4/5	
	Rear clutch		6/6	
	Low and reverse brake		5/5	6/6
Servo diameter (Piston outer diameter/retainer inner diameter) mm (in)	OD band servo		60/40 (2.362/1.575)	
	2nd band servo		80/56 (3.150/2.205)	80/52 (3.150/2.047)
Automatic transmission fluid (ATF)	Type		Dexron II or M-III	
	Capacity liters (US qt, Imp qt)	Total	7.3 (7.7, 6.4)	
		Oil pan	4.0 (4.2, 3.5)	

97U0KX-502

COMPARISON OF '89 RX-7 AND '89 929

Item		'89 RX-7	'89 929
Electronic control system components	Input	Hold switch Cruise control unit Engine control unit (Coolant temperature and throttle valve fully closed signal) Speed sensor Throttle sensor Inhibitor switch Turbine sensor	Hold switch Mode switch Cruise control unit Engine control unit (Coolant temperature s[illegible] Idle switch Speed sensor Inhibitor switch Turbine sensor Throttle sensor
	Output	Hold indicator Engine control unit (No-load signal) 1-2 shift solenoid 2-3 shift solenoid 3-4 shift solenoid Lockup control solenoid 3-2 control solenoid	Hold indicator Mode indicator Engine control unit (No-load signal) 1-2 shift solenoid 2-3 shift solenoid 3-4 shift solenoid Lockup control solenoid 3-2 control solenoid
		EC-AT control unit	EC-AT control unit
Lockup control	Lockup inhibition	When engine coolant temperature below 50°C (122°F) or accelerator pedal fully closed.	When engine coolant temperature below 55°C (131°F) or accelerator pedal fully closed
Shift control	OD inhibition	When cruise control is operating and there is 8 km/h (5 mph) difference between preset cruise speed and vehicle speed or SET or RESUME switch is ON.	When cruise control is operating and there is 3 km/h (1.9 mph) difference between preset cruise speed and vehicle speed or SET or RESUME switch is ON.

INTERCHANGEABILITY OF MAJOR COMPONENTS

The following chart shows interchangeability of the major parts of the 1989 RX-7 and 1989 929 EC

Part name	Interchangeability	Remark
Converter housing	X	Shape
OD case and drum support assembly	○	
Transmission case	X	Shape
Extension housing	X	Shape
Torque converter	○	
Oil pump assembly	○	
OD planetary pinion carrier	○	
Direct clutch	○	
OD band servo	○	
Intermediate shaft	X	Shape, material
Input shaft	○	
Front clutch assembly	○	
Rear clutch assembly	○	
Front planetary pinion carrier	X	Material
Rear planetary pinion carrier	X	Material
Oil distributor	○	
Output shaft	X	Shape
Parking rod	○	
Parking pawl	○	
Control valve assembly	X	Valve spring specifications, length of 1-2, N- and N-D accumulator pistons
Oil pan		
2nd band servo	X	Retainer inner diameter

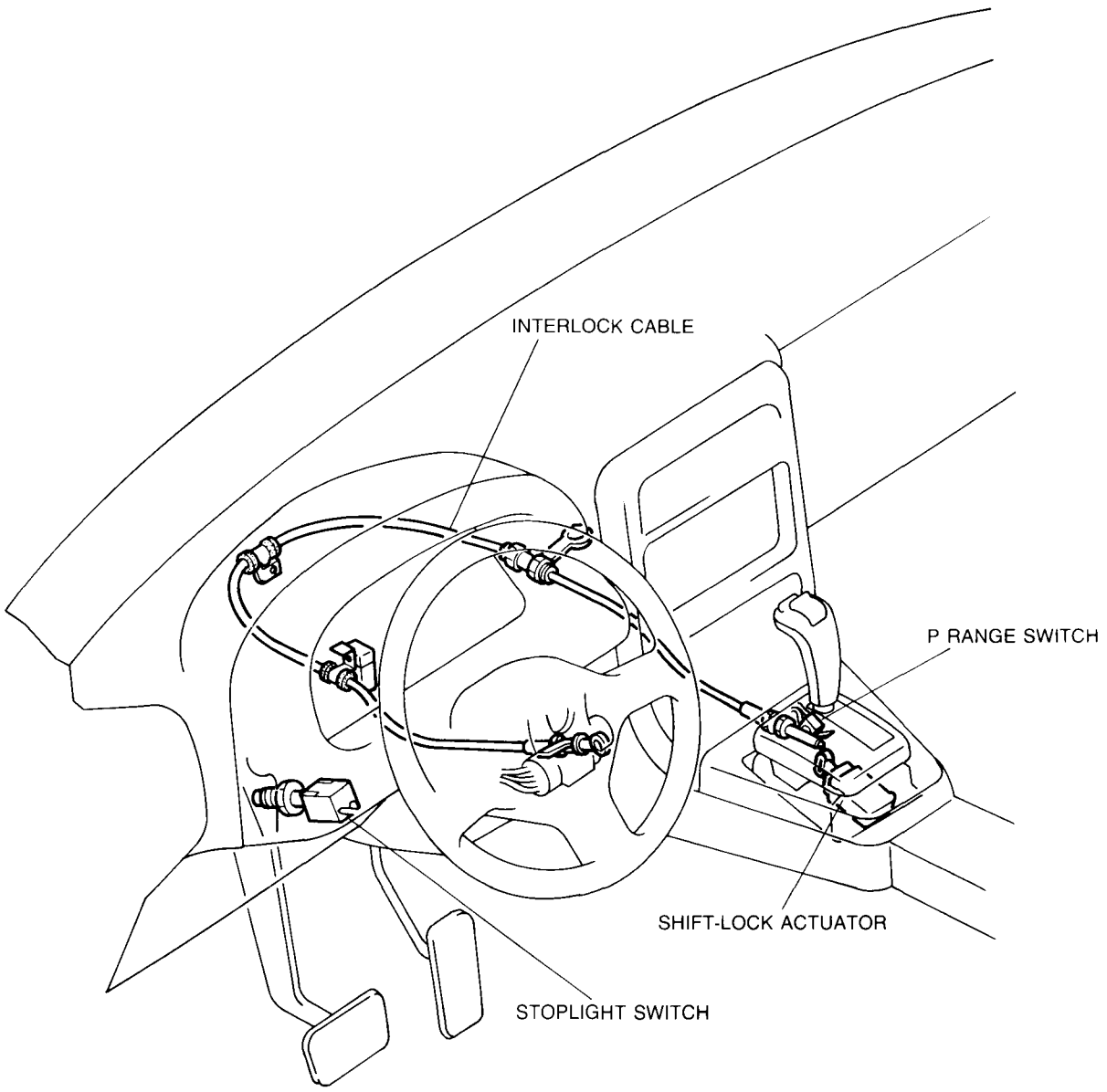
Symbols
○: Interchangeable
X: Not interchangeable

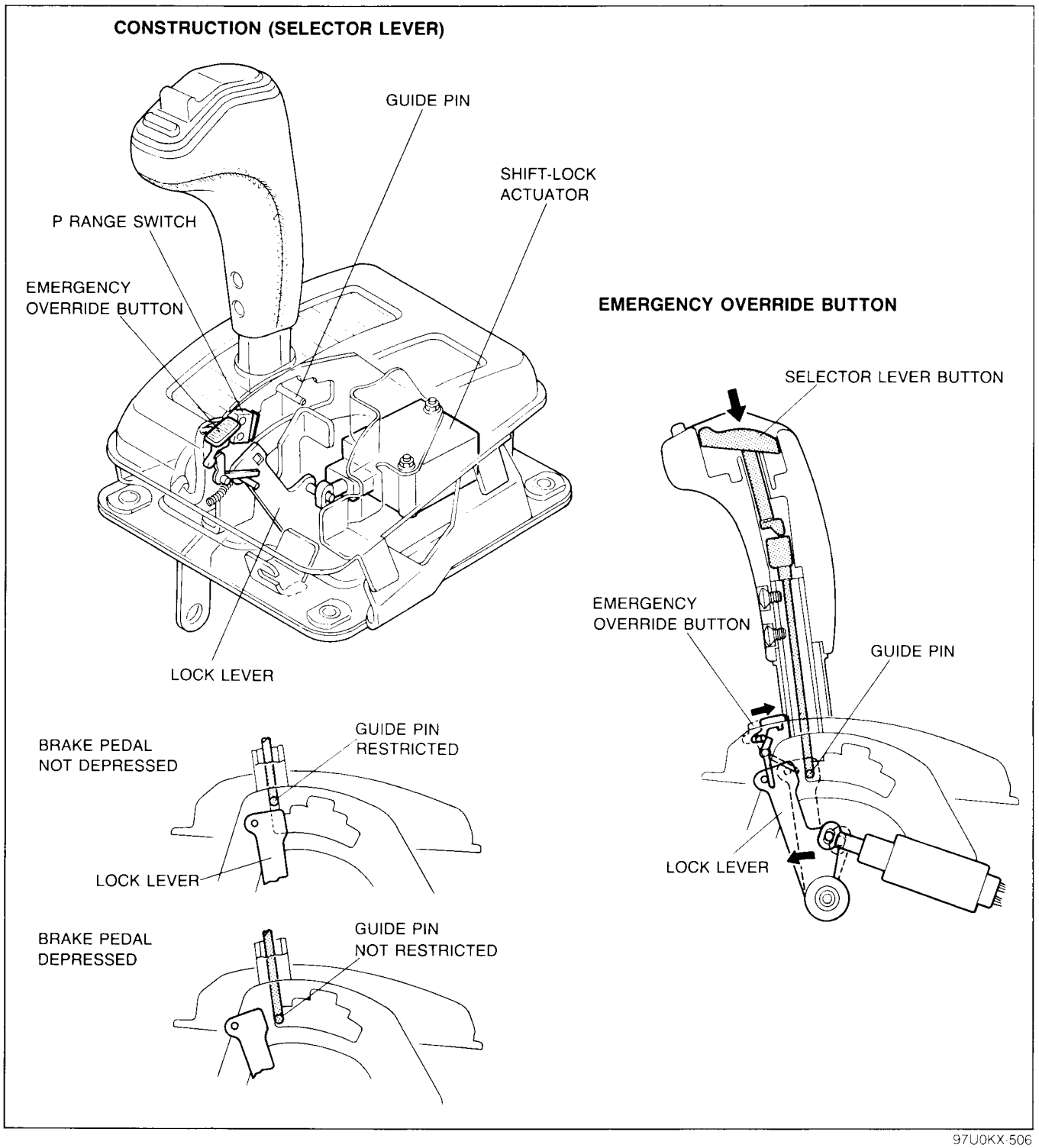
SHIFT-LOCK SYSTEM

FEATURES OF SHIFT-LOCK SYSTEM

- The selector lever cannot be moved from P range unless the brake pedal is depressed and the ignition switch is ON.
- The locked selector lever can be released by operation of the emergency override button (i.e., battery voltage low).
- The ignition key cannot be turned to LOCK position with the selector lever in ranges other than P range.
- The selector lever cannot be moved from P range with the ignition key removed.

SHIFT-LOCK SYSTEM COMPONENTS





97U0KX-506

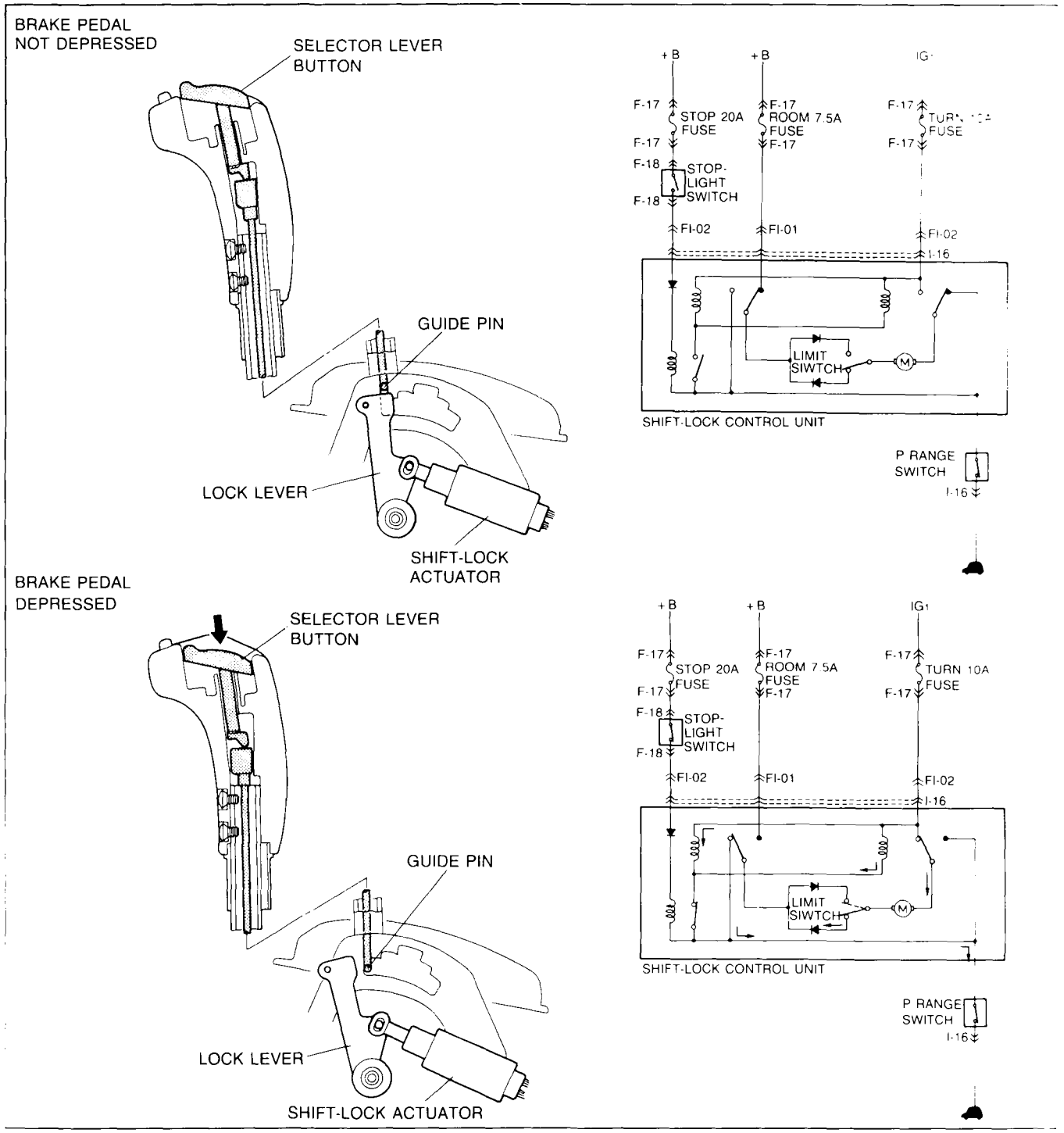
CONSTRUCTION (SELECTOR LEVER)

The shift-lock system is composed of the shift-lock actuator, the P range switch, the lock lever, and the emergency override button; the system is controlled by the shift-lock control unit incorporated within the shift-lock actuator.

If, an attempt is made to shift the selector lever from P range without the ignition switch ON and the brake pedal depressed, the selector lever button cannot be depressed (because the guide pin is restricted by the lock lever), and no shift can be made.

Emergency Override Button

The lock lever can be manually operated to release the guide pin by firmly sliding the emergency override button (located on shift console) rearward. The selector lever may then be moved from P range. This override button is available in the event the system does not operate correctly due to a failure in the shift-lock system.



OPERATION

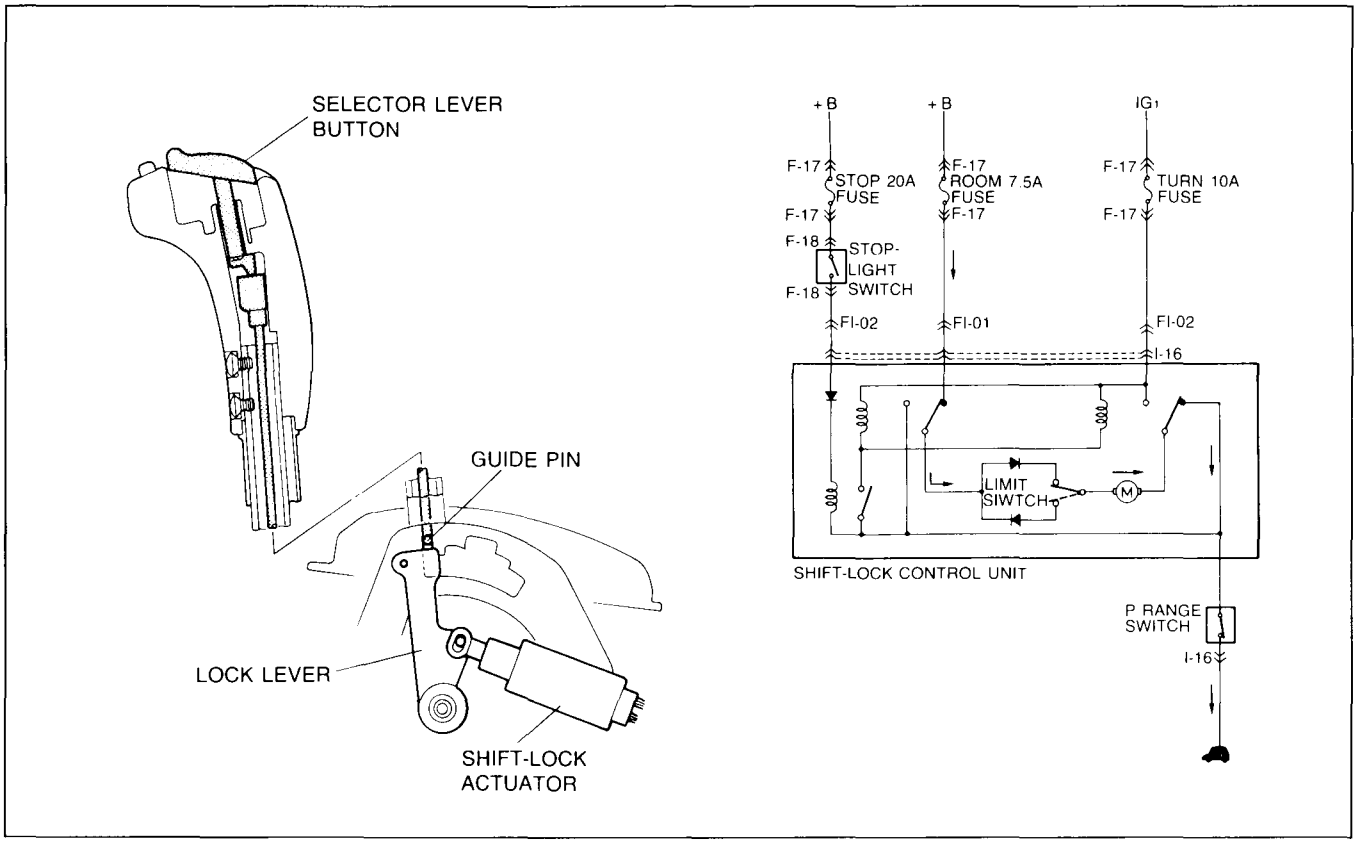
Shift-lock Locked → Unlocked

The selector lever can be shifted from P range only when the following conditions are satisfied:

- The ignition switch is ON.
- The stoplight switch is ON (brake pedal depressed).
- The P range switch is ON (selector lever at P position and selector lever button released).

The shift-lock actuator is in the locked condition when the ignition switch is OFF and the P range s.. s ON. There is no current flow in the coil of the relays within the control unit until the brake pedal is depress.. even if the ignition switch is ON) because the ground circuit is not completed. The lock lever prevents m.. ment of the guide pin, and there can be no shift from P range.

When the brake pedal is depressed, current flows to ground as shown in the bottom figure, energ.. relays. The shift-lock actuator is activated and the lock lever moves to the release side, allowing mo.. of the guide pin, making a shift is possible.

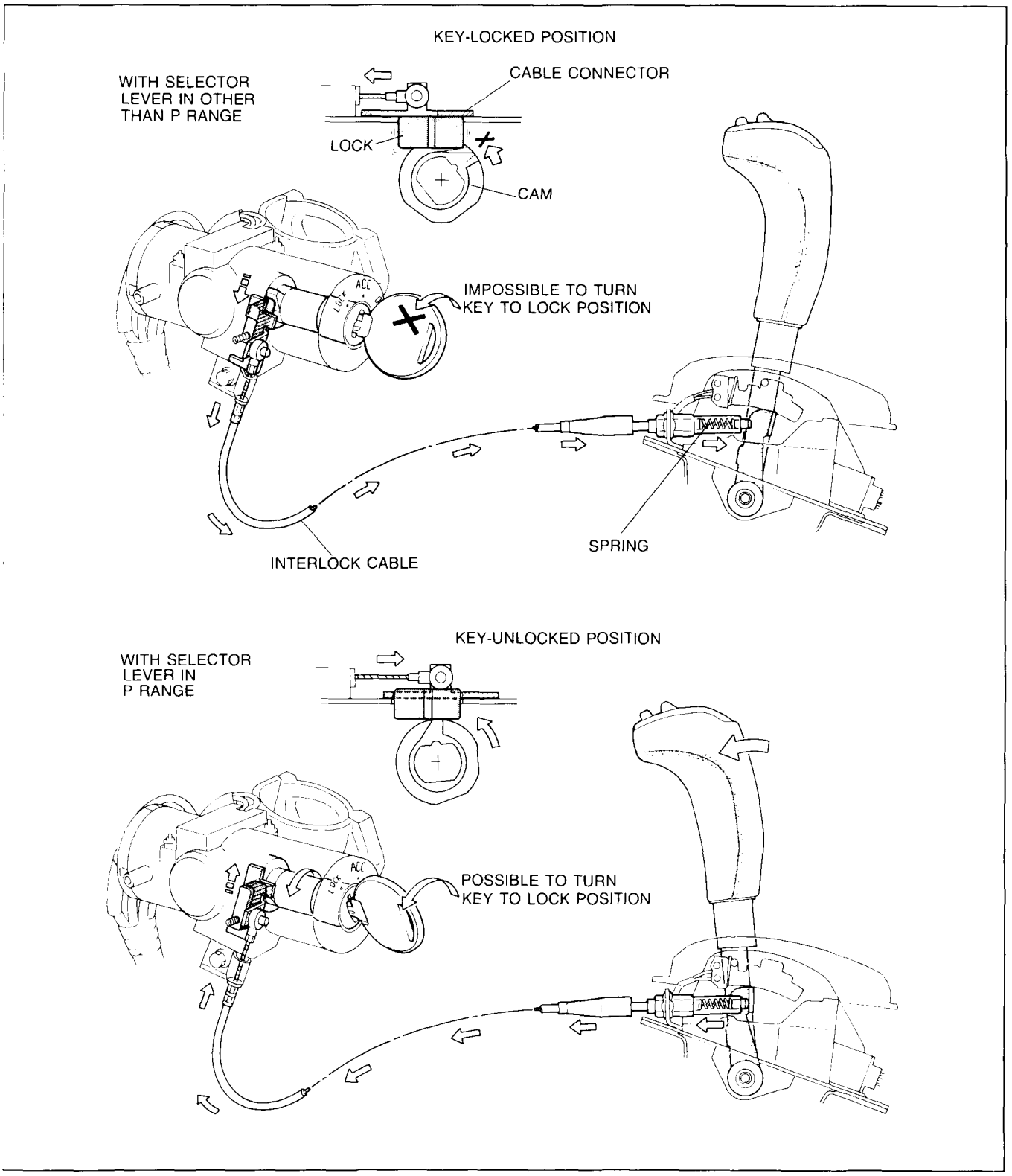


97U0KX 508

Shift-lock Unlocked → Locked

When the selector lever is shifted out of P range, the P range switch is switched OFF, and no current flows within the control unit. Consequently the shift-lock actuator is held in the unlocked position.

When the selector lever is moved back to P range, the P range switch is switched ON, and, as shown in the figure, current flows within the control unit and the shift-lock actuator moves the lock lever to the locked position.



97U0KX-509

CONSTRUCTION AND OPERATION (KEY CYLINDER)

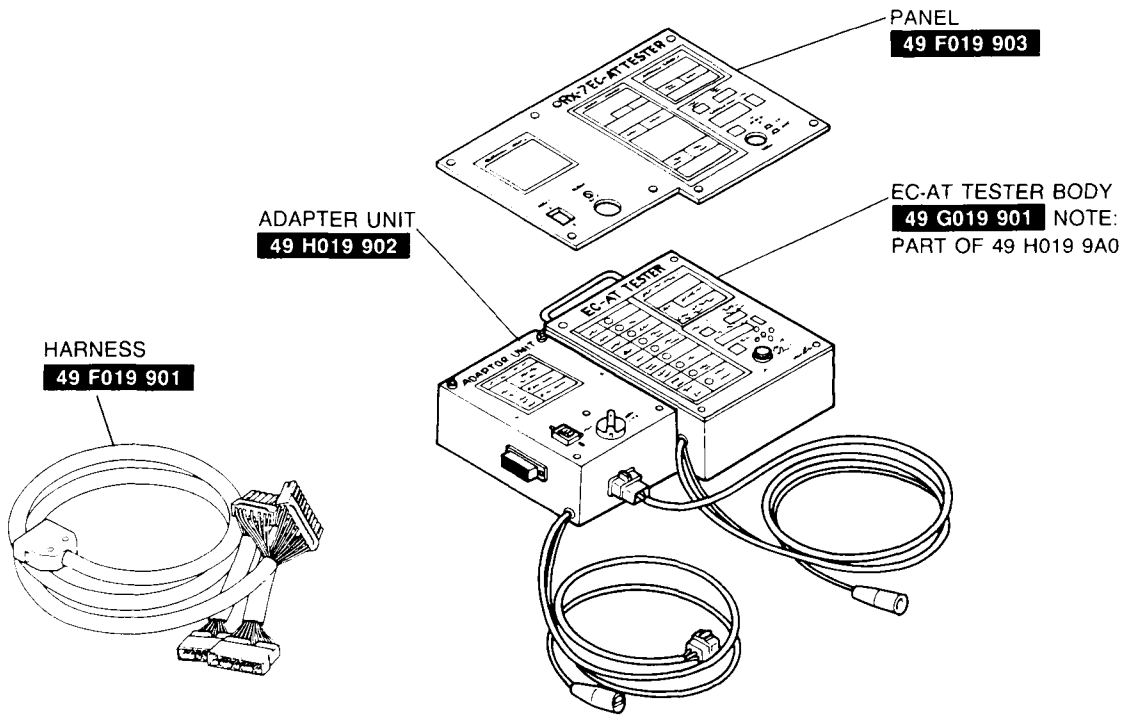
The key-interlock unit is composed of the interlock cable and the cable connector, lock, spring, and cam incorporated within the key cylinder set).

When the selector lever is in other than the P range, the cable connector is set at the key-locked position. When, in this condition, the engine is switched OFF and an attempt is made to turn the ignition key to the LOCK position, the cam tries to push the lock upward, but, because the cable connector restricts the upward movement of the lock, the ignition key cannot be turned to the LOCK position. When the selector lever is in P range, the cable connector is at the key-unlocked position, and, because the cable connector does not restrict movement of the lock, the ignition key can be turned to LOCK.

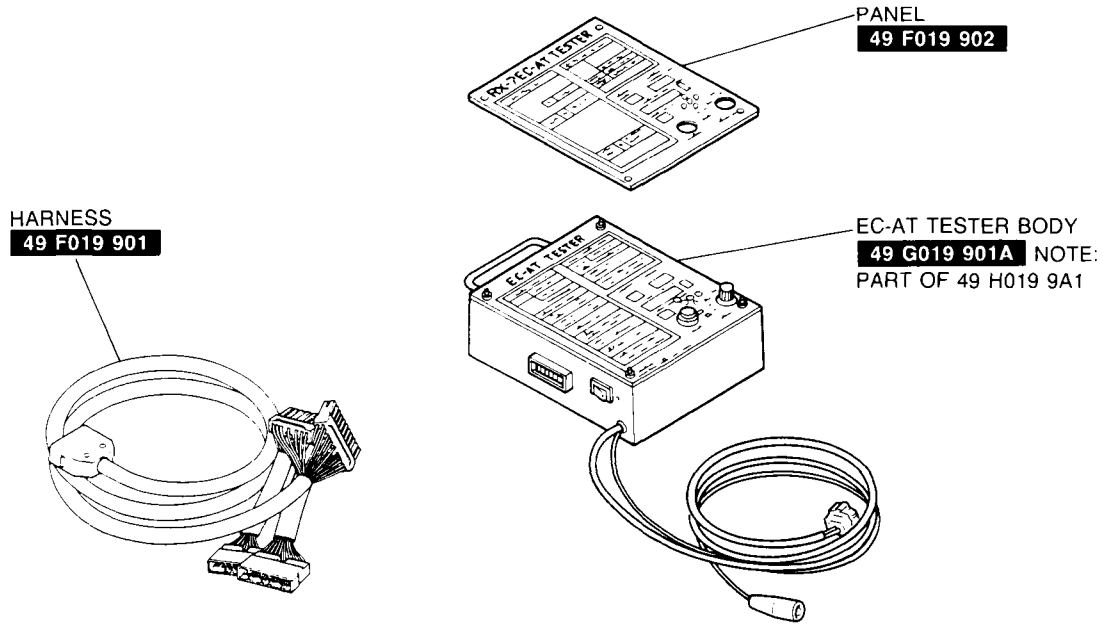
SERVICE POINTS

EC-AT TESTER

EC-AT TESTER BODY (49 G019 901) AND ADAPTER UNIT (49 H019 902)

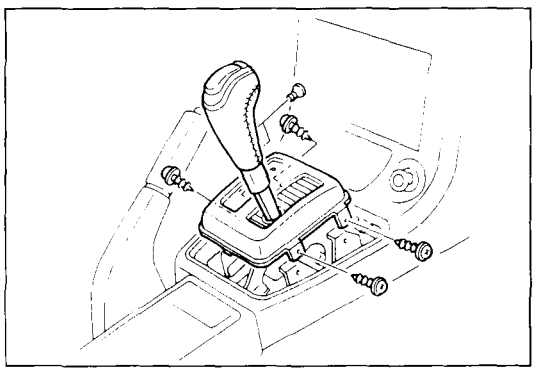


EC-AT TESTER BODY (49 G019 901A)



97U0KX-510

For easy troubleshooting of the EC-AT, an RX-7 EC-AT Harness and panel are established. The previous EC-AT Tester (49 G019 901A, or 49 G019 901 and 49 H019 902) can be used along with the **Harness** (49 F019 901) and **Panel** (49 F019 902 or 49 F019 903). The RX-7 EC-AT Tester tests all the input and output signals and indicates the gear positions.



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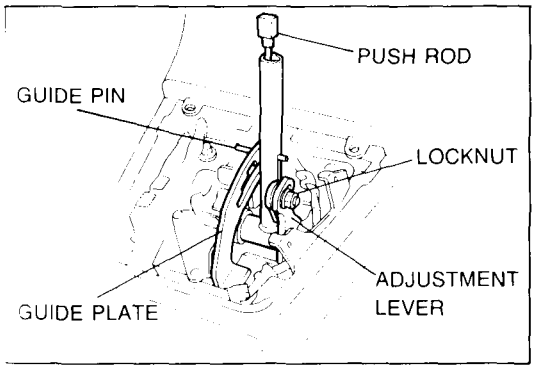

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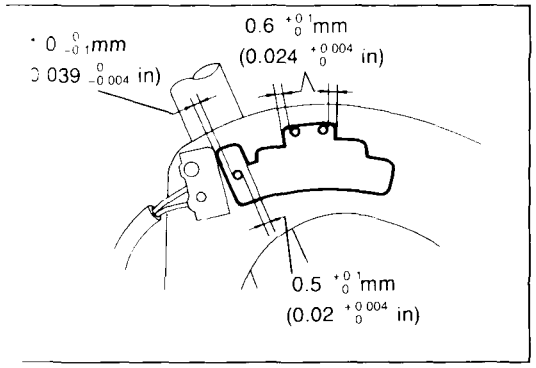

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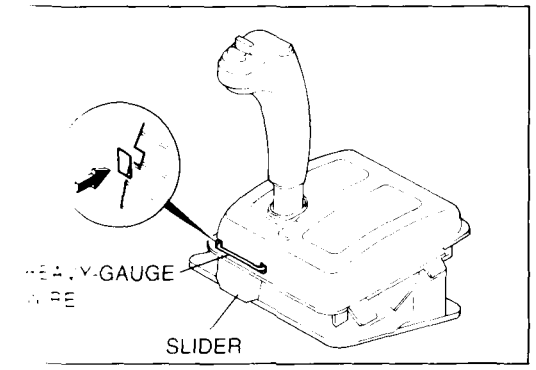

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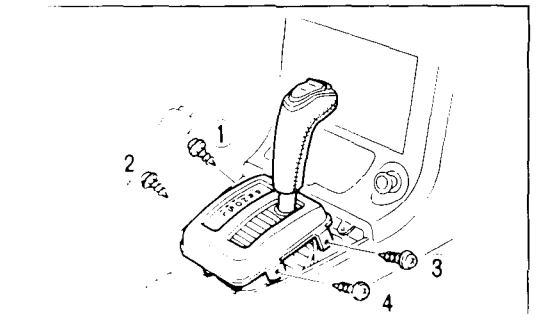


SELECTOR LEVER

Adjustment

Lever position

1. Disconnect the negative battery cable to deactive the shift-lock system.
2. Pry off the upper panel.
3. Shift the selector lever to L range.
4. Remove the selector knob and indicator panel screws.

Caution

- **Do not pull the selector knob up too far to prevent damaging the wire harness.**

5. Lift up the selector knob, selector sleeve, and indicator panel.
6. Disconnect the hold switch connector.
7. Shift the selector lever to P range.
8. Loosen the locknut.
9. Shift the transmission to P range by pushing the adjustment lever forward.
10. Adjust the lever so that the clearance between the guide plate and the guide pin in P range with the push rod lightly depressed is as shown.
11. Tighten the locknut.

Tightening torque:
20—28 N·m (2.0—2.9 m-kg, 14—21 ft-lb)

12. Move the selector lever to N and D ranges and verify that the clearance is the same between the guide plate and the guide pin.
13. If not as specified, readjust the lever.
14. Install the indicator panel, selector sleeve, selector knob, and upper panel in the reverse order of removal.
15. Check the selector lever operation.

Indicator panel

1. Pry off the upper panel.
2. Shift the selector lever to P range.
3. Loosen the indicator screws.
4. Align the alignment grooves in the slider with the holes in the indicator panel. Install suitable heavy-gauge wire to hold the slider.
5. Tighten the indicator screws in the order shown in the figure.
6. Remove the wire.
7. Verify that the selector lever properly aligns with the indicator in each range.

FRONT AND REAR AXLES

97U0MX-501

VISCOUS LIMITED SLIP DIFFERENTIAL (VISCOUS L.S.D.)

FEATURES OF VISCOUS L.S.D.

The newly designed viscous limited slip differential is made available for the 1989 RX-7 in order to improve handling, performance and serviceability, and to achieve reductions of vibration and noise.

1. Improved handling
   - Excellent handling on low traction roads.
   - Greatly improved stability during cornering and near braking limit.
2. Improved performance
   - Greatly improved control entering and exiting turns.
   - Driving force transmitted to road surface with little wheel spin.
3. Improved serviceability
   - No special lubricating oil or troublesome adjustments required as for friction-plate type limited slip differential.
4. Reduction of vibration and noise
   - Because differential-limiting force is obtained through viscous resistance of oil instead of mechanical resistance there is no generation of vibration or noise.

The viscous limited slip differential is a viscous coupling that takes advantage of resistance of a fluid to control operation of the differential.

The viscous limited slip differential is composed of the self-contained viscous coupling unit and the differential mechanism (side gears and pinion gears) common to other differentials.

97U0MX-502

SPECIFICATIONS

Item			Model	Turbo	Non-Turbo
Differential	Type			Limited slip differential	
	Reduction gear			Hypoid gear	
	Reduction ratio			4.1	4.3
	Differential gear			Straight-bevel	
	Number of pinion gears			4	
	Oil	Grade		API Service GL-5	
		Viscosity	Above −18°C (0°F)	SAE 90	
			Below −18°C (0°F)	SAE 80W	
		Capacity liters (US qt, Imp qt)		1.4 (1.5, 1.2)	1.3 (1.4, 1.1)
	Viscous coupling unit	O.D. and I.D. of outer plates mm (in)		94.5 (3.720), 60.5 (2.382)	84.5 (3.327), 53 (2.087)
		O.D. and I.D. of inner plates mm (in)		88.5 (3.484), 59.5 (2.343)	79.6 (3.134), 52.2 (2.055)
		Thickness of outer and inner plate mm (in)		0.4 (0.016)	
		Number of outer plates		21	26
		Number of inner plates		20	25
		Viscosity of silicone oil cst*		30,000	50,000

* Centimeter stokes; Viscosity unit

97U0MX-503

INTERCHANGEABILITY OF MAJOR COMPONENTS

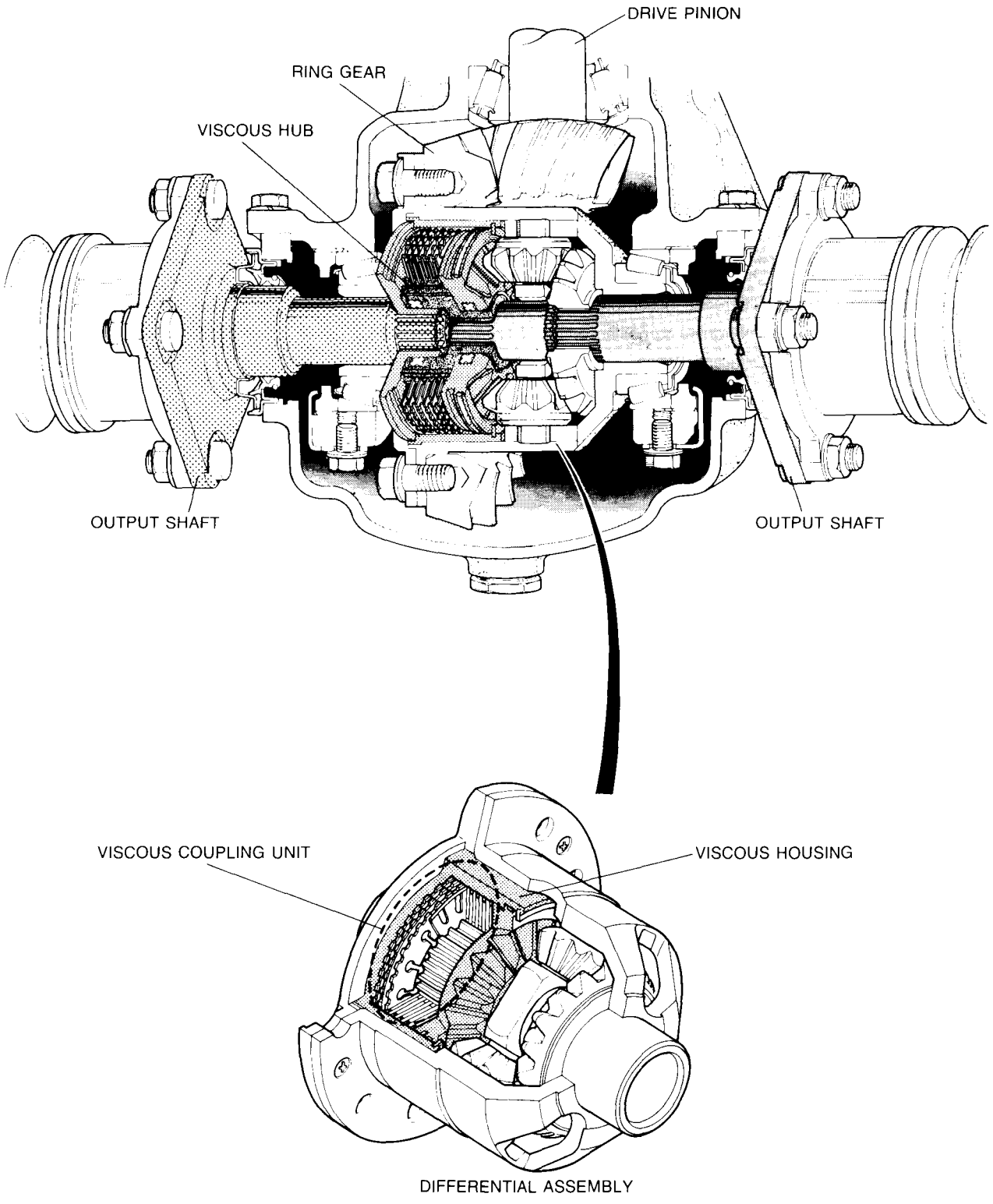
Parts interchangeability and differences between the 1989 RX-7 and the 1988 RX-7 with standard differentials are shown below.

There is no interchangeability of components between the viscous L.S.D. and the standard differential.

Model	Part name	Interchangeable	Remark
Non-Turbo (M/T)	Driveshaft (Right)	○	
	Driveshaft (Left)	○	
	Output shaft (Right)	○	
	Output shaft (Left)	○	
	Differential assembly	○	
	Differential carrier assembly	○	
	Differential case	X	Shape
Non-Turbo (A/T except convertible model)	Driveshaft (Right)	○	
	Driveshaft (Left)	○	
	Output shaft (Right)	○	
	Output shaft (Left)	○	
	Differential assembly	○	
	Differential carrier assembly	○	
	Differential case	X	Shape

97U0MX-504

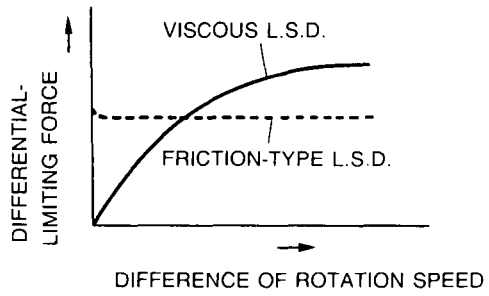
CROSS-SECTIONAL VIEW

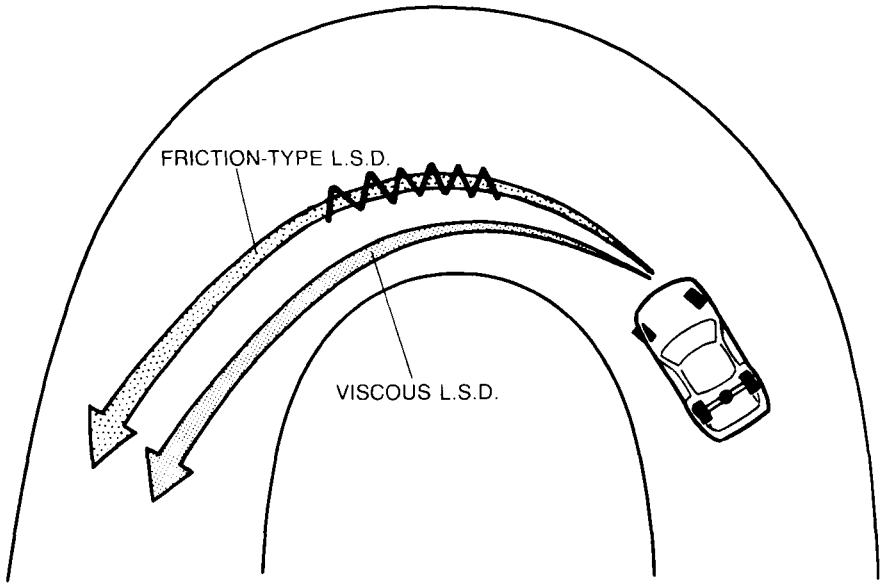


97U0MX-505

COMPARISON OF VISCOUS L.S.D. AND FRICTION-TYPE L.S.D.

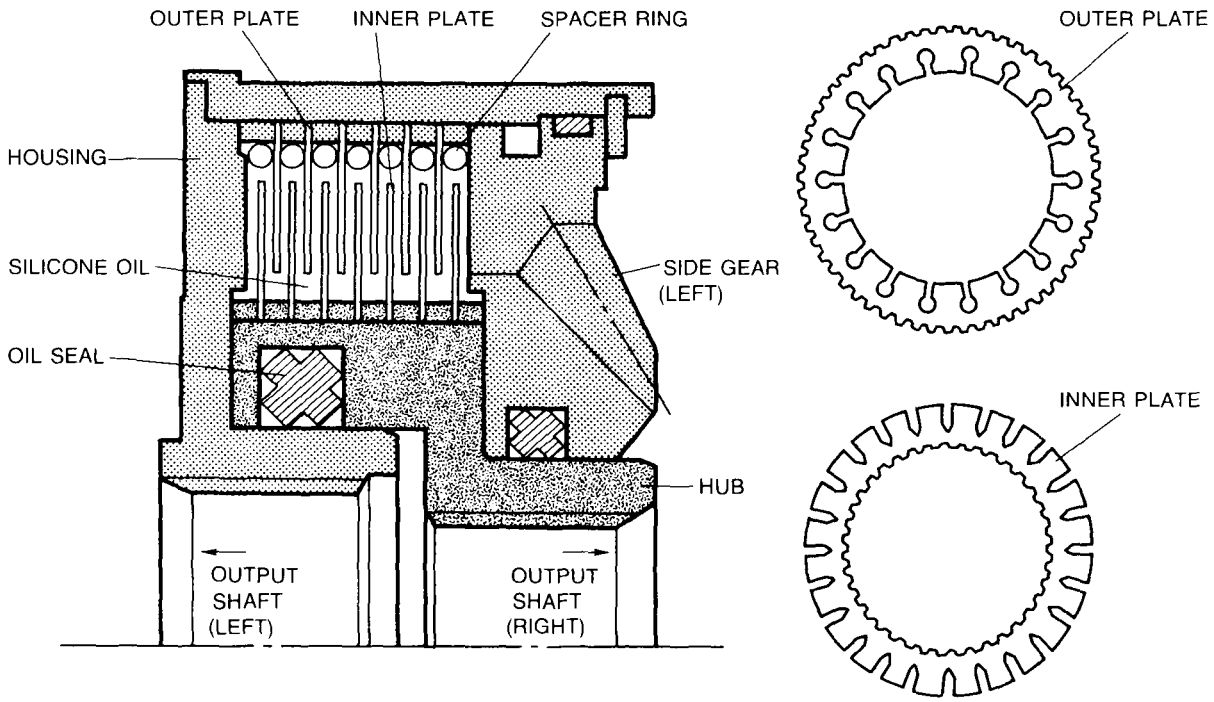
	VISCOUS L.S.D.	FRICTION-TYPE L.S.D.
Differential-limiting-force generation mechanism	Differential-limiting force obtained through viscous resistance of silicone oil. A wheel-speed-proportional system (differential-limiting force becomes greater in proportion to difference between left and right wheel speeds).	Differential-limiting force obtained through frictional resistance of metal plates. A torque-proportional system (differential-limiting force becomes greater in proportion to driving force).
Generation of vibration and noise	During ordinary use, no vibration or noise. Smooth differential-limiting force obtained through viscous resistance.	Differential-limiting force not completely stable because of "stick/slip" action of metal plates. Vibration and noise sometime produced.
Lubricating oil	Viscous oil in sealed viscous coupling unit. Standard differential oil used for lubrication.	Special limited-slip differential oil used to stabilize mechanical friction.
Maintenance	Maintenance-free non-rebuildable differential assembly.	Adjustment of friction discs and friction plates necessary.
Vehicle characteristics Example: During high-speed cornering, body roll increases as a result of centrifugal force and inner rear wheel tends to rise; inner wheel slips and rotational speed increases.	Differential-limiting force smoothly generated as rotational speed of left and right wheels increases. Driving force transmitted from inside wheel to the outside wheel. Force created turns vehicle inward, improving the turning performance.	Differential-limiting force occurs at even slight torque difference between left and right wheels, causing understeer of vehicle. Understeer changes with steering input and throttle action, vehicle becomes unstable.



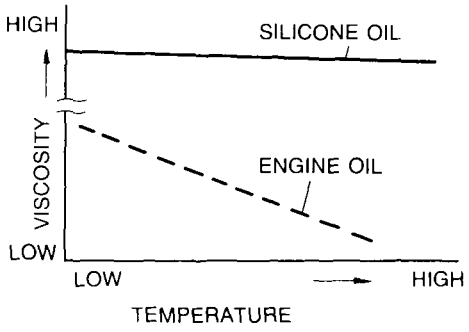


VISCOUS COUPLING UNIT

CONSTRUCTION



CHARACTERISTICS OF SILICONE OIL



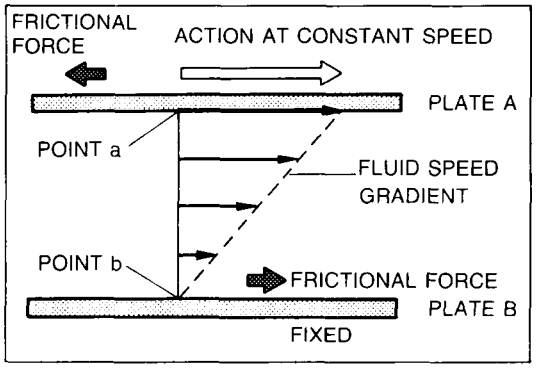
97U0MX-50

Construction

The viscous coupling unit consists of a number of thin steel inner and outer plates and high-viscosity silicone oil. The outer plates couple the housing and the spline.
The housing is unified with the left side gear, and, via the output shaft and the driveshaft, is linked to the left wheel.
Between the outer plates are spacer rings. The inner plates are coupled to the hub, and the hub, via the output shaft and the driveshaft, is linked to the right wheel.
The inner plates can move side to side on the hub.
The slots in the plates create the shearing of the silicone oil and cause the fluid coupling effect.
The viscous coupling unit is sealed by heat- and pressure-resistant oil seals, and is not rebuildable.

Characteristics of Silicone Oil

1. Viscosity changes little relative to temperature.
2. Expands greatly relative to temperature.
3. Viscosity change small relative to shearing.
   The housing is filled to 80% to 90% of full with silicone oil.



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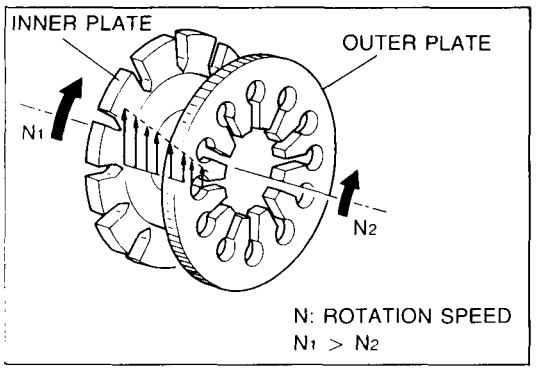

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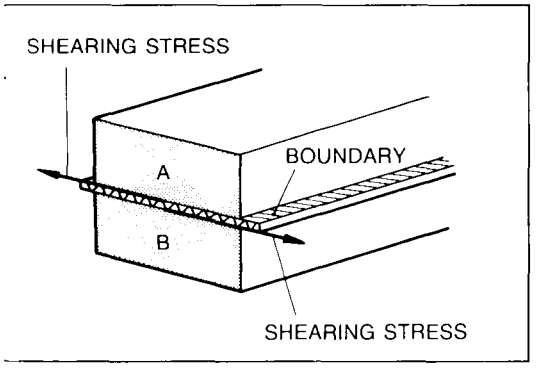

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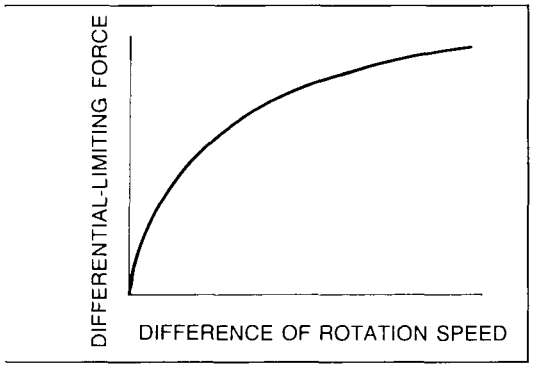


97U0MX-511

Principle of Operation

Suppose that there is fluid between two parallel plates (A and B), and that plate B is fixed and plate A moves in parallel at a constant speed. The molecues of the fluid that contact the plates at points a and b adhere to the plates, and for that reason the fluid at point a moves at the same speed as plate A, and at point b the fluid speed remains 0.
Because the fluid has a certain viscosity, a related degree of force is required to move plate A.
Seen another way, because of the difference in the speed of plates A and B, shearing stress* is produced within the fluid, and an equal frictional force is caused to act upon plate A, acting as resistance trying to impede its movement. At the same time, this fluid-generated frictional force also acts upon plate B in the opposite direction.

How, then, does this principle apply to the viscous coupling unit? Suppose, for example, that the rotational speed of the inner plate is, as shown in the illustration, faster than that of the outer plate. Because there is a speed difference between the two plates, shearing stress is produced in the silicone oil, and an equal frictional force acts upon the faster-turning inner plate as resistance. This resistance becomes differential-limiting torque. This frictional force then also acts upon the slower-turning outer plate (in the opposite direction), thus increasing its rotational speed.

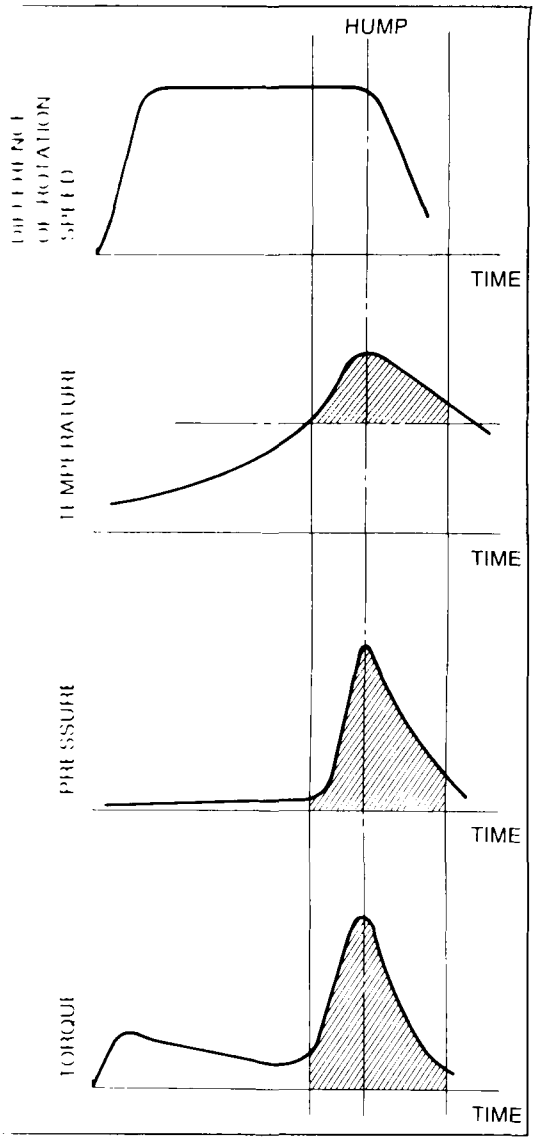
* Shearing stress

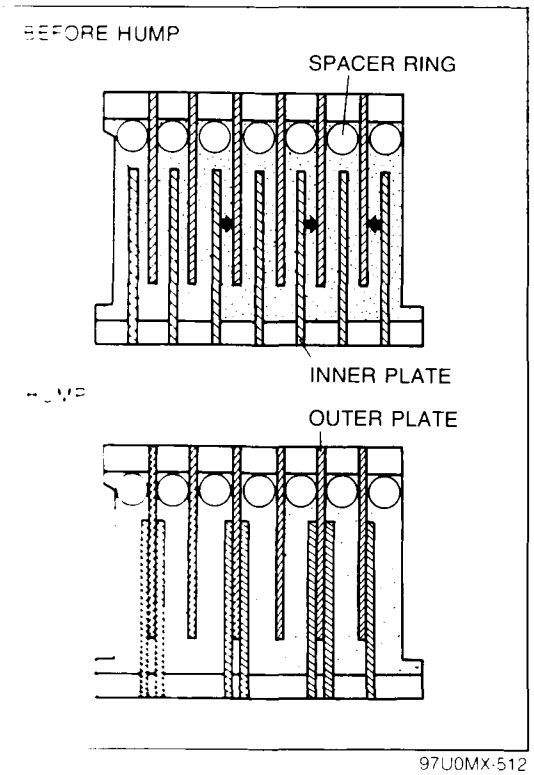
Consider fluid (A and B) held in extremely close proximity to each other, and further suppose that the speed at which A moves is faster than the speed at which B moves. There is, consequently, a mutual "sliding" that occurs at the boundary layer between A and B, and, in the same manner as when two rough solid surfaces slide against one another, a force acts to hinder the mutual parallel sliding at the boundary. This force per unit surface area at the boundary is known as shearing stress.

Operation

Power transmission at normal mode

In normal use, differential-limiting force (driving force) is transmitted according to the difference in the rotational speed of the left and right wheels.



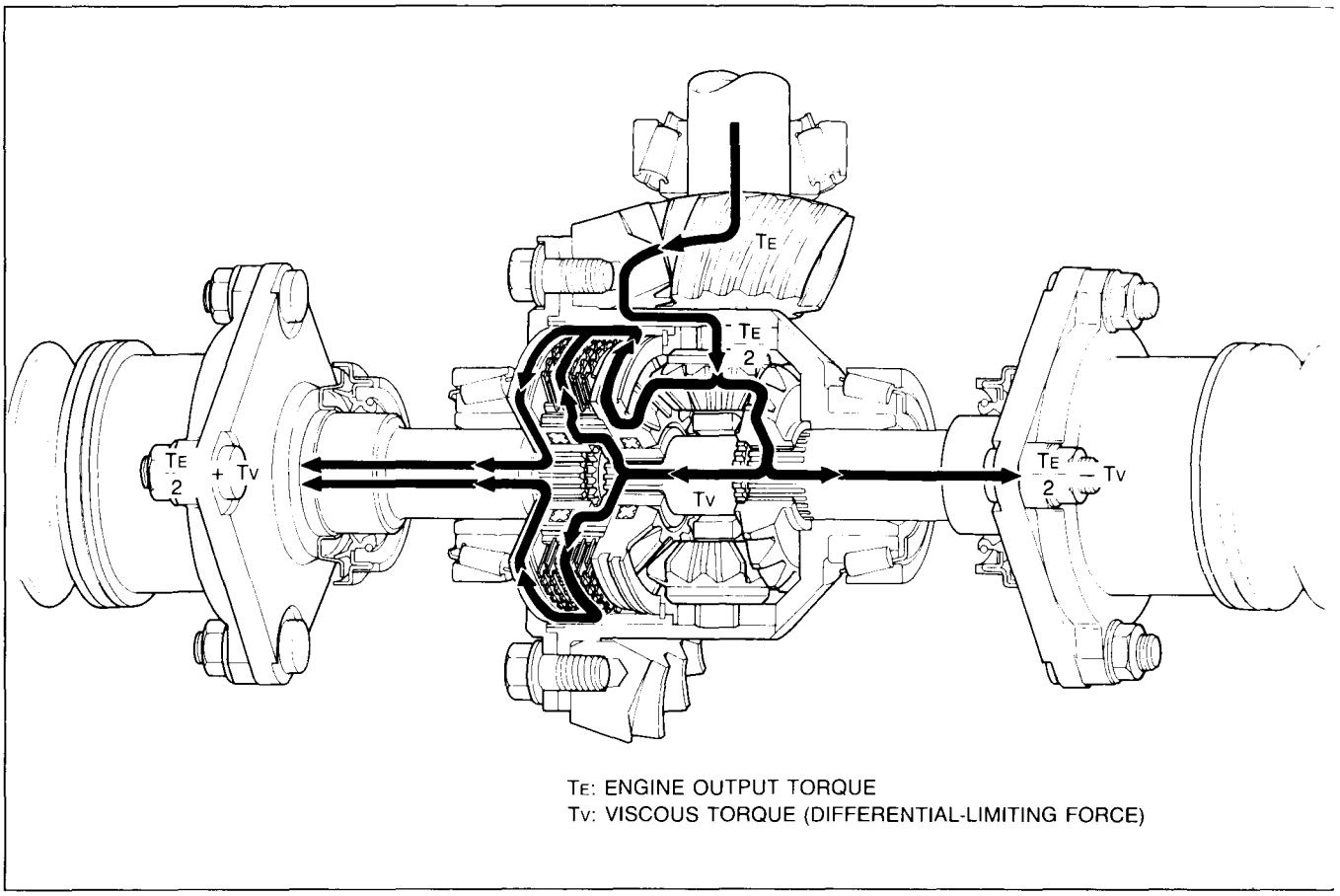


97U0MX-512

Power transmission at hump mode

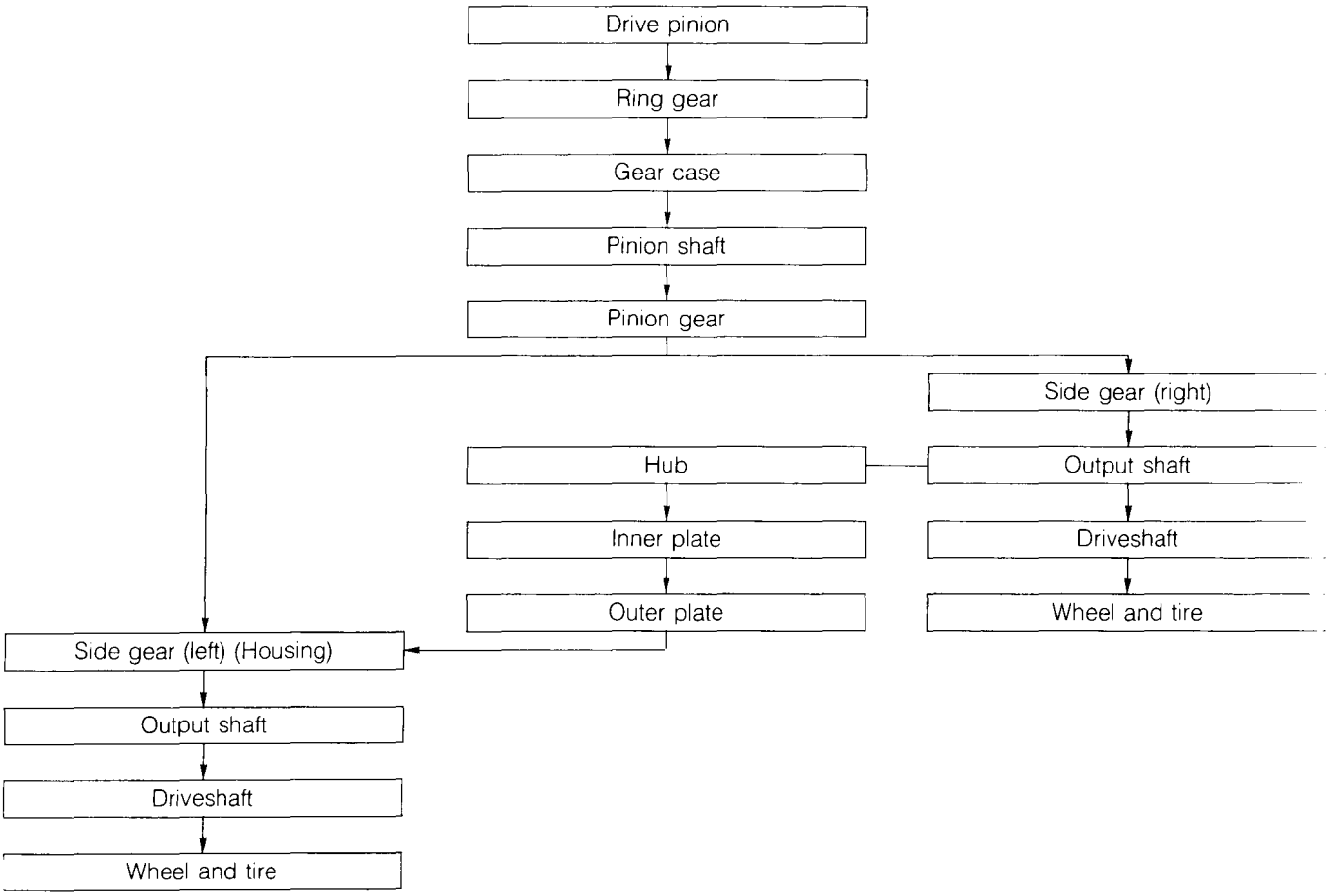
When the rotational speed continues at a fixed amount over a period of time (i.e. one wheel in mud), an increase in transmission of power occurs suddenly. This called the "hump phenomenon". The figure shows the relationship of time and the hump phenomenon. What happens is, as the silicone oil is sheared by the plates, its temperature increases, suddenly breaking down the air bubbles in the oil. As the air bubbles break down, the oil expands and causes the inner plates to move and contact the outer plates. Because torque transmission occurs as a result of the friction between the plates, the transmitted torque increases suddenly (hump mode). In the hump mode, as the rotational speed of the plates equalizes, the oil temperature falls, and the inner plates again move away from the outer plates. There is, then, a return to the original torque transmission according to the silicone oil viscosity.

POWER FLOW
Right wheel speed higher (left turn or split-traction road)

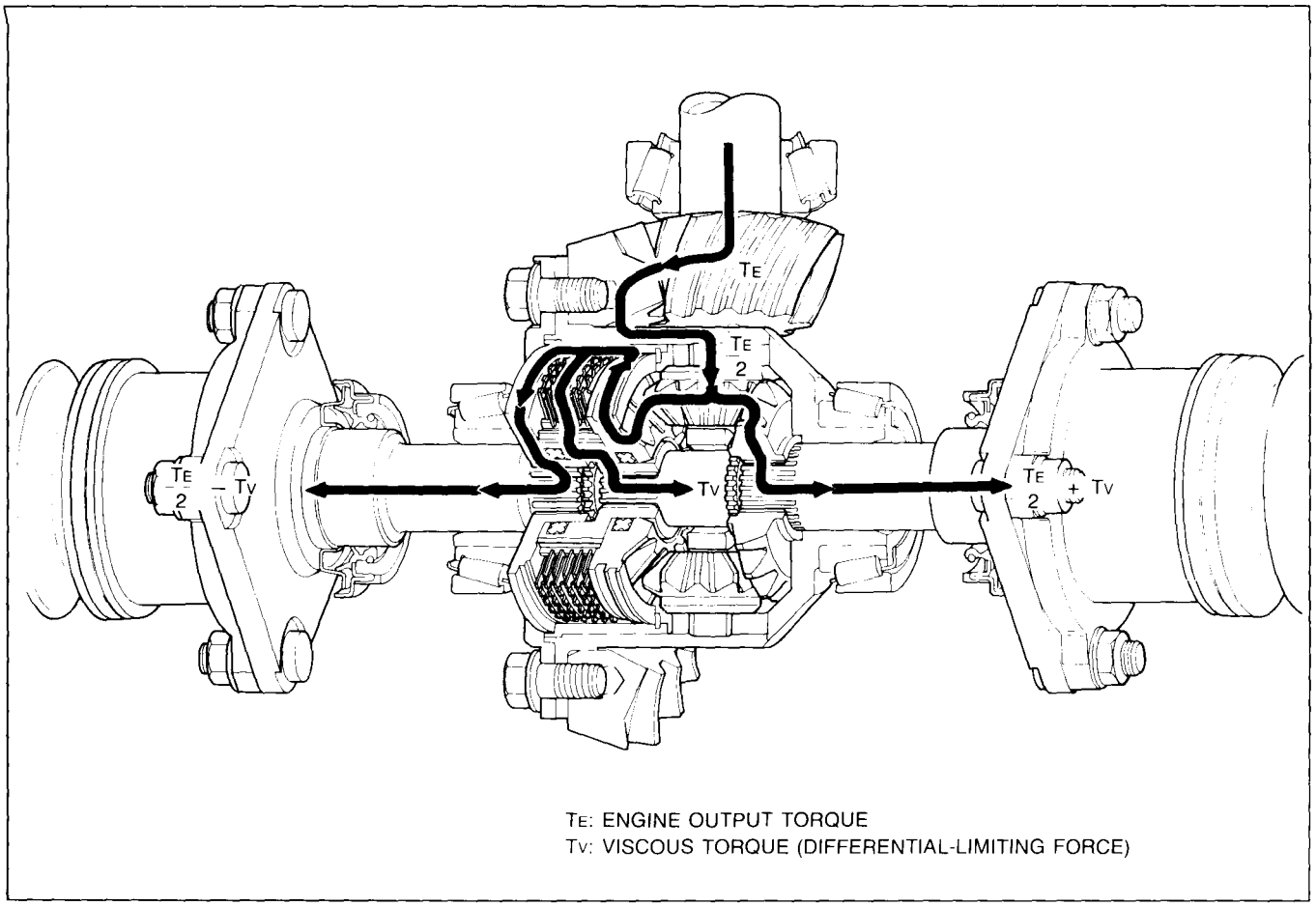


TE: ENGINE OUTPUT TORQUE
Tv: VISCOUS TORQUE (DIFFERENTIAL-LIMITING FORCE)

97U0M

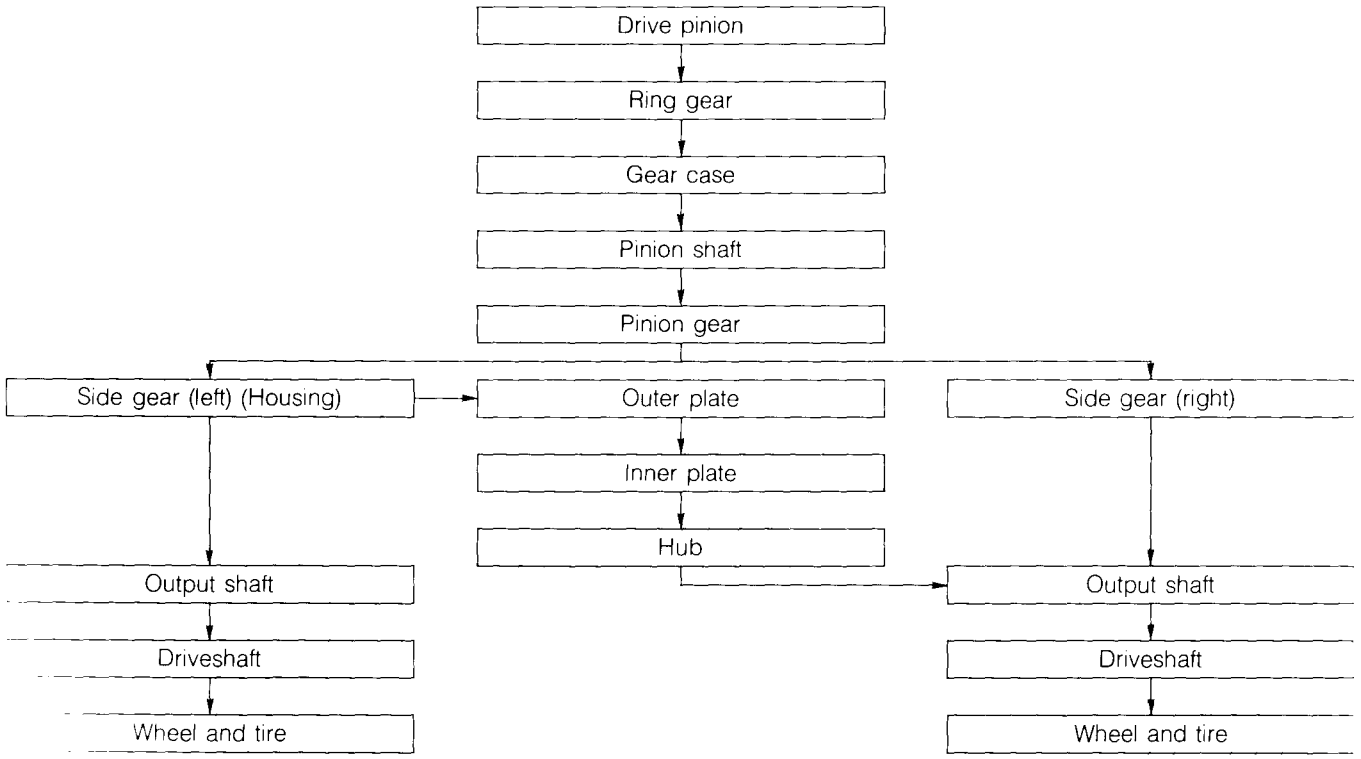


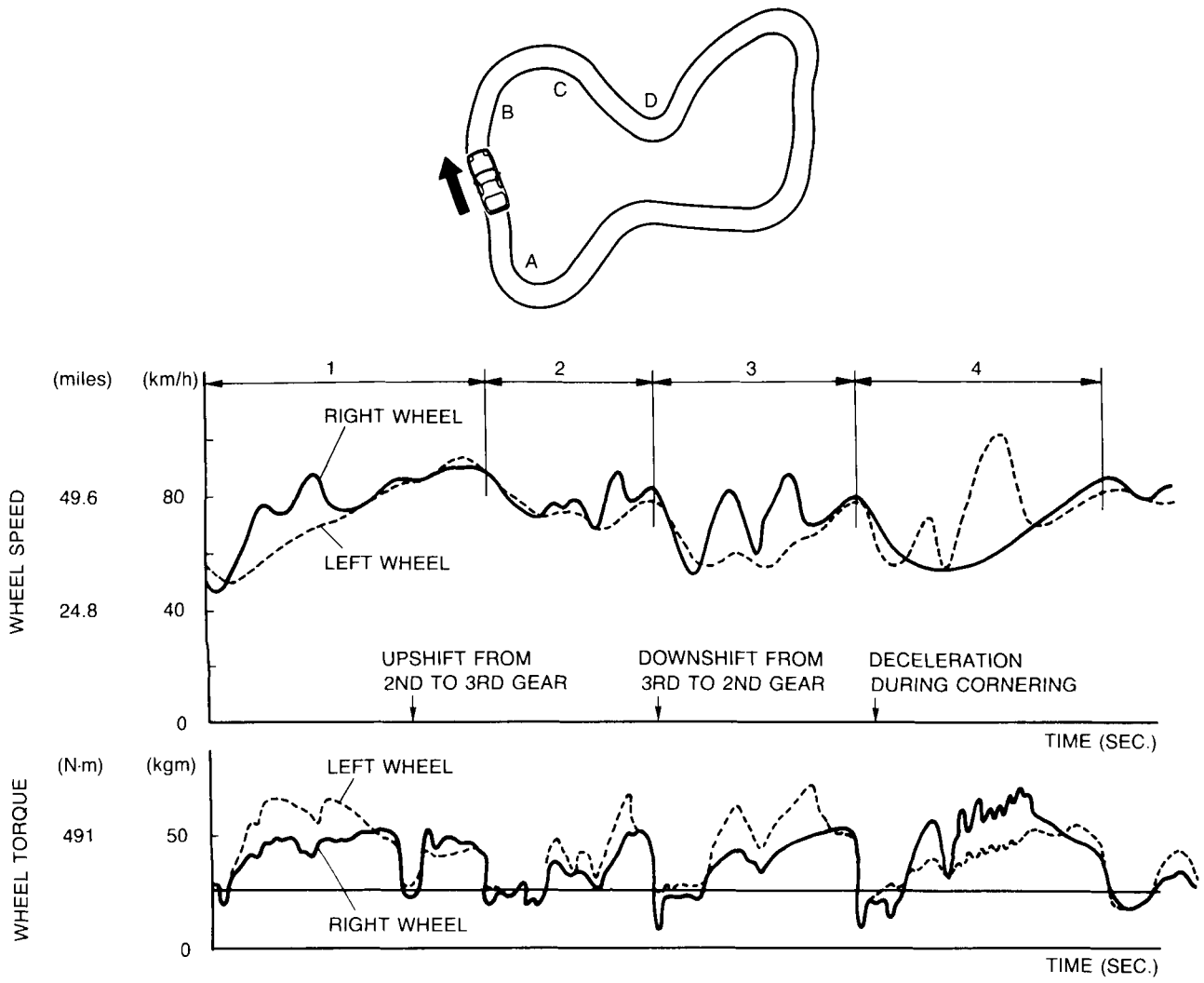
Left wheel speed higher (right turn or split-traction road)



TE: ENGINE OUTPUT TORQUE
TV: VISCOUS TORQUE (DIFFERENTIAL-LIMITING FORCE)

97U0MX 514





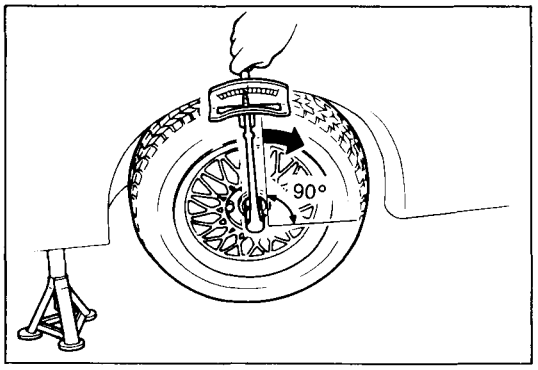
97U0MX-515

The figure above shows the wheel speeds that occur during driving at the limit on a winding road, and the generation of wheel torque at that time.

1. After acceleration through curve A, the driver accelerates toward curve B and upshifts from 2nd to 3rd gear.
2. The driver decelerates entering curve B, and then temporarily accelerates.
3. Entering curve C, there is deceleration and a downshift from 3rd to 2nd gear. The curve is negotiated by accelerator control, accelerating through the curve.
4. There is no change as the vehicle enters curve D; after deceleration during cornering, the curve is then negotiated with full acceleration, and then is accelerated for the straight-away.

When driven at the limit, there is an extreme decrease of wheel loading on the inside drive wheel, resulting in wheel spin due to the drop in traction.

Through the action of the viscous limited-slip differential, however, spin of the inside wheel is suppressed, and driving force is transmitted to the outside wheel.



97U0MX-516

SERVICE POINTS

Operation Inspection

1. Turn off the engine and shift the transmission into reverse.
2. Block the front wheels with wheel chocks.
3. Jack up the rear wheels and support the vehicle with jack stands.
4. Release the parking brake.
5. Using a torque wrench on a wheel lug nut, measure the time it takes to turn the wheel **90°** while applying the specified torque.

   Specified torque: 39 N·m (4.0 m-kg, 29 ft-lb)
   Specified time: 4.0 sec. min.

6. If not as specified, replace the viscous limited slip differential and fill the differential housing with new specified oil.

Viscous L.S.D. Notes

1. Spare tire
   Use only the T135/70D16 temporary spare tire supplied in the vehicle. The tire's diameter is almost the same as the conventional tire.
2. Tire rotation
   Do not use the following on the drive axle:
   - Tires of other than the designated size.
   - Tires of unmatched size or type.
   - Tires that have a noticeably different pattern or amount of wear.
   - Tires not sufficiently inflated.

   If such tires are used, the constant difference in the rotation speed of the rear wheels may damage the viscous coupling unit.
3. Wheel balance (On-vehicle)
   a) Block the front wheels with wheel chocks.
   b) Jack up the rear wheels and support the vehicle with safety stands.
   c) Release the parking brake.
   d) Balance the wheel using an on-vehicle type balancer and the vehicle's engine power. (Do not use drive power of the balancer, damage to the viscous coupling may result.)

97U0MX-517

STEERING SYSTEM

97U0NX-501

OUTLINE

OUTLINE OF CONSTRUCTION

1. Power steering system is standard on all models.
2. Two types of power steering control are available. One is an engine speed sensing type (ESPS) and the other is the electronically controlled type (ECPS) used previously.
3. The theory and function for ESPS is basically the same as the other models.
4. The ECPS control system is simplified.

97U0NX-502

SPECIFICATIONS

Item	Type		Engine speed sensing power steering	Electronically controlled power steering
Steering wheel	Outer diameter	mm (in)	380 (15.0)	
	Lock-to-lock	turns	2.70	3.09
Steering shaft and joint	Shaft type		Collapsible	
	Joint type		2-cross joint	
	Tilt stroke	mm (in)	35 (1.38)	
Steering gear	Type		Rack-and-pinion	
	Gear ratio		∞ (infinite)	
Oil	Type		ATF DEXRON-II or M-III	
	Capacity	liter (US qt, Imp qt)	0.8 (0.85, 0.70)	

97U0NX-503

INTERCHANGEABILITY

The following chart shows interchangeability of the main parts of the new ECPS and the previous one.

○.....Interchangeable X.....Not interchangeable

Part name	Interchangeability	Remark
Control unit	X	Control system changed
Oil pump	○	
Oil pressure switch	X	Electric current changed
Gear box	○	

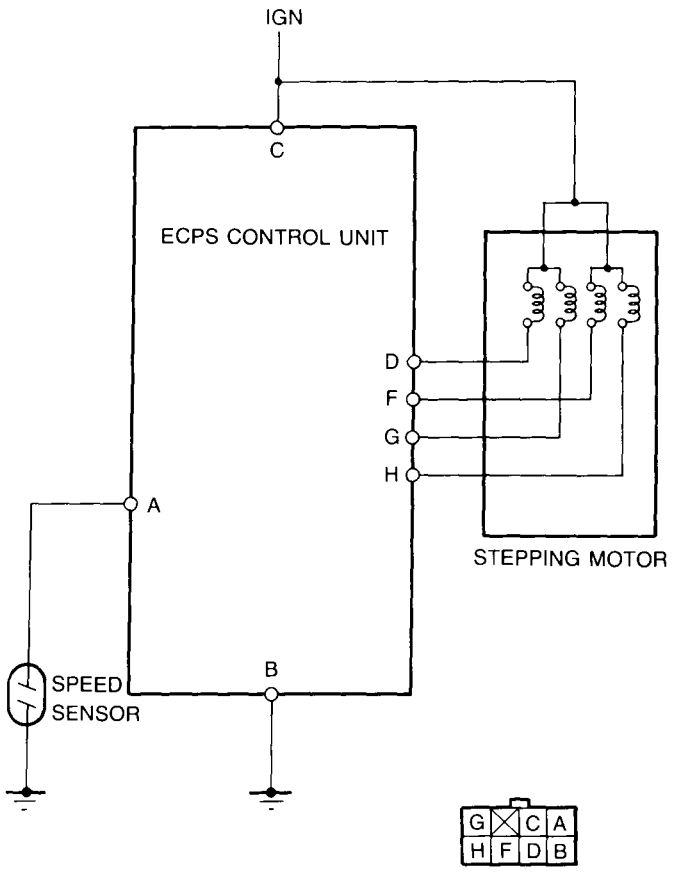
97U0NX-504

ELECTRONICALLY CONTROLLED POWER STEERING

ECPS CONTROL UNIT

The ECPS control system is simplified to use vehicle speed information (detected from the vehicle speed sensor) only.
The control unit for ECPS has fail-safe function, but does not have the warning code function. Because the system is simplified.

Circuit Diagram



97U0NX-505

Fail Safe Function

Failure	Description	Power steering effect
Malfunction of vehicle speed sensor	No vehicle speed signal, for over 0.2 seconds at vehicle speed 30 km/h (18.6 mph) or over	Steering effort maintained as at vehicle speed when failure occurred
Droppring of power sourse voltage	Power sourse voltage dropping to 8V or below	Steering effort maintained as at vehicle speed when failure occurred

97U0NX-[illegible]

BRAKING SYSTEM

97U0PX-501

OUTLINE

OUTLINE OF CONSTRUCTION

The braking system is mostly unchanged; however, the master cylinder and the power brake unit are changed on Turbo models. Other parts are basically the same as the previous models.

97U0PX-502

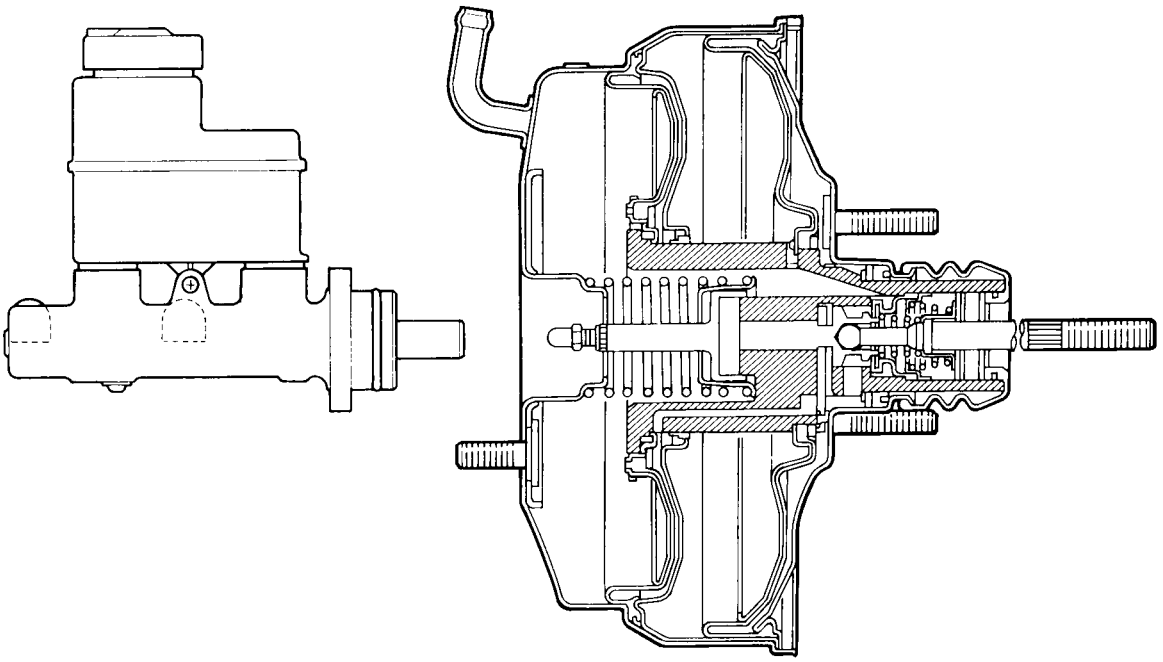
SPECIFICATIONS

Item			NON-TURBO		TURBO
			Type A*	Type B*	
Brake pedal	Type		Suspended		
	Pedal lever ratio		4.5 : 1		
	Maximum stroke	mm (in)	136 (5.35)		
Master cylinder	Type		Tandem (with level sensor)		
	Cylinder bore	mm (in)	22.22 (0.875)		23.81 (0.937)
Power brake unit	Type		Single diaphragm		Tandem diaphragm
	Diameter	mm (in)	238 (9.37)		188 & 215 (7.40 & 8.46)
Front disc brake	Type		Ventilated disc, single-piston caliper	Ventilated disc, four-piston caliper	
	Cylinder bore	mm (in)	50.8 (2.00)	36.12 (1.42)	
	Pad dimensions (Area x Thickness)	mm^2 x mm (in^2 x in)	4,280 x 9 (6.63 x 0.35)	4,700 x 11 (7.28 x 0.43)	
	Disc plate dimensions (Outer diameter x Thickness)	mm (in)	276 x 22 (10.87 x 0.87)		
Rear disc brake	Type		Solid disc	Ventilated disc	
	Cylinder bore	mm (in)	34.93 (1.375)		
	Pad dimensions (Area x Thickness)	mm^2 x mm (in^2 x in)	3,210 x 8 (4.98 x 0.31)		
	Disc plate dimensions (Outer diameter x Thickness)	mm x in	261 x 10 (10.28 x 0.39)	273 x 20 (10.75 x 0.79)	
Braking force control device			Proportioning bypass valve		
Parking brake			Center lever (Mechanical, two rear brakes)		
Brake fluid			SAE J1703 or FMVSS116, DOT-3		

97U0PX-503

* Type A: Standard suspension models
* Type B: Sport suspension, Auto Adjusting Suspension (AAS), or convertible models

TANDEM POWER BRAKE UNIT AND RECESSED MASTER CYLINDER



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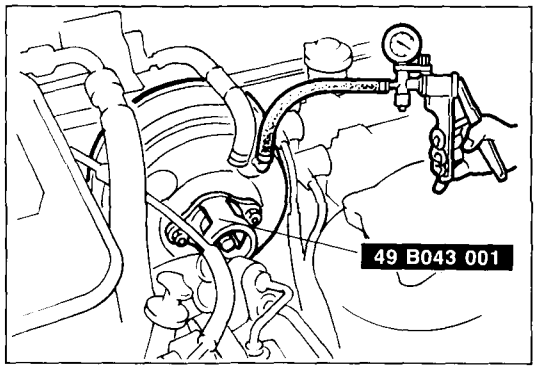
To improve brake performance of Turbo models, the power brake unit is changed from a 9-inch single diaphragm type to a 7 & 8-inch tandem diaphragm type. With the larger power brake unit, the master cylinder is changed to a recessed type.

The adjustment procedure of the push rod clearance for the tandem power brake unit is different from the single type.



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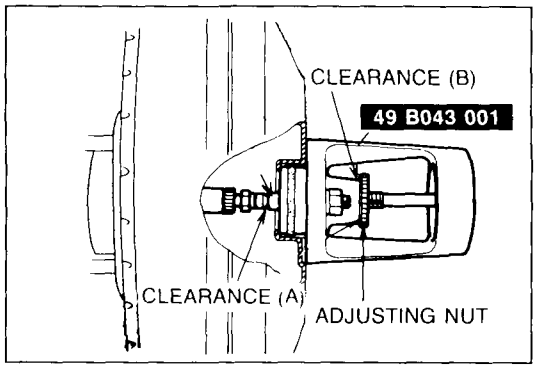

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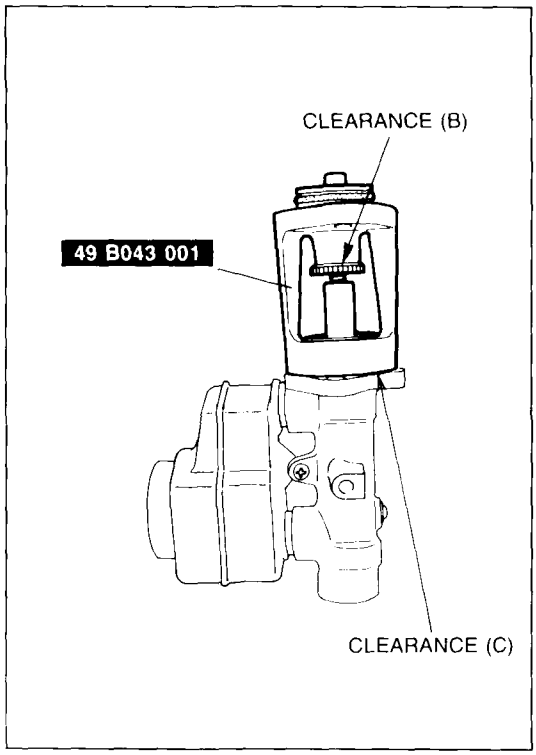

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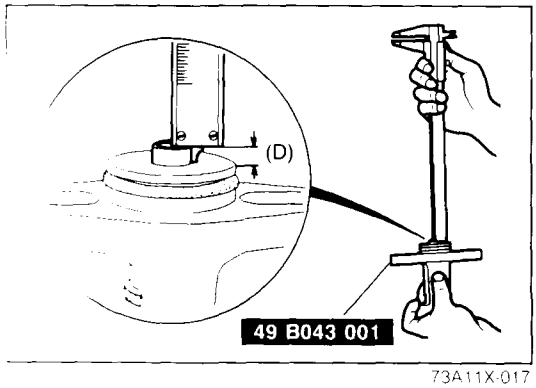


73A11X-017

SERVICE POINT
Push Rod Clearance Inspection

Inspect the push rod clearance in the following order.

1. Attach the **SST** to the power brake unit.

   Tightening torque:
   10—16 N·m (1.0—1.6 m-kg, 7.2—12 ft-lb)

2. Apply a vacuum of **500 mm-Hg (19.7 in-Hg)** using a vacuum pump.

3. Set clearance (A) between the push rod end of power brake unit and the push rod end of the **SST** and clearance (B) between the adjust nut and the **SST** body to 0mm (0 in) by turning the adjust nut.

4. Remove the **SST** from the power brake unit keeping the clearance as above. Install the **SST** to the master cylinder body as shown in the figure.
5. Measure clearance (C) between the **SST** and the master cylinder, and then measure clearance (B) between the adjust nut and the **SST** body.

Judgement Table

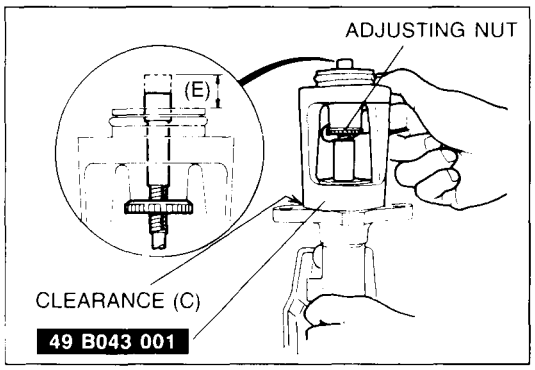
	Measurement	Necessity of adjustment
(a)	Clearance at (C)	Yes
(b)	Clearance at (B)	Yes
	Both clearances of (C) and (B) are 0mm (0 in)	No

(a) is when the push rod of the power brake unit extends.
(b) is when the push rod of the power brake unit is recessed.

Adjustment

Adjust the push rod clearance in the following order.

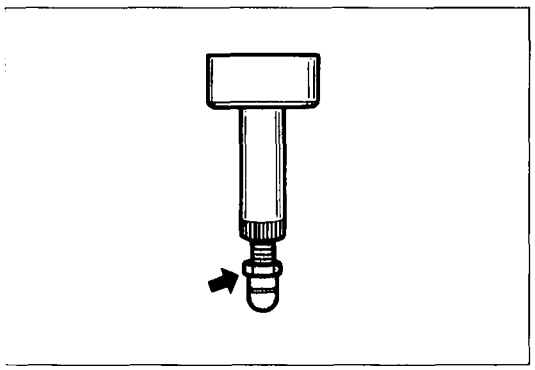
1. For **(a)** of judgement table:
   (1) Measure the height of (D) and record after removing the **SST** from the master cylinder.



97U0PX-506

(2) Install the **SST** again to the master cylinder, and turn the adjust nut so that clearance (C) between the **SST** and the master cylinder is 0mm (0 in).
(3) Measure the height of (E) when clearance (C) is 0mm (0 in).

(E) — (D) = Projecting amount of the power brake unit push rod (push rod clearance).
(4) Remove the push rod from the power brake unit.



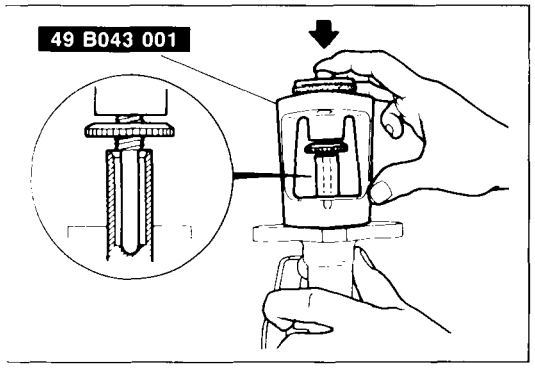
73A11X-019

(5) Make the push rod clearance 0mm (0 in) by turning the nut shown in the figure and shortening the push rod length by the amount of (E) — (D).

Note
- **The threads of the push rod are specially designed so that the bolt becomes harder to turn past a certain point to prevent loosening of the bolt. Turn the bolt only within this range when adjusting.**

2. For **(b)** of the judgement table:
(1) Push the push rod of **SST** lightly by hand until the push rod end touches the bottom of the primary piston in the master cylinder.

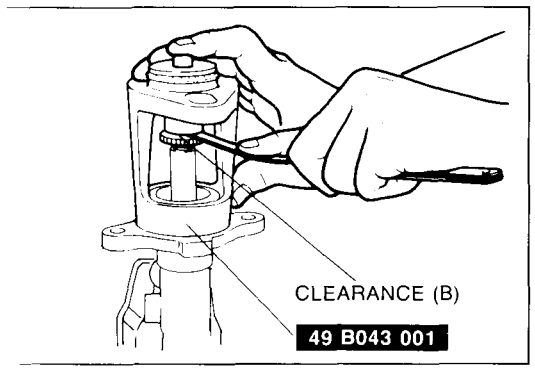
Caution
- **When pushing only use enough pressure to contact the rod in the piston. If too much pressure is applied a false reading will occur.**



73A11X-020

(2) Measure clearance (B) between the adjust nut and the **SST** body with the rod held down.

(B) = Recessed amount of the power brake unit push rod (push rod clearance).
(3) Remove the push rod from the power brake unit.



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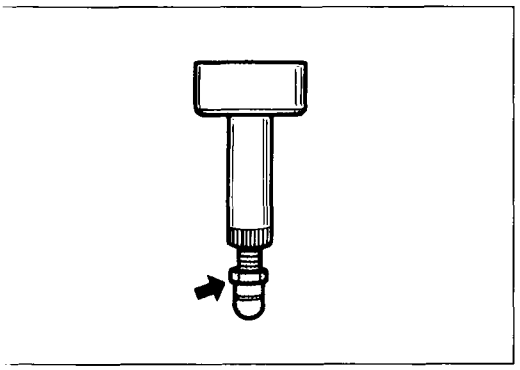
(4) Make the push rod clearance 0mm (0 in) by turning the nut shown in the figure and lengthening the push rod length by the amount of (B).



73A11X-022

Note
- **The threads of the push rod are specially designed so that the bolt becomes harder to turn past a certain point to prevent loosening of the bolt. Turn the bolt only within this range when adjusting.**

SUSPENSION

97U0RX-501

OUTLINE

OUTLINE OF CONSTRUCTION

1. The construction of the suspension system is the same as the previous models.
2. The coil spring specifications have been changed.
3. In order to improve serviceability, the AAS system has been simplified.

97U0RX-5

SPECIFICATIONS

Front Suspension

Item \ Type			Sport suspension Left	Sport suspension Right	Standard suspension Left	Standard suspension Right
Suspension type			Strut			
Stabilizer	Type		Torsion bar			
	Diameter	mm (in)	24 (0.94)			
Shock absorbers			Cylindrical, double-acting			
Coil springs	Identification mark color		Green	Gray	Red	Light green
	Wire diameter	mm (in)	12.2 (0.48)	12.0 (0.47)	12.0 (0.47)	12.0 (0.47)
	Coil diameter Top	mm (in)	147.2 (5.80)	147.0 (5.79)	147.0 (5.79)	147.0 (5.79)
	Coil diameter Bottom	mm (in)	69.8 (2.75)	70.0 (2.76)	70.0 (2.76)	70.0 (2.76)
	Free length	mm (in)	346.5 (13.64)	336.5 (13.23)	355.5 (14.00)	348.5 (13.72)
	Coil number	turns	4.29	4.08	4.41	4.41
Front wheel alignment (*Unladened)	Total toe-in	mm (in)	3 ± 3 (0.12 ± 0.12)			
		degree	0°18' ± 18'			
	Maximum steering angle Inner		36° ± 2°			
	Maximum steering angle Outer		32° ± 2°			
	Camber angle		0°20' ± 30'			
	Caster angle		4°40' ± 45'			
	Kingpin angle		13°45'			

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Rear Suspension

Item \ Type			Sport suspension Normal body	Standard suspension Convertible top
Suspension type			Multilink semi-trailing	
Stabilizer	Type		Torsion bar	
	Diameter	mm (in)	14 (0.55)	12 (0.47)
Shock absorbers			Cylindrical, double-acting	
Coil springs	Identification mark color		Purple	Orange
	Wire diameter	mm (in)	10.1 (0.40)	10.3 (0.41)
	Coil diameter	mm (in)	84.4 (3.32)	84.2 (3.31)
	Free length	mm (in)	385.0 (15.16)	372.5 (14.67)
	Coil number	turns	9.62	9.43
Rear wheel alignment (*Unladened)	Total toe-in	mm (in)	3 ± 3 (0.12 ± 0.12)	
		degree	0°18' ± 18'	
	Camber angle		−0°44' ± 30'	

97U0RX-504

* Fuel tank full, radiator coolant and engine oil at specified level, spare tire, jack, and tools in designated position

AUTO ADJUSTING SUSPENSION (AAS)

OUTLINE

The control system is simplified to detect vehicle speed only. The damping force of the shock absorbers is regulated by detecting the vehicle s acceleration and deceleration rate based on changes of the vehicle's speed.

97U0RX-505

INTERCHANGEABILITY

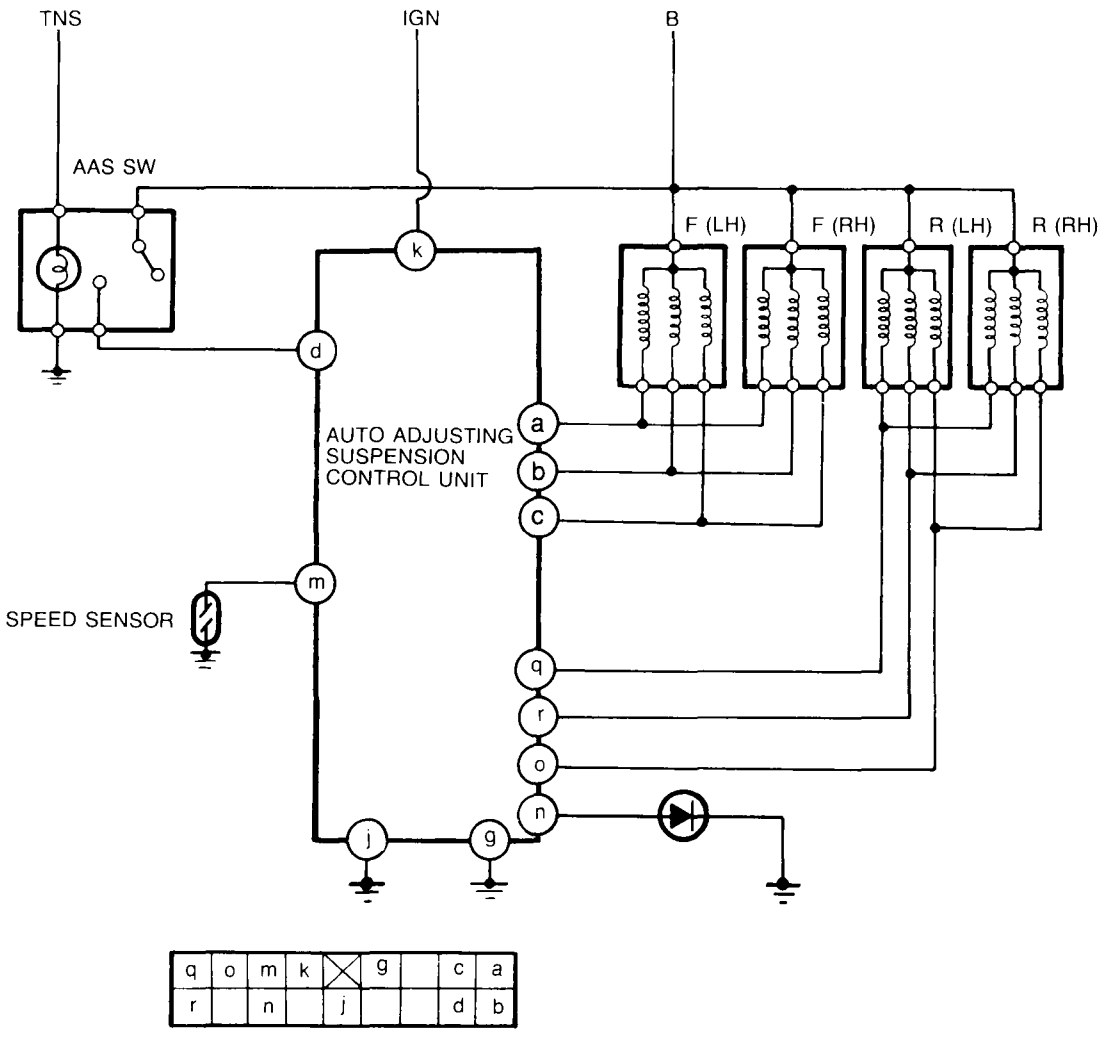
The following chart shows interchangeability of the main parts of the new AAS and the previous AAS.

○.....Interchangeable X.....Not interchangeable

Part name	Interchangeability	Remark
Control unit	X	Control system changed
Actuator	X	Specification changed
Shock absorber	○	
AAS switch	○	

97U0RX-506

SYSTEM DIAGRAM



q	o	m	k		g		c	a
r		n		j			d	b

97U0RX-507

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97U0RX-505

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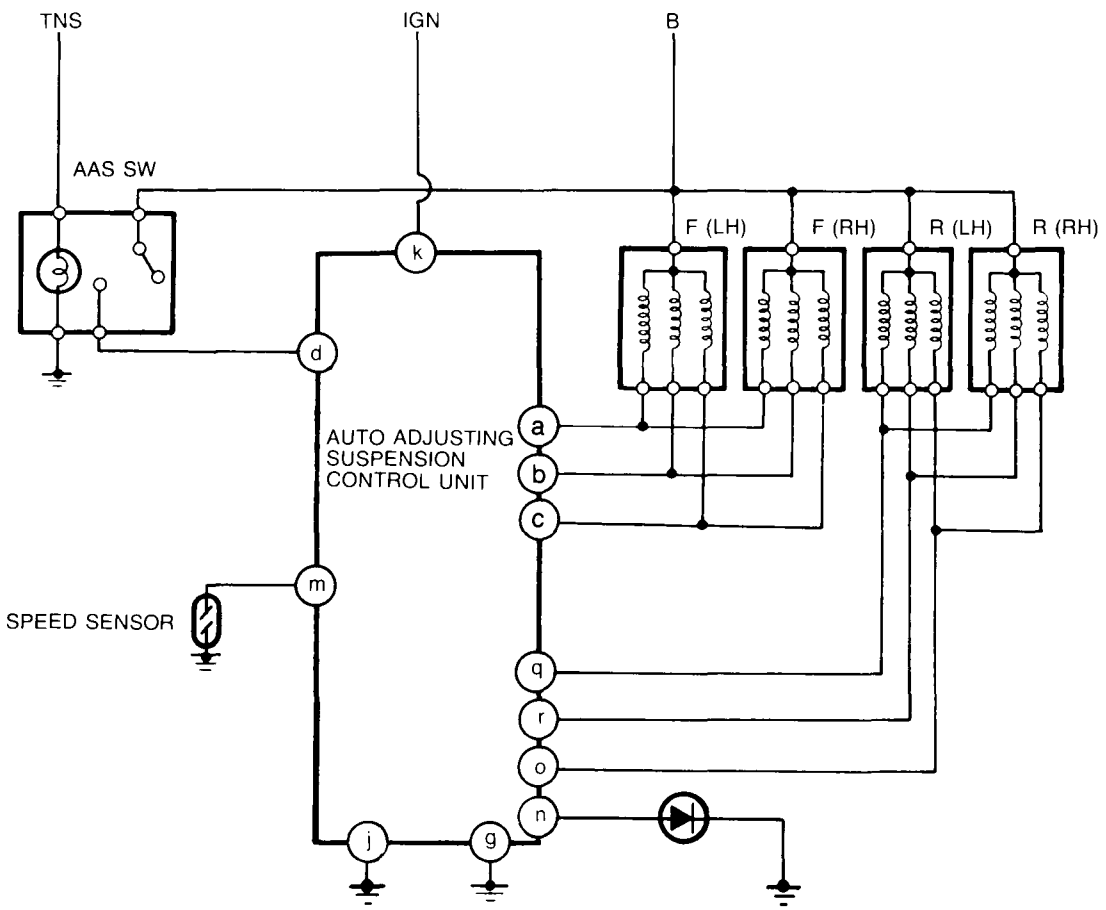
97U0RX-506

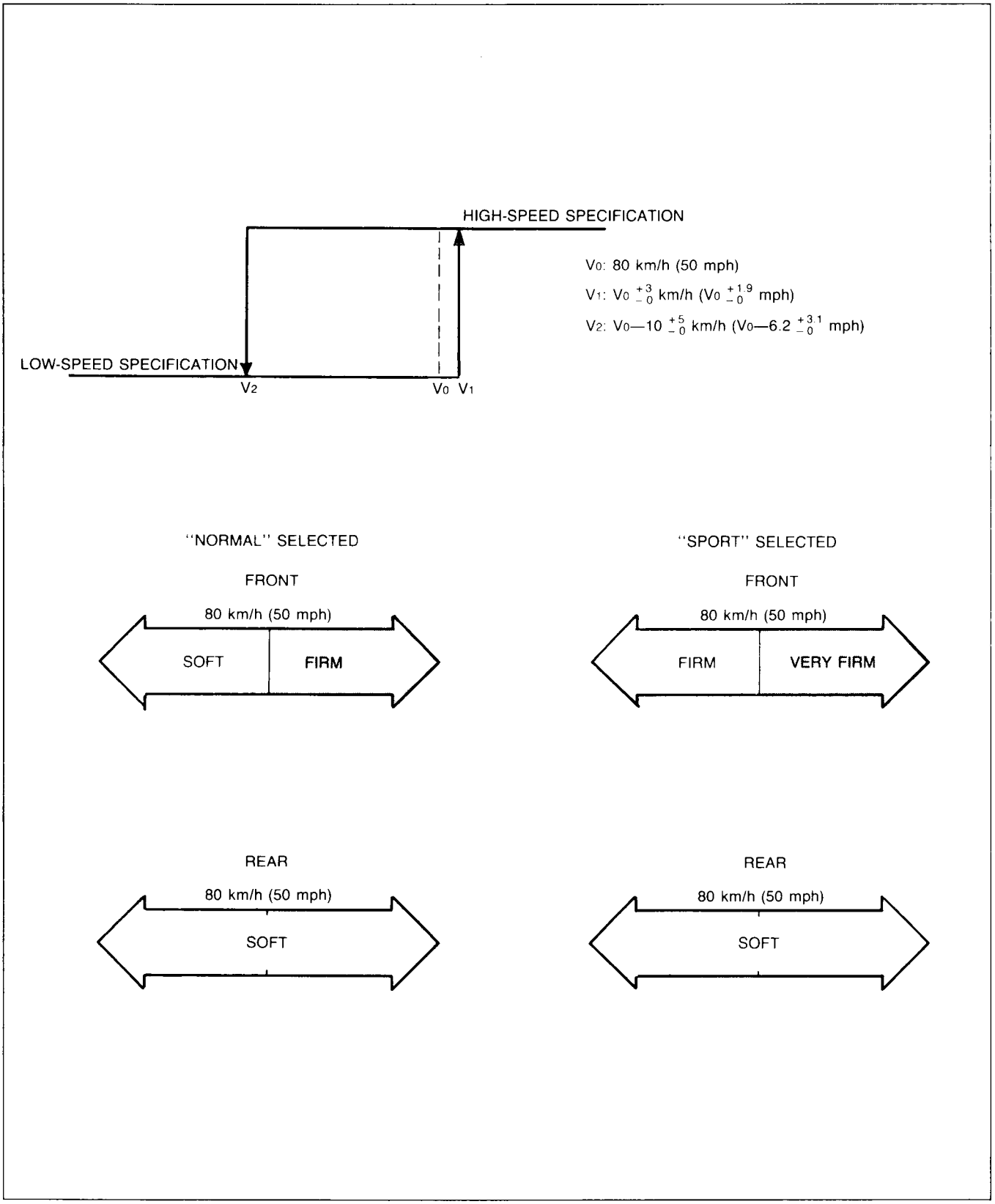
SYSTEM DIAGRAM



q	o	m	k		g		c	a
r		n		j			d	b

97U0RX-507

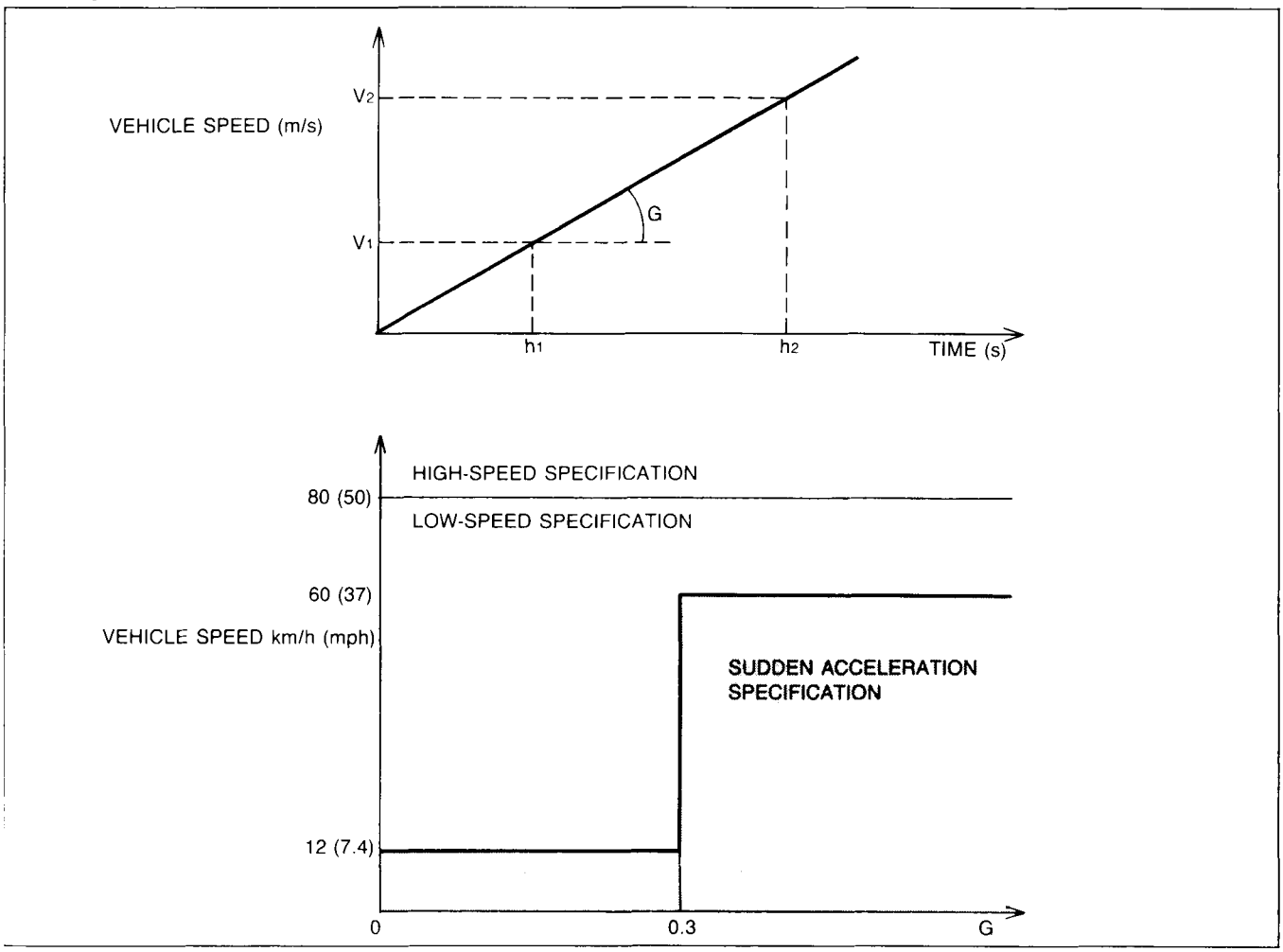
AAS FUNCTIONS
Speed-response Function



97U0RX-508

When, during crusing, vehicle speed V1 shown in the diagram is exceeded, the damping force of the shock absorbers is set to high-speed specifications as shown above.
At speeds lower than the change point (V0), the shock absorbers are set to low-speed specifications.
There is an approximately 5—13 km/h (3.1—8.1 mph) hysteresis of V1 speed to V2 speed when the shock absorber change back to low-speed specifications.

Anti-squat Function



97U0RX-509

The acceleration value, G, between h1 and h2 is calculated according to the following formula:

$$G = \frac{V2 - V1}{h2 - h1} \ (m/s^2) \times \frac{1}{9.8}$$

When accleration, G, reaches 0.3G, the control unit judges the condition to be sudden acceleration (from a stop or while crusing), as shown by the diagonal line in the diagram.
If the vehicle is in the Normal mode and the speed is 60 km/h (37 mph) or lower, the damping force of the front and rear shock absorber is set to "Firm"; in the Sport mode, the damping force of the front and rear shock absorber is set to "Very Firm". At 12 km/h (7.4 mph) or lower, even when G is less than 0.3G, the damping force is set to sudden accleration specifications.
Sudden acceleration specifications are not set if the vehicle speed is greater than 60 km/h (37 mph).
When acceleration is less than 0.3G , the shock absorbers act as during crusing (Refer to page R–4.)
There is a waiting of approximately 4 seconds at acceleration of 0.3G before the shock absorber change.
A hysteresis of 10 ± 2 km/h (6 ± 1.2 mph) at a vehicle speed of 60 km/h (37 mph), 8 ± 2 km/h (5 ± 1.2 mph) at 12 km/h (7.4 mph) is provided.

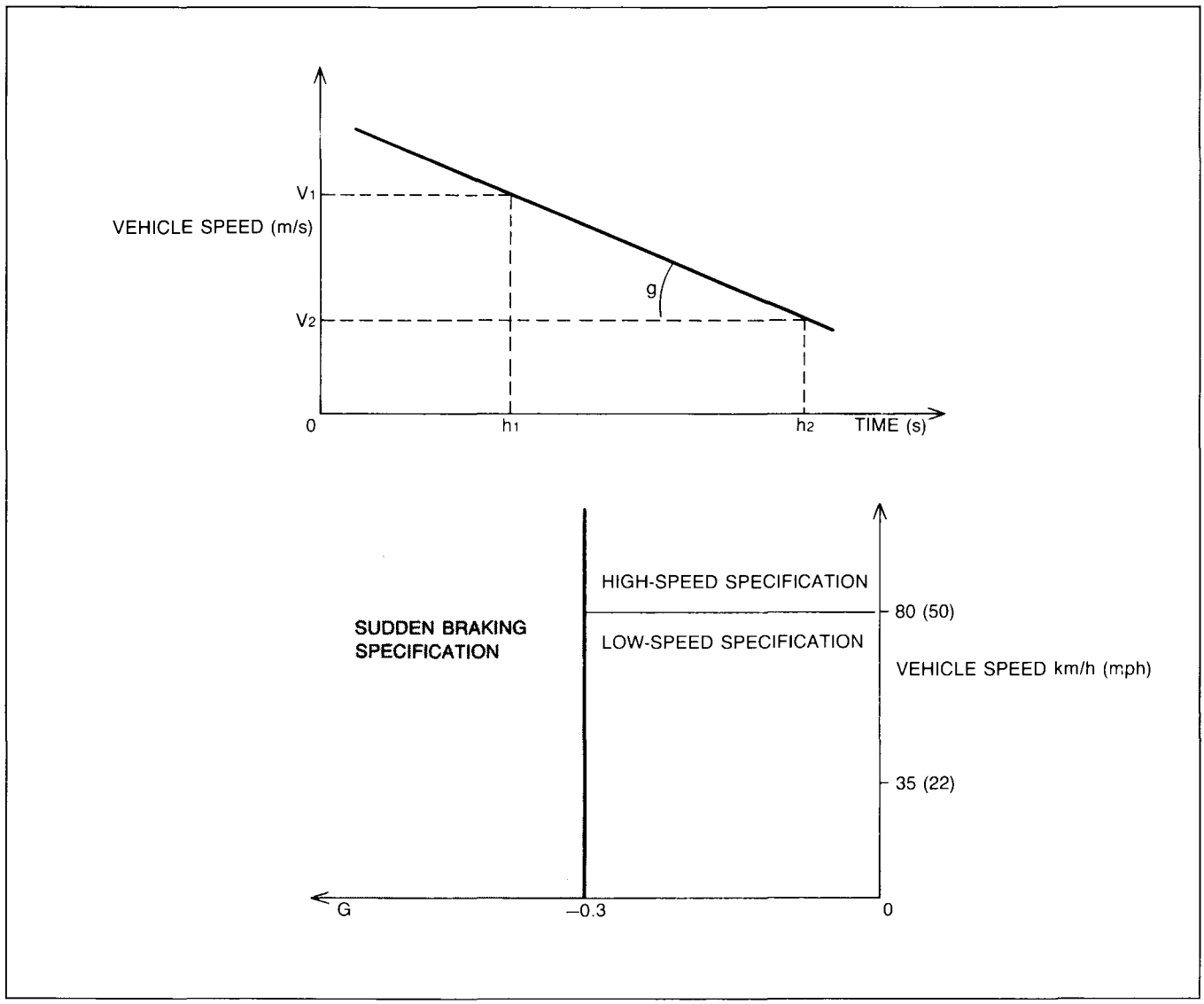
Sudden acceleration specifications

AAS switch position	Damping force	
	Front	Rear
Normal	Firm	Firm
Sport	Very firm	Very firm

Low-speed and High-speed specifications

Refer to page R–4.

Anti-dive Function



97U0RX 510

The degree of deceleration, g, between h1 and h2 is computed the same as for acceleration:

$$g = \frac{V2 - V1}{h2 - h1} \ (m/s^2) \times \frac{1}{9.8}$$

When deceleration, g, reaches -0.3G, as shown by the diagonal line in the diagram, sudden braking is judged.
If the vehicle is in the Normal mode the damping force for both the front and rear shock absorber is set to "Firm"; in the Sport mode, the damping force of the front and rear shock absorber is set to "Very Firm".
When deceleration is less than -0.3G the shock absorbers act as during crusing. (Refer to page R–4.)
There is a waiting time of approximately 2 seconds if the vehicle speed is 35 km/h (22 mph) or above and 4 seconds for under 35 km/h (22 mph) at deceleration of -0.3G before the shock absorber changes.

Sudden braking specifications

AAS switch position	Damping force	
	Front	Rear
Normal	Firm	Firm
Sport	Very firm	Very firm

Low-speed and High-speed specifications
Refer to page R–4.

BODY

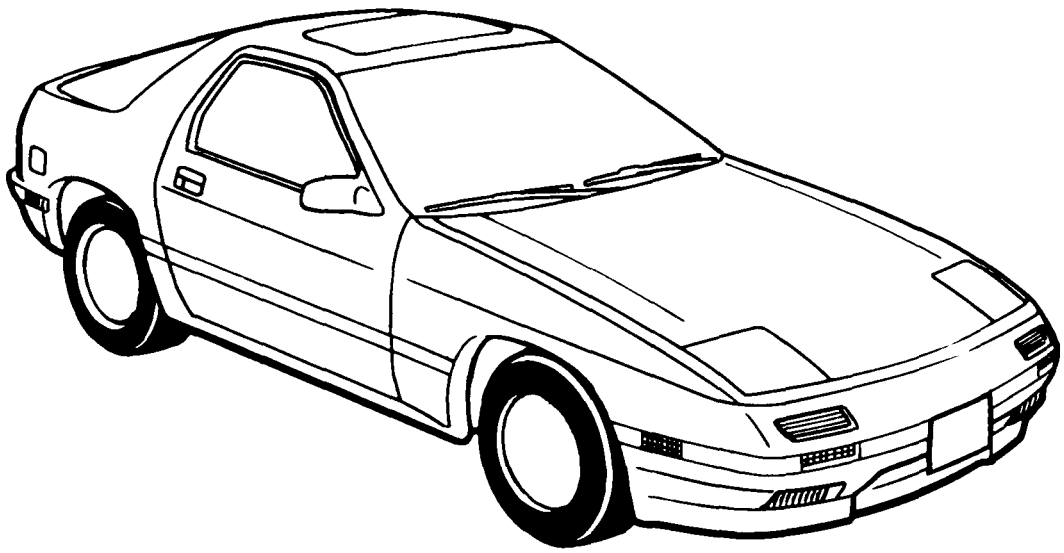
97U0SX 501

OUTLINE

OUTLINE OF CONSTRUCTION

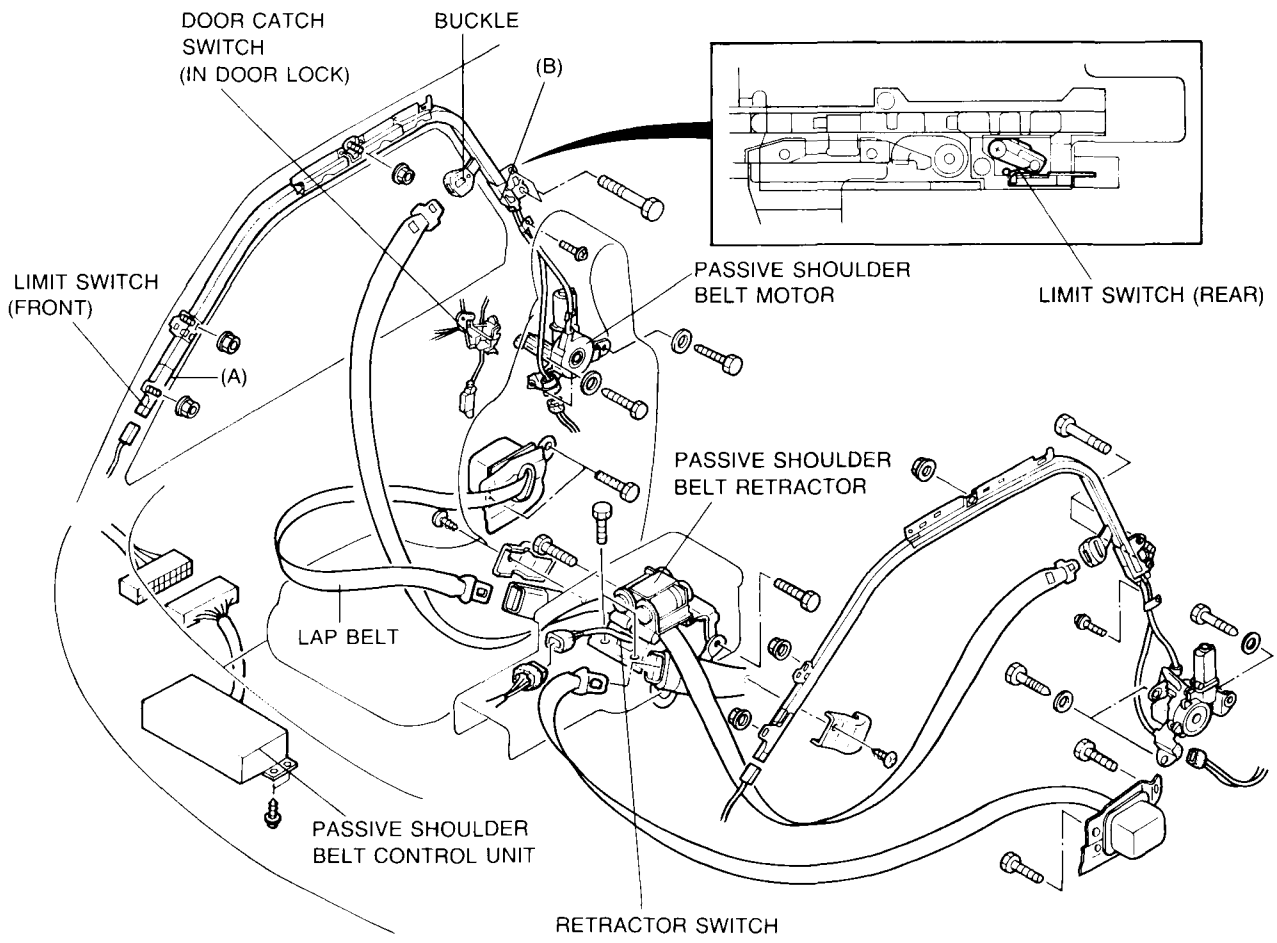
The 1989 RX-7 is mostly unchanged from the previous year, however; the two items described below are new.

1. Passive shoulder belt is newly equipped to the Mazda RX-7.
2. The front wiper motor contains built-in circuit breaker for protection.



97U0SX-502

PASSIVE SHOULDER BELTS



97U0SX-503

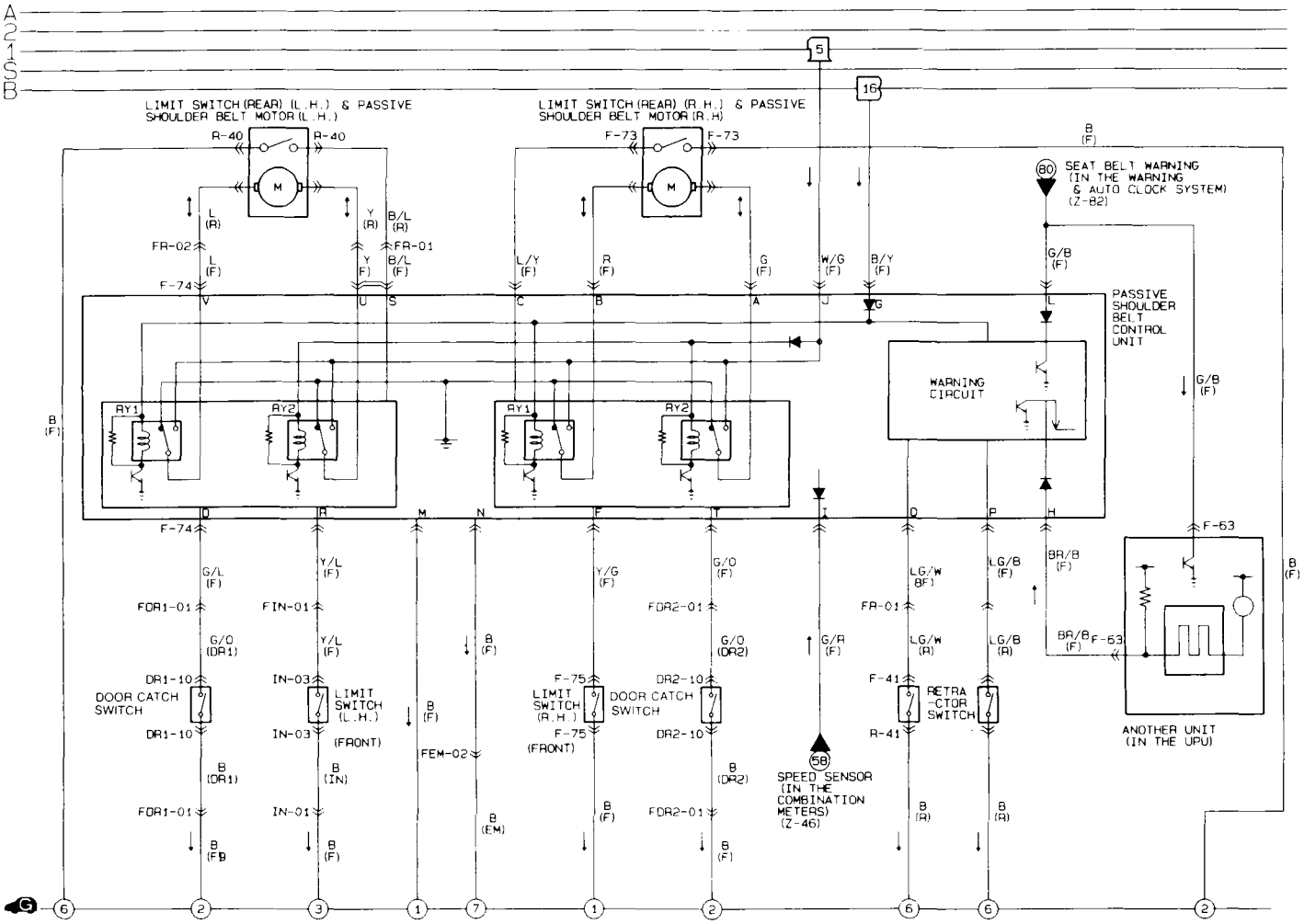
OPERATION

1. Release of automatic shoulder belts

When a door is opened, current is caused to flow to the motor, regardless of the position of the ignition switch, as a result of the signals of the door catch switch and the motor turns.
As a result, the automatic shoulder belt buckle moves from **(B)** to **(A)** point.
When the passive shoulder belt buckle moves to point **(A)**, the current to the motor is cut by the front side limit switch, and the motor stops.

2. Setting of passive shoulder belts

When a door is closed and the ignition switch is switched ON, the passive shoulder belt buckle moves from point **(A)** to point **(B)**.
When the passive shoulder belt buckle reaches to point **(B)**, the current to the motor is cut by the rear side limit switch, and the motor stops.

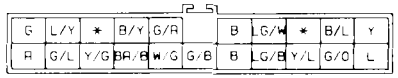


F-63 CPU (F)

( ) ... POWER WIMGOW & DOOR LOCK KEY SYLINDER ILLUMI

F-73 PASSIVE SHOULDER BELT MOTOR (R, H) & LIMIT SWITCH REAR (R, H) (F)

F-74 PASSIVE SHOULDER BELT CONTROL UNIT (F)



F-75 LIMIT SWITCH FRONT (R, H) (F)

R-40 PASSIVE SHOULDER BELT MOTOR & LIMIT SWITCH FRONT (L, H) (R)

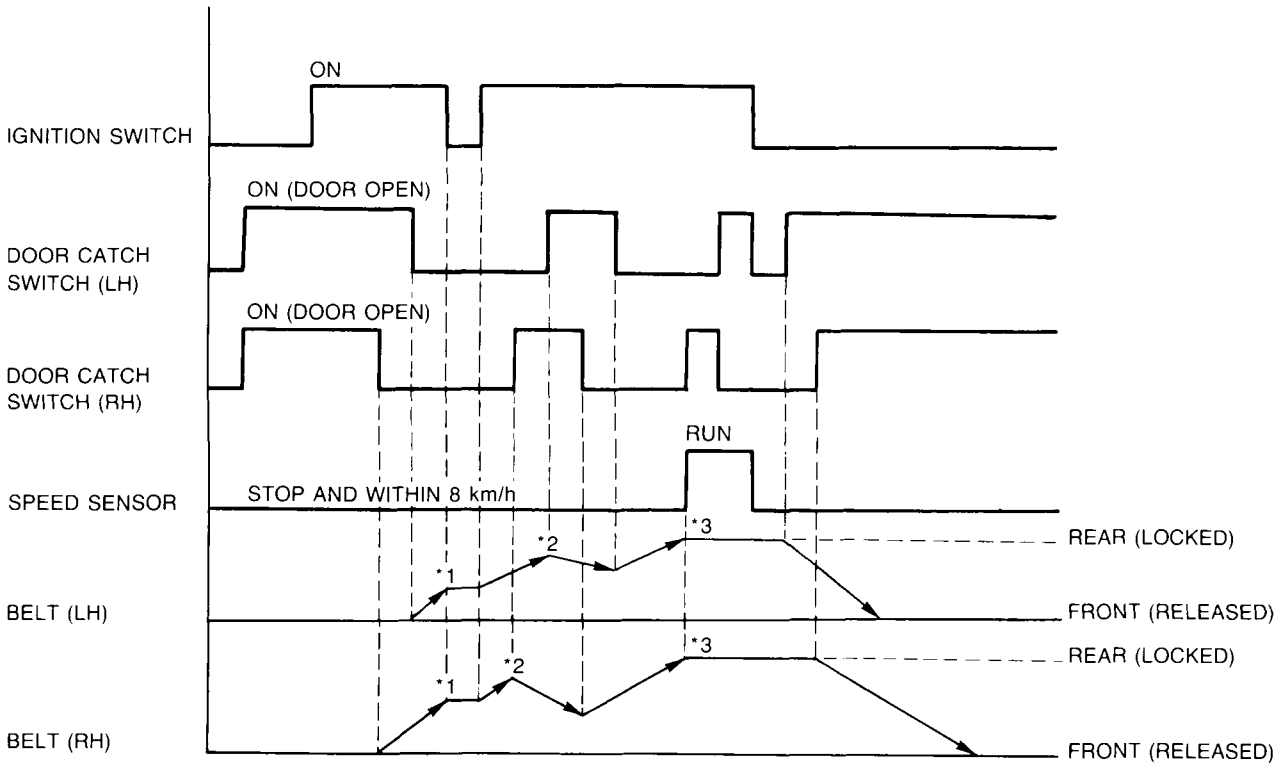
R-41 RETRACTOR SWITCH (R)

DR1-10 DOOR CATCH SWITCH (DR1)

DR2-10 DOOR CATCH SWITCH (DR2)

IN-03 LIMIT SWITCH REAR (L, H)

BELT OPERATION



*1: IGN-OFF DURING MOVEMENT OF BELT → BELT STOPPED

*2: WHEN DOOR OPENED DURING MOVEMENT OF BELT → BELT MOVED FORWARD

*3: WHEN DOOR OPENED DURING DRIVING → BELT REMAINS SET

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For safety, if a front door is opened while the vehicle is moving at a speed of 8 km/h or higher, the passive seat belt buckle does not move toward the front; it remains locked at the rear position. This function is controlled whithin the passive seat belt control unit by the signals resulting from the detection of the vehicle speed by the speed sensor.

Anti-burnt function

When the buckle stopes more than 10 seconds by the load during driving (rear→front), the buckle moves back the released position. By this operation, the motor protects to burn out.

WARNING LAMP/CHIME

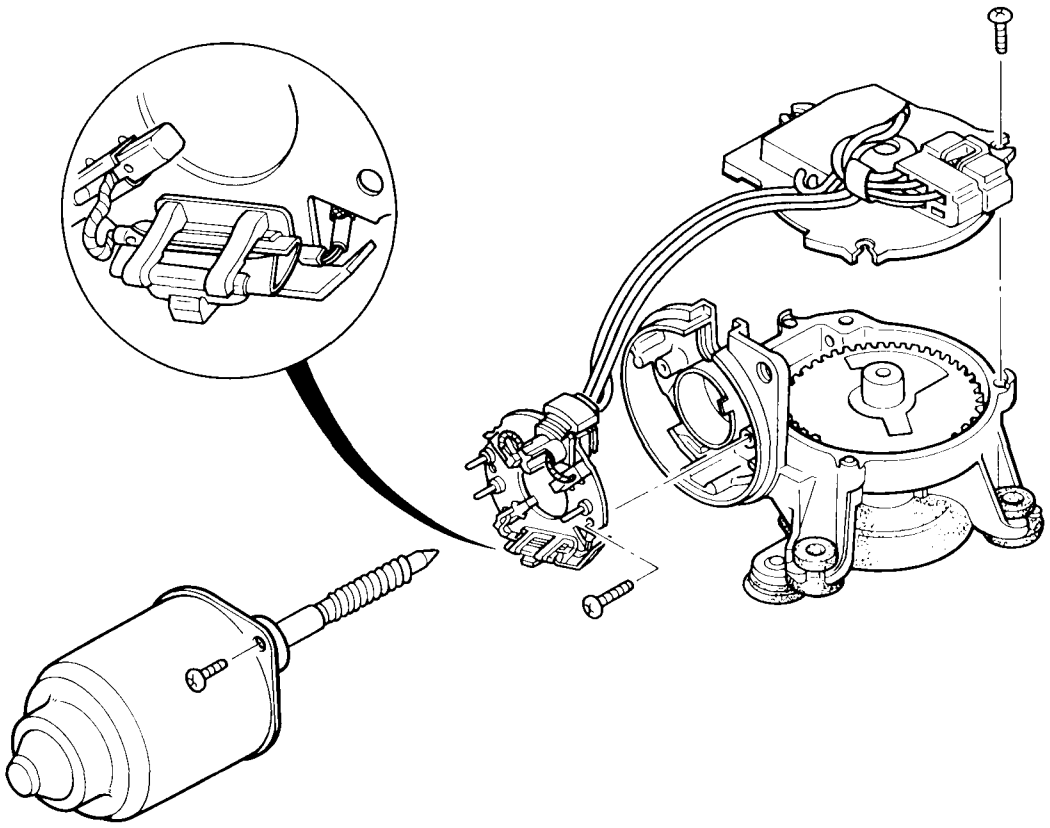
1. The passive shoulder belt warning system works as described below. (Ignition switch ON)

	Condition	Seat belt warning lamp	Warning chime
1	Passive shoulder belt is moving	Warning lamp shines until the belt comes to reset (in the rear position or front position)	—
2	Passive shoulder belt not connected to the buckle	Warning lamp shines until belt attached	Beep sounds for 5 sec.

97U0SX-505

2. Lap belt warning.
   The warning light and buzzer function to provide an alarm when the ignition switch is switched ON. Note, however, that the warning light illuminates during the timer period (approx. 6 seconds), regardless of whether the lap belt is fastened or unfastened, and then automatically stops illumination after that time has passed.

FRONT WIPER MOTOR



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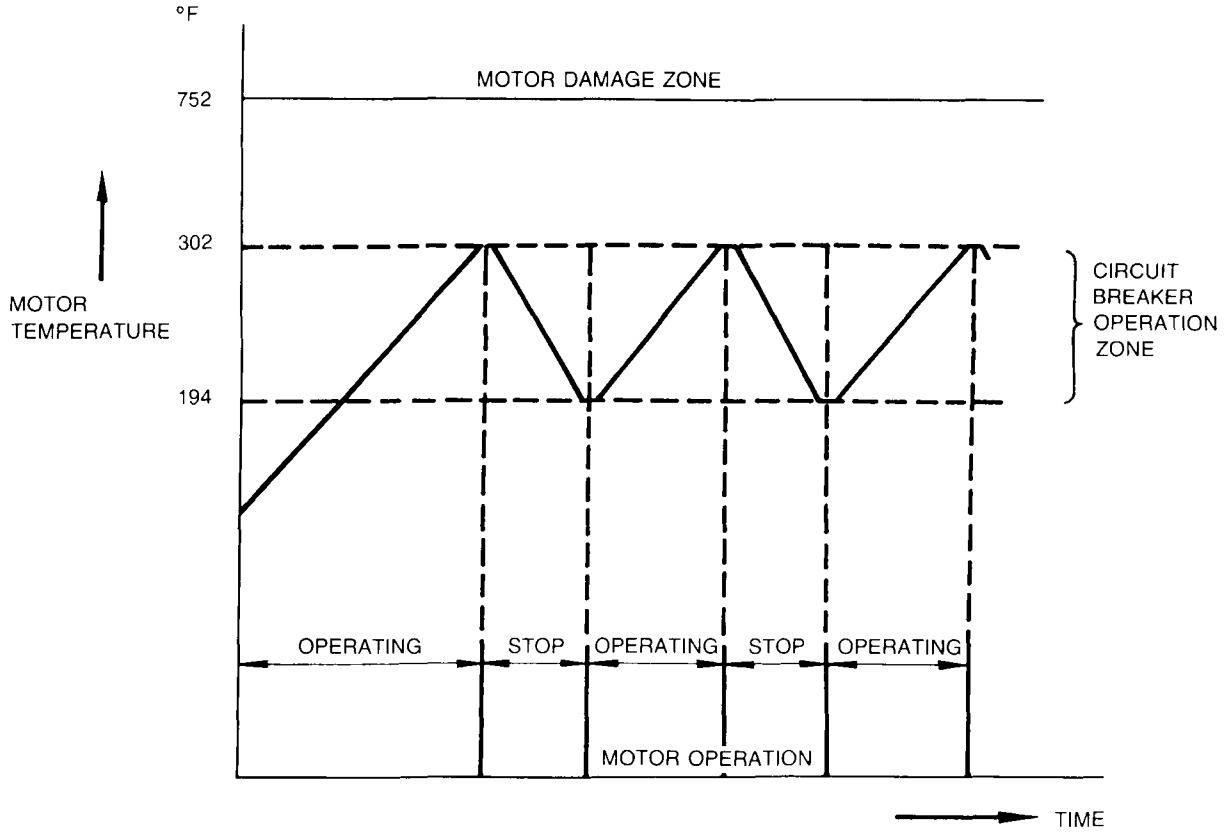
The front wiper motor contains built-in circuit breaker for protection.

CIRCUIT BREAKER PURPOSE

Prevents wiper motor damage in the event the motor is prevented from turning, such as the wiper blades frozen to the windshield or excessive build up of snow.
Controls wiper motor temperature rise when the wipers are operated under heavy-load conditions, such as heavy snowfall.



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CIRCUIT BREAKER OPERATION

The internal circuit is opened to stop the motor if the motor temperature exceeds approx. 150°C (302°F). The circuit breaker automatically resets and the motor operates when the temperature drops to below approx. 90°C (194°F).

Note

- **During heavy-load conditions (heavy rain, heavy snowfall) the circuit breaker may open and momentarily stop operation of the wipers. They will again operate when the circuit breaker resets itself.**
- **If the wiper switch is turned off while the circuit breaker is open, the wipers will automatically return to the park position when the circuit breaker resets.**

PREVENTION OF WIPER MOTOR BINDING

To prevent binding of the wiper motor caused by the wiper blades sticking to the windshield if they remain unused for a long period or if there is the possibility of freezing or heavy snow build up, lift the wiper arms to raise the wipers off the glass.

If the blades become stuck to the glass, follow the procedures on the following page to free them. If necessary, wait a few minutes for the circuit breaker to reset before the wiper motor will operate normally.

Condition	Action
Wiper blades will not move because of freezing or heavy snow build up.	Remove ice or snow. Confirm that blades are free.
Wiper blades stuck to windshield because of long term disure.	Carefully release blades from glass. being careful not to damage them.

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Note

- **Never operate the wipers when the windshield is dry. Squirt washer fluid on the glass before using the wipers to clean the windshield.**

IF WIPER MOTOR STOPS

If the wiper motor stops while the vehicle is in motion, carefully guide the vehicle to the road and stop. Turn OFF the wiper switch.
After approximately 5 minutes, turn the wiper switch ON to verify wiper operation. If the wipers operate, the wiper motor is functioning correctly (circuit breaker opened momentarily).
If the wiper motor does not operate, check the wiper motor circuit. (Refer to workshop manual of specific model.)

97U0SX 509

BODY ELECTRICAL SYSTEM

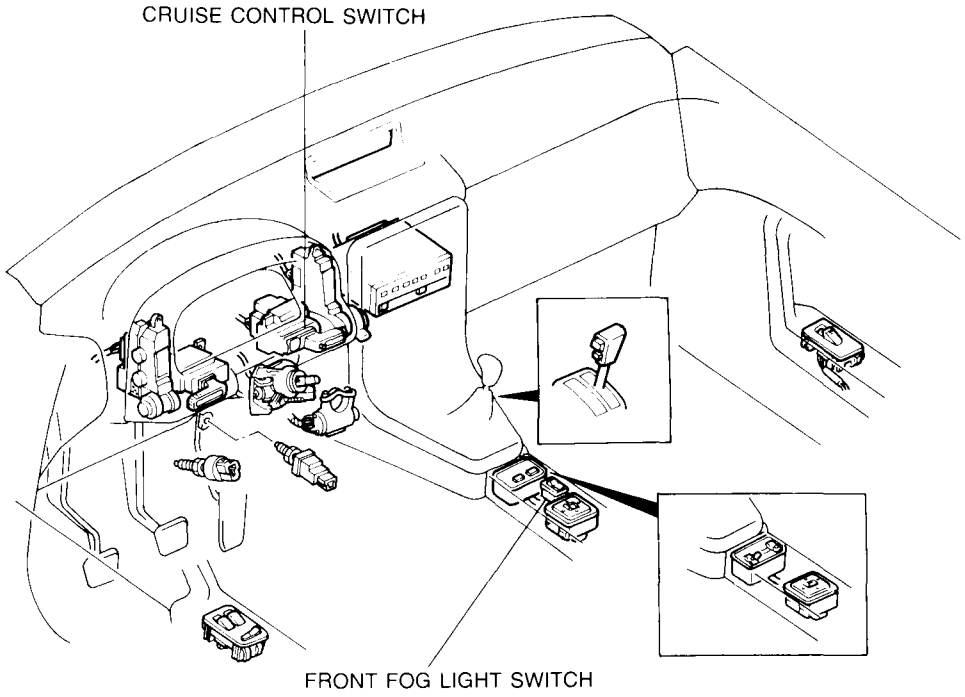
97U0TX-501

OUTLINE

OUTLINE OF CONSTRUCTION

1. A central processing unit (CPU) incorporating ten functions is provided for improved serviceability.
2. Front fog lights (for USA) and daytime running lights (for Canada) are newly equipped.
3. The cruise control system now has a self-diagnosis function for easing inspection.
4. The operation circuit of the theft-deterrent system control unit is buit into the CPU.
5. Audio system is changed (5 type).

LOCATION OF SWITCHES



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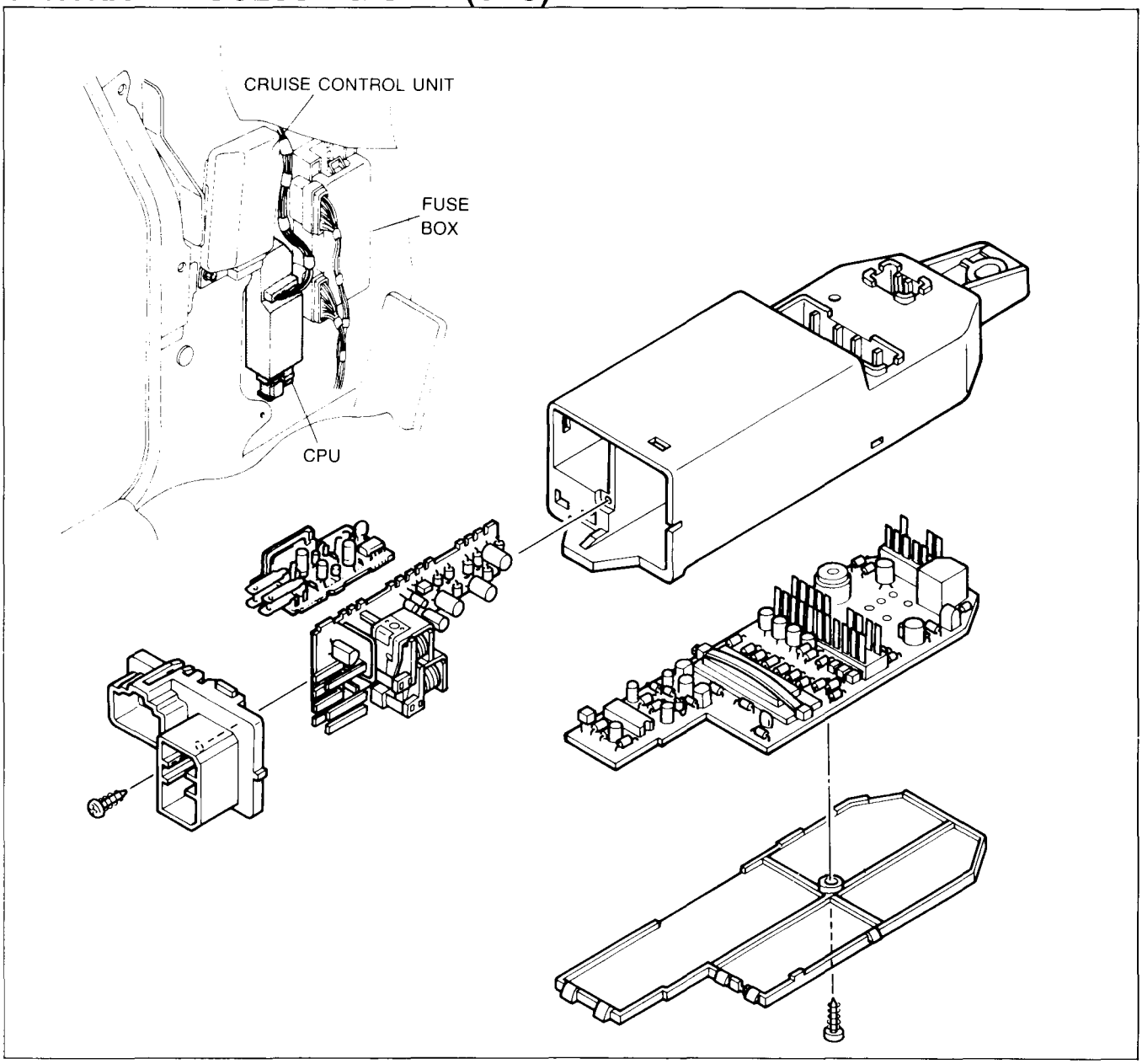
CENTRAL PROCESSING UNIT (CPU)



97U0TX-503

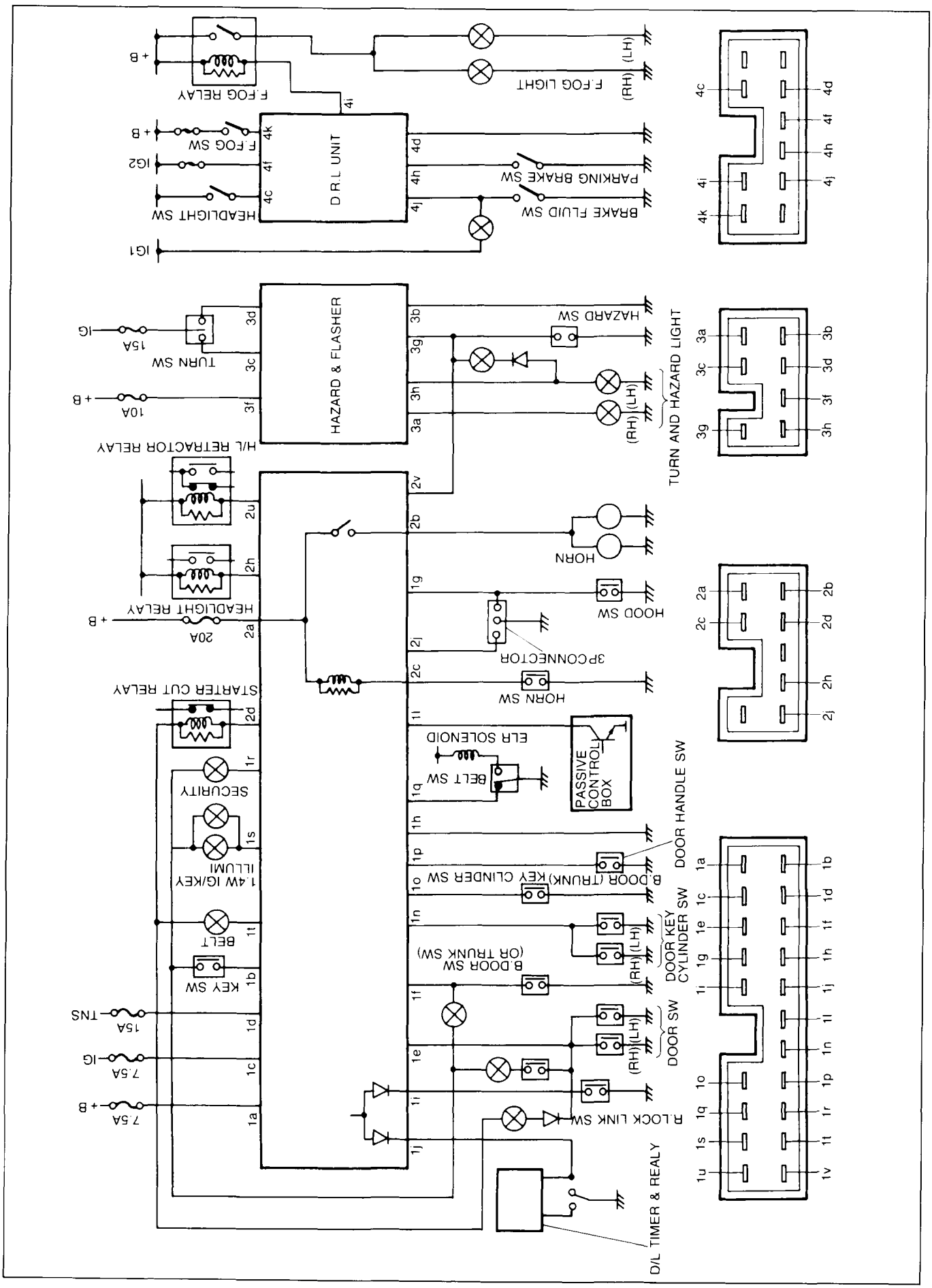
The central processing unit (CPU) is controlled by a microcomputer.
The functions included in the CPU are as follows.

Sound Alarm System
- Key reminder alarm
- Lights-off reminder alarm
- Seat belt alarm
- Passive shoulder belt alarm

Timer System
- Seat belt timer
- Key illumination light timer

Other System
- Theft-deterrent system
- Horn relay
- Hazard and flasher unit
- Daytime running light (DRL) unit (Canada only)

CIRCUIT DIAGRAM



97U0TX-504

FUNCTION
Sound Alarm System

Function	Activation condition	Sound alarm operation
Key reminder alarm	1. Key reminder switch ON 2. Ignition switch OFF 3. Door switch ON If three of them are maintained simultaneously	Sounds two times per cycle
Lights-off reminder alarm	1. Light switch ON 2. Ignition switch ON 3. Door switch ON If three of them are maintained simultaneously	
Seat belt alarm	1. Seat belt timer ON 2. Seat belt switch ON If two of them are maintained simultaneously	
Passive shoulder belt alarm	1. Passive shoulder belt not connected to the buckle 2. Ignition switch ON If two of them are maintained simultanelusly	

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Timer System

Function	Activation condition	Operation
Seat belt timer	For approx. 6 sec. after ignition switch turned ON from OFF	Illuminates seat belt warning lamp
Key illumination lamp timer	After door opened by outer handle then closed, ON approx. 30 sec. 1. Outer handle switch ON 2. Door switch ON Either case	Illuminates ignition key lamp

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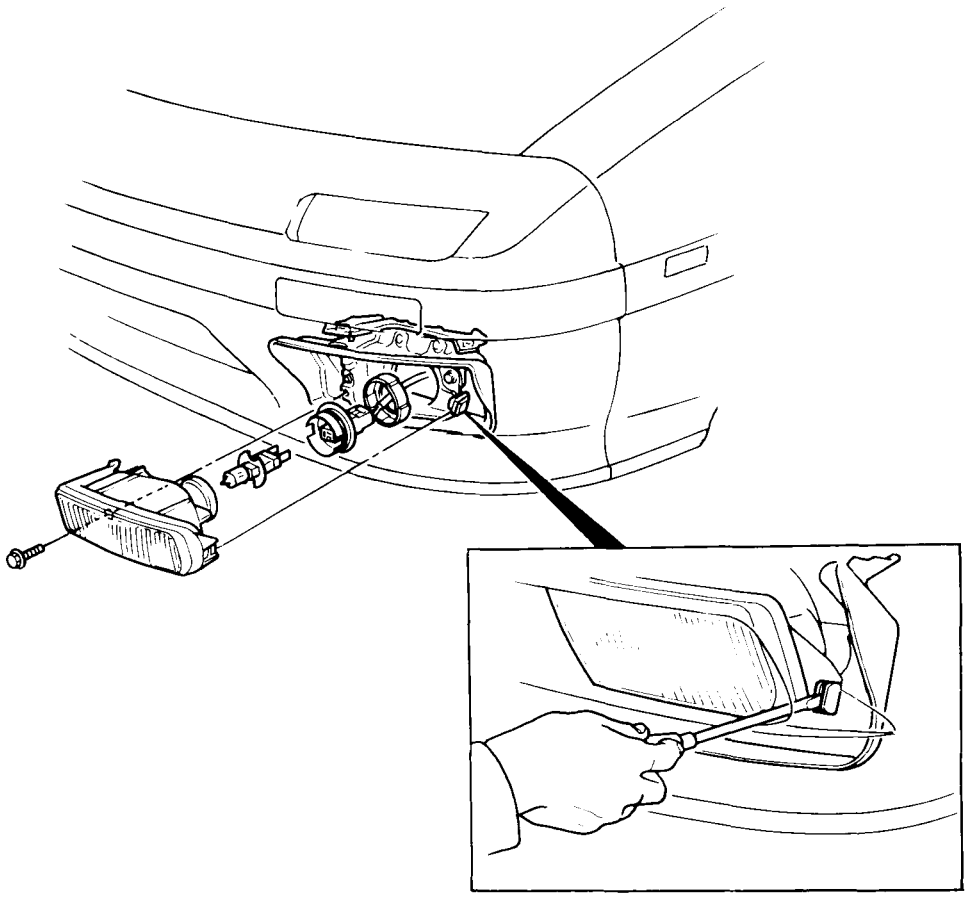
FRONT FOG LIGHTS AND DAYTIME RUNNING LIGHTS

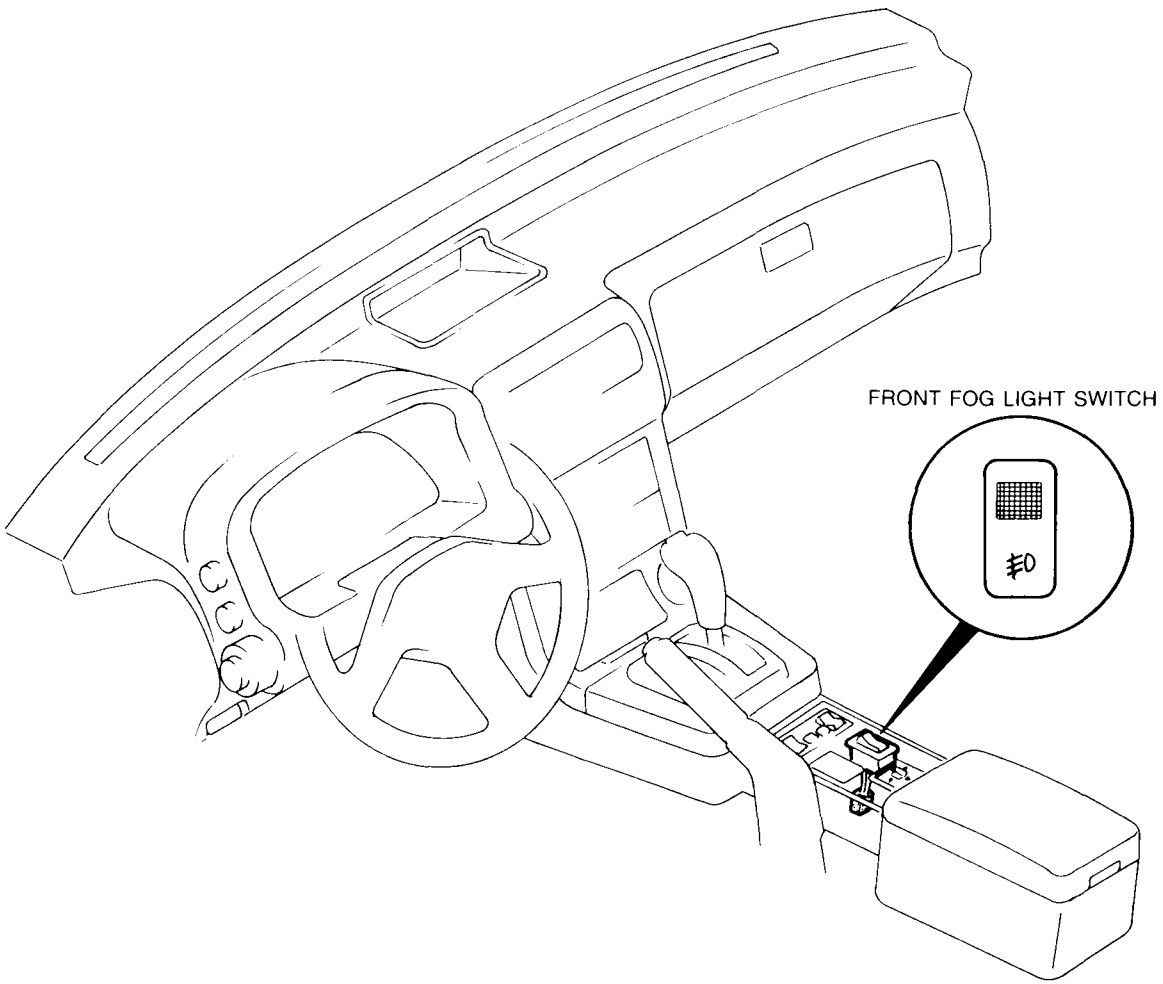


97U0TX-507

The front fog lights (for USA) and the daytime running lights (for Canada) are the same components. The difference between the front fog light and the daytime running lights is their operation.

OPERATION

Daytime running lights:
In Canada, certain regulations require that vehicles be driven with lights illuminated during daytime operation. It is for that reason that the daytime running lights are automatically illuminated when the ignition switch is turned to the ON position.
The daytime running lights are switched OFF any of the following conditions.
1. When the headlights are swithced ON.
2. When the parking brake is applied.
3. When flash-to-pass is operated.



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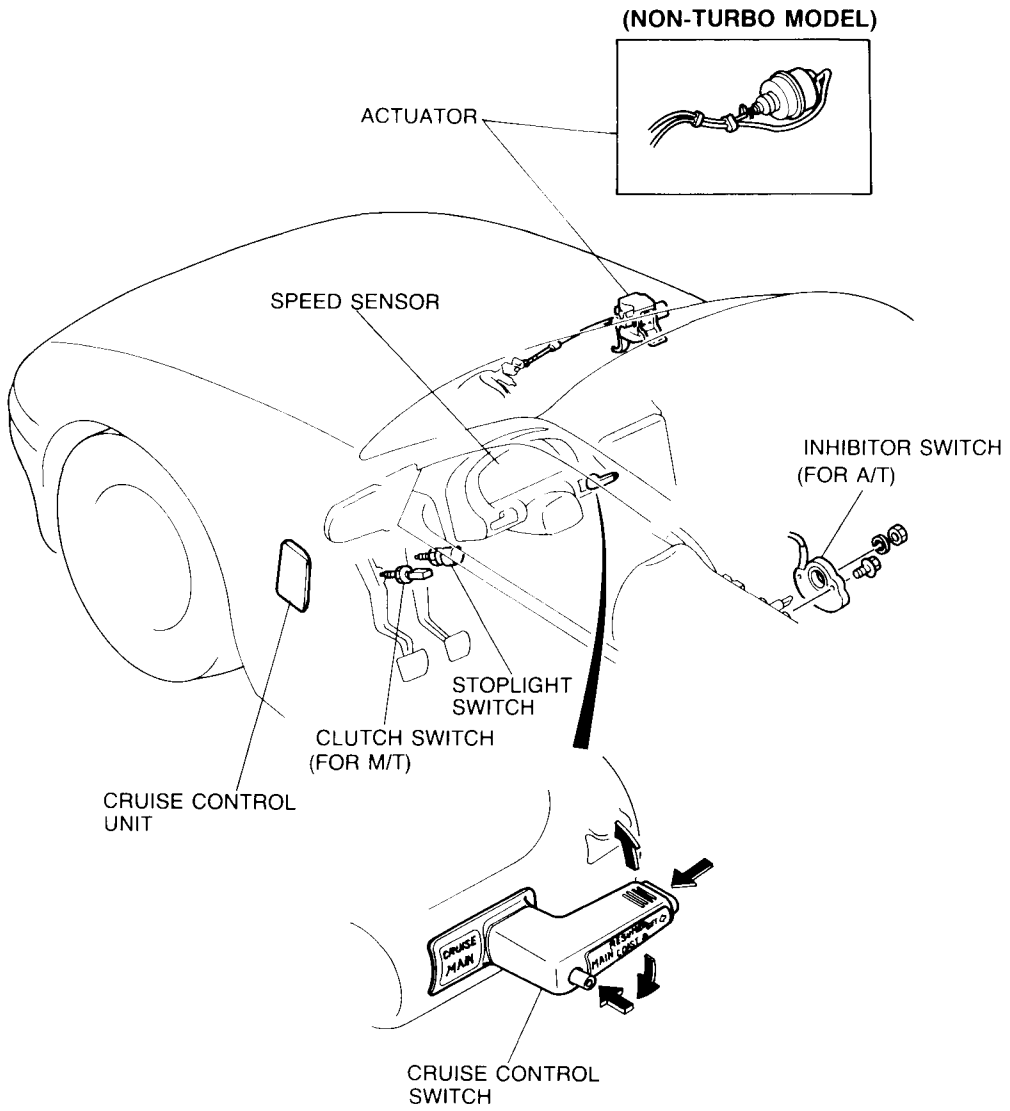
Front fog lights:
When, with the headlights ON the low beam, the front fog light switch is pressed, the front fog lights will come on. (The front fog lights momentarily are switched OFF while in high beam or during flash-to-pass operation.) The front fog lights are turned OFF by the fog light switch.

CRUISE CONTROL SYSTEM



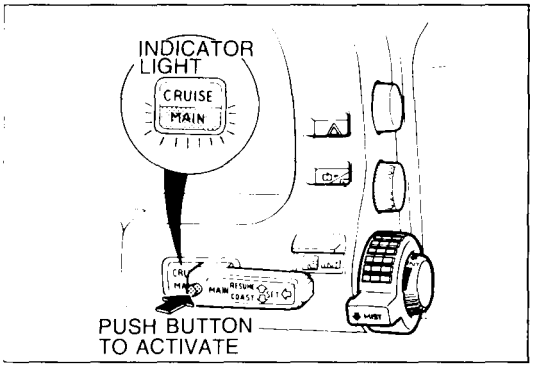
97U0TX-509

The cruise control system is basically the same as the 929. The improved point on the system is self-diagnostic function still more.

SELF-DIAGNOSTIC FUNCTION

The self-diagnostic function intergrated within the cruise control unit diagnoses the condition of the cruise control system.
Condition codes are indicated by flashing of the CRUISE indicator. (Refer to condition code numbers on page T–11.) This operation continues until the conditions to cancel the operation is inputted.

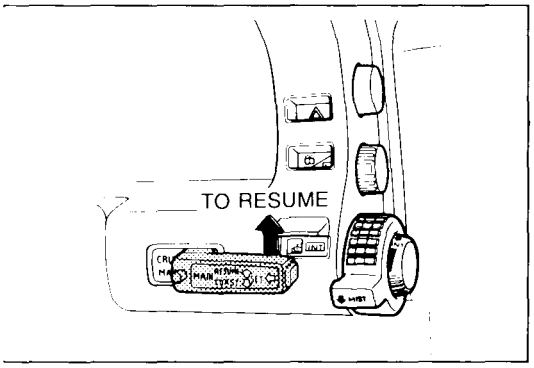
97U0TX-510



97U0TX-511

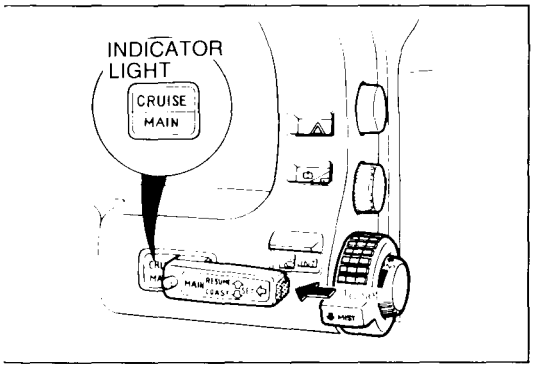
Inspection Procedure
Self-diagnosis of malfunction

1. Turn ignition switch to ON.
2. Push the cruise control MAIN switch. (The MAIN indicator lamp comes on.)



97U0TX-512

3. Move the control lever upward to the RESUME position and hold it more than 3 seconds.
4. Release the lever.
5. The self-diagnosis is now activated.
6. Note the condition code number(s). (Refer to page T–11.)
7. Drive the vehicle at more than 16 km/h (10 mph) or push the MAIN switch (The MAIN indicator lamp goes out.) to deactivate Self-diagnosis.



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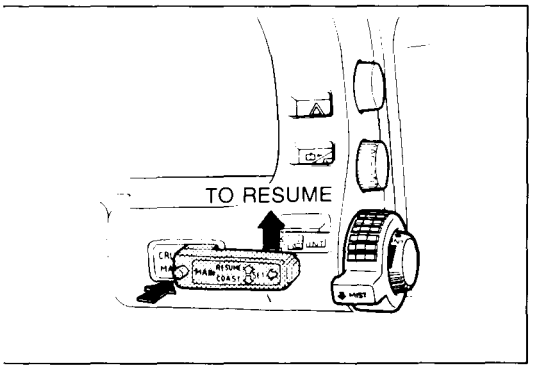
Quick inspection of cruise control system

1. Turn ignition switch to ON.
2. Verify that the MAIN switch is OFF. (The MAIN indicator lamp off.)



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3. Move the control lever upward to the RESUME position and hold it.
4. Push the MAIN switch to activate inspection of system. (The MAIN indicator lamp comes on.)
5. Operate each switch as described and verify operation codes. (Refer to page T–11.)
6. Push the MAIN switch to deactivate inspection of system. (The MAIN indicator lamp goes out.)

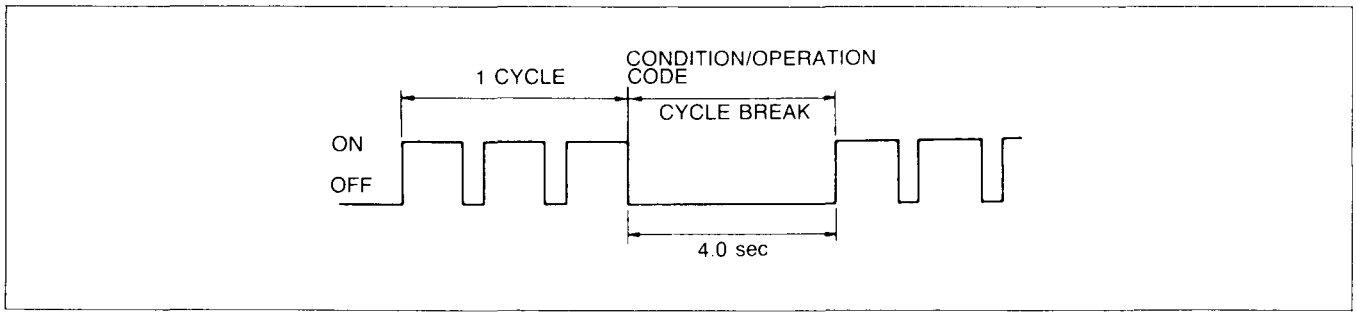
PRINCIPLE OF CODE CYCLE

Condition and operation codes are determined by flashing of the CRUISE indicator as shown below.

97U0TX-515

1. Code cycle break

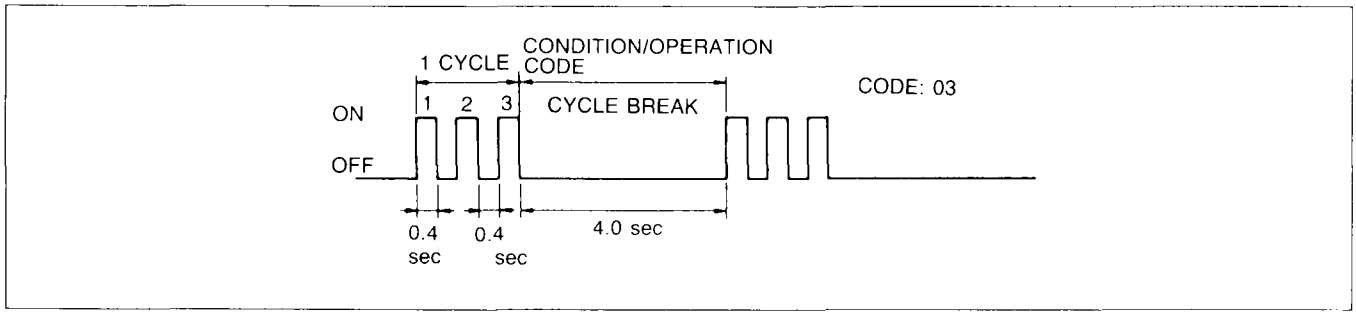
The time between condition/operation code cycles is 4.0 seconds (the time the lamp is off).



97U0TX-516

2. Second digit of condition/operation code (ones position)

The digit in the ones position of the condition/operation code represents the number of times the lamp is on 0.4 second during one cycle.

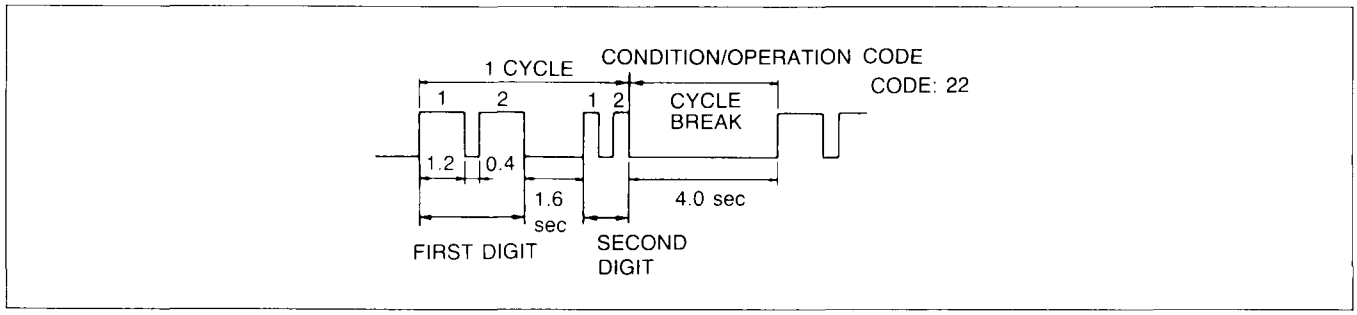


97U0TX-517

3. First digit of condition/operation code (tens position)

The digit in the tens position of the condition/operation code represents the number of times the lamp is on 1.2 seconds during one cycle.

The lamp remains off for 1.6 seconds between the long and short flashes.



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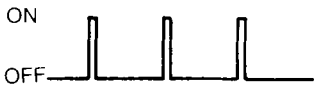
CONDITION/OPERATION CODE NUMBERS

Self-diagnosis of Malfunction

The CRUISE indicator will flash if a malfunction is present.

Pattern of output signal (CRUISE indicator lamp)	Code No.	Possible Cause
	01	Defective wiring or ground Defective actuator Defective stoplight switch (For cruise)
	05	STOP fuse blown
	07	Both stoplight switches (for vehicle and cruise) are ON simultaneously
	11	Defective SET, COAST, or RESUME switch
	15	Defective cruise control unit

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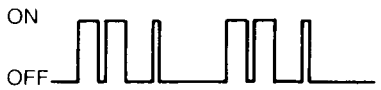
Note

- **If there is more than one malfunction, the code numbers will be indicated in numerical order.**

Inspection of Cruise Control System

The CRUISE indicator will flash if the system is operating correctly. If the lamp fails to flash, inspect the system.

Procedure	Pattern of output signal (CRUISE indicator lamp)	Code No.
Press SET button		21
Move control lever downward to COAST position		22
Move control lever upward to RESUME position		23
Depress brake pedal		31
Shift the selector lever to P or N rang (For A/T). Depress clutch pedal (For M/T)		35
Drive vehicle above 40 km/h (25 mph)		37

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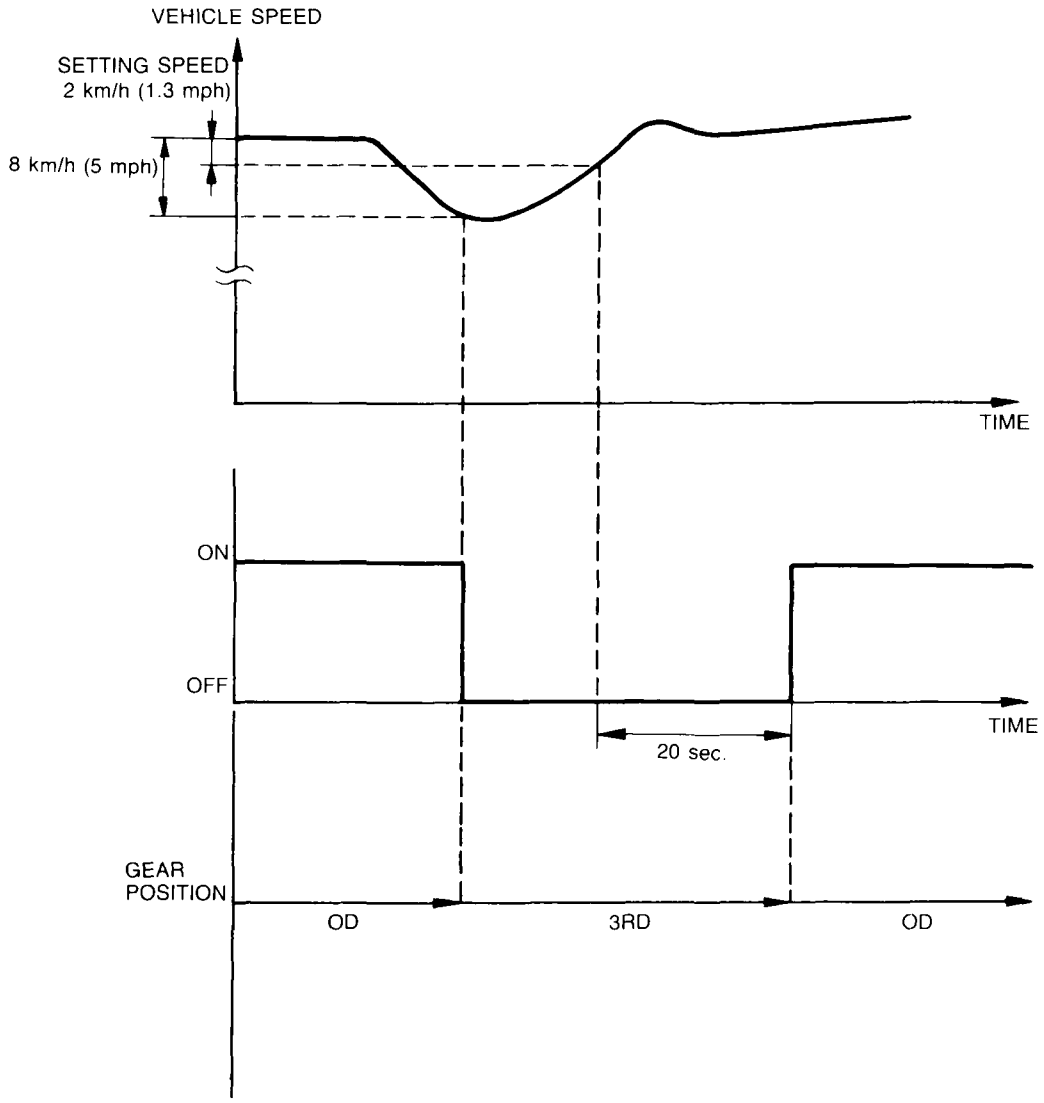
A/T CONTROL OPERATION



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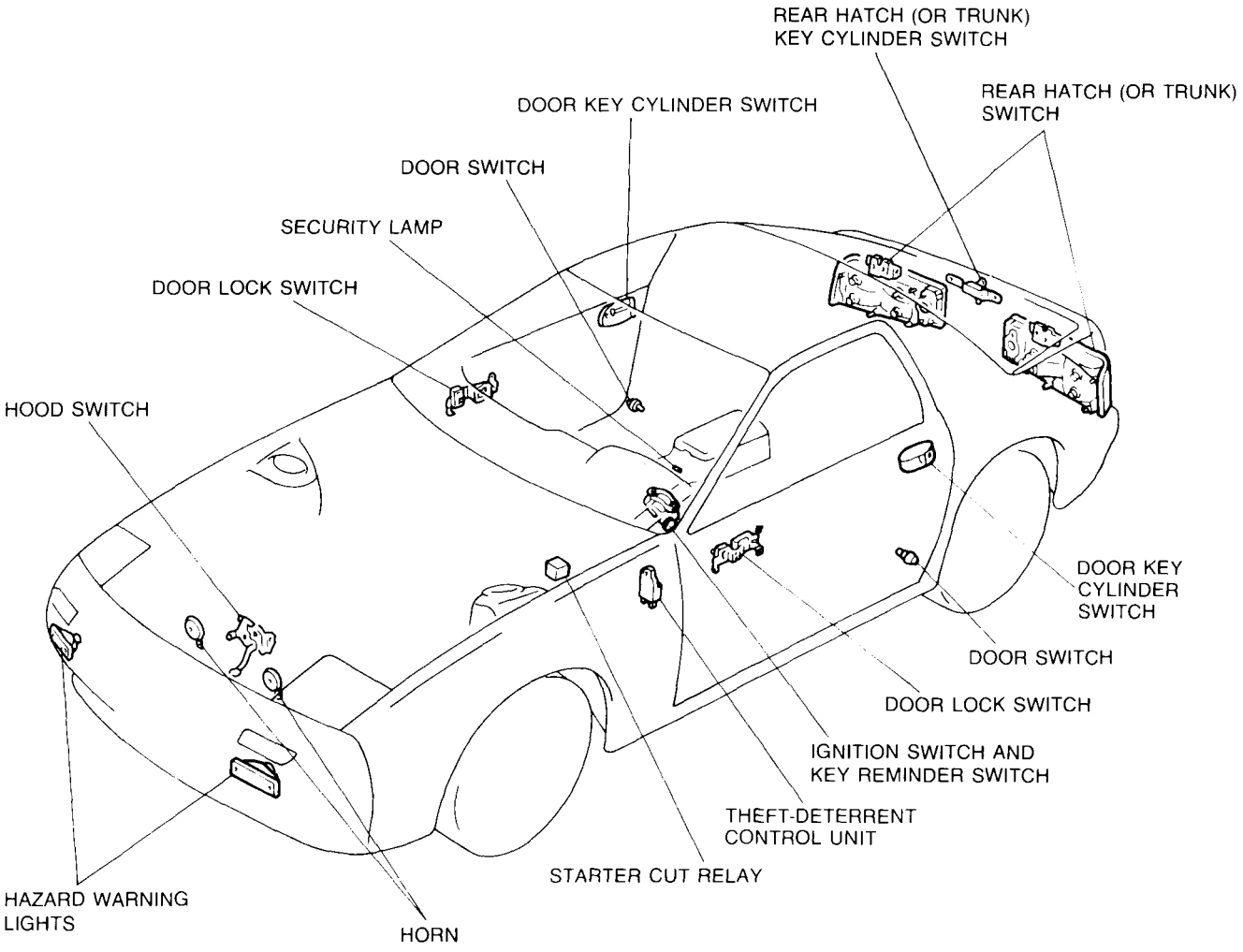
When the vehicle speed drops 8 km/h (5 mph) below the set speed, OD is canceled or prevented by the cruise control unit sending a signal to the EC-AT control unit for shift down.
After the vehicle speed returns to within 2 km/h (1.3 mph) of the set speed, and remains there for 20 seconds, OD again becomes available.

Note

- **If the vehicle speed drops 15 km/h (9.3 mph) below the set speed or the brake is depressed, cruise control operation is canceled by the cruise control unit.**

THEFT-DETERRENT SYSTEM



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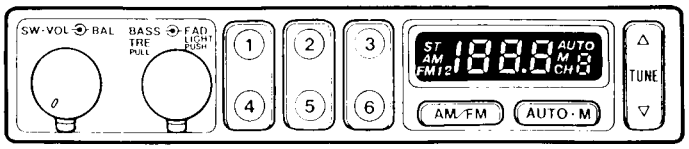
The theft-deterrent system is basically the same as the 1988 RX-7. The improved point on the system is that the control unit is built into the CPU.

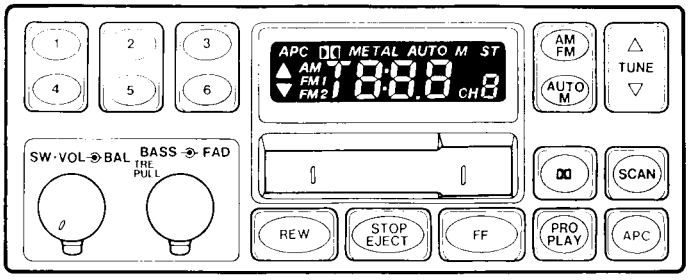
AUDIO SYSTEM

STRUCTURAL VIEW

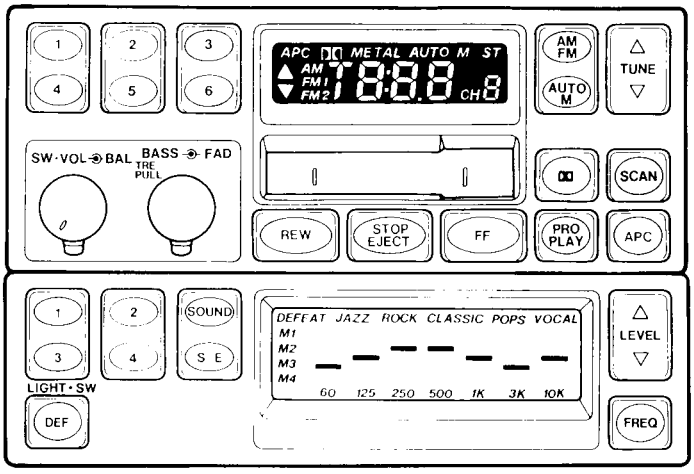
FOR COUPE
TYPE 1 (RADIO)



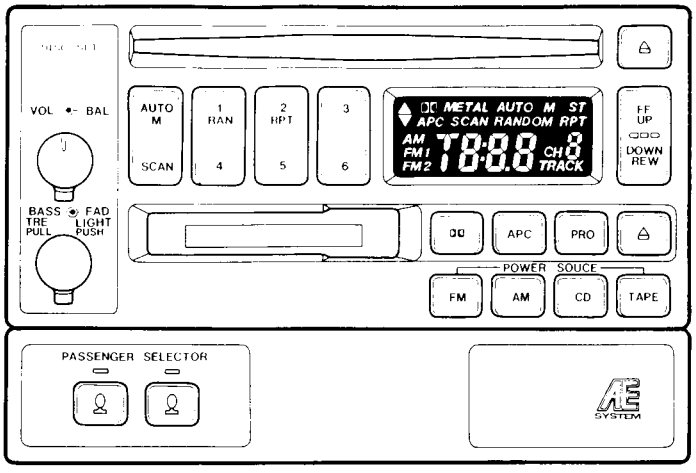
TYPE 2 (RADIO, CASSETE DECK)



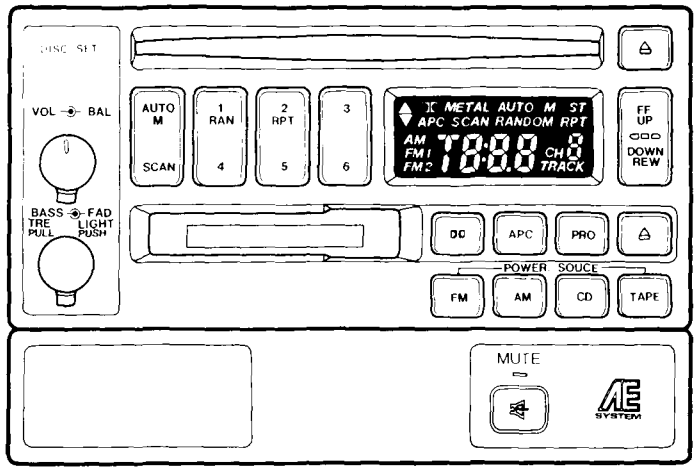
TYPE 3 (RADIO, CASSETE DECK + GRAPHIC EQUALIZER)



TYPE 4 (RADIO, CASSETE DECK, CD PLAYER + AE SYSTEM)

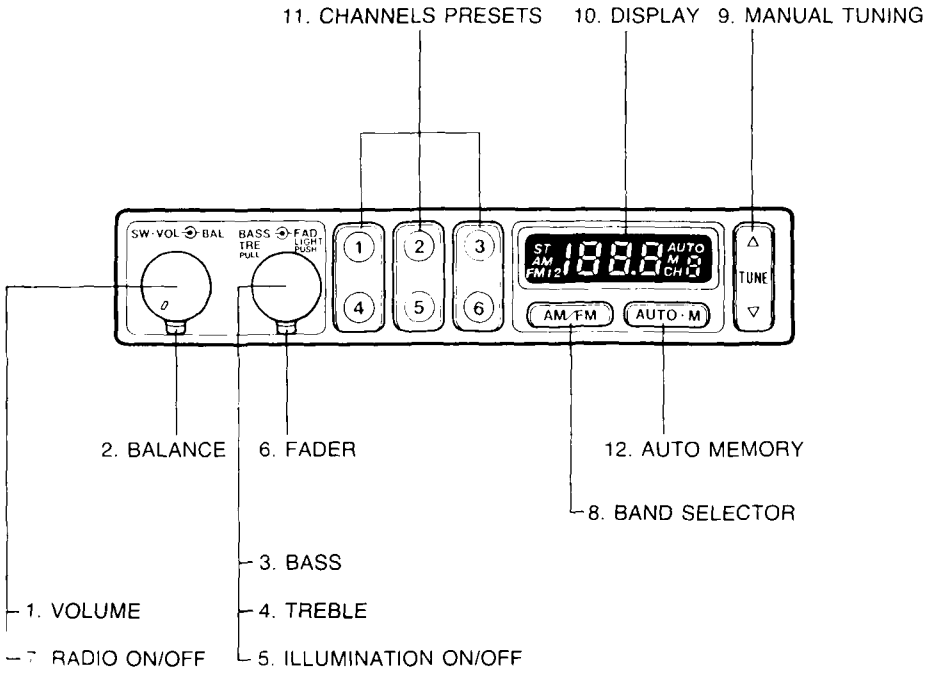


For Convertible
TYPE 1 (RADIO, CASSETE DECK, CD PLAYER + AE SYSTEM)

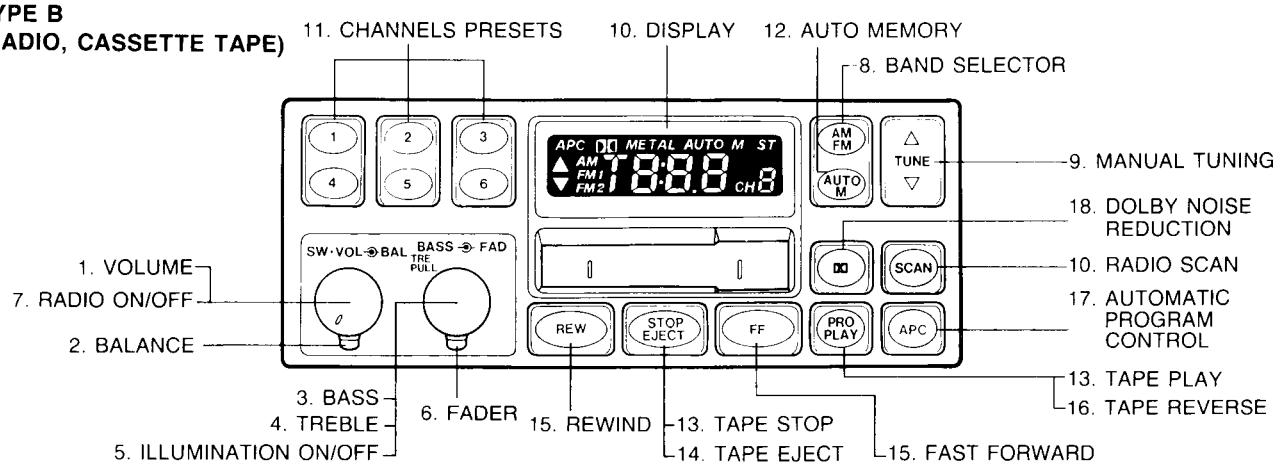


FUNCTION AND OPERATION

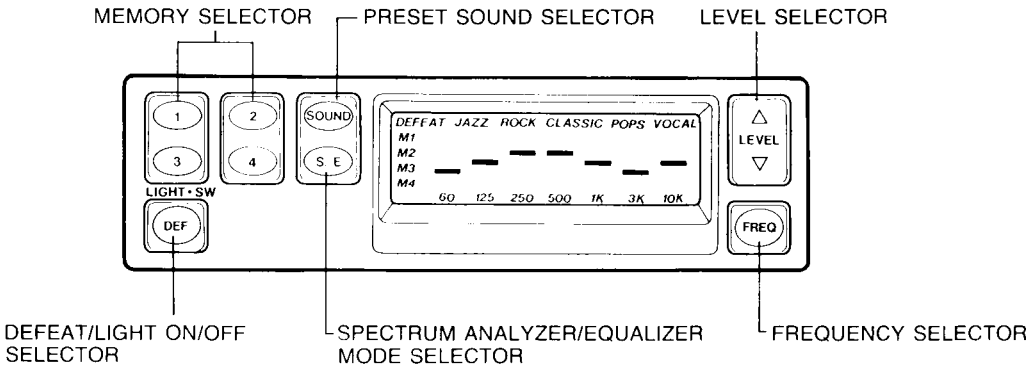
TYPE A (RADIO)



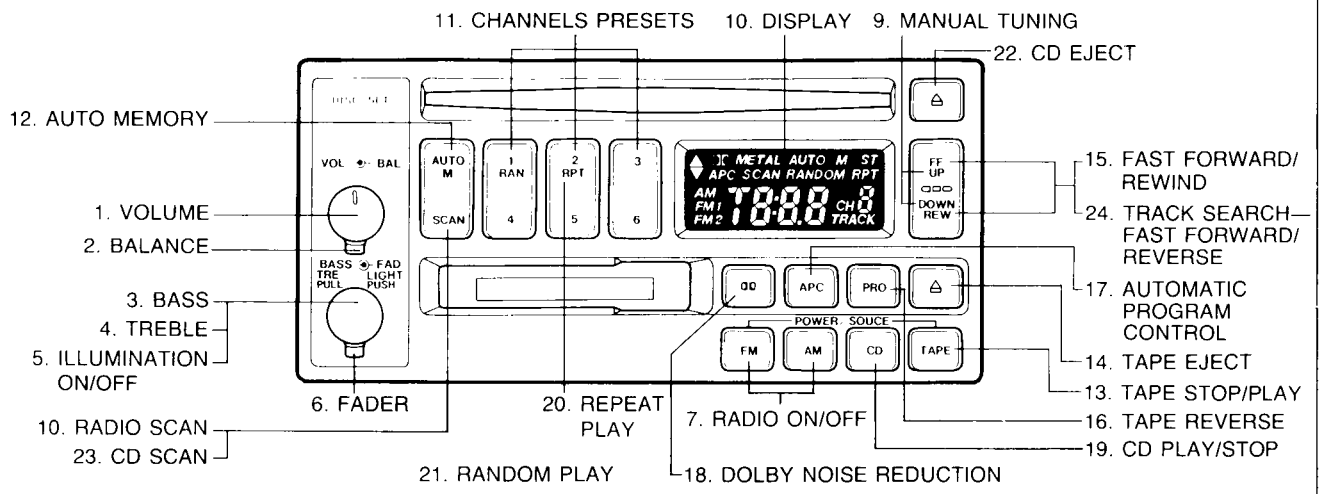
TYPE B (RADIO, CASSETTE TAPE)



GRAPHIC EQUALIZER



TYPE C (RADIO, CASSETTE TAPE, COMPACT DISC)



AE SYSTEM (PASSENGER SELECTOR SWITCHES)

AE SYSTEM (MUTE SWITCH)

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How to Handle Audio System

Radio

1. Volume

Turn the knob to adjust the volume.

2. Balance

This control adjusts the sound distribution between the right and left speakers. Turn it clockwise to shift the sound to the left speakers; counterclockwise to shift the sound to the right speakers.

3. Bass

This controls the lower tonal qualities. If your listening preference is for more lows, turn the control clockwise; for less lows, turn the control counterclockwise.

4. Treble

Pull and turn the knob to control the higher tonal qualities. If your listening preference is for more highs, turn the control clockwise; for less highs, turn the control counterclockwise.

(Convertible top model)

When the fader is set to the rear position, treble sound is not reproduced.

5. Illumination ON/OFF

Press the knob to cancel the unit's illumination except the graphic equalizer display. Press the knob again to restore illumination.

6. Fader

Turn the knob clockwise to gradually shift the stereo sound to the rear speakers; counterclockwise to shift it to the front.

(Convertible top models)

When the fader is set to the front position, the headrest speakers do not operate. Also, when the fader is set to the rear position, treble sound is not reproduced.

7. Radio ON/OFF

To operate the radio, turn the ignition switch to ACC or ON.

(Type A, Type B)

To select radio operation, press the knob (no need to eject tape), it will revert to the previously selected station and its frequency will be displayed. Press again to turn the radio OFF.

(Type C)

Press AM or FM to turn the radio on (no need to eject the tape/compact disc). Pressing AM alternately selects AM and unit OFF. Pressing FM alternately selects FM1, FM2, and unit OFF.

8. Band selector

(Except Type C)

Press AM/FM to choose either an AM or FM. Pressing AM/FM alternates AM, FM1, and FM2. The corresponding indicator will light.

9. Manual tuning

(Type A, Type B)

To manually tune a station, press △ for a higher frequency, and press ▽ for a lower frequency. Holding either switch down for more than one second and releasing will begin automatic seeking of the next receivable higher or lower frequency station.

(Type C)

To manually tune a station. Press UP for a higher frequency, and press DOWN for a lower frequency. Press and release the button to change frequencies in increments.

10. Radio scan

Press the SCAN to automatically sample strong stations, SCAN will be displayed. Scanning stops at each station for about five seconds (Type B); eight seconds (Type C). To hold a station, simply press SCAN again during this five seconds (Type B); eight seconds (Type C).

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11. Channel presets

The three channel preset buttons can be used to store, 6 AM and 12 FM stations. First select AM1, FM1, or FM2 by pressing the AM/FM (Type A, Type B) or AM or FM (Type C). AM, FM1, or FM2 will be displayed. Tune the desired station and depress one of the channel preset bottons. Hold the button until a beep is heard and sound returns. The channel number and station frequency will be displayed. The station is now held in memory. Repeat this operation for other stations and bands.

12. Auto memory

Press and hold AUTO M for about two seconds. The system will automatically scan and temporarily store the six strongest stations of the selected band in that area. After scanning is completed, the strongest station will be tuned and its frequency will be displayed.

Cassette tape

13. Tape PLAY/STOP

(Type B)

To stop tape play during playback without ejecting the tape, press STOP/EJECT. The tape will be in a pause mode. By pressing the PRO/PLAY button, tape play restarts. To listen to the tape directly from radio mode while the tape is inserted, press PRO/PLAY.

(Type C)

To stop tape play during playback without ejecting the tape, press TAPE. The tape will be in a pause mode. The unit will not shift to radio or compact disc mode. By pressing the button again, tape play restarts. To listen to the tape directly from radio or compact disc mode while the tape is inserted, press TAPE.

14. Tape eject

(Type B)

The tape can be ejected while in the pause mode by pressing STOP/EJECT.

(Type C)

The tape can be ejected at any time by pressing TAPE EJECT.

15. Fast forward/Rewind

(Type B)

Press FF or REW to operate. The tape direction indicator will flash while the tape is in fast forward or rewind. To stop this operation, press STOP/EJECT.

(Type C)

Press FF or REW to operate. The tape direction indicator will flash while the tape is in fast forward or rewind. To stop this operation, press again.

16. Tape reverse

To change tape play direction, press PRO/PLAY (Type B) or PRO (Type C). When the upper triangle (▲) in the display is lit, the top side of the tape is being played. When lower triangle (▼) is lit, the bottom side of the tape is being played.

17. Automatic program control

When APC is on, after 15 seconds blank space is detected, the player automatically advances the tape to the next selection.

18. Dolby noise reduction

When using a tape encoded with Dolby NR*, press the Dolby button. To play a normal tape, push the button once again.

Compact disc

19. CD PLAY/STOP

To stop CD play during playback without ejecting the disc, press CD. The compact disc will be in a pause mode. By pressing the button again, CD play restarts from the point at which it was stopped. To listen to the compact disc directly from radio or tape mode while the disc is inserted, press CD.

20. Repeat play

Press RPT during play of the selection to be repeated. RPT will be displayed. The current selection is repeated until RPT is again pressed.

21. Random play

Press RAN to operate random play during play. The current selection will continue to play, and from the next selection play will be randomly selected. RANDOM will be displayed. Press RAN once again to cancel random play operation.

22. CD eject

The compact disc can be ejected at any time by pressing CD EJECT.

23. Scan

Press SCAN during play start scan operation. SCAN will be displayed. To cancel scan operation, press SCAN again. If the unit is left in the scan function, normal play will resume when the beginning of the selection from which scan was initiated is reached.

24. Track search-fast forward/Reverse

Press FF/REW lightly to search for a specific selection (track number). Each press of the FF icreases the track number. Track number will be displayed. Pressing REW decreases the number. Holding the button pressed will cause the program to change at high speed. The sound will be audible at a reduced loudness level.

Graghic equalizer

1. Spectrum analizer/equalizer mode selector

Spectrum analyzer mode

Pressing the button to the spectrum analyzer mode enables the user to see the frequency band output of the music being listened to in this mode selected.

Equalizer mode

Pressing the button to the equalizer mode enables the user to see the selected adjustment level of the various frequency ranges in this mode selected.

2. Preset Sound Selector.

Pressing the button to the preset sound mode allows the user to select the output characteristics for the type of music being played. There are five selections that fit the average listener's expectations.

SETTING	CHARACTERISTICS
JAZZ	Extended high range and emphasized transient response
ROCK	Characteristics adapted to high speed, intense sonic changes
CLASSIS	Balanced response for different instruments together with a sense of scale and impact of a large performance hall
POPS	Slight echo for emotional response in vocals
VOCAL	Vocals reproduced with maximum fidelity

3. Defeat/Light ON-OFF selector

To control operation of the graphic equalizer, press this button to select defeat mode ON or OFF. Defeat is shown in the equalizer display when selected. Hold the button for about two seconds to select ON or OFF of the graphic equalizer display.

4. Manual adjustment of frequency bands

1. Press the Frequency Selector to change the unit to the manual adjustment mode irregardless of the previous mode selected.
2. Select the band to be set. Each subsequent press of the button selects band from 60 to 10K. The indicator bar of the band selected will flash for about 30 seconds.
3. Adjust the output level of the selected band up or down by pressing the Level Selector within 30 seconds.

5. Setting memory

Four adjustable memory selections are available to set for recall manually adjusted frequency renge output patterns. These can be used in addition to the preset ranges.

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Passenger Selector Switches
These switches are used to make corrections in the sound's characteristics and its location within the automobile according to the number of passengers.

1. **Passenger selector switch (driver side)**
   This switch should be switched ON to adapt the sound's location to the driver. (The indicator will light.)

2. **Passenger selector switch (passenger side)**
   This switch should be switched ON to adapt the sound's location to the passenger. (The indicator will light.) When both switches are switched either OFF or ON, the sound is located at the center of the interior.

Mute Switch
Press MUTE to quickly reduce the volume when listening to either the radio or a cassette tape. When MUTE is pressed again, the volume automatically returns to the previous level. The MUTE indicator lights during mute operation.

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THE
MAZDA
WAY

AN INTENSE
COMMITMENT
TO TOTAL
CUSTOMER
SATISFACTION

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