ENGINE

57G01X-501

OUTLINE

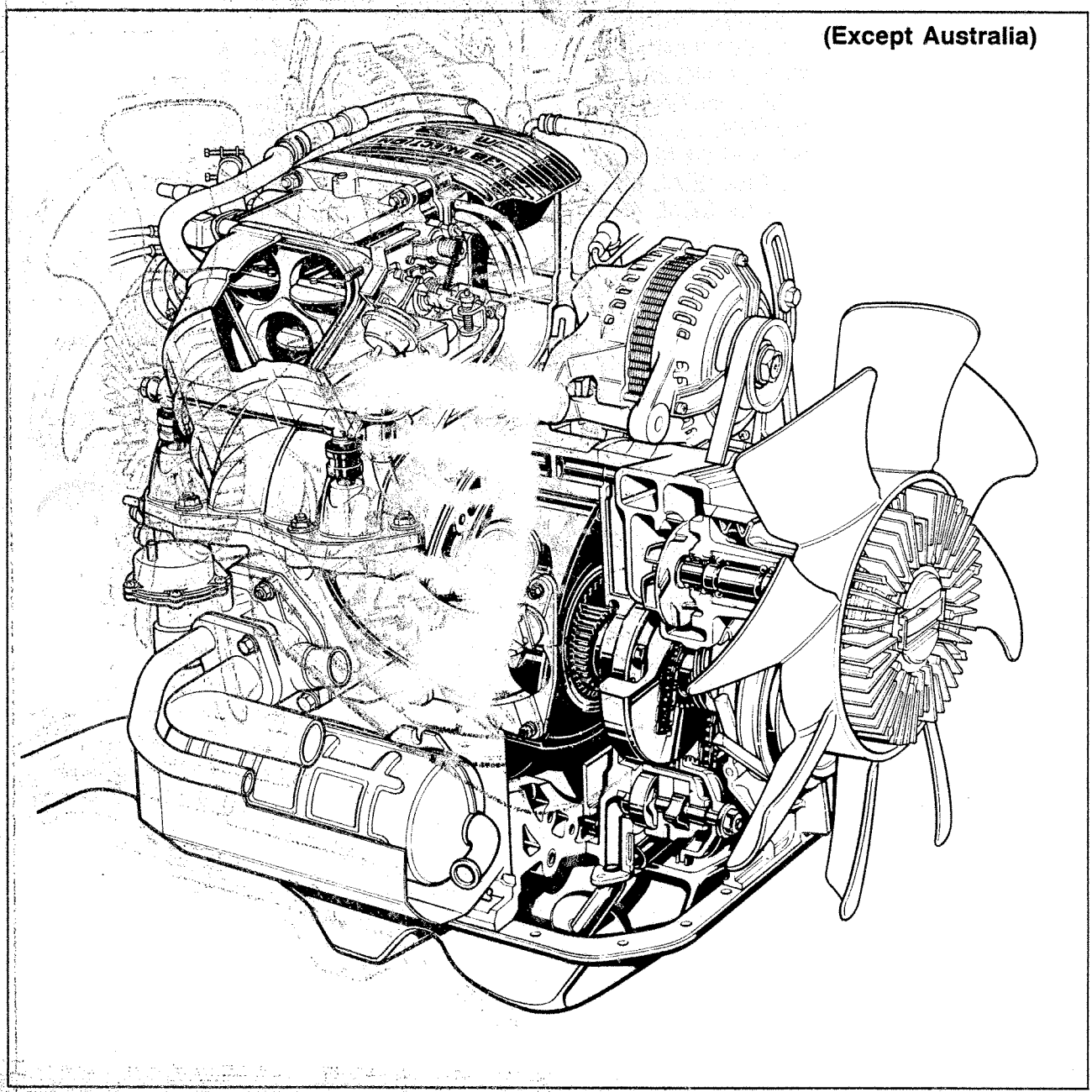
OUTLINE OF CONSTRUCTION

The 13B EGI rotary engine used in the new model was designed for higher output and greater reliability.

Major changes

1. Rotor seals: the apex seal is a 3-piece type with 2 springs. And the width of the apex seal and side seal has been reduced.
2. Sealing rubber groove: provided on side housing.
3. Rotor housing: backing material strengthened.
4. Rotor: lightweight, increased number of spring pins for internal gears.
5. Coolant passages in engine: narrowed, reducing volume of coolant within engine.
6. Eccentric shaft bypass valve: reduces oil discharge when engine is cold.

STRUCTURAL VIEW



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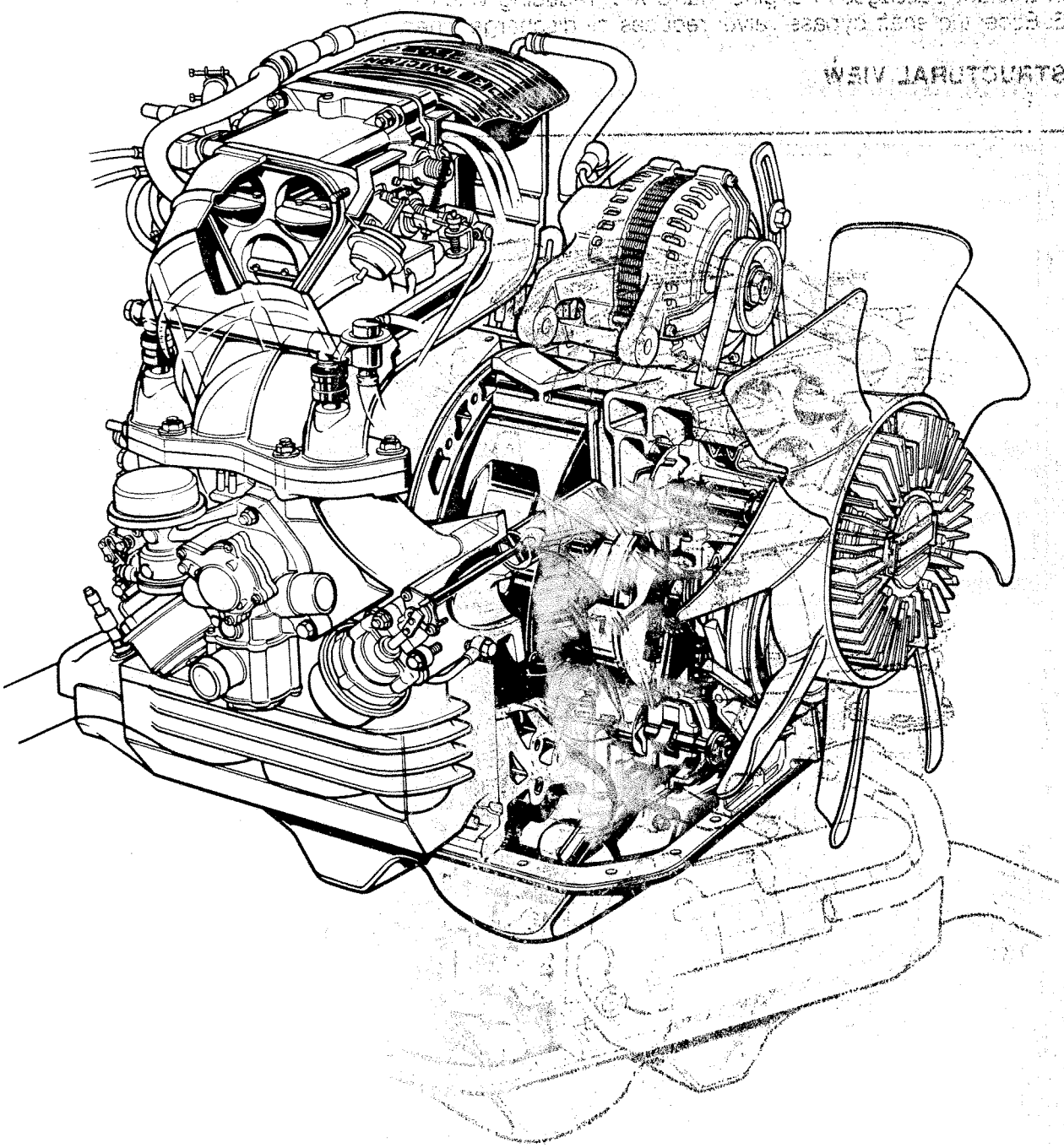
(Australia)



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SPECIFICATIONS

Item \ Model				New model	Previous model
Engine type				13B Rotary engine	12A Rotary engine
Displacement cc (cu in)				654 x 2 (40.0 x 2)	573 x 2 (35.0 x 2)
Number of cylinders and arrangement				2 rotors, longitudinal	
Combustion chamber type				Bath tub	
Compression ratio				9.4 : 1	
Port timing	Intake	Open	Primary	32° ATDC	32° ATDC
			Secondary	32° ATDC	
			Auxiliary	45° ATDC	—
		Close	Primary	40° ABDC	50° ABDC (ECE, Switzerland)
			Secondary	30° ABDC	38° ABDC (Middle East, Gen.L.H.D)
			Auxiliary	80° ABDC	—
	Exhaust	Open		75° BBDC	
		Close		48° ATDC	48.5° ATDC (ECE, Switzerland) 38° ATDC (Middle East, Gen.L.H.D)
Fuel supply system				EGI (Electronic gasoline injection)	Carburetor
Ignition timing			Trailing	20° ATDC (Red mark)	
			Leading	5° ATDC (Yellow mark)	
Idle speed rpm				750	

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INTERCHANGEABILITY OF MAJOR COMPONENTS

The following components are not interchangeable with the previous model.

Parts		Major changes
Housing related parts	Front rotor housing Rear rotor housing	1. Strengthened backing material for trochoid surface. 2. Change of plating material of trochoid surface 3. Narrower coolant passages (Australia only) 4. Sealing rubber groove moved to side housing 5. Change of exhaust port insert design 6. Opening timing of exhaust port 7. Position of leading spark plug (Australia only) 8. Addition of housing oil nozzle
	Front housing Intermediate housing Rear housing	1. Narrower coolant passages 2. Addition of grooves for sealing rubbers 3. Addition of auxiliary port (Front housing, Rear housing) 4. Position of oil pump mounting bolt (Front housing) 5. Repositioned engine mount (Intermediate housing)
	Inner sealing rubber Outer sealing rubber	Cross-section shape changed
	Front cover	Shape changed to conform to vehicle mounting
	Oil pan	Shape changed to conform to vehicle mounting
	Tension bolt	Reduced diameter of lower part of seat (Australia only)
Rotating related parts	Eccentric shaft	1. Change of oil passage within shaft 2. Addition of eccentric shaft bypass valve
	Rotor	1. Weight reduction 2. Increased number of spring pins for internal gear 3. Narrower width of groove for apex seals and side seals 4. Chromium plating of apex seal groove (Except Australia)
	Apex seal and spring	1. Thickness reduced 2. Three-piece type 3. Two springs
	Side seal and spring	Thickness reduced
	Corner seal	Reduced width of groove for apex seal
	Balance weight	Light weight
	Oil pump drive sprocket	Number of teeth
	Eccentric shaft pulley	Change of shape
	Eccentric shaft bypass valve	Newly added
	Pulley lock bolt	1. "O"ring added 2. Addition of hole for eccentric shaft bypass valve
	Flywheel (M/T)	Weight reduction
	Counter weight (A/T)	Weight reduction

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Parts		Major changes
Lubricating related parts	Oil strainer	Change of shape
	Oil pump	Change of discharge characteristics
	Oil pump sprocket	Change of number of teeth
	Oil pump drive chain	Change of number of links
	Metering oil pump	Increased number of oil discharge place
	Metering oil nozzle	Newly added
Cooling related parts	Cooling fan	Change of air volume
	Fan drive	Change of characteristics
	Water pump	Body weight reduced
	Water seal	Change to one-piece seal
	Thermostat	1. Rubber seat added 2. Frame material changed 3. Adhesived to thermostat cover (Middle East only)
	Thermostat cover	Coolant filler cap added

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The following components are interchangeable with the previous model.

- Front stationary gear
- Rear stationary gear
- Eccentric shaft main bearing
- Rotor bearing
- Eccentric shaft needle bearing
- Thrust washer
- Thrust plate
- Tubular dowel pin
- Distributor drive gear
- Rotor oil seal
- Rotor oil seal "O" ring
- Front oil seal
- Rear oil seal
- Rear stationary gear "O" ring
- Pilot bearing

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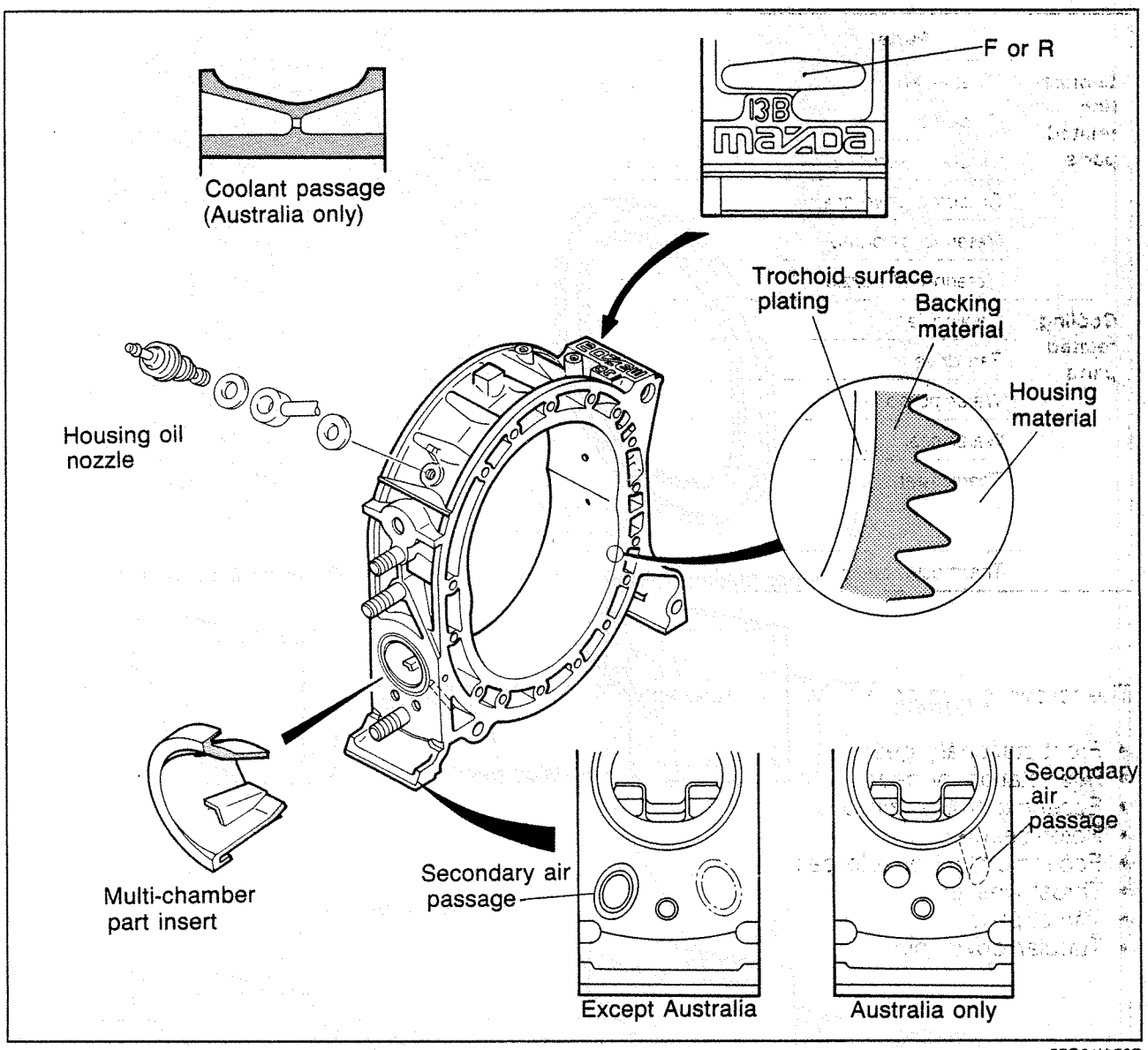
ROTOR HOUSING



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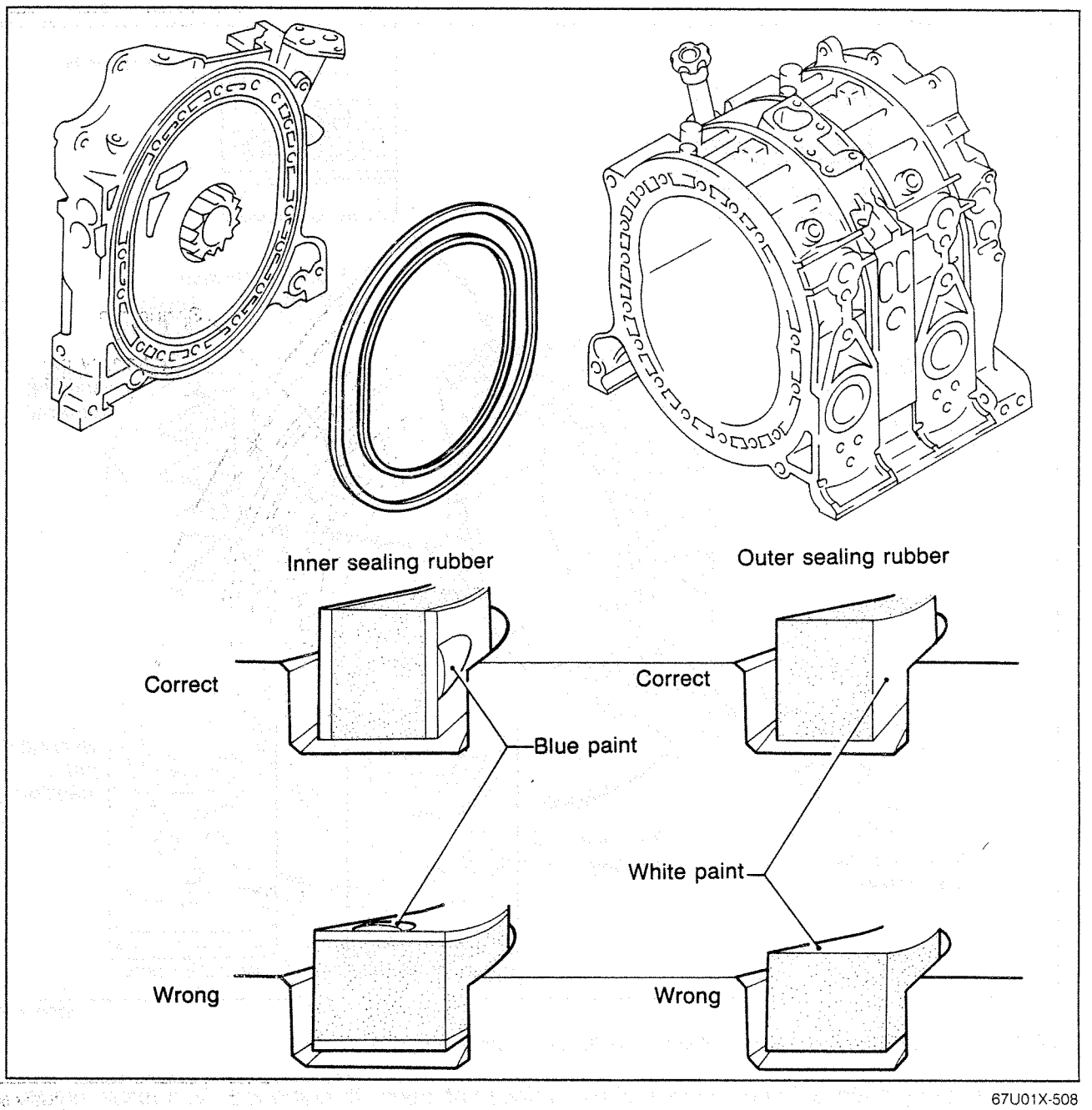
Changes of shape and specifications are as described below.

1. The backing material beneath the trochoid surface has been strengthened. As a result, rigidity of the trochoid surface has been increased as well as the strength of the rotor housing itself.
2. The plating of the trochoid surface has been changed from chromium plating to chromium-molybdenum plating for inproved wear resistance.
   Manner of the plating is the microchannel-porous plating same as before.
3. The exhaust port insert has been changed to a multi-chamber insert. (Refer to page 4—18.)
4. A sealing rubber groove has been moved from the rotor housing to the side housing. (Refer to page 1—8.)
5. The metering oil nozzle has been positioned. (Refer to page 2—5.)
6. The width of the coolant passages have been narrowed. (Australia only—Refer to page 3—5.)

Note that front and rear rotor housings are not interchangeable due to the different position of the air passage in relation to the exhaust port. For easy identification, the letter "F"(front) or "R"(rear) is stamped above the MAZDA mark.

SEALING RUBBER



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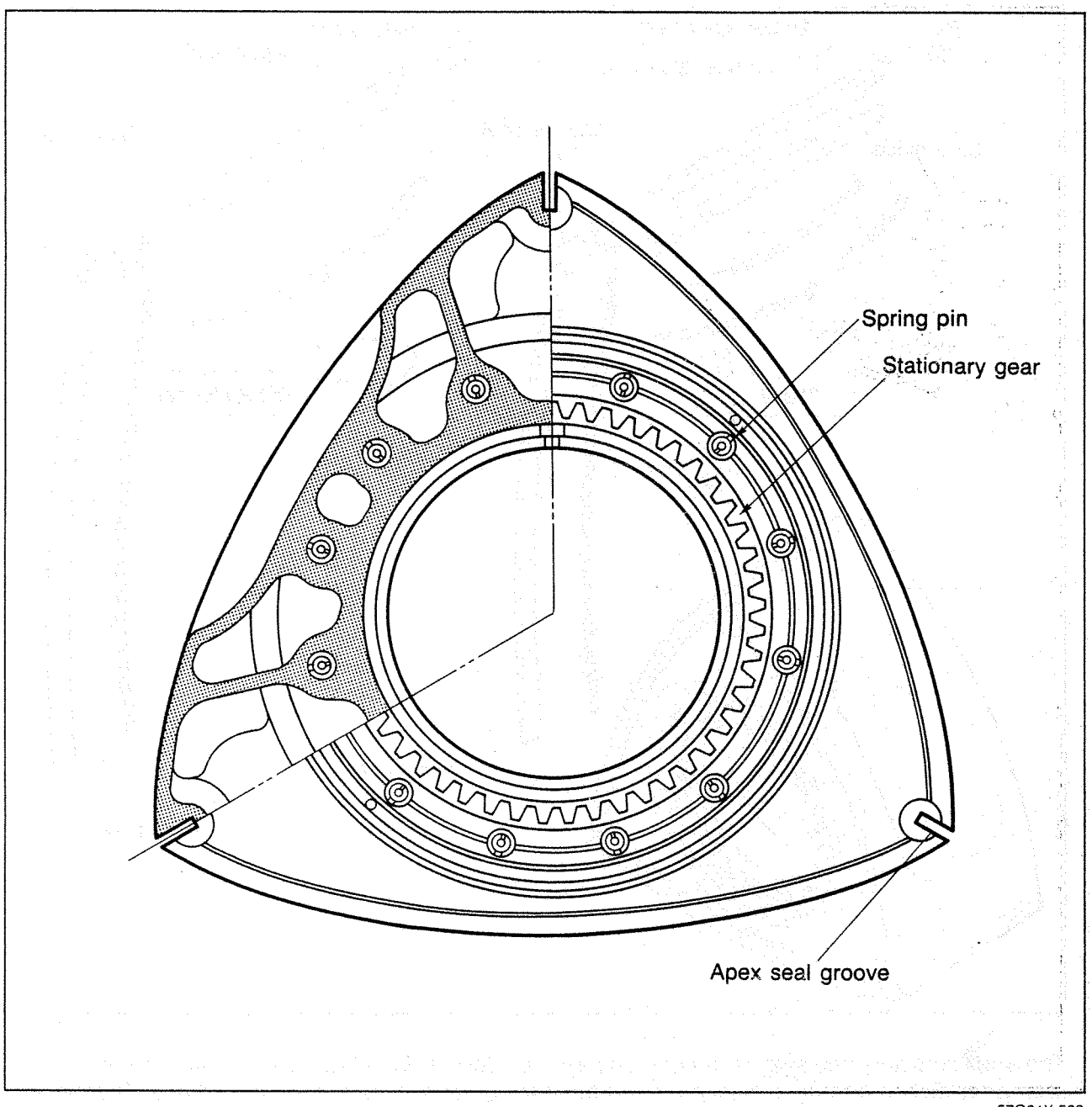
Grooves for the housing sealing rubbers have been repositioned from the rotor housings to the side housings. This increases seal life as the side housing temperatures are lower than those of the rotor housings.

The cross-sectional shape of both the inner and outer sealing rubbers has been changed. Therefore, these rubbers are not interchangeable with sealing rubbers used on earlier engines.
Care should be taken when installing the seals to ensure that they are postioned correctly (as shown in the illustration).

Installation identification marks:
Inner: blue paint at outer circumference
Outer: white paint at inner/outer circumference

ROTOR



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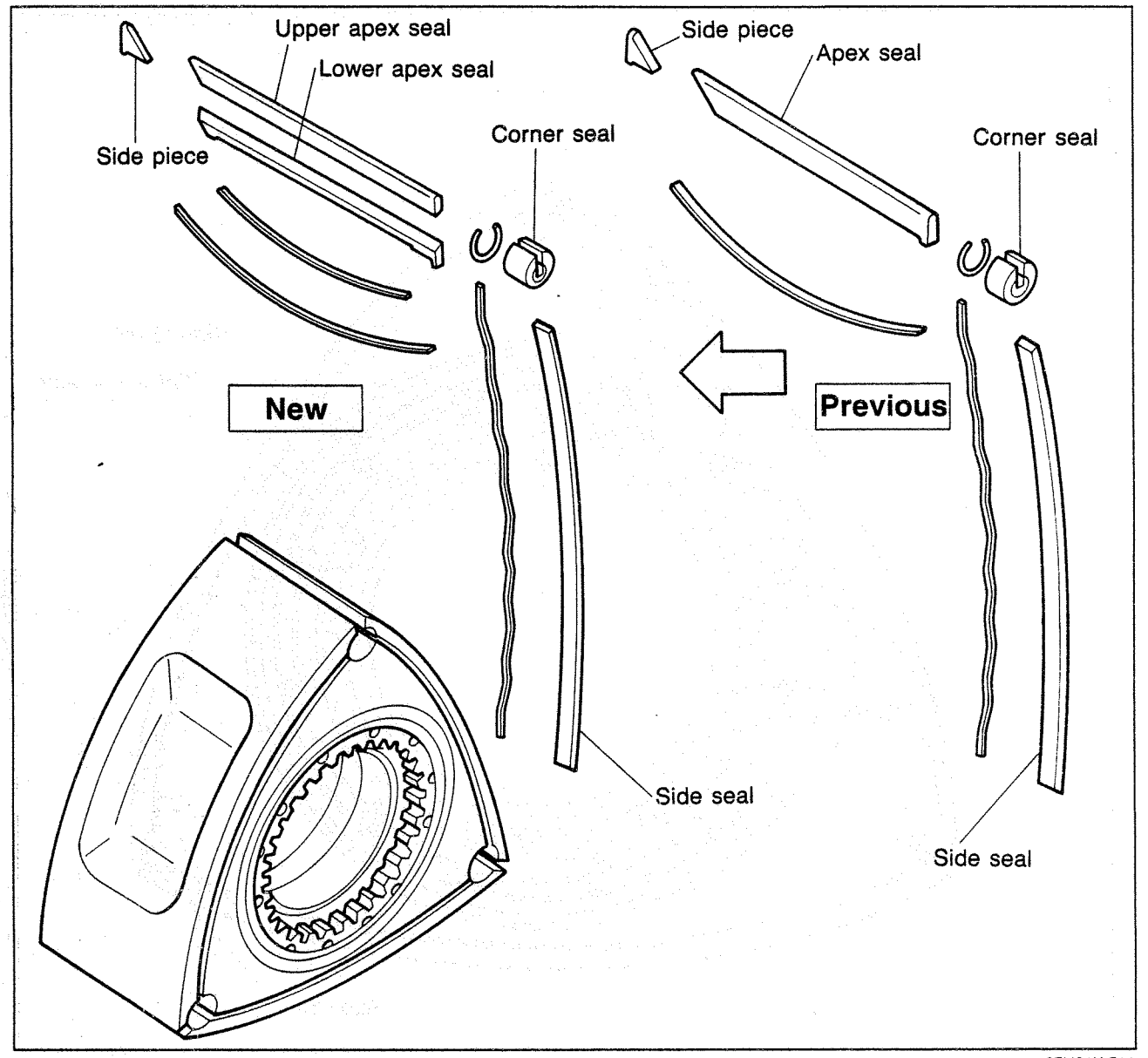
1. The weight of the rotor has been reduced by reducing the thickness of the ribs inside the rotor. As a result of this change, the rotation response of the engine has been improved.
2. The number of spring pins has been increased from 9 to 12, thus improving the load-resistance capacity of the internal gear.
3. Chromium plating has been applied to the apex seal groove to reduce groove detarioration (Except Australia).

Note
The front and rear rotors are interchangeable.

ROTOR SEALS



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The apex seal and side seal have been changed as described below. These changes have reduced sliding resistance and have also improved the tracing capacity of the sliding surface. Therefore, the gas sealing performance has been greatly improved.

Apex seal and spring:

1. The apex seal has been divided into two parts, the upper and lower.
2. The width has been changed from 3 mm (0.118 in) to 2 mm (0.079 in).
3. There has been a change to two springs.

Side seal and spring:

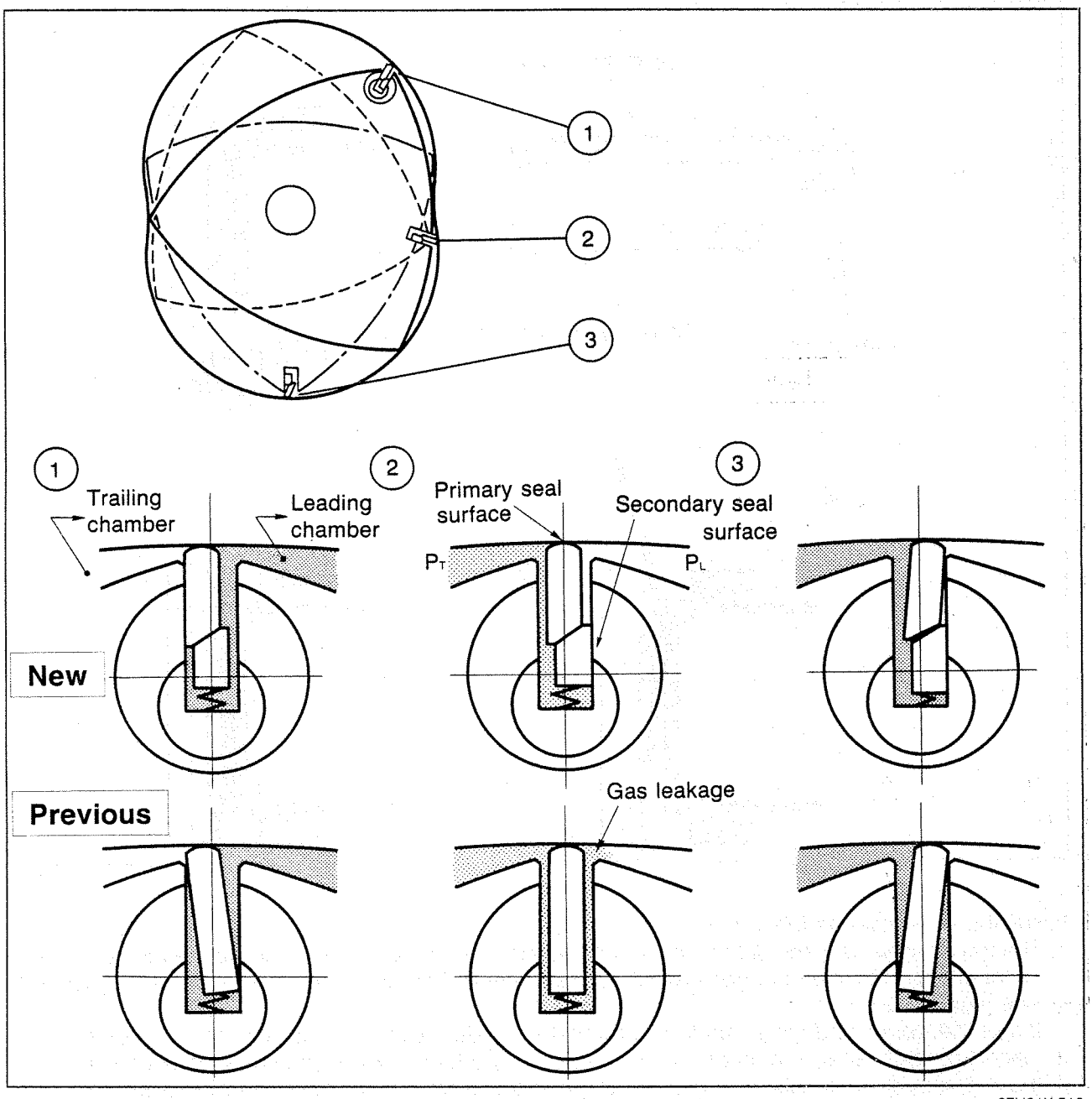
The width has been changed from 1 mm (0.039 in) to 0.7 mm (0.028 in).

Corner seal and spring:

The width of the groove of the apex seal has been reduced.

The width of the rotor side seal grooves and apex seal grooves has also been reduced.

APEX SEAL MECHANISM



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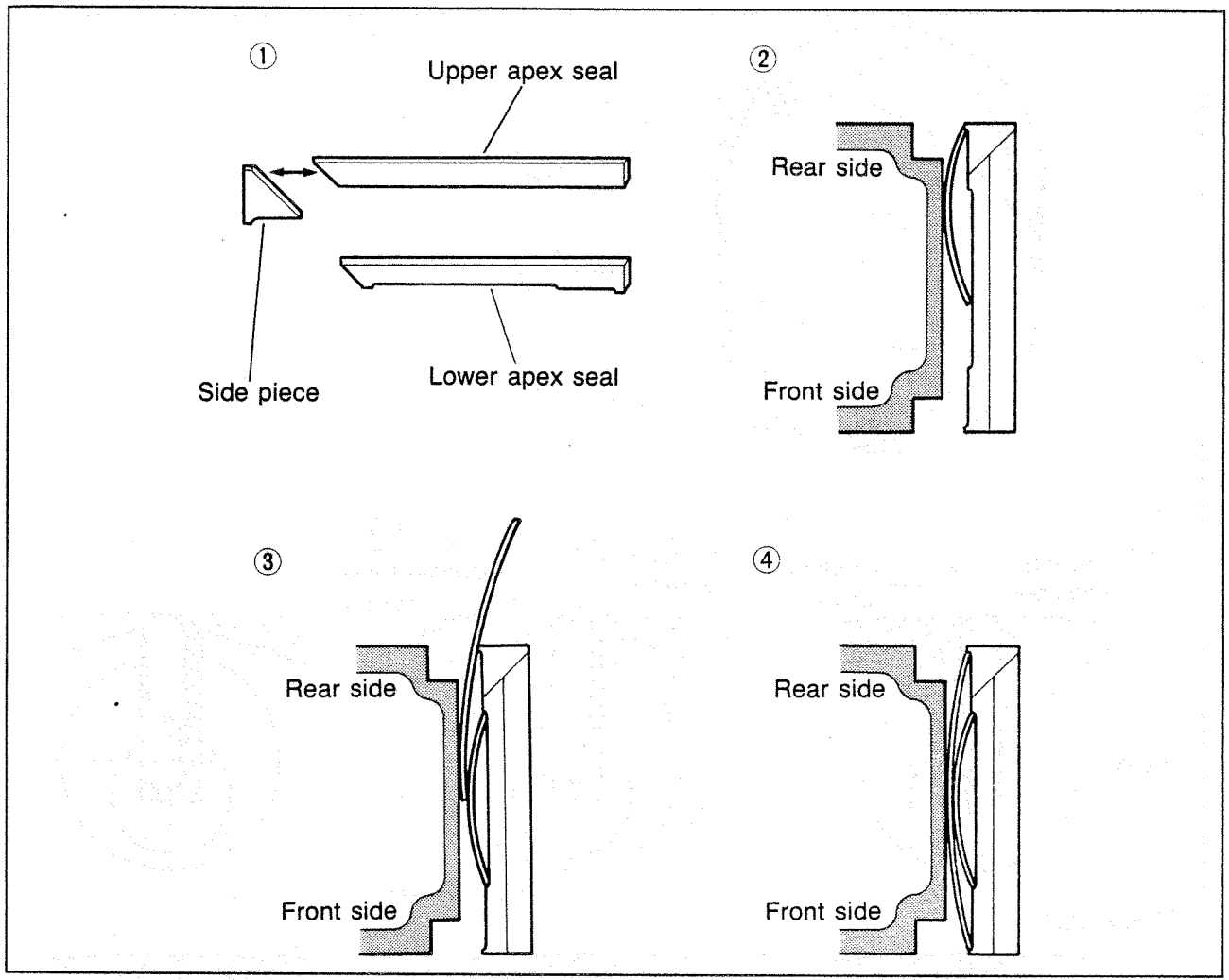
The apex seal has been divided to provide better sealing for both the leading combustion chamber and trailing combustion chamber. This seal moves within the apex seal groove in accordance with fluctuations of combustion chamber pressure.
With the former apex seal arrangement, when the pressure (P_L) of the leading combustion chamber and the pressure (P_T) of the trailing combustion chamber were in equilibrium, primary sealing (the sealing of the upper part of the apex seal and the trochoid surface) was made. However, secondary sealing (within the groove of the apex seal) was insufficient. Therefore, by dividing the apex seal into upper and lower, the severed surface is tilted so that the second piece moves quickly to make the secondary sealing. (See figure above.)

APEX SEAL ASSEMBLY



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Install the apex seal as follows:

1. The upper apex seal and side piece should be adhered, by using an anaerobic bonding adhesive, so that the surfaces and edges are flat. Use a cutter or similar tool to remove any excessive adhesive which protrudes.
   Install the upper and lower apex seal so that the side piece is at the rear of the engine.
2. Insert the short apex seal spring until it is just in the long spring groove, as in the illustration.
3. Insert the long apex seal spring so as to push the short spring, as in the illustration.
4. Completely insert the long apex seal spring.
   If about 4 ~ 12 mm (0.16 ~ 0.47 in) remains uninserted, this is because it is caught in the short spring groove. If this happens, pull the long spring out and try once again.

Caution:

a. The adhesive should be such that a temperature of about 200°C (390°F) dissolves the bond.

b. The apex seal should be inserted so that the side piece is toward the rear of the engine. If the seal is the reversed, gas sealing will be insufficient because the apex seal surface tilt would be backwards.

c. After installation of the intermediate housing and rear housing, check that the end of the side piece does not protrude into the clearance between the housings. This condition could occur if the side piece was not adequately bonded to the apex seal. The result could be damage to the housing if not corrected prior to installation.