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1.1L ROTARY
Article Text
1983 Mazda RX7
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Sunday, August 26, 2001 04:57PM

ARTICLE BEGINNING

1983 ENGINES
Mazda 1.1L Rotary

RX7

ENGINE CODING

ENGINE IDENTIFICATION

Engine identification number is stamped on front engine housing behind the distributor.

ENGINE IDENTIFICATION CODES TABLE

Application	Engine Code
RX7	
1.1L Rotary Engine	12A

ENGINE

REMOVAL & INSTALLATION

Removal
1) Remove hood and disconnect battery ground cable. Drain engine oil and coolant. Remove engine under cover.
2) Disconnect following electrical wires: Primary and secondary ignition wires at coils, pick-up coil wiring connections, condenser lead, oil level sensor lead, temperature sensor and oil thermo sensor (except California vehicles).

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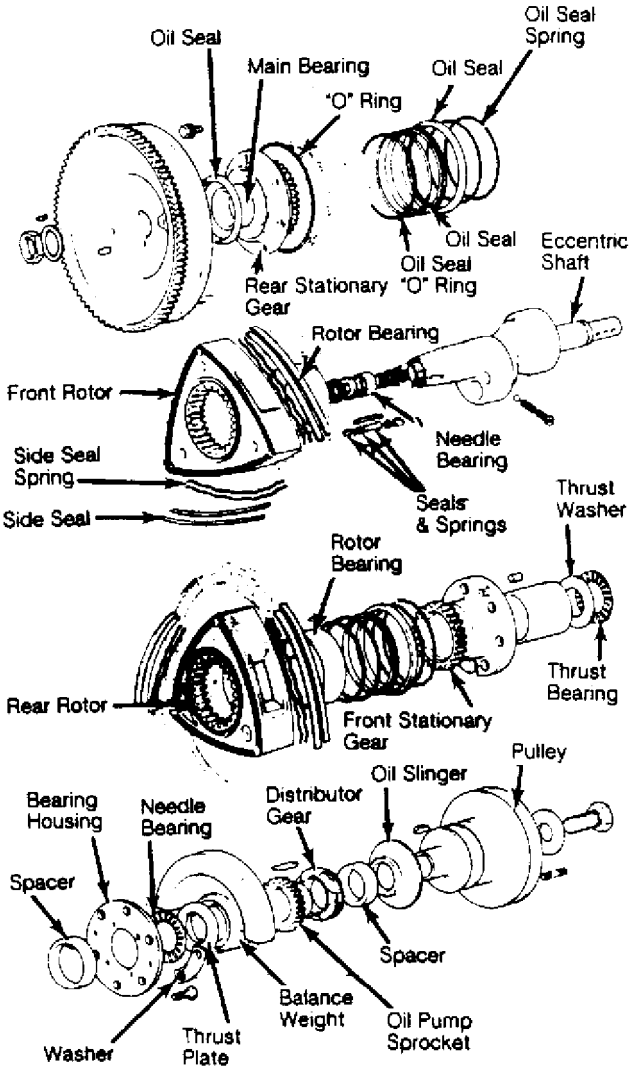

Fig. 1: Exploded View of Rotors & Eccentric Shaft Assembly

3) Remove air cleaner assembly. Disconnect the following tubes and hoses: Oil hoses at cooler, radiator hoses, automatic transmission cooler lines (if equipped), heater hoses, fuel supply and return lines, vacuum and evaporative hoses, and air pipe at rear of intake manifold.

4) Remove cooling fan and drive assembly, radiator, and radiator shroud assembly. Disconnect connector and "B" terminal wire from alternator. Disconnect connector from throttle sensor.

5) Without disconnecting refrigerant lines, remove compressor and air conditioning condenser (if equipped) and tie out of the way.

6) Disconnect choke heater connector. Disconnect accelerator, choke and hot start assist cables. Disconnect any remaining wires, tubes or linkages between engine and chassis at top of engine. Remove upper engine-to-transmission bolts.

7) Raise and support vehicle. Remove starter. Remove lower engine-to-transmission bolts. Remove exhaust pipe front cover. Remove

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nuts and bolts, and disconnect exhaust pipe from exhaust manifold. Support front catalytic converter.

8) Support front of transmission with jack and remove left and right engine mount nuts. Attach sling to engine and take up slack. Pull engine forward to clear clutch shaft, then lift engine from vehicle.

Installation

To install engine, reverse removal procedure ensuring that linkages, tubes and electrical connections are restored in original position. Refill all fluids to specified levels, warm up engine and check for leaks.

DISASSEMBLY

NOTE: To ease engine disassembly, manufacturer recommends use of special engine stand (49 0107 680A) and hanger (49 1114 005).

1) Loosen drive belts and hoses, and remove air pump and alternator. Disconnect metering oil pump connecting rod and hoses at metering oil pump outlets. Remove exhaust manifold cover. Remove intake manifold and carburetor. Remove gasket and "O" ring.

2) Remove exhaust manifold, engine mount and distributor . Remove, oil filter and cover from front housing. Remove water pump and drive pulley for air conditioning compressor (if equipped).

3) Turn engine over, and remove oil pan and strainer. Install flywheel brake (49 1881 060) on manual transmission models or stopper (49 1881 055) on automatic transmission models.

4) Remove eccentric shaft pulley. Take off front cover with gasket, and slide distributor gear off shaft. Remove "O" ring from oil passage. Remove oil pump sprocket nut. See Fig. 2. Slide oil pump sprocket, eccentric shaft sprocket and drive chain off together. Remove oil pump.

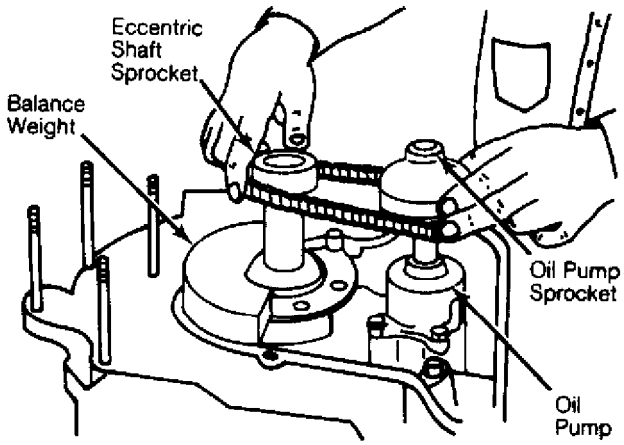

Fig. 2: Oil Pump Drive and Sprocket Removal
Pump drive and sprocket must be removed together.

5) Remove balance weight and following parts in order: Thrust

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washer, needle bearing, bearing housing, needle bearing, spacer and thrust plate.

6) On manual transmission models, remove clutch assembly. Use puller to remove flywheel. On automatic transmission models, remove drive plate. Use puller to remove counterweight.

7) Remove tension bolts on rear housing in sequence. See Fig. 3. Loosen in 2 or 3 steps. Lift rear housing off shaft. Remove any seals stuck to rotor sliding surface, and place them back in original positions. Remove seals and "O" rings from face of rear rotor housing.

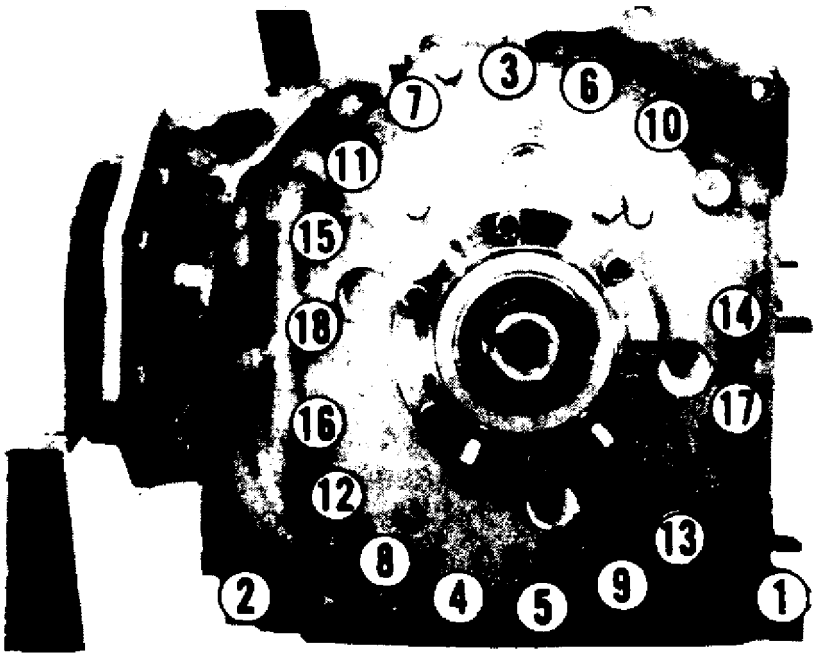

Fig. 3: Loosening Sequence of Tension Bolts
Loosen in 2 or 3 steps.

8) Attach dowel puller (49 0813 215A), and pull tubular dowels off rear rotor housing. See Fig. 4. Hold rotor housing by hand to keep it from moving up, and remove rear rotor housing. Use caution to avoid dropping apex seals and side pieces of rear rotor. Remove seals and "O" ring from front side of rear rotor housing.

9) Remove side pieces, apex seals and springs from rear rotor and store in order for reassembly. Remove all corner seals, corner seal springs, side seals and side seal springs and store in order for reassembly. Remove rear rotor, and place on clean pad with internal gear side down.

10) Remove seals and springs on remaining side of rotor, and store in order for reassembly. Place protector on seal inner lip, and remove outer seal with remover (49 0813 225). Remove inner seal. Remove seals and springs and store in order for reassembly. Mark rear rotor for assembly identification.

11) Attach puller, and while holding housing down, pull tubular dowels off intermediate housing. Remove intermediate housing

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by sliding beyond rear rotor journal on eccentric shaft. Carefully lift out eccentric shaft to avoid damage to rotor bearing and main bearing. Repeat steps 6) through 8) to remove front rotor housing and rotor assembly.

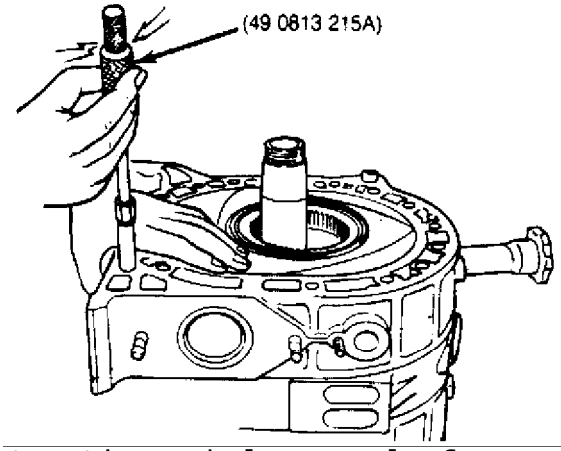

Fig. 4: Extracting Tubular Dowels from Engine
Hold housing down with hand.

INSPECTION & OVERHAUL

Front, Intermediate & Rear Housings

1) Clean housings, using extra fine emery paper to remove carbon deposits from rotor running surface. Use ketone or thinner to remove sealing agent.

2) Place a straightedge across housing surface in positions shown in Fig. 5. Using a feeler gauge, measure distortion of front housing. Replace housing if distortion limit of .0016" (.04 mm) is exceeded.

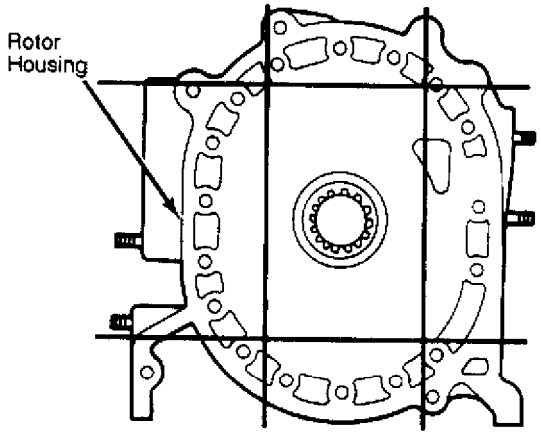

Fig. 5: Straightedge Positions for Checking Housing Distortions
Replace if warpage exceeds limit.

3) Remove oil pressure control valve and spring from front cover. Check for damage or corrosion. Replace if defective. Measure

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control valve spring free length. Free length must be 2.74" (69.6 mm).

NOTE: Cap bolt and valve spring for 1983 models are painted yellow. Never use a control valve spring from a 1982 or earlier year in 1983 models.

4) Check for stepped wear on rotor sliding surfaces of the 3 housings . Measurements are made using a dial indicator and gauge body. See Fig. 6.

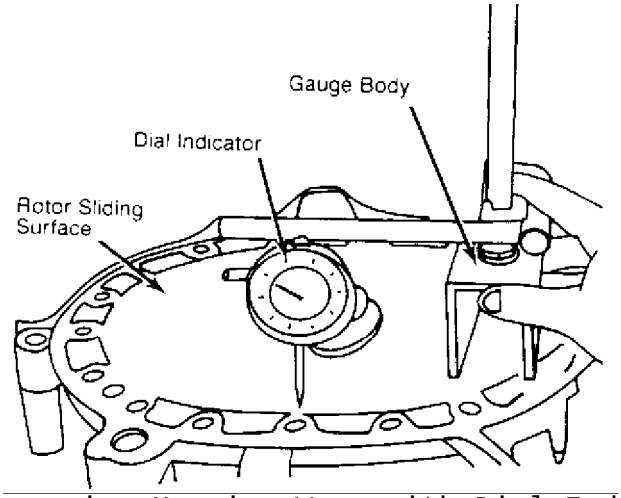

Fig. 6: Measuring Housing Wear with Dial Indicator
Check entire circumference of housing.

5) Side seal step wear must be checked on the inside and outside of oil seal tracing mark. See Fig. 7.

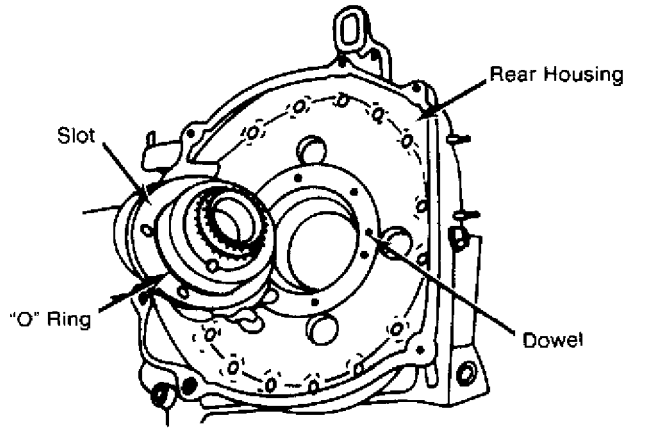

Fig. 7: Checking Side Seal Step Wear
Replace housing if step wear exceeds limit.

SIDE SEAL STEP WEAR TABLE

Location	Limit

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Inside Oil Seal Tracing Mark ..... .0004" (.01 mm)
Outside Oil Seal Tracing Mark ..... .004" (.10 mm)

6) Check oil seal step wear. Limit is .0008" (.02 mm). See Fig. 8.

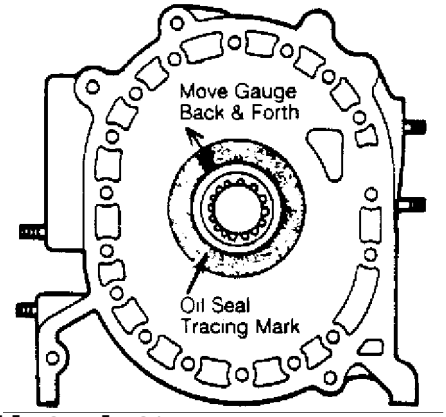

Fig. 8: Oil Seal Step Wear
Step wear limit is .0008" (.02 mm)

7) Measure inner diameter of main bearing and outer diameter of bearing journal on eccentric shaft. Standard clearance is .0016-.0028" (.04-.07 mm). If clearance exceeds .0039" (.10 mm), replace bearing.

8) To replace front or rear main bearing, remove stationary gear retaining bolts. Using a mandrel (49 0813 235), drive stationary gear with bearing out of housing .

9) Place stationary gear in a press. Use same mandrel and press main bearing out of stationary gear.

10) Install new bearings while aligning tang bearing with a slot of stationary gear. Press bearing into gear until adapter of mandrel just contacts stationary gear flange. Install the stationary gear into the housing, aligning the slot of the gear flange with the dowel pin on the housing. See Fig. 9.

NOTE: When installing rear main bearing, check condition of "O" ring and replace if necessary. Apply sealing agent on stationary gear flange prior to installing it on rear housing. Align pin and slot.

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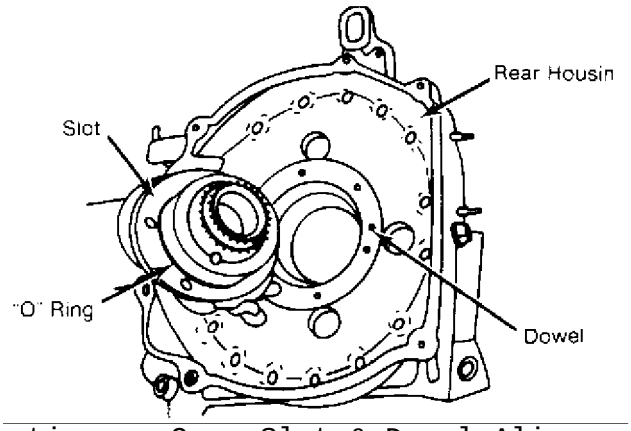

Fig. 9: Stationary Gear Slot & Dowel Alignment
Illustration applies to front and rear housings.

Rotor Housing

1) Inspect rotor housing for signs of water or gas leakage. Check for wear or damage to rotor running surface or stationary gear. Check main bearings for signs of scoring or flaking.

2) To clean housing, wipe off sealing agent or carbon in rotor running surface with a rag and ketone or thinner. Remove rust deposits in water cooling passages.

3) Inspect for cracks or damage to chromium-plated surface. Check for signs of gas or water leakage. Housing must be replaced if any of these conditions exist.

4) Place a straightedge across sealing surface of rotor housing and check for distortion with a feeler gauge. If distortion exceeds .0016" (.04 mm), replace housing. See Fig. 10.

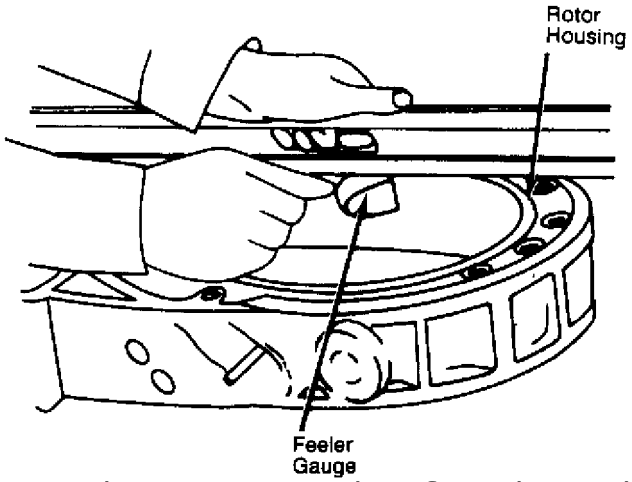

Fig. 10: Measuring Rotor Housing for Distortion
Replace if distortion exceeds limit.

5) Check rotor housing thickness at points A, B, C, and D in Fig. 11. If micrometer readings vary between point A and minimum value for B, C, and D by more than .0024" (.06 mm), replace rotor housing.

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NOTE: This excessive clearance would indicate a possibility of gas or water leakage.

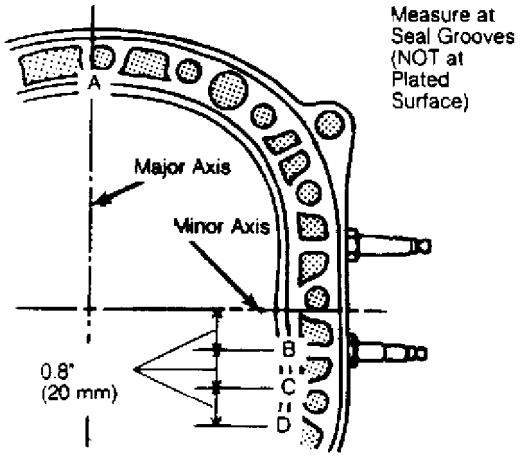

Fig. 11: Rotor Housing Thickness Check Points
Check thickness at A, B, C & D.

Rotors

1) Inspect rotor for wear or damage, and check internal gear for chips, cracks or scoring. Measure rotor width at 3 points, and subtract maximum width from width of rotor housing at point "A" in Fig. 11.

2) Clearance between side housing and rotor should be .0047-.0071" (.12-.18 mm). If clearance is excessive or rotor is damaged, replace rotor assembly.

3) If clearance is less than specified, internal gear may have come out. Strike internal gear lightly with plastic hammer and remeasure.

4) Measure inner diameter of rotor bearing and outside diameter of rotor bearing journal on eccentric shaft. Replace rotor bearing if clearance exceeds .0039" (.10 mm) or any damage is shown. See Rotor Bearing Replacement.

Rotor Oil Seal

With oil seal installed in rotor, measure contact lip width of seal. Seal must be replaced if contact width exceeds .020" (0.5 mm). Measure seal protrusion, and replace seal spring if protrusion is less than .020" (0.5 mm). See Fig. 12.

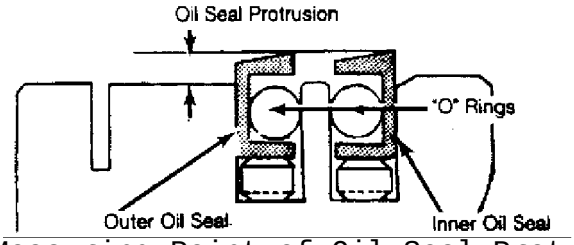

Fig. 12: Measuring Point of Oil Seal Protrusion
Check for free movement of seals in groove.

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Rotor Bearing Replacement

1) Place rotor bearing on support so internal gear is facing downward. Using rotor bearing replacer (49 0813 240), without adapter ring, press bearing out of rotor.

2) Place rotor on support with internal gear facing upward. Place a new rotor bearing so slot in rotor bore is in line with bearing lug. Press new bearing (using tool with adapter) until bearing is flush with rotor boss. See Fig. 13.

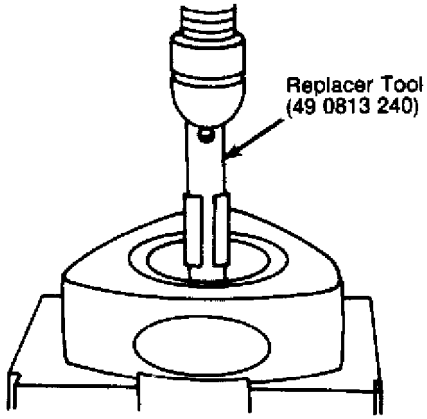

Fig. 13: Pressing Rotor Bearing from Rotor
Slot in rotor bore must be in line with bearing lug.

Apex Seal

1) Clean all carbon from apex seal and spring with a cleaning solution (not emery paper). Measure height of apex seal with a micrometer. See Fig. 14. Replace seal if height is less than .275" (7.0 mm).

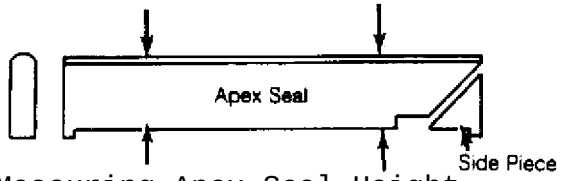

Fig. 14: Measuring Apex Seal Height
Clean thoroughly before measuring.

2) Check for warpage by measuring the clearance between the top surfaces of 2 apex seals with a feeler gauge. Replace all 3 seals if clearance exceeds .0024" (.06 mm). See Fig. 15.

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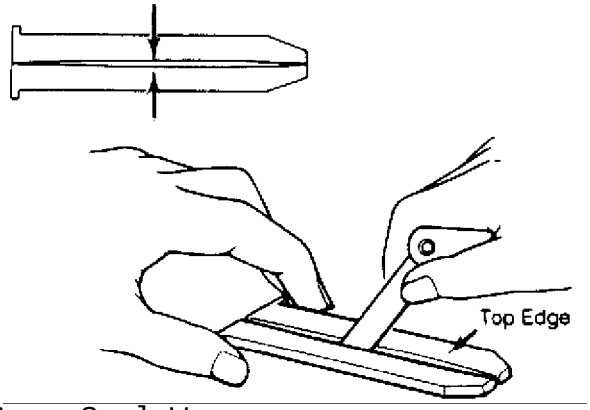

Fig. 15: Apex Seal Warpage
Replace if the clearance exceeds limits.

3) Using a feeler gauge, check gap between apex seal and groove in rotor. Feeler gauge should be inserted until tip of feeler gauge reaches bottom of groove.

4) Standard clearance is .0020-.0035" (.05-.09 mm). Replace apex seal if gap exceeds .0059" (.15 mm). Check seal spring height as shown in Fig. 16. Replace spring if free height is less than .2165" (5.5 mm).

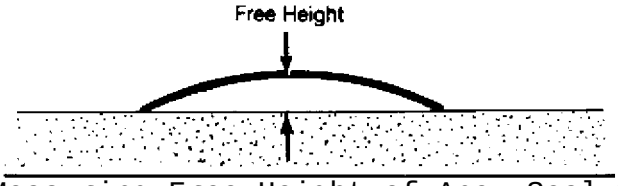

Fig. 16: Measuring Free Height of Apex Seal Spring
Height must be more than .2165" (5.5 mm).

Side Seal

1) Remove all carbon from side seal and spring. Check side seal protrusion from rotor surface, and confirm free movement by pressing with finger. Protrusion should be more than .02" (.5 mm).

2) Check gap between side seal and groove with a feeler gauge. Standard gap is .0012-.0031" (.03-.08 mm). If wear limit of .004" (.10 mm) is measured, replace side seal.

3) Check gap between side seal and corner seal with seals installed on rotor. Insert feeler gauge between end of side seal (against rotating direction of rotor) and the corner seal. If gap exceeds .016" (.4 mm), replace side seal.

4) When side seal is replaced, adjust gap between side seal and corner seal by grinding one end of side seal along round shape of corner seal, using a fine file. Adjust gap .002-.006" (.05-.15 mm).

Corner Seal

1) Clean carbon from corner seal. Check corner seal protrusion from rotor surface, and check free movement by pressing with finger. Protrusion should be more than .02" (.5 mm).

2) Extent of corner seal groove wear is determined by using

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special Bar Limit Gauge (49 0839 165) shown in Fig. 17, and is classified according to the following.

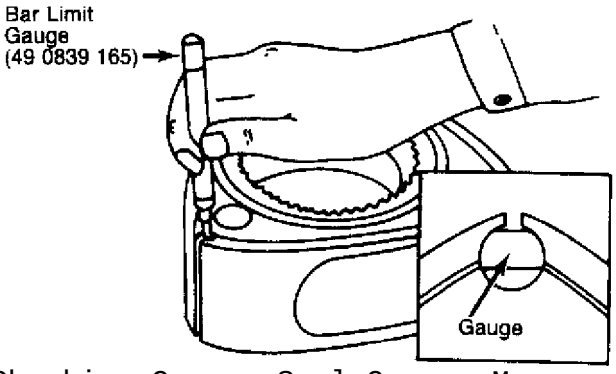

Fig. 17: Checking Corner Seal Groove Measurement
Replace rotor if both ends of gauge fit in gap.

3) If neither end of gauge goes into groove, it indicates that gap conforms to specifications. If "Go" end of gauge goes into groove, it indicates that gap is more than standard, but less than wear limit. In this case replace corner seal. See Fig. 18.

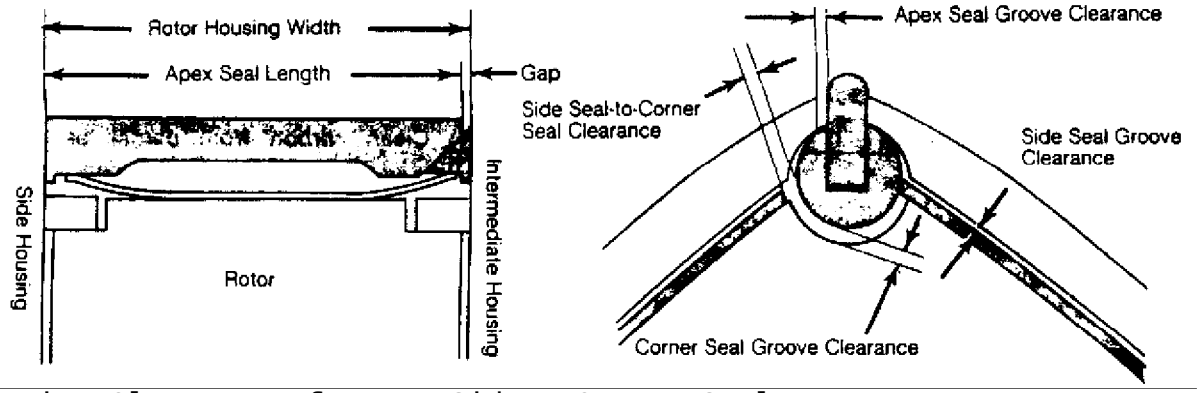

Fig. 18: Measuring Clearance of Apex, Side & Corner Seals

4) If both ends of gauge (both the "Go" and "No Go" ends) fit in groove, it indicates that gap exceeds wear limit. Replace rotor.

Eccentric Shaft

1) Thoroughly clean eccentric shaft in a cleaning solution and blow out oil passages with compressed air. Inspect shaft for scratching or scoring of bearing journals and possible blocked oil passages.

2) Check rotor bearing clearance by measuring inner diameter of the rotor bearing and outer diameter of the eccentric shaft rotor journal. Clearance should be .0016-.0031" (.04-.08 mm).

3) Replace the bearing if clearance exceeds .0039" (.10 mm). Replace eccentric shaft if journal diameters are under specified limits.

4) Place eccentric shaft in 2 "V" blocks. Mount a dial indicator and check runout of both ends by rotating shaft slowly. If

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runout exceeds .0024" (.06 mm), replace shaft.

5) Oil passages in eccentric shaft are sealed by a blind plug in rear of shaft. Inspect plug for possible oil leakage. If leakage is detected, remove plug with an Allen wrench, and install new "O" ring. Tighten plug.

6) Inspect needle bearings in end of shaft for wear or damage. Check for spring weakness, stuck, or damaged steel ball at the oil jets. Inspect front needle bearing, bearing housing, and thrust plate for wear or damage. Inspect front and rear oil seals for leaks, replace as necessary.

REASSEMBLY

Oil Seals

1) Place the rotor on rubber pad or cloth. Install oil seal springs in their respective grooves on rotors, with each edge of spring fitted in stopper hole.

2) Ensure oil seal springs have been painted in cream or blue color: Cream colored springs must be placed on front edge faces of rotors and blue springs on rear faces of rotors. When installing, painted side of spring must face oil seal (upward). See Fig. 19.

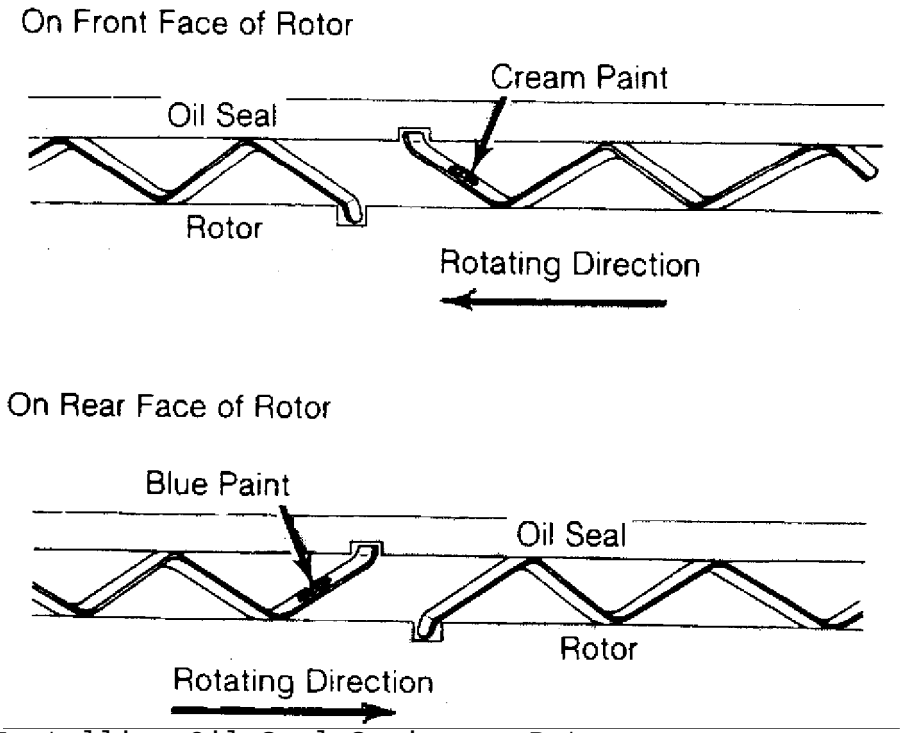

Fig. 19: Installing Oil Seal Spring on Rotor
Painted side of spring must face oil seal.

3) Insert new "O" ring in each oil seal. Install inner oil seal to each side of rotor as follows: Position oil seal to groove so square edge of spring fits in stopper notch of oil seal. Press into

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position by using a used inner oil seal so lip of inner oil seal sinks into position approximately .016" (.4 mm) below surface of rotor.

4) Install outer oil seal so square edge of spring fits in stopper notch of oil seal. Slowly push oil seal in position with fingers. Confirm smooth movement of each oil seal by pressing oil seal.

5) Check oil seal protrusion. Install oil seal springs and oil seals on the other side of rotor. Take care not to deform lip of oil seal.

Apex, Corner & Side Seals

1) Before installing apex seal, cut the assist piece to a length of .08-.011" (2.0-2.8 mm). Peel off paper and install assist piece of apex seal. See Fig. 20.

2) Position apex seals without springs and side pieces into their respective grooves so that each side piece rests on rear side of each rotor. Install the soft seal into the corner seal.

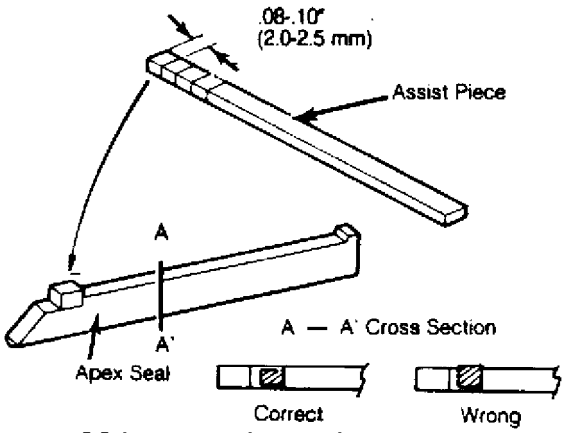

Fig. 20: Installing Assist Piece on Apex Seal

Check each seal for smooth movement.

3) Place corner seals and springs into their respective grooves, then position side seals and springs into proper grooves. Ensure smooth movement of each seal by pressing its head.

Installing Front Rotor

Mount front housing on engine stand and place front rotor assembly on housing. Use care not to drop seal into port. Mesh internal and stationary gears so that one rotor apex is set to one of 4 positions shown in Fig. 21.

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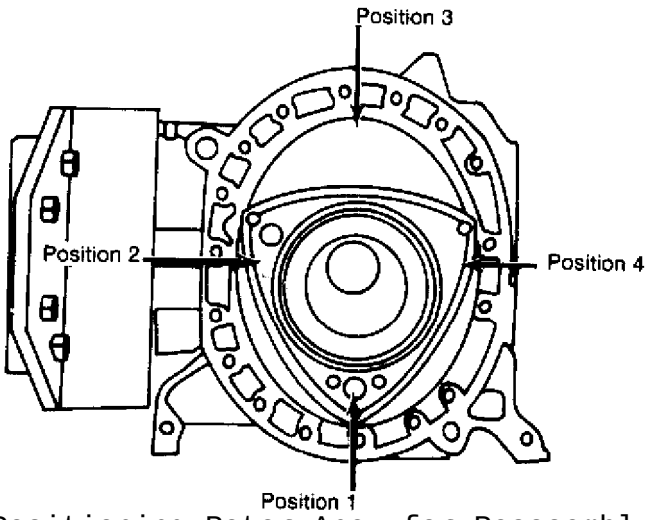

Fig. 21: Positioning Rotor Apex for Reassembly
Use care not to drop seal into port.

Installing Eccentric Shaft

Lubricate front rotor journal and main journal on shaft with engine lubricant. Being careful not to damage rotor and main bearings, insert eccentric shaft.

Installing Front Rotor Housing

1) As front and rear rotor housings are not interchangeable, be sure they are installed in correct sequence. Apply sealing agent to front side of rotor housing. See Fig. 22.

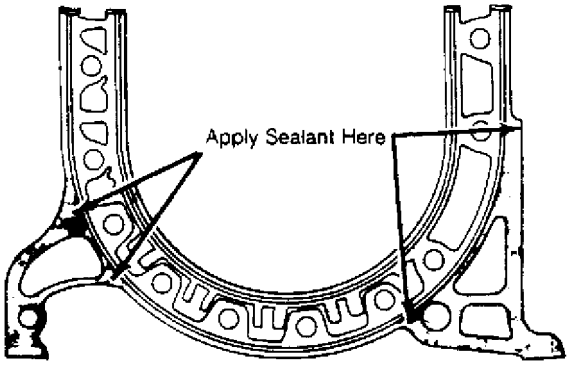

Fig. 22: Applying Sealing Agent to Rotor Assembly

2) To provide greater durability to sealing rubbers, install a protector behind each inner sealing rubber. See Fig. 23. Install a new "O" ring, sealing rubbers and protector in front side of engine housing. Apply light coat of petroleum jelly to hold seals in place.

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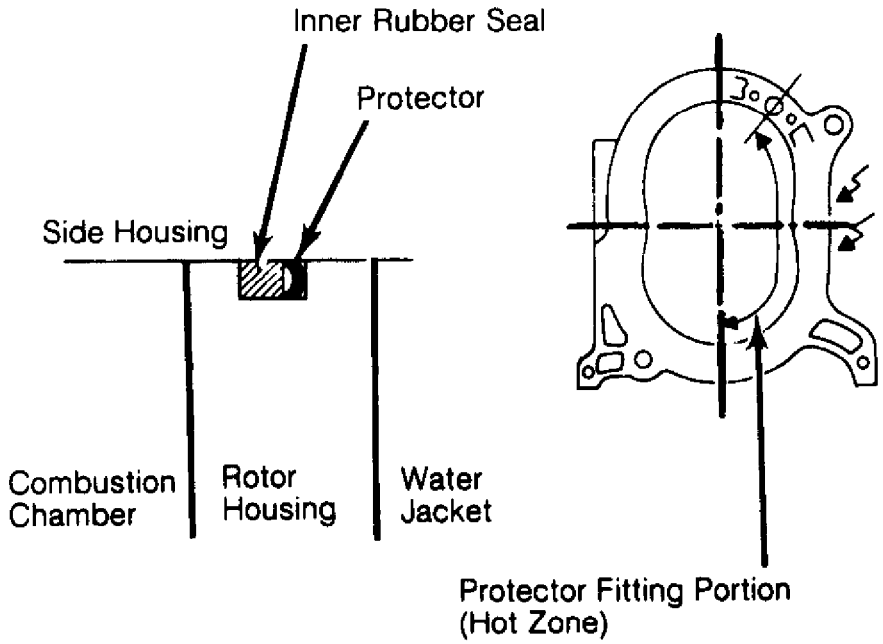

Fig. 23: Installing Protectors for Inner Sealing Rubbers
Apply light coat of petroleum jelly to hold seals in place.

NOTE: Inner sealing rubber is square type. The wider white line of sealing rubber should face toward combustion chamber and seam of rubber should be placed as shown in Fig. 24. Do not stretch sealing rubbers.

3) Invert front rotor housing using care that seals remain in position, and install on front housing. Lubricate tubular dowels and insert through front rotor housing holes.

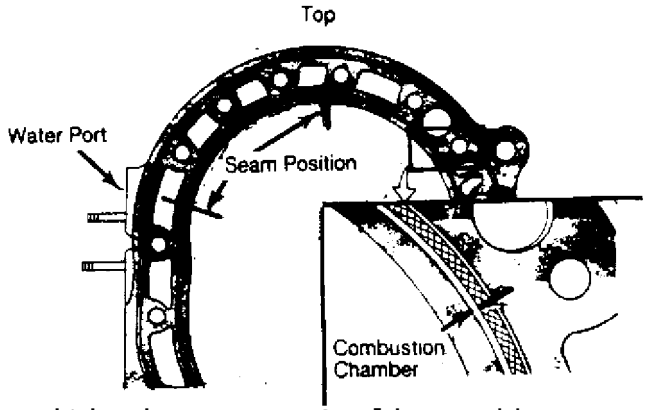

Fig. 24: Positioning Inner Sealing Rubber
Wider white line of sealing rubber should face toward combustion chamber.

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4) Insert apex seal springs so that both ends of spring may support the back side of the apex seal. Install the soft seal into corner seal. Install corner seal springs and seals into their respective grooves. Fit side pieces to original positions and lubricate with engine oil.

5) Confirm that spring is set correctly on side piece. See Fig. 25. Confirm smooth movement of each seal by pressing on head.

6) Apply sealing agent on the rear side of front housing in areas shown in Fig. 22 and then place new "O" ring, sealing rubbers and protector on rear side of front housing. Apply engine oil to sliding surfaces of front rotor housing.

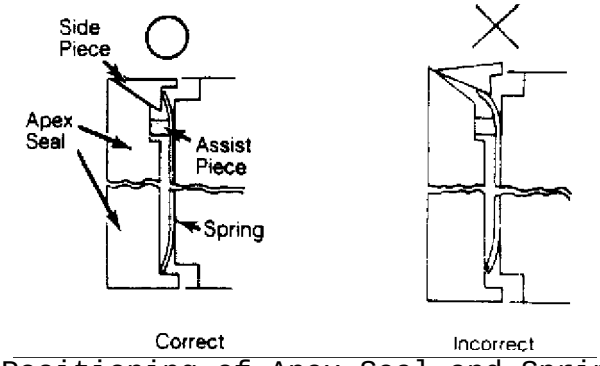

Fig. 25: Positioning of Apex Seal and Spring
Check side piece for correct installation.

Installing Intermediate Housing

1) Turn front housing and rotor assembly so that top of housing is upward. Pull eccentric shaft outward approximately 1.0" (25 mm), but not more than 1.5" (38 mm).

2) Rotate eccentric shaft until eccentric portion points to 2 o'clock position. Install intermediate housing over eccentric shaft and turn engine so that rear of engine is upward.

Installing Rear Rotor & Housing

Use same procedures up to Intermediate Housing when installing rear rotor and rotor housing.

Installing Rear Housing

Position engine with rear end upward. Apply sufficient lubricant onto stationary gear and main bearing. Install rear housing onto rear rotor housing, and turn rear rotor slightly to engage rear housing stationary gear with rear rotor internal gear.

Tightening Tension Bolts

Place a new sealing washer on each tension bolt and oil threads of each bolt. Tighten bolts, in sequence shown in Fig. 26, in stages until final torque is reached. After tightening, turn eccentric shaft to make sure rotation is light and smooth.

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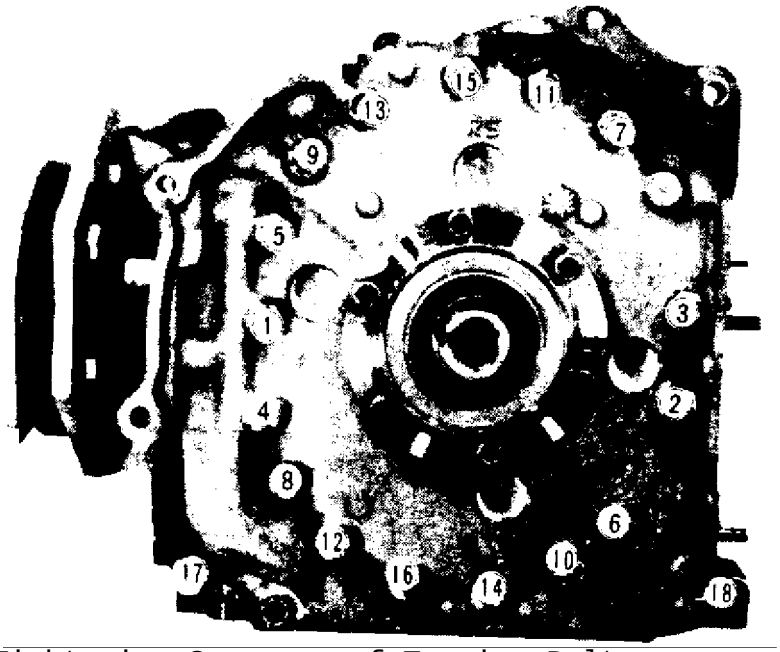

Fig. 26: Tightening Sequence of Tension Bolts
Replace all tension bolt sealing washers when the engine is overhauled.

Flywheel Counterweight Installation (Man. Trans.)

1) Apply engine oil to oil seal in the rear housing. Mount flywheel to rear end of eccentric shaft so that key fits into flywheel keyway.

2) Apply sealing agent to lock nut surface that contacts flywheel. Hold flywheel with ring gear brake (49 1881 060), and tighten lock nut to specifications.

3) Hold clutch disc in position with clutch disc centering tool (49 0813 310 or equivalent). Mount clutch cover and pressure plate assembly on flywheel, and align the "O" marks of clutch cover and flywheel.

4) Install 4 standard and 2 reamer bolts finger tight. To avoid distortion of pressure plate cover, tighten bolts in steps, a few turns at a time, until all are tight.

Flywheel Counterweight Installation (Auto. Trans.)

1) Apply engine oil to oil seal in rear housing. Fit key to eccentric shaft. Install counterweight to eccentric shaft. Apply sealing agent to lock nut surface that will contact counterweight and install lock nut.

2) Hold counterweight with stopper (49 1881 055), and tighten lock nut. Install drive plate to counterweight so hole in counterweight and drive plate line up.

Eccentric Shaft End Play Adjustment

1) Turn engine so front is up. Install thrust plate with

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chamfer downward. Slide spacer and needle bearing on eccentric shaft. Lubricate shaft and bearings, and install bearing housing.

NOTE: If bearing housing has not been removed, use care that center of needle bearing in bearing housing comes to center of eccentric shaft and that spacer is seated to thrust plate.

2) Lubricate and install needle bearing, thrust washer, and balance weight on shaft. Install keys in oil pump and eccentric shaft keyways. Place oil pump drive chain on oil pump sprocket and eccentric shaft sprocket. Install sprockets on shafts.

3) Align the keyways of eccentric shaft sprocket and balance weight. Install key. Install distributor drive gear, with "F" mark on gear facing front of engine. Install eccentric shaft pulley on shaft. Use new washer, and tighten pulley bolt to specification.

4) Turn engine so top is upward. Attach a dial indicator on the flywheel or counterweight so it contacts rear housing. Move flywheel or counterweight back and forth.

5) Standard end play is .0016-.0028" (.04-.07 mm). If end play is more than .0035" (.09 mm) grind spacer on surface plate with emery paper or install thinner spacer. If end play is less than .0016" (.04 mm), install thicker spacer.

6) Oversize spacers are available in 5 sizes from .3181" to .3150" (8.08 mm to 8.00 mm) and are identified by stamped letter "X", "K", "Y", "V", and "Z" respectively. When spacer has been installed, recheck end play.

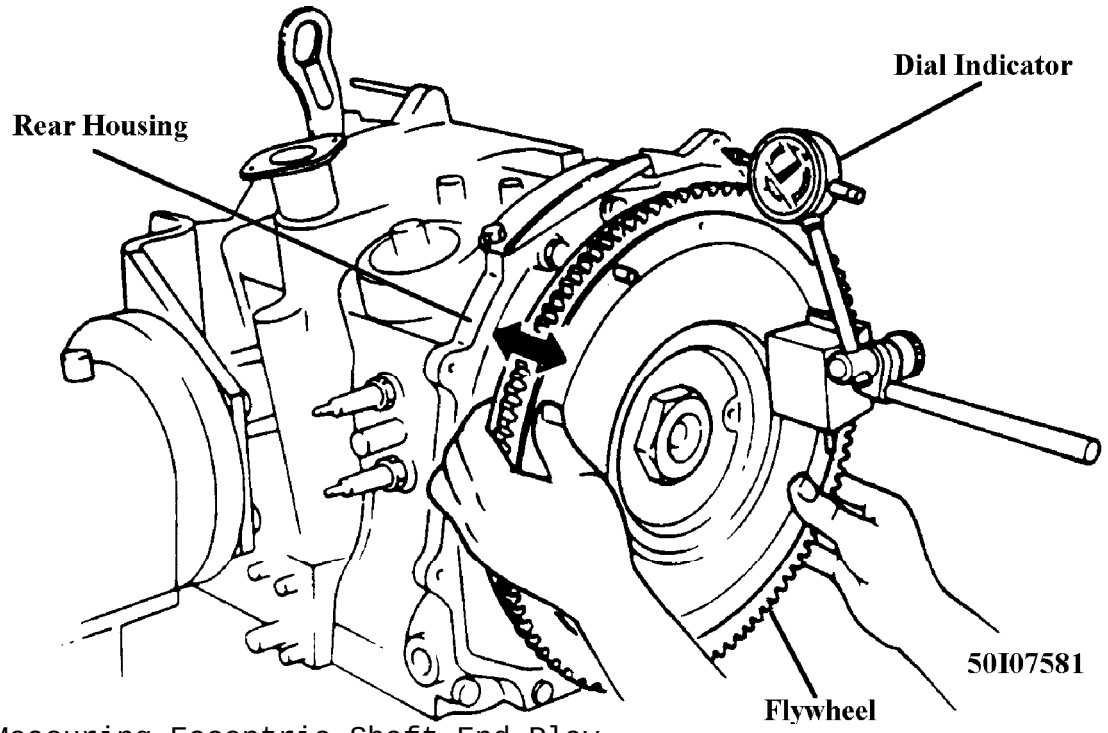

Fig. 27: Measuring Eccentric Shaft End Play
Standard end play is .0016-.0028" (.04-.07mm).

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NOTE: If end play is below specified amount, spacer thickness is too small. If end play is beyond specifications, spacer is too thick.

Installing Front Cover & Eccentric Shaft Pulley

1) Turn engine so front is upward. Remove eccentric shaft pulley. Tighten oil pump sprocket nut and bend tab of lock washer.

2) Check oil pump drive chain slack by pressing finger against chain. See Fig. 29 Chain slack measurement should not exceed .47" (12 mm). If the slack exceeds the limit, replace drive chain.

3) Install new "O" ring on front housing oil passage. Install front cover and gasket on front housing. Lubricate oil seal in front cover. Install eccentric shaft pulley on shaft. Use new washer and tighten pulley bolt.

Installing Oil Strainer & Oil Pan

1) Invert engine so that bottom of engine is up. Install oil strainer gasket and strainer on front housing. Cut off excess gasket along mounting surface of oil pan.

2) Apply a .16-.24" (4-6 mm) bead of sealer on mounting surface of oil pan (to the inside of pan bolt holes) and install gasket. Apply a similar bead of sealant to gasket. Install pan and tighten bolts.

Installing Water Pump

Turn engine upright, position gasket and water pump on front housing and tighten attaching bolts.

NOTE: For further information on cooling system components, see Cooling System in this article.

Installing Distributor

1) Rotate eccentric shaft until yellow mark (leading timing mark) on pulley aligns with indicator pin on front cover. Align notch on distributor housing with punch mark on driven gear.

2) Insert distributor and lock nut. Turn distributor housing until a trigger wheel blade aligns with pick-up coil. Tighten lock nut.

Installing External Components

1) Install exhaust manifold, engine mount, intake manifold with carburetor, and alternator and drive belt. Check clearance between alternator support and bracket. Limit is .0059" (.15 mm). Adjust with shim if necessary.

2) Install air pump and drive belt. oil filter assembly and all other external components. Before removing engine from stand, install engine hanger bracket to front cover.

ENGINE OILING

CRANKCASE CAPACITY

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The crankcase capacity is 4.9 quarts (4.6L), including filter.

OIL FILTER

A full-flow, disposable cartridge-type filter is mounted on the rear housing.

NORMAL OIL PRESSURE

Normal oil pressure is 10-26 psi (.7-1.8 kg/cmý) at idle speed, 64-78 psi (4.5-5.5 kg/cmý) at 3000 RPM.

ENGINE OILING SYSTEM

Engine oiling system is forced circulation using a 2 rotor type oil pump. Oil pump is mounted on front housing and is chain driven through eccentric shaft. The oil pressure is maintained through a regulator valve and pressure control valve. A full flow oil filter and oil cooler are mounted on the rear housing.

Oil is directed from the oil pump to the oil pressure control valve in the front cover. The oil then flows to the oil filter/cooler assembly on the rear cover which directs lubricating oil to all internal parts. The pressure regulator valve in the rear cover acts as a secondary pressure regulation device.

The oil pressure control valve is designed to open at 114 psi (8 kg/cmý). The free length of the control valve spring should be 2.74" (69.6 mm). Never use an oil pressure control spring from a previous year in a 1983 model. The cap bolt and spring are painted yellow in 1983. The oil pressure regulator valve will relieve pressure at 71.1 psi (4.9 kg/cmý). Its spring free length should be 1.83" (46.4 mm).

The engine is equipped with a metering oil pump which regulates the amount of oil pumped to the float chamber of the carburetor. The oil enters the combustion chamber with the air/fuel mixture to lubricate the seals within the chamber. The amount of oil increases as engine RPM increases. The metering pump control lever is actuated by a rod connected to the throttle lever.

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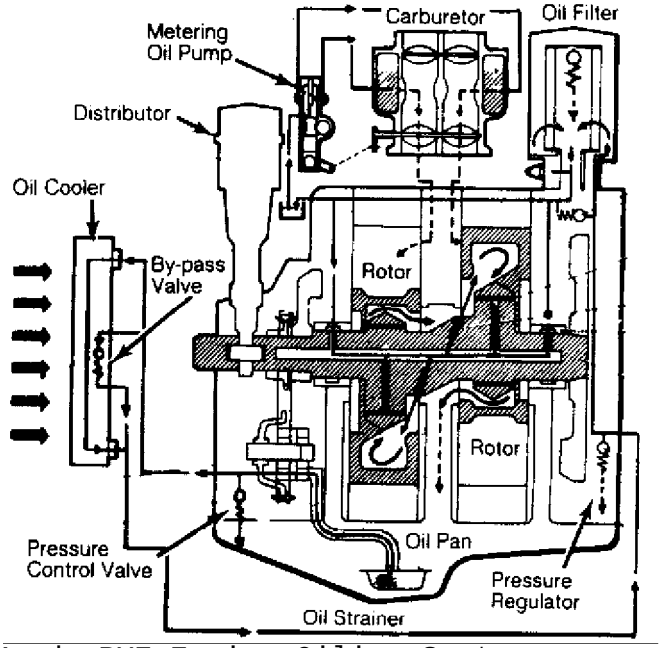

Fig. 28: Mazda RX7 Engine Oiling System

OIL PUMP

NOTE: Oil pump is mounted on the front engine housing and must be overhauled with front engine cover removed.

1) Remove front engine cover. Check oil pump drive chain slack by pressing finger against chain and measuring slack. If measurement exceeds .47" (12 mm), replace drive chain. See Fig. 29.

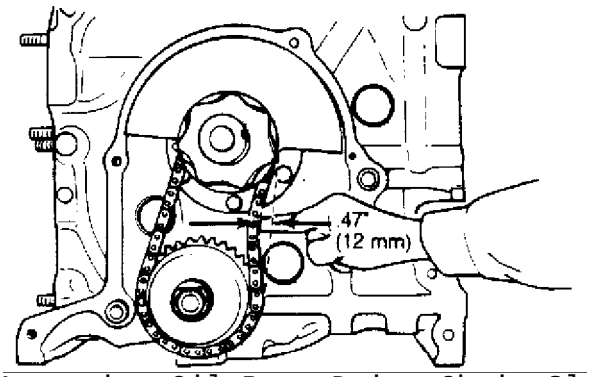

Fig. 29: Measuring Oil Pump Drive Chain Slack
Replace chain if slack exceeds limit.

2) Disassemble oil pump in following order: Remove snap ring, rear outer rotor, rear inner rotor, key, and middle plate. Remove front inner rotor, key shaft, spring pin, and front outer rotor. See Fig. 30.

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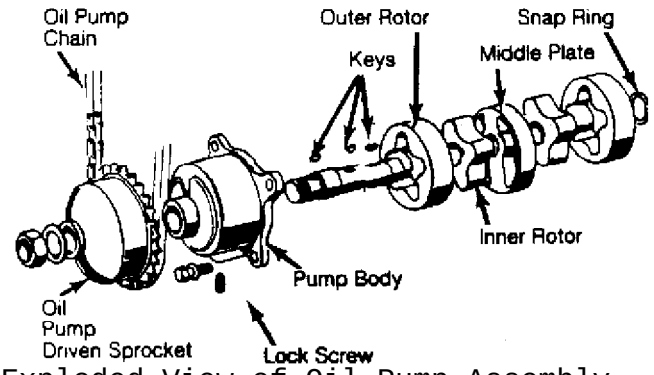

Fig. 30: Exploded View of Oil Pump Assembly

3) Insert a feeler gauge between lobes of inner and outer rotors and check clearance. If beyond .006" (.15 mm), replace both rotors.

4) Check clearance between outer rotor and pump housing with a feeler gauge. If clearance exceeds .012" (.30 mm), replace rotors and housing.

5) Place straightedge across pump mounting surface, and check rotor end play with a feeler gauge. If beyond .006" (.15 mm), replace pump body or rotors.

6) To assembly oil pump, reverse disassembly procedure. Install oil pump and tighten bolts. Install sprockets and chain as previously outlined. See Eccentric Shaft End Play Adjustment.

METERING OIL PUMP

1) Check clearance between metering pump lever and washer. See Fig. 31. Clearance must be no more than .04" (1.0 mm).

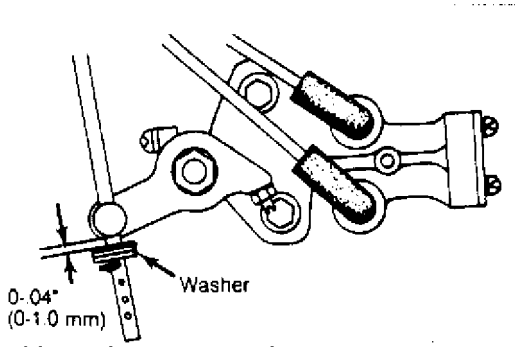

Fig. 31: Adjusting Metering Pump Control Rod
Adjust clearance by changing washers.

2) To check oil discharge, detach connecting rod. Disconnect oil lines at carburetor. Start engine and adjust idle to 2000 RPM. Once oil flow from hoses becomes steady, measure volume discharged. Pump should discharge .07-.08 oz. (2.0-2.4 cc) in 6 minutes.

CAUTION: Carburetor will not be receiving oil during test. Add small amount of clean oil to carburetor to provide proper lubrication during testing.

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3) To adjust oil metering pump, turn the adjusting screw clockwise to increase flow or counterclockwise to decrease flow. One completer turn will change oil discharge flow by .007-.011" oz. (.2-.3 cc) for 6 minutes of operation.
4) Ensure lock nut on adjustment screw is tight. Recheck metering oil pump discharge rate.

OIL COOLER

Inspection

Check the oil cooler for damage, cracks, or leaks. Replace the oil cooler if defective.

Removal & Installation

1) Remove water hoses installed on the inlet and outlet sides of cooler. Remove oil pipe and sealing washer. Remove oil cooler and filter housing as an assembly.
2) Remove "O" rings. Do not disassemble. Replace as an assembly if necessary. To install, reverse removal procedure. Use new filter, "O" rings, and sealing washer. Add engine oil and coolant. Start engine and check for leaks.

ENGINE COOLING

THERMOSTAT

Thermostat is a wax pellet type which starts to open at 180øF (82øC) and fully opens at 203øF (95øC).

PRESSURE CAP

The radiator pressure cap is rated at 13 psi (.9 kg/cmý).

WATER PUMP

Removal

1) Drain cooling system. Remove air cleaner, water temperature switch connector, air conditioner drive belt, and air pump drive belt.
2) Remove alternator, cooling fan, and drive belts. Remove air conditioning pulley (if equipped). Disconnect radiator hoses and remove water pump.

Disassembly

1) Press the pulley boss off of the pump shaft. Remove the snap ring.
2) Supporting the pump body, apply pressure to the rear end of the shaft to press the shaft, spacer, and bearing assembly out through the front of the pump body. See Fig. 32.
3) Remove impeller and seal assembly from the pump body. Press bearings and spacer from the shaft.

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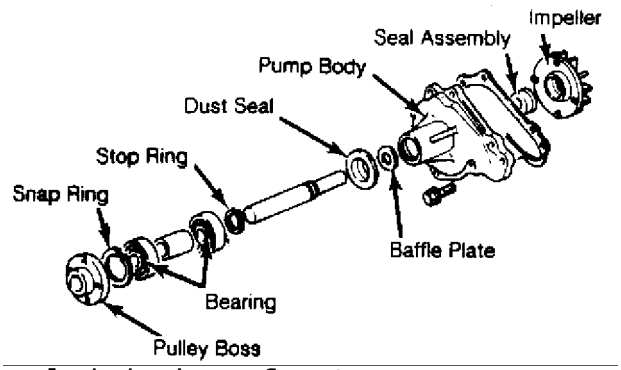

Fig. 32: Exploded View of Water Pump

Reassembly

1) Install stop ring and dust seal on the shaft. Drive baffle plate onto the taper of the shaft.

2) Press the rear bearing onto the shaft with sealed side rearward until it contacts the stop ring. Press shaft and bearing assembly into the pump body.

3) Place spacer on the shaft fill with grease. Install front bearing (sealed side forward) until the snap ring can be installed. Press pulley boss onto pump shaft.

4) Install the seal assembly into the body. Press impeller onto the shaft until it is flush with the end of the shaft.

Installation

To install, reverse removal procedure. Adjust drive belt tension and refill cooling system.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

Application	Ft. Lbs. (N.m)
Eccentric Shaft Pulley	72-87 (98-118)
Flywheel Lock Nut	289-362 (393-492)
Intake Manifold	14-19 (19-26)
Oil Pump Sprocket	23-34 (32-47)
Pressure Plate	13-20 (18-27)
Water Pump	13-20 (18-27)

ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS

GENERAL SPECIFICATIONS TABLE

Displacement

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Cu. In. 70
Liters 1.1
Fuel System ..... 4 Bbl.
HP @ RPM ....
Torque Ft. @ RPM ....
Compr. Ratio 9.4:1
Rotor Housing Width
In. (mm) 2.7559 (70)

ROTOR SPECIFICATIONS

ROTOR HOUSING, INTERMEDIATE HOUSING & ROTOR SPECIFICATIONS TABLE

Front	
Rotor Housing	
Width In. (mm)	2.7559 (70)
Distortion Limit In. (mm)	.0016 (.04)
Front, Intermediate & Rear Housing	
Width In. (mm)	1.576 (40)
Distortion Limit In. (mm)	.0016 (.40)
Rotor	
Width In (mm)	2.748 (69.8)
Housing-to-Rotor Protrusion	.0047-.0074 (.12-.19)
Land Protrusion In. (mm)	...
Center	
Front, Intermediate & Rear Housing	
Width In. (mm)	1.969 (50)
Distortion Limit In. (mm)	.0016 (.40)
Rear	
Rotor Housing	
Width In. (mm)	2.7559 (70)
Distortion Limit In. (mm)	.0016 (.04)
Front, Intermediate & Rear Housing	
Width In. (mm)	2.362 (60)
Distortion Limit In. (mm)	.0016 (.40)
Rotor	
Width In (mm)	2.748 (69.8)
Housing-to-Rotor Protrusion	.0047-.0074 (.12-.19)
Land Protrusion In. (mm)	...

APEX SEAL SPECIFICATIONS

APEX SEAL SPECIFICATIONS TABLE

Length In. (mm)	2.748 (69.8)
Seal Width In. (mm)	.1181 (3.0)
Height In. (mm)	.3347 (8.5)
Seal-To-Housing	
Clearance	...

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Wear Limit	...
Seal-To-Rotor	
Groove Clearance	.0020-.0035 (.05-.09)
Wear Limit	.0059 (.15)

SIDE SEAL SPECIFICATIONS

SIDE SEAL SPECIFICATIONS TABLE

Thickness In. (mm)	.4331 (11.0)
Width In. (mm)	.2756 (7.0)
Seal-To-Groove	
Clearance In. (mm)	...
Limit In (mm)	...
Side Seal-To-Corner Seal	
Clearance In. (mm)	.0020-.0059 (.05-.15)
Limit In. (mm)	.0157 (.40)

SHAFT & ROTOR BEARING SPECIFICATIONS

ECCENTRIC SHAFT MAIN & ROTOR BEARINGS SPECIFICATIONS TABLE

Main Bearings	
Journal Diameter In. (mm)	1.6929 (43)
Clearance In. (mm)	.0016-.0031 (.04-.08)
Eccentric Shaft End Play In. (mm)	.0016-.0028 (.04-.07)
Rotor Bearings	
Journal Diameter In. (mm)	2.9134 (74)
Clearance	.0016-.0031 (.04-.08)

CORNER SEAL SPECIFICATIONS

CORNER SEAL SPECIFICATIONS TABLE

Diameter In. (mm)	.4331 (11.0)
Height In. (mm)	.2756 (7.0)
Seal-To-Groove	
Clearance In. (mm)	...
Limit In. (mm)	...
Side Seal-To-Corner Seal	
Clearance In. (mm)	.0020-.0059 (.05-.15)
Limit In. (mm)	.0157 (.40)

OIL SEAL SPECIFICATIONS

OIL SEAL SPECIFICATIONS TABLE

Height In. (mm)	.2205 (5.6)

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Seal Lip Contact Width
Standard In. (mm) ..... Less than .02 (Less than .5)
Limit In. (mm) ....

PORT TIMING SPECIFICATIONS

PORT TIMING SPECIFICATION TABLES

Intake	
Open (ATDC)	32ø
Close (ABDC)	40ø
Exhaust	
Open (BBDC)	75ø
Close (ATDC)	38ø

END OF ARTICLE

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ARTICLE BEGINNING

1983-88 ENGINE PERFORMANCE
Mazda VIN Code Identification

RX7

MODEL IDENTIFICATION

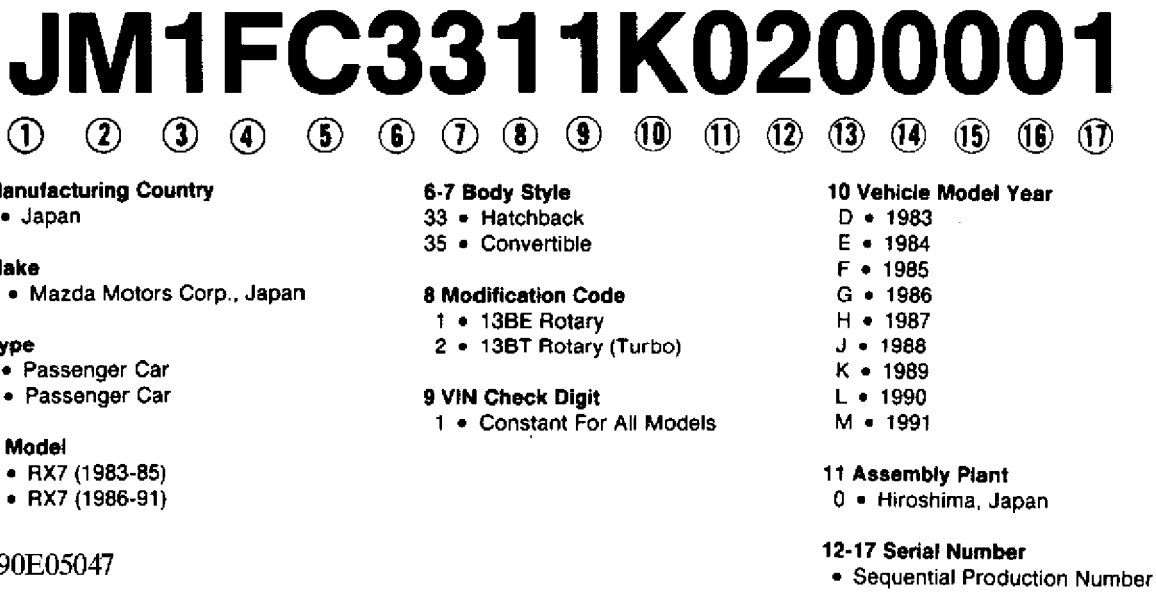

Fig. 1: VIN Code Identification

VIN CODE ID EXPLANATION

Numbers preceding the explanations in the legend below refer to the sequence of characters as listed on VIN identification label in Fig. 1. The legend listed below will also be found in Fig. 1.

1 Manufacturing Country
J * Japan

2 Make
M * Mazda Motors Corp., Japan

3 Type
1 * Passenger Car
V * Passenger Car

4-5 Model
FB * RX7 1983-85
FB * RX7 1986-88

6-7 Body Style
33 * HB RX7

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35 * Convertible

8 Modification Code
1 * Not Specified By Manufacturer

9 VIN Check Digit
1 * Constant For All Models

10 Vehicle Model Year
D * 1983
E * 1984
F * 1985
G * 1986
H * 1987
J * 1988

11 Assembly Plant
0 * Hiroshima, Japan

12-17 Serial Number
* Sequential Production Number

END OF ARTICLE

AIR INJECTION SYSTEM
Article Text
1983 Mazda RX7
For www.iluvmyrx7.com
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Sunday, August 26, 2001 04:57PM

ARTICLE BEGINNING

1983 Exhaust Emission Systems
MAZDA RX7 ENGINE AIR INJECTION SYSTEM

DESCRIPTION

This system controls CO, HC and NOx emissions by injecting secondary air into the exhaust system to cause further burning of exhaust gases. System consists of an air pump, 2 check valves, an air control valve, relief solenoid valve, switching solenoid valve, heat hazard sensor, monolith converter and pellet converter.

Air is drawn from the clean side of the air cleaner by the air pump and directed to the air control valve under pressure. From the air control valve, secondary air is directed (by the switching solenoid valve) "downstream" to the pellet converter or "upstream" to the exhaust port.

The secondary air system contains 2 check valves to prevent exhaust gas from leaking back into the air pump. The switching solenoid valve directs secondary air through the air control valve "downstream" and/or "upstream", based upon engine temperature, manifold vacuum and engine speed.

The relief solenoid valve controls the amount of air injected according to intake manifold vacuum. Under normal operating conditions, part of the secondary air supplied by the air pump is directed back to the air cleaner. The heat hazard sensor lights an exhaust temperature warning light on the instrument panel if exhaust temperatures become excessive.

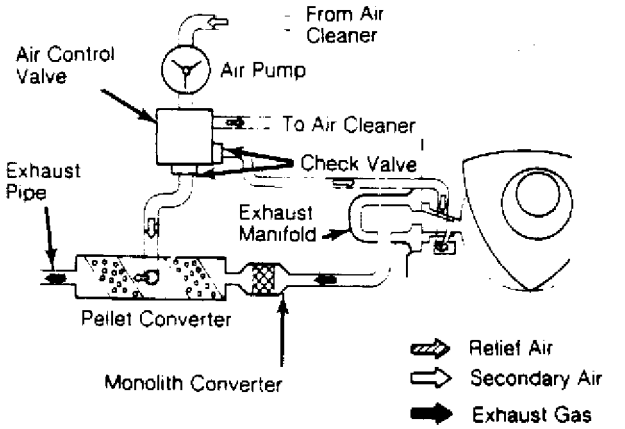

Fig. 1: Mazda RX7 Air Injection System

TESTING

Note: Before replacing air control valve, switching solenoid valve or relief solenoid valve, check auxiliary control unit, No. 2 water temperature switch, choke switch and choke relay as described in "Mazda RX7 Auxiliary Control Device" article in this section. Also, check throttle

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sensor as described in "Mazda RX7 Deceleration Control System" article in this section.

AIR PUMP TEST

1) With engine at normal operating temperature, inspect all hose connections for leaks. Check for pump noise and belt tension.
2) Stop engine and disconnect air line at air control valve. Connect hose to a pressure gauge. Connect tachometer to engine.
3) Start engine and run at idle speed. Gauge should register more than 1.64 psi (.12 kg/cmý) with engine at 800 RPM. If pump pressure is below specification, replace air pump.

CHECK VALVES TEST

1) Check valves are located at the air control valve exhaust port outlet and in the air supply line between the air control valve and pellet converter.
2) To test exhaust port check valve, detach air pump-to-air control valve hose at air control valve. To test converter check valve, detach air control valve-to-pellet converter hose at air control valve. Test each valve separately using the following procedure:
3) With engine at normal operating temperature, connect tachometer to engine. Detach hose for valve to be tested. Start engine and increase engine speed to 1500 RPM. Watch for exhaust leak. If leak exists, replace check valve being tested.

AIR CONTROL VALVE TEST

1) After ensuring air pump and all hoses are correct, check carburetor and air control valve attaching nuts for tightness. Warm engine to normal operating temperature.
2) Stop engine and connect a tachometer. Disconnect air cleaner-to-air control valve hose at air cleaner. Disconnect both vacuum hoses from relief solenoid valve (Blue color dot).
3) Using rubber hose, by-pass relief solenoid valve by connecting vacuum lines on each side of relief valve together. See Fig. 2. This will cause manifold vacuum to be routed directly to air control valve.
4) Start engine and run at idle. Place finger over air cleaner-to-air control valve hose and check that air is not escaping through hose. Disconnect rubber hose used to by-pass relief solenoid valve; air should escape at air cleaner-to-air control valve hose.
5) Reconnect by-pass hose at relief solenoid valve. Using throttle, set engine speed at 2500 RPM. Disconnect vacuum sensing tube from switching solenoid valve (Gray color dot).
6) Place finger over air cleaner-to-air control valve hose; air should escape through hose. Reconnect switching solenoid valve vacuum tube.
7) Air should not escape at air cleaner-to-air control valve

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hose. If air control valve does not respond as described, replace air control valve.

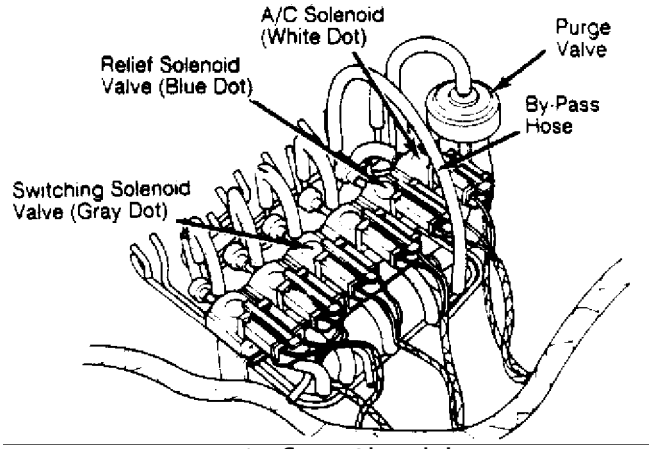

Fig. 2: Hose Arrangement for Checking Air Control Valve Operation

RELIEF SOLENOID VALVE TEST

1) Disconnect vacuum sensing tubes from relief solenoid valve and vacuum pipe. Blow through solenoid valve from vacuum sensing tube "B" in Fig. 3. Air should pass through valve and escape from front port.

2) Disconnect electrical connector from relief solenoid valve and connect battery power to solenoid terminals. Blow through vacuum hose again. Air should pass through valve and escape through air filter. If valve does not respond as described, replace valve.

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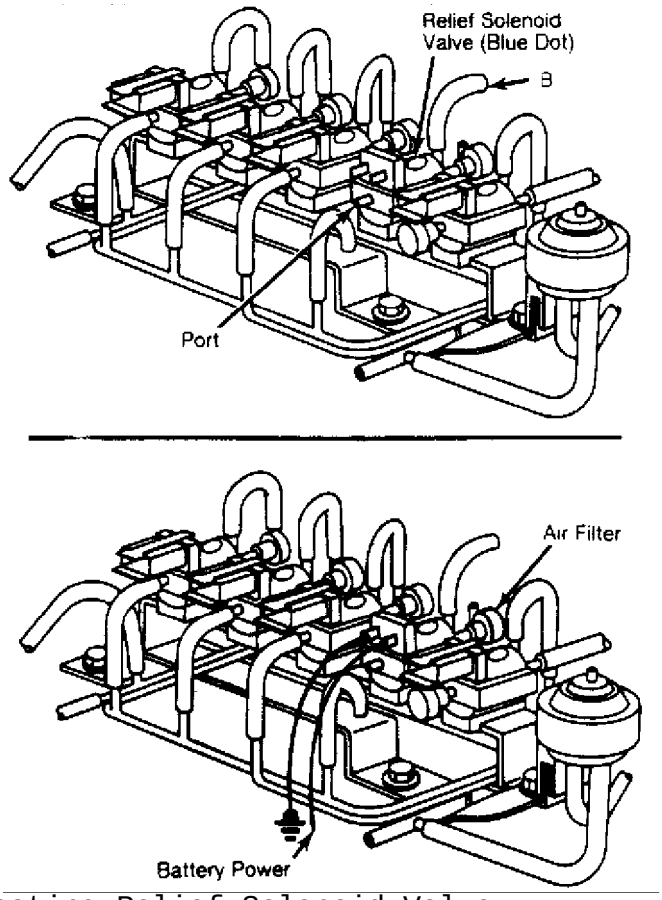

Fig. 3: Testing Relief Solenoid Valve

RELIEF SOLENOID VALVE SIGNAL CHECK TEST

1) Warm engine to normal operating temperature. Connect tachometer to engine. Connect voltmeter to relief solenoid valve connector terminals.

2) Disconnect connector from throttle sensor and connect a jumper wire between terminals "A" and "C" of connector. See Fig. 4. Start engine and increase engine speed.

3) Voltmeter should read near 0V when engine speed is 3600-4400 RPM. Set engine speed at 2000 RPM. Disconnect No. 2 water temperature switch (located on radiator) electrical connector.

4) Slowly decrease engine speed from 2000 RPM and watch voltmeter. When engine speed is 1000-1200 RPM, voltmeter should read near 12V. Decrease engine speed to idle.

5) Remove jumper wire from throttle sensor connector and reconnect throttle sensor connector. Slowly increase engine speed from idle (with throttle) and watch voltmeter. The voltmeter should read 12V at any engine speed.

6) The voltmeter should read near 0V if engine is accelerated quickly. Disconnect electrical connector from No. 1 water temperature switch (located behind alternator) and connect a jumper wire between both terminals of connector.

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7) Pull out choke knob and check that NO current flows to relief solenoid valve. Push choke knob back in. Reconnect No. 1 and No. 2 water temperature switch and disconnect jumper wire.

8) Remove passenger seat and fold back carpeting to expose heat hazard sensor wiring. Disconnect heat hazard sensor connector and connect a jumper wire to both terminals in the connector.

9) Voltmeter should read 0V at any engine speed. Reconnect heat hazard sensor. If relief solenoid valve does not operate as outlined, check heat hazard sensor and retest relief solenoid valve.

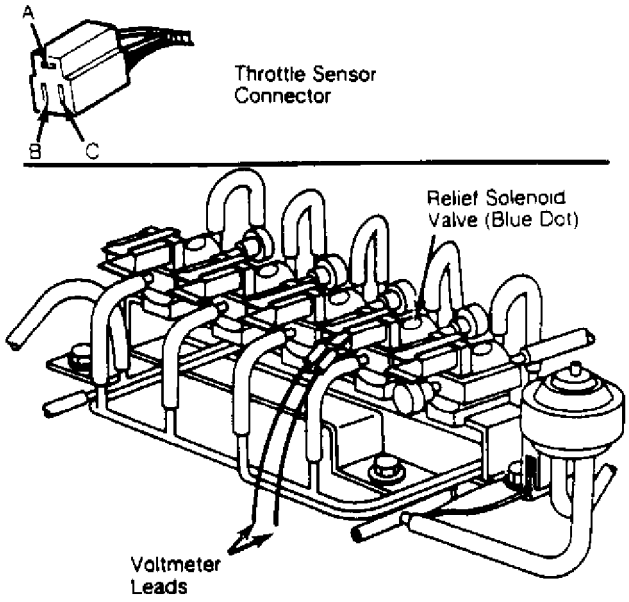

Fig. 4: Testing Relief Solenoid Valve Signal

SWITCHING SOLENOID VALVE TEST

1) Disconnect vacuum sensing tubes from switching solenoid valve and vacuum pipe. Blow through switching valve from vacuum sensing tube "B" in Fig. 5. Air should pass through valve and escape from front port.

2) Disconnect electrical connector from switching valve and connect battery power to terminals on valve.

3) Blow through hose again; air should pass through valve and escape through filter at rear of valve. If switching valve does not respond as described, replace switching solenoid valve.

SWITCHING SOLENOID VALVE SIGNAL CHECK TEST

1) Warm engine to normal operating temperature. Connect tachometer to engine. Connect voltmeter to negative terminal (Light Gray) of switching solenoid valve connector.

2) Disconnect throttle sensor connector and connect a jumper wire between terminals "A" and "C" of connector. Start engine and run at 2000 RPM. Voltmeter should read near 0V. Slowly decrease engine

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speed and watch voltmeter.

3) Voltmeter should read near 12V when engine speed is 1000-1200 RPM. Disconnect No. 1 water temperature switch (located behind alternator) and connect a jumper wire between both terminals in connector.

4) Pull out choke knob and check that voltmeter reads near 12V. Push choke knob back in. Remove jumper wire from throttle sensor connector and reconnect connector.

5) Slowly increase engine speed from idle. Voltmeter should read near 12V at any engine speed. Quickly accelerate engine; there should be NO current flow to switching valve. If switching valve does not respond as outlined, replace switching solenoid valve.

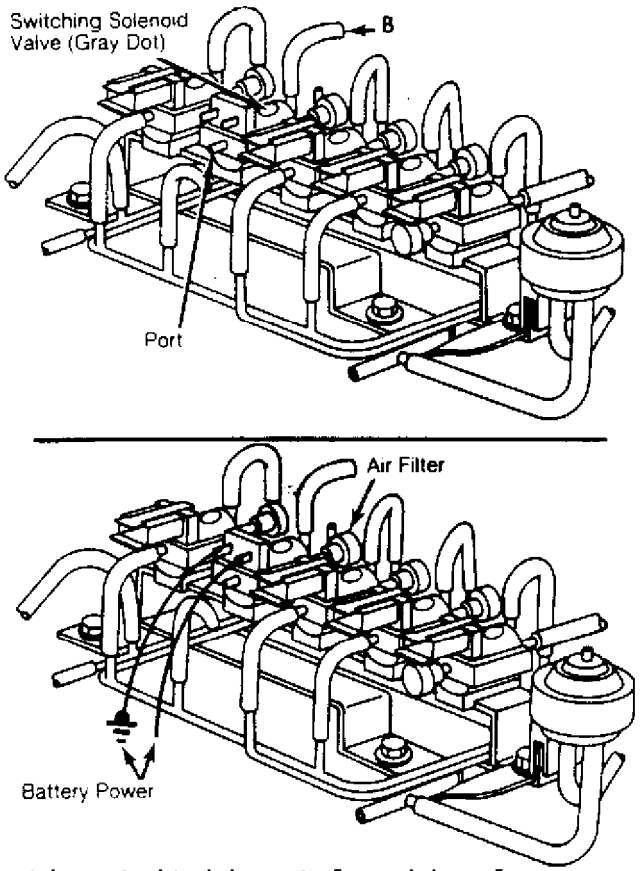

Fig. 5: Testing Switching Solenoid Valve

HEAT HAZARD SENSOR TEST

1) Turn ignition on; "Overheat Exh. System" warning light should glow. Start engine and warning light should go out. Remove passenger seat, fold back carpeting and disconnect heat hazard sensor connector.

2) Warning light should glow when jumper wire is connected to both terminals of the connector. If warning light does not respond as outlined, remove and test sensor. Wrap sensor and a thermometer in aluminum foil (electrical connector must be exposed for access).

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3) Place sensor and thermometer (wrapped in aluminum foil) in container filled with oil. Place a second thermometer in container of oil. See Fig. 6.

4) Connect a battery and test lamp to sensor connector. Test lamp should glow. Gradually heat oil. Test lamp should go OFF when temperature inside aluminum foil is 248-284øF (120-140øC). If sensor does not respond as outlined, replace heat hazard sensor.

NOTE: Do not heat oil above 302øF (150øC).

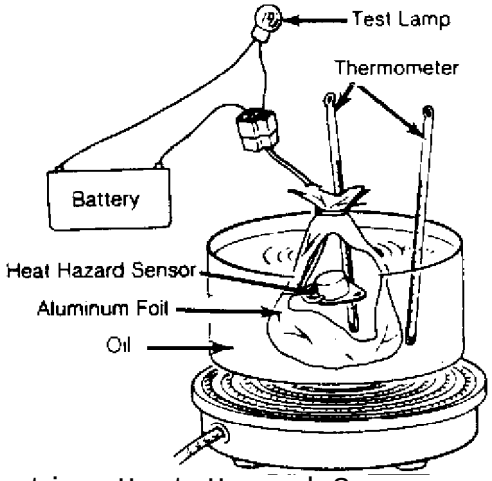

Fig. 6: Testing Heat Hazard Sensor

END OF ARTICLE

AUXILIARY CONTROL DEVICE
Article Text
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ARTICLE BEGINNING

1983 Exhaust Emission Systems
MAZDA RX7 AUXILIARY CONTROL DEVICE

DESCRIPTION

In addition to the regular exhaust emission control systems previously described, RX7 models use an auxiliary control device. This unit works in conjunction with emission systems previously explained.

The components of the auxiliary control device include the control unit, choke switch, choke magnet, choke relay, and 2 water temperature switches.

TESTING

CONTROL UNIT

1) Engine must be at normal operating temperature and transmission in Neutral (Park on A/T models). Check the control unit according to Control Unit Testing chart.

2) When more than 1 Checking Condition is listed, all conditions must be checked. Connect the negative probe of voltmeter to terminal "P" and positive probe to other terminals as described.

3) If a problem exists, check circuit to which terminal is connected. If circuit is normal, replace control unit.

NOTE : Disconnect electrical coupler from throttle sensor on carburetor and connect a known good throttle sensor to coupler.

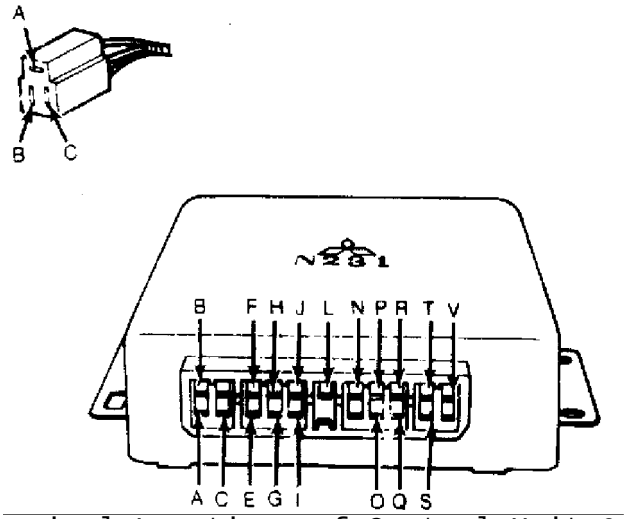

Fig. 1: Terminal Locations of Control Unit & Throttle Sensor Unit is located under left side of dashboard.

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CHOKE RELAY

1) Disconnect coupler from relay. With engine off and no power applied, check continuity of terminals.
2) There should be continuity between No. 1 and No. 2. There should be no continuity between No. 3 and No. 4.
3) Connect a wire from battery positive post to terminal No. 6 and battery negative post to terminal No. 5. There should be continuity between No. 3 and No. 4. There should be no continuity between No. 1 and No. 2.

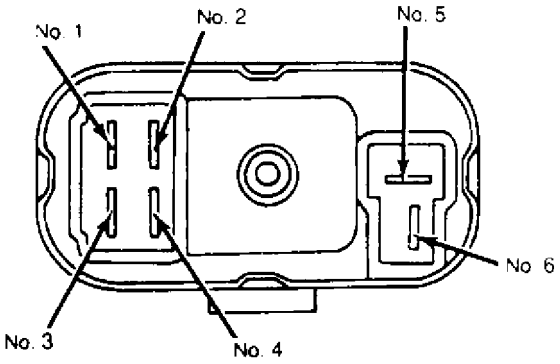

Fig. 2: Choke Relay Terminal Locations

CHOKE SWITCH

1) Unplug connector from choke switch. Check continuity between numbered terminals in connector using an ohmmeter.
2) Continuity should exist between terminals No. 3 and No. 7 when choke knob is pulled to about 0.4" (10 mm.). Continuity should exist between terminals No. 6 and No. 8 when choke knob is at any position. See Fig. 3 for terminal locations.

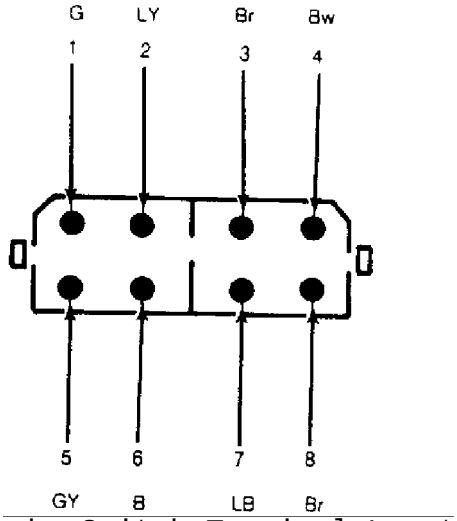

Fig. 3: Choke Switch Terminal Locations

WATER TEMPERATURE SWITCHES

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No. 1 Switch

1) Remove switch from water pump housing. Place switch in water with a thermometer. Connect ohmmeter to switch connector and gradually heat water.

2) Continuity should not exist between terminals when temperature reaches 146-170øF (63-77øC). If switch does not respond as described, replace No. 1 water temperature switch.

No. 2 Switch

1) Remove switch from lower radiator tank and perform same test as for No. 1 water temperature switch.

2) Continuity should not exist between terminals until temperature reaches 52-66øF (12-18øC). If switch does not respond as described, replace No. 2 water temperature switch.

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Terminal	Connection	Voltage	Checking Condition
A	Trailing Ignition Coil	12V (pals signal)	Engine running at idle speed.
B	Ignition Key Switch	Approx. 12V	Ignition key switch turned on.
C	Carburetor Heater	Approx. 12V	Engine operating and choke knob pulled out fully.
E	Throttle Sensor	7.7-8.5V	Ignition key switch turned on.
F	Switching Solenoid Valve	0V	Unplug the connector from the throttle sensor and connect a jumper wire to "A" and "C" terminals in the connector. *See Fig. 1.* Engine speed must be more than 1000 RPM.
H or V	Starting Motor	0V	Ignition key switch turned on. On automatic transmission models, shift selector to "P" or "N".
J	No. 2 Water Temperature Switch	0V	Engine must be operating temperature and at idle.
L	Air Conditioning Solenoid Valve	0V	Turn on air conditioning switch. Engine speed must be less than 1000 RPM.
N	Relief Solenoid Valve	0V	**1)** Disconnect the connector from the throttle sensor and connect a jumper wire to "A" and "C" terminals in the connector. Engine speed must be more than 3600 RPM. **2)** Unplug the connector from the No. 2 water temperature switch. Unplug the connector from the throttle sensor and connect a jumper wire from "A" to "C" terminals. Engine speed must be more than 1000 RPM. **3)** Unplug the connector from the heat hazard sensor and connect a jumper wire to both terminals in the connector. Engine must be at idle speed.
O	Heat Hazard Sensor	0V	Unplug the connector from the heat hazard sensor and connect a jumper wire to both terminals in the connector. Engine must be at idle speed.
P	Ground	.....	.....
Q	Shutter Solenoid Valve	0V	**1)** Unplug the connector from the throttle sensor and connect a jumper wire to "A" and "C" terminals in the connector. Engine speed must be less than 1000 RPM. **2)** On automatic transmission models, unplug the throttle sensor connector while quickly desreasing engine speed.
R	Choke Switch	Approx. 12V	Engine running at idle speed.
S	Leading Vacuum Control Solenoid Valve	0V	**1)** Unplug connector from the No. 1 water temperature switch and connect a jumper wire to both terminals in the connector. Set engine speed to 2000 RPM. **2)** Engine speed be less than 1000 RPM. **3)** On automatic transmission models, shift selector to "P" or "N". Engine speed must be less than 1000 RPM. **4)** When engine speed is quickly decreased.
T	Trailing Vacuum Control Solenoid Valve	Approx. 1V	**1)** When engine speed is less than 2500 RPM. **2)** Quickly decreasing engine speed from 3000 RPM. **3)** Unplug the connector from the No. 2 water temperature switch on the radiator and the engine speed is less than 1000 RPM.

Fig. 4: Control Unit Testing

END OF ARTICLE

CARBURETOR - NIKKI 4-BBL
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ARTICLE BEGINNING

1983 Nikki Carburetors
NIKKI 4-BARREL

Mazda RX7

DESCRIPTION

Carburetor is of 4-barrel, 2-stage design. Primary stage includes idle system, slow speed circuit, accelerator pump system and main metering system. In addition, Federal models are equipped with a sub-zero starting device which admits fluid into the primary stage.

Secondary stage contains secondary vacuum diaphragm operating system, stepping circuit and main metering system. Choking is accomplished through a semi-automatic choke. Other features include a deceleration control system, automatic choke return, hot start assist, idle compensation and dashpot (manual transmission).

ADJUSTMENTS

NOTE: For all on-vehicle adjustments not covered in this article, see the appropriate TUNE-UP SERVICE PROCEDURES article.

FLOAT LEVEL

1) Before assembling air horn to main body, adjust float level. Invert air horn and allow float to hang by its own weight.

2) Measure clearance between float and air horn gasket. See Fig. 1. Clearance should be .61-.65" (15.5-16.5 mm). If not within specifications, bend float seat to adjust.

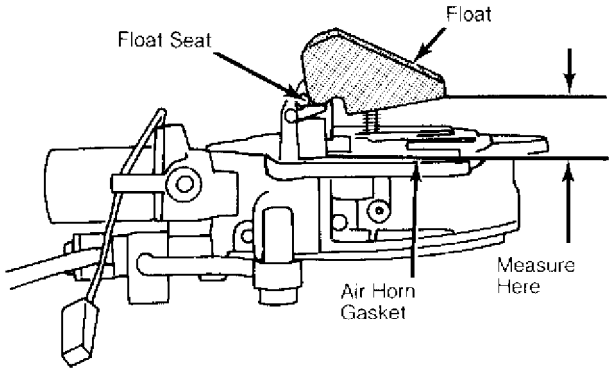

Fig. 1: Float Level Adjustment

FLOAT DROP

Turn air horn upright and allow float to hang by its own weight. Measure distance between bottom of float and air horn gasket. See Fig. 2. Distance should be 1.98-2.02" (50.5-51.5 mm). If not,

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bend float stop to adjust.

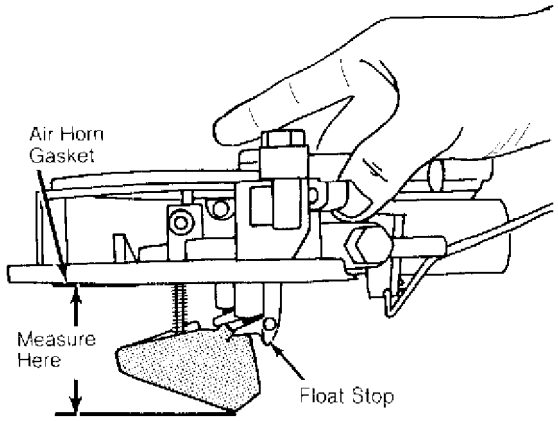

Fig. 2: Float Drop Adjustment

CHOKE LINKAGE (FAST IDLE OPENING ANGLE)

Close choke valve fully and measure clearance between primary throttle valve and wall of throttle bore. Set clearance to .040-.047" (1.0-1.2 mm) by bending fast idle rod. See Fig. 3.

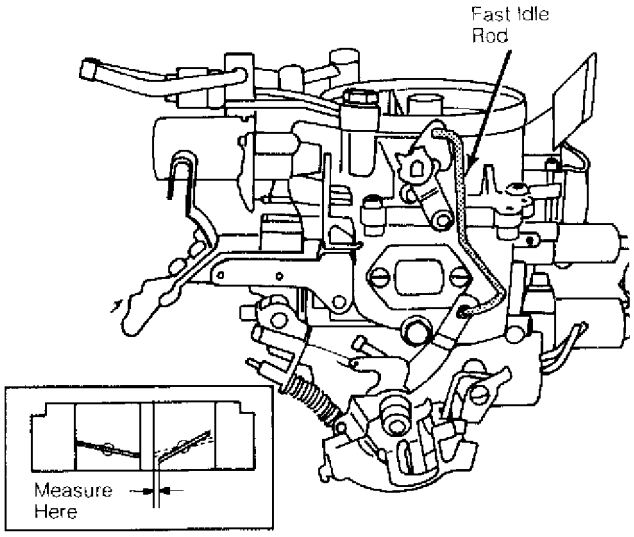

Fig. 3: Choke Linkage (Fast Idle Opening Angle)
Bend fast idle rod to adjust.

CHOKE VALVE OPENING ANGLE

NOTE: Choke diaphragm No. 1 is the dual diaphragm assembly, choke diaphragm No. 2 is the single diaphragm assembly.

1) Disconnect both vacuum sensing tubes from No. 1 vacuum diaphragms. Pull choke lever link out fully and hold in place. Apply more than 19.7 in. Hg to inner diaphragm. See Fig. 4.
2) Clearance should be .22-.24" (5.5-6.2 mm). Apply more than 19.7 in. Hg to both diaphragms and measure clearance again.

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Clearance should be .45-.51" (11.5-13.0 mm).

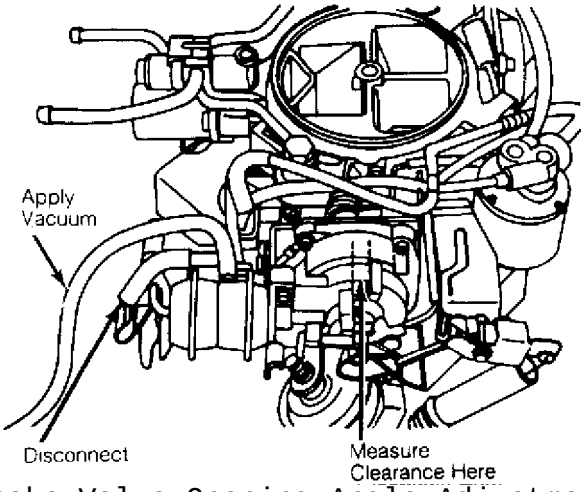

Fig. 4: Choke Valve Opening Angle Adjustment

NO. 2 CHOKE DIAPHRAGM

1) Disconnect vacuum sensing tube from No. 2 vacuum diaphragm. Pull choke lever link out fully and hold in place. Choke valve should close fully. (Cool bi-metal coil if necessary).
2) Apply more than 19.7 in. Hg to vacuum diaphragm and measure clearance between choke valve and wall of air horn. Clearance should be .057-.070" (1.46-1.80 mm).

CHOKE DIAPHRAGM OPERATION (NO. 1 & NO. 2 DIAPHRAGMS)

Remove air cleaner. Start engine and run at idle. Disconnect both vacuum sensing tubes from No. 1 diaphragm and one from the No. 2 diaphragm. Each diaphragm shaft should move outward from diaphragm.

CHECKING CHOKE DELAY VALVE OPERATION

NOTE: Automatic transmission must be in Neutral.

1) Warm engine to normal operating temperature. Stop engine and remove air cleaner assembly. Disconnect inner vacuum sensing tube from choke diaphragm No. 1.
2) Start the engine and run at idle speed. Diaphragm shaft should move fully inward within 10-20 seconds after reconnecting vacuum sensing tube to choke diaphragm.

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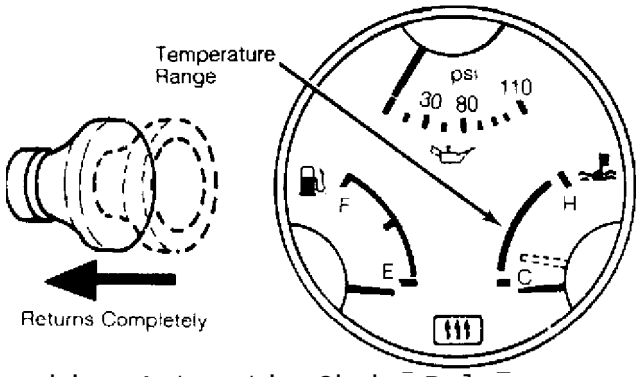

Fig. 5: Checking Automatic Choke Release

CHECKING AUTOMATIC CHOKE RELEASE

1) With engine cold and ignition "OFF", pull choke knob out fully and release. Knob should return automatically and freely. Connect tachometer to engine.
2) Start engine and set engine speed at 2000 RPM with choke knob. As engine temperature reaches range indicated in Fig. 5., choke knob should return automatically and freely.

CHECKING CARBURETOR HEATER

1) Disconnect electrical connector from No. 1 water temperature switch and connect jumper wire to both terminals of connector. Connect tachometer to engine.
2) Disconnect carburetor heater electrical connector and connect voltmeter to connector. Start engine and set engine speed at 2000 RPM with choke knob.
3) With choke knob pulled out, current should flow to carburetor heater lead. Current should not flow to heater lead with choke knob pushed in.
4) Connect ohmmeter between carburetor heater lead and carburetor body. If ohmmeter shows no movement, carburetor heater is defective and must be replaced.

HOT START ASSIST CABLE

1) Remove lock spring of hot start assist cable from cable bracket. Slowly pull outer cable until hot start lever just touches stop lever.
2) Check clearance between cable bracket and lock nut on cable. See Fig. 6. Clearance should be .02-.08" (0.5-2.0 mm). Adjust by turning lock nut, then install lock spring securely on cable.

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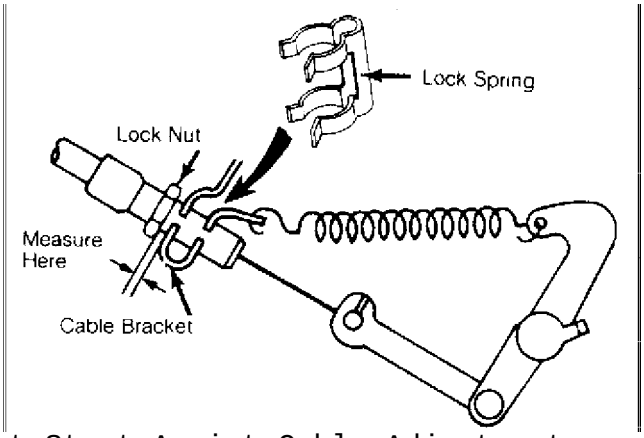

Fig. 6: Hot Start Assist Cable Adjustment

THROTTLE OPENER

A/C Models Only

1) Turn off all accessories. Remove fuel filler cap. Disconnect and plug idle compensator tube at air cleaner. Connect tachometer to engine and warm engine to normal operating temperature.

2) Disconnect electrical connector from air switching solenoid valve (Gray color). Disconnect and plug vacuum sensing tubes from leading vacuum control units on distributor.

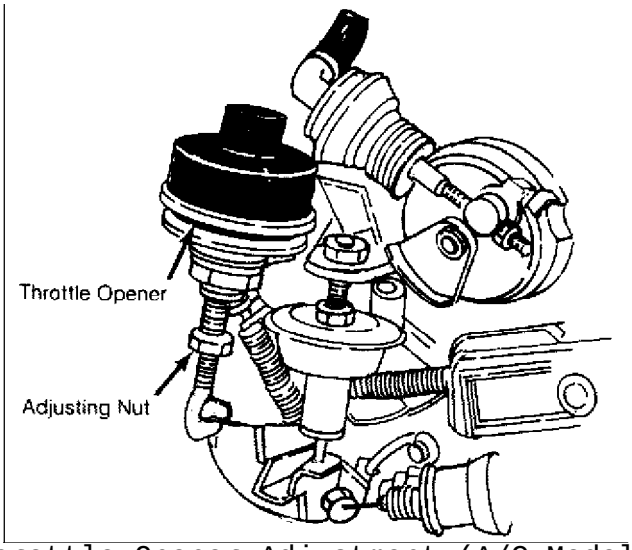

Fig. 7: Throttle Opener Adjustment (A/C Models Only)

3) Turn off air conditioner switch. Disconnect electrical connector from air conditioner solenoid. Connect battery power to one terminal in connector and ground other terminal.

4) Throttle opener should operate and engine speed should increase to 1150-1250 RPM in Neutral. If engine speed is not to specification, turn adjusting nut shown in Fig. 7.

CHECKING ALTITUDE COMPENSATOR

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NOTE: Altitude compensator must be checked at altitudes of 1640-4920 feet.

1) Remove air cleaner and start engine. Engine should run smoothly at specified idle. Place finger over slow port on carburetor air horn; idle speed should drop.
2) If idle speed did not drop, remove compensator valve and blow through both ports. Air should pass through compensator valve. If not replace altitude compensator valve.

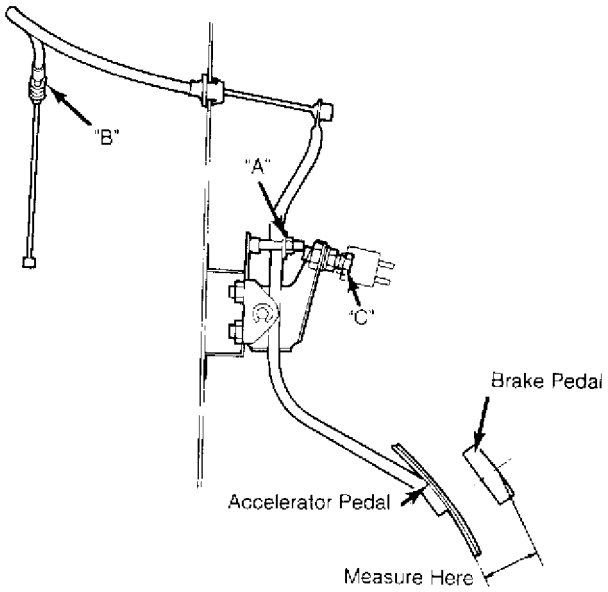

Fig. 8: Adjusting Accelerator Cable and Pedal Height

ACCELERATOR CABLE ADJUSTMENT

1) Check accelerator pedal position. Pedal should be 1.5-1.9" (37-47 mm) lower than brake pedal. See Fig. 8. If necessary, adjust nut "A" to obtain correct position.
2) Cable free play at carburetor should be .04-.12" (1-3 mm). To adjust free play, adjust nut "B". Depress accelerator to floor and check that throttle valves are wide open. If necessary, adjust stop bolt "C".

OVERHAUL

NOTE: Disassembly and assembly procedures will vary from vehicle to vehicle due to emissions equipment and type of transmission. Some carburetors may not have all parts referred to in the following procedures.

DISASSEMBLY

1) Remove vacuum sensing tubes for altitude compensator

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valve and choke delay valve. Remove choke heater lead, choke diaphragm No. 2 vacuum sensing tube and altitude compensator valve.

2) Remove throttle opener and bracket assembly, No. 1 choke diaphragm vacuum sensing tube, dashpot diaphragm and bracket assembly (Man. Trans. only) and throttle return spring.

3) Remove sub-return spring, return spring bracket, bi-metal spring housing and bracket assembly. Remove split pin and fast idle rod, hot start assist lever spring and bracket assembly and choke lever.

4) Remove the choke return diaphragm and bracket, No. 2 choke diaphragm and air horn assembly from main body. Disconnect float pin and remove float, needle valve, spring, valve stem and retainer.

5) From main body, remove accelerator pump rod, secondary throttle valve rod, throttle sensor and main body attaching bolts. Remove main body from throttle body.

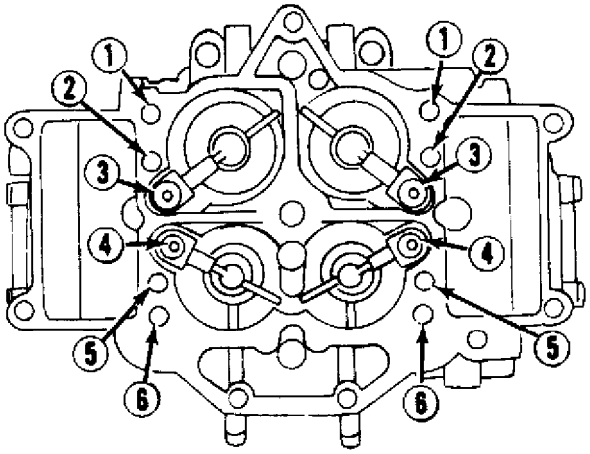

Fig. 9: Removing Jets and Air Bleeds

6) Remove secondary throttle attaching screws, cover, return spring, pin and clip, diaphragm, housing and gasket. Remove "E" clip, washer and shaft, accelerator pump lever, attaching screws, cover, diaphragm and return spring.

7) From main body, remove accelerator pump injection screw, nozzle, gasket, weight, outlet check valve, check valve seat, weight and inlet check valve. Remove retainer, blind plug and washer, primary main jet and secondary main jet.

8) Remove air bleeds and jets. See Fig. 9. Using a hacksaw, remove idle limiter cap by cutting through limiter cap, 0.4" (10 mm) from cap end. Remove and discard mixture adjusting screw and spring.

CLEANING & INSPECTION

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1) Wash all parts in clean solvent and clear all passages using compressed air. Never use wire for cleaning jets, orifices or passages. Inspect air horn, main body and throttle body for cracks or breakage.

2) Inspect choke shaft and throttle shaft for wear, linkage and connecting rods for bends, and return springs for damage. Inspect float, needle valve and seat and strainer for damage.

3) To check air vent solenoid for proper operation, apply battery voltage to solenoid valve, valve stem should pull into valve body. Replace solenoid if it fails to operate properly.

REASSEMBLY

1) To reassemble, reverse the disassembly procedure, using new gaskets. Avoid mixing primary and secondary system parts having similar shape. When installing new mixture screw, seat lightly and back out 3 turns for initial adjustment.

2) When installing bi-metal spring housing, fit choke shaft lever to bi-metal spring by closing choke valve and pulling vacuum diaphragm shaft. Before installing air horn, make necessary float adjustments.

ADJUSTMENT SPECIFICATION

CARBURETOR ADJUSTMENT SPECIFICATIONS

Application	Specification
RX7	
Float Level In. (mm)	.61-.65 (15.5-16.5)
Float Drop In. (mm)	1.98-2.02 (50.5-51.5)
Choke Linkage In. (mm)	.040-.047 (1.0-1.2)
Accel. Cable Free Play In. (mm)	.04-.12 (1.0-1.3)
Choke Valve Opening In. (mm)	.22-.24 (5.5-6.2)

END OF ARTICLE

CHOKE - ELECTRIC ASSIST
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ARTICLE BEGINNING

1983 Exhaust Emission Systems
MAZDA RX7 CHOKE RETURN & HOT START ASSIST SYSTEMS

DESCRIPTION

The Choke Return system prevents the choke knob from being left unreturned to prevent overheating of the exhaust system. The Hot Start Assist system opens the throttle valve partially during cranking of warm engine to optimize air/fuel mixture to improve starting.

The choke return system components include No. 1 water temperature switch, choke relay, choke magnet and choke switch. The hot start assist system components include No. 1 water temperature switch, hot start relay and hot start motor.

OPERATION

CHOKE RETURN SYSTEM

When cold engine is started with assist of choke knob, the knob is held in pulled position by the choke magnet. Full release of choke knob is achieved as engine coolant temperature reaches 158øF (70øC). The No. 1 water temperature switch stops the flow of electrical current to magnet and the choke knob is released.

HOT START ASSIST SYSTEM

During cranking of a warm engine, the No. 1 water temperature switch provides power to the hot start relay when starter is engaged. When hot start relay is activated, the hot start motor pulls the hot start cable which opens the throttle valve.

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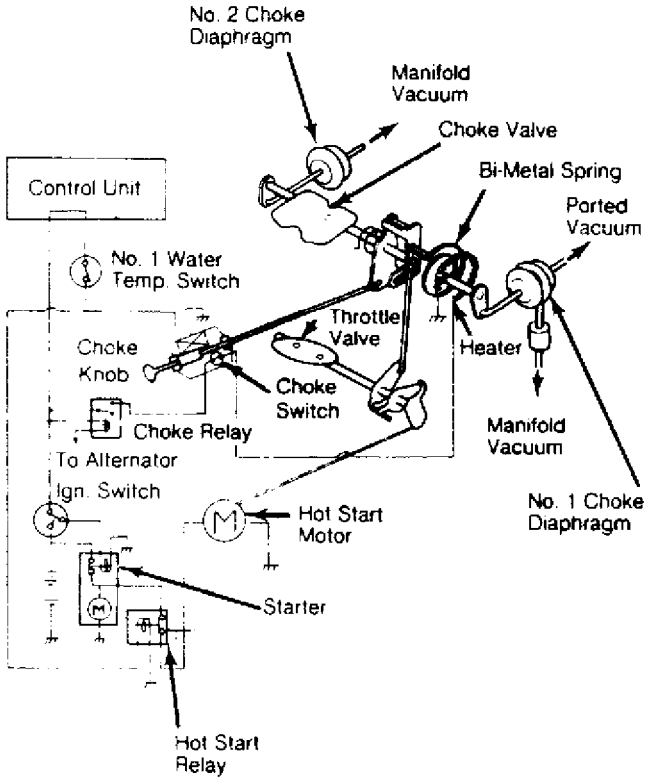

Fig. 1: Choke Return and Hot Start Assist Systems

TESTING

CHOKE RETURN SYSTEM

1) With engine cold and ignition switch "OFF", pull choke knob out fully. Choke knob should return automatically.

2) Connect tachometer to engine. Start engine and set engine speed at 2000 RPM with choke knob. With engine running, choke knob should automatically return when engine temperature indicator is in position shown in Fig. 2.

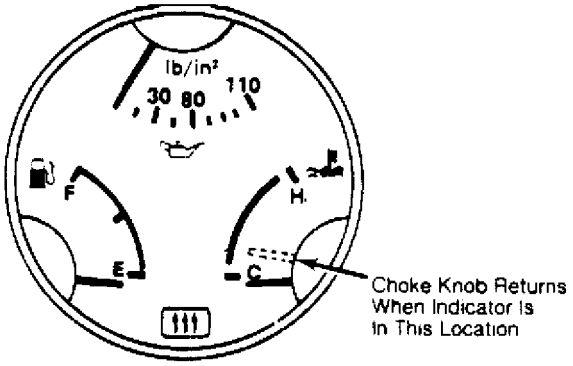

Fig. 2: Engine Temperature Indication for Release of Choke Knob

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CHOKE MAGNET

Disconnect electrical connector from choke switch. Using an ohmmeter, check continuity between terminals. Continuity should exist between terminals No. 6 and No. 8. See Fig. 3.

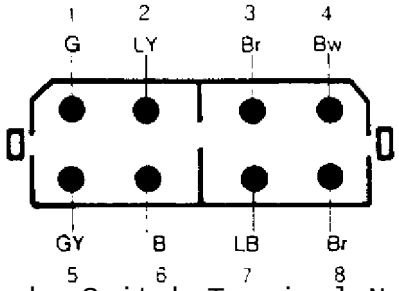

Fig. 3: Choke Switch Terminal Numbering

HOT START ASSIST SYSTEM

NOTE: Before replacing hot start motor or relay, check No. 1 water temperature switch as outlined in "Mazda RX7 Auxiliary Control Device" article in this section.

1) Inspect hot start assist cable and linkage for proper installation, no binding or sticking, and full return. Warm engine to normal operating temperature and stop engine.
2) Disconnect leading and trailing primary wires from ignition coils. Crank engine. Hot start lever should open throttle valve. If hot start system does not respond as outlined, check hot start assist relay.

HOT START ASSIST RELAY

1) Disconnect electrical connector from hot start relay. Using an ohmmeter, check continuity between terminals. Continuity should exist between terminals No. 1 and No. 5 without power applied. Continuity should not exist between terminals No. 1 and No. 3 without power applied.
2) Connect battery power to relay (positive to terminal No. 2, negative to terminal No. 4). With battery power applied, continuity should exist between terminals No. 1 and No. 3. Continuity should not exist between terminals No. 1 and No. 5 with power applied.

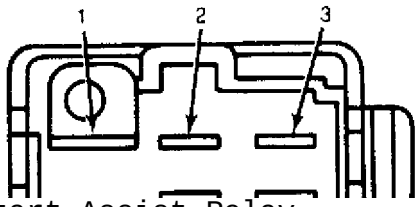

Fig. 4: Hot Start Assist Relay Terminal Numbering

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HOT START ASSIST
CABLE ADJUSTMENT

1) Remove hot start assist cable lock spring from cable bracket. Slowly pull outer cable until hot start lever just touches stopper lever. Check clearance between cable bracket and cable lock nut.

2) If clearance is not .02-.08" (0.5-2.0 mm), adjust clearance by turning lock nut. Recheck clearance and install lock spring.

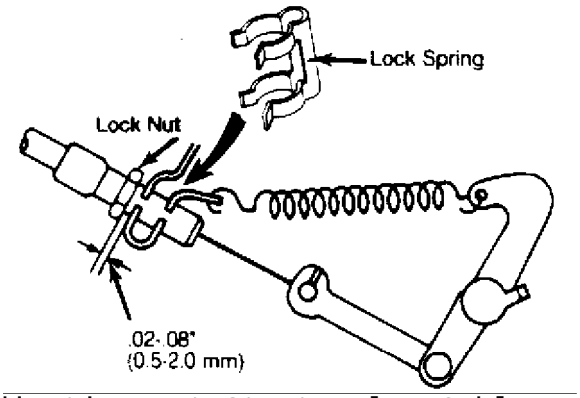

Fig. 5: Adjusting Hot Start Relay Cable

END OF ARTICLE

DECELERATION CONTROL SYSTEM
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ARTICLE BEGINNING

1983 Exhaust Emission Systems
MAZDA RX7 DECELERATION CONTROL SYSTEM

DESCRIPTION

The Deceleration system is designed to maintain a balanced air/fuel mixture during deceleration. System consists of 2 anti-afterburn valves, shutter solenoid valve, coasting/shutter valve, throttle sensor, dashpot (manual transmission models) and connecting hoses and wiring.

OPERATION

The No. 2 anti-afterburn valve (located below air cleaner) is actuated by the shutter solenoid valve to supply additional air from air cleaner to intake manifold at initial deceleration to prevent afterburning of fuel. The coasting/shutter valve work together to supply air (coasting valve) and fuel (shutter valve) during deceleration to prevent backfiring.

TESTING

NO. 1 ANTI-AFTERBURN VALVE

1) Warm engine to normal operating temperature and ensure engine operates smoothly at idle. Stop engine. Disconnect air pump-to-air control hose at air pump.
2) Disconnect electrical connectors from relief solenoid valve (Blue color dot) and switching solenoid valve (Gray color dot). Start engine and run at idle. Place finger over air pump-to-air control hose.
3) Air should not be drawn in and idle speed should not change. Disconnect vacuum sensing tube "A". The idle speed should drop and return to normal idle when tube is connected. If valve does not respond as outlined, replace No. 1 anti-afterburn valve.

NOTE: Before replacing No. 1 anti-afterburn valve, check auxiliary control unit as outlined in "Mazda RX7 Auxiliary Control Device" article in this section. Also check relief solenoid valve and switching solenoid valve as described in "Mazda RX7 Air Injection System" article in this section.

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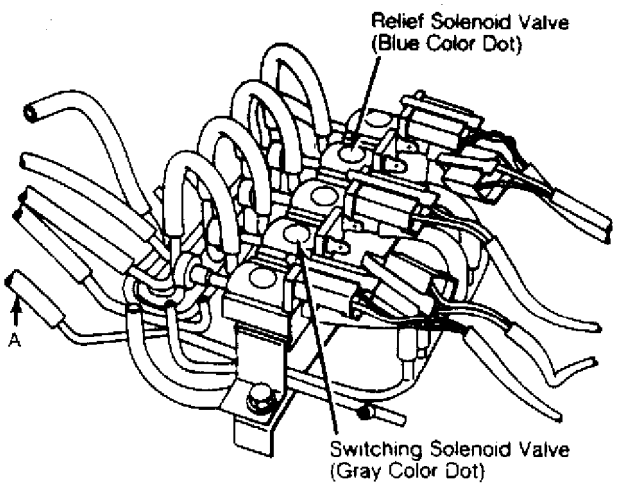

Fig. 1: Testing No. 1 Anti-Afterburn Valve

NO. 2 ANTI-AFTERBURN VALVE

1) Warm engine to normal operating temperature. Disconnect No. 2 anti-afterburn valve-to-air cleaner hose at air cleaner. Place finger over hose and ensure air is not drawn into hose.
2) Disconnect vacuum sensing hose from No. 2 anti-afterburn valve. Air should not be drawn into hose. Connect vacuum sensing hose to valve; air should be drawn into anti-afterburn valve-to-air cleaner hose for 3 seconds.
3) If air is drawn for more than 3 seconds or no air is drawn, replace No. 2 anti-afterburn valve.

THROTTLE SENSOR

1) Warm engine to normal operating temperature. Stop engine. Connect tachometer to engine. Disconnect throttle sensor electrical connector, located on right side of engine (Black/Yellow and Green/Black wires).
2) Using 2 voltmeters, connect positive lead of one voltmeter to Light Green/Yellow wire terminal of throttle sensor check connector.
3) Connect positive lead of other voltmeter to Green/Yellow wire terminal of throttle sensor connector. Connect negative terminals of voltmeters to good ground. See Fig. 2.

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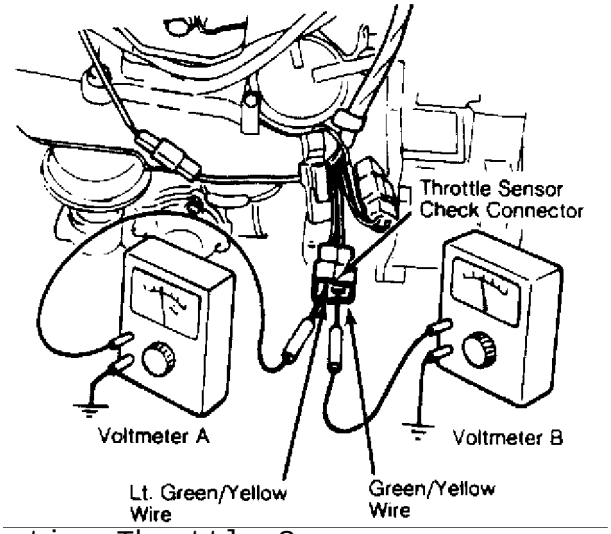

Fig. 2: Testing Throttle Sensor

4) Start engine and run at 3000 RPM. Quickly decelerate engine. Current should flow to both terminals simultaneously when engine speed is 1000-1200 RPM.

5) If current does not flow to both terminals at the same time, remove cap from throttle sensor adjusting screw and adjust throttle sensor.

6) Adjust timing of current flow to voltmeter "A" in Fig. 2 by turning throttle sensor adjusting screw.

7) Turning screw in causes current to flow to Light Green/Yellow wire at lower engine speed. After adjustment, install cap on throttle sensor adjusting screw and retest throttle sensor.

SHUTTER SOLENOID VALVE

1) Disconnect vacuum sensing tubes from shutter solenoid valve (Yellow color dot). Blow through solenoid valve through vacuum hose "B" shown in Fig. 3; air should go through valve and escape at front port.

2) Disconnect electrical connector and apply battery power to terminals on solenoid valve. Blow through hose again; air should escape through air filter at rear of solenoid valve. Replace valve if it does not respond as outlined.

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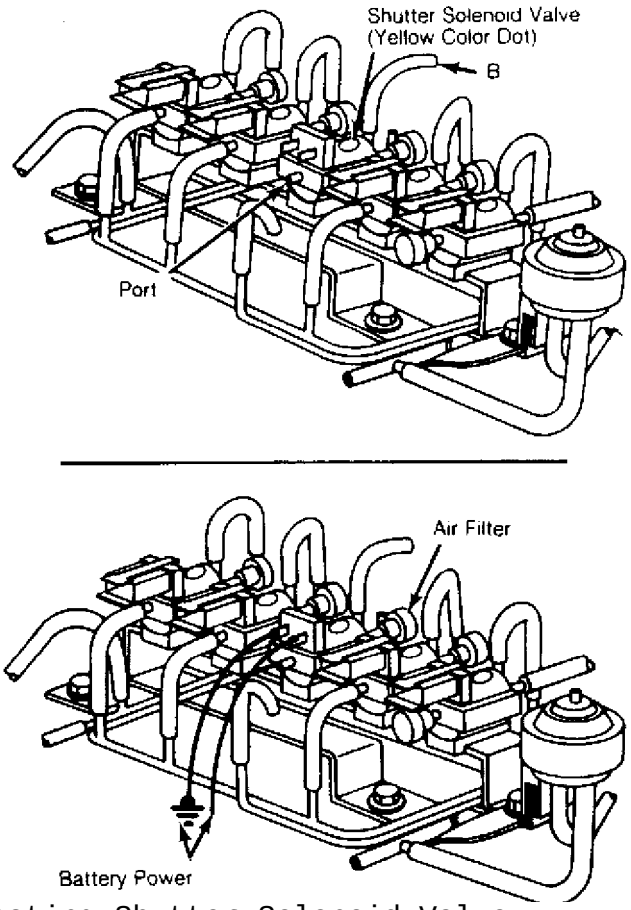

Fig. 3: Testing Shutter Solenoid Valve

SHUTTER SOLENOID VALVE SIGNAL CHECK

1) Warm engine to normal operating temperature. Stop engine. Connect tachometer to engine. Connect voltmeter to negative (Light Green/Yellow) terminal of shutter solenoid valve electrical connector without disconnecting connector.

2) Disconnect throttle sensor electrical connector (Black/Yellow and Green/Black wires). Shift automatic transmission into "P" or "N". Start engine and run at idle.

3) Voltmeter should read 0V at shutter solenoid valve terminals. Disconnect electrical connector from throttle sensor. Voltmeter should read near 12V and engine idle is erratic.

4) Shift automatic transmission into "D". Connect throttle sensor connector disconnected in step 1). Voltmeter should read near 12V.

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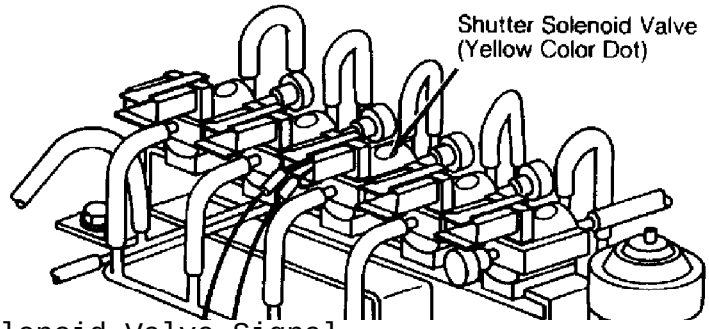

Fig. 4: Testing Shutter Solenoid Valve Signal

5) On automatic transmissions, shift into "P" or "N". Current should NOT flow to solenoid valve terminal at any engine speed. If solenoid valve does not respond as described, replace shutter solenoid valve.

NOTE: Before replacing shutter solenoid valve, check auxiliary control unit as outlined in "Mazda RX7 Auxiliary Control Device" article in this section. Also check relief solenoid valve and switching solenoid valve as described in "Mazda RX7 Air Injection System" article in this section.

COASTING/SHUTTER VALVE

1) Warm engine to normal operating temperature. Stop engine. Disconnect air cleaner-to-coasting valve hose at air cleaner. Start engine and run at idle. Place finger over disconnected hose; air should not be drawn into hose.

2) Disconnect electrical connector from shutter solenoid valve (Yellow dot). Air should be drawn into disconnected hose and idle should fluctuate.

3) At the same time, the coasting valve rod should be pulled into coasting valve about .4" (10mm), opening shutter valve. Replace coasting/shutter valve if it does not respond as outlined.

DASHPOT (MAN. TRANS. ONLY)

1) Remove air cleaner. Checking all vacuum sensing tubes for proper condition and connections. Check that dashpot rod does not bind throttle lever movement.

2) Quickly operate throttle lever fully and make sure dashpot rod extends quickly. Release throttle lever and make sure that throttle lever returns slowly to idle position after it has touched dashpot rod.

3) Connect tachometer to engine. Start engine and warm to operating temperature. Ensure engine idle speed is adjusted to specification. Operate throttle lever until it is away from dashpot rod.

4) Slowly decrease engine speed and check speed at which throttle lever just touches dashpot rod. It should be 3800-4200 RPM.

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If not, loosen lock nut and turn dashpot diaphragm to adjust engine speed.

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EMISSION APPLICATION
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ARTICLE BEGINNING

1983 ENGINE EMISSIONS
Mazda Emission Control Applications

626, GLC, Pickup, RX7

EMISSION CONTROL DEVICE APPLICATIONS

EMISSION CONTROL DEVICE APPLICATIONS TABLE

B2000 2.0L
PCV, AIS, EVAP, OC, EGR, SPK, AI (1), DCS

B2000 2.2L Diesel
PCV, EGR

FWD GLC 1.5L
PCV, EVAP, EGR, ECC, FCO, HIC

RWD GLC 1.5L
PCV, AIS, EVAP, OC, EGR, DCS, HIC

RX7
PCV, AIS, EVAP, TWC, ACD, CRV, DCS, IC, ITCS (2)

626 2.0L
TAC, EVAP, OC, EGR, FCO, HIC

(1) - California only.
(2) - Exc. California only.

ABBREVIATION DEFINITIONS

ABBREVIATIONS DEFINITIONS TABLE

Abbreviation	Description
ACD	Auxiliary Control Device
AI	Air Injection
AIS	Air Injection System
CEC	Computerized Engine Controls
CRV	Coasting Richer Valve
DCS	Deceleration Control System
ECC	Electronic Controlled Carburetor
EVAP	Evaporative Emission Control
EGR	Exhaust Gas Recirculation
FCO	Fuel Cut-Off
HIC	Hot Idle Compensator
IC	Integrated Control

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ITCS ..... Ignition Timing Control System
OC ..... Oxyidation Catalyst
O2 ..... Oxygen Sensor
PCV ..... Positive Crankcase Ventilation
SPK ..... Spark
TAC ..... Thermostatic Air Cleaner
TWC ..... Three-Way Catalyst

END OF ARTICLE

FUEL EVAPORATION SYSTEM
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ARTICLE BEGINNING

1983 Fuel Evaporation Systems
MAZDA ROTARY ENGINE

RX7

DESCRIPTION

System prevents escape of fuel vapors into atmosphere. Components consist of a non-vented fuel tank with integral vapor separator, vapor valve, check and cut valve (located at fuel tank), charcoal canister, air vent solenoid valve, purge valve and connecting hoses.

OPERATION

When engine is not running, fuel vapors formed in fuel tank pass through vapor valve. Those vapors that do not condense to liquid fuel are routed through vent lines to charcoal canister where they are adsorbed. When engine is running, filtered air is drawn into the system through the air cleaner, mixed with gases and vapors that blow by the rotor and are drawn through purge valve and into intake runner to be burned. The purge valve operates as the PCV and check valve.

AIR VENT SYSTEM

An air vent solenoid on carburetor prevents carburetor bowl evaporated fuel from collecting in the intake manifold after hot engine shut off. With ignition off, the solenoid closes an air vent in the carbon canister, trapping the evaporated fuel.

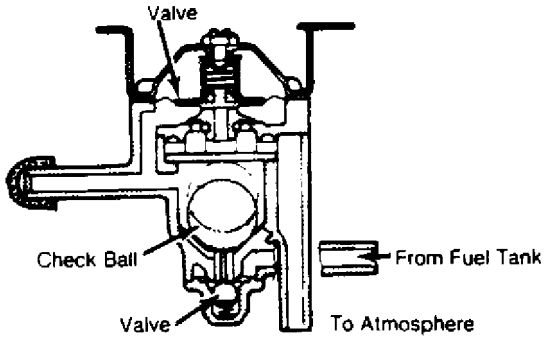

Fig. 1: Mazda RX7 Check and Cut Valve

FUEL EVAPORATION SYSTEM

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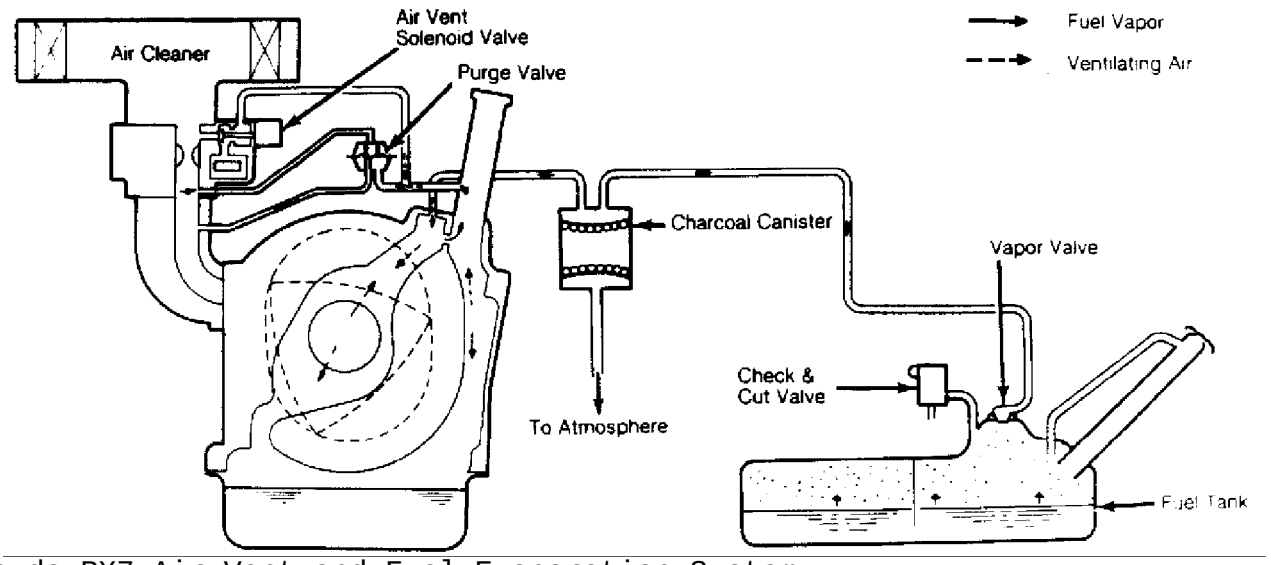

Fig. 2: Mazda RX7 Air Vent and Fuel Evaporation System

CHECK & CUT VALVE

This valve has 3 functions: When fuel tank pressure becomes too high, valve releases pressure to atmosphere. When vacuum becomes too high, valve allows air into tank to prevent tank from collapsing. If vehicle is overturned, valve prevents fuel leakage by sealing the line with a check ball.

TESTING

EVAPORATIVE LINE CHECK

1) Disconnect evaporative hose from canister. Connect detached hose to a "U" tube type pressure gauge filled with water.
2) Gradually apply low air pressure into "U" tube so that difference of water level reaches 14" (356 mm).
3) Bind inlet of "U" tube and leave bound for 5 minutes. If water level drops no more than 1" (25 mm) after 5 minutes, evaporative line is in good condition.

CHECK & CUT VALVE

1) Remove check and cut valve from lines. Connect a pressure gauge with "T" on nipple leading to fuel tank. Hold finger over opposite nipple.
2) Blow through open end of "T" fitting. When pressure gauge reads .78-1.0 psi (.06-.07 kg/cmý), valve should open.
3) Remove "T" fitting and gauge from fuel tank nipple and connect to nipple at bottom of valve (atmosphere vent). Valve should be located horizontally.
4) Repeat test. Valve should open when pressure gauge reads .14-.71 psi (.01-.05 kg/cmý). If valve does not operate as described, replace check and cut valve.

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AIR VENT SOLENOID VALVE

Check air vent hose for cracks or damage. Disconnect air vent hose from ventilation pipe. Slowly blow through hose. Air should pass through solenoid. Turn ignition "ON" and blow through hose again. Air should not pass through valve. If valve does not operate as described, replace valve.

MAINTENANCE

Check system function every 15,000 miles. Check and Cut Valve should be tested every 25,000 miles. Replace parts as necessary.

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FUEL PUMP - ELECTRIC
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ARTICLE BEGINNING

1983 Electric Fuel Pump
MAZDA

RX7, Pickup

DESCRIPTION & OPERATION

Electric fuel pump is mounted near fuel tank on frame member. Power is supplied when ignition switch is in the "RUN" position. This circuit is protected by a 15-amp fuse (20-amp on RX7) at fuse panel. In-line fuel filter must be changed within recommended mileage interval before performing tests. If in doubt, install new filter.

TESTING

PRESSURE TEST

1) Remove air cleaner assembly and disconnect fuel line at carburetor. Connect pressure gauge with restrictor and a flexible hose. See Fig. 1. Turn ignition on and briefly vent the system into container by opening hose restrictor.
2) Pressure should stabilize at 2.8-3.6 psi (.19-.25 kg/cmý). If not within specifications, and lines and filter are in satisfactory condition, replace pump.

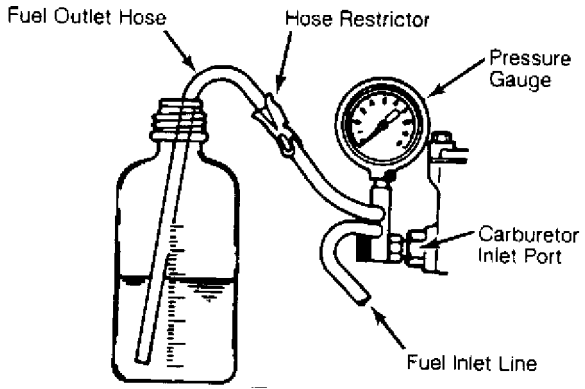

Fig. 1: Fuel Pump Pressure and Volume Test

VOLUME TEST

With fuel pressure within limits, open restrictor for one minute and measure fuel expelled. If not within specifications, check for restrictions in tank, line or filter. Replace pump if required.

FUEL PUMP VOLUME

Application	Volume Qt./Min. (cc/Min.)

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RX7 ..... 1.5 (1400)
Pickup ..... .8(800)

FUEL PUMP

Removal & Installation (B2000)

Disconnect negative battery cable. Unplug connector at fuel pump. Disconnect inlet and outlet hoses at fuel pump. Remove fuel pump-to-mounting bracket nuts and remove pump. To install, reverse removal procedure.

Removal & Installation (RX7)

Remove rear floor mat and disconnect fuel pump electrical lead. Raise and support vehicle. Remove fuel pump cover. Disconnect inlet and outlet hoses from pump. Remove fuel pump. To install, reverse removal procedure.

END OF ARTICLE

HOT IDLE COMPENSATION SYSTEM

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ARTICLE BEGINNING

1983 Exhaust Emission Systems
MAZDA PISTON ENGINE
HOT IDLE COMPENSATION SYSTEM

All Models

DESCRIPTION

The Hot Idle Compensation System supplies additional air to intake manifold under hot idle conditions to maintain smooth idle and reduce emissions. A bi-metal valve in air cleaner opens passage from air cleaner to intake manifold. When this happens, fresh air mixes with rich air/fuel mixture (caused by sustained idle) and creates better combustion. Valve opens between 145-160øF (63-71øC).

TESTING

HOT IDLE COMPENSATOR

When engine is cold or air temperature is normal, detach air hose from intake manifold and try to pull air through with vacuum pump. No air should pass through compensator. Using a heat lamp, heat valve to temperature above 155øF (69øC) and try to pull air through hose. Air should pass through compensator. If not, replace compensator.

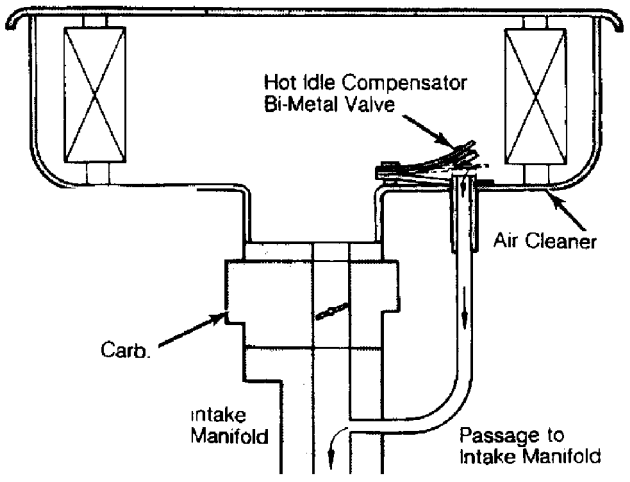

Fig. 1: Mazda Hot Idle Compensator Valve

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ARTICLE BEGINNING

1983 Exhaust Emission Systems
MAZDA RX7 IDLE COMPENSATION SYSTEM

DESCRIPTION

The Idle Compensation system is installed to control the air/fuel mixture under varying engine operating conditions. The system consists of idle compensator, altitude compensator and throttle opener (air conditioned models).

IDLE COMPENSATOR OPERATION

The idle compensator is a bimetal valve installed in the air cleaner. The bimetal valve opens at approximately 149øF (65øC) to supply additional air to intake manifold to lean the air/fuel mixture for more complete burning.

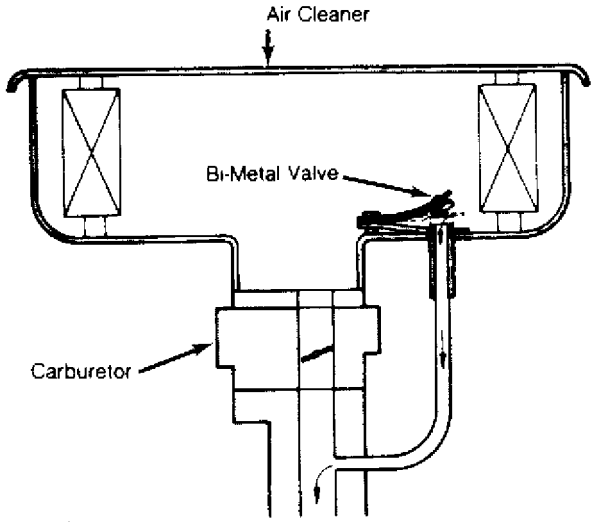

Fig. 1: Idle Compensator

ALTITUDE COMPENSATOR OPERATION

The altitude compensator is installed on the carburetor to supply additional air to carburetor during idle mode in high altitude areas. The altitude compensator stabilizes engine operation.

THROTTLE OPENER OPERATION

AIR CONDITIONED MODELS

The throttle opener consists of air conditioner switch (relay on manual transmission models), air conditioner solenoid valve, servo

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diaphragm (throttle opener) and connecting hoses and wires. The throttle opener opens the primary throttle valve when air conditioner is operated at engine speeds of 1000-1200 RPM to maintain smooth engine operation.

IDLE COMPENSATOR TEST

Remove air cleaner cover and filter element. When bi-metal temperature is below 149øF (65øC), valve should be closed and no air leakage should exist when vacuum is applied to tube. Bi-metal valve should be open when temperature exceeds 159øF (69øC). If valve does not function as described, replace valve.

ALTITUDE COMPENSATOR TEST

NOTE: Altitude compensator can only be checked at altitudes of 1640-4920 ft. (500-1500 m).

1) Remove air cleaner and start engine. Engine should idle smoothly. Place finger over slow port inside carburetor bore (located on right side of rear bore). With slow port covered, idle speed should drop.

2) If idle speed does not drop, stop engine and remove compensator valve. With compensator valve removed, blow through drilled passages.

3) Air should pass through valve from both passages at altitudes of 1640-4920 ft. (500-1500 m). If not, replace altitude compensator valve.

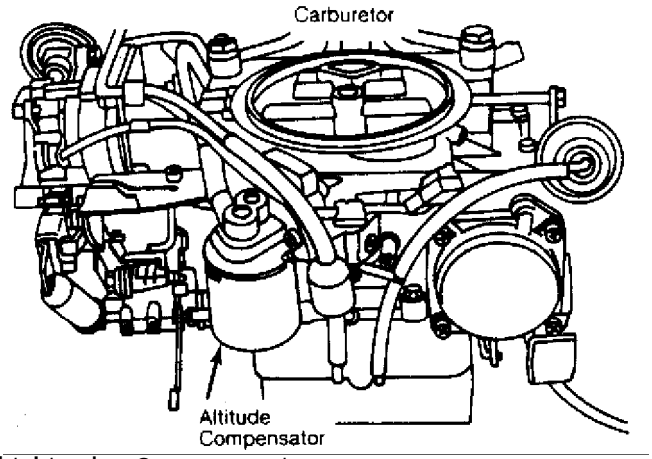

Fig. 2: Altitude Compensator

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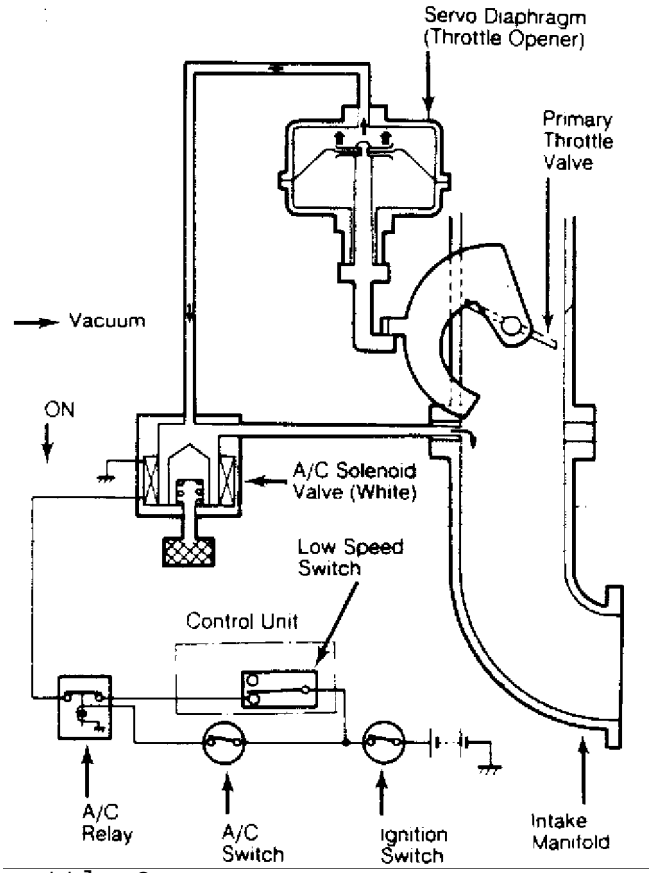

Fig. 3: Throttle Opener

AIR CONDITIONER SOLENOID VALVE TEST

1) Disconnect vacuum sensing tubes from solenoid valve and vacuum port (rear of valve). Blow through vacuum hose and ensure air passes through valve and escapes from air filter. See Fig. 4.

2) Disconnect solenoid valve electrical connector and apply battery power to terminals. Blow through hose again. Air should pass through valve and escape from rear port. See Fig. 4. If valve does not respond as outlined, perform signal check.

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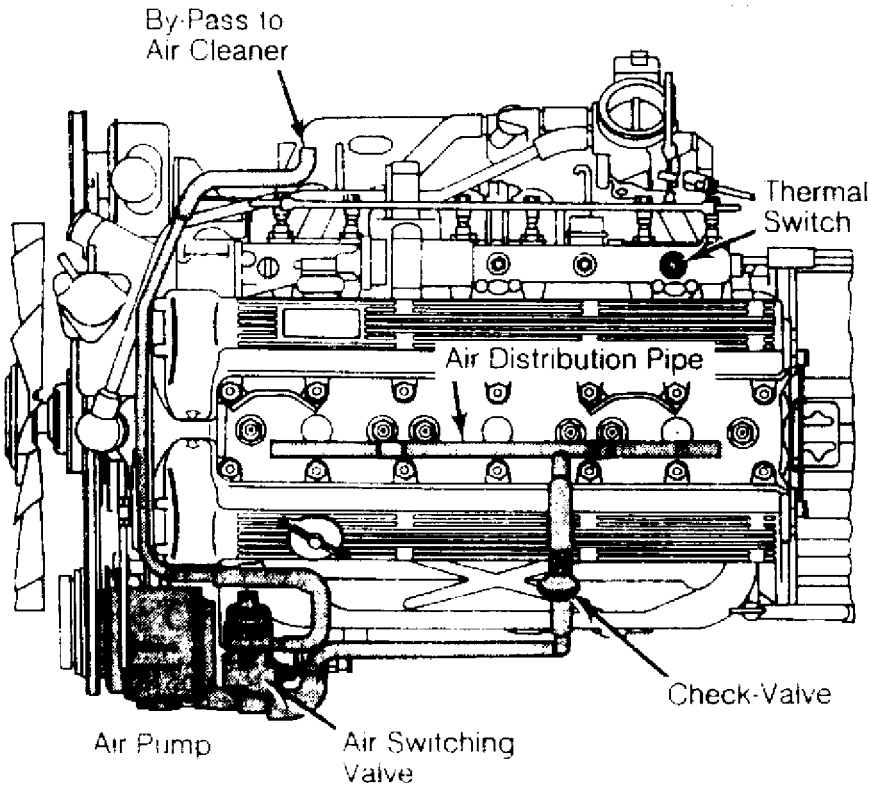

Fig. 4: Testing Air Conditioner Solenoid Valve

AIR CONDITIONER SOLENOID VALVE SIGNAL CHECK TEST

1) Warm engine to normal operating temperature. Stop engine and connect tachometer. Connect a voltmeter to the air conditioner solenoid valve (White color dot) negative terminal. Start engine and turn air conditioner on.

2) On automatic transmission models, current should NOT flow to solenoid valve at any engine speed. On manual transmission models, increase engine speed to 2000 RPM with throttle.

3) Slowly decrease engine speed and watch voltmeter. Voltmeter should read near 0V when engine speed is 1000-1200 RPM. If valve does not respond as outlined, replace air conditioner solenoid valve.

NOTE: Before replacing air conditioner solenoid valve, check auxiliary control unit as outlined in "Mazda RX7 Auxiliary Control Device" article in this section.

AIR CONDITIONER RELAY TEST

Man. Trans. Only

1) Disconnect electrical connector from air conditioner relay. Using an ohmmeter, check continuity between terminals.

2) With engine off and no power applied, there should be

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continuity between No. 1 and No. 5. There should be no continuity between No. 1 and No. 3.

3) Connect a wire from battery positive post to terminal No. 2 and battery negative post to terminal No. 4. There should be continuity between No. 1 and No. 3. There should be no continuity between No. 1 and No. 5.

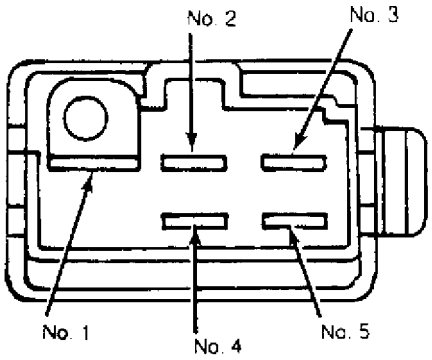

Fig. 5: Air Conditioner Relay Terminals (Manual Transmission Only)

THROTTLE OPENER TEST

1) Switch off all accessories. Remove fuel filler cap. Disconnect and plug idle compensator tube at air cleaner. Connect tachometer to engine and warm engine to normal operating temperature.

2) Disconnect electrical connector from switching solenoid valve (Gray color dot). Disconnect and plug vacuum sensing tubes from vacuum control units on distributor (except Calif. Man. Trans.).

3) Turn air conditioner off. Disconnect electrical connector from air conditioner solenoid valve and connect battery power to solenoid terminals.

4) With battery power applied to solenoid terminals, throttle opener should increase engine speed from idle to 1150-1250 RPM (in Neutral). If engine speed is not within specification, turn adjusting nut on throttle opener arm until engine speed is within specification.

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PCV SYSTEM
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ARTICLE BEGINNING

1983 Crankcase Ventilation
MAZDA

B2000, B2200, GLC, 626, RX7

DESCRIPTION & OPERATION

PISTON ENGINES

The PCV system includes 2 hoses and a PCV valve. Air normally flows out of the valve cover hose, through the PCV valve and into combustion chambers. A hose from the air cleaner to the valve cover supplies fresh air to the crankcase.

When intake manifold vacuum drops due to heavy loads, the amount of blow-by exceeds the capacity of the PCV valve. Air then flows directly from the valve cover into the air cleaner and carburetor. When engine is not running, the PCV valve is closed and vapors are stored in the crankcase.

ROTARY ENGINES

The system used on the rotary engine (RX7) is also a closed system and operates basically the same way as the piston engine arrangement.

Filtered air is drawn into the system through the air cleaner, mixed with the gases and vapors that blow by the rotor during engine operation, and is drawn out through a purge valve and into the intake manifold. The purge valve operates as the PCV valve in this system.

DIESEL ENGINE

The PCV system on diesel engines consists of a hose to the air intake from the cylinder head cover. All blow-by gases are introduced into the air intake and prevented from entering the atmosphere. There is no testing the PCV system on the diesel engines. Hoses should be kept free of obstructions.

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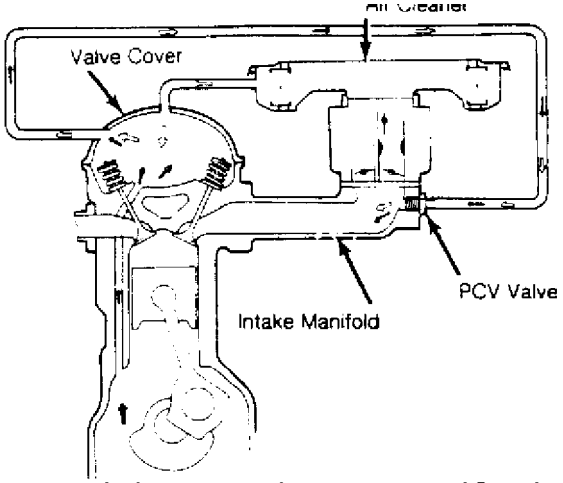

Fig. 1: B2000 Pickup Crankcase Ventilation System

TESTING

PISTON ENGINES

All Exc. GLC FWD

With engine idling at normal operating temperature, disconnect PCV valve hose at valve cover. Close off hose opening with finger and check that idle speed drops. If idle speed does not drop, replace valve.

GLC FWD

Remove PCV valve from valve cover. Blow through valve with mouth pressure from valve cover side of valve. Air should pass through. Blow through valve from opposite end. Air should not pass through. If valve does not operate as described, replace valve.

ROTARY ENGINES

1) Disconnect purge valve-to-oil filler tube hose from purge valve. Start engine and operate at idle speed. Place finger over port "C" and check that air is not being drawn into port. See Fig. 2.

2) Increase engine speed to 2000 RPM and check port "C". Air should be drawn into port. If valve does not operate as outlined, replace purge valve.

MAINTENANCE

Clean valve and check PCV system operation every 30,000 miles.

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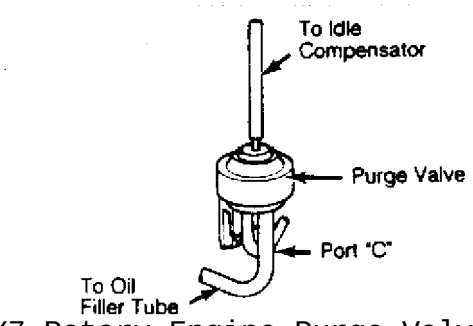

Fig. 2: RX7 Rotary Engine Purge Valve
Air flow should be checked at port "C".

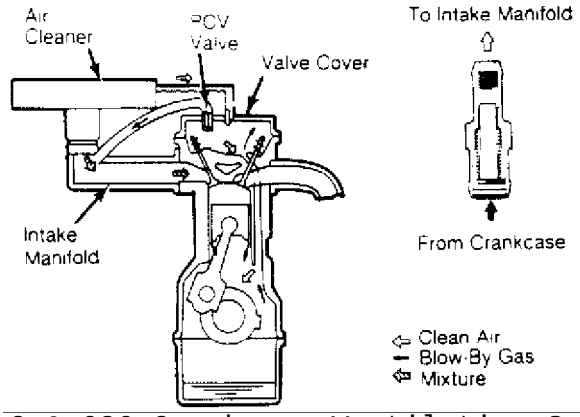

Fig. 3: GLC & 626 Crankcase Ventilation System
Note direction of flow.

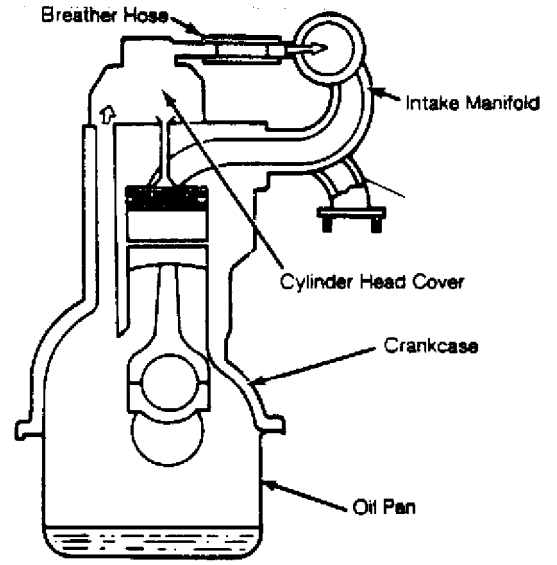

Fig. 4: B2200 Diesel Pickup Crankcase Ventilation System

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SPARK CONTROL SYSTEM
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ARTICLE BEGINNING

1983 Exhaust Emission Systems
MAZDA RX7 IGNITION CONTROL SYSTEM

RX7 (Exc. Calif. Man. Trans.)

DESCRIPTION

The Ignition Control system is used to regulate vacuum advance of leading and trailing distributor systems. In addition, this system helps reduce CO and HC emissions by aiding pellet converter warm-up during cold engine starts.

System consists of leading and trailing components of distributor system, vacuum control solenoid valve (except Calif. man. trans.), No. 1 water temperature switch and connecting wiring and tubing.

OPERATION

The Ignition Control system operates when engine is cold and running between 1000-1200 RPM and when engine is hot during quick deceleration from 3000 RPM.

TESTING

NOTE: For additional information and adjustments on distributor spark timing, see appropriate information in "Mazda RX7 Tune-Up Service Procedures," article in this section.

VACUUM CONTROL SOLENOID VALVE

1) Disconnect vacuum sensing tubes from leading vacuum control solenoid valve (Brown dot). Blow through solenoid valve from vacuum tube "B" shown in Fig. 1. Air should escape at front port. Trailing vacuum control solenoid valve (Green dot) is tested in the same manner.

2) Disconnect electrical connector from solenoid valve and connect battery power to terminals on valve. Blow through hose again. Air should escape through air filter at rear of valve. Replace valve if it does not perform as outlined.

VACUUM CONTROL SOLENOID VALVE
SIGNAL CHECK

1) Warm engine to normal operating temperature. Stop engine and connect tachometer to engine. Connect voltmeter to negative terminal of leading vacuum control solenoid valve (do not unplug connector). Place auto. trans. vehicles in "P", man. trans. vehicles in Neutral.

2) Start engine and run at idle speed. Voltmeter should read

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0V at idle. When transmission is shifted into any forward or reverse gears, voltmeter should read near 12V.

3) Increase engine speed to 2000 RPM. Slowly decrease engine speed from 2000 RPM and watch voltmeter. Current should stop flowing to solenoid terminals when engine speed is 1000-1200 RPM.

4) Stop engine and disconnect No. 1 water temperature switch connector (located behind alternator). Connect a jumper wire between terminals of water temperature connector. Start engine and set engine speed at 2000 RPM with choke knob.

5) Unplug connector from No. 2 water temperature switch (located on radiator). Check that the voltmeter reads near 12V when the connector is unplugged from the switch. Disconnect jumper wire and plug in No. 1 water temperature switch connector.

6) Quickly decelerate engine speed from 3000 RPM. The voltmeter should read near 0V during deceleration and at idle speed. Trailing vacuum control solenoid valve (Green dot) is tested in the same manner.

NOTE: Before replacing vacuum control solenoid valve, check auxiliary control unit, No. 2 water temperature switch, choke switch and choke relay as described in "Mazda RX7 Auxiliary Control Device," article in this section. Also check throttle sensor as described in "Mazda RX7 Deceleration Control System," article in this section.

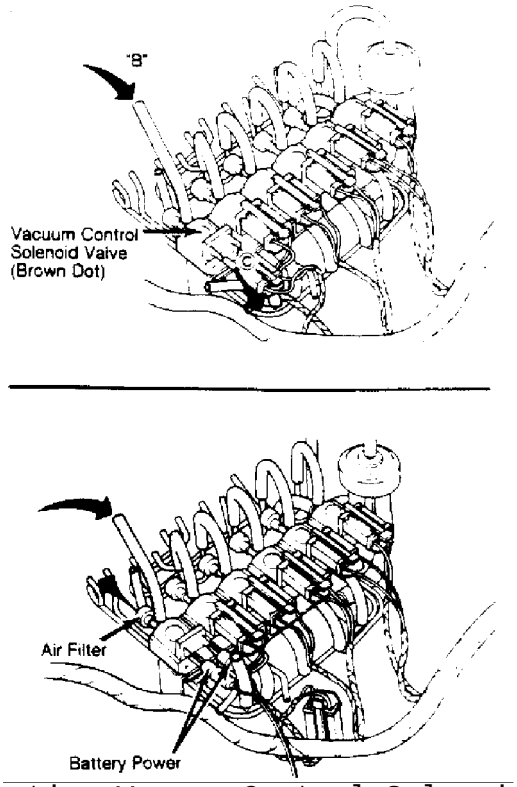

Fig. 1: Testing Vacuum Control Solenoid Valve
Voltmeter and tachometer required for tests.

TUNE-UP - ROTARY
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ARTICLE BEGINNING

1983 Mazda Rotary Tune-Up
TUNE-UP

RX7

IDENTIFICATION

ENGINE IDENTIFICATION

Engine type code is stamped on rear rotor housing, to the rear of oil filter. Engine serial number is stamped on front rotor housing behind distributor.

TESTING

ENGINE COMPRESSION

The manufacturer recommends using a special compression tester (49 0820 280K). Compression testers for piston engines will read only the highest pressure of the 3 combustion chambers in the rotor housing.

COMPRESSION SPECIFICATIONS

Application	Specification
Min. Compression Pressure	86 psi (6.0 kg/cmý)
Max. Variation	21 psi (1.5 kg/cmý)

SPARK PLUGS

SPARK PLUG TYPE

Application	Nippondenso No.	NGK No.
All Models	W25EDR14	BR8EQ14

SPARK PLUG SPECIFICATIONS

Gap: In. (mm)	Torque: Ft. Lbs. (N.m)
0.055 (1.4)	11 (15)

HIGH TENSION WIRE RESISTANCE

Carefully remove high tension wires from spark plugs and

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distributor cap. Using an ohmmeter, measure resistance of wires while gently twisting wires. If resistance is not to specifications, or fluctuates from infinity to any value, replace high tension wire(s).

HIGH TENSION WIRE RESISTANCE

Application	Ohms
All Models	4880 per Foot

ADJUSTMENTS

DISTRIBUTOR

All models are equipped with Mitsubishi electronic ignition with 2 pick-up coils. Air gap is non-adjustable.

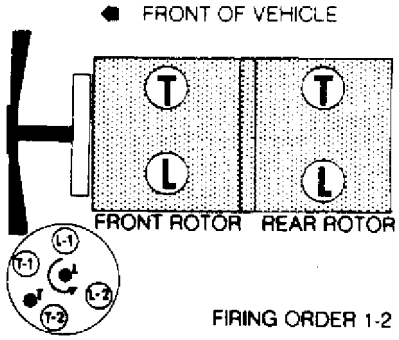

Fig. 1: Firing Order and Distributor Rotation

IGNITION TIMING

NOTE: On vehicles equipped with automatic transmission, place selector lever in "D" position and block the wheels.

1) Warm engine to normal operating temperature. Connect a tachometer, then connect timing light to leading (lower) spark plug of front rotor. Start engine and run at idle speed.
2) Check ignition timing and rotate distributor to correct if necessary. Tighten distributor lock nut and recheck timing.
3) Connect timing light to trailing (upper) plug of front rotor. Start engine and check timing. If not correct, loosen vacuum unit attaching screws. Move vacuum unit in or out to adjust trailing timing. Remove test equipment.

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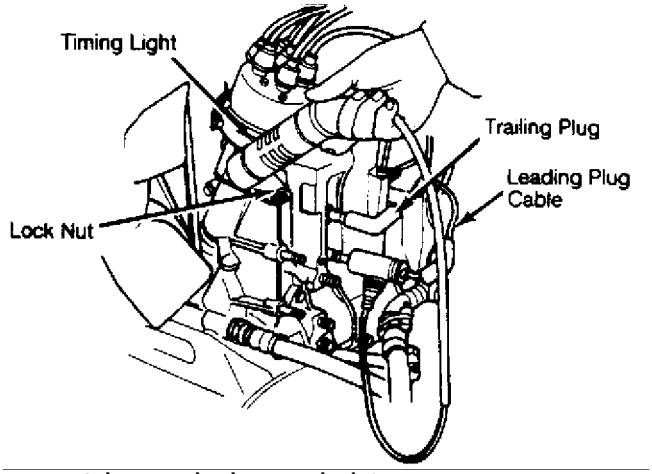

Fig. 2: Connecting Timing Light
Check leading plug timing first.

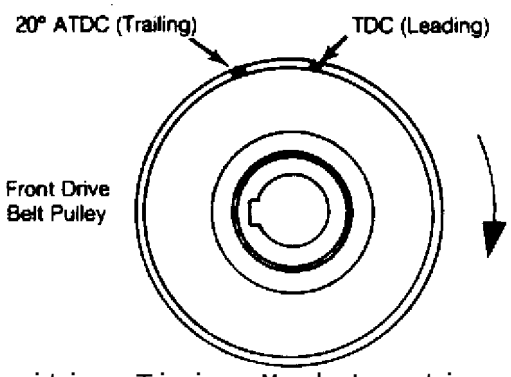

Fig. 3: Ignition Timing Mark Location

IGNITION TIMING (DEGREES ATDC @ RPM)

Application	Timing
Leading	TDC@750
Trailing	20@750

IDLE SPEED & MIXTURE

Idle Speed

1) Switch off all accessories. Remove fuel filler cap. Disconnect and plug idle compensator tube at air cleaner. Connect tachometer to engine. Ensure parking brake is engaged and wheels are blocked.

2) On manual transmission models, make sure dashpot rod does not keep throttle lever from returning to stop. On air conditioned models, make sure throttle opener does not keep throttle lever from returning to stop.

3) Warm engine to normal operating temperature. Place automatic transmission in "D". Check idle speed. Adjust curb idle

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speed to specification by turning throttle adjusting screw.

NOTE: Mixture adjustment is not part of normal tune-up procedure and should not be performed unless carburetor is overhauled or vehicle fails emissions testing.

Idle Mixture

1) Idle mixture adjustment requires removal of carburetor to remove limiter cap. Using a hacksaw, cut through limiter cap and mixture screw 0.4" (10 mm) from cap end. Remove mixture screw and install new mixture screw.

2) To install new mixture screw, tighten screw lightly and ensure it is fully seated. Back screw out 3 turns for preliminary adjustment. Reinstall carburetor with new gaskets and warm engine to normal operating temperature.

3) To adjust idle mixture, set idle speed to idle set specification by turning throttle set screw (automatic transmission in "N"). Set idle speed to highest RPM obtainable by turning mixture screw. Reset idle speed to idle set specification by turning throttle screw. See Fig. 4.

4) Turn mixture screw until lean drop specification is obtained (automatic transmission in "N"). On automatic transmission, shift transmission to "D" and set idle speed to curb idle specification by turning throttle screw.

IDLE SPEED & MIXTURE SPECIFICATIONS

Application	Curb Idle RPM	Idle Set RPM	Lean Drop RPM
Man. Trans.	750	770	750
Auto. Trans.	(1) 750	(2) 870	(2) 840

(1) - Transmission in "D".
(2) - Transmission in "N".

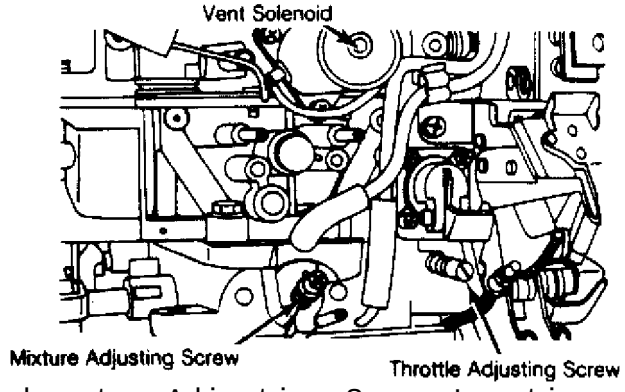

Fig. 4: Carburetor Adjusting Screw Locations

COLD (FAST) IDLE RPM

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NOTE: Carburetor must be removed to check and/or adjust fast idle.

Adjust fast idle by setting angle of primary throttle valve with choke valve fully closed. Clearance between primary throttle valve and throttle bore should be .040-.047" (1.0-1.2 mm). If not to specification, bend fast idle rod until correct clearance is obtained.

SERVICING

EMISSION CONTROL

See EMISSIONS section.

SPECIFICATIONS

IGNITION

Distributor
All models are equipped with Mitsubishi electronic ignition with 2 pick-up coils. Air gap is non-adjustable.

IGNITION COIL RESISTANCE - Ohms @ 68øF (20øC)

Primary	Secondary
1.2-1.5	N/A

FUEL SYSTEMS

FUEL PUMP PERFORMANCE

Pressure: psi (kg/cmý)	Pints (Liters): Volume in 30 Sec.
2.8-3.6 (.2-.3)	1.5 (.7)

Carburetor
All models use a Nikki 4-Bbl. carburetor.

BATTERY

BATTERY SPECIFICATIONS

Application	Amp Hr. Capacity
Standard	50
Optional	55

STARTER

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All models are equipped with a Mitsubishi starter using an overrunning clutch.

STARTER SPECIFICATIONS

Application	Volts	Amps	Test RPM
Man. Trans.	11.5	60	6500
Auto. Trans.	11.5	100	3500

ALTERNATOR

All models are equipped with a Mitsubishi alternator.

ALTERNATOR SPECIFICATIONS

Application	Rated Amp Output
All Models	50

ALTERNATOR REGULATOR

All models are equipped with a Mitsubishi voltage regulator.

REGULATOR OPERATING VOLTAGE @ 68øF (20øC)

Application	Voltage
All Models	13.5

SERVICE SPECIFICATIONS

BELT ADJUSTMENT

Application	(1) Deflection In. (mm)
Alternator Belt	.5-.7 (13-17)
Air Pump Belt	.43-.51 (11-13)
A/C Belt	.39-.47 (10-12)

(1) - Deflection is with 22 lbs. (10 kg) pressure applied midway on longest belt run.

REPLACEMENT INTERVALS

Component	Interval (Miles)
Engine Oil	7500

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Oil Filter	15,000
Air Filter	30,000
Spark Plugs	30,000

FLUID CAPACITIES

Application	Quantity
Crankcase (Includes Filter)	4.9 qts. (4.6L)
Cooling System (Includes Heater)	10.0 qts. (9.5L)
Man. Trans. (SAE 90)	2.1 qts. (1.9L)
Auto Trans. (ATF Type F)	6.6 qts. (6.2L)
Rear Axle (SAE 90)	
Standard	2.6 pts. (1.2L)
Limited Slip	3.4 pts. (1.6L)
Fuel Tank	16.6 gals. (63L)

END OF ARTICLE

VACUUM DIAGRAMS
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ARTICLE BEGINNING

1983 EXHAUST EMISSION SYSTEMS
Mazda Vacuum Diagram

RX7

VACUUM DIAGRAM

VACUUM DIAGRAMS
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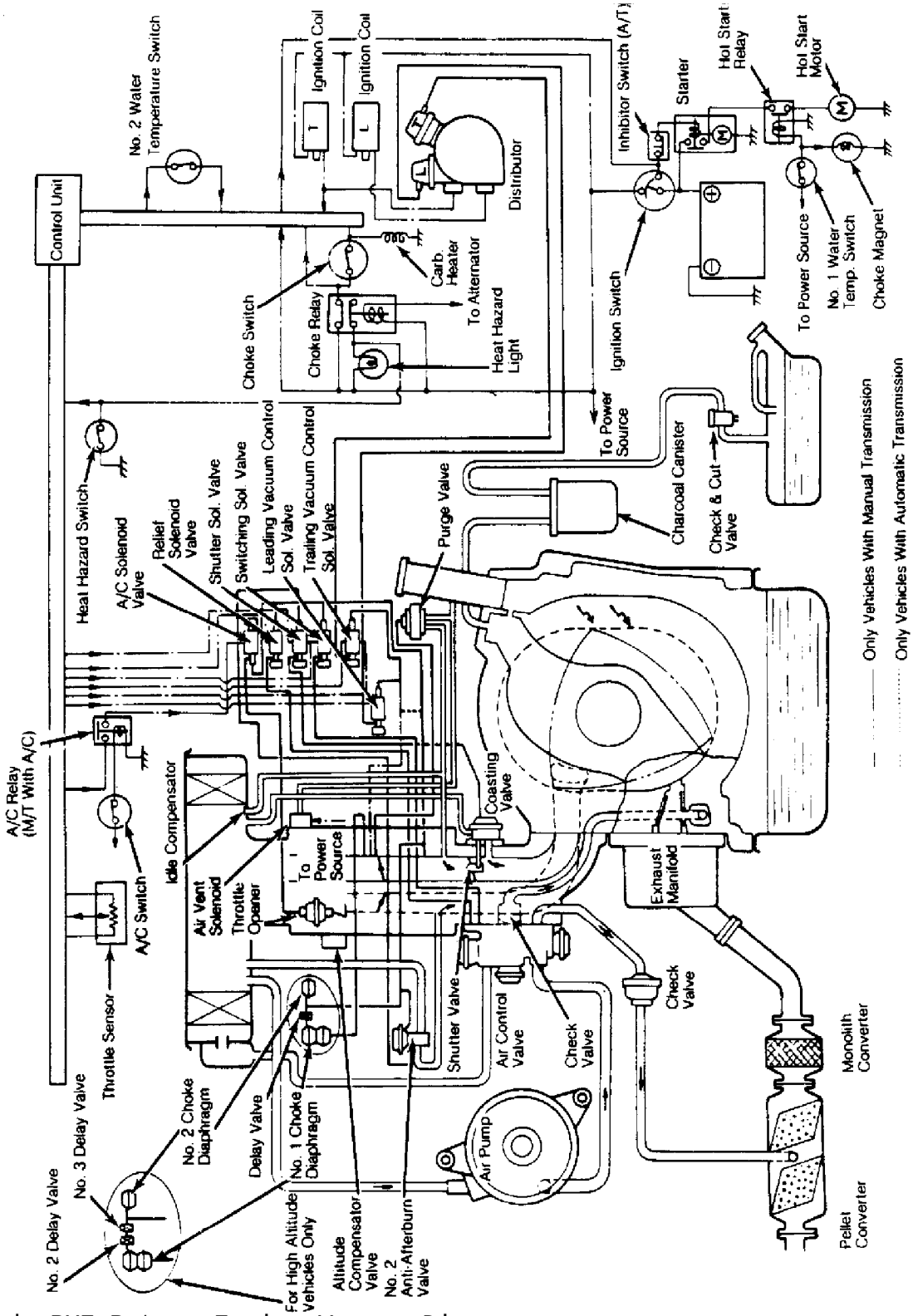

Fig. 1: Mazda RX7 Rotary Engine Vacuum Diagram

END OF ARTICLE