Mazda

MAZDA RX-3

WORKSHOP MANUAL

MAZDA RX-3

ENGINE

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TOYO KOGYO CO., LTD.
HIROSHIMA, JAPAN

NOVEMBER, 1971

ENGINE

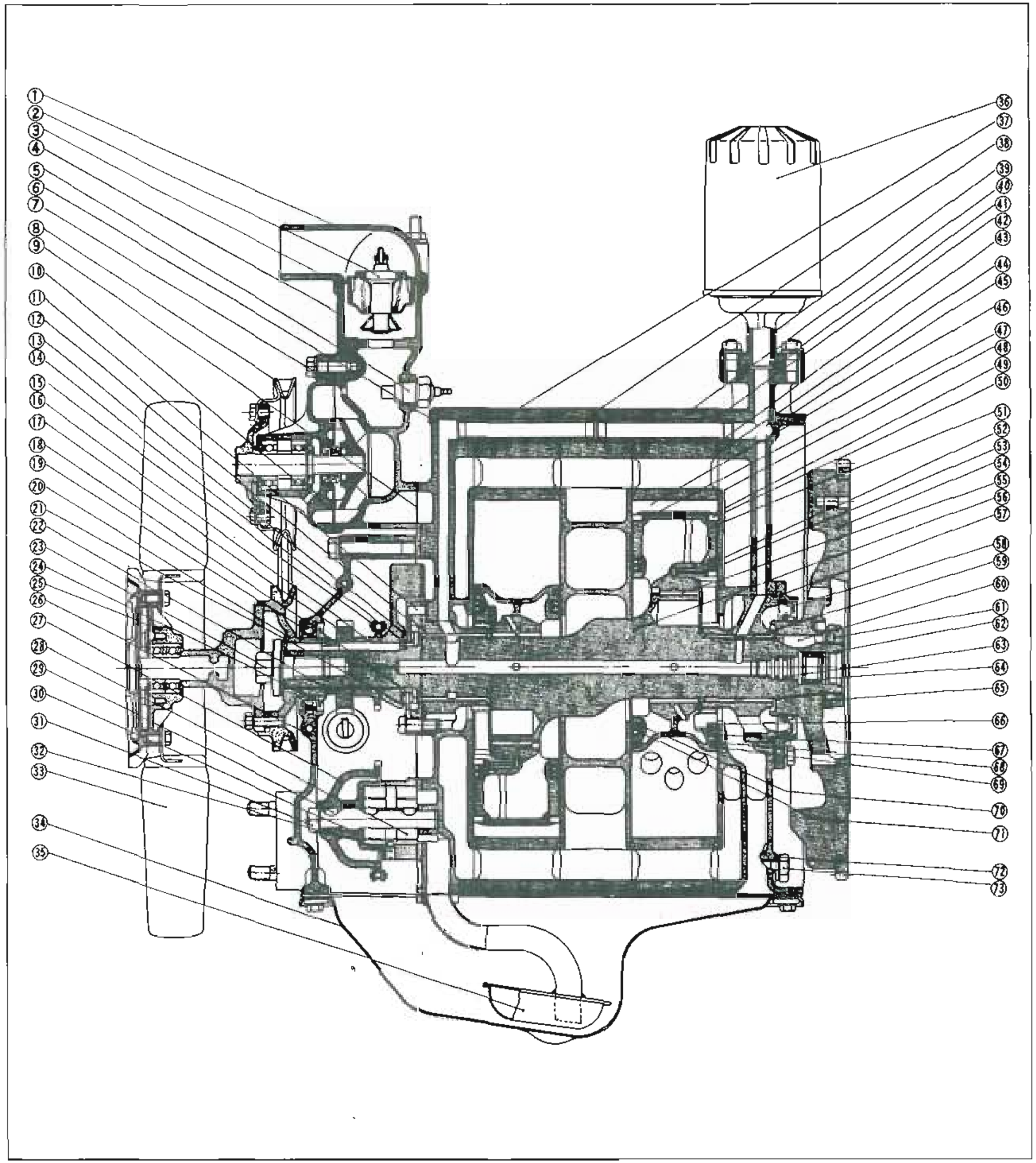


Fig. 1–1 Engine cross section (I)

1. Thermostat cover
2. Thermostat
3. Gasket
4. Water pump casing
5. Water thermometer unit
6. Front housing
7. Water pump body
8. Water pump pulley
9. Gasket
10. Gasket
11. Dowel pin
12. Bearing housing
13. Needle bearing
14. Spacer
15. Oil pump drive chain
16. Oil pump drive sprocket
17. Distributor drive gear
18. Thrust plate
19. Eccentric shaft front oil seal
20. Eccentric shaft pulley
21. Front stationary gear
22. Spacer
23. Eccentric shaft pulley bolt
24. Oil thrower
25. Fan drive
26. *Front cover*
27. Oil pump driven sprocket
28. Oil pump rotor
29. Key
30. Oil pump body
31. Oil pump drive sprocket nut
32. Oil pump middle plate attaching screw
33. Cooling fan
34. Oil pan
35. Oil strainer
36. Oil filter
37. Front rotor housing
38. Intermediate housing
39. Oil filter cover
40. Rear rotor housing
41. "O" ring
42. Tubular dowel
43. "O" ring
44. Sealing rubber (outer)
45. Rear housing
46. Apex seal
47. Apex seal spring
48. Sealing rubber (Inner)
49. Corner seal spring
50. Corner seal
51. Rear rotor
52. Oil seal (Outer)
53. Oil seal (Inner)
54. Flywheel
55. Rear rotor bearing
56. Eccentric shaft
57. Rear stationary gear
58. Eccentric shaft rear oil seal
59. Main bearing
60. Key
61. Flywheel nut
62. Needle bearing
63. "O" ring
64. Grease seal
65. Lock washer (Flywheel nut)
66. "O" ring (Inner oil seal)
67. "O" ring (Outer oil seal)
68. Side seal (Inner)
69. Side seal (Outer)
70. Oil seal spring (Inner)
71. Oil seal spring (Outer)
72. *Sealing washer*
73. Tension bolt

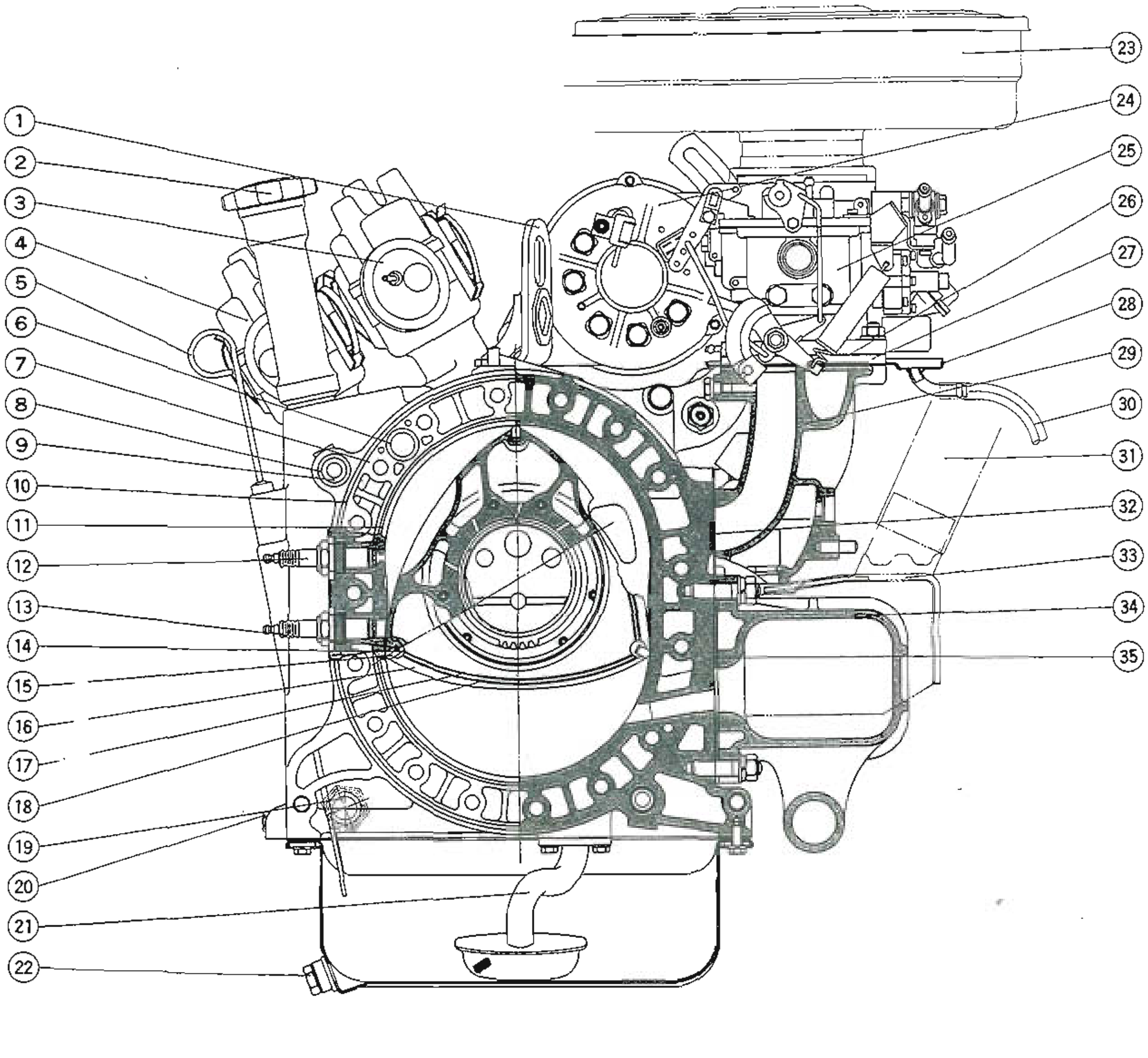


Fig. 1–2 Engine cross section (2)

1. Engine hanger bracket
2. Oil filler cap
3. Trailing distributor
4. Leading distributor
5. Dipstick gauge
6. "O" ring
7. Rotor housing
8. "O" ring
9. Tubular dowel
10. Sealing rubber (Outer)
11. Sealing rubber (Inner)
12. Spark plug
13. Apex seal spring
14. Corner seal
15. Apex seal
16. Rotor
17. Side seal (Inner)
18. Side seal (Outer)
19. Pressure regulator
20. Coolant drain plug
21. Oil filter
22. Oil drain plug
23. Air cleaner
24. Alternator
25. Carburetor
26. Gasket
27. Insulator
28. Carburetor tray
29. Intake manifold
30. Drain pipe
31. Air hose
32. Gasket
33. Hot air duct
34. Exhaust manifold
35. Gasket

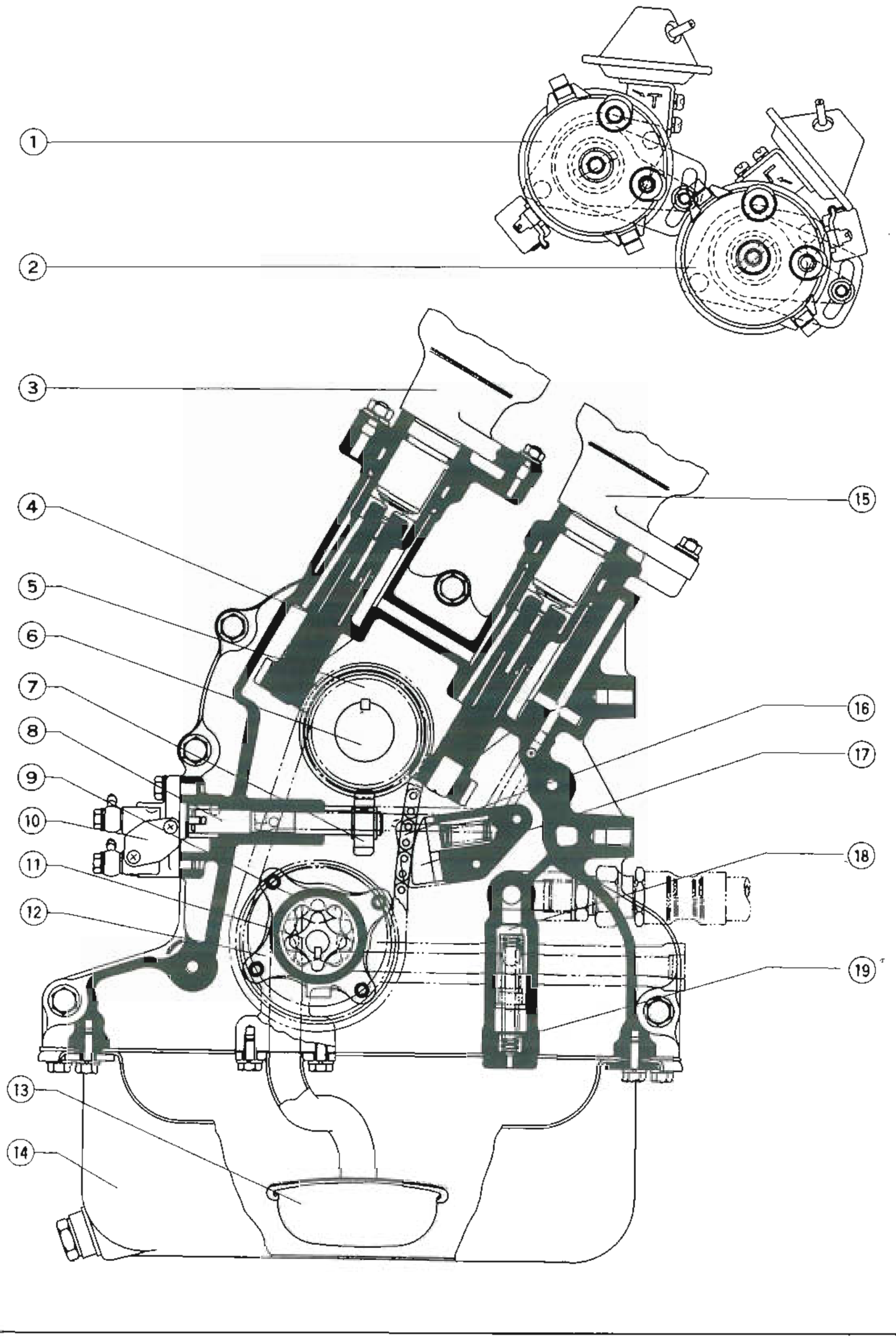


Fig. 1-3 Engine cross section (3)

1. Trailing distributor
2. Leading distributor
3. Trailing distributor socket
4. Distributor shaft
5. Distributor drive gear
6. Eccentric shaft
7. Metering oil pump driven gear
8. Metering oil pump shaft
9. Oil pump outer rotor
10. Metering oil pump
11. Oil pump inner rotor
12. Oil pump body
13. Oil strainer
14. Oil pan
15. Leading distributor socket
16. Oil pump chain
17. Oil pump chain adjuster
18. Pressure regulator
19. Spring

DESCRIPTION

RX-3 is mounted with a 2-rotor type rotary engine of Toyo Kogyo's unique design. Its single chamber capacity is 491 cc (30.0 cu. in) and the compression ratio is 9.4 : 1.

The main component parts of the rotary engine are entirely different from those of the conventional reciprocating engine. The rotor which correspond to the piston of the reciprocating engine makes a rotary motion due to the explosion pressure occurring in the chamber formed by the rotor housing and side housings which correspond to the cylinder of the reciprocating engine. This rotary motion of the rotor is converted into the rotary motion of the eccentric shaft, thereby producing the output.

1–A. ON CAR SERVICE

1–A–1. Eccentric Shaft Front Oil Seal

a. Removing of eccentric shaft front oil seal

1. Remove the screws and bolts attaching the radiator shroud, and remove the radiator shroud.
2. Remove the bolts that attach the cooling fan drive assembly onto the eccentric shaft pulley and remove the fan drive assembly.
3. Loosen the V-belt adjusting bar bolt and remove the V-belt.
4. Lock the flywheel from the service hole on the clutch housing with a suitable tool and remove the eccentric shaft pulley bolt. Then, remove the pulley.

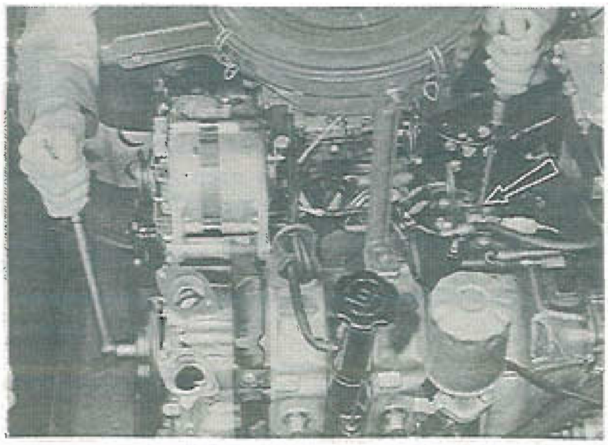


Fig. 1–4 Removing of eccentric shaft pulley

5. Remove the oil seal from the front cover with a suitable tool.

b. Installing of eccentric shaft front oil seal

Follow the removal procedures in the reverse order.

Note:

(a) Before installing the oil seal, apply lubricant onto the lip of the oil seal.

(b) Tighten the pulley bolt to **8.5 m-kg (60 ft-lb).**

(c) Adjust the V-belt deflection to **15 ~ 17 mm (0.59 ~ 0.67 in).**

1–A–2. Front Cover and Bearing Housing

a. Removing of front cover and bearing housing

1. Raise the front of the vehicle and support with stands.
2. Remove the bolts and screws attaching the engine under cover and remove the under cover.
3. Drain the lubricant by removing the drain plug. After draining, reinstall the drain plug.
4. Remove the bolts attaching the oil pan and remove the oil pan with gasket.
5. Remove the bolts attaching the oil strainer and remove the oil strainer.
6. Loosen the alternator adjusting bar bolt and remove the V-belt.
7. Remove the distributor caps.
8. Remove the nuts securing the distributors and lift the distributors out of the sockets.

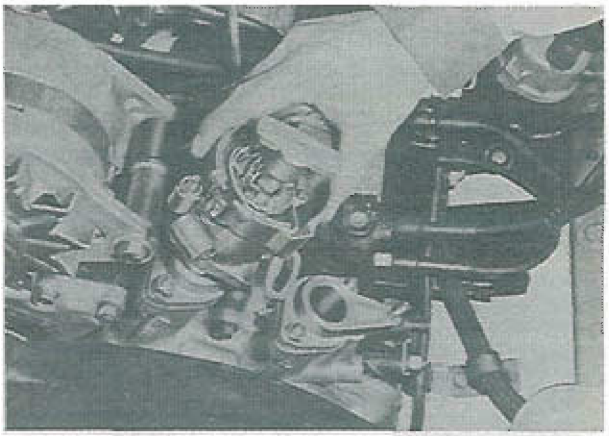


Fig. 1–5 Removing of distributor

9. Apply identification marks onto the distributor sockets and front cover for convenience in reassembly. Remove the nuts attaching the distributor sockets and remove the sockets.
10. Remove the screws and nuts attaching the radiator shroud and remove the shroud.
11. Remove the bolts that attach the cooling fan

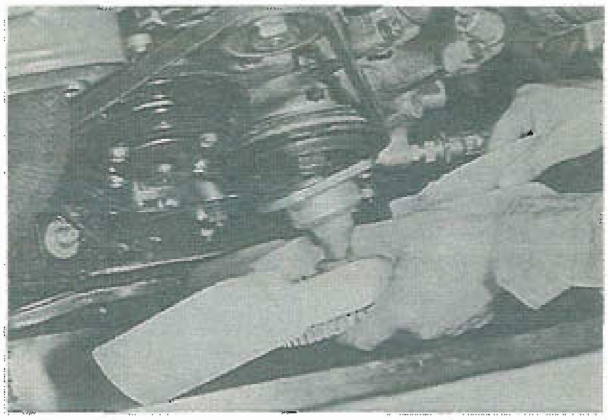


Fig. 1–6 Removing of cooling fan drive assembly

drive assembly onto the eccentric shaft pulley and remove the fan drive assembly.

12. Apply a dial indicator onto the eccentric shaft pulley as shown in Fig. 1–7. Move the pulley fore and aft, and take the reading of the indicator. The end play should be **0.04 ~ 0.07 mm (0.0016 ~ 0.0028 in)**. If it is not within the limits, adjust it by means of grinding the spacer using the emery paper on the surface plate, or by replacing the spacer.

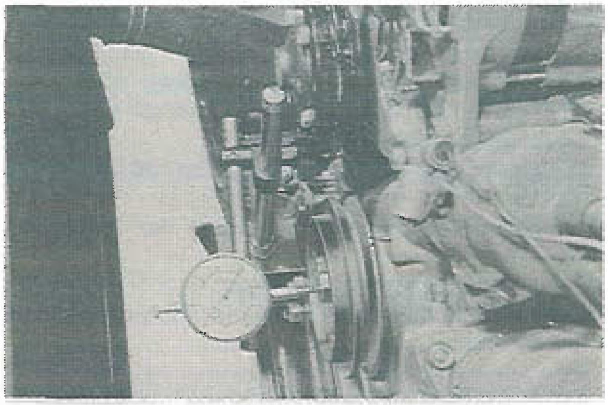


Fig. 1–7 Checking of eccentric shaft end play

13. Lock the flywheel from the service hole on the clutch housing and remove the eccentric shaft pulley bolt. Then, remove the pulley and key.
14. Disconnect the oil hose from the front cover as shown in Fig. 1–8.

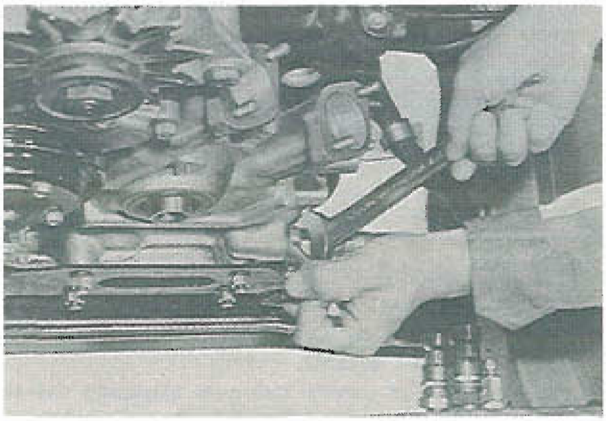


Fig. 1–8 Disconnecting of oil hose

15. Disconnect the oil tubes and connecting rod from the metering oil pump.
16. Place a jack under the intermediate housing, protecting the housing with a block of wood.
17. Remove the nuts attaching the engine mounting brackets and remove the brackets.
18. Remove the bolts attaching the front cover and remove the front cover.
19. Slide the oil thrower, spacer and distributor drive gear off the shaft.
20. Remove the nuts attaching the chain adjuster and remove the adjuster.
21. Remove the lock nut and washer for the oil pump driven sprocket. Slide the oil pump drive sprocket and driven sprocket together with the drive chain off

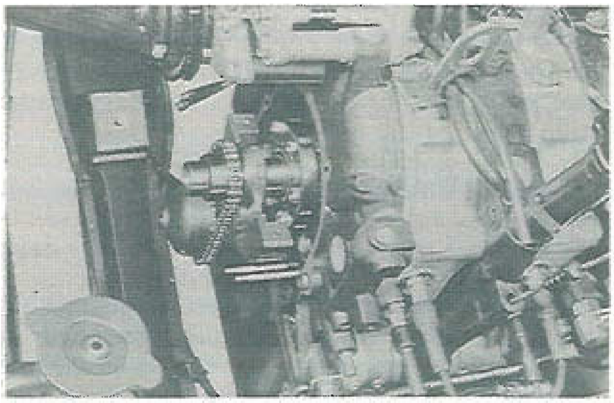


Fig. 1–9 Removing of sprockets and chain

the eccentric shaft and oil pump shaft simultaneously. Remove the key on the eccentric shaft.
22. Slide the balance weight, thrust washer and needle bearing off the shaft.
23. Remove the bolts attaching the bearing housing and slide the bearing housing, needle bearing, spacer and thrust plate off the shaft.

b. Checking of front cover and bearing housing

1. Replace the needle bearings that are worn or damaged.
2. Replace the bearing housing if there is any evidence of wear or damage.
3. Replace the thrust washer and thrust plate that are worn or damaged.
4. Replace the distributor drive gear if worn or scored.
5. Replace the chain adjuster, oil pump sprockets and drive chain if there is any evidence of wear or damage.
6. Replace the front cover that is cracked or damaged. Replace the oil seal in the cover if necessary.

c. Installing of front cover and bearing housing

1. Apply lubricant, and install the thrust plate and needle bearing onto the eccentric shaft.
2. Install the bearing housing onto the shaft, tighten the attaching bolts to 2.0 m-kg (15 ft-lb), and then bend the tabs of the lock washers.
3. Install the spacer, needle bearing and thrust washer onto the shaft and apply lubricant onto them.

Note :
Ensure that two needle bearings are placed in their proper position at the center of the shaft.

4. Install the balance weight onto the shaft.
5. Fit the keys onto the oil pump shaft and eccentric shaft. Engage the oil pump drive chain with the driven sprocket and drive sprocket, and install the sprockets with chain onto the eccentric shaft and oil pump shaft simultaneously.

Note :
When installing the chain, it should be engaged to the sprockets before installing the sprockets to the eccentric shaft and oil pump shaft.

6. Install the distributor drive gear, spacer and oil thrower onto the eccentric shaft.

Note:
The "F" mark on the gear must be faced to the front of the engine.

7. Fit the eccentric shaft pulley key onto the shaft and install the pulley onto the shaft so that the key way of the pulley aligns with the key. Tighten the pulley bolt to **8.5 m-kg (60 ft-lb).**
8. Check the eccentric shaft end play with a dial indicator. If the end play is not within **0.04 and 0.07 mm (0.0016 and 0.0028 in),** adjust it by grinding the spacer or replacing the spacer.
9. Remove the eccentric shaft pulley bolt and remove the pulley.
10. Install the chain adjuster and tighten the nuts.

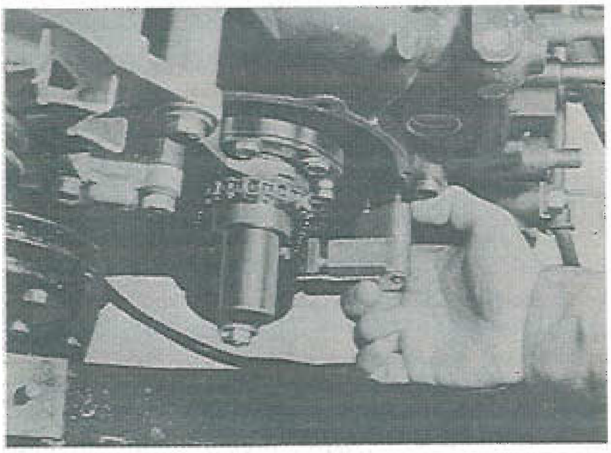


Fig. 1—10 Installing of chain adjuster

11. Tighten the oil pump driven sprocket nut to **3.5 m-kg (25 ft-lb)** and bend the tab of the lock washer.
12. Place the "O" ring on the oil passage of the front housing.

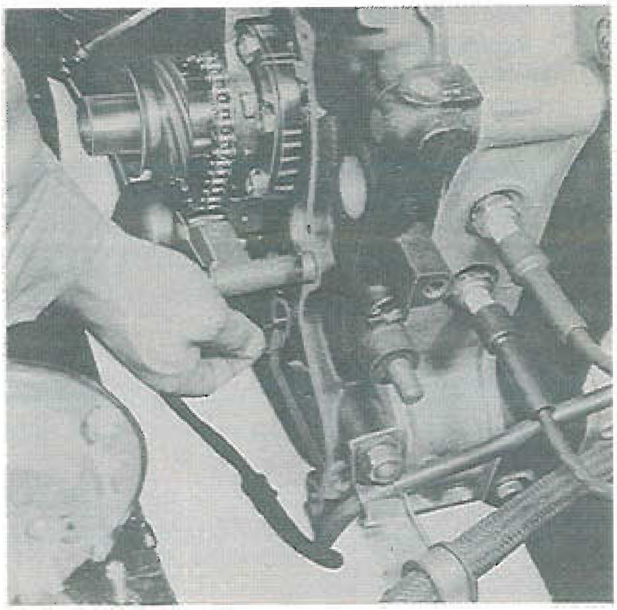


Fig. 1—11 Placing of "O" ring

13. Position the gasket and front cover onto the front housing and tighten the nuts to **2.0 m-kg (15 ft-lb).**

Note:
Cut off the excess gasket on the front cover along the mounting surface of the oil pan.

14. Secure the connecting rod to the metering oil pump with the cotter pin and connect the oil tubes with the metering oil pump.
15. Install the eccentric shaft pulley onto the shaft and tighten the pulley bolt to **8.5 m-kg (60 ft-lb).**
16. Place the gasket and oil strainer on the front housing and tighten the bolts.
17. Apply sealing agent onto the mating surfaces of the oil pan and each housing.
18. Place the gasket and oil pan in position and install the bolts through the stiffeners. Tighten the bolts **little by little in turn** until the torque becomes **1.0 m-kg (7.0 ft-lb) evenly.**
19. Rotate the eccentric shaft until the **yellow mark** on the pulley aligns with the needle on the front cover.

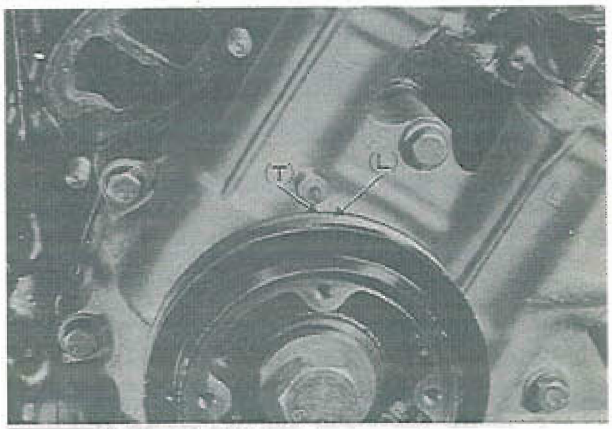


Fig. 1—12 Aligning of top dead center

20. Insert the trailing distributor socket through the gasket into the front cover so that the groove on the drive shaft is at an inclination of about 34° to the right against the longitudinal axis of the engine. Tighten the nuts attaching the socket.

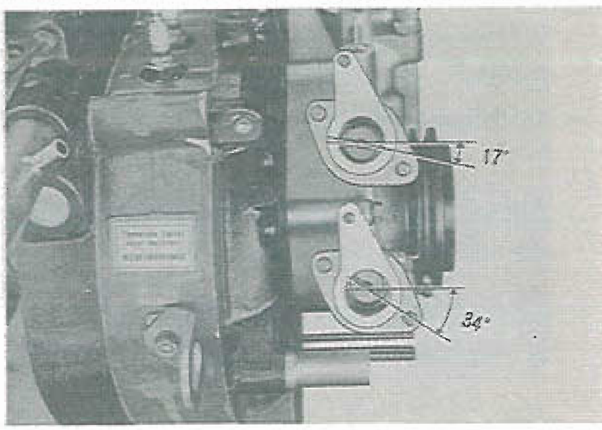


Fig. 1—13 Position of distributor sockets

21. The leading distributor socket is mounted at an inclination of 17° against the longitudinal axis of the engine.
22. Align the identification marks on each distributor housing and driven gear.
23. Insert the trailing and leading distributors into their respective sockets so that the tongue on the end of the distributor shaft fits into the groove on the drive shaft.

Note:
The marks on the distributor and front cover, "T" and "L", must be coincide with each other.

24. Rotate each distributor slightly in the direction shown in Fig. 1–14 and stop it when the contact points start to separate. Then, tighten the lock nut for each distributor.

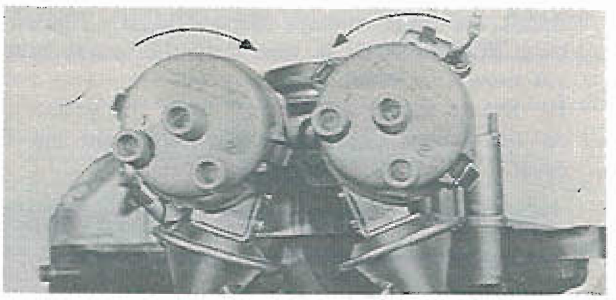


Fig. 1–14 Adjusting of ignition timing

25. Install the engine mounting brackets and tighten the nuts.
26. Connect the oil hose with the front cover.
27. Install the engine under cover, and tighten the bolts and screws.
28. Install the cooling fan drive assembly onto the eccentric shaft pulley and tighten the bolts.
29. Install the radiator shroud and tighten the bolts.
30. Install the V-belt and adjust the belt deflection to **15 ~ 17 mm (0.59 ~ 0.67 in).**
31. Fill the engine with lubricant.

1–A–3. Eccentric Shaft Rear Oil Seal

a. Replacing of eccentric shaft rear oil seal
1. Remove the clutch assembly as described in **Par. 6A–B–1.**

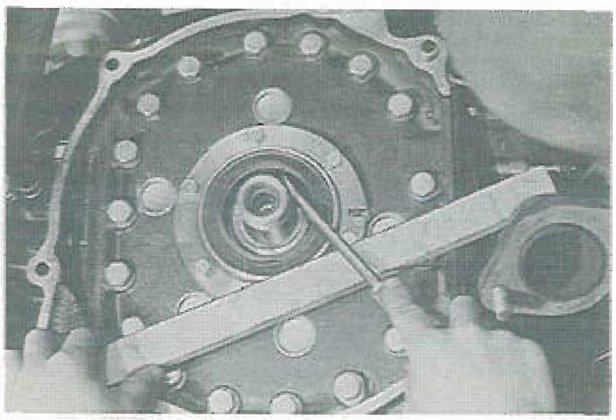


Fig. 1–15 Removing of oil seal

2. Remove the oil seal with a suitable tool, as shown in Fig. 1–15.
3. Apply lubricant onto the lip of the oil seal and install the oil seal using a plastic hammer, as shown in Fig. 1–16.

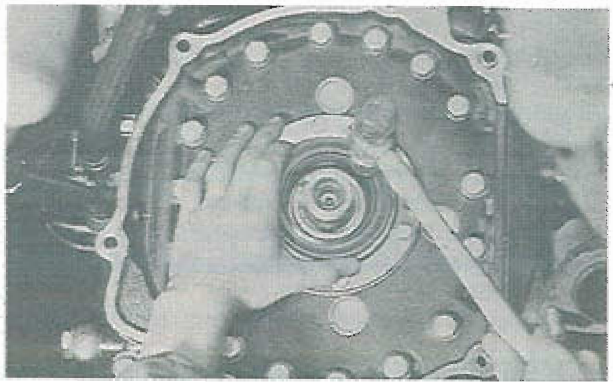


Fig. 1–16 Installing of oil seal

4. Install the clutch assembly.

1–B. MAJOR SERVICE

1–B–1. Engine Removal

The procedures for removing the engine from the vehicle for overhauling are as follows:
1. Remove the hood, as described in **Par. 14–A–1.**
2. Remove the engine under cover, and drain the coolant and the engine lubricant.
3. Disconnect the negative battery cable from the battery terminal.
4. Remove the air cleaner and support bracket.
5. Disconnect the choke cable and accelerator cable from the carburetor.
6. Disconnect the fuel pipes from the carburetor.
7. Remove the nuts attaching the thermostat cover and disconnect the engine earth cable from the thermostat cover. After disconnecting, install the attaching nuts.

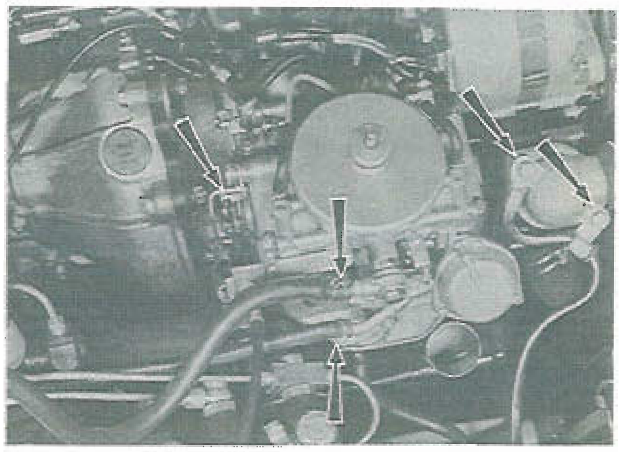


Fig. 1–17 Disconnecting of cables and pipes

8. Disconnect the vacuum hose for the power brake unit from the intake manifold.
9. Remove the bolts attaching the radiator shroud and remove the shroud.
10. Remove the bolts attaching the cooling fan drive assembly onto the eccentric shaft pulley and remove the fan drive assembly.
11. Loosen the water hose clamps, and remove the radiator upper and lower hoses.

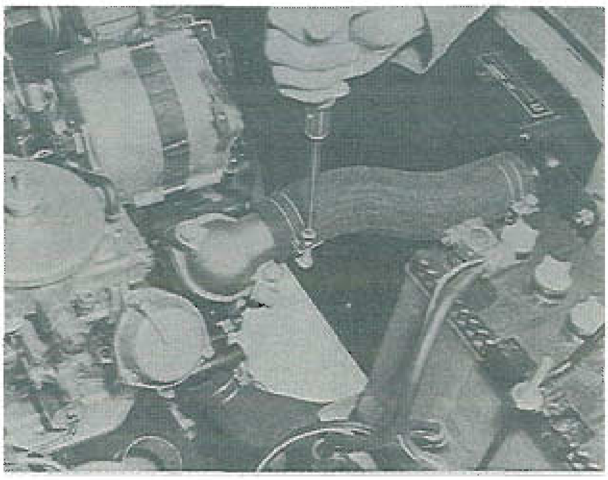


Fig. 1–18 Loosening of water hose clamps

12. Pull the high tension cables off the spark plugs.
13. Pull the primary wires off the distributors and remove the distributor caps.
14. Disconnect the wires at the alternator, water temperature gauge unit, oil pressure switch, carburetor coasting richer and starting motor.
15. Disconnect the heater hoses from the engine.
16. Disconnect the oil hoses from the engine front cover and rear housing.

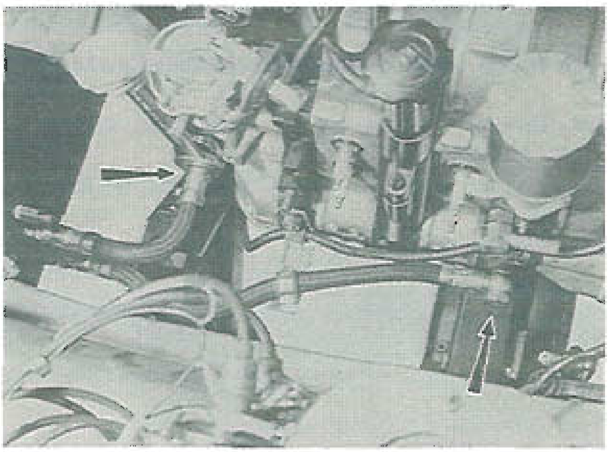


Fig. 1–19 Disconnecting of oil hoses

17. Disconnect the battery positive cable from the engine.
18. Remove the nuts attaching the clutch release cylinder. Then, remove the release cylinder from the clutch housing and wire it to the body to prevent damage.
19. Disconnect the exhaust pipe from the exhaust manifold.
20. Remove the bolts and nuts securing the clutch housing to the engine rear housing.
21. Support the transmission with a jack.
22. Remove the nuts from each engine mounting bracket.
23. Fit a suitable lifting sling to the engine hanger bracket on the engine rear housing. Attach the sling to a hoist or other lifting device and take up all slack.
24. Pull the engine forward until it clears the clutch shaft. Then, lift the engine from the vehicle. Take care not to damage the other components.
25. Remove the nuts attaching the hot air duct onto the exhaust manifold and remove the air duct.
26. Remove the nuts attaching the exhaust manifold, and remove the manifold and gaskets.

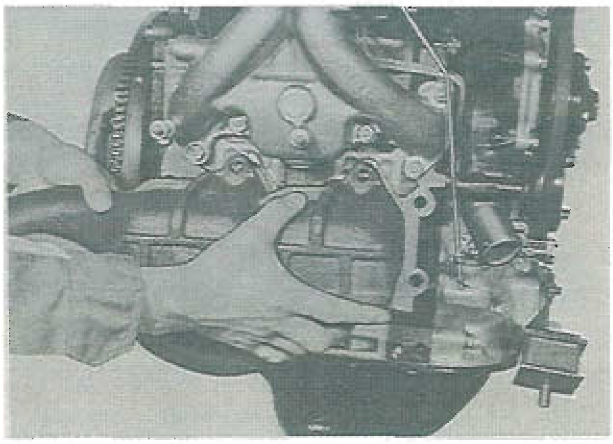


Fig. 1–20 Removing of exhaust manifold

27. Mount the engine on the **work stand** (Part Nos, 49 0839 000, 49 0813 005 and 49 0820 006).

1–B–2. Engine Disassembly

Engine disassembly should be done in the following order after removing the engine from the vehicle.
1. Disconnect the metering oil pump connecting rod, oil tubes and vacuum sensing tube from the carburetor.
2. Remove the nuts attaching the intake manifold, and remove the carburetor and intake manifold assembly.

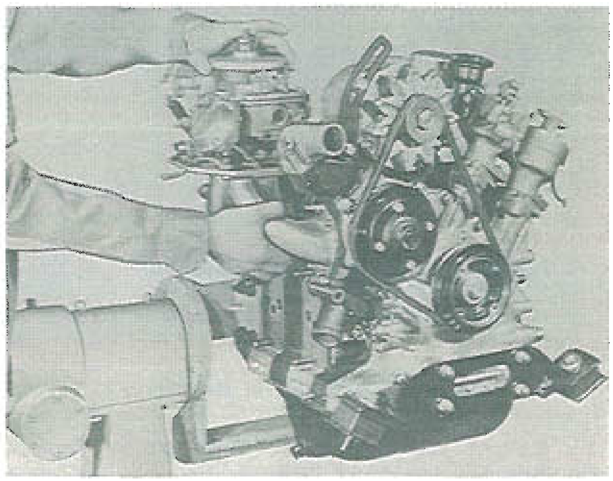


Fig. 1–21 Removing of intake manifold assembly

3. Remove the alternator adjusting bar bolt. **Do not** remove the adjusting bar.
4. Remove the bolt and nut attaching the alternator, and remove the alternator and V-belt.
5. Remove the bolts attaching the water pump pulley to the water pump and remove the pulley.
6. Remove the five nuts and two bolts attaching the water pump and remove the water pump.
7. Remove the nuts securing each distributor and lift the distributors out of the sockets.

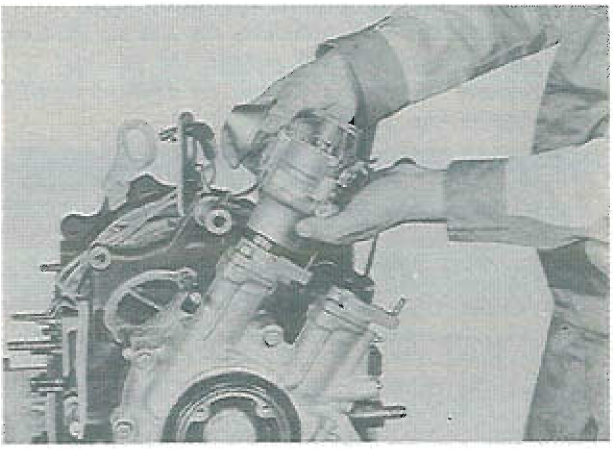


Fig. 1–22 Removing of distributors

8. Apply **identification marks** on the distributor sockets for convenience in reassembly. Remove the nuts securing each distributor socket and pull the sockets out of the front cover.
9. Attach the **ring gear brake** (Part No. 49 0820 060A) to the flywheel.
10. Remove the eccentric shaft pulley bolt and remove the pulley and key.
11. Remove the bolts attaching the clutch cover onto the flywheel, and remove the clutch cover and pressure plate assembly and clutch disc.
12. Straighten the tab of the lock washer and remove the flywheel nut using the **flywheel nut wrench** (Part No. 49 0820 035).

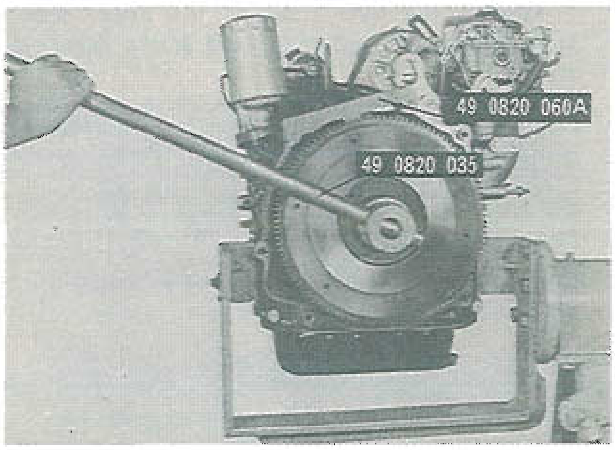


Fig. 1–23 Removing of flywheel nut

13. Remove the flywheel by using the **flywheel puller** (Part No. 49 0823 300), turning the handle of the puller and lightly hitting the head of the puller.

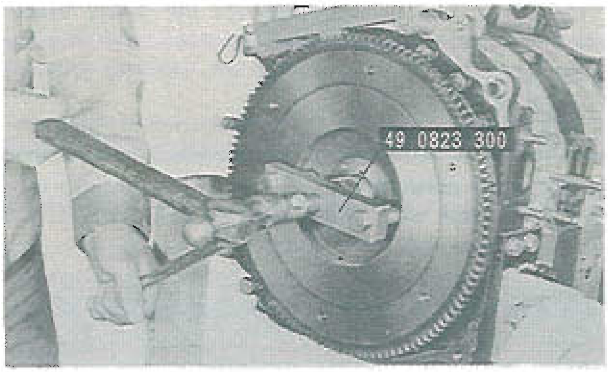


Fig. 1–24 Removing of flywheel

14. Invert the engine on the work stand.
15. Remove the bolts attaching the oil pan, and remove the oil pan and gasket.
16. Remove the bolts attaching the oil strainer, and remove the oil strainer and gasket.
17. Apply **identification marks** onto the front rotor housing and rear rotor housing, which are common parts, so that they will be as they were, when reassembling the engine.

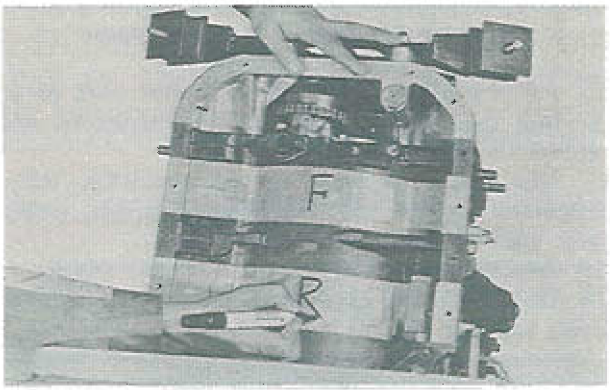


Fig. 1–25 Applying of identification marks

18. Turn the engine on the work stand so that the front end of the engine is up.
19. Remove the nuts attaching the engine mounting bracket to the front cover and remove the mounting bracket.
20. Remove the bolts attaching the front cover, and

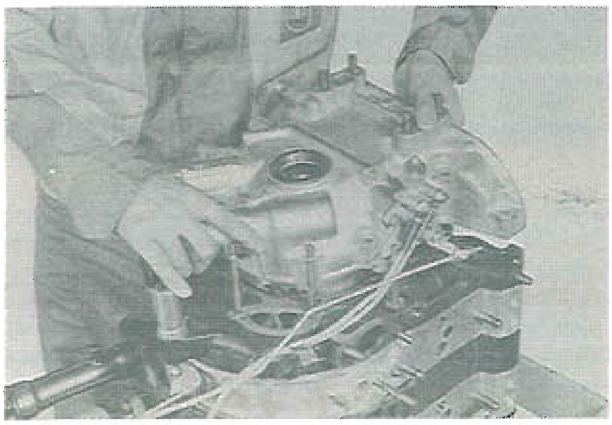


Fig. 1–26 Removing of front cover

remove the front cover and gasket.
21. Remove the "O" ring from the oil passage on the front housing.
22. Slide the oil thrower, spacer and distributor drive gear off the shaft.
23. Remove the nuts attaching the chain adjuster and remove the chain adjuster.
24. Remove the lock nut and washer for the oil pump driven sprocket.
25. Slide the oil pump drive sprocket and driven sprocket together with the drive chain off the eccentric shaft and oil pump shaft simultaneously. Remove the key on the eccentric shaft.
26. Slide the balance weight, thrust washer and needle bearing off the shaft.
27. Remove the bolts attaching the bearing housing, and slide the bearing housing, needle bearing, spacer and thrust plate off the shaft.

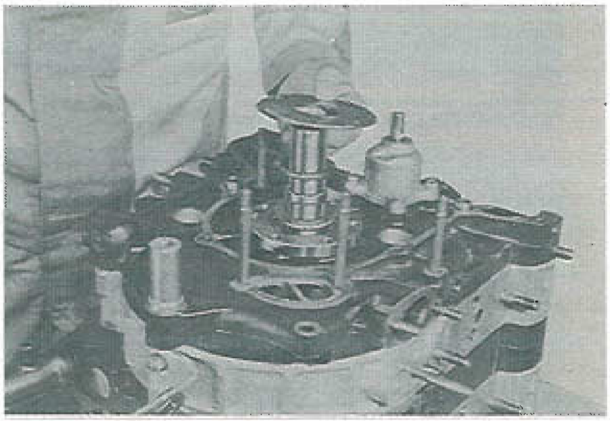


Fig. 1–27 Removing of bearing housing

28. Turn the engine on the work stand so that the top of the engine is up.
29. Loosen the tension bolts **in the reverse order of tightening,** and remove the tension bolts.

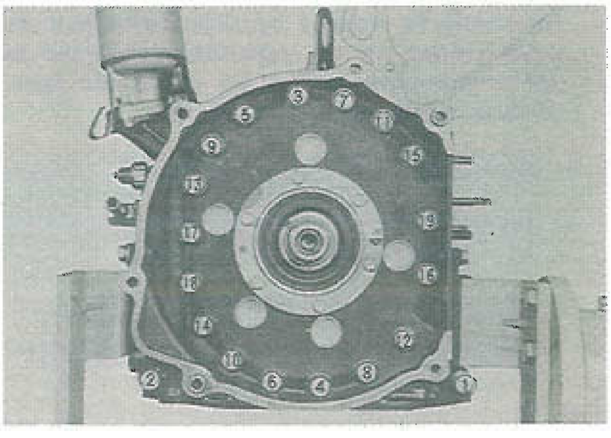


Fig. 1–28 Loosening order

Note :
Do not loosen the tension bolts at one time. Perform the removal in twice or three procedures.

30. Turn the engine on the work stand so that the front end of the engine is up.
31. Lift the front housing off the shaft.

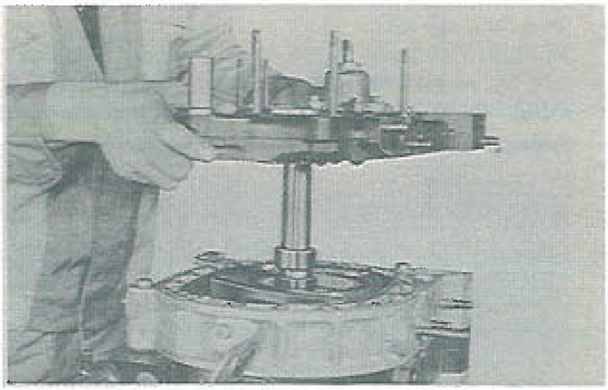


Fig. 1–29 Lifting of front housing

32. Remove any seals sticking to the rotor sliding surface of the front housing and place them back into their original position of each seal.

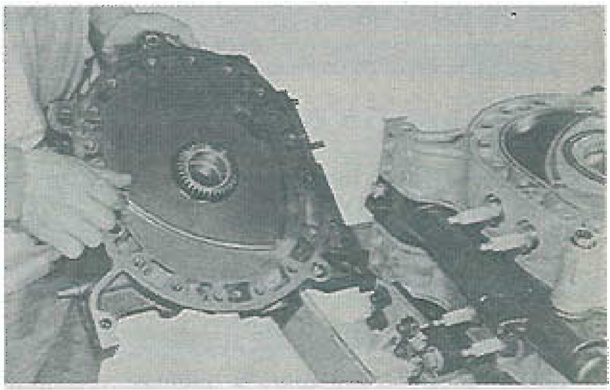


Fig. 1–30 Removing of seals

33. Remove the three corner seals, three corner seal springs, six side seals and six side seal springs from the front rotor, and place them in the **seal case** (Part No. 49 0813 250), in accordance with the marks which are applied on the side face of the rotor near each respective groove. These marks are made in order to prevent each seal from changing its original position when reassembling.
34. Remove the two sealing rubbers and two "O" rings from the front rotor housing.
35. Hold the front rotor housing down by hand

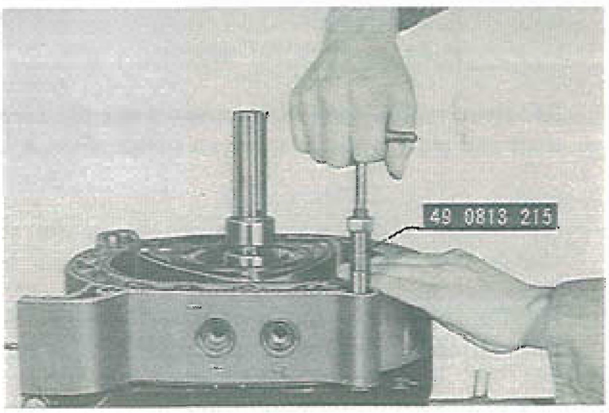


Fig. 1–31 Removing of tubular dowel

to prevent it from moving up, then pull the tubular dowels off the rotor housing with the **dowel puller** (Part No. 49 0813 215).

36. Lift the front rotor housing away from the rotor, so as not to drop the apex seals on the front rotor. Remove the two "O" rings and two sealing rubbers from the front rotor housing.

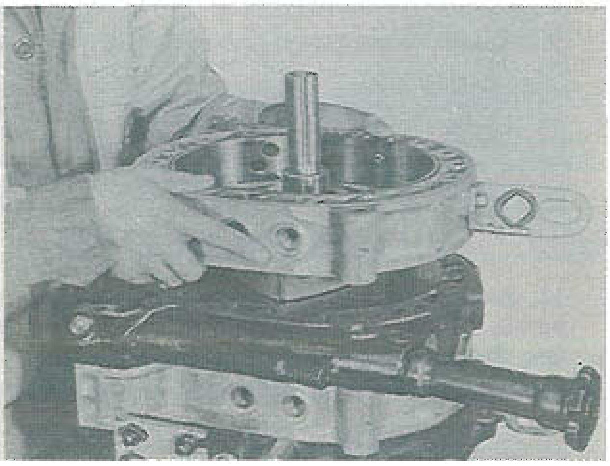


Fig. 1–32 Lifting of rotor housing

37. Remove the three apex seals and three springs from the front rotor and place them in the seal case. When removing the apex seal, put an **identification mark** on the bottom of the apex seal so that, when reassembling the engine, the apex seals can be installed in their correct locations and in the correct direction. **Never put** a mark with a punch.

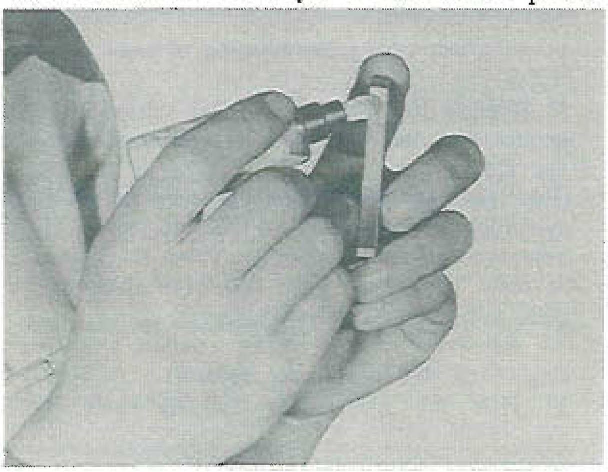


Fig. 1–33 Putting of identification mark

38. Remove the front rotor away from the eccentric shaft and place it upside down on a clean sheet of cloth.

Note :

(a) If some of the seals drop off, be careful not to change the original position of each seal on the reverse side of the rotor.

(b) The front and rear rotors are marked "F" or "R" on the internal gear side as shown in Fig. 1–34. "F" is the front rotor, while "R" is the rear rotor. When assembling, ensure that the front and rear rotors are correctly positioned.

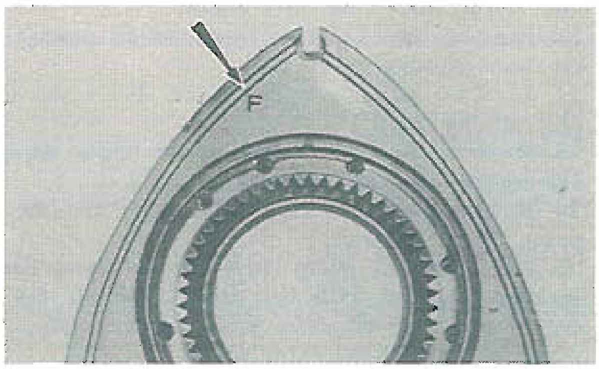


Fig. 1–34 Identification mark of rotor

39. Remove each seal and springs on the reverse side of the front rotor, and place them in the seal case.

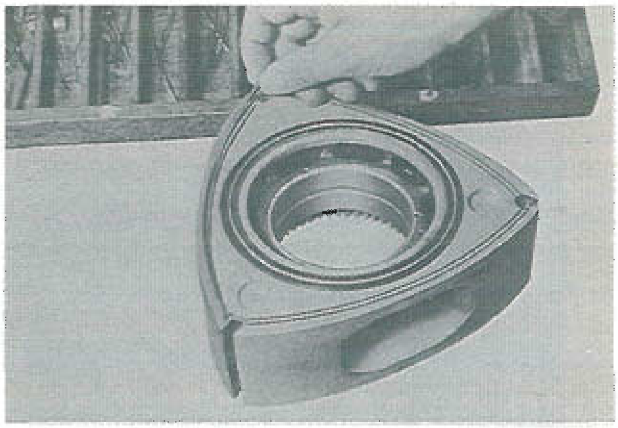


Fig. 1–35 Removing of seals

40. Hold the intermediate housing down by hand, and pull the tubular dowel off the intermediate housing using the **dowel puller** (Part No. 49 0813 215).

41. Lift the intermediate housing off the shaft so as not to damage the shaft. The intermediate housing should be removed by sliding it beyond the front rotor journal on the eccentric shaft while holding the intermediate housing up and at the same time pushing up the eccentric shaft.

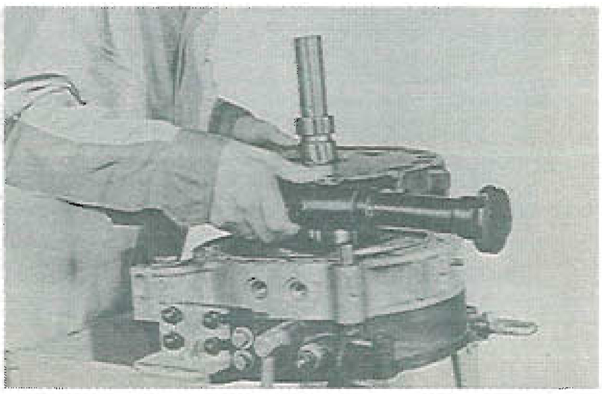


Fig. 1–36 Lifting of intermediate housing

42. Lift out the eccentric shaft.

43. Repeat the above procedures to remove the rear rotor housing and the rear rotor assembly.

1–B–3. Engine Inspection and Repair

a. Inspecting of front housing

1. Check the front housing for traces of gas or water leakage.
2. Remove all carbon on the housing with an extra-fine emery paper. When using a carbon scraper, be careful not to damage the mating surfaces of the housing.
3. Remove the sealing agent on the housing by using a cloth or a brush soaked in a solution of ketone or thinner.

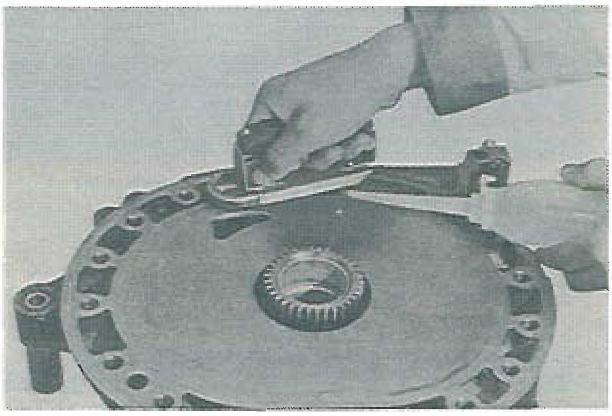


Fig. 1–37 Cleaning of front housing

4. Check for housing distortion by placing a straight edge on the housing surface. Measure the clearance between the straight edge and the housing surface with a feeler gauge, as shown in Fig. 1–38. If

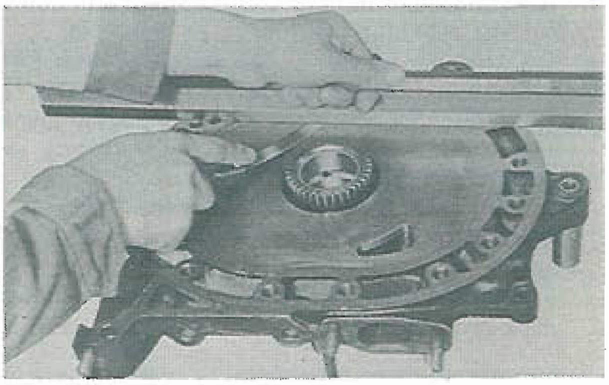


Fig. 1–38 Checking of front housing distortion

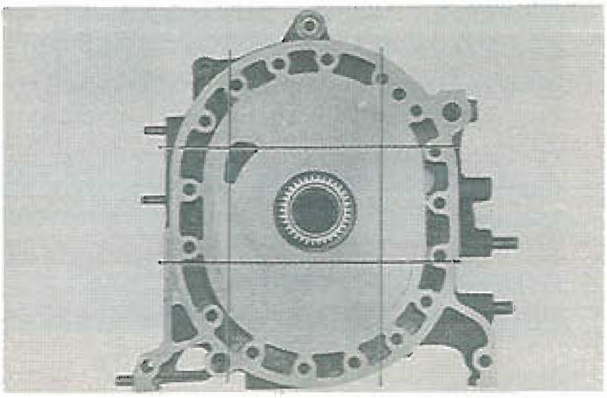


Fig. 1–39 Inspecting positions of housing distortion

the distortion exceeds **0.04 mm (0.002 in)**, replace the housing.
5. Check for wear on the rotor sliding surfaces of the housing with a dial indicator, as shown in Fig. 1–40. If the wear exceeds **0.10 mm (0.004 in)**, replace the housing.

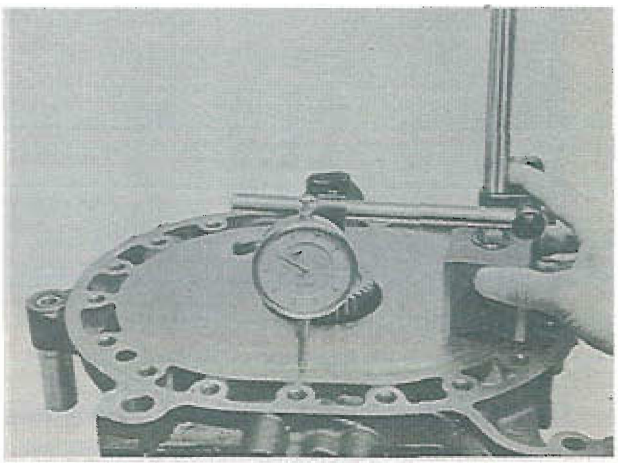


Fig. 1–40 Checking of front housing wear

There is a tendency of excessive wear occurring at both ends of the minor axis of the housing. However, width of this wear is small.

b. Inspecting of front stationary gear and main bearing

1. Check the teeth on the stationary gear for wear, crack or damage.
2. Check the main bearing for wear, scratching, flaking or other damages.
3. Check the clearance between the main bearing and eccentric shaft main journal by measuring the inner diameter of the main bearing and outer diameter of the eccentric shaft main journal.

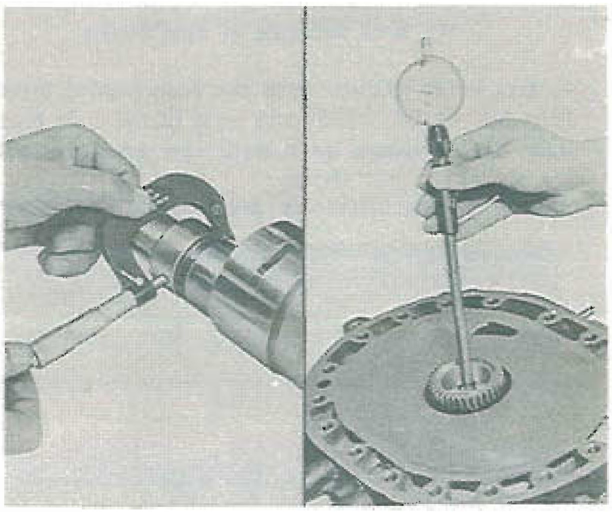


Fig. 1–41 Checking of main bearing clearance

The standard clearance is **0.04 ~ 0.07 mm (0.0016 ~ 0.0028 in)**. If the bearing clearance exceeds **0.10 mm (0.0039 in)**, replace the main bearing or eccentric shaft. **To replace** the main bearing, proceed as follows :
1) Remove the stationary gear and main bearing as-

sembly from the housing, using the **main bearing remover** (Part No. 49 0813 235) shown in Fig. 1–42.

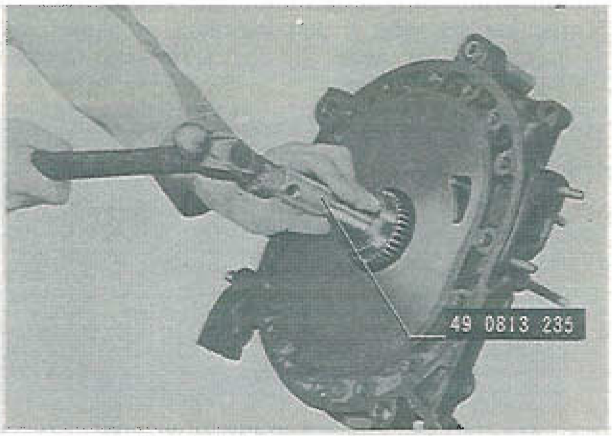


Fig. 1–42 Removing of stationary gear

2) Remove the adaptor on the main bearing remover and press the main bearing out of the stationary gear by using the main bearing remover (Part No. 49 0813 235), as shown in Fig. 1–43.

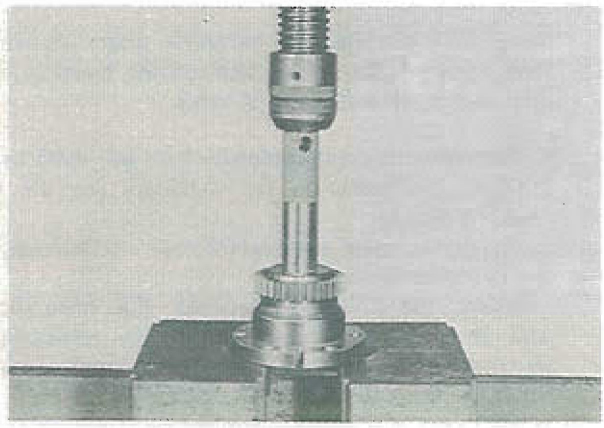


Fig. 1–43 Removing of main bearing

3) Attach the adaptor onto the **main bearing installer** (Part No. 49 0813 235) and press fit the main bearing into the stationary gear until the adaptor touches the stationary gear flange.
4) Press in the stationary gear to the housing with the main bearing installer (Part No. 49 0813 235), aligning the slot of the stationary gear flange and the dowel pin on the housing, as shown in Fig. 1–45.

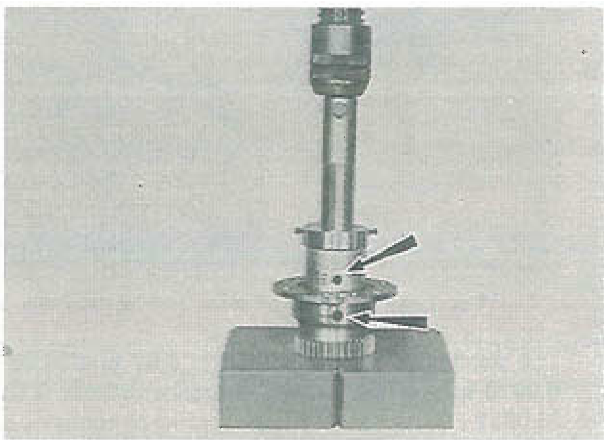


Fig. 1–44 Installing of main bearing

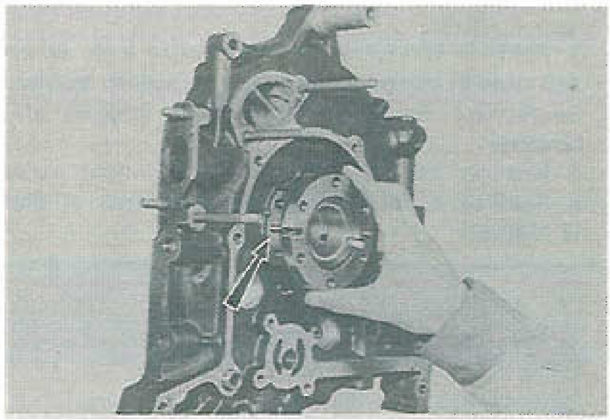


Fig. 1–45 Installing of stationary gear

Note:
When replacing the stationary gear, refer to **Par. 1–B–3, h.**

c. Inspecting of intermediate housing
Refer to **Par. 1–B–3. a,** and inspect the intermediate housing.

d. Inspecting of rear housing
Refer to **Par. 1–B–3. a,** and inspect the rear housing.

e. Inspecting of rear stationary gear and main bearing
Inspections of the rear stationary gear and main bearing are carried out according to **Par. 1–B–3. b,** but the following point must be inspected.
1. Check the oil seal in the stationary gear for wear or damage. Replace the oil seal if necessary.
To replace the stationary gear, proceed as follows:
1) Remove the bolts attaching the stationary gear to the rear housing.
2) Using the **main bearing remover** (Part No. 49 0813 235), remove the stationary gear from the rear housing.
3) Apply a thin coat of grease on the "O" ring and place it in the groove of the stationary gear.

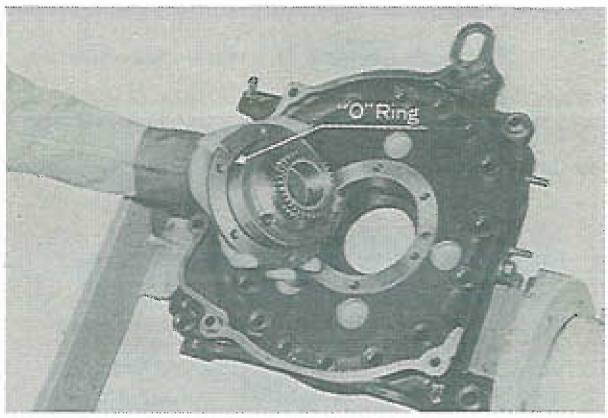


Fig. 1–46 Placing of "O" ring

4) Apply sealing agnet onto the stationary gear flange.

5) Install the stationary gear to the rear housing being careful to not damage the "O" ring and to align the slot of the stationary gear with the dowel pin on the rear housing.

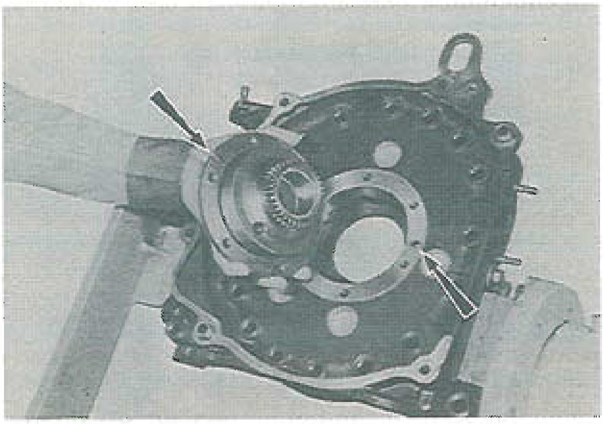


Fig. 1–47 Installing of stationary gear

6) Tighten the bolts attaching the stationary gear.

Note:
Replace the "O" ring with a new one whenever the stationary gear is removed.

f. Inspecting of rotor housing

1. Check for traces of gas or water leakage along the inner margin of each side face of the rotor housing.
2. Remove all carbon from the inner surface of the rotor housing by wiping with a cloth. Soak the cloth in a solution of ketone or thinner if the carbon is difficult to remove.

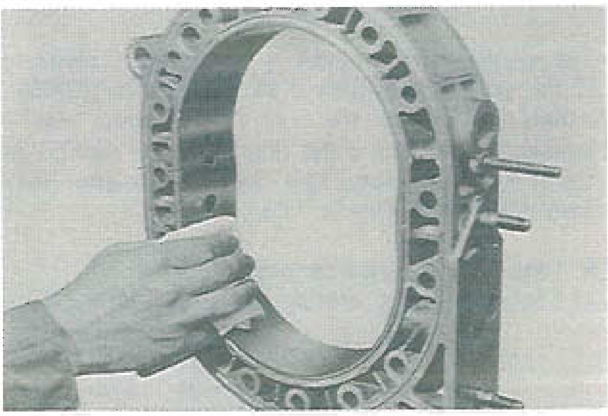


Fig. 1–48 Removing of carbon

3. Remove all deposits and rust from the cooling water passages on the housing.
4. Remove sealing agent by wiping with a cloth or brush soaked in a solution of ketone or thinner.
5. Check the chromium-plated surface on the rotor housing for scoring, flaking or any other damage.
If any of these condition exists, replace the rotor housing.
6. Check for rotor housing distortion by placing a straight edge in the position shown in Fig. 1–49.

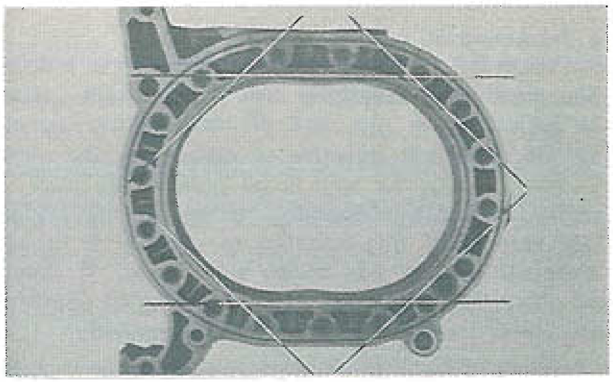


Fig. 1–49 Inspecting positions of housing distortion

Measure the clearance between the straight edge and rotor housing surface with a feeler gauge. If the distortion exceeds **0.04 mm (0.002 in)**, replace the rotor housing.

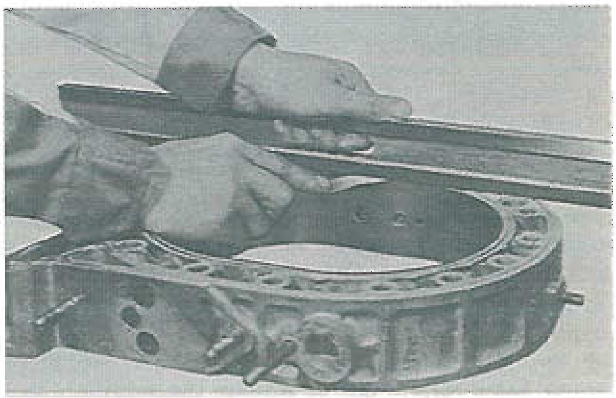


Fig. 1–50 Checking of rotor housing distortion

Note:
This check should be done whenever the engine is overhauled.

7. Check the rotor housing width **at points close to the trochoid surface** by using a micrometer. The measurements should be taken at 8 points at the least. If the difference between the maximum value and the minimum value exceeds **0.08 mm (0.0031 in),** the rotor housing should be replaced with a new one, because there should be possibility of gas or water leakage. The standard width is **60 mm (2.3622 in).**

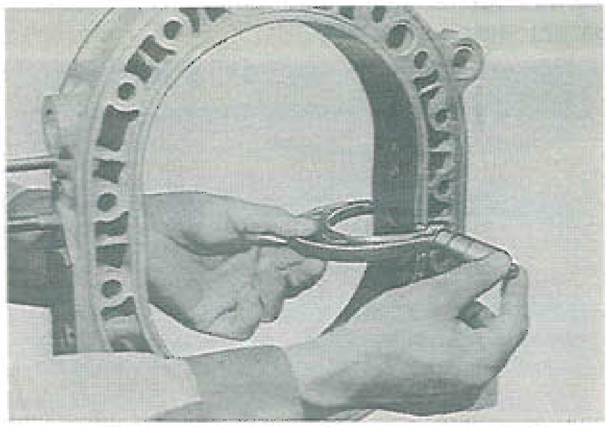


Fig. 1–51 Checking of rotor housing width

g. Inspecting of rotor

1. Check the combustion condition and gas leakage. The combustion condition can, to a certain extent, be judged as in the case of reciprocating engines by the color and quantity of carbon on the rotor. Combustion can be said to be good if the color of carbon is brown. Generally carbon on the leading side seen from the direction of rotation is brown, while the trailing side shows black color. It should be noted that this color varies according to operating conditions just before the engine is removed.

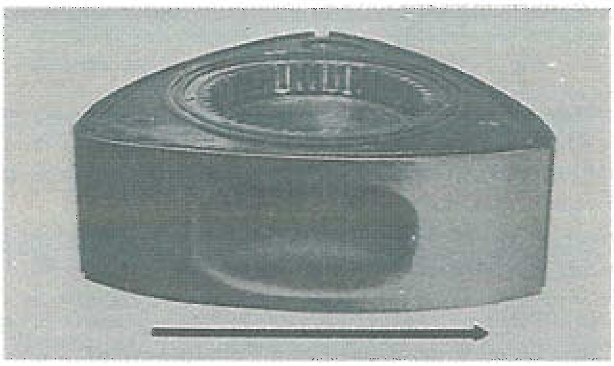


Fig. 1–52 Checking of combustion condition

The gas leakage can be judged by checking the color of the rotor side surface for blow-by traces originating from the side seals and corner seals.

2. Remove the carbon on the rotor by using a carbon remover or emery paper. Carbon in the seal grooves of the rotor should be removed with a carbon remover being careful not to damage the grooves. Wash the rotor in cleaning solution and dry by blowing with compressed air.

3. Carefully inspect the rotor and replace if it is severely worn or damaged.

4. Check the internal gear for cracks, worn or chipped teeth.

5. Remove the oil seals in the rotor as described in **Par. 1–B–3. i**, and check the land protrusion of the rotor by placing a straight edge on the land. Measure the clearance between the rotor and the straight edge with a feeler gauge as shown in Fig. 1–53. The standard protrusion is **0.10 ~ 0.15 mm (0.004 ~ 0.006 in)**. If the protrusion is less than the specification, there is a possibility of the rotor touching the side housing at places other than the land, causing wear or damage.

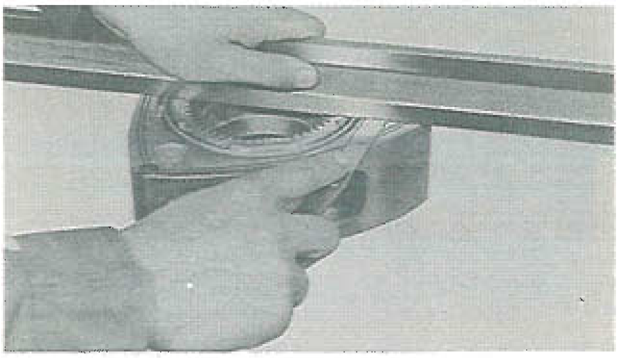


Fig. 1–53 Checking of land protrusion

6. Check the gap between the side housing and the rotor by measuring the rotor housing width and rotor width. The rotor width should be measured at the position shown in Fig. 1–55.

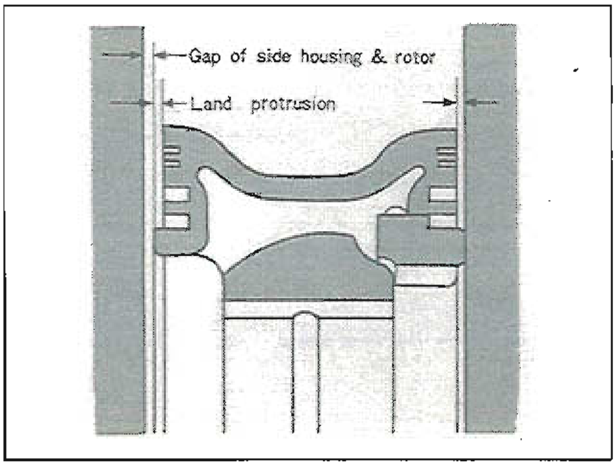


Fig. 1–54 Checking gap between side housing and rotor

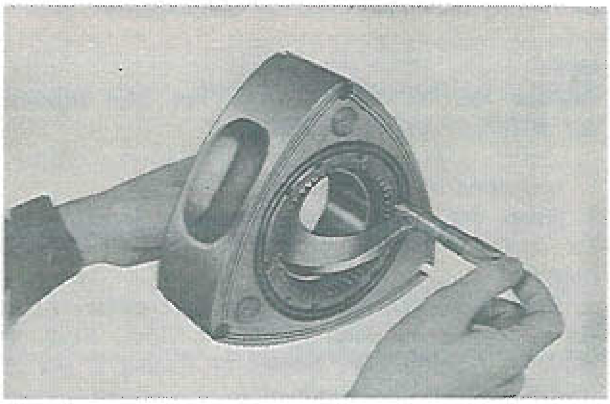


Fig. 1–55 Measuring of rotor width

The standard rotor width is **59.85 mm (2.3563 in)**. If the gap is not within **0.13 ~ 0.17 mm (0.0051 ~ 0.0067 in)**, replace the rotor and internal gear assembly. If the gap is less than 0.13 mm (0.0051 in), there is a possibility that the internal gear locked with six double pins is loose.

h. Inspecting of rotor bearing

1. Check the rotor bearing for wear, flaking, scoring

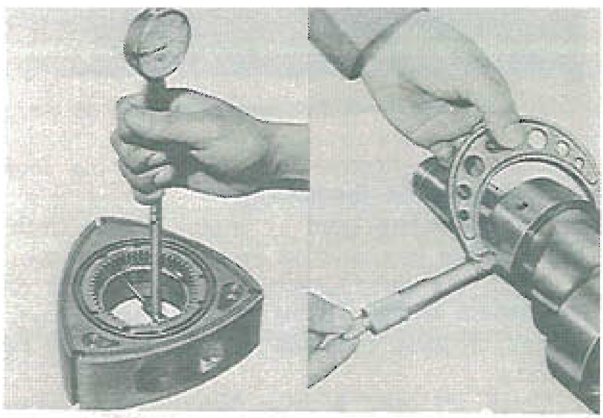


Fig. 1–56 Checking of rotor bearing clearance

or any damage. If any of these conditions is found, replace the bearing.
2. Check the rotor bearing clearance by measuring the inner diameter of the rotor bearing and outer diameter of the eccentric shaft rotor journal. The standard clearance is 0.04 ~ 0.08 mm (0.0016 ~ 0.0031 in). Replace the bearing if it is more than **0.10 mm (0.0039 in).**
To replace the rotor bearing, proceed as follows :
1) Insert the **expander** (Part No. 49 0813 245) into the rotor bearing to prevent any deformation of the bearing when drilling the hole.

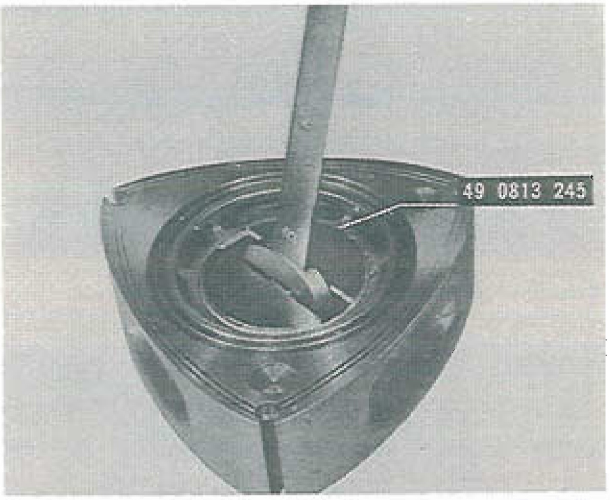


Fig. 1–57 Inserting of expander

2) Drill a hole of 3.5 mm (0.14 in) diameter and about 7 mm (0.28 in) deep in the locking screw which holds the bearing on the rotor. And then, remove the expander.

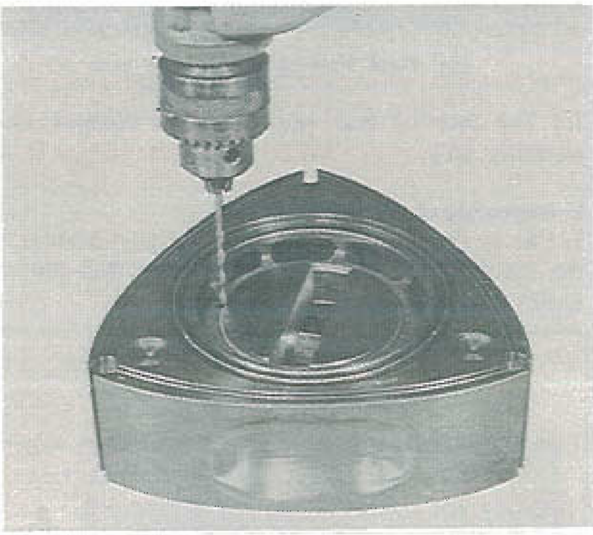


Fig. 1–58 Drilling of holes

3) Place the rotor on the support so that the internal gear is facing upward.
Using the **rotor bearing remover** (Part No. 49 0813 240) without the adaptor ring, press the bearing out of the rotor, being careful not to damage the internal gear.

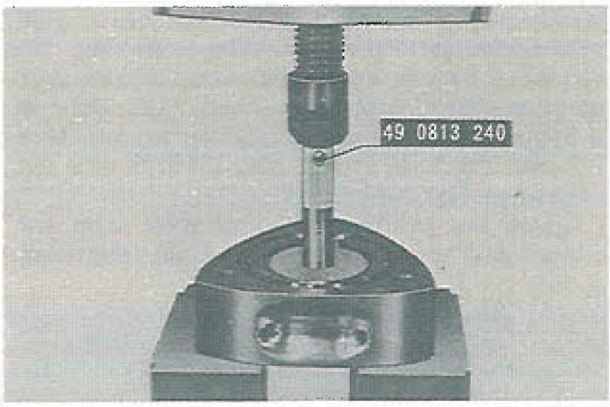


Fig. 1–59 Removing of rotor bearing

4) If the bearing bore in the rotor is damaged, finish the bore with emery paper and blow with compressed air.
5) Place the rotor on the support so that the internal gear is facing upward. Press fit a new bearing using the **rotor bearing installer** (Part No. 49 0813 240) with the adaptor screws of the installer removed so that the oil hole of the bearing is in line with the oil hole on the apex side of the rotor, and the bearing is flush with the rotor boss.

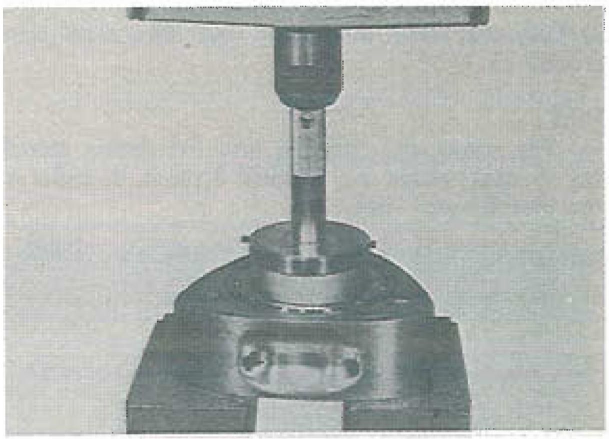


Fig. 1–60 Installing of rotor bearing

6) Insert the expander (Part No. 49 0813 245) into the bearing, and then drill a hole of 3.5 mm (0.14 in) diameter and about 7 mm (0.28 in) deep at

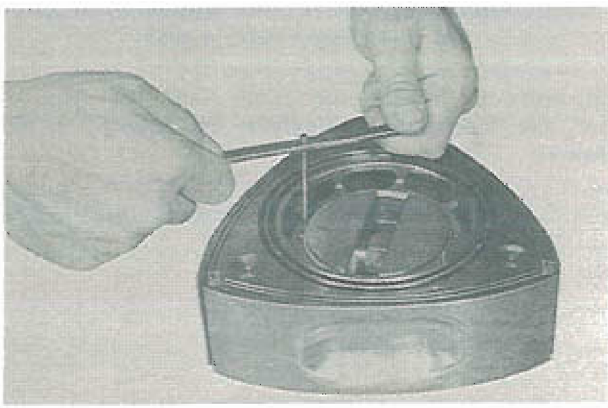


Fig. 1–61 Making of threads

approximately 7 mm (0.28 in) to the left or right of the original position of the locking screw hole. The positions of the new holes must be in the same direction from that of each original hole. The center of the hole must be 0.5 mm (0.02 in) from the rotor bore.
7) Thread the hole with a M4, P = 0.70 mm tap, as shown in Fig. 1–61.
8) Tighten the locking screws and stake them into positions with a punch to prevent them from working out.

Fig. 1–62 Staking of locking screws

9) Wash the rotor thoroughly and blow with compressed air.

Note :
(a) The rotors are classified into five grades according to their weight and marked a, b, c, d, and e on the internal gear side.

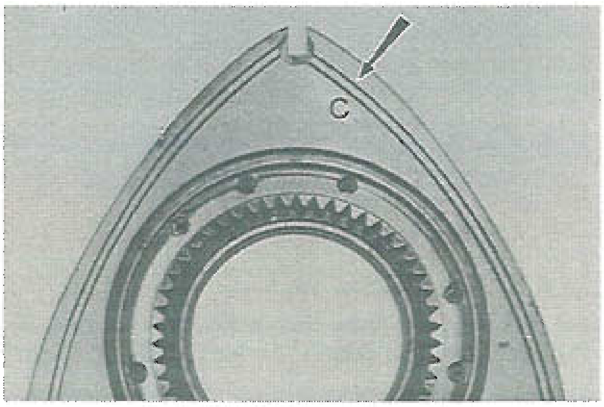


Fig. 1–63 Weight mark of rotor

In order to balance the front rotor and rear rotor, the following combinations are adopted in the factory.

Combination of rotor

a – b
b – a, b, c
c – b, c, d
d – c, d, e
e – d

If it becomes necessary to replace a rotor, use the rotor marked "C" in all cases.

(b) The internal gears and stationary gears are classified into three grades, by embossing markings, A, and C, also given no mark.
In order to obtain the proper backlash between the internal gear and the stationary gear, gears of the same marking are installed in the factory.
When replacing the stationary gear, there is no need to select the marking.

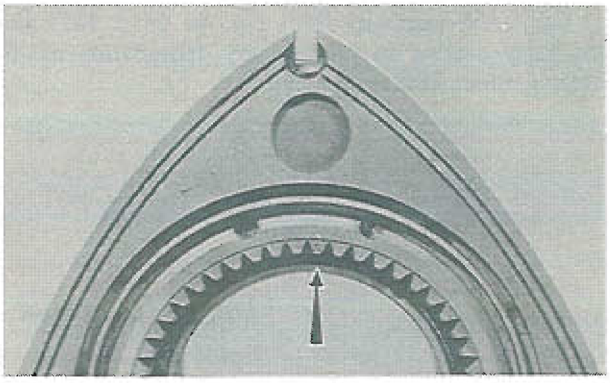


Fig. 1–64 Marking of internal gear

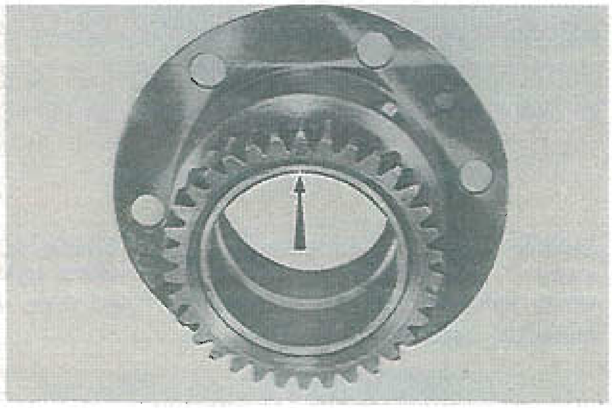


Fig. 1–65 Marking of stationary gear

(c) The internal gear and rotor are serviced as an assembly only.

i. Inspecting of oil seal in rotor
1. Check the oil seal for wear or any damage. If the lip width of the oil seal is more than **0.8 mm (0.031 in)**, replace the oil seal.

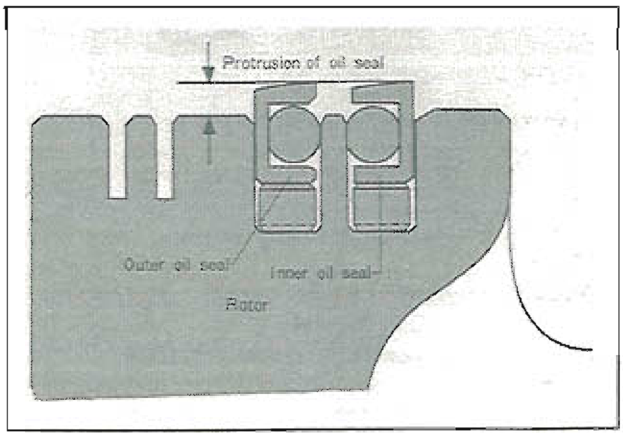


Fig. 1–66 Protrusion of oil seal

2. Check the oil seal protrusion shown in Fig. 1–66. The protrusion should be more than **0.5 mm (0.20 in)**.
If necessary, replace the oil seal as follows:
1) Remove the oil seal by inserting the **oil seal remover** (Part No. 49 0813 225) or a screwdriver in the slots of the rotor and prying the seal off.

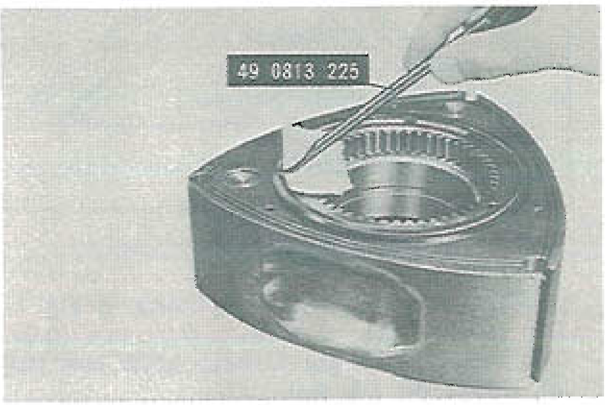


Fig. 1–67 Removing of oil seal

Note :
(a) **Do not** exert strong pressure at only one place to prevent deformation of the oil seal.
(b) Be careful not to damage the oil seal lip. Use a suitable protector shown in Fig. 1–67.
(c) Replace the "O" ring in the oil seal when the engine is overhauled.

2) Fit the outer and inner oil seal springs in their respective grooves on the rotor so that the ends of the spring are facing upward and the spring gaps are located opposite each other, as shown in Fig. 1–68.

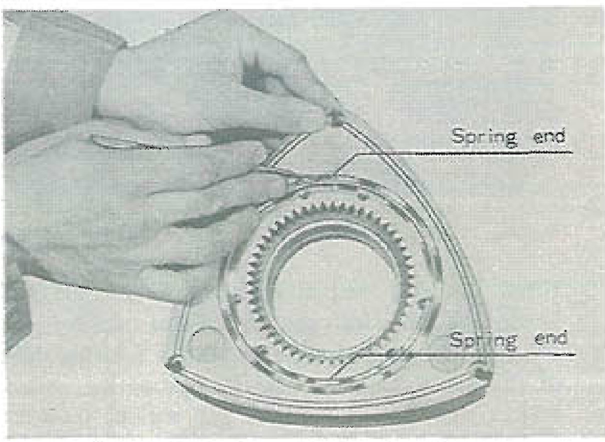


Fig. 1–68 Position of oil seal spring end

Note :
Before installing the "O" ring to the oil seal, confirm the smooth movement of each oil seal by placing the oil seal on the oil seal spring in the groove.

3) Insert new "O" ring in each oil seal.
4) Apply the sufficient engine lubricant onto the oil seal and oil seal groove.
5) Install the oil seal to the groove on the rotor

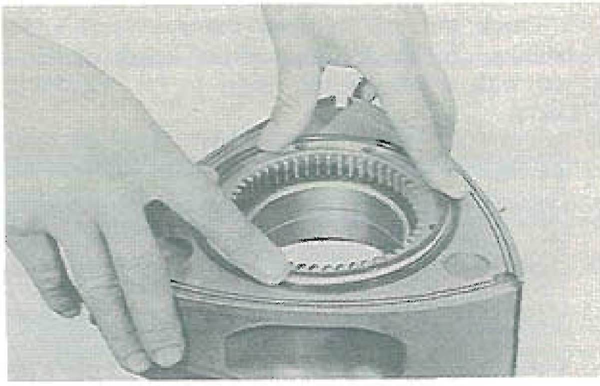


Fig. 1–69 Installing of oil seal

pushing the head of the oil seal with fingers slowly. Be careful not to deform the oil seal.

Note :
(a) As chamfering is performed and a white mark is applied on the bottom of the oil seal, confirm these before installing the oil seal so that the head (lip) of the oil seal may not be mistaken for the bottom.
(b) Install the oil seals on the both sides of the rotor.

J. Inspecting of apex seal
1. Remove all carbon from the apex seal and spring, being careful not to damage the apex seal. **Never use** emery paper as it will damage the apex seal. Wash them with cleaning solution.
2. Check the apex seal for wear, crack, or any damage. If any of these conditions is found, replace the apex seal. Check the spring for weakness.
3. Measure the height of the apex seal with a micrometer. Replace if the height is less than **10.0 mm (0.3937 in)**.
4. Check the gap between the apex seal and the groove. To check the gap, place the apex seal in its respective groove on the rotor and measure the gap between the apex seal and the groove with a feeler gauge. As shown in Fig. 1–70, the apex seal tends to wear unevenly and for this reason the feeler guage should be inserted until the tip of the gauge reaches the bottom of the groove. If the gap is more than **0.1 mm (0.004 in)**, replace the apex seal.

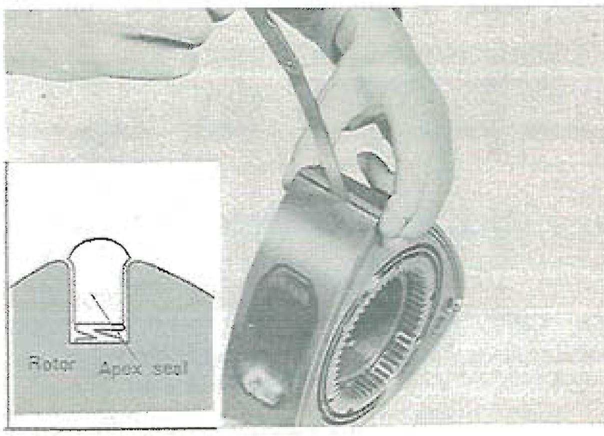


Fig. 1–70 Checking gap of apex seal and groove

5. Check the gap between the apex seal and side housing. To check, measure the length of the apex seal with a micrometer. Refer to **Par. TECHNICAL DATA.**

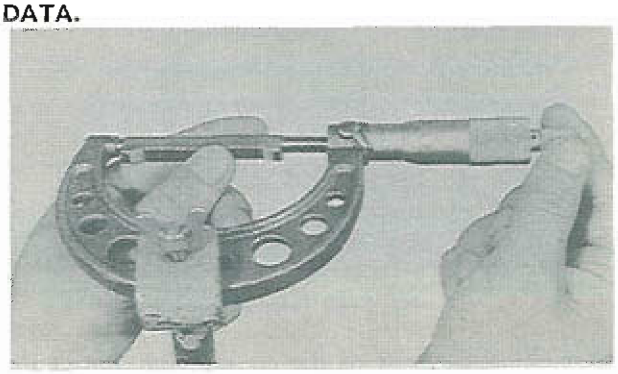


Fig. 1–71 Measuring of apex seal length

Compare the measured length with the minimum value of the rotor housing width to calculate the gap between the apex seal and side housing. If the gap is more than **0.15 mm (0.0059 in)**, replace the apex seal. If necessary, correct the apex seal length with emery paper.

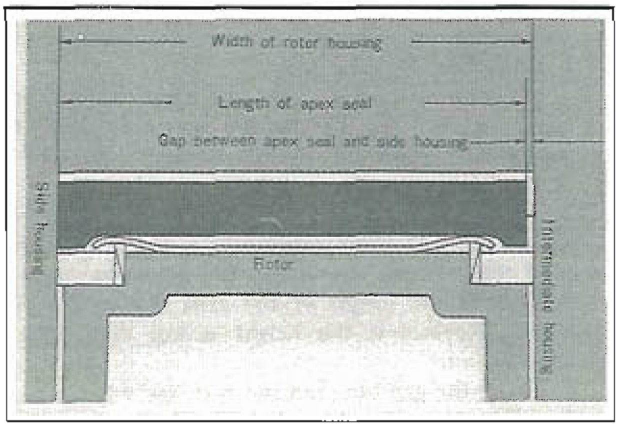


Fig. 1–72 Checking gap between apex seal and side housing

k. Inspecting of side seal

1. Remove all carbon from the side seal and spring with a carbon remover.
2. Check the side seal for wear, crack or any other damage and replace if any of these conditions is found.
3. Check the gap between the side seal and the

Fig. 1–73 Checking of side seal gap

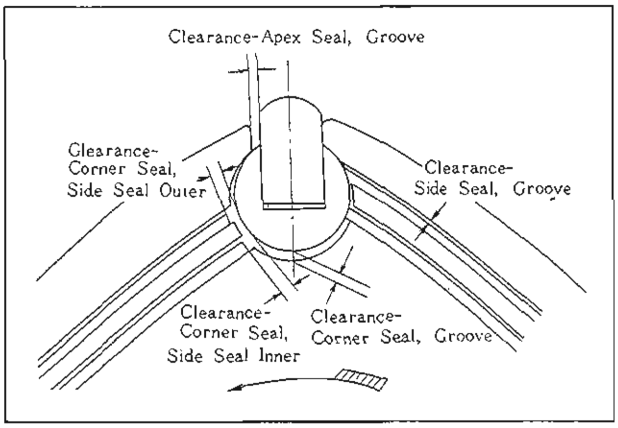


Fig. 1–74 Clearance of seals

groove with a feeler gauge as shown in Fig. 1–73. The standard gap is 0.04 ~ 0.07 mm (0.002 ~ 0.003 in). If the gap exceeds **0.078 mm (0.0031 in)**, replace the side seal.
4. Check the gap between the side seal and the corner seal with these seals installed on the rotor.

To check, insert a feeler gauge between the end of the side seal (against the rotating direction of rotor) and the corner seal. If the gap exceeds **0.4 mm (0.016 in)**, replace the side seal.

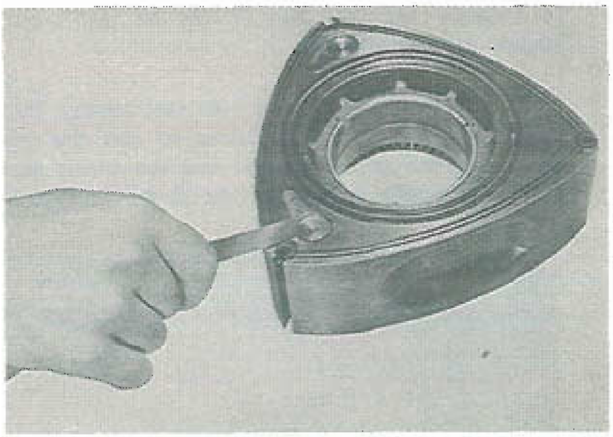


Fig. 1–75 Checking gap of corner seal and side seal

When the side seal is replaced, adjust the gap between the side seal and the corner seal by grinding the opposite end of the side seal in rotating direction of the rotor along the round shape of the corner seal with a fine file so that the gap will be **0.05 ~ 0.15 mm (0.002 ~ 0.006 in)**. If this gap is too large, gas-sealing performance will deteriorate.

Note :
Be sure to use the correct side seal when installing a new side seal as there are four different types, namely, the front inner, front outer, rear inner, and rear outer seal.

l. Inspecting of corner seal

1. Remove carbon from the corner seal.
2. Check the corner seal for wear or damage.

3. Check the gap between the corner seal and the corner seal groove. The standard gap is 0.020 ~ 0.048 mm (0.0008 ~ 0.0019 in) and the limit is **0.08 mm (0.0031 in)**. This gap enlargement shows uneven wear of the corner seal groove, which occur when the engine is operated with dust entering through a clogged element, damaged air cleaner or any other cause. When the wear is permitted to increase, the engine power will be reduced and the engine will become hard to start. The extent of wear of the corner seal groove is determined by the **bar limit gauge** (Part No. 49 0839 165) and classified into three conditions.

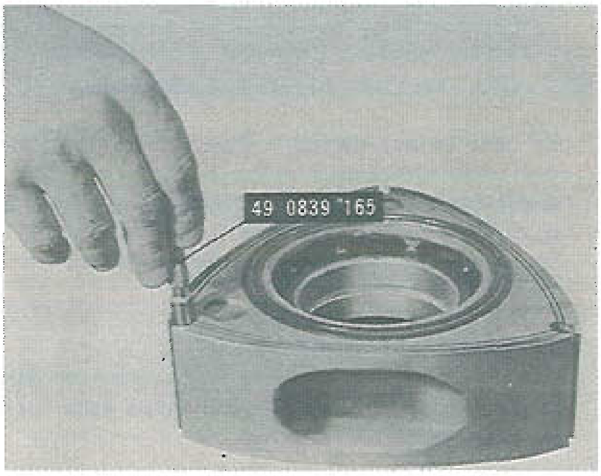


Fig. 1–76 Checking of corner seal groove

(1) Neither end of the gauge does not go into the groove. This means that the gap conforms to the specifications.
(2) While the go-end of the gauge goes into the groove, the not-go-end does not. This means the gap is more than standard dimension and less than the limit. In this case, replace the corner seal with a **0.03 mm (0.0012 in)** oversize one. **Do not** rebore the groove.
(3) If the both ends of the gauge go into the bore, it means that the gap exceeds the limit of 0.8 mm (0.0031 in). Rebore the corner seal groove with the **jig and reamer** (Part Nos. 2113 99 900 and 49 0839 170) to 11.2 mm (0.4410 in) diameter and use a **0.2 mm (0.0079 in)** oversizer corner seal.

Note:
(a) As the corner seal groove tends to show a heavy wear in the direction of the rotation, the side arcs on the gauge are partially cut off. Be sure to take the measurement in the direction of the maximum wear of the groove.
(b) If the gauge is not available, use a feeler gauge.
(c) The dimensions of the outer diameter of the gauge are as follows:

Go-end $11.0 \begin{smallmatrix} +0.019 \\ +0.021 \end{smallmatrix}$ mm $(0.4331 \begin{smallmatrix} +0.0007 \\ +0.0008 \end{smallmatrix}$ in)

Not-go-end $11.0 \begin{smallmatrix} +0.044 \\ +0.046 \end{smallmatrix}$ mm $(0.4331 \begin{smallmatrix} +0.0017 \\ +0.0018 \end{smallmatrix}$ in)

To rebore the corner seal groove, proceed as follows:
1) Remove carbon, rust and other deposits from the groove, being careful not to damage.
2) Install the **jig** (Part No. 2113 99 900) onto the rotor and tighten the correct bar being careful not to damage the rotor bearing and apex seal groove.

Fig. 1–77 Reaming of corner seal groove

3) Ream the groove with the ***reamer*** (Part No. 49 0839 170) by hand applying sufficient engine oil as a coolant. When feeding the reamer, it must be turned by about 20 rotations or over before the reaming work is accomplish completely.
4) Remove the reamer and jig from the rotor.
5) Repeat the same procedure when reaming the other grooves of the rotor.
6) Thoroughly clean the rotor, and check and confirm by visual inspection the condition of the reaming groove and to see if there is any damage to the rotor.
7) Fit a **0.2 mm (0.0079 in)** oversize corner seal into the groove, and check the gap between the corner seal and the groove. The standard gap is 0.02 ~ 0.048 mm (0.0008 ~ 0.0019 in).

Note:
(a) When installing or removing the jig, be careful not to hit the rotor.
(b) If the reaming is carried out without applying oil, it will be difficult to obtain the proper surface roughness no matter how many times the reaming may be repeated.
(c) Avoid two stage reaming, that is, drawing the reamer halfway during the reaming work and then resuming the reaming, because chips may affect the surface roughness.
(d) Before starting the reaming work, it must be confirmed that the reamer diameter is up to specifications, because the reamer could be worn in excess of the limit if it was used many times.

m. Inspecting of each seal spring
Check for weakness, wear or damage of the seal springs, especially the sections of the springs contacting the rotor or seal.

n. Inspecting of eccentric shaft
1. Wash the shaft in a cleaning solution and blow the oil passage with compressed air.
2. Check the shaft for cracks, scratches, wear or any other damage. Be sure that the oil passages are open.

3. Measure the diameter of the shaft journals with a micrometer. Replace the shaft if the wear is excessive. The standard diameter is **43 mm (1.6929 in)** on the main journal and **74 mm (2.9134 in)** on the rotor journal.

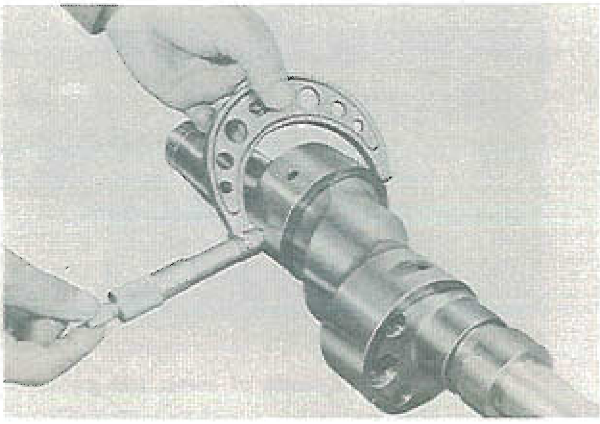


Fig. 1–78 Measuring of rotor journal diameter

4. Check the shaft run-out. To check, mount the shaft on "V"-blocks and apply a dial indicator. Slowly rotate the shaft and note the reading on the indicator. If the run-out is more than **0.02 mm (0.0008 in)**, replace the shaft with a new one.

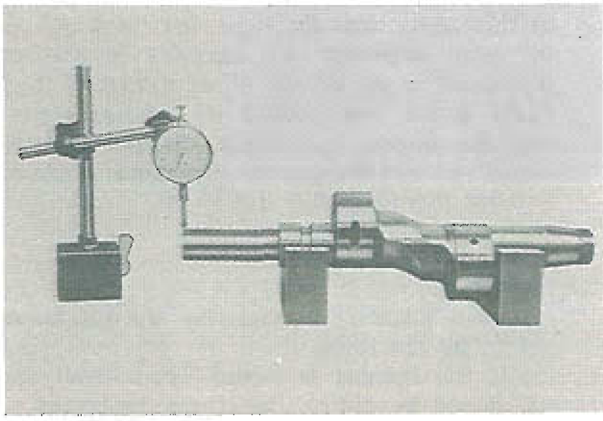


Fig. 1–79 Checking of eccentric shaft run-out

5. Check the blind plug in the shaft end for oil leakage or looseness. If any oil leakage is found, remove the blind plug with a hexagonal Allen key and replace the "O" ring.

6. Check the needle roller bearing in the shaft end

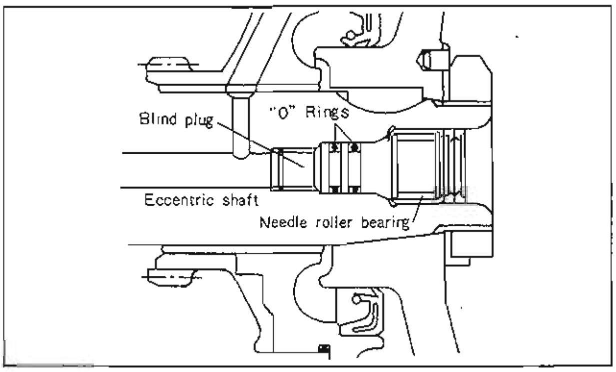


Fig. 1–80 Blind plug

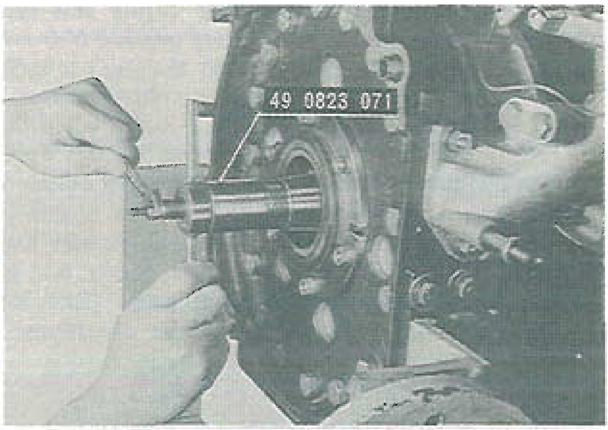


Fig. 1–81 Replacing of pilot bearing

for wear or any damage. Then insert the main drive shaft into the needle roller bearing and check the needle bearing for smooth operation and proper clearance.

To replace the bearing, use the **replacer** (Part Nos. 49 0823 071 and 49 0823 072).

o. Inspecting of needle bearing

Check the needle bearing for wear or damage. Inspect the bearing housing and thrust plate for wear or any damage.

1–B–4. Engine Assembly

The procedures for assembling the engine when the engine is to be completely overhauled are as follows:

a. Installing of oil seal

1. Place the rear rotor on a rubber pad or cloth.
2. Fit the outer and inner oil seal springs in their respective grooves on the rotor so that the spring gap is located opposite each other.
3. Insert a new "O" ring in each oil seal.

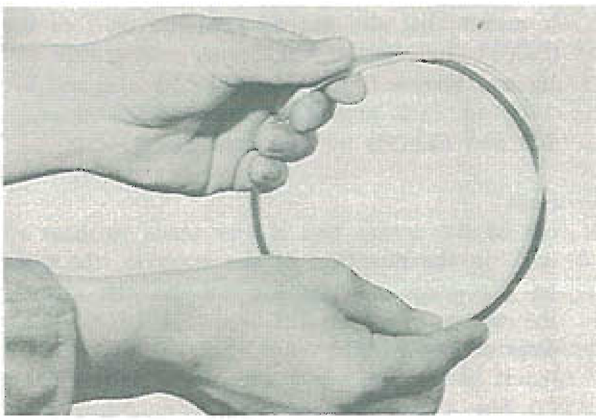


Fig. 1–82 Inserting of "O" ring

Note :

When replacing the oil seal, confirm the smooth movement of each oil seal by placing the oil seal on the oil seal spring in the groove before inserting the "O" ring.

4. Apply sufficient engine lubricant onto the oil seal and groove.

5. Install the oil seal to the groove on the rotor *pushing the head of the oil seal slowly with fingers.* Be careful not to deform the oil seal.

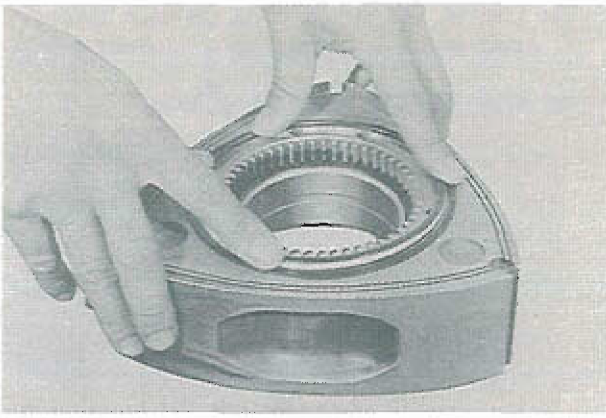


Fig. 1-83 Installing of oil seal

Note :
(a) As chamfering is performed and a white mark is applied on the bottom of the oil seal, confirm these before installing the oil seal so that the head (lip) of the oil seal will not be mistaken for the bottom.

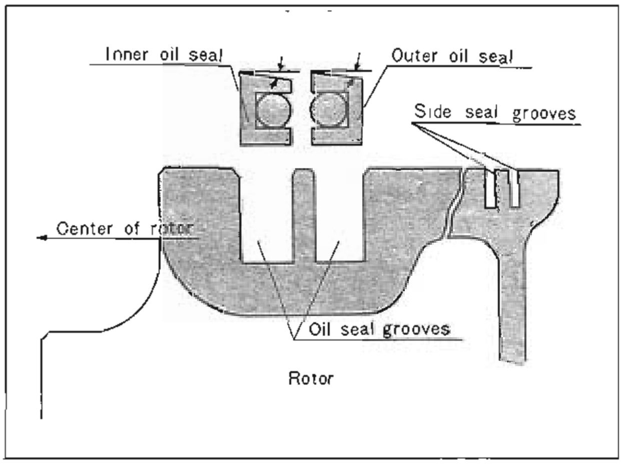


Fig. 1-84 Oil seal cross section

(b) Install the oil seals on both sides of the rotor.

b. Installing of each seal
1. Place the rear rotor on a rubber pad or cloth so that the teeth on the internal gear are facing upward.
2. Place each apex seal onto their respective grooves without the spring.
3. Place the corner seal springs and corner seals onto the grooves and apply engine lubricant onto them.

Note :
The top surface of the corner seal should be **1.3 ~ 1.5 mm (0.05 ~ 0.06 in)** higher than the rotor surface. It must also move freely, when pressed by finger.

4. Place the side seal springs on the side seal grooves of the rotor so as to face the both ends of the spring upward and apply engine lubricant onto them.

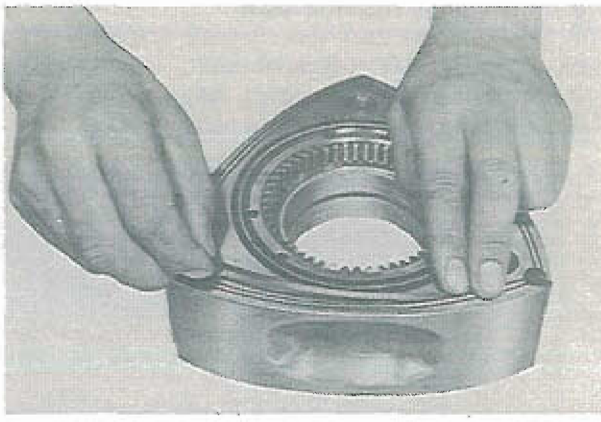


Fig. 1-85 Fitting of side seal

5. Fit the side seals into their respective grooves.

Note :
The side seal must protrude approximately **1.0 mm (0.04 in)** from the rotor surface. Also, check free movement by pressing with finger.

6. Apply engine lubricant onto each seal and internal gear of the rotor.

c. Installing of rear rotor
1. Mount the rear housing on the **work stand** (Part Nos. 49 0839 000, 49 0813 005 and 49 0820 006).
2. Turn the rear housing on the work stand so that the top of the housing is up.
3. Place the rotor on the rear housing taking care not to drop the seals, and turn the rear housing with the rotor so that the sliding surface of the rear housing faces upward.
4. Mesh the internal gear and stationary gear so that one of the rotor apexes is set to any one of the four places shown in Fig. 1-86.

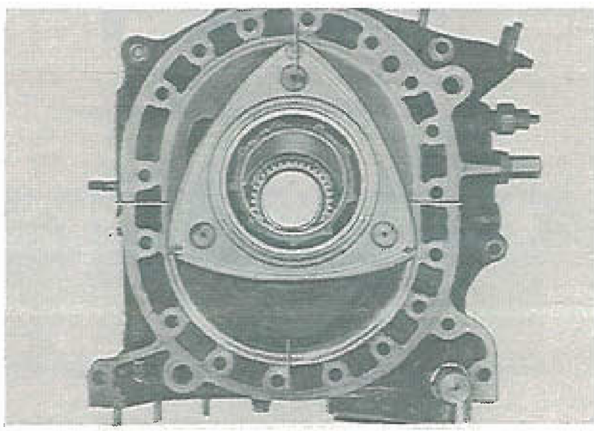


Fig. 1-86 Position of rotor apex

Note:
In this case, be careful not to drop the corner seal into the ports.

5. Remove the apex seals and place them on the flank of the rear rotor close to each of their respective original positions.

d. **Installing of eccentric shaft**

1. Lubricate the rear rotor journal and main journal on the shaft with engine lubricant.
2. Insert the eccentric shaft being careful not to damage the rotor bearing and main bearing.

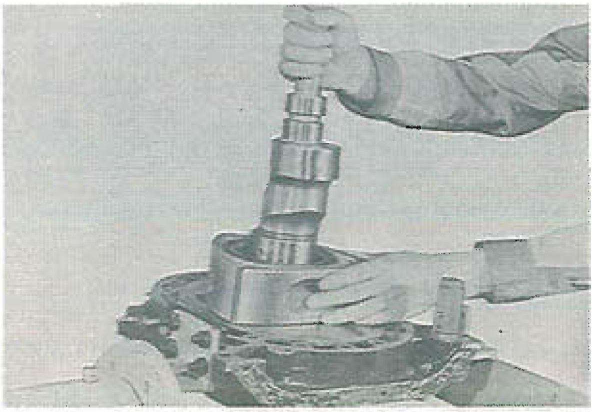


Fig. 1–87 Inserting of eccentric shaft

e. **Installing of rear rotor housing**

1. Apply sealing agent onto the rear side of the rear rotor housing, as shown in Fig. 1–88. Be careful not to let the sealing agent penetrate into the water passages or oil passages.

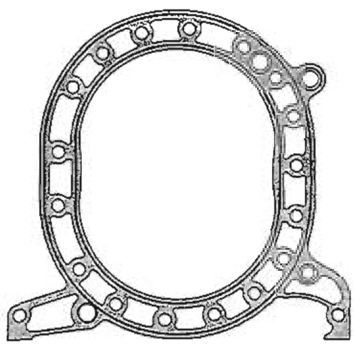


Fig. 1–88 Applying of sealing agent

2. Slightly apply rubber grease onto new "O" rings and sealing rubbers to prevent them from coming off, and place the "O" rings and sealing rubbers on

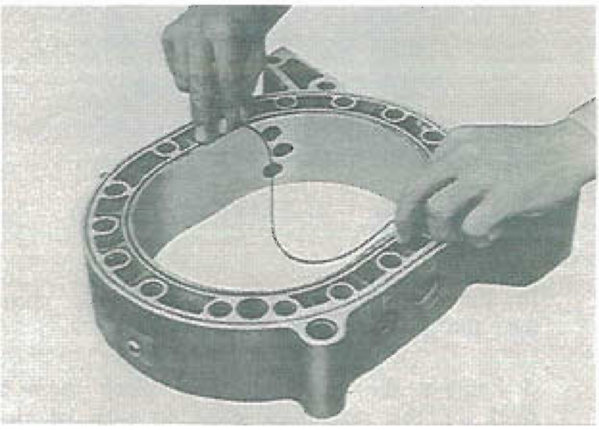


Fig. 1–89 Placing of sealing rubber

the rear rotor housing.

3. Invert the rear rotor housing being careful not to let the sealing rubbers and "O" rings drop out of the grooves, and mount it on the rear housing.
4. Apply engine lubricant onto the tubular dowels and insert the tubular dowels through the rear rotor housing holes into the rear housing holes.

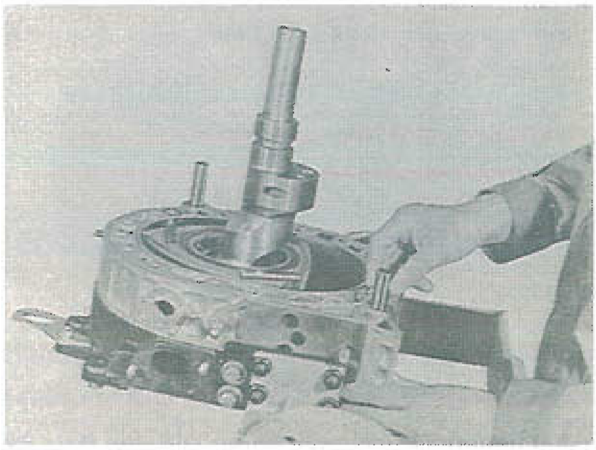


Fig. 1–90 Inserting of tubular dowel

f. **Installing of seals**

1. Fit each apex seal and springs into the grooves on the rear rotor, confirming their position and direction.

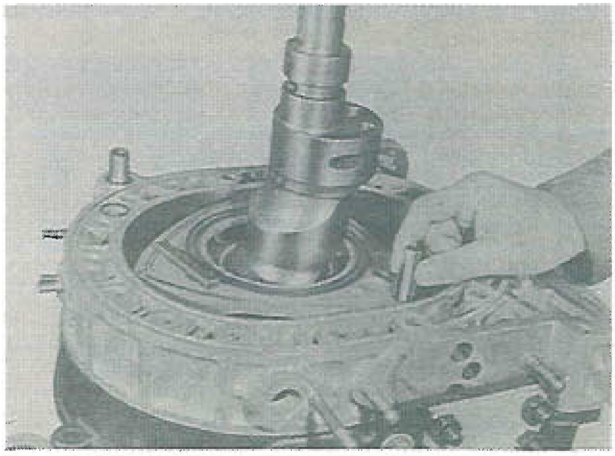


Fig. 1–91 Fitting of apex seal and spring

2. Fit the corner seals and side seals together with the springs to their respective grooves on the rear rotor (Refer to **step b in Par. 1–B–4**).
3. Apply some engine lubricant onto the seals on the rear rotor and sliding surface of the rear housing.

g. **Installing of intermediate housing**

1. Apply sealing agent onto the mating surface of the rear rotor housing.
2. Place new "O" rings and sealing rubbers on the rear rotor housing.
3. Make sure that the rear rotor housing is free from any foreign matter.
4. While holding the rear end of the eccentric shaft up to the extent that the front end of its rear rotor

journal does not come above the front end of the rear rotor bearing, place the intermediate housing on the rear rotor housing.

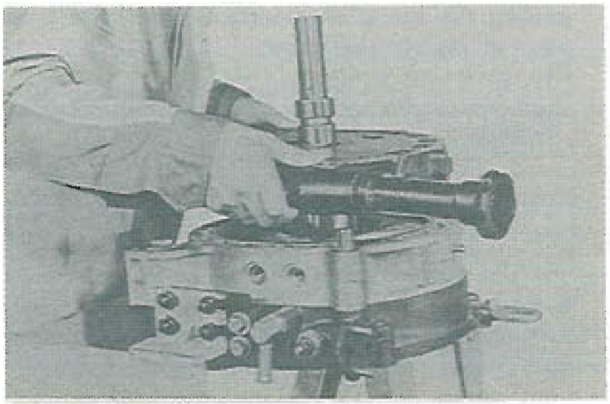


Fig. 1–92 Placing of intermediate housing

h. Installing of front rotor and front rotor housing
Refer to **steps a, b, c, e and f in Par. 1–B–4** and install the front rotor and front rotor housing.

i. Installing of front housing
1. Apply sufficient engine lubricant onto the stationary gear and main bearing.
2. Place the front housing on the front rotor housing. If necessary, turn the front rotor slightly to engage the teeth on the front housing stationary gear with these on the front rotor internal gear.

j. Tightening of tension bolts
1. Fit the tension bolts and apply 2 or 3 turns of each bolt.
2. Turn the engine on the work stand so that the top of the engine is up, and tighten the bolts gradually in the order shown in Fig. 1–93. The specified torque is **3.0 m-kg (22 ft-lb). Do not** tighten the tension bolts at one time.

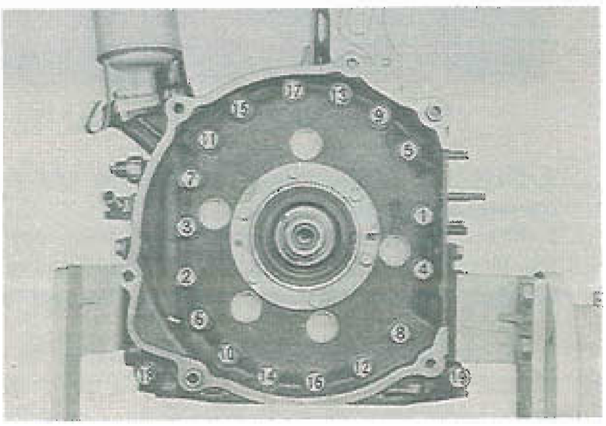


Fig. 1–93 Tightening order

3. Turn the eccentric shaft and make sure that the rotation is light and smooth.

k. Installing of flywheel
1. Apply lubricant to the oil seal in the rear housing and locking agent onto the thread of the eccentric shaft through the key.

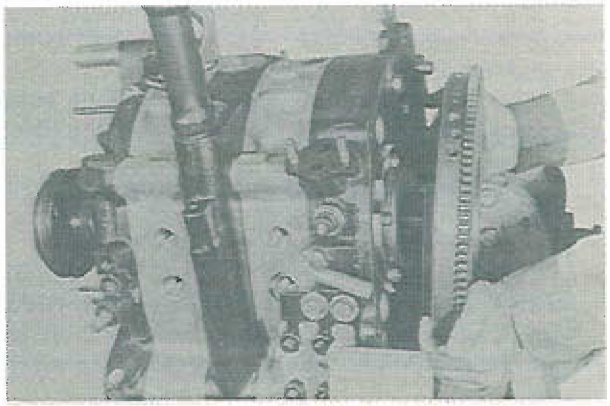


Fig. 1–94 Mounting of flywheel

2. Mount the flywheel to the rear end of the eccentric shaft so that the key fits into the keyway of the flywheel.
3. Apply sealing agent to both sides of the flywheel lock washer and place the lock washer in position.
4. Fit the flywheel lock nut by the fingers, and using the **flywheel nut wrench** (Part No. 49 0820 035) tighten the lock nut to **45.0 m-kg (350 ft-lb)**, holding the flywheel with the **ring gear brake** (Part No. 49 0820 060A).

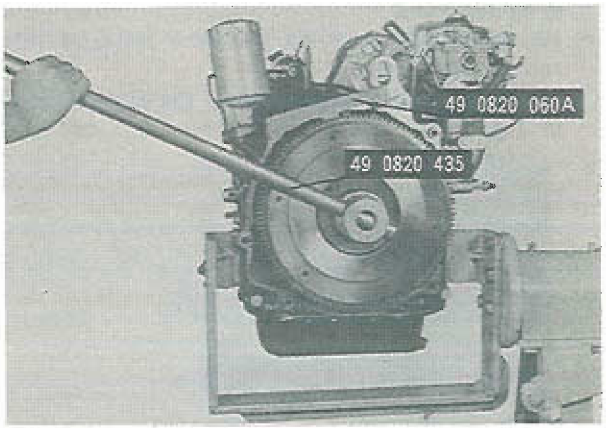


Fig. 1–95 Tightening of flywheel

l. Adjusting of eccentric shaft end play
1. Turn the engine on the work stand so that the front of the engine is up.

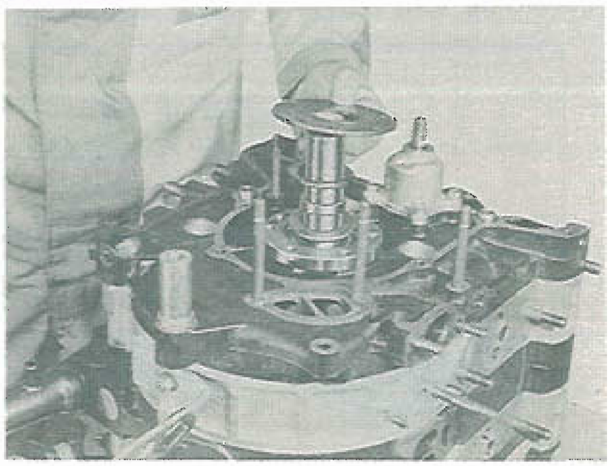


Fig. 1–96 Sliding of spacer and needle bearing

2. Slide the thrust plate, spacer and needle bearing onto the eccentric shaft, and then apply sufficient engine lubricant onto them.
3. Place the bearing housing on the front housing. Tighten the attaching bolts and bend the tabs of the lock washers.
4. Slide the needle bearing and thrust washer onto the shaft, and apply engine lubricant onto them.
5. Slide the balance weight onto the shaft.
6. Engage the oil pump drive chain with the driven sprocket and drive sprocket and slide the sprockets with chain onto the eccentric shaft and oil pump shaft simultaneously. Fit the key onto the eccentric shaft.

Note:
When installing the chain, it should be engaged to each sprocket before installing the sprockets to the eccentric shaft and oil pump shaft.

7. Slide the distributor drive gear, spacer and oil thrower onto the eccentric shaft.
8. Install the eccentric shaft pulley onto the shaft so that the keyway of the pulley aligns with the key.
9. Attach the **ring gear brake** (Part No. 49 0820 060A) to the flywheel, and tighten the pulley bolt to **8.5 m-kg (60 ft-lb).**
10. Turn the engine on the work stand so that the top of the engine is up.
11. Apply a dial indicator onto the flywheel as shown in Fig. 1–97. Move the flywheel fore and aft, and

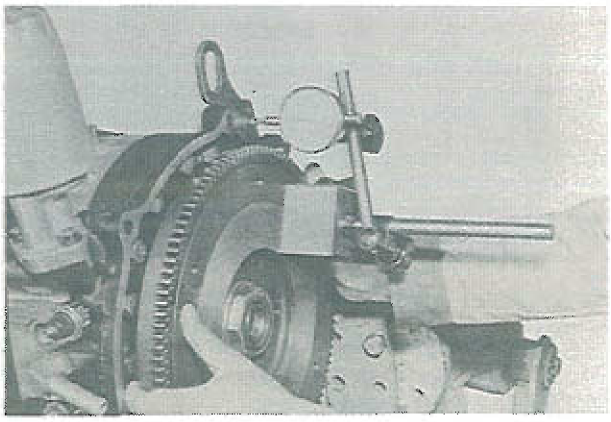


Fig. 1–97 Checking of eccentric shaft end play

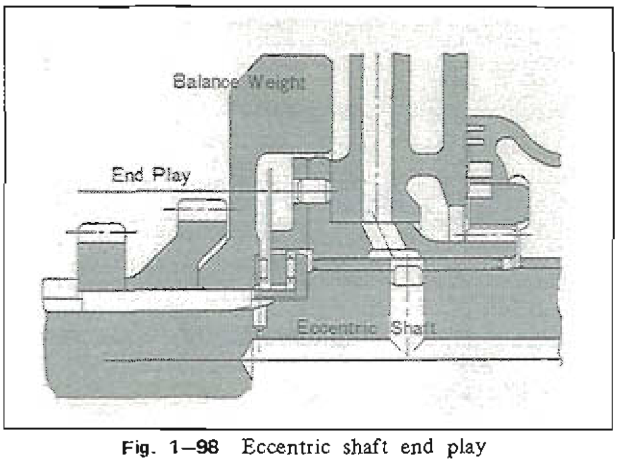


Fig. 1–98 Eccentric shaft end play

note the reading of the indicator. The standard end play is **0.04 ~ 0.07 mm (0.0016 ~ 0.0018 in).** If the end play is not within the limits, adjust it by grinding the spacer on a surface plate using a emery paper or replace the spacer.
The spacers are available in the following thicknesses:

Identification Mark	Thickness
X	8.08 ± 0.01 mm (0.3181 ± 0.0001 in)
Y	8.04 ± 0.01 mm (0.3166 ± 0.0001 in)
V	8.02 ± 0.01 mm (0.3158 ± 0.0001 in)
Z	8.00 ± 0.01 mm (0.3150 ± 0.0001 in)

Recheck the end play. If the end play is 0.04 ~ 0.07 mm (0.0016 ~ 0.0018 in), remove the eccentric shaft pulley, and proceed as follow to install the front cover:

m. Installing of front cover and eccentric shaft pulley
1. Turn the engine on the work stand so that the front of the engine is up.
2. Tighten the oil pump driven sprocket nut and bend the tab of the lock washer.
3. Place a new "O" ring on the oil passage of the front cover.

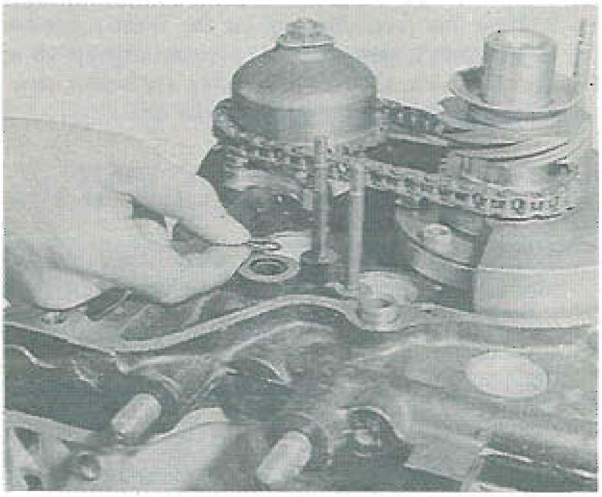


Fig. 1–99 Placing of "O" ring

4. Place the chain adjuster in position and tighten the attaching nuts.
5. Place the front cover gasket and front cover on the front housing and tighten the attaching bolts.
6. Apply engine lubricant onto the oil seal in the front cover.
7. Install the eccentric shaft pulley onto the shaft so that the keyway of the pulley aligns with the key.
8. Attach the ring gear brake to the flywheel and tighten the pulley bolt to **8.5 m-kg (60 ft-lb).**

n. Installing of clutch cover assembly
1. Hold the clutch disc in its mounting position with the **clutch disc arbor** (Part No. 49 0813 310). If the arbor is not available, use a spare main drive shaft.

2. Mount the clutch cover and pressure plate assembly on the flywheel, and **align the "O" mark** on the clutch cover with the **reamed hole of the flywheel**. Install the attaching bolts and tighten the bolts to 2.0 m-kg (15 ft-lb), using the **ring gear brake** (Part No. 49 0820 060A). Use the two reamer bolts in the reamed hole.

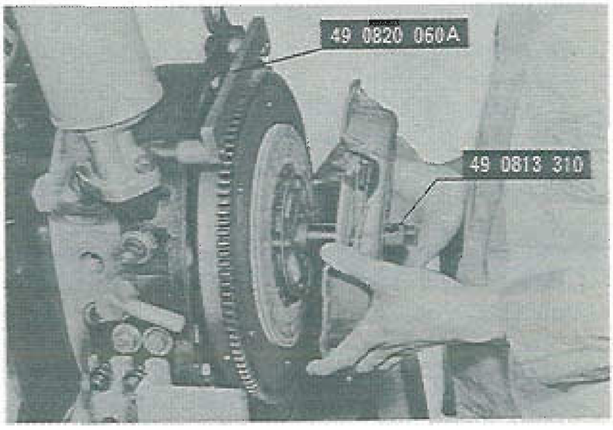


Fig. 1–100 Mounting of clutch cover

o. Installing of oil strainer and oil pan

1. Turn the engine on the work stand so that the bottom of the engine is up.
2. Cut off the excess gasket on the front cover along the mounting surface of the oil pan.

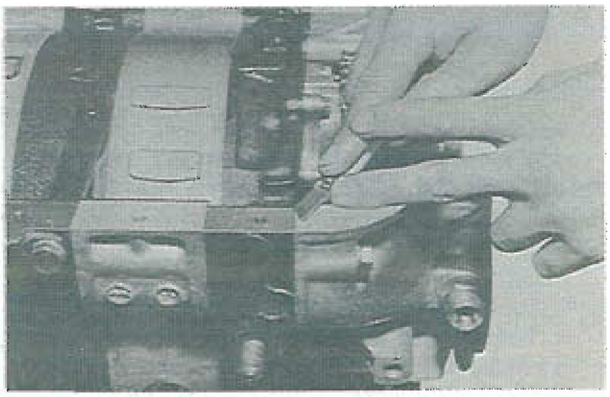


Fig. 1–101 Cutting of excess gasket

3. Place the oil strainer gasket and strainer on the front housing and tighten the attaching bolts.

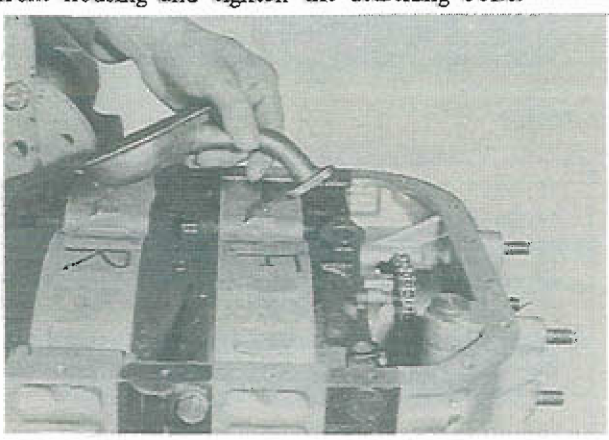


Fig. 1–102 Placing of oil strainer

4. Apply sealing agent onto the mating surfaces of the oil pan and each housing.

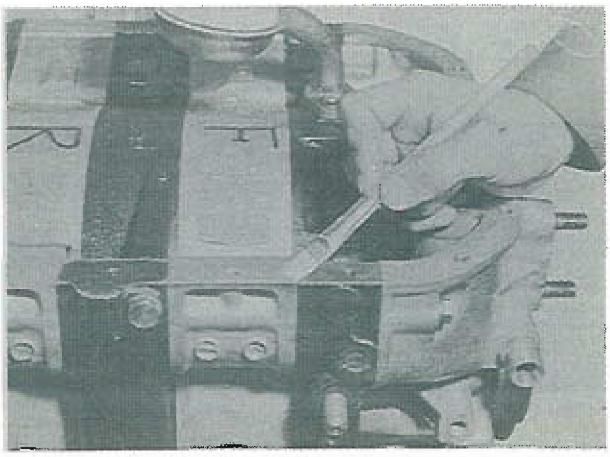


Fig. 1–103 Applying of sealing agent

5. Place the gasket and oil pan in position.
6. Insert the bolts through the stiffeners, and tighten the bolts **little by little in turn** until the torque becomes **1.0 m-kg (7.0 ft-lb) evenly.**

p. Installing of distributors

1. Invert the engine on the work stand.
2. Rotate the eccentric shaft until the white mark on the pulley aligns with the needle on the front cover.

Note :
On the rotary engine, each rotor makes a 1/3 rotation as against one rotation of the eccentric shaft. That is, a combustion is obtained at each 1/3 rotation of the rotor makes a 1/3 rotation. Therefore, when the white mark and needle are aligned, the front rotor is always located at top dead center in the compression stroke.

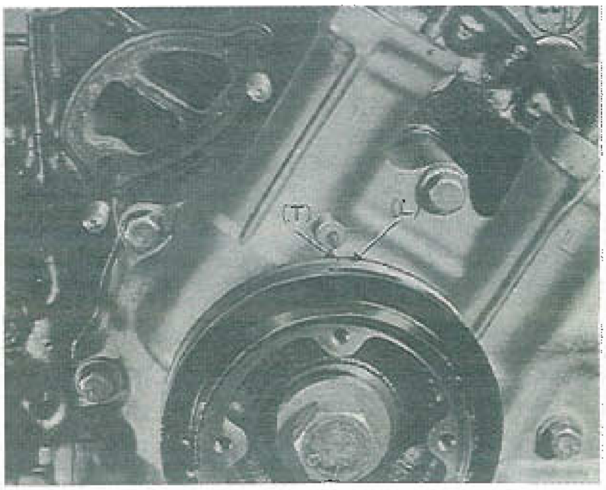


Fig. 1–104 Aligning of top dead center

3. Install the trailing distributor socket through the gasket so that the groove on the drive shaft is at an inclination of **about 34°** to the right against the longitudinal axis of the engine. Tighten the socket attaching nuts.

4. Install the leading distributor socket through the gasket onto the front housing so that the groove on the drive shaft is at an inclination of **about 17°** to the right against the longitudinal axis of the engine. Tighten the attaching nuts.

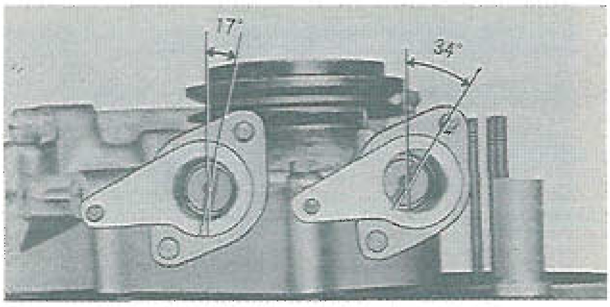


Fig. 1–105 Position of distributor socket

5. Align the identification marks on each distributor housing and driven gear. Insert each distributor into the socket so that the distributor driven shaft end fits into the groove on the drive shaft.

Note:
The marks of the distributor and front cover, "T" and "L", must be coincide with each other.

6. Rotate each distributor slightly in the direction shown in Fig. 1–106 and the contact points start to separate. Then, tighten the lock nut for each distributor.
7. Fit each distributor cap.

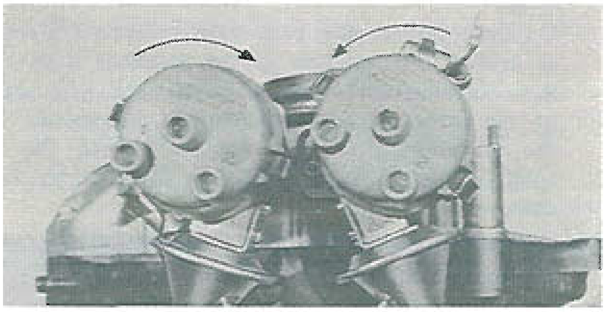


Fig. 1–106 Adjusting of ignition timing

q. Installing of water pump and engine mounting bracket
1. Place the gasket and water pump on the front housing, and tighten the attaching nuts.
2. Install the water pump pulley onto the water pump boss and tighten the bolts.
3. Install the engine mounting bracket onto the front cover and tighten the attaching nuts.

r. Installing of alternator
1. Install the alternator to the bracket with the bolt and nut.
2. Attach the upper end of the alternator flange to the adjusting bar.
3. Fit the "V"-belt.
4. Adjust the belt deflection.
The belt deflection should be **15 ~ 17 mm (0.59~ 0.67 in)** when thumb pressure of about 10 kg (22 lb) is applied to the middle of the belt between the alternator pulley and eccentric shaft pulley. On a new belt, the deflection should be **12 ~ 14 mm (0.47 ~ 0.55 in)**. After adjusting, tighten the bolts and nuts.

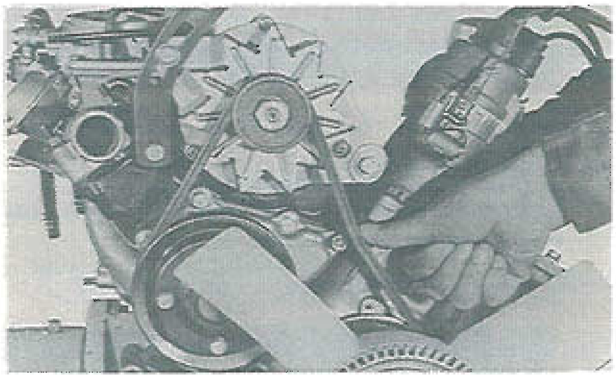


Fig. 1–107 Adjusting of "V" belt deflection

s. Installing of intake manifold and carburetor
1. Place the carburetor and intake manifold assembly with the gaskets in position and tighten the attaching nuts.
2. Connect the oil tubes, vacuum tube and metering oil pump connecting rod with the carburetor.

t. Installing of exhaust manifold
1. Remove the engine from the work stand.
2. Place the gaskets and exhaust manifold in position and tighten the attaching nuts.
3. Place the hot air duct in position and tighten the attaching nuts.

1–B–5. Engine Installation
Follow the removal procedures in the reverse order.

SPECIAL TOOLS

49 0839 000	Engine work stand	49 0813 245	Expander (For rotor bearing)
49 0813 005	Engine hanger	49 0813 240	Rotor bearing remover and installer
49 0820 006	Attachment (For engine hanger)	49 0813 225	Oil seal remover
49 0820 060A	Ring gear brake	49 0839 165	Bar limit gauge (For corner seal groove)
49 0820 035	Flywheel nut wrench		
49 0823 300	Flywheel puller	49 0839 170	Reamer (For corner seal groove)
49 0813 250	Seal case	2113 99 990	Jig (For corner seal groove)
49 0813 215	Tubular dowel puller	49 0823 071	Needle bearing remover
49 0813 235	Main bearing remover and installer	49 0823 072	Needle bearing installer
		49 0813 310	Clutch disc arbor

LUBRICATING SYSTEM

DESCRIPTION

Oil is circulated under pressure by a rotor type pump. The pump is driven by the eccentric shaft through the chain. A full-flow type oil filter is mounted on the rear housing. A metering oil pump delivers an adequate amount of oil into the float chamber of the carburetor to lubricate each seal. An oil cooler is fixed beneath the radiator.

2–A. LUBRICATING CIRCUIT

1. The oil pump which is driven by the eccentric shaft, draws up oil from the oil pan through the strainer and sends it to the oil cooler.
2. The oil that has been cooled through the oil cooler is forced to the oil filter.
3. The oil that has been filtered by the oil filter is forced to the front main bearing through the tubular dowel and to the rear main bearing through the passage of the rear housing.
4. After lubricating the front and rear main bearings, the oil passes through the oil holes of the bearings and enters the oil passage provided in the eccentric shaft.
5. Stationary gears, internal gears and needle bearings are lubricated by the oil forced through the clearance between the main bearing and shaft.
6. The oil circulating through the eccentric shaft passage lubricatesl the rotor bearings.
7. The oil passing through the tubular dowel is sent to the distributors and metering oil pump.
8. From the metering oil pump, the lubricant is forced to the carburetor and is supplied into the combustion chambers together with the air-fuel mixture to lubricate the apex seals, corner seals, side seals and housings.

2–B. OIL PUMP

The oil pump is of a rotor type based on a trochoid curve and consists of the parts as shown in Fig. 2–1. The feeding capacity is 6 liters/min. (12.7 U.S. pints/min., 10.6 Imp. pints/min.) at 1,000 rpm of engine revolution.

2–B–1. Oil Pump Removal

1. Remove the front cover as described in Par. **1–A–2.**
2. Remove the bolts attaching the oil pump to the front housing and remove the oil pump.

2–B–2. Oil Pump Disassembly

1. Remove the snap ring from the shaft, and remove the rear rotors and key.
2. Remove the middle plate attaching screw and remove the middle plate.
3. Remove the front rotors, and key from the shaft.

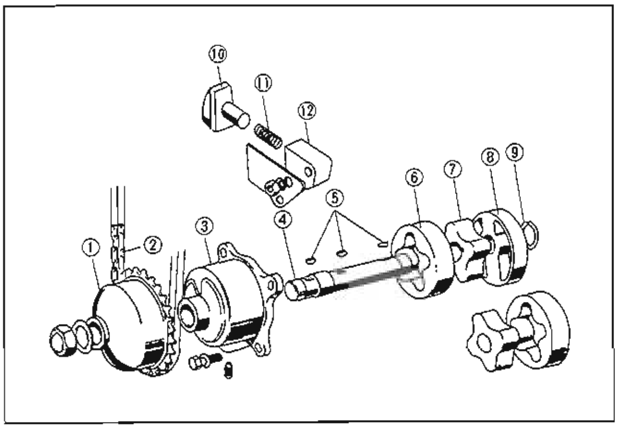


Fig. 2–1 Oil pump components

1. Oil pump driven sprocket	7. Inner rotor
2. Oil pump chain	8. Middle plate
3. Pump body	9. Snap ring
4. Shaft	10. Slipper head
5. Keys	11. Spring
6. Outer rotor	12. Body

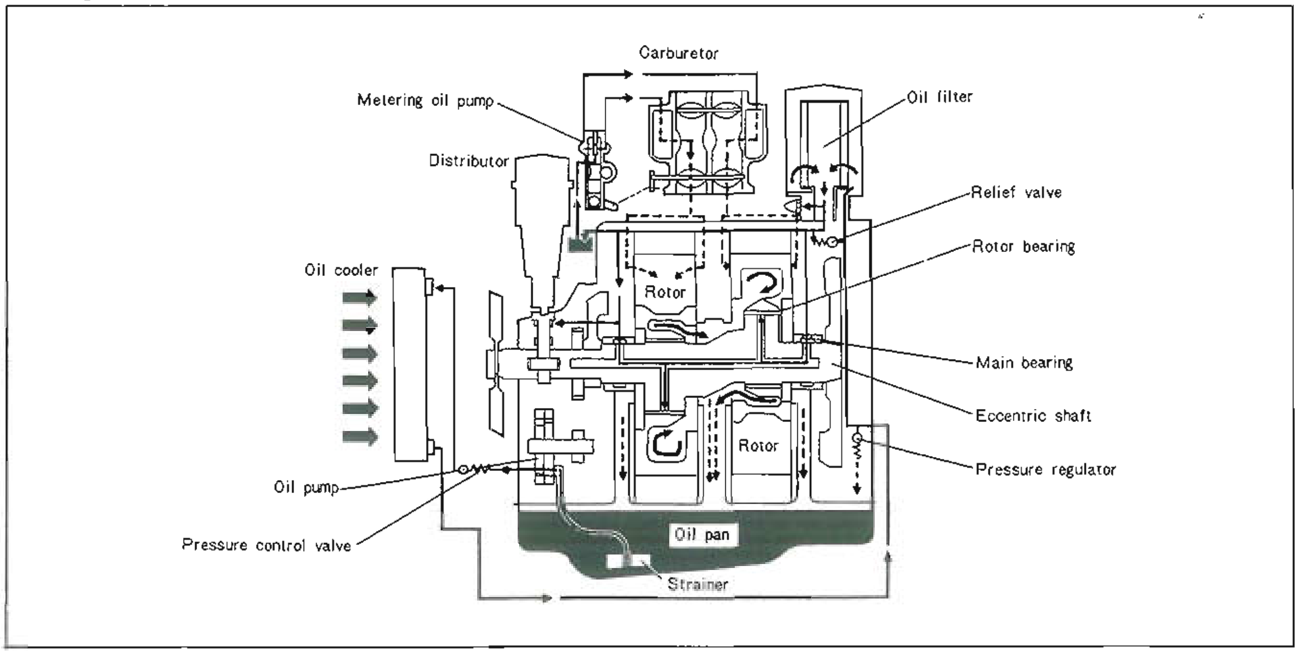


Fig. 2–2 Lubricating circuit

2–B–3. Oil Pump Inspection

1. Check the clearance between the lobes of the rotors with a feeler gauge, as shown in Fig. 2–3. The standard clearance should be 0.01 ~ 0.09 mm (0.0004 ~ 0.0035 in). If the clearance exceeds **0.15 mm (0.006 in)**, replace both rotors.

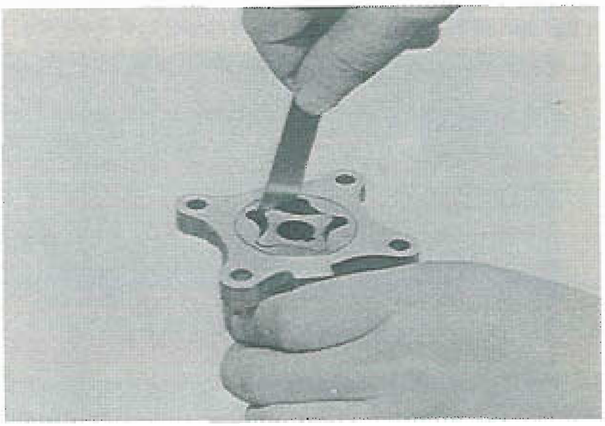


Fig. 2–3 Checking clearance between rotors

2. Check the clearance between the outer rotor and pump body with a feeler gauge as shown in Fig. 2–4. The specified clearance is 0.200 ~ 0.245 mm (0.008 ~ 0.010 in). If the clearance is more than **0.30 mm (0.012 in)**, replace both rotors.

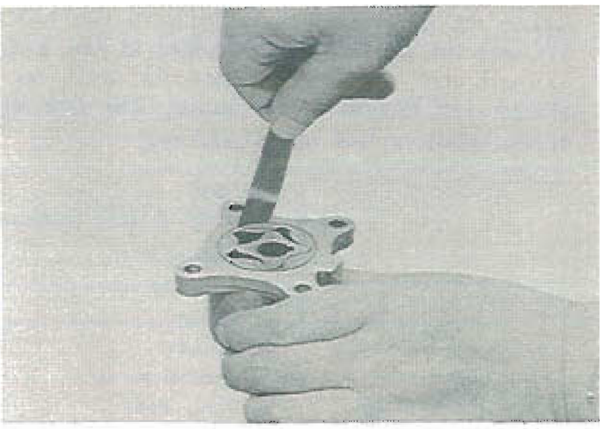


Fig. 2–4 Checking clearance of outer rotor and body

3. Check the end float of the rotors. Place a straight edge across the pump body and measure the clearance between the rotor and straight edge with a

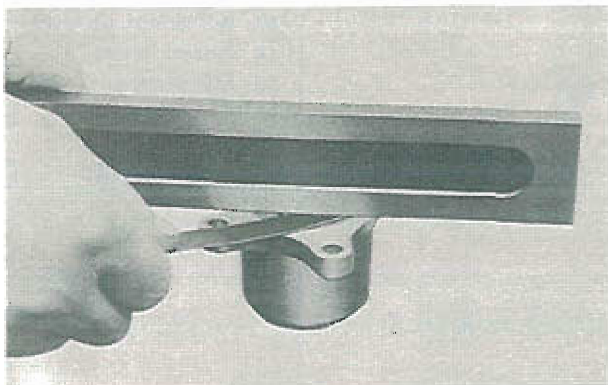


Fig. 2–5 Checking of end float

feeler gauge. The standard end float is 0.030 ~ 0.125 mm (0.001 ~ 0.005 in). If the end float exceeds **0.30 mm (0.012 in)**, correct the pump body or replace both rotors.

2–B–4. Oil Pump Assembly

Follow the disassembly procedures in the reverse order.

2–B–5. Oil Pump Installation

Follow the removal procedures in the reverse order.

2–C. CHAIN ADJUSTER

2–C–1. Chain Adjuster Removal

Refer to **Par. 1–A–2** and remove the chain adjuster.

2–C–2. Chain Adjuster Inspection

1. Check the amount of protrusion of the chain adjuster, as shown in Fig. 2–6. If the protrusion exceeds **12 mm (0.47 in)**, repalce the adjuster or chain.

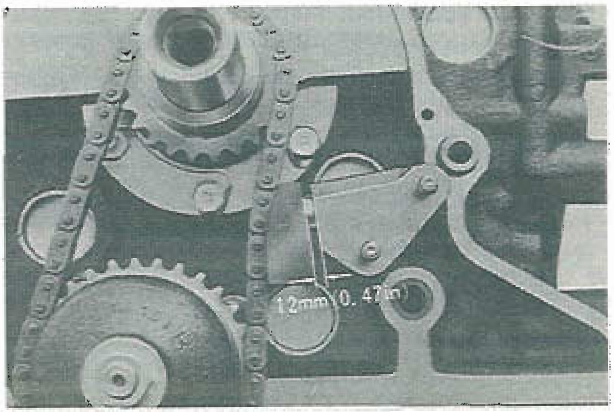


Fig. 2–6 Checking of chain adjuster protrusion

2. Check the rubber on the contacting surface of the chain adjuster for wear or damage and spring for weakness. If necessary, replace the chain adjuster.

2–C–3. Chain Adjuster Installation

Follow the removal procedures in the reverse order.

2–D. OIL PUMP CHAIN AND SPROCKET

2–D–1. Oil Pump Chain and Sprocket Removal

Refer to **Par. 1–A–2** and remove the oil pump chain and sprocket.

2–D–2. Oil Pump Chain and Sprocket Inspection

1. Check the chain for broken links.
2. Check the sprockets for cracks and worn or damaged teeth. If any defects are found, replace with new parts.

2–E. PRESSURE REGULATOR

The pressure regulator is provided on the rear housing. When the engine revolution becomes high and excessive oil pressure develops in the system, the pressure regulator opens to relieve the pressure and to send the excess oil to the oil pan. Thus, the oil pressure is maintained within the maximum pressure of **5 kg/cm² (71.1 ft-lb²).**

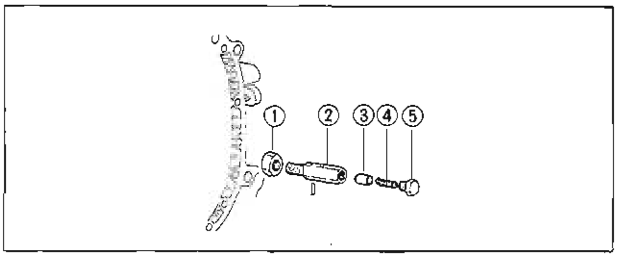


Fig. 2–7 Pressure regulator components

1. Lock nut
2. Regulator body
3. Plunger
4. Spring
5. Plug

To check the oil pressure, proceed as follows:

1. Remove the oil pressure switch and install an oil pressure gauge in its place.
2. Warm up the engine to the normal operating temperature.
3. Run the engine at **3,000 rpm** and take a reading of the gauge. If the reading of the gauge is **5.0 kg/cm² (71.1 lb/in²)**, the oil pressure is normal.

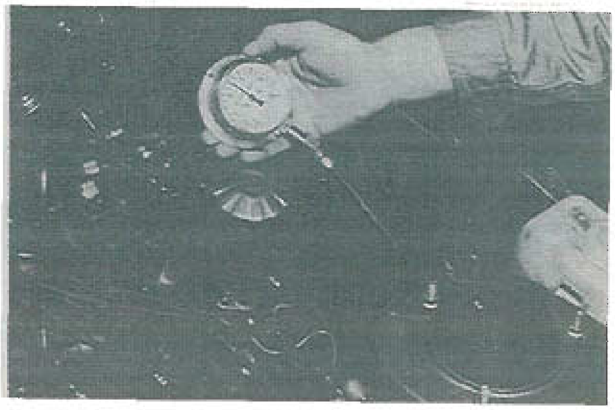


Fig. 2–8 Checking of oil pressure

If the oil pressure is extremely low, check the following points:

1) Ensure that the oil level is between the "F" and "L" marks of the dipstick gauge.
2) Check the oil filter for clogging. If it is clogged, replace the filter cartridge, referring to **Par. 2–K.**
3) Check the oil pump, as described in **Par. 2–B–3.**
4) Check the pressure regulator for wear on the plunger and fatigue on the spring. The free length of the spring is **46.4 mm (1.827 in).**

2–F. OIL PRESSURE SWITCH

The oil pressure switch fitted to the rear housing is connected by the wiring to the oil pressure warning lamp. The safe minimum pressure is **0.3 kg/cm² (4.3 lb/in² at idle.** If the oil pressure drops below 0.3 kg/cm² (4.3 lb/in²) the warning lamp lights up to indicate a trouble in the lubricating system. Therefore, when the warning lamp goes on, the oil pressure should be checked immediately.

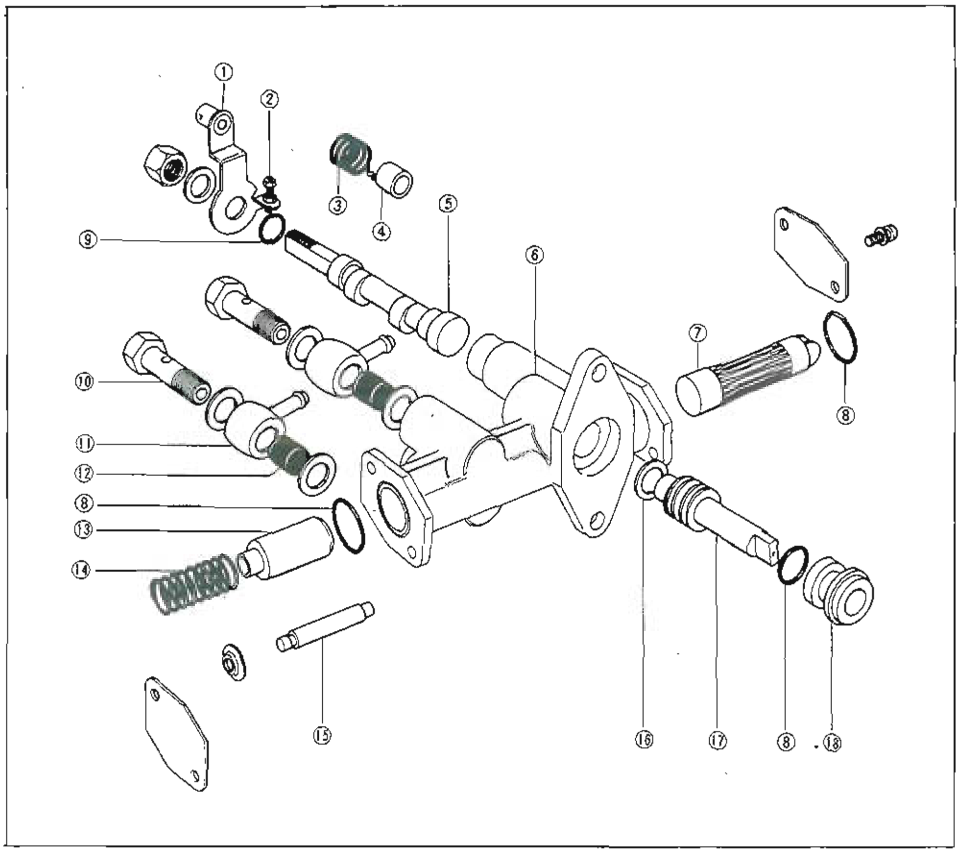


Fig. 2–9

Metering oil pump components

1. Control lever
2. Adjusting screw
3. Spring
4. Spacer
5. Control pin
6. Pump body
7. Plunger
8. "O" ring
9. "V" ring
10. Connecting bolt
11. Connector
12. Strainer
13. Differential plunger
14. Plunger spring
15. Sub plunger
16. Thrust washer
17. Worm gear
18. Worm bearing

2–G. METERING OIL PUMP

The plunger type metering oil pump is provided to send the proper amount of oil to the carburetor. The oil enters the combustion chamber together with the air-fuel mixture and lubricates the sliding surfaces of the seals and housings. The amount of oil supply is controlled by the engine revolutions and the load, in the following way:

The control lever of the pump is interlocked with the throttle lever of the carburetor and moves the control pin. The control pin which is a cam-shaped shaft and is in contact with the cam-shaped tip of the plunger, and thus the stroke of the plunger is controlled by the opening angle of the throttle valve.

When the opening of the throttle valve is small, the stroke of the plunger is also small. Thus since the stroke of the differential plunger which is turned and pushed together with the plunger is small, the amount of oil discharge small is kept at a low level. As the opening of the throttle valve increases, the stroke of the plunger becomes larger, increasing the stroke of the differential plunger. Thus the amount of oil supply becomes larger.

2–G–1. Metering Oil Pump Removal

1. Disconnect the connecting rod from the control lever of the pump by removing the cotter pin.

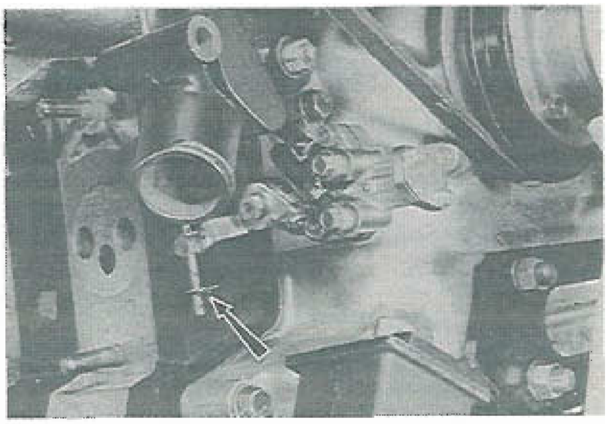


Fig. 2–10 Removing of cotter pin

2. Pull out the oil tubes at the carburetor.
3. Remove the bolts attaching the pump to the front cover and remove the pump.

2–G–2. Metering Oil Pump Disassembly

1. Remove the screws attaching the covers to the pump body and remove the covers from both sides of the body.
2. Remove the plunger, worm gear and spring.
3. Remove the front cover, as described in **Par. 1–A–2**, and remove the oil pump driven gear and shaft from the front cover.

To remove the driven gear, proceed as follows:

1) Remove the snap ring that secures the driven gear to the shaft and remove the shim and driven gear from the shaft.
2) Remove the shaft lock pin.
3) Remove the snap ring and remove the shaft from the front cover.

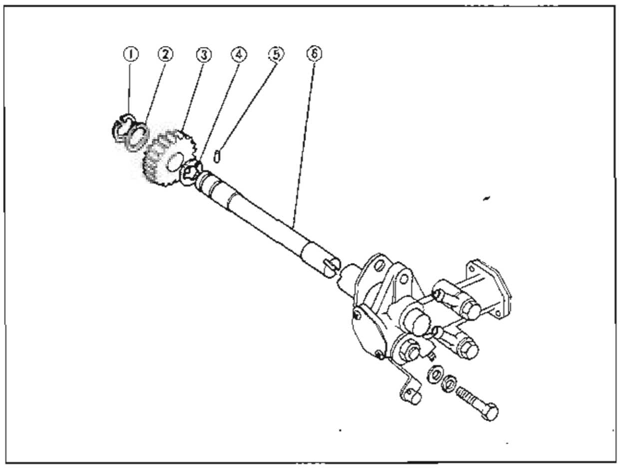


Fig. 2–11 Metering oil pump drive components

1. Snap ring	4. Snap ring
2. Shim	5. Lock pin
3. Driven gear	6. Pump shaft

2–G–3. Metering Oil Pump Inspection

The amount of oil discharge from the metering oil pump should be inspected as follows:

1. Disconnect the oil tubes at the carburetor.
2. Disconnect the connecting rod of the metering oil pump at the carburetor.
3. Run the engine **at 2,000 rpm**.

Check the amount of oil discharged from the two oil tubes of the metering oil pump. If it is **2.4 ~ 2.9 cc/6 min.**, the discharge of oil is normal. If necessary, adjust the metering oil pump.

Fig. 2–12 Checking of oil discharge

2–G–4. Metering Oil Pump Adjustment

When adjusting the metering oil pump, the amount of oil discharge is increased by turning the adjusting screw clockwise and decreased by turning it counterclockwise.

2–G–5. Metering Oil Pump Assembly

Follow the disassembly procedures in the reverse order.

2–G–6. Metering Oil Pump Installation

Follow the removal procedures in the reverse order.

2–G–7. Adjusting of Metering Oil Pump Connecting Rod

At the ends of the pump connecting rod there are three holes which provide three changes in the pump discharge amount. Accordingly, select and use the hole according to the engine condition.

2–H. OIL COOLER

2–H–1. Oil Cooler Removal

1. Raise the vehicle and support with stands.
2. Drain the engine lubricant.
3. Remove the bolts and screws attaching the engine under cover, and remove the engine under cover.
4. Disconnect the oil hose from the oil cooler.
5. Remove the nuts attaching the oil cooler to the radiator and remove the oil cooler.

2–H–2. Oil Cooler Inspection

Examine the oil cooler carefully for leaks. If any leakage is found, however small it may be, repair completely by soldering, etc. Clean the exterior of the oil cooler core by blowing out with compressed air.

2–H–3. Oil Cooler Installation

Follow the removal procedures in the reverse order.

2–I. OIL PAN

2–I–1. Oil Pan Removal

1. Raise the vehicle and support with stands.
2. Drain the engine lubricant.
3. Remove the bolts and screws attaching the engine under cover, and remove the engine under cover.
4. Remove the bolts attaching the oil pan, and remove the oil pan and gasket.

2–I–2. Oil Pan Inspection

Scrape off any dirt or metal particles from the inside of the oil pan. Wash the oil pan in a solvent and dry it with compressed air.
Check the oil pan for any cracks and damaged drain plug threads. Inspect for damage (uneven surface) at the bolt holes caused by over-torqueing the bolts.
Straighten surfaces as required. Repair any damage, or replace the oil pan if repairs can not be made satisfactorily.

12–I–3. Oil Pan Installation

Follow the removal procedures in the reverse order.

2–J. OIL STRAINER

2–J–1. Oil Strainer Removal

1. Remove the oil pan, as described in **Par. 2–I–1.**
2. Remove the bolts attaching the oil strainer and remove the oil strainer.

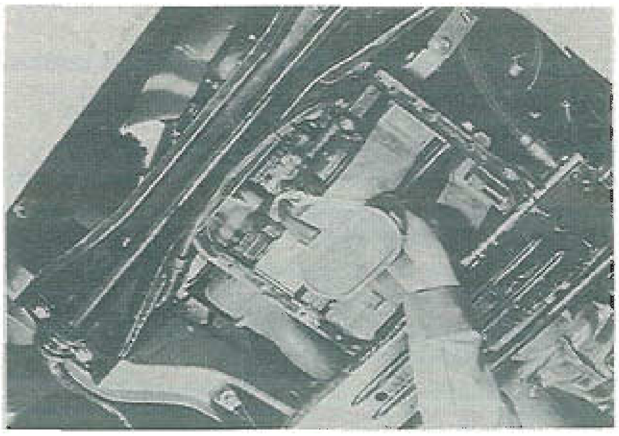


Fig. 2–13 Removing of oil strainer

2–J–2. Oil Strainer Installation

Follow the removal procedures in the reverse order.

2–K. OIL FILTER

The oil filter is of a cartridge type. The element of the filter is sealed in the container as a unit.
The oil filter is provided with a relief valve. If the oil filter is clogged by impurities in the oil and the filtering resistance reaches **1.2 kg/cm² (17.1 lb/in²)**, the oil can not pass through the element. In this case, the oil pushes the relief valve open and unfiltered oil is supplied to the engine.
The oil filter should be replaced **every 12,000 km (8,000 miles).**
To replace the oil filter, proceed as follows:
1. Remove the oil filter cartridge with a suitable oil filter wrench.
2. Apply oil onto the rubber gasket on the new filter cartridge.
3. Place the cartridge on the cover and screw in until it just touches the cover.
4. Tighten the cartridge a further 2/3 of a turn but absolutely no more.
Do not use the oil filter wrench.
5. Start the engine and check to see that the oil is not leaking from the joints. Top up with oil if necessary.

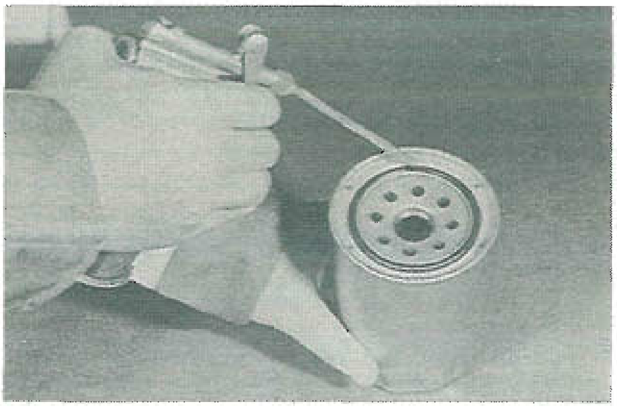


Fig. 2–14 Applying of oil

COOLING SYSTEM

DESCRIPTION

The completely sealed cooling system consists of a corrugated fin type radiator with sealed filler cap, expansion tank with pressure cap, centrifugal water pump, wax pellet type thermostat, and four-blade fan. The radiator and the expansion tank are connected by the hose. When the engine is overheated, the coolant in the radiator flows out and is let into the expansion tank through the hose. The coolant is then returned to the radiator by negative pressure which builds-up in the cooling system when the engine cools down. The coolant should be changed **every two years or every 48,000 km (32,000 miles).**

3–A. COOLANT CIRCUIT

The water pump is driven by the eccentric shaft pulley through a V-belt and discharges the cooling water to the front housing. The water circulates from the front housing through the water passage provided in each housing and flows to the rear housing. From the rear housing, the water is returned to the front housing. At low engine temperature, the thermostat is closed to keep the water from entering the radiator. The water then flows directly to the water pump where it is recirculated to each housing. As the thermostat opens when the engine is warmed up, the water flows into the radiator. The cooled water flows from the radiator to the water pump through the connecting hose and cools the engine by circulation.

3–B. FLUSHING OF COOLING SYSTEM

The cooling system should be flushed **every two years or 48,000 km (32,000 miles).**

The flushing procedures are as follows:

1. Open the drain plugs and drain the coolant.

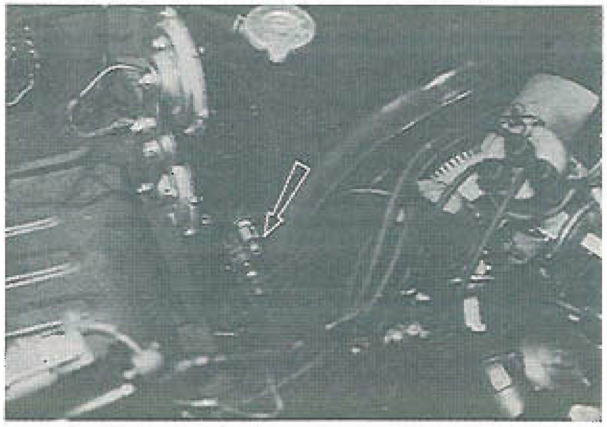


Fig. 3–1 Opening of drain plug

2. Close the drain plugs and supply clean soft water.

Note:
If necessary, use cleaning solution to loosen rust and scale, by following the instructions given, by the maker of the cleaning solution.

3. Run the engine for about one hour, at the normal operating temperature.
4. Drain the water completely.
5. Fill with soft water (demineralized water) and genuine long life coolant, referring to **Par. 3–C.**

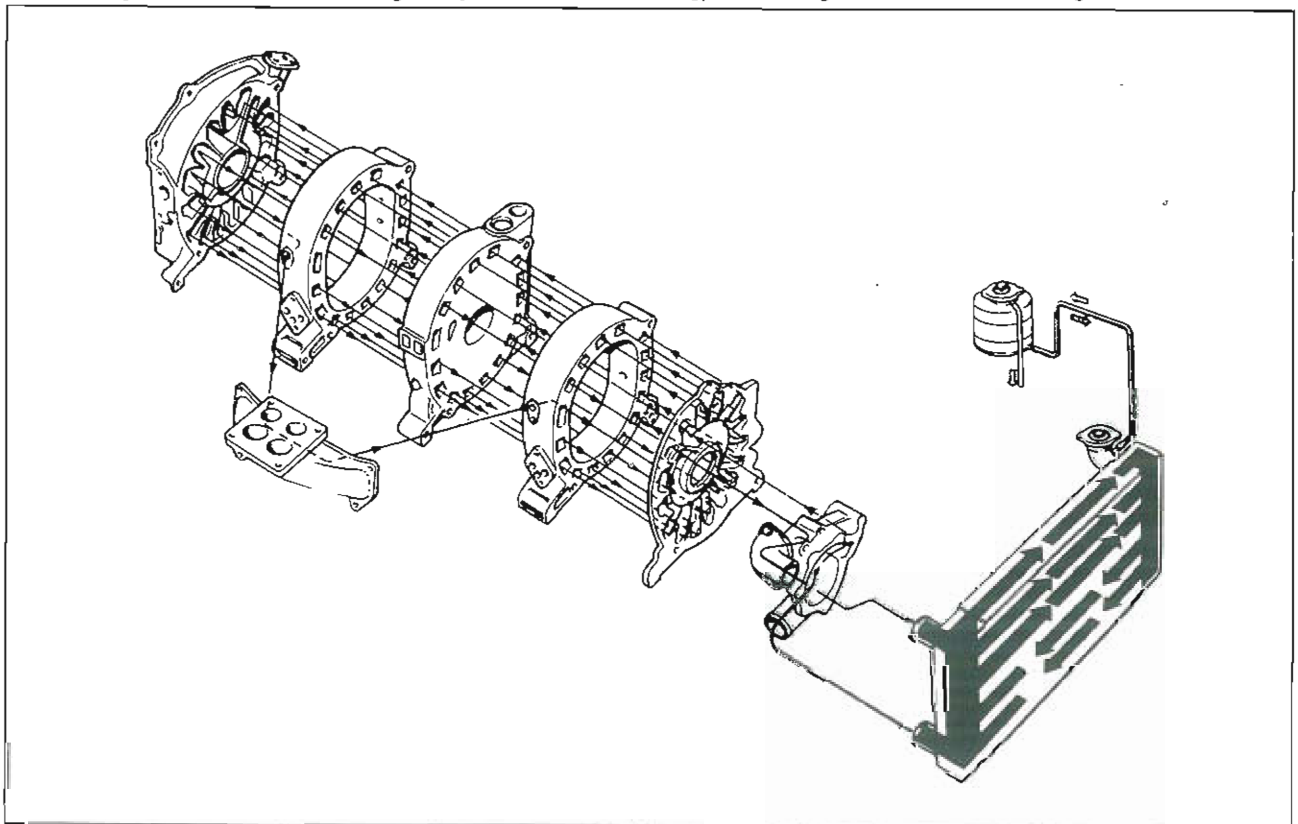


Fig. 3–2 Cooling circuit

3–C. GENUINE LONG LIFE COOLANT

Genuine long life coolant is used in the cooling system of RX-3. This coolant includes an anti-freeze solution and an anti-corrosive solution. The mixture ratio of water and genuine long life coolant is shown in the following table :

Freezing point	Mixture ratio		Specific gravity of mixture at 20°C (68°F)
	Coolant	Water	
−20°C(−4°F)	35	65	1.051
−45°C(−49°F)	55	45	1.078

Note :

(a) Always use soft water (demineralized water) in the cooling system.

(b) If genuine long life coolant is not available, add genuine anti-freeze solution or anti-corrosive according to the time of the year.

Freezing point		Mixture ratio %		Specific gravity of mixture at 20° C (68°F)
C	F	Antifreeze solution	Water	
− 6.3	20.7	15	85	1.022
− 9.3	15.3	20	80	1.029
−12.6	9.3	25	75	1.037
−16.2	2.8	30	70	1.044
−20.5	− 4.9	35	65	1.051
−25.2	−13.4	40	60	1.058
−31.2	−24.2	45	55	1.066
−37.6	−35.7	50	50	1.073
−45.2	−49.4	55	45	1.080

3–D. RADIATOR

The radiator is of the corrugated fin type with a sealed filler cap. The water capacity of the radiator is 1.9 liters (4.0 U.S. pints, 3.3 Imp. pints)

3–D–1. Radiator Removal

1. Drain the cooling system.
2. Remove the bolts and screws attaching the radiator shroud and remove the radiator shroud.
3. Disconnect each hose from the radiator.

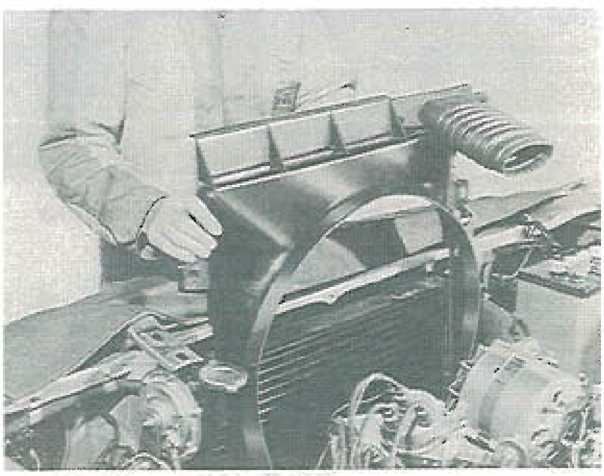


Fig. 3–3 Removing of radiator shroud

4. Remove the nuts attaching the radiator to the oil cooler and body, and remove the radiator.

3–D–2. Radiator Inspection

Check the radiator for leaks. Repair if necessary. Check the radiator core fin for clogging of the air passages. If necessary, repair the fins. If the clogging of the radiator core covers an area of more than 20 percent of the total radiator area, replace the radiator.

3–D–3. Radiator Installation

Follow the removal procedures in the reverse order.

3–E. EXPANSION TANK

The expansion tank has a pressure cap and is connected with the radiator by hose. The pressure in the cooling system raises the boiling point of the coolant, thus preventing overheating and reducing overflow loss. When the pressure in the cooling system exceeds 0.9 kg/cm² (12.8 lb/in²), the pressure valve opens. A vacuum release valve is employed to prevent undesirable vacuum build-up when the system cools down.

Fig. 3–4 Expansion tank

3–E–1. Expansion Tank Inspection

Check the function of the pressure cap. Many types of pressure gauges are available for use. Therefore, it is recommended that the gauge manufacturer's instructions be followed when performing the test. The specified pressure is **0.9 kg/cm² (12.8 lb/in²)**. Check the expansion tank for any crack or damage.

Note :

(a) The coolant should be filled full in the radiator and 1/3 full in the expansion tank.

(b) **To remove** the radiator sealed filler cap when the coolant temperature is high or at the boiling point, depress the push button on the expansion tank to release the pressure in the cooling system.

Then, turn the radiator cap further until it can be removed.

3–F. THERMOSTAT

The thermostat is of a wax type and also of a bottom bypass type which is superb in cooling efficiency. A bypass hole is provided beneath the thermostat, as shown in Fig. 3–5, and when the thermostat is completely closed, a large volume of cooling water flows through this hole so that localized rise in temperature can be prevented. On the other hand, when the thermostat is completely opened, the by-pass hole is closed by the thermostat valve and the entire amount of cooling water is circulated into the radiator, which will enable the radiator to work effectively. However, in case the thermostat is removed, a large volume of cooling water will flow through the bypass hole due to the larger bypass hole and the water circulating into the radiator will be decreased by half which will result in a rise in the temperature of the cooling water. Accordingly, be sure not to remove the thermostat nor to use any other type of thermostat.

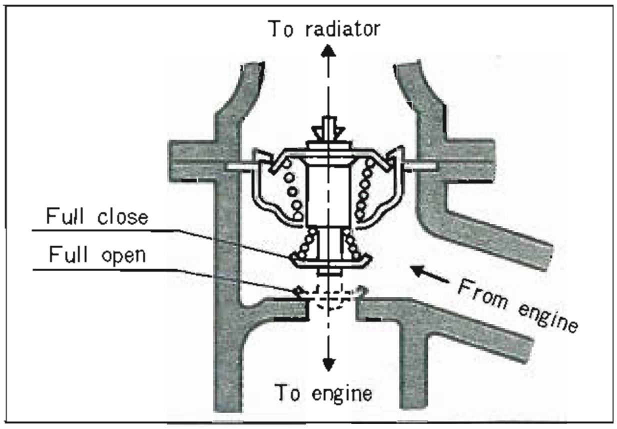


Fig. 3–5 Thermostat and by-pass hole

3–F–1. Thermostat Removal

1. Drain the cooling system.
2. Remove the bolts attaching the thermostat cover to the water pump and remove the cover.
3. Lift out the thermostat.

3–F–2. Thermostat Inspection

To inspect the thermostat, place it in water with a thermometer and gradually heat the water.

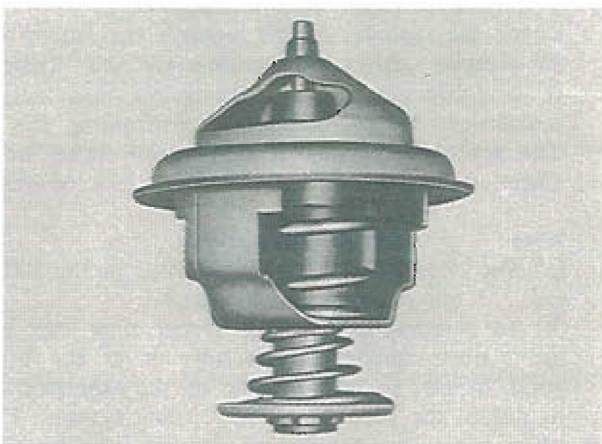


Fig. 3–6 Thermostat

Check the temperature when the thermostat starts to open and when it is fully opened, and also, measure the lift height when the thermostat is fully opened. If the reading shows a large difference from the standard specifications, replace the thermostat. The specifications of the thermostat are shown in the following table:

Starts to open	82°C (180°F)
Fully opens	95°C (203°F)
Lift height	8 mm (0.31 in)

3–F–3. Thermostat Installation

Follow the removal procedures in the reverse order.

3–G. COOLING FAN

A torque limit type fan drive has been adopted to drive the cooling fan for purpose of reducing the loss in horsepower at the high speeds under full load and preventing noises due to the fan. Furthermore the drive is so designed by using silicon oil as the medium for transmitting the torque that even the engine revolution increases, the revolution of the fan does not exceed a certain limit.

3–G–1. Cooling Fan Removal

1. Loosen the alternator adjusting bar bolt and disengage the V-belt.
2. Remove the bolts attaching the cooling fan to the eccentric shaft pulley and remove the cooling fan.
3. Remove the nuts attaching the fan to the fan drive and remove the fan.

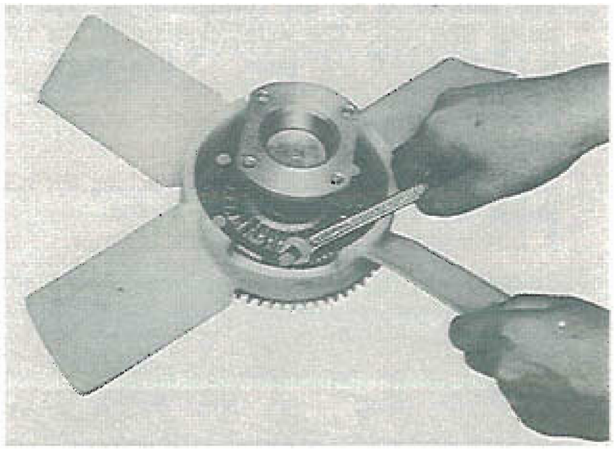


Fig. 3–7 Removing of cooling fan assembly

3–G–2. Checking of Fan Revolution

In case troubles, such as oil leakage should take place on the fan drive, the fan revolution will decrease. If the engine is apt to overheat, check the revolution of the fan in the following procedures:

1. Stick scotch tape on the fan drive shaft and fan as shown in Fig. 3–8.
2. Keep the engine revolution at 2,000 rpm by using a photoelectrical revolution counter.

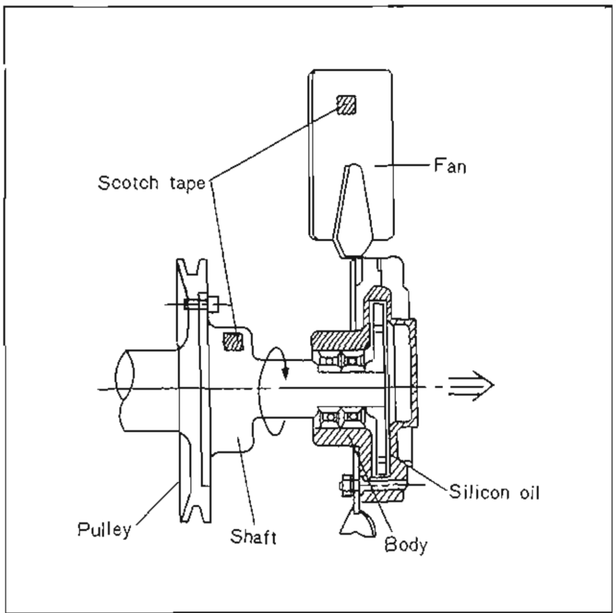


Fig. 3-8 Fan drive assembly

3. Facing the revolution counter toward the fan, read the revolution of the fan, and if it is less than the prescribed number of revolutions, replace the fan drive assembly. If it exceeds the prescribed number of revolutions, carry out the following check.
4. After warming-up the engine for 2 minutes at more than 2,000 rpm, keep the engine at 4,000 rpm by using a tachometer, and check to see if the revolution of the fan at that time is within the prescribed number of revolution.

Prescribed Revolution	
Engine	Fan
2,000 rpm	1,500 ~ 2,000 rpm
4,000 rpm	2,000 ~ 3,000 rpm

3–G–3. Cooling Fan Installation

Follow the removal procedures in the reverse order.

3–H. WATER PUMP

The water pump employs a centrifugal impeller. In the pump body, the shaft is supported by two bearings. The impeller is fitted to the rear end of the shaft. The seal assembly prevents water leakage.

3–H–1. Water Pump Inspection

Check the water pump for leaks and excessive end play or looseness of the shaft and bearings. If there is evidence of excessive play when the fan blades are manually moved up and down, this indicates that the bearings are rough. If water leaks from the hole located on the body, this is an indication of a defective seal necessitating overhaul of the pump and check of the seal and seat surface. If defective, replace the seal assembly.

3–H–2. Water Pump Removal

1. Drain the cooling system.
2. Remove the air cleaner.
3. Loosen the bolts attaching the water pump pulley to the water pump boss.
4. Loosen the alternator adjusting bar bolt and disengage the V-belt.
5. Remove the water pump pulley attaching bolts and then remove the pulley from the water pump.
6. Remove the bolts and nuts attaching the water pump to the front cover and remove the water pump.
7. Remove the bolts attaching the water pump body to the pump casing and remove the pump body.

3–H–3. Water Pump Disassembly

1. Using the **pulley boss support** (Part No. 49 0813 145A), press the shaft slowly, and remove the pulley boss and dust seal plate.

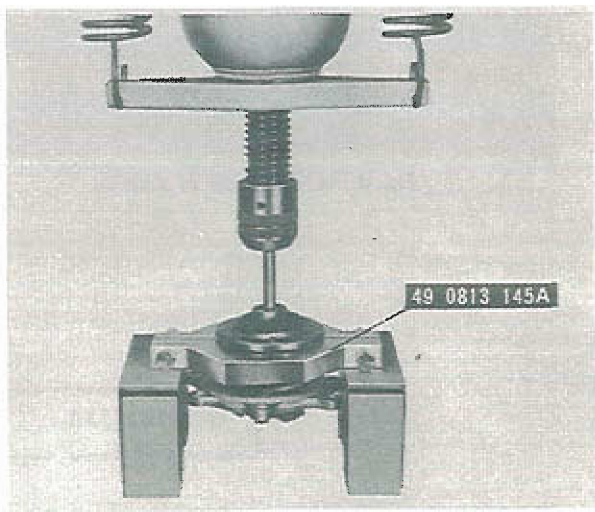


Fig. 3-9 Removing of water pump pulley boss

2. Remove the snap ring retaining the shaft and bearing assembly in the pump body.

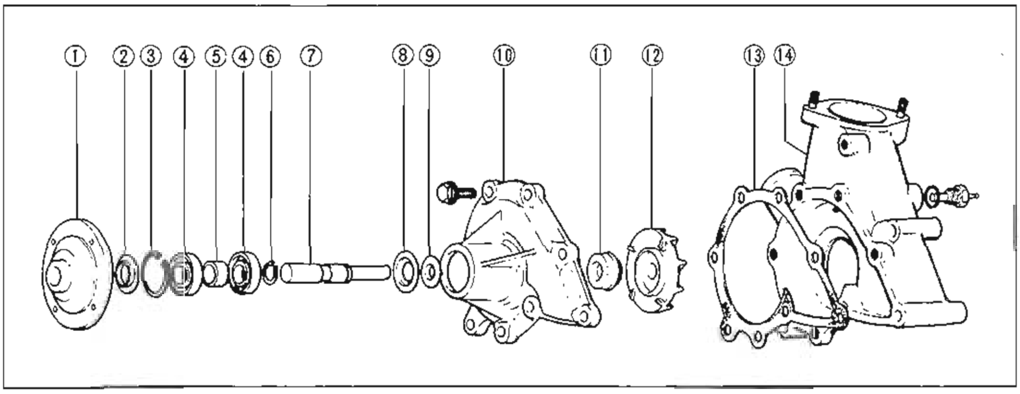


Fig. 3-10
Water pump components
1. Pulley boss
2. Dust seal plate
3. Snap ring
4. Bearing
5. Spacer
6. Stop ring
7. Shaft
8. Dust seal
9. Baffle plate
10. Pump body
11. Seal assembly
12. Impeller
13. Gasket
14. Casing

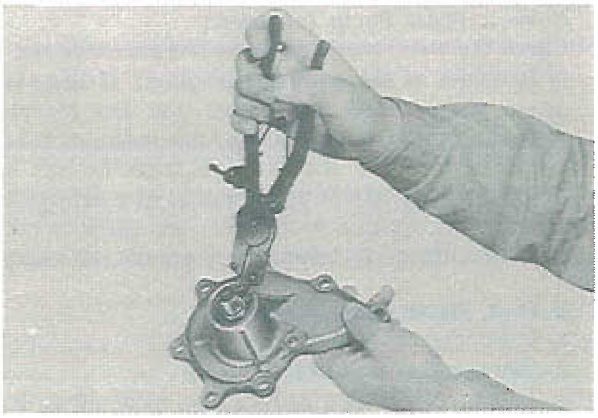


Fig. 3–11 Removing of snap ring

3. Place the front side of the pump body on the **support** (Part No. 49 0813 145A) and apply pressure to the rear end of the shaft to press the shaft and

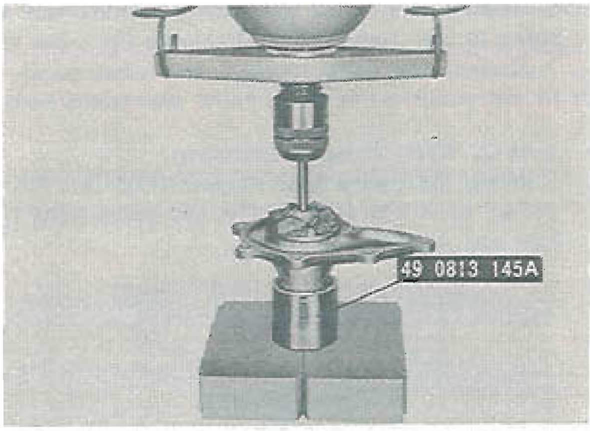


Fig. 3–12 Removing of impeller

remove the impeller from the shaft.
Then press the shaft and bearing assembly out of the pump body.
4. Remove the seal assembly from the pump body.
5. Slide the baffle plate and dust seal plate off the shaft.
6. Remove the bearing stop ring from the shaft.
7. Remove the bearings and spacer from the shaft.

3–H–4. Water Pump Assembly

1. Fit the bearing stop ring onto the groove of the shaft.
2. Slide the dust seal plate onto the shaft.
3. Slide the baffle plate onto the taper of the shaft.
4. Press fit the bearing onto the shaft with sealed side rearward.
5. Press the shaft and bearing into the pump body.
6. Slide the spacer onto the shaft and **fill 1/3 of the space** between the two bearings with grease.
7. Press fit the bearing onto the shaft with the sealed side forward until the snap ring can be installed.
8. Install the snap ring onto the groove of the pump body to retain the shaft and bearing assembly in position.
9. Slide the dust seal plate onto the shaft, and press the pulley boss onto the shaft until it is flush with the front end of the shaft.
10. Apply lubricant onto the seal assembly and install the seal assembly into the pump body.
11. Press the impeller onto the shaft until it is flush with the end of the shaft.

3–H–5. Water Pump Installation

Follow the removal procedures in the reverse order.

SPECIAL TOOL

49 0813 145A	Water pump pulley boss support

FUEL SYSTEM

DESCRIPTION

The fuel system consists of the carburetor, fuel pump, fuel filter, fuel tank, fuel line, accelerator linkage and air cleaner.

The fuel tank is installed in the luggage compartment. By the suction of the fuel pump, the fuel flows through the fuel line into the fuel filter. The fuel passes through the filter element from the outside to the inside of the element. During this fuel flow, the filter element cleans out all the dirt. The fuel pump is producing a constant controlled pressure, and the fuel volume required for engine operations. The fuel supplied by the fuel pump flows passing through the fuel hose into the carburetor.

The carburetor mixes the air and fuel in varying proportions for different operating conditions. As the air passes through the carburetor before entering the engine, fuel is supplied into the engine through the various circuits of the carburetor.

The air cleaner operates primarily to remove dust and dirt from the air which is drawn into the carburetor and then into the engine.

4–A. FUEL TANK

4–A–1. Fuel Tank Removal

1. Remove the drain plug from the bottom of the tank, and allow the fuel to drain from the fuel tank.
2. Open the luggage compartment, and remove the package trim by removing the two attaching screws.
3. Disconnect the fuel gauge wire from the unit.
4. Disconnect each hose from the fuel tank.
5. Remove the bolts attaching the fuel tank and remove the fuel tank.

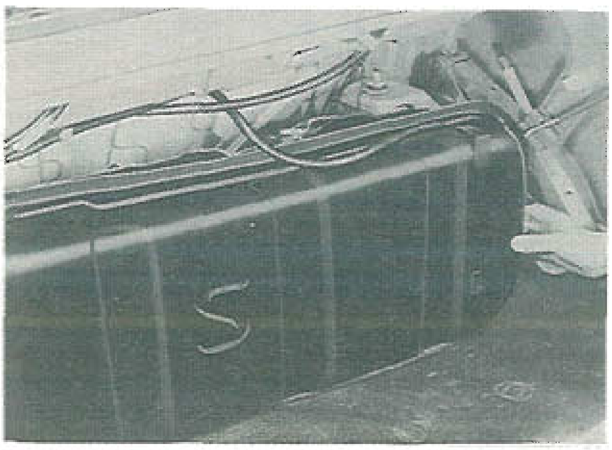


Fig. 4–1 Removing of fuel tank

6. Remove the screws attaching the fuel gauge unit to the tank and remove the fuel gauge unit.

4–A–2. Fuel Tank Inspection

Inspect the fuel tank for cracks and corrosion. If any defect is present, repair or replace as necessary.

Note :
Before repairing, clean the fuel tank thoroughly with steam and sufficiently to remove all explosive gas.

4–A–3. Fuel Tank Installation

Follow the removal procedures in the reverse order.

4–B. FUEL FILTER

The fuel filter is of a cartridge type. The element of the filter is sealed cartridge and should be replaced **every 12,000 km (8,000 miles)**.

4–B–1. Fuel Filter Removal

1. Open the luggage compartment, and remove the package trim by removing the two attaching screws.
2. Disconnect the inlet hose and outlet hose from the filter.
3. Remove the filter from the retaining support.

4–B–2. Fuel Filter Installation

Follow the removal procedures in the reverse order.

4–C. FUEL PUMP

4–C–1. Fuel Pump Test

If the fuel pump does not supply the proper amount of fuel to the carburetor, the following tests should be made.

a. Pressure test

Connect a fuel pressure tester to the discharge port of the pump to test the fuel pressure. The feeding pressure should be **0.20 ~ 0.25 kg/cm² (2.8 ~ 3.6 lb/in²)**. If it is not to specifications, replace the fuel pump.

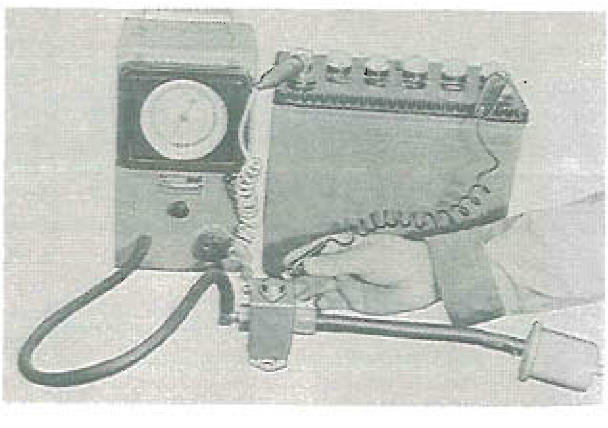


Fig. 4–2 Testing of fuel pressure

b. Volume test

Conduct a volume test of the fuel pump. The fuel pump should discharge a volume of **800 cc (0.21 U.S.**

gallon, 0.18 Imp. gallon) of fuel per minute. If defective, replace the fuel pump.

4–C–2. Fuel Pump Removal

1. Open the luggage compartment, and remove the package trim by removing the two attaching screws.
2. Disconnect the wire and hoses from the pump.
3. Remove the bolts attaching the pump and remove the pump.

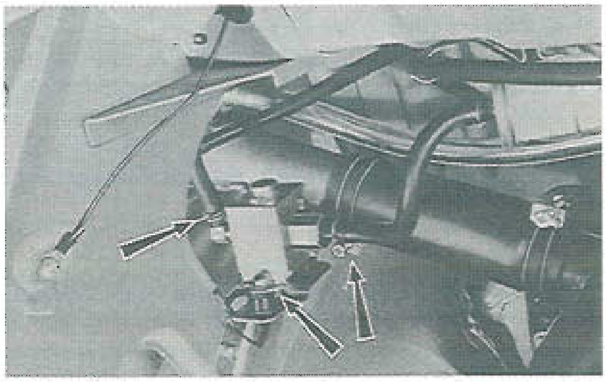


Fig. 4–3 Removing of fuel pump

4–C–3. Fuel Pump Installation

Follow the removal procedures in the reverse order.

4–D. FUEL LINES

Inspect the fuel lines for leaks and tighten the fuel line connections to prevent leakage. It is important that the fuel system be kept clean and free from water. If an excessive amount of dirt or water is found, drain the fuel from the tank and blow out the fuel lines with compressed air.

4–E. AIR CLEANER

The air cleaner is of a filter paper type. The element should be serviced as shown in the following table : To clean, blow the element with compressed air at low pressure.

	Clean	Replace
On dusty road	Every 1,500 km (1,000 miles)	Every 18,000 km (12,000 miles)
On paved road	Every 3,000 km (2,000 miles)	Every 36,000 km (24,000 miles)

4–F. ACCELERATOR LINKAGE

Inspect the accelerator linkage for proper installation. Remove the air cleaner and, with the accelerator fully depressed, observe the position of the carburetor throttle valves. They should be vertical (wide open position). Check the accelerator to ensure there is sticking or binding and for full return.

4–G. CARBURETOR

RX-3 is equipped with a 2-stage 4-barrel Zenith Stromberg carburetor. This carburetor comprises two sets each of primary barrels (for normal use) and a secondary barrels (for high output). In addition, a float circuit and a transfer system for the primary and secondary stages are attached. The primary barrel is equipped with a choke circuit, a low speed circuit, an auxiliary slow circuit and an accelerating circuit.

4–G–1. Carburetor Function

a. Fuel return circuit

This system incorporates a bimetal type fuel return valve to prevent percolation. When the fuel temperature reaches 55°C (131°F), the valve begins to open to return the fuel to the fuel tank.

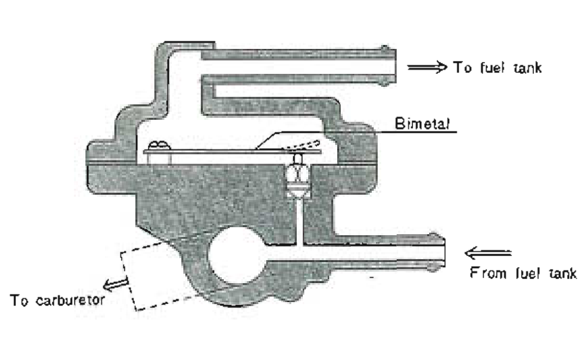


Fig. 4–4 Fuel return circuit

b. Float circuit

The float chamber is equipped with a float and a needle valve to keep the fuel level constant under all operating conditions.
A fuel level gauge is provided in the float chamber for easy inspection of the fuel level.
The ventilation system of the float chamber is of the inner circulation type.
Thus the fuel consumption is not influenced even if the air cleaner is clogged to a certain extent.

c. Low speed circuit

During idling and early part-throttle operation, the fuel is measured in the low speed circuit.
The fuel passes through the slow jet fitted in a branch passage of the main jet.
Then the fuel is mixed with air from the slow air bleed.
The air-fuel mixture then flows through the low speed passage and is ejected from the idle hole or the bypass hole.

d. Auxiliary slow circuit

This circuit has been installed to prevent misfiring and knocking which are liable to occur at low load and high revolution due to lean mixture.

This is of the structure that a diaphragm responsive to the negative pressure of the secondary side is provided halfway on the circuit with its valve designed to open at a certain extent of the negative pressure, allowing the fuel led from the secondary step system to pass and proceed to the auxiliary slow jet and then finally the fuel is ejected through the auxiliary slow port to the primary venturi.

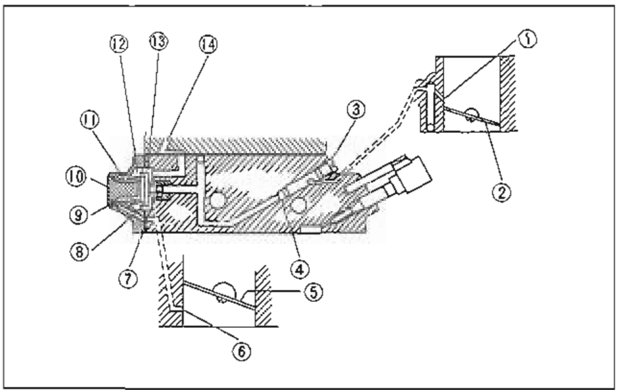


Fig. 4–5 Auxiliary slow circuit

1. Auxiliary slow hole
2. Primary throttle valve
3. Plug
4. Auxiliary slow jet
5. Secondary throttle valve
6. Vacuum hole
7. Ball valve
8. Diaphragm
9. Shim
10. Cover
11. Diaphragm spring
12. Vacuum chamber
13. Fuel chamber
14. From step circuit

e. Primary high speed circuit

During operation at part-throttle or full-throttle, the fuel is supplied through the high speed circuit. The fuel in the float chamber flows through the main jet, is mixed in the emulsion tube with the air from the main air bleed, and is sprayed through the main nozzle to the venturi.

f. Accelerating circuit

The accelerating circuit measures and supplies fuel for the rapid acceleration and smooth engine operation when the throttle valve is opened at lower speed. The accelerating piston rod is connected to the primary throttle valve by a link. When the primary throttle valve is closed, piston is raised.

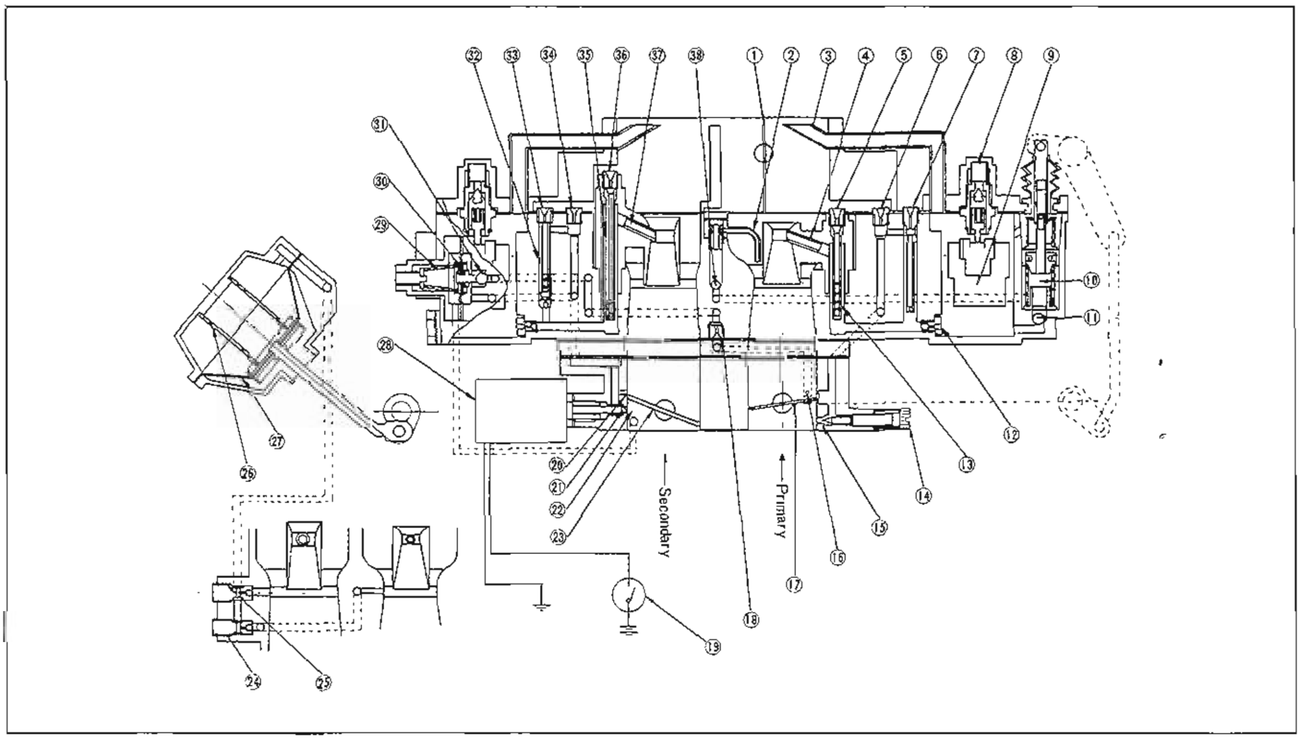


Fig. 4–6 Carburetor cross section

1. Choke valve
2. Pump nozzle
3. Air vent pipe
4. Primary main nozzle
5. Primary main air bleed
6. Primary No. 2 air bleed
7. Primary No. 1 air bleed
8. Fuel passage bolt filter
9. Float
10. Accelerating pump plunger
11. Pump inlet check valve
12. Primary main jet
13. Primary emultion tube
14. Idle adjust screw
15. Idle hole
16. Sub-slow hole
17. Primary throttle valve
18. Sub-slow jet
19. Vacuum switch
20. Secondary by-pass hole
21. Coasting richer valve
22. Coasting richer hole
23. Secondary throttle valve
24. Primary vacuum jet
25. Secondary vacuum jet
26. Diaphragm spring
27. Diaphragm
28. Coasting richer
29. Diaphragm spring
30. Sub-slow diaphragm
31. Sub-slow valve
32. Secondary emultion tube
33. Secondary slow jet
34. Secondary slow air bleed
35. Secondary emultion tube
36. Secondary main air bleed
37. Secondary main nozzle
38. Pump outlet check valve

Then the fuel in the float chamber is sucked up into the accelerating pump cylinder through the inlet check valve. With the primary throttle valve is open, the piston is lowered, the inlet check valve is closed, and the outlet check valve is opened. Then, the fuel in the accelerating pump is sprayed through the pump nozzle to the venturi.

g. Choke circuit

For easy starting and warming-up, the mixture ratio of air and fuel is controlled by the choke valve. The choke valve is an offset spring loaded type and prevents excessive choking.

When the choke valve is fully closed, the throttle valve is automatically opened to 15° by the choke connecting rod so as to obtain the most suitable mixture for starting-up of the engine.

h. Step circuit

The step circuit corresponds to the low speed circuit of the primary barrel and improves the connection between the primary and secondary barrels.

The fuel-flow in the secondary slow jet is mixed with air from the secondary slow air bleed, passes through the secondary low speed passage, and is ejected through a bore located near the fully-closed position of the secondary throttle valve.

i. Secondary high speed circuit

The secondary high speed circuit corresponds to the primary high speed circuit.

The secondary throttle valve is constructed so as to react to negative pressure in the venturi.

The vacuum jets are provided in the venturi sections of the primary and secondary stages. The average negative pressure of both jets acts in the diaphragm chamber and moves the diaphragm. The diaphragm and the secondary throttle valve are connected by a link to open the throttle valve according to the negative pressure.

However, the secondary throttle valve cannot be opened until the primary throttle valve is opened to 45° since the liable range of the secondary throttle valve to open or close is controlled with a connection between the lock-off lever installed on the primary shaft and the stopper on the secondary shaft.

When the opening of the primary throttle valve exceeds 45°, the secondary throttle valve opens in proportion to the negative pressure. Then the fuel from the main jet is mixed with air from the main air bleed and sprayed from the main nozzle into the venturi.

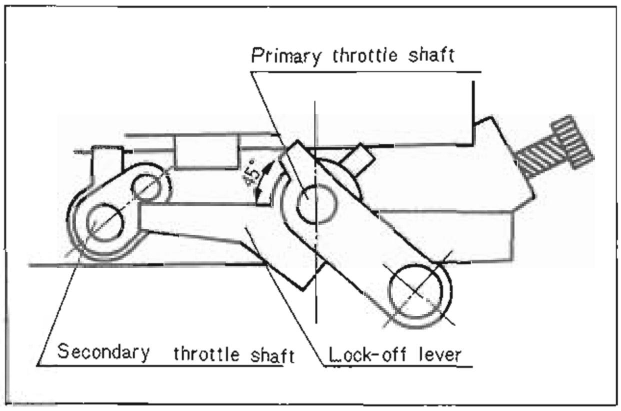


Fig. 4–7 Lock-off system

j. Coasting richer

The coasting richer prevents afterburning in the exhaust pipe which is liable to occur at sudden deceleration. The coasting richer opens the fuel passage to the secondary stage to supply an additional fuel so as to bring the lean mixture to an optimum air-fuel ratio, thereby improving its combustibility. The operation of the coasting richer is controlled by the vacuum switch. The vacuum switch closes the circuit to the coasting richer at intake manifold vacuum of over 630 mm-Hg and opens the circuit when the intake manifold vacuum is lowered to below 595 mm-Hg. The circuit to the coasting richer is as shown in Fig. 4–8.

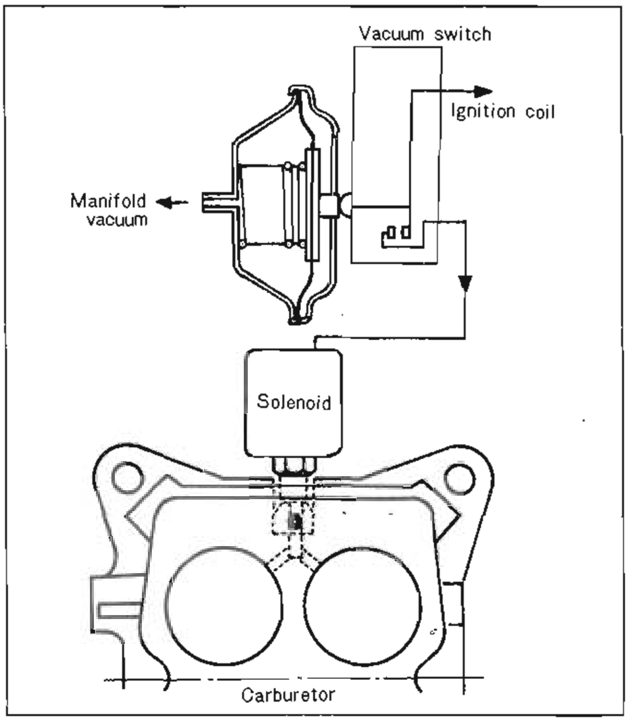


Fig. 4–8 Coasting richer

4–G–2. Carburetor Removal

1. Disconnect the negative battery cable from the battery terminal.
2. Remove the air cleaner.
3. Disconnect the choke cable and accelerator cable.
4. Disconnect the metering oil pump tubes and pump connecting rod.
5. Disconnect the fuel hoses and vacuum tube.
6. Remove the nuts attaching the carburetor to the intake manifold and remove the carburetor.

4–G–3. Carburetor Disassembly

a. Removing of air horn and throttle chamber

1. Remove the air horn attaching screws and air cleaner set bolt, and disconnect the pump connecting rod from the pump lever by removing the cotter pin.

2. Separate the air horn from the body, and disconnect the choke connecting rod from the fast idle lever. Then, remove the air horn from the body.

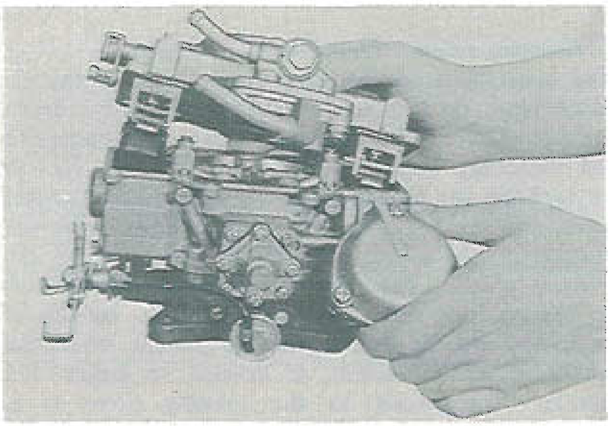


Fig. 4–9 Separating of air horn

3. Disconnect the vacuum control unit rod from the secondary throttle lever by removing the cotter pin.
4. Remove the vacuum control unit attaching screws and remove the cover, spring, diaphragm and unit body.

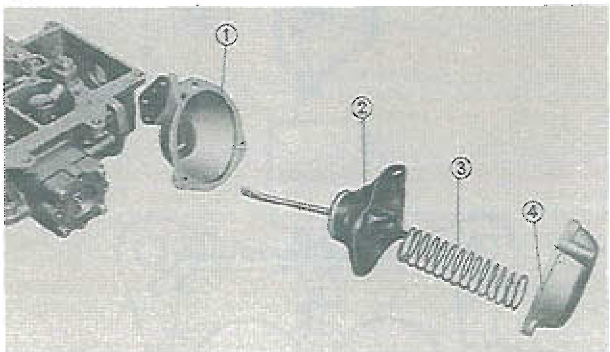


Fig. 4–10 Removing of vacuum control unit

1. Unit body
2. Diaphragm
3. Spring
4. Cover

5. Remove the screws attaching the body to the throttle chamber and remove the body.

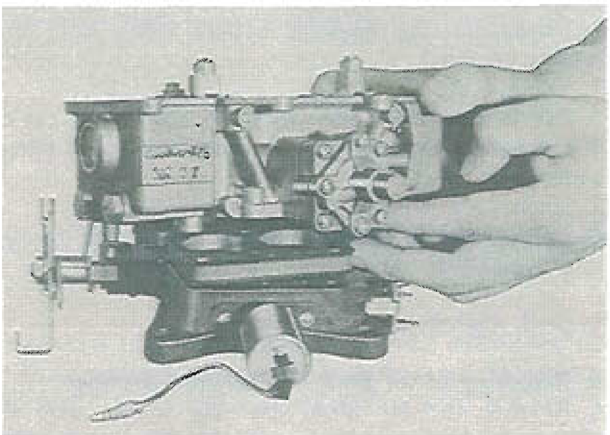


Fig. 4–11 Removing of throttle chamber

b. Disassembling of air horn

1. Remove the main passage bolt, filter and fuel return valve assembly.
2. Remove the accelerating pump lever and the pump plunger.
3. Remove the float retaining pin and remove the float.
4. Remove the clip, and take out the needle valve, spring and spring retainer. Then, remove the needle valve seat and filter.

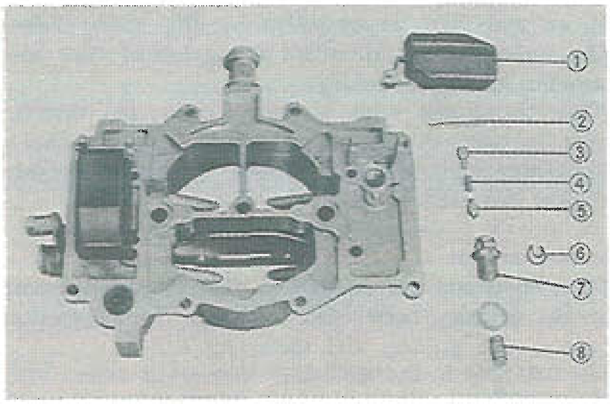


Fig. 4–12 Float and needle valve components

1. Float
2. Float retaining pin
3. Needle valve stem
4. Spring
5. Needle valve
6. Spring retainer
7. Fuel main passage bolt
8. Filter

c. Disassembling of body

1. Remove the accelerating pump nozzle from the body. Remove the outlet valve and inlet valve.
2. Remove the slow jets of the primary and secondary stages and all air bleeds from the body.
3. Remove the main jets by removing the plug from the body.
4. Remove the vacuum jets from the body.
5. Remove the screws attaching the sub-slow diaphragm cover and take out the diaphragm, return spring and washer. Remove the sub-slow jet by removing the plug.

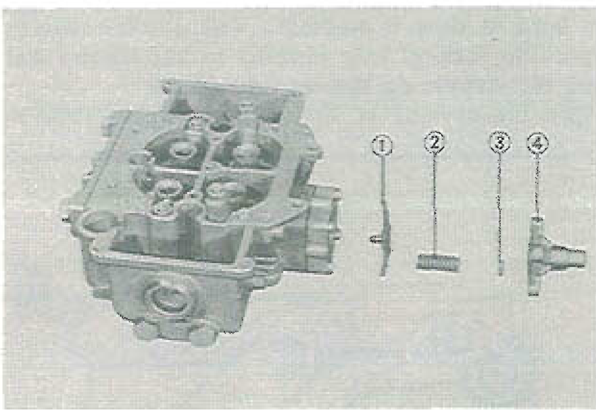


Fig. 4–13 Removing of sub-slow assembly

1. Diaphragm
2. Return spring
3. Washer
4. Diaphragm cover

6. Remove the venturi by tapping it from the bottom.

d. Disassembling of throttle chamber

1. Remove the lever by removing the attaching nut of the primary throttle lever on the shaft. Remove the throttle valve and shaft by removing screws attaching the throttle valve.
2. Remove the attaching screw of the secondary throttle valve and dismantle the secondary throttle valve and the shaft.

Note :
Do not dismangle the venturi, throttle valve and shaft, and the choke valve and shaft except when they have to be replaced because of wear or damage.

3. Remove the idle adjusting screw from the throttle chamber.

4–G–4. Carburetor Inspection

1. Wash all parts in clean gasoline and dry with compressed air. All passages of the carburetor must be blown very carefully. **Never use** a wire for cleaning the jets.
2. Inspect the air horn, body and body flange for cracks, nicks or burrs on their respective gasket surfaces.
3. Inspect the float for deformation, damaged tab and worn retaining pin bore.
4. Check the float needle valve for wear and for proper seating. To check the needle valve for proper seating, invert the air horn, assemble the needle valve and the float and then suck the fuel main passage. At this time, if any leakage is present, the valve seating is not satisfactory.
5. Inspect the filter for rust and damage.
6. Check the choke valve for proper choking, smooth movement and excessive play of choke shaft.
7. Check all jets and air bleeds for clog, damaged threads, damaged head slots and damaged holes.
8. Check the pump plunger for wear of sliding portion and smooth operation with the plunger bore. Check the spring for rust and weakness.
9. Check the idle adjusting screw for damaged thread and also seating surface. Check spring for weakness.
10. Check the primary and secondary throttle valves. If these close firmly or not, check them for smooth movement and excessive play of the shafts.

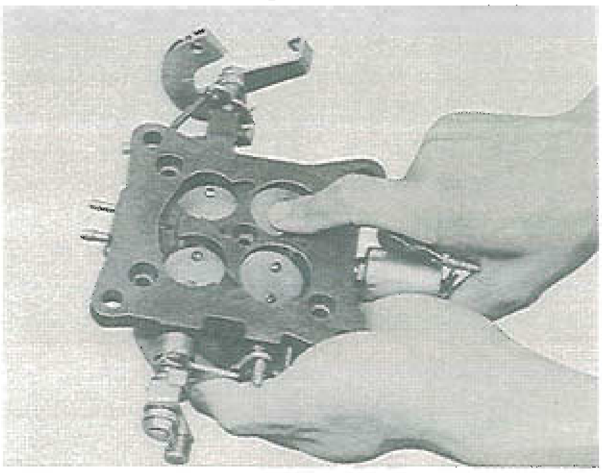


Fig. 4–14 Checking of throttle valves

Note :
Worn throttle valve shaft allows air to enter into the cylinder and air-fuel mixture at low speed becomes lean.

11. Check the diaphragm of vacuum control unit for damage. Check the spring for weakness.
12. Check whether the coasting richer is attracted when the solenoid wires are connected to the battery terminals as shown in Fig. 4–15.

Fig. 4–15 Checking of coasting richer

4–G–5. Carburetor Assembly

To assemble, follow the disassembly procedures in the reverse order with the following cautions.

1. Discard the old gaskets and use new ones.
2. Check that all parts are in good condition and clean.
3. Both the primary and secondary systems have their respective parts which are of the shape. Therefore, when installing, care should be taken so as not to mistake one for the other.
4. Adjust the primary and secondary throttle valves to close firmly at fully closed position.

4–G–6. Carburetor Installation

Follow the removal procedures in the reverse order.

4–G–7. Carburetor Adjustment

a. Adjusting of idle speed

1. Connect a tachometer onto the ignition coil and install a vacuum gauge onto the intake manifold.
2. Start the engine, and run it at idle speed.
3. Turn the throttle valve adjusting screw in or out until the engine operates smoothly without stalling at lowest possible revolution.
4. Turn the throttle valve adjusting screw, and the idle adjusting screw alternately to obtain a steady

and smooth engine operation at engine idle speed, which is indicated by steady reading on the gauge. The engine idle speed is **700 rpm.**

b. Adjusting of float level

Adjust the float level by bending the float lever seat so that the dimension **H** will be **18 mm (0.71 in)** when the float lever seat is in contact with the needle valve stem as shown in Fig. 4–16.

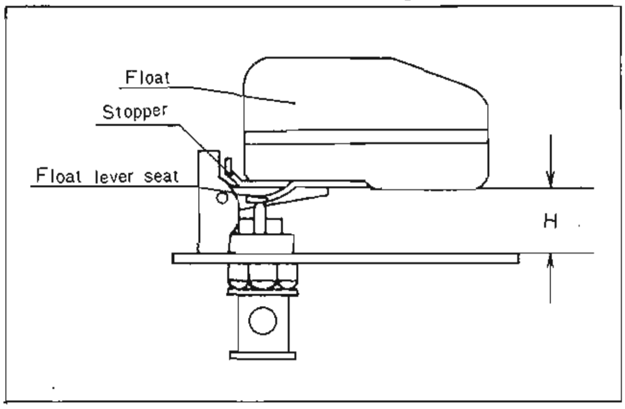


Fig. 4–16 Adjusting of float level

c. Fast idle adjustment

When the carburetor is in choked position, the lip of fast idle lever contact with the fast throttle arm and the throttle valve is opened **slightly (15°)**. For this reason, the idle revolution is slightly higher (fast idle). When the choke valve is fully closed the clearance between the primary throttle valve and the bore should be **0.98 mm (0.039 in)**. Measure the clearance using a suitable wire gauge, and if necessary, adjust it by bending the fast idle lever. Check the choke valve for smooth movement.

d. Adjusting of accelerating pump stroke

At the ends of the pump lever there are four holes which provide four changes in the pump injection amount. When the pump lever connecting rod is placed in hole Ⓐ, the injection amount is smaller, whereas the injection amount is larger when the connecting rod is placed in hole Ⓑ. Accordingly, select and use a hole according to the engine condition, running condition and atmospheric temperature.

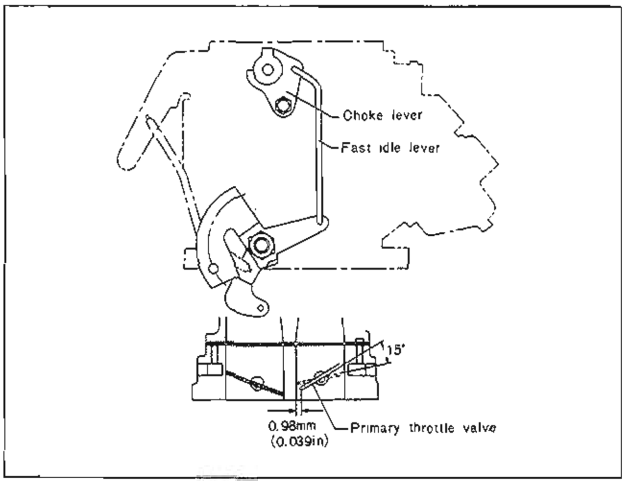


Fig. 4–17 Fast idle adjustment

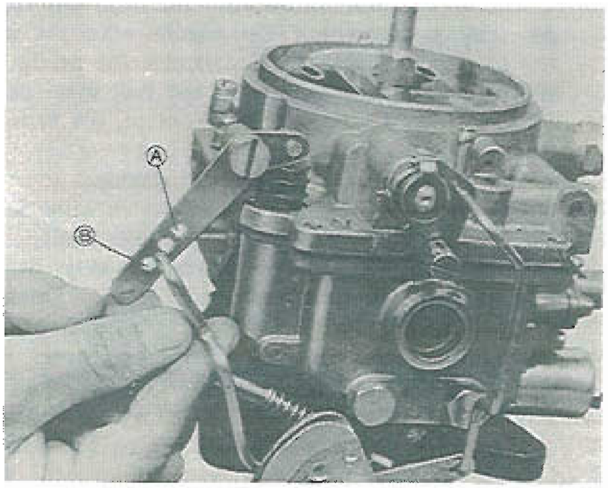


Fig. 4–18 Adjusting of accelerating pump stroke

ELECTRICAL SYSTEM

DESCRIPTION

The major electrical systems are the charging system, ignition system, starting system and lighting system. Service information for these systems are included in this section.

5–A. BATTERY

RX-3 is equipped with a 12 volt battery consisting of six cells. Its capacity is as follows:

NS60	45AH (20 hours rate)
NS70	65AH (20 hours rate)
N50Z	60AH (20 hours rate)

5–A–1. Checking of Battery

As the battery has many important functions to engine start, ignition and lighting, check the following points periodically and always keep the battery in perfect condition.

1. Check the electrolyte level in each cell of the battery, and add distilled water to maintain the solution **10 ~ 20 mm (0.4 ~ 0.8 in)** above the plates.
Do not overfill.
2. Check the specific gravity of the electrolyte with a hydrometer, as shown in Fig. 5–1.

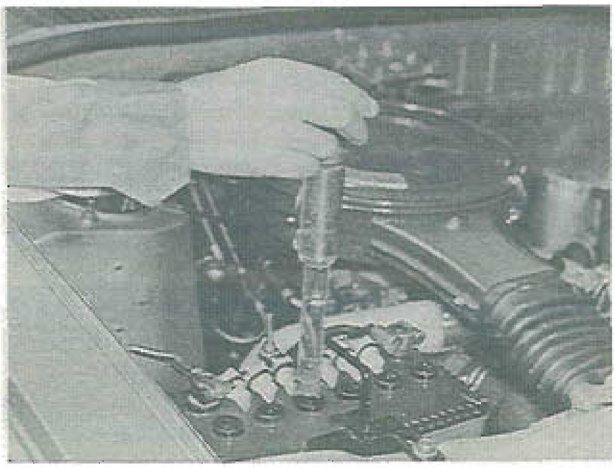


Fig. 5–1 Checking of specific gravity

If the reading is **1.26 or more,** it indicates that the battery is fully charged. If the reading is **below 1.20,** the battery requires recharging.

3. Check the tightness of the terminals to ensure good electrical connections. Clean the terminals and coat the terminals with grease.
4. Inspect for corroded or frayed battery cables.

5–A–2. Charging of Battery

a. Constant current charge

1. If the exterior of the battery is dirty with sulphuric acid or dust and dirt, wash these off with clean water and dry thoroughly before charging the battery.
2. Check the electrolyte level and add distilled water if necessary.

Note:
If addition of distilled water is neglected, the plates and separators will become exposed to air, causing a sulphation to occur on the plates.
Do not add dilute sulphuric acid unless the electrolyte has overflown or leaked out.

3. Connect the battery to the charger, ensuring that the polarities are correct.
4. To charge, apply an electric current of approximately 5A until the specific gravity of the electrolyte reaches 1.25 ~ 1.27.

b. Fast charge

As a fast charge causes both the temperature and the level of the electrolyte to rise suddenly, it does not have a favorable effect on the battery. Therefore, this should not be performed unless in the case of an emergency.
To charge with a fast charger, follow the instructions of the manufacture.

Note:

1. Ensure that the cables are removed from the battery terminals before the charge is applied. If this is neglected, it could cause a damage to the diodes on the alternator.
2. The battery should be kept by the use of cooling water to prevent the temperature of the electrolyte from exceeding 55°C (131°F), otherwise the charging should be discontinued temporarily when the temperature rises above this point.

5–B. SPARK PLUG

The two spark plug system is adopted on RX-3 for increasing the combustion efficiency. There are three kinds of heat range for genuine spark plugs as follows, so that they can be used under the driving area or running condition.

Manufacture	Hot type	Standard	Cold type
NGK	B–6EM	B–7EM	B–8EM
NIPPONDENSO	W20 EA	W22 EA	W25 EA

As these spark plugs are designed specially for RX-3, **do not** replace these with any of other types of spark plug.

5–B–1. Checking of Spark Plug

Check the spark plugs for burned and eroded electrode, black deposits, fouling, and cracked porcelain. Clean the spark plugs with a spark plug cleaner or a wire brush if they are fouled.
Replace the badly burned or eroded spark plugs.
Measure the electrode gap of each spark plug with a wire gauge, as shown in Fig. 5–2.
The standard gap is **0.8 ~ 0.9 mm (0.03 ~ 0.035 in).**
If the electrode gap exceeds more than 1.1 mm (0.043 in), replace the spark plug.

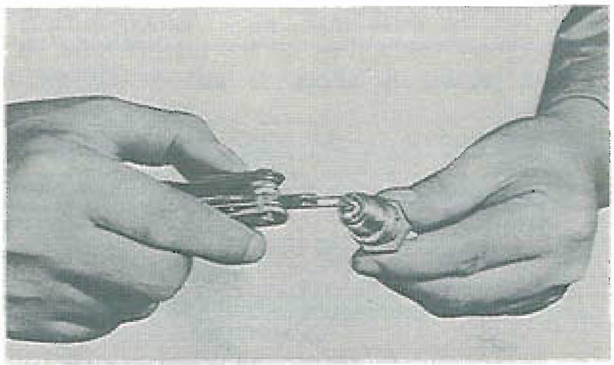


Fig. 5–2 Measuring of electrode gap

5–C. IGNITION COIL

Two types of ignition coil are equipped.
One is the leading ignition coil with external resistance which improves ignition performance and startability of the engine, and another is ordinary type, the trailing ignition coil.
When the ignition key is turned on to actuate the starting motor, the "S" and "R" terminals of the key switch are closed with the "B" terminal of the key switch and the "Ig" terminal is opened. In this case, current leads to the "S" terminal of the relay and magnetizes the relay coil. Thus, the "H" and "B" terminals of the relay are closed. Then, the primary current leads from the "R" terminal to the trailing ignition coil via the relay. And also, the primary current for leading one is led from the "R" terminal direct to the leading ignition coil by passing the external resistance.
When the ignition key is returned to the "Ig" position after starting the engine, only "Ig" terminal is closed with "B" terminal of the key switch. Therefore, the function of the relay is stopped and the primary current flows from the "Ig" terminal to the trailing ignition coil. And also, the current for leading one flows from the "Ig" terminal to the leading ignition coil by way of the external resistance.

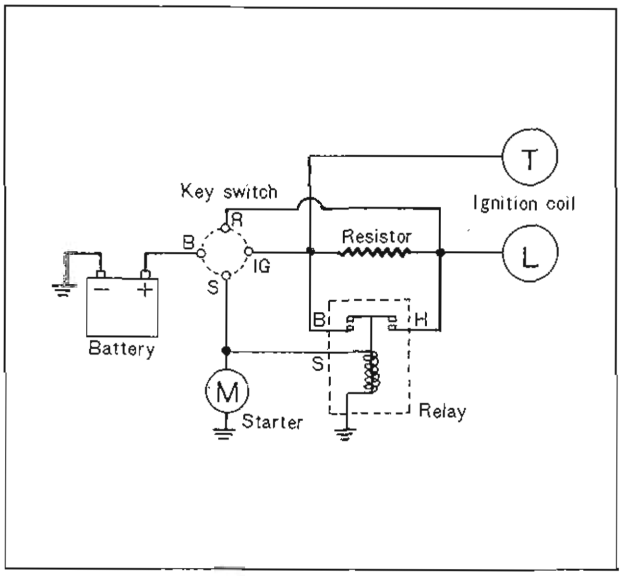


Fig. 5–3 Diagram of ignition coil

5–D. DISTRIBUTOR

RX-3 is equipped with two distributors, one for the spark plugs on the leading side and one for those on the trailing side.

5–D–1. Adjusting of Point Gap

Adjust the point gap of each distributor as follows:
1. Check the contact points alignment. If necessary, bend the stationary contact bracket so as to obtain contact in the center of the contact points.
2. Crank and stop the engine when the rubbing block on the contact arm just rests on the highest point of the cam.
3. Insert a feeler gauge of **0.45 mm (0.018 in)** between the contact points, loosen the two set screws and move the stationary contact point until the correct gap is obtained.

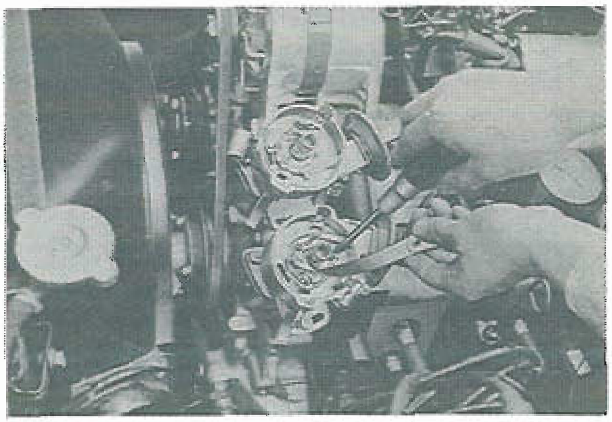


Fig. 5–4 Adjusting of point gap

4. Tighten the set screws and recheck the point gap.

5–D–2. Adjusting of Ignition Timing

To adjust, proceed as follows:
1. Connect a timing light to the high tension cord for leading spark plug of the front rotor housing.
2. Start the engine, and run it at idle speed of 700 rpm.
3. Aim the timing light at the timing indicator pin on the front cover.
4. Loosen the distributor locking nut, and rotate the leading distributor body until the timing mark on the eccentric shaft pulley aligns with the timing indicator pin on the front cover.

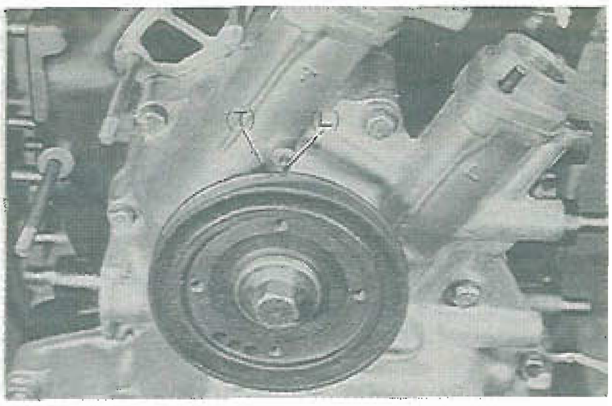


Fig. 5–5 Timing marks

5. Tighten the locking nut and recheck the timing.
6. Adjust the trailing distributor in the same way as above.

5–D–3. Testing of Distributor

a. Dwell angle test

The dwell angle also called cam angle is degrees of rotation through which the contact points remain closed.

To test the dwell angle, use a distributor tester following the instructions of the manufacturer. If the dwell reading is within 55 and 61 degrees, it is correct.

If the reading is not within the specifications, it indicates the following troubles.

1. Incorrect point gap
2. Worn cam
3. Worn rubbing block
4. Distorted contact arm

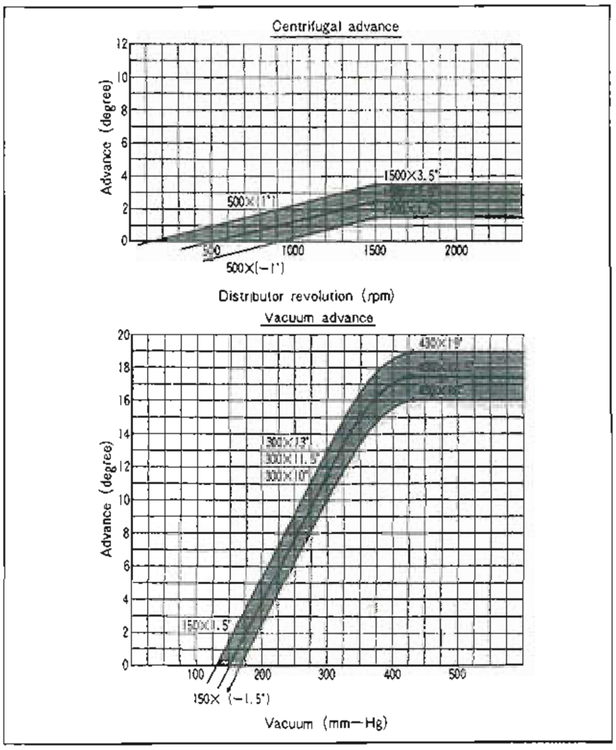


Fig. 5–6 Advancing characteristic (trailing side)

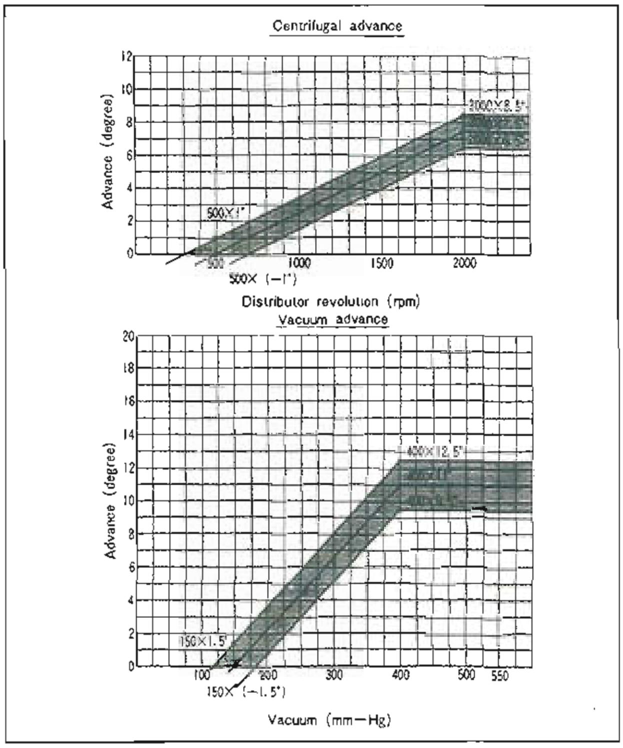


Fig. 5–7 Advancing characteristic (leading side)

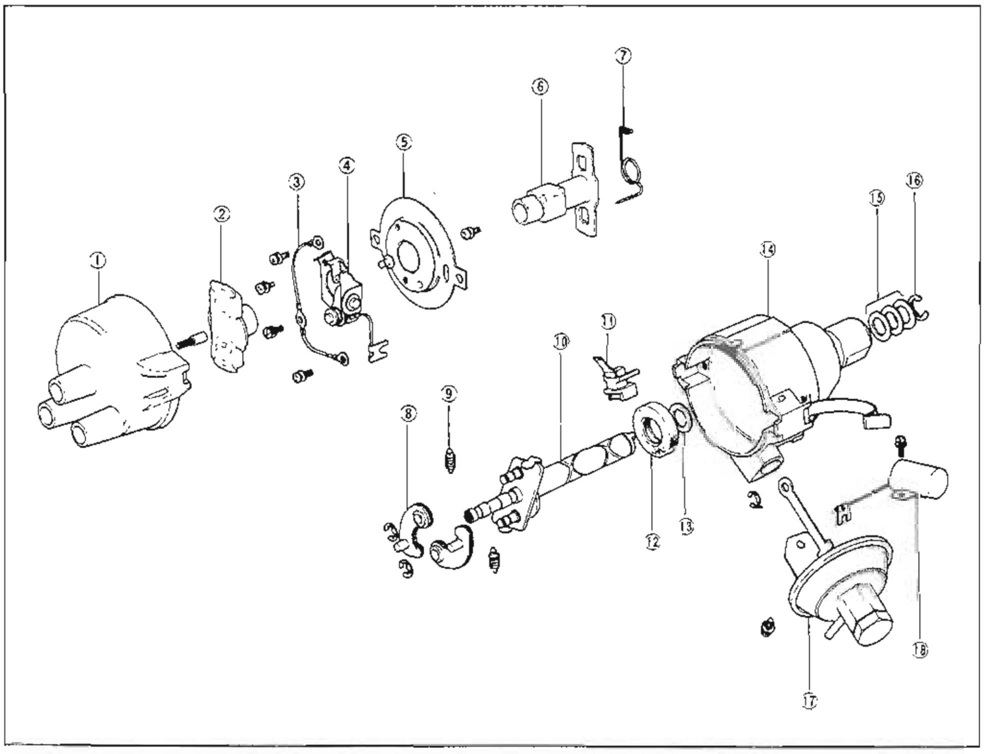


Fig. 5–8
Distributor components
1. Cap
2. Rotor
3. Earth wire
4. Contact point assembly
5. Breaker base assembly
6. Cam
7. Hair pin spring
8. Governor weight
9. Governor spring
10. Drive shaft
11. Terminal
12. Oil seal
13. Washer
14. Distributor body
15. Washer
16. Retaining clip
17. Vacuum control unit
18. Condenser

b. Advance Test
To test the ignition advancing characteristic of the distributor, use a distributor tester.
The advancing characteristic of each distributor should be **within the range** shown in Fig. 5–6 and 5–7.

5–D–4. Disassembling of Distributor
1. Loosen the cap retaining clips and lift off the cap.
2. Remove the rotor.
3. Remove the screws that attach the vacuum control unit and remove the clip holding the vacuum control unit rod. Remove the vacuum control unit.
4. Loosen the primary terminal screw and disconnect the lead. Remove the contact point assembly from the breaker base after removing the set screws.
5. Remove the primary terminal stud and insulator.
6. Remove the condenser.
7. Remove the screws that attach the breaker base and remove the breaker base.
8. Take off the felt and remove the cam set screw, then remove the cam.
9. Remove the distributor drive shaft retaining clip and washers. Remove the shaft in upward direction through the top of the distributor.
10. The governor can be removed by removing the governor spring and clip.

5–D–5. Distributor Inspection

a. Inspecting of distributor cap
Inspect the distributor cap for cracks, carbon runners and signs of arcing. Replace the cap if any of these are found.
Clean the high tension terminals.

b. Inspecting of rotor
Inspect the rotor for cracks or evidence of excessive burning at the end of the metal strip.

c. Inspecting of contact points
Inspect the points for wear, burning and pitting. If the points are affected only slightly, clean with stiff metal brush or oil stone. In case of severe damage, replace the points.

d. Checking of contact arm spring tension
For inspection, hook a spring scale on the contact arm and pull straight at a right angle to the contact arm.
Read the tension when the contact points start to separate. If the reading is **0.575 kg (1.27 lb) or less**, replace the contact point assembly.

e. Checking of condenser
If the condenser is leaky, it will cause a weak spark or burned contact points check the capacity of the condenser with a condenser tester.
The capacity is **0.27 ± 10%** microfarads. In the absence of a tester, check by substituting a new condenser.

5–D–6. Assembling of Distributor
Assemble the distributor in the reverse order of disassembling.

5–E. ALTERNATOR

5–E–1. Service Precautions
When servicing the charging system, observe the following precaution. If not followed, the result will be in serious damage of the system.
1. **Do not** short across or ground any of the terminals on the alternator.
2. **Never** operate the alternator on with an open circuit (with the field terminal connected and the armature terminal disconnected).
3. When installing a battery, always make sure that the negative post of the battery is attached securely to the ground strap.
4. **Never** reverse battery leads, not even for an instant, as reverse polarity current flow will damage the diodes in the alternator.
5. When charging the battery with a fast charger, disconnect the positive cable at the battery.

5–E–2. Checking of Charging System on Car
If the electrical system is not charging properly, it is advisable to determine whether the trouble is in the alternator or regulator prior to removing the alternator.
1. Disconnect the wire from "B" terminal of the alternator and connect the ammeter with the negative lead of the ammeter to the wire and the positive lead to the "B" terminal, as shown in Fig. 5–9.

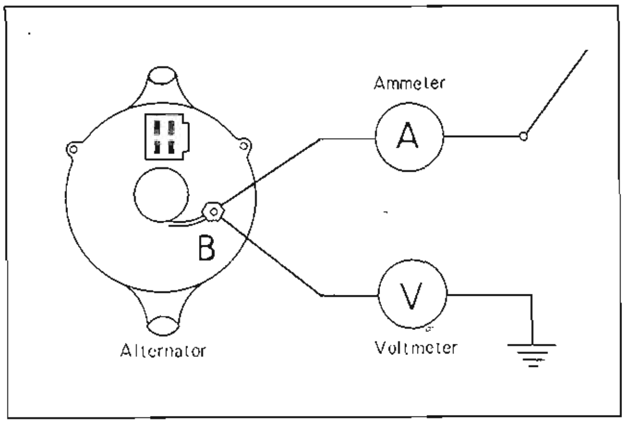


Fig. 5–9 Checking of alternator

2. Connect the positive lead of the voltmeter to the "B" terminal of the alternator and ground the negative lead of the voltmeter.
3. Switch the headlight on.
4. Start the engine and take the reading of the ammeter and voltmeter, holding the engine speed of 1,200 rpm (alternator speed: 2,500 rpm).
If the ammeter shows less than 32 ampares, the trouble is in the alternator and if the voltagemeter shows without the specifications it is in the regulator.

5–E–3. Disassembling of Alternator
1. Remove the front housing attaching bolts.
2. Separate the front housing by prying apart with a screwdriver at the slots of the front housing.
3. Remove the nut attaching the pulley to the shaft and remove the pulley, fan and spacer.

4. Remove the rotor from the front housing.
5. Remove the front bearing retainer attaching screw and remove the retainer. Support the front housing close to the bearing boss, and press out the old bearing from the housing, only if the bearing is defective.
6. Unsolder the diode leads and stator coil leads.
7. Remove the stator from the rear housing.
8. Remove the screws that attach the brush holder to the housing and remove the brush and holder, insulator and terminal.
9. Remove the screw attaching the diode holder and the two terminal screws, and remove the diode and holder assemblies from the rear housing.
10. Remove the nut attaching the radio noise suppression condenser and remove the condenser.

5–E–4. Alternator Inspection

a. Checking of stator coil

Check the stator coil for both open and grounded circuits with a tester.

To check for open, connect the prods to each of the two leads, as shown in Fig. 5–10. If there is no flow of current, the coil is open circuit and must be repaired or replaced.

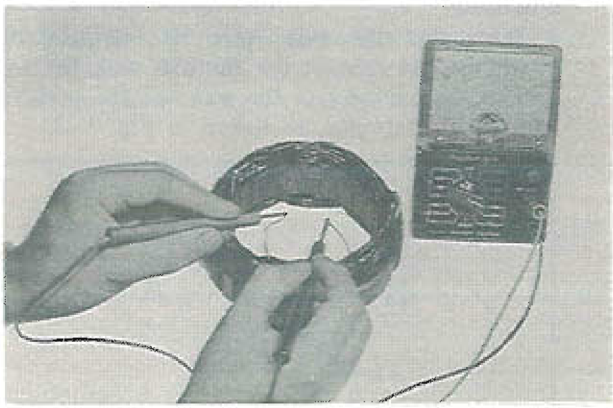


Fig. 5–10 Checking of stator coil for open

To check for ground, connect one prod to the core and the other to each lead wire, as shown in Fig. 5–11. If a ground is present the current will flow and the stator coil must be repaired or replaced.

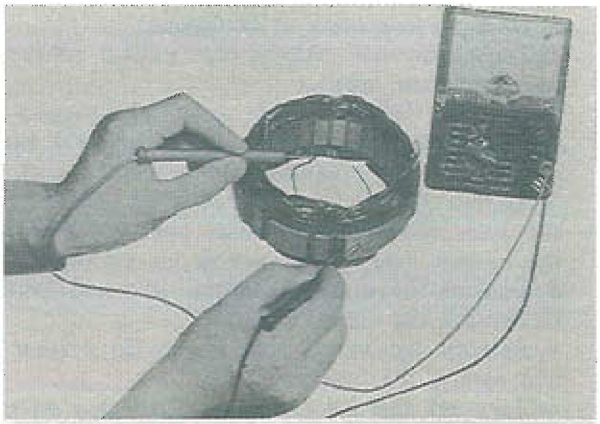


Fig. 5–11 Checking of stator coil for ground

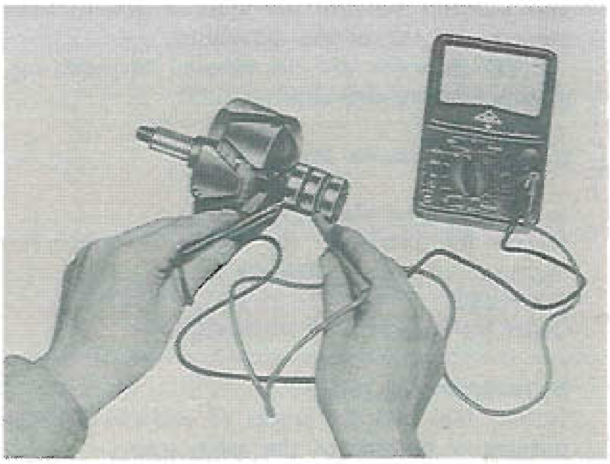


Fig. 5–12 Checking of rotor for open

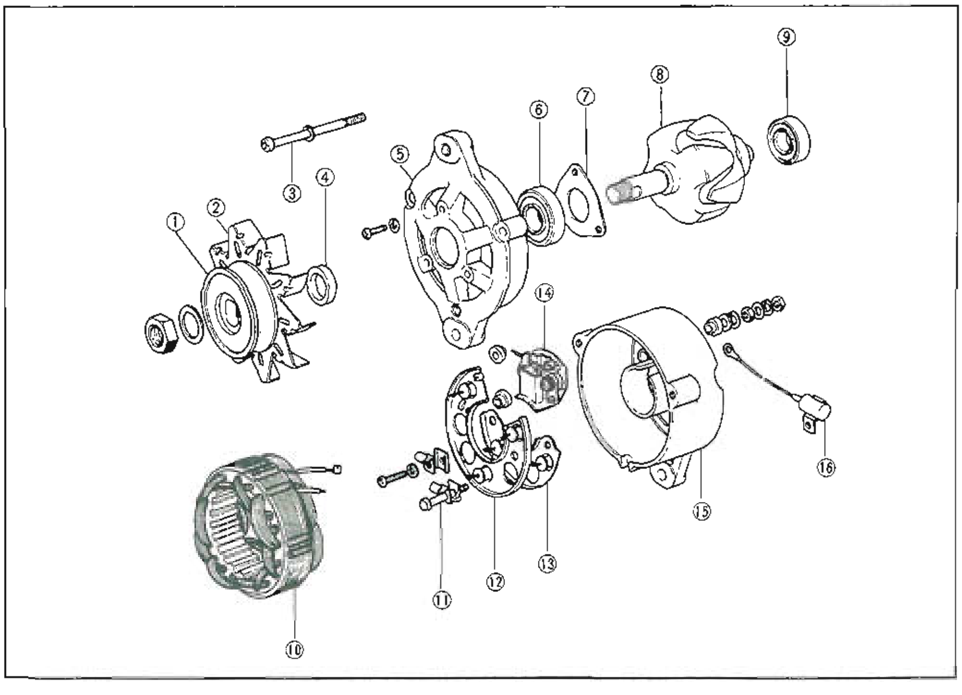


Fig. 5–13
Alternator components
1. Pulley
2. Fan
3. Bolt
4. Spacer
5. Front housing
6. Front bearing
7. Bearing retainer
8. Rotor
9. Rear bearing
10. Stator
11. Terminal bolt
12. Positive diode and holder
13. Negative diode and holder
14. Brush and holder
15. Rear housing
16. Condenser

b. Checking of rotor

To check for open circuit, place both prods of a tester on the slip rings, as shown in Fig. 5–12.
If the reading is 4 to 6 ohms, there is no trouble in the rotor.
To check for ground, connect one prod to the slip ring and other prod to the core. If the current flows the rotor must be repaired or replaced.

c. Checking of diodes

To check diodes, proceed as follows:
1. Positive diode open test
Connect the tester (+) lead on the diode holder and (–) lead on diode lead as shown in Fig. 5–14. Switch the tester to resistance check range, and check the resistance. Good diode will indicate no resistance, and if it indicates a high resistance, the diode is opened. The diode opened, should be replaced as a unit.

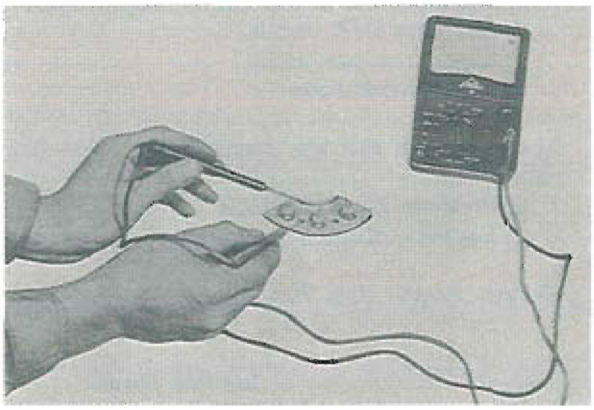


Fig. 5–14 Checking of positive diode

2. Negative diode open test
Connect the tester (–) lead on the diode holder, and (+) lead on the diode lead. Switch the tester to resistance check range, and check the resistance. Good diode will indicate no resistance, and if it indicates a high resistance, the diode is opened. Diode should be replaced as a unit.

d. Checking of brushes

The brush should be replaced when one third of its original length is worn. The standard length is 16 mm (0.630 in).
The standard tension of the brush spring is 390 gr (13.7 oz). If the tension is too low or if excessive corrosion exists, the spring must be replaced.

e. Checking of bearings

There is no need of lubricating as the bearing is pre-lubricated. In a long spell of use, when the bearing is worn or damaged, replace it with a new one.

5–E–5. Assembling of Alternator

Assemble the alternator in the reverse order of disassembling noting the following point.
1. When installing the rotor assembly to the rear housing and stator assembly, hold the brushes in position by inserting a piece of stiff wire into the hole of the brush through the rear housing as shown in Fig. 5–15.

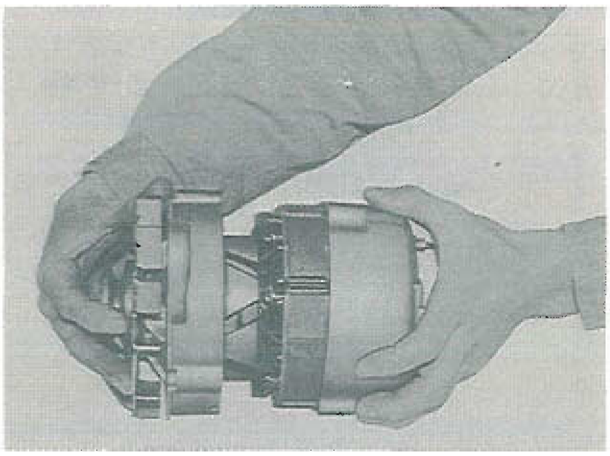


Fig. 5–15 Assembling of rotor assembly

2. The soldering of the diode leads should be performed in **less than twenty seconds** as the excessive heat may damage the diode.

5–F. REGULATOR

5–F–1. Checking of Constant Voltage Relay

To check, use an almost fully charged battery and connect a voltmeter between the (A) and (E) terminals of the regulator, as shown in Fig. 5–16.
Then, hold the alternator revolution to 4,000 rpm (engine revolution 2,000 rpm) and take a reading of the voltmeter. If the reading is from **13.5 ~ 14.5 volts**, it is in proper order. If it is not within the specifications, the voltage relay must be adjusted, as instructed in Par. 5–F–2.

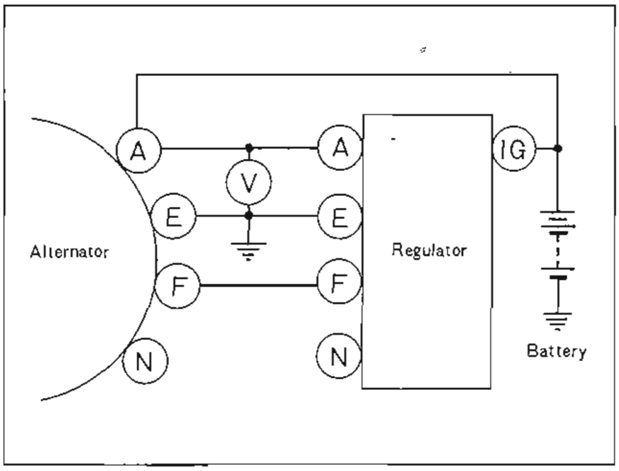


Fig. 5–16 Checking of constant voltage relay

5–F–2. Adjusting of Regulator

First, check the air gap, back gap and point gap with a wire gauge.
If they are not within the specifications, adjust by bending the stationary contact bracket. After correct gaps are obtained, adjust the voltage setting. Bend

the upper plate down to decrease the voltage setting, up to increase the voltage setting.

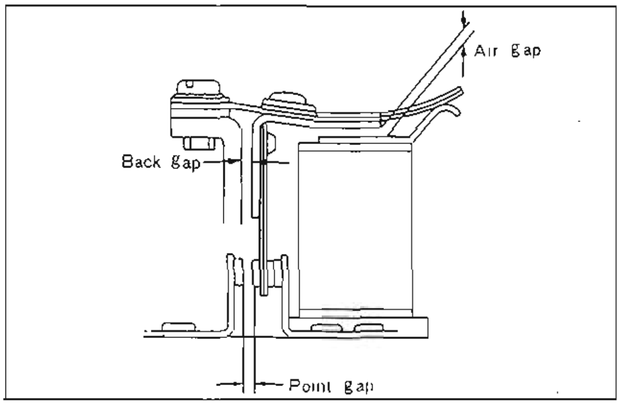


Fig. 5–17 Regulator gap

Constant voltage relay

Adjustment	Standard specification
Air gap	0.7 ~ 1.1 mm (0.028 ~ 0.043 in)
Point gap	0.3 ~ 0.4 mm (0.012 ~ 0.016 in)
Back gap	0.7 ~ 1.1 mm (0.028 ~ 0.043 in)
Voltage	14 ± 0.5V (Alternator 4,000 rpm)

5–G. STARTING MOTOR

5–G–1. Checking of Starting Circuit

When the starting motor fails to operate or does not satisfactorily operate, check the following points before removing the starting motor :

1. Weak battery
2. Corroded or loose battery terminal
3. Loose starting motor terminal
4. Broken or loose wires of the starting circuit
5. Faulty ignition switch

5–G–2. Testing of Starting Motor

a. Free running test

1. Place the starting motor in a vise equipped with soft jaws and connect a fully-charged 12 volts battery to the starting motor.

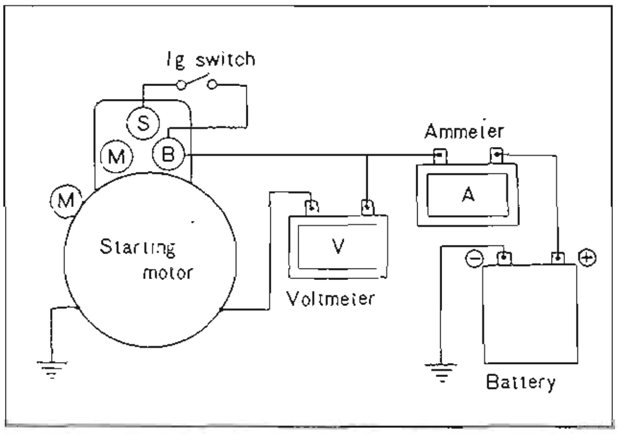


Fig. 5–18 Testing of circuit

2. Connect an ammeter between the (B) terminal of the starting motor and the battery.
3. Operate the starting motor and take a reading. Refer to **Par. TECHNICAL DATA.**

b. Lock resistance test

To test the lock resistance of the starting motor, follow the instructions of the test equipment manufacturer. Refer to **Par. TECHNICAL DATA.**

If the starting motor does not perform to the above test requirements repair it referring to the following list.

1) Starter rotates slowly with a large current at free running.
   a) Worn, dirty or defective bearings
   b) Short circuit of armature
   c) Grounded armature and field coil

2) Starter does not rotate with a large current
   a) Defective field circuit
   b) Short armature circuit
   c) Burnt commutator

3) Low torque and low current flow. Low free running speed.
   a) Breakage of field circuit
   b) Excessive internal resistance

4) Low torque. High free running speed.
   a) Short circuit of field coil

5–G–3. Disassembling of Starting Motor

1. Disconnect the field strap from the terminal on the magnetic switch.
2. Remove the magnetic switch attaching screws and remove the magnetic switch, spring and washers from the driving housing.

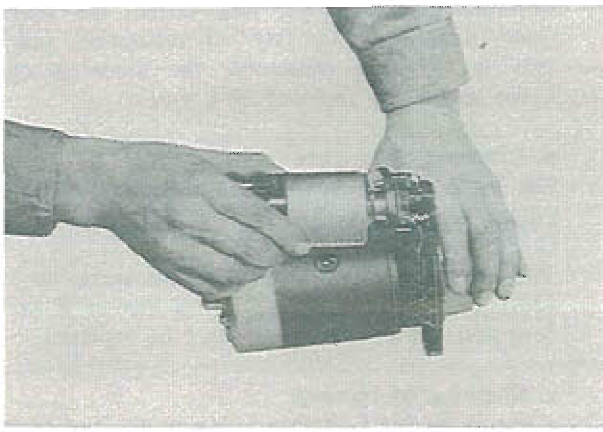


Fig. 5–19 Removing of magnetic switch

3. Remove the plunger from the driving lever.
4. Remove the bracket through bolts and brush holder attaching screws. Then, remove the rear bracket.
5. Remove the insulator and washer from the end of the armature shaft.
6. Remove the brush holder.
7. Separate the front bracket and the yoke.

8. Remove the armature from the yoke and remove the washers.
9. Loosen the screws attaching field coil, and separate the field coil assembly from the yoke.
10. Remove the driving lever, spring and spring seat.
11. Remove the over running clutch assembly from the armature shaft.

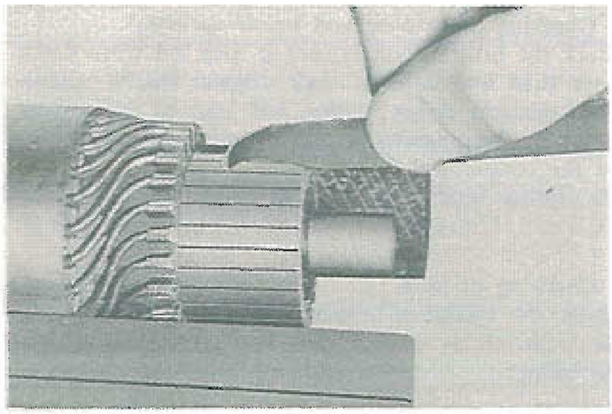


Fig. 5–21 Checking of commutator

5–G–4. Starting Motor Inspection

a. Checking of armature

Check the armature for both grounding and short circuit. To check for grounding, touch one prod of a tester to each segment and the other prod to the core or shaft. If there is current flow, the coil of the corresponding segment is grounded.

To check for short circuit, use a growler tester. Place the armature against the core of the tester, and hold a steel strip on the armature. Then, rotate the armature slowly by hand. In case of short in the coil, the steel strip will become magnetized and vibrate.

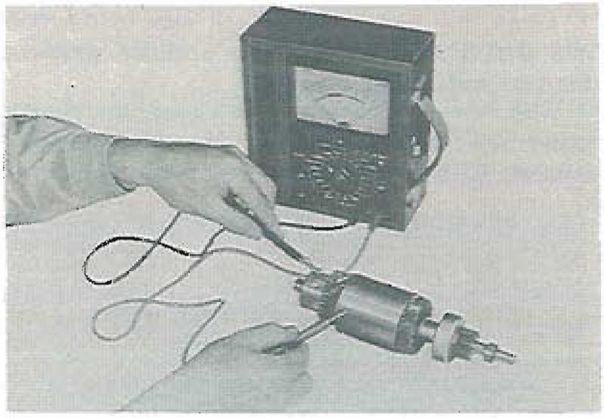


Fig. 5–20 Checking of armature

b. Checking of commutator

If the commutator is dirty, discolored or worn, clean it with emery paper and wash with clean solvent. After cleaning, undercut the mica between the segments to the depth of 0.5 ~ 0.8 mm (0.020 ~ 0.031 in). Refer Fig. 5–21.

c. Checking of field coil

To test the field coil for ground with a tester, place one prod on the yoke or pole core and the other prod to the field terminal. In case of grounding, there will be current flow and the field coil must be repaired or replaced. Refer Fig. 5–22.

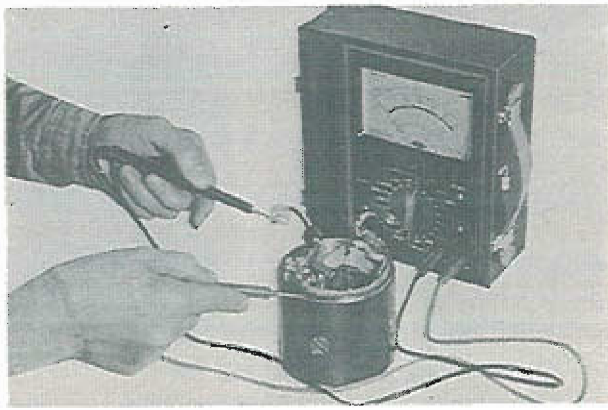


Fig. 5–22 Checking of field coil

d. Checking of brush holder

Check the brush holder for ground. Touch one prod of a tester to the brush holder and the other prod to the frame. Current flow indicates grounding. In that case replace the holder.

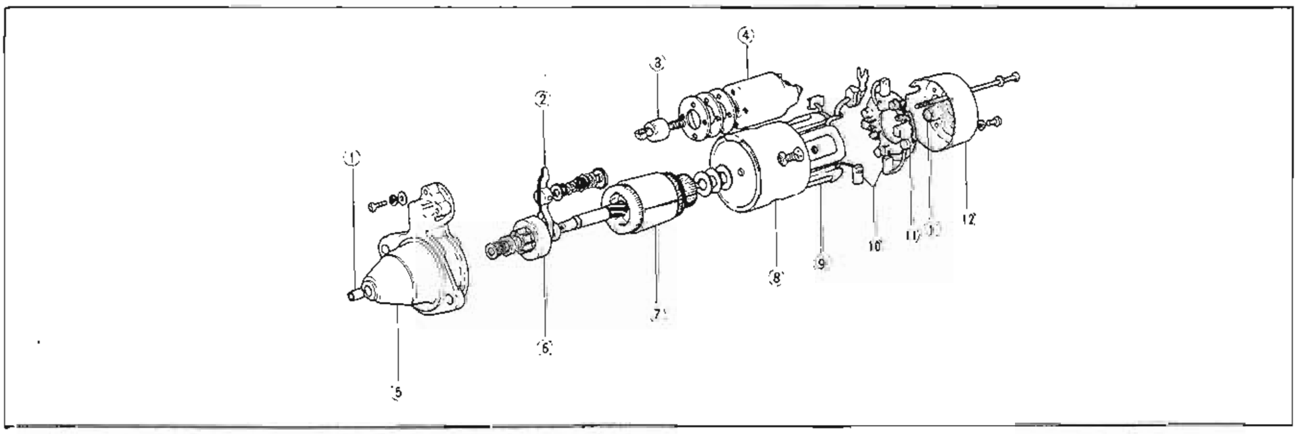


Fig. 5–23 Starting motor components

1. Bush	2. Driving lever	3. Plunger	4. Magnetic switch
5. Front bracket	6. Over running clutch assembly	7. Armature	8. Yoke
9. Field coil assembly	10. Brush	11. Brush holder	12. Rear bracket

e. Checking of brushes and brush springs
Check the brushes and replace if they are worn down more than one third of their original length. Otherwise, reduced spring tension will lead to an increase in the brush-commutator contact resistance. This lowers the torque and causes burnt commutator surface. The spring tension is 1.13 kg (40.0 oz) or 2.0 kg (70.5 oz). If the tension is too low, replace the springs.

f. Checking of bush
Check the clearance between the armature shaft and the bush. If it exceeds 0.2 mm (0.08 in), replace the bush.

5–G–5. Magnetic Switch Test

a. Pull-in coil test
Apply the specified voltage (8V) between the (S) terminal and (M) terminal. If the magnetic switch is forcefully attracted, the pull-in coil is in good condition.

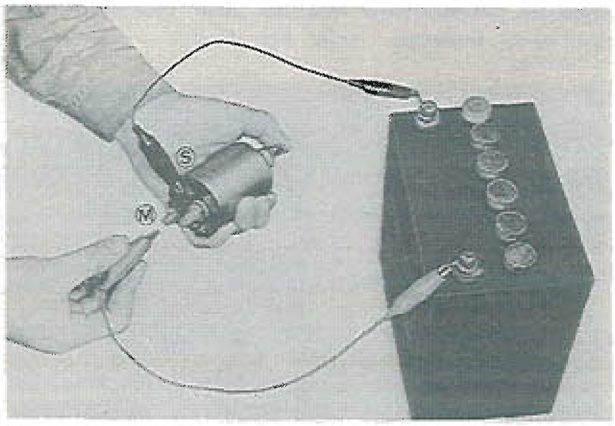


Fig. 5–24 Pull-in coil test

b. Holding coil test
Ground the (M) terminal to the magnetic switch body with a lead and apply the specified voltage (8V) to the terminal (S) to pull in the plunger. If the plunger remains attracted after disconnecting the lead from the (M) terminal, the coil functions properly.

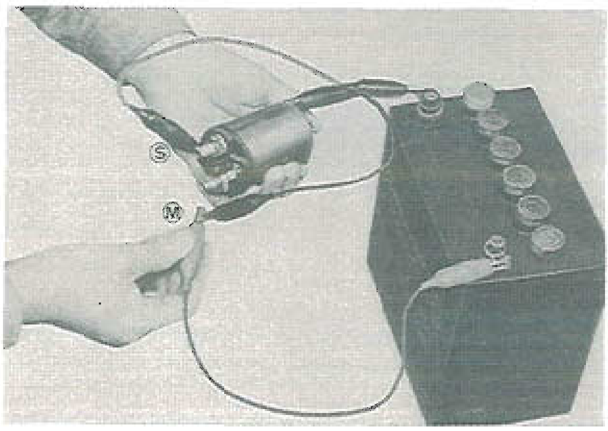


Fig. 5–25 Holding coil test

c. Return test
Push in the plunger by hand and apply the specified voltage (12V) between the (M) terminal and the magnetic switch body. If the plunger is not attracted, there is no trouble.

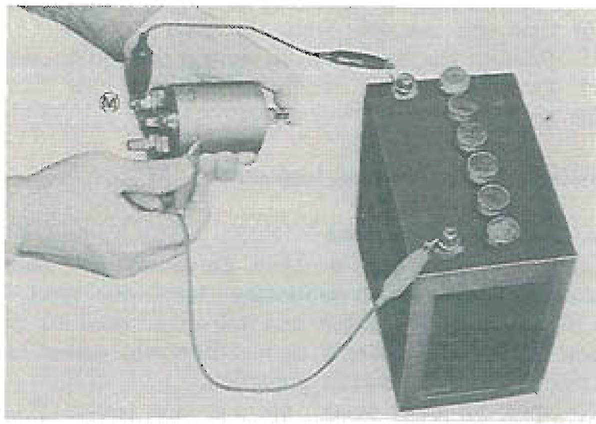


Fig. 5–26 Return test

5–G–6. Assembling of Starting Motor

To assemble the starting motor, reverse the procedure of **Par. 5–G–3**, noting the following points.
1. Adjust the armature shaft end play to 0.1 ~ 0.4 mm (0.004 ~ 0.015 in) with a thrust washer on the rear end of the shaft.
2. When the magnetic switch is closed, the clearance between the pinion and stop collar should be 0.5 ~ 2.0 mm (0.012 ~ 0.079).

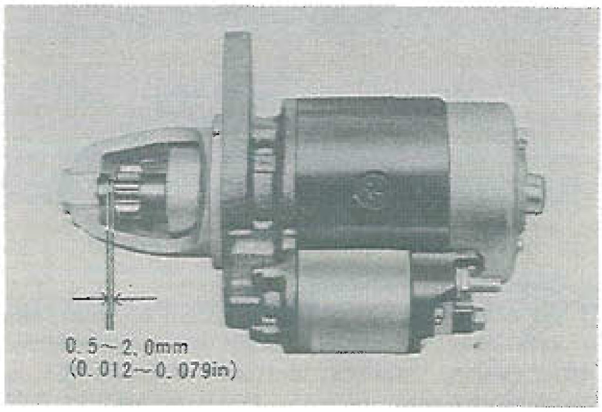


Fig. 5–27 Clearance of pinion and stop collar

5–H. LIGHTING SYSTEM

The wiring of the lighting systems is shown in the wiring diagrams. The wires in the various circuits are of different colors to aid when checking individual circuits.

5–H–1. Headlight Aim

Before adjusting the headlights, make sure that the tires are inflated uniformly to recommended pressure and the vehicle is on the level ground without load. To adjust the headlights, remove the head lamp frames and turn the three spring-loaded screws of the sealed beam unit until the headlights are aimed properly. When the high beam is amied 2.0 m (6.6

ft) straight ahead, the center of the high intensity should be 26.6 mm (1.47 in) lower than the horizontal lamp center line, as shown in Fig. 5–28.

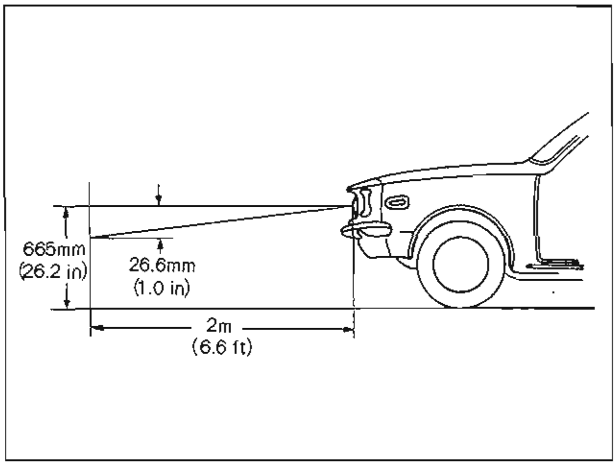


Fig. 5–28 Headlight aiming

5–H–2. Replacing of Bulbs

When replacing the bulbs, use the correct bulbs, referring the following table:

Head lamp	50W/37.5W or 45W/40W
Front turn signal and side lamp	21W/5W or 23W/8W
Rear turn signal lamp	23W/8W or 21W
Back-up lamp	23W or 10W
Stop and tail lamp	21W/5W
Licence lamp	8W or 5W
Side turn signal lamp	3.4W

5–I. METER PANEL

5–I–1. Fuel Gauge

RX-3 is equipped with an electric fuel gauge. The fuel gauge indicates the fuel quantity in the tank when the ignition switch is turned on. The fuel gauge circuit is composed of the fuel meter, mounted on the meter panel, and the fuel tank unit, connected by a single wire through the ignition switch.

Should the meter fail to register, check and repair the fuel meter circuit as follows:

1) Fuel gauge does not register with ignition "ON".
   a) Defective panel unit
   b) Faulty contact in "Ig" terminal of meter gauge
   c) Wiring to tank grounded
   d) Meter gauge improperly grounded
2) Fuel gauge shows "F" under all conditions.
   a) Open circuit in tank unit and meter gauge
   b) Break in wiring between tank unit and panel
3) Fuel gauge shows "E" under all conditions.
   a) Loose or faulty contact of terminals
   b) Short circuit in tank unit or meter gauge
   c) Break in P coil and S coil of meter gauge

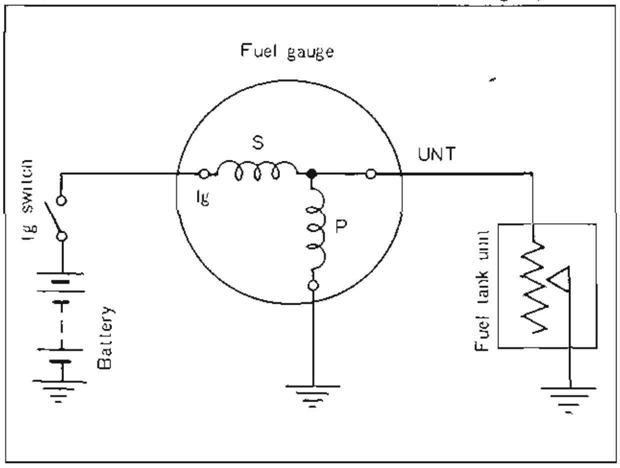


Fig. 5–29 Diagram of fuel gauge

5–I–2. Water Thermometer

The cooling water thermometer is operated electrically like the fuel gauge. The circuit consists of the water thermometer on the meter panel and the sending unit installed on the intake manifold. When the water thermometer registers improperly, check on the following points and refer to the wiring diagram for repair.

1) Pointer does not move when ignition switch is turned on.
   a) Defective panel unit
   b) Faulty contact in "Ig" terminal
2) Pointer shows "H" under all conditions.
   a) Open circuit in sending unit
   b) Break in wiring between both units.
   c) Loose or faulty contact in terminals
3) Pointer shows "C" under all conditions.
   a) Defective panel unit
   b) Short circuit in sending unit
   c) Panel unit improperly grounded

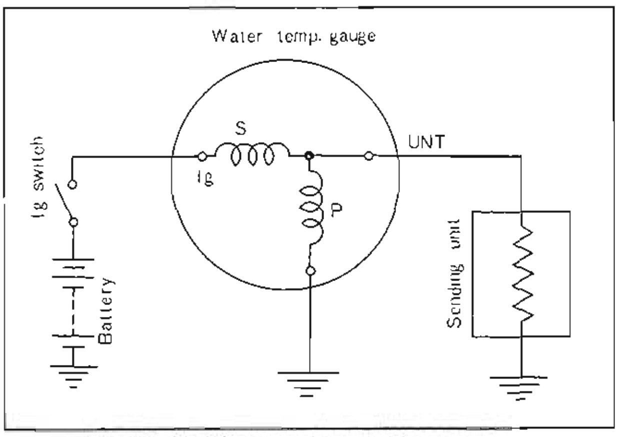
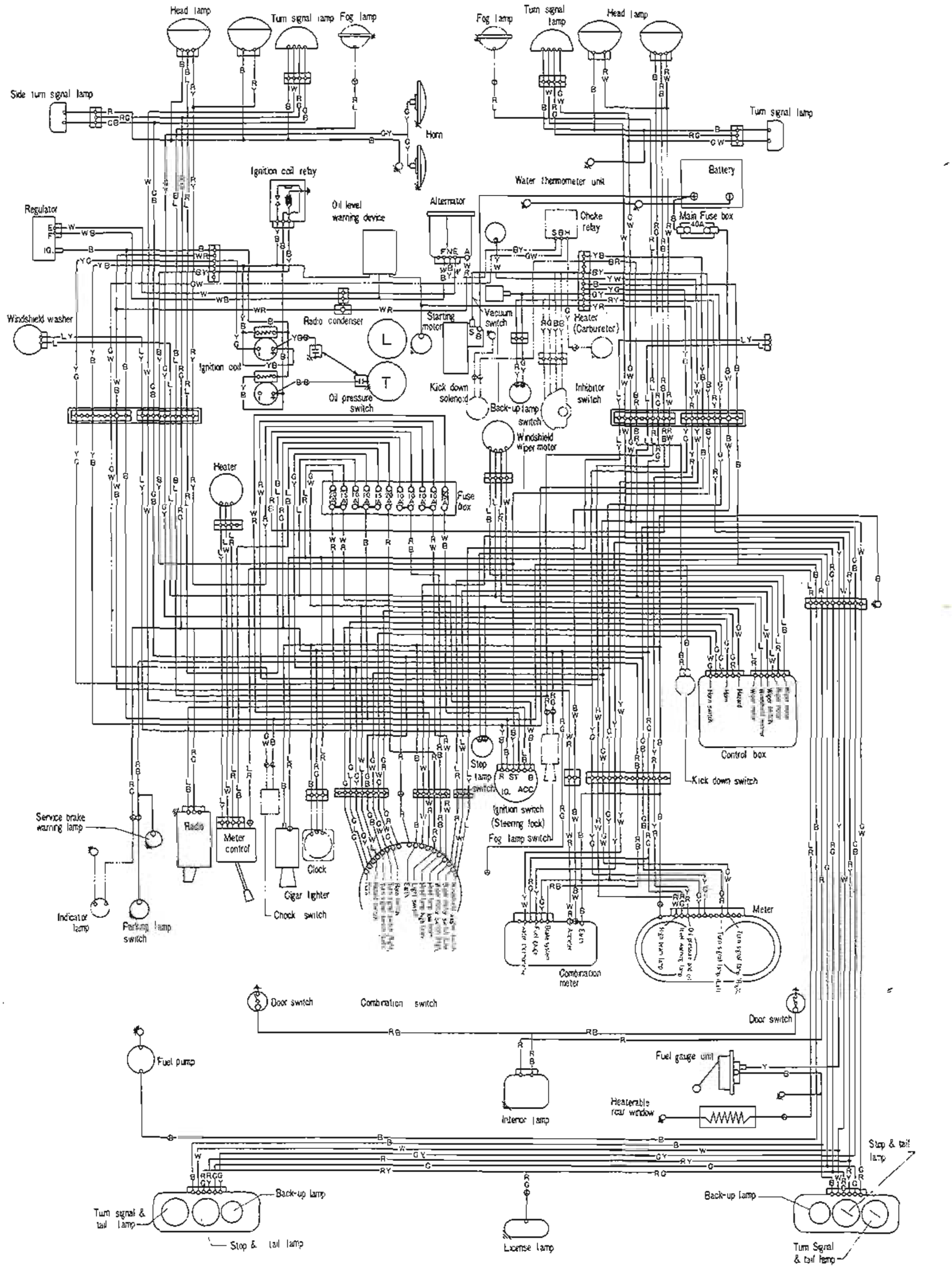


Fig. 5–30 Diagram of water thermometer



Wiring colour code
R : Red
G : Green
B : Black
L : Blue
Y : Yellow
W : Whith

Example

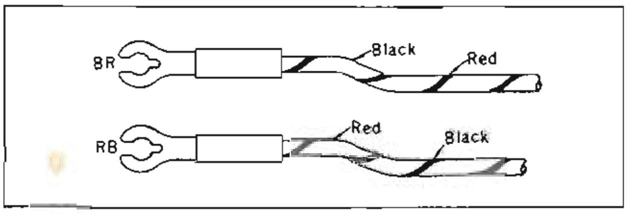


Fig. 5–31 Wiring diagram

TECHNICAL DATA

T

Engine (General Data)

Type	Rotary engine, in line 2 rotors, water cooled
Displacement	491 cc x 2 rotors (30.0 cu. in x 2 rotors)
Compression ratio	9.4 : 1
Compression pressure	6.0 kg/cm^2 at 280 rpm (85 lb/in^2 at 280 rpm)
Max. Brake horsepower	110 HP/7,000 rpm (SAE)
Max. Torque	100 ft-lb/4,000 rpm (SAE)
Port timing :	
Intake opens	Primary : 32° A.T.D.C. Secondary : 32° A.T.D.C.
Intake closes	Primary : 40° A.B.D.C. Secondary : 40° A.B.D.C.
Exhaust opens	80° B.B.D.C.
Exhaust closes	48° A.T.D.C.

Engine

Front and rear housing :	
Limit of distortion	0.04 mm (0.002 in)
Limit of wear	0.10 mm (0.004 in)
Rotor housing :	
Width	$60^{+0}_{-0.02}$ mm ($2.3622^{+0}_{-0.0008}$ in)
Limit of distortion	0.04 mm (0.002 in)
Intermediate housing :	
Width	50 ± 0.1 mm (1.9685 ± 0.0039 in)
Limit of distortion	0.04 mm (0.002 in)
Limit of wear	0.10 mm (0.004 in)
Rotor :	
Standard weight (with internal gear and bearing)	3.940 kg (8.686 lb)
Inside diameter	$80^{+0.019}_{-0}$ mm ($3.1497^{+0.0008}_{-0}$ in)
Gap of side housing and rotor	0.13 ~ 0.17 mm (0.0051 ~ 0.0067 in)
Protrusion of land	0.10 ~ 0.15 mm (0.004 ~ 0.006 in)
Permissible protrusion of land	Max. 0.2 mm (0.008 in) Min. 0.085 mm (0.003 in)
Width of apex seal gloove	6 ± 0.009 mm (0.2362 ± 0.0004 in)
Diameter of corner seal cave	$11^{+0.018}_{-0}$ mm ($0.4331^{+0.0007}_{-0}$ in)
Depth of corner seal cave	$8.0^{+0}_{-0.2}$ mm ($0.3150^{+0}_{-0.0079}$ in)
Width of side seal groove	$1.0^{+0.039}_{+0.014}$ mm ($0.0394^{+0.0015}_{+0.0006}$ in)
Depth of sidc seal groove	4.5 ± 1 mm (0.1772 ± 0.0039 in)
Width of oil seal groove	$3.5^{+0.06}_{+0.03}$ mm ($0.1378^{+0.0024}_{+0.0012}$ in)
Depth of oil seal groove	6.4 ± 0.1 mm (0.2520 ± 0.0039 in)
Apex seal :	
Length	$59.97^{+0}_{-0.025}$ mm (Arctic spec.) ($2.3611^{+0}_{-0.0010}$ in) $59.94^{+0}_{-0.020}$ mm ($2.3599^{+0}_{-0.0008}$ in)
Width	$6^{-0.043}_{-0.066}$ mm ($0.2362^{-0.0017}_{-0.0026}$ in)
Height	$10^{+0}_{-0.1}$ mm ($0.3937^{+0}_{-0.0039}$ in)
Limit of height	8.0 mm (0.3150 in)
Gap of apex seal and side housing :	
Standard	0.01 ~ 0.055 mm (0.0004 ~ 0.0020 in) 0.02 ~ 0.055 mm (0.0008 ~ 0.0020 in) Arctic spec. 0.05 ~ 0.070 mm (0.0020 ~ 0.0028 in)
Limit	0.15 mm (0.0059 in)
Gap of apex seal and rotor groove :	
Standard	0.036 ~ 0.072 mm (0.0014 ~ 0.0028 in) 0.034 ~ 0.075 mm (Arctic spec.) (0.0013 ~ 0.0030 in)
Limit	0.10 mm (0.004 in)
Apex seal spring:	
Free height	5.0 mm (0.197 in)
Set height	2.0 mm (0.079 in)
Set load	2.9 ± 0.2 kg (6.4 ± 0.4 lb)
Spring constant	0.97 kg/mm (54.3 lb/in)
Corner seal:	
Outside diameter	$11^{-0.020}_{-0.030}$ mm ($0.4331^{-0.0008}_{-0.0012}$ in)
Width	$7^{+0}_{-0.2}$ mm ($0.2756^{+0}_{-0.0079}$ in)
Gap of corner seal and rotor groove:	
Standard	0.020 ~ 0.048 mm (0.0008 ~ 0.0019 in)
Limit	0.08 mm (0.0031 in)
Corner seal spring:	
Free height	2.7 mm (0.106 in)
Set height	1.0 mm (0.039 in)
Set load	1.3 ± 0.3 kg (2.9 ± 0.7 lb)
Spring constant	0.76 kg/mm (42.6 lb/in)
Side seal:	
Thickness	$1.0^{-0.014}_{-0.039}$ mm ($0.0394^{-0.0006}_{-0.0015}$ in)
Width	$3.5^{+0}_{-0.1}$ mm ($0.1378^{+0}_{-0.0039}$ in)
Gap of side seal and rotor groove:	
Standard	0.04 ~ 0.07 mm (0.002 ~ 0.003 in)
Limit	0.078 mm (0.0031 in)

Gap of side seal and corner seal:	
Standard	0.05 ~ 0.15 mm (0.002 ~ 0.006 in)
Limit	0.40 mm (0.016 in)
Side seal spring:	
Free height	1.9 mm (0.075 in)
Set height	1.0 mm (0.039 in)
Set load	4.0 ± 1.0 kg (8.8 ± 2.2 lb)
Spring constant	3.6 kg/mm (201.6 lb/in)
Oil seal:	
Thickness	$5.5^{+0.2}_{-0}$ mm ($0.2165^{+0.0079}_{-0}$ in)
Width	$3.35^{+0.05}_{-0.15}$ mm ($0.1319^{+0.0020}_{-0.0059}$ in)
Outside diameter of outer oil seal	$126^{-0.04}_{-0.10}$ mm ($4.9607^{-0.0016}_{-0.0039}$ in)
Outside diameter of inner oil seal	$116^{-0.03}_{-0.09}$ mm ($4.5670^{-0.0012}_{-0.0035}$ in)
Contact width of oil seal lip:	
Standard	0.2 mm (0.008 in)
Limit	0.8 mm (0.031 in)
Oil seal spring:	
Free height	Inner side: 2.7 mm (0.106 in) Outer side: 2.6 mm (0.102 in)
Set height	1.0 mm (0.039 in)
Set load	13^{+3}_{-0} kg ($28.7^{+6.6}_{-0}$ lb)
Spring constant	Inner side : 7.5 kg/mm (419.6 lb/in) Outer side: 8.3 kg/mm (464.4 lb/in)
Main bearing:	
Inner diameter	$43^{+0.050}_{+0.020}$ mm ($1.6929^{+0.0018}_{+0.0008}$ in)
Main bearing clearance:	
Standard	0.04 ~ 0.07 mm (0.0016 ~ 0.0028 in)
Limit	0.10 mm (0.0039 in)
Rotor bearing:	
Inner diameter	$74^{+0.070}_{+0.030}$ mm ($2.9134^{+0.0028}_{+0.0012}$ in)
Rotor bearing clearance:	
Standard	0.04 ~ 0.08 mm (0.0016 ~ 0.0031 in)
Limit	0.10 mm (0.0039 in)
Eccentric shaft:	
Eccentricity of rotor journal	$15^{+0}_{-0.035}$ mm ($0.5906^{+0}_{-0.0014}$ in)
Main journal diameter	$43^{+0.015}_{-0.030}$ mm ($1.6929^{+0.0006}_{-0.0012}$ in)
Rotor journal diameter	$74^{-0.015}_{-0.030}$ mm ($2.9134^{-0.0006}_{-0.0012}$ in)

Permissible run-out	Less than 0.02 mm (Less than 0.0008 in)
Eccentric shaft end play:	
Standard	0.04 ~ 0.07 mm (0.0016 ~ 0.0028 in)
Limit	0.09 mm (0.0035 in)
Internal gear:	
Number of teeth	51
Backlash of internal gear and stationary gear	0.06 ~ 0.08 mm (0.0024 ~ 0.0031 in)
Stationary gear:	
Number of teeth	34
Inner diameter	$47^{+0.016}_{-0}$ mm ($1.8504^{+0.0006}_{-0}$ in)

Lubricating system

Oil pump:	
Feeding capacity	6 liters/min (12.7 U.S. pints/min, 10.6 Imp. pints/min) at 1,000 rpm 22 liters/min (46.5 U.S. pints/min, 38.7 Imp. pints/min) at 7,000 rpm
Clearance of outer rotor and body	0.200 ~ 0.245 mm (0.008 ~ 0.010 in)
Clearance of outer rotor and inner rotor	0.01 ~ 0.09 mm (0.0004 ~ 0.0035 in)
Rotor end float	0.030 ~ 0.125 mm (0.001 ~ 0.005 in)
Oil pressure:	
Normal	5.0 kg/cm² (71.1 lb/in²) at 3,000 rpm 0.5 kg/cm² (7.1 lb/m²) at 700 rpm
Warning lamp lights	Less than 0.3 kg/cm² (4.3 lb/in²)
Pressure regulator control spring:	
Free length	46.4 mm (1.827 in)
Set length	35.3 mm (1.390 in)
Set load	7.1 kg (15.6 lb)
Relief valve opens:	
Regulated pressure	5.06 kg/cm² (72.0 lb/in²)
Oil metering pump feeding capacity	2.4 ~ 2.9 cc/6 min at 2,000 rpm
Oil capacity:	
Oil pan	4.8 liters (10.1 U.S. pints, 8.4 Imp. pints)
Full capacity	5.8 liters (12.3 U.S. pints, 10.2 Imp. pints)

Cooling system

Water pump:	
Type	Centrifugal
Feeding capacity	110 ~ 120 liters (233 ~ 254 U.S. pints, 194 ~ 211 Imp. pints/min)
Fan:	
Standard revolution	1,500 ~ 2,000 rpm at 2,000 rpm of engine
Fan diameter	380 mm (14.96 in)
Number of blades	4
Water pump pulley ratio	1.035 : 1
Thermostat:	
Starts to open	82 ± 1.5°C (180 ± 35°F)

Fully opens	95°C (203°F)
Lift	8^{+2}_{-0} mm ($0.31^{+0.079}_{-0}$ in) at 95°C (203°F)
Radiator :	
Type	Corrugated fin
Core area	7.15 m^2 (77.0 ft^2) or 6.28 m^2 (67.6 ft^2)
Relief valve pressure	0.9 ± 0.1 kg/cm^2 (12.8 ± 1.4 lb/in^2)
Cooling capacity :	
With heater	7.3 liters (15.4 U.S. pints, 12.8 Imp. pints)
Without heater	6.8 liters (14.5 U.S. pints, 12.1 Imp. pints)

Fuel system

Fuel tank capacity	60.0 liters (15.6 U.S. gallons, 13.2 Imp. gallons)
Fuel filter	Paper element, cartridge type
Fuel pump :	
Type	Electrical (Transistor)
Rated terminal voltage	12 V
Min. operating voltage	Less than 10 V
Feeding pressure	0.20 ~ 0.25 kg/cm^2 (2.8 ~ 3.6 lb/in^2)
Feeding capacity	More than 800 cc (0.21 U.S. gallon, 0.18 Imp. gallon/min)
Carburetor :	
Type	Down-draft, Zenith Stromberg
Throat diameter	Primary : 26 mm (1.0236 in) Secondary : 30 mm (1.1811 in)
Venturi diameter	Primary : 21 x 8 mm (0.8268 x 0.3150 in) Secondary : 28 x 10 mm (1.1024 x 0.3937 in)
Main jet	Primary : # 92 Secondary : # 140
Main air bleed	Primary : # 100 Primary : # 90 (Automatic transmission) Secondary : # 140
Slow jet	Primary : # 42 Secondary : # 60
Slow air bleed	Primary : # 200 Secondary : # 180
Pump nozzle	0.7 mm (0.028 in)

Electrical system

Battery :	
Voltage	12 V (NS60, NS70 or N50Z)
Capacity	45AH, 60AH or 65AH (20 hours rate)
Terminal ground	Negative
Specific gravity	Fully charged : 1.26 Recharge at : 1.20
Distributor (T and L) :	
Contact point gap	0.45 ± 0.05 mm (0.018 ± 0.002 in)
Contact point pressure	0.575 ± 0.075 kg (1.27 ± 0.17 lb)
Condenser capacity	0.27 ± 0.027μF
Centrifugal advance :	
Trailing	Start : 0 ± 1° at 500 rpm of dis. Max. : 2.5 ± 1° at 1500 rpm of dis.
Leading	Start : 0 ± 1° at 500 rpm of dis. Max. : 7.5 ± 1° at 2,000 rpm of dis.
Vacuum advance :	
Trailing	Start : 0 ± 1.5° at 150 mmHg Max. : 17.5 ± 1° at 430 mmHg
Leading	Start : 0 ± 1° at 150 mmHg Max. : 11 ± 1.5° at 400 mmHg
Dwell angle	58 ± 3°
Firing order	1 – 2
Ignition timing	Trailing : 5° A.T.D.C. Leading : 0°
Marking location	Eccentric shaft pulley
Spark plug type and gap :	
Hot type	NGK B-6EM 0.8 ~ 0.9 mm (0.031 ~ 0.035 in) NIPPONDENSO W20EA (0.8 ~ 0.9 mm (0.031 ~ 0.035 in)
Standard type	NGK B-7EM 0.8 ~ 0.9 mm (0.031 ~ 0.035 in) NIPPONDENSO W22EA 0.8 ~ 0.9 mm (0.031 ~ 0.035 in)
Cold type	NGK B-8EM 0.8 ~ 0.9 mm (0.031 ~ 0.035 in) NIPPONDENSO W25EA 0.8 ~ 0.9 mm (0.031 ~ 0.035 in)
Starting motor :	
Capacity	1.0 KW 2.0 KW (Arctic spec. or automatic transmission)
Free running test	Voltage : 11.5 V : 12 V (Automatic transmission) Current : Less than 70 A at 5,000 rpm or more : Less than 100 A at 5,400 rpm or more (Arctic spec.) : Less than 100 A at 1,700 rpm or more (Automatic transmission)
Lock test	Voltage : 5V : 4V (Arctic spec. or automatic transmission) Current : 800A or less : 1,000A or less (Arctic spec.) : 1,200A or less (Automatic tranmission) Torque : 0.9 m-kg or more (6.51 ft-lb or more) : 1.8 m-kg or more (13.02 ft-lb or more) (Arctic spec.) : 6.0 m-kg or more (43.40 ft-lb or more) (Automatic transmission)

Brush	4	Regulator:	
Brush spring tension	1.13 kg (40.0 oz) 2.0 kg (70.5 oz) (Arctic spec.)	Constant voltage relay	Air gap: 0.7 ~ 1.1 mm (0.028 ~ 0.043 in) Point gap: 0.3 ~ 0.4 mm (0.012 ~ 0.016 in) Back gap: 0.7 ~ 1.1 mm (0.028 ~ 0.043 in)
Magnetic switch operating Voltage	9V		
Alternator:			
Ground polarity	Negative	Regulated voltage, without load	14 ± 0.5V
No load test	Voltage: 14V at 1,050 rpm or less Current: 0A	Bulbs:	
		Head lamp	50W/37.5W or 45W/40W
		Front turn signal & side lamp	21W/5W or 23W/8W
Load test	Voltage: 14V at 2,500 rpm or less Current: 32A	Side turn signal lamp	3.4W
		Fog lamp	25W
		Interior lamp	5W
Brush spring pressure	390 gr (13.7 oz)	Rear turn signal lamp	21W or 23W/8W
Slip ring diameter	33 mm ± 0.2 (1.299 ± 0.008 in)	Stop, tail & back-up lamp	21W/5W/10W
		Licence lamp	8W, 10W or 5W
Ratio of alternator and eccentric shaft	2.02 : 1		

TIGHTENING TORQUE LIST

	m-kg	ft-lb		m-kg	ft-lb
Engine:			Coolant drain plug (Intermediate housing)	2.0	15
Tension bolt	3.0	20			
Flywheel nut	45.0	350	Water pump	2.0	15
Eccentric shaft pulley	8.5	60	Water pump pulley	0.8	5
Front cover	2.0	15	Carburetor	2.0	15
Bearing housing	2.0	15	Intake manifold	2.0	15
Rear stationary gear	2.0	15	Exhaust manifold	5.0	40
Oil pan	1.0	7	Spark plug	1.5	10
Pressure regulator	3.5	25			
Oil drain plug	3.5	25	Standard bolts:		
Oil pump	0.8	5	6 mm P = 1.25	0.8	5
Oil pump driven sprocket nut	3.5	25	8 mm P = 1.25	2.0	15
Oil pressure switch	1.5	10	10 mm P = 1.25	4.0	30
Cooling fan	0.8	5	12 mm P = 1.5	7.0	50
Water thermometer gauge unit	1.0	7	14 mm P = 1.5	9.0	60

WORKSHOP MANUAL

MAZDA RX-2 . RX-3

ENGINE

(LICENSE NSU-WANKEL)

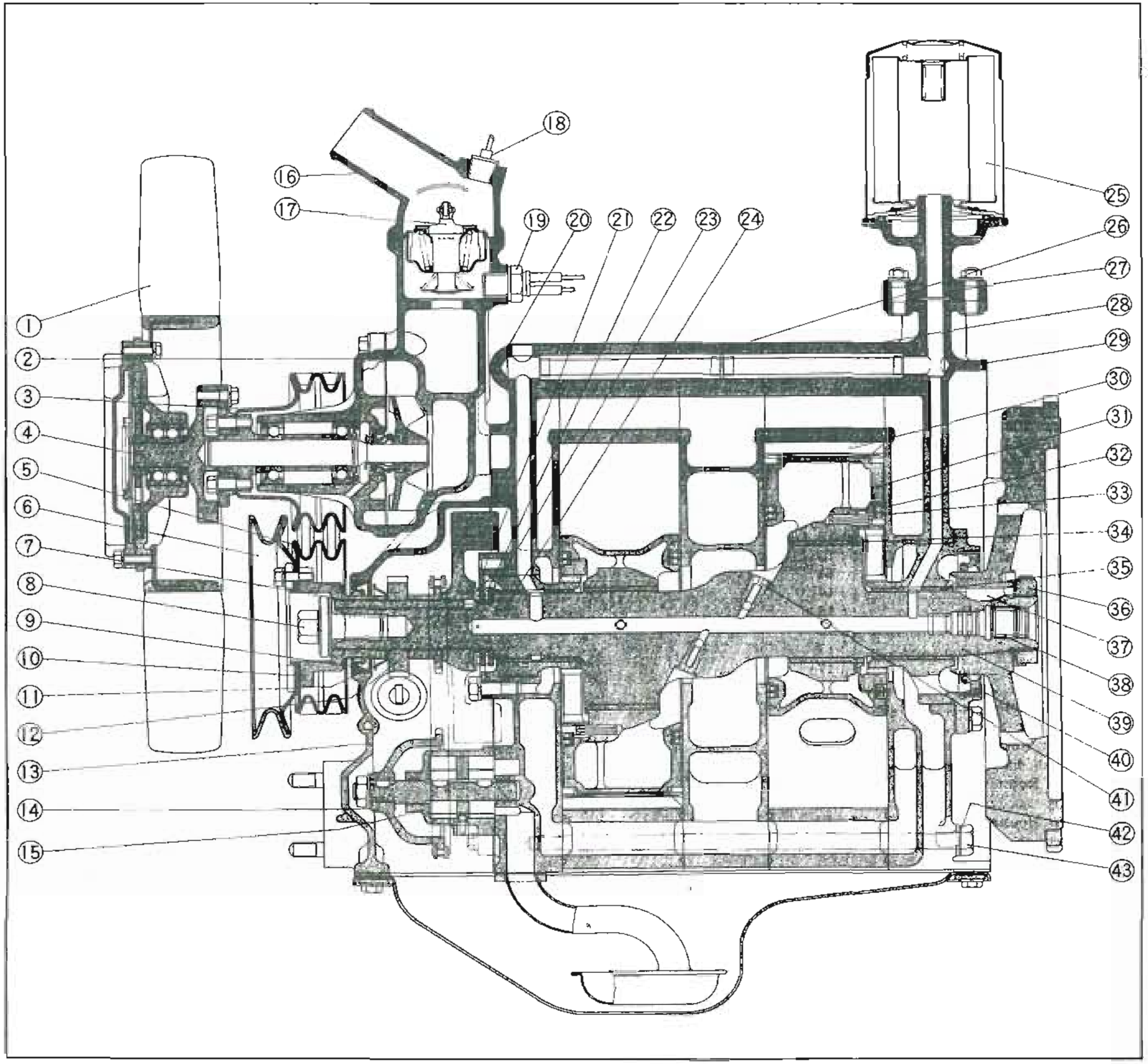
SECTION INDEX	
Name	Section
Engine	1
Emission Control System	1A
Lubricating System	2
Cooling System	3
Fuel System	4
Electrical System (Engine)	5
Technical Data	T

Note:
The specifications and design details contained in this manual are not binding. We reserve the right to carry out the modifications without previous notice.

1105310

TOYO KOGYO CO.,LTD.
HIROSHIMA, JAPAN

ENGINE



1. Cooling fan
2. Water pump body
3. Water pump pulley
4. Cooling fan drive
5. Eccentric shaft pulley
6. Eccentric shaft pulley
7. Key
8. Eccentric shaft pulley bolt
9. Eccentric shaft front oil seal
10. Eccentric shaft pulley boss
11. Oil thrower
12. Distributor drive gear
13. Front cover
14. Oil pump driven sprocket
15. Oil pump body
16. Thermostat cover
17. Thermostat
18. Water thermo switch (for air conditioner)
19. Water thermo switch (for choke control)
20. Front housing
21. Thrust washer
22. Needle bearing
23. Thrust plate
24. Spacer
25. Oil filter
26. Intermediate housing
27. Oil filter cover
28. Rear rotor housing
29. Rear housing
30. Apex seal
31. Rear rotor
32. Oil seal (outer)
33. Oil seal (inner)
34. Rear rotor bearing
35. Rear main bearing
36. Flywheel lock nut
37. Key
38. Needle bearing
39. Eccentric shaft
40. Eccentric shaft rear oil seal
41. Oil jet
42. Sealing washer
43. Tension bolt

Fig. 1–1 Engine cross section (1)

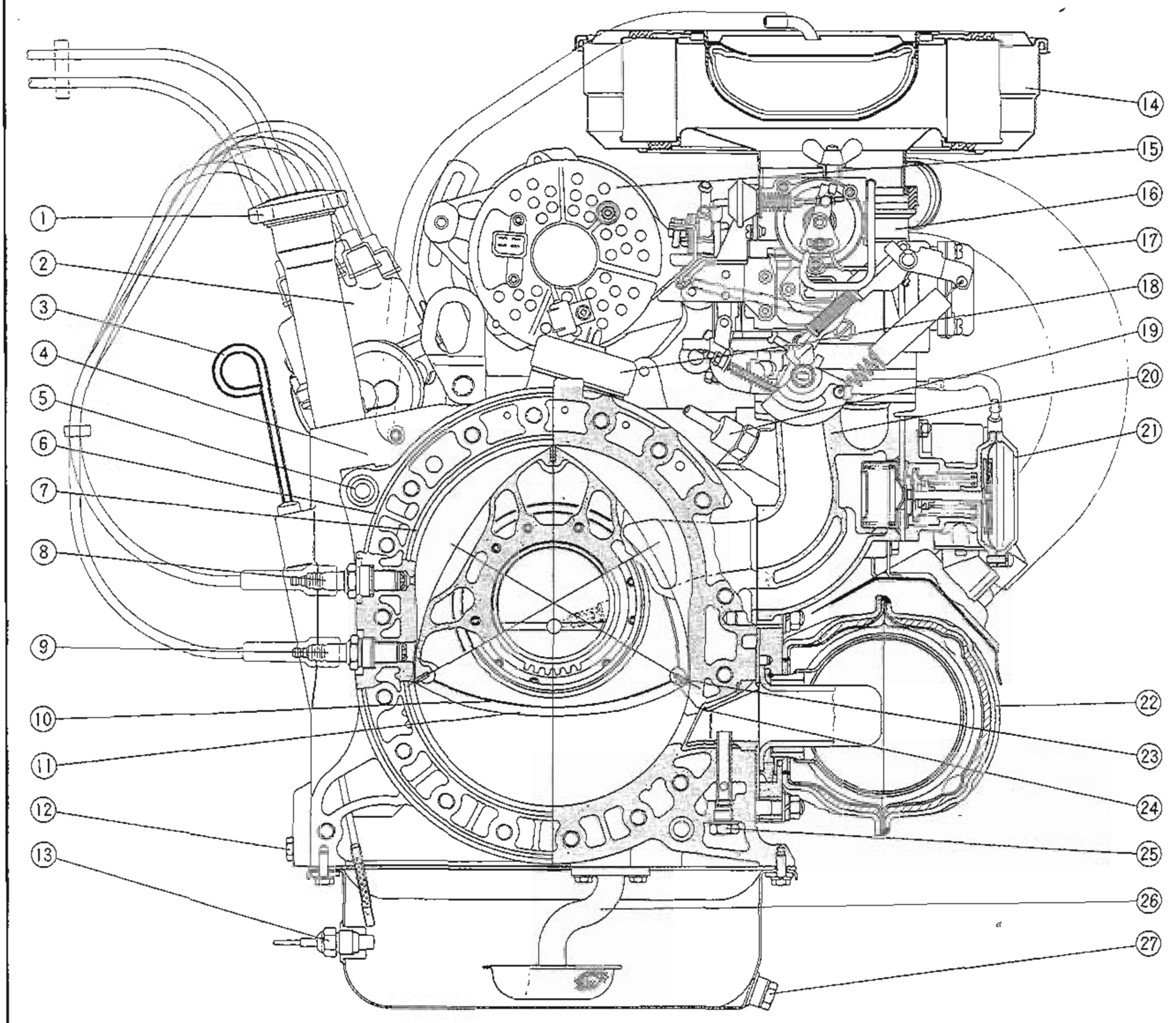


Fig. 1–2 Engine cross section (2)

1. Oil feller cap
2. Distributor
3. Dipstick gauge
4. Rotor housing
5. Tubular dowel
6. Scaling rubber (outer)
7. Sealing rubber (inner)
8. Trailing spark plug
9. Leading spark plug
10. Side seal
11. Rotor
12. Coolant drain plug
13. Oil warning siwtch
14. Air cleaner
15. Alternator
16. Carburetor
17. Hot air hose
18. Water thermo senser
19. P.C.V. valve
20. Intake manifold
21. Air control value
22. Thermal reactor
23. Apex seal
24. Corner seal
25. Air injection nozzle
26. Oil strainer
27. Oil drain plug

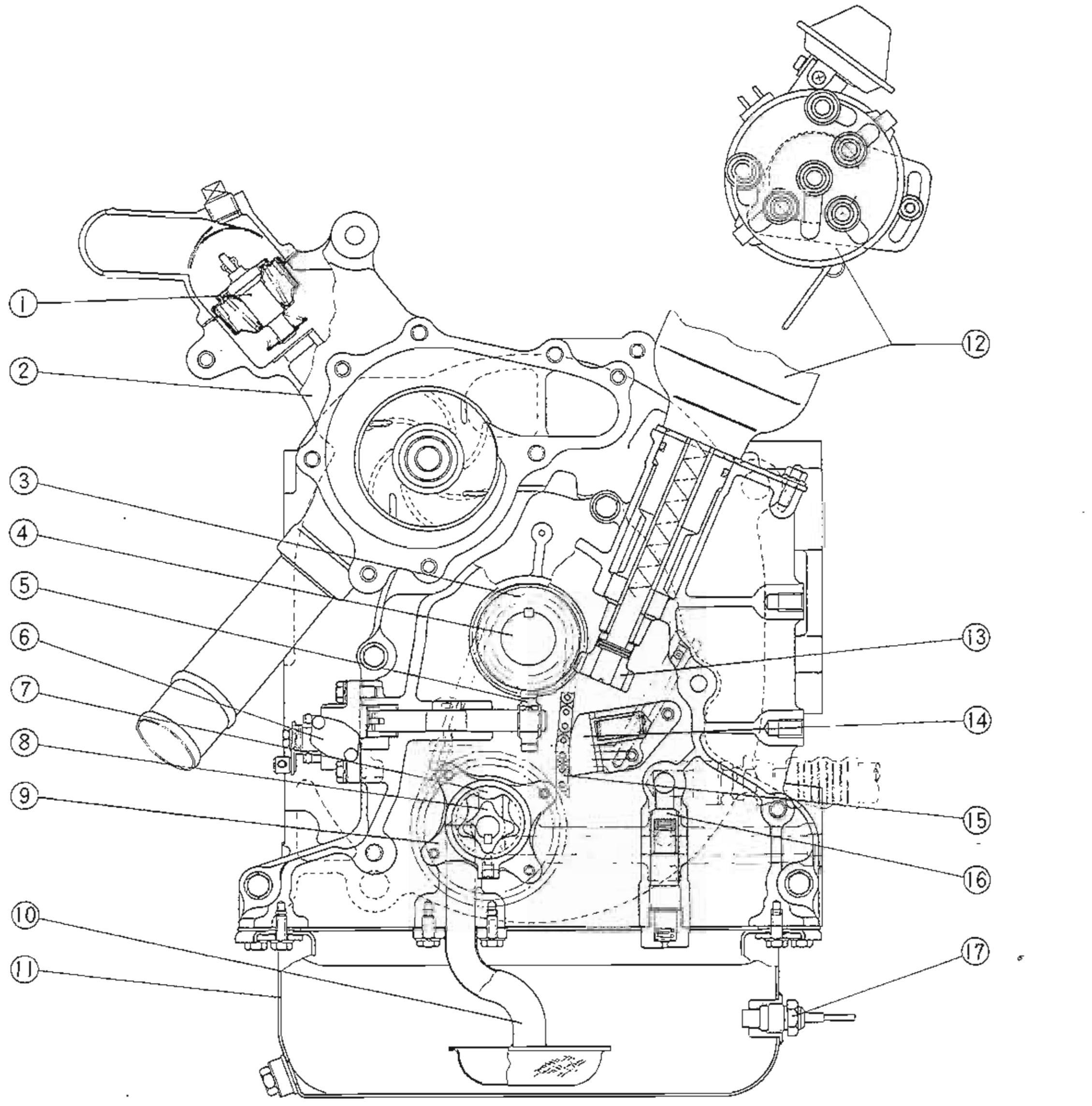


Fig. 1–3 Engine cross section (3)

1. Thermostat
2. Water pump casing
3. Distributor drive gear
4. Eccentric shaft
5. Metering pump drive gear
6. Metering pump
7. Oil pump outer gear
8. Oil pump inner gear
9. Oil pump body
10. Oil strainer
11. Oil pan
12. Distributor
13. Distributor driven gear
14. Oil pump chain adjuster
15. Oil pump chain
16. Pressure control valve
17. Oil warning switch

1–A. ENGINE DISASSEMBLY

Engine disassembly should be done in the following order after removing the engine from the vehicle.

Note: When overhauling a rotary engine, the former method of mounting the engine on to the work stand was to support the rear housing. Henceforth, on this occasion when the '74 year-type of rotary engine is being introduced, we have adopted the method of supporting the front housing by using the **New Hanger** (49 1114 005) for the purpose of facilitating the working procedure. The new hanger can be used for any type of engine now in service.

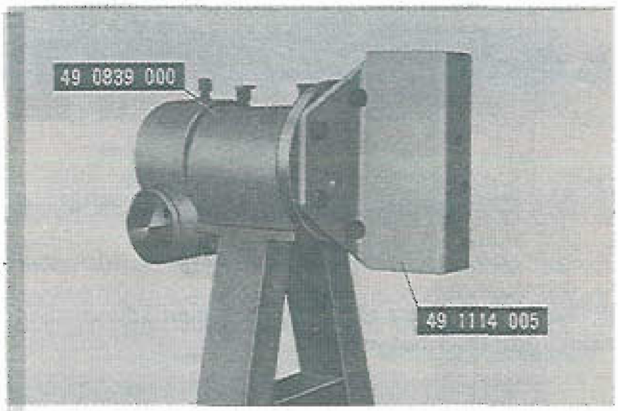


Fig. 1–4 Engine work stand

1. Remove the oil hose support bracket from the front housing.
2. Mount the engine on the **engine work stand** (49 0839 000) with the **hanger** (49 1114 005).
3. Remove the engine hanger bracket from the front cover.
4. Disconnect the vacuum hoses, air hoses and wires, then remove the deceleration valve if equipped.
5. Remove the air pump attaching bolts and bar, and remove the air pump if equipped and the V-belt.
6. Remove the alternator attaching bolts, and remove the alternator and V-belt.
7. Disconnect the metering oil pump connecting rod, oil tubes and vacuum sensing tube from the carburetor.
8. Remove the intake manifold attaching nuts, and remove the carburetor and intake manifold assembly.

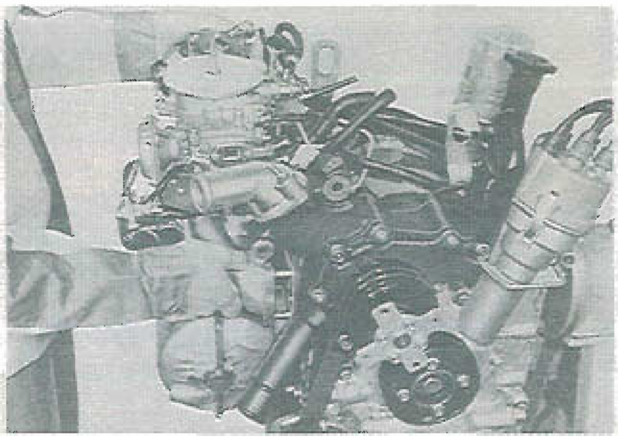


Fig. 1–5 Removing intake manifold ass'y

Then remove the gasket and two rubber rings.

9. *Remove the thermal reactor (or exhaust manifold)* attaching nuts and remove it with gaskets.
10. Remove the distributor securing nut and pull it out from the front cover.

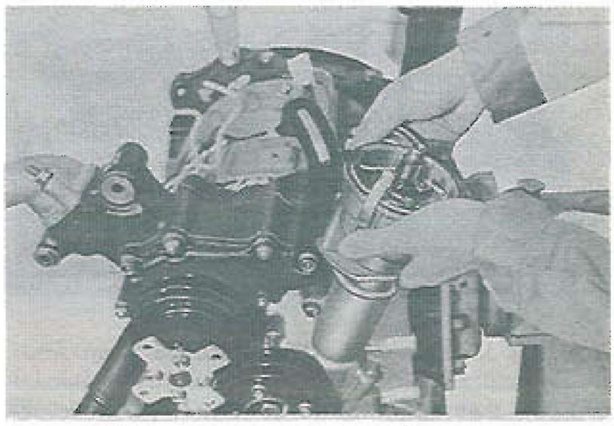


Fig. 1–6 Removing distributor

11. Remove the water pump attaching bolts, and remove the pump and gasket.

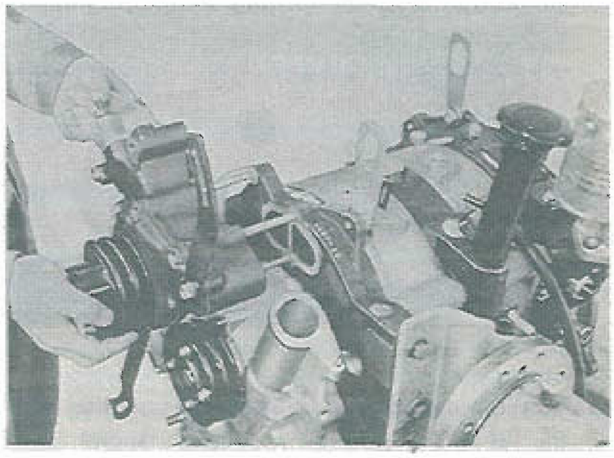


Fig. 1–7 Removing water pump

12. Invert the engine on the work stand.
13. Remove the bolts attaching the oil pan, and remove the oil pan and gasket.

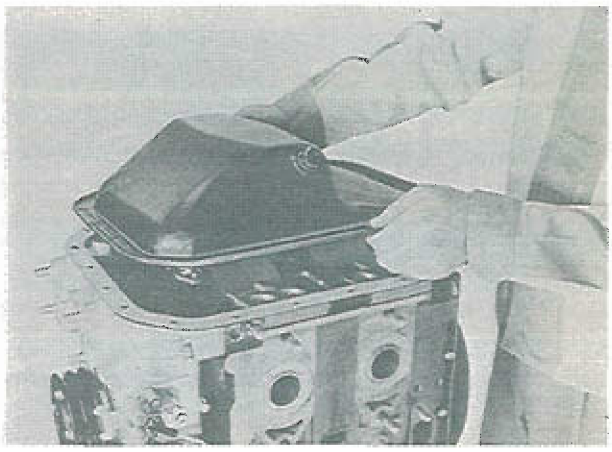


Fig. 1–8 Removing oil pan

14. Remove the bolts attaching the oil strainer, and remove the oil strainer and gasket.

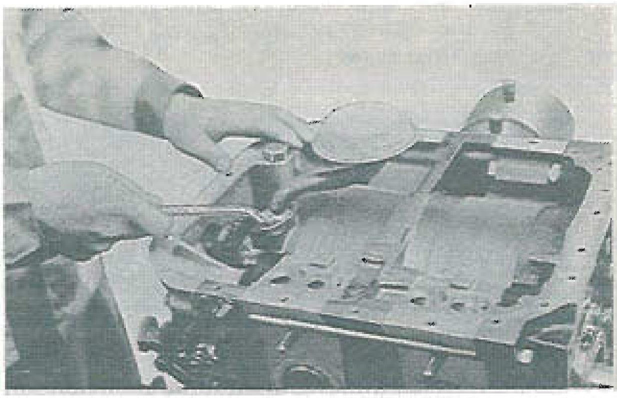


Fig. 1–9 Removing oil strainer

15. Apply identification marks onto the front rotor housing and rear rotor housing, which are common parts, so that they will be as they were when reassembling the engine.

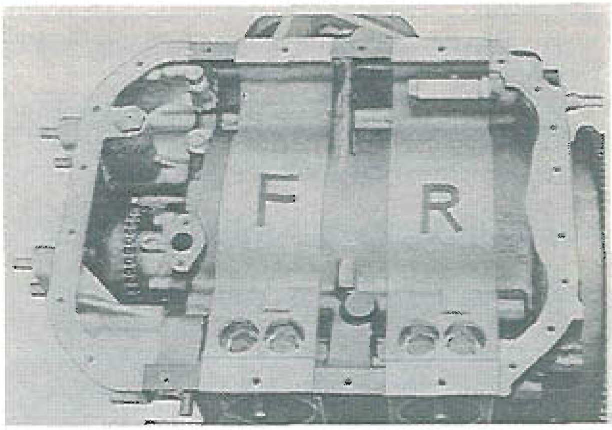


Fig. 1–10 Putting identification marks

16. Turn the engine on the work stand so that the top of the engine is up. Then remove the nuts attaching the engine mounting bracket to the front cover and remove the mounting bracket.
17. Attach the **ring gear brake** (49 1881 060) to the flywheel or drive plate.
18. Remove the eccentric shaft pulley bolt and remove the pulley.

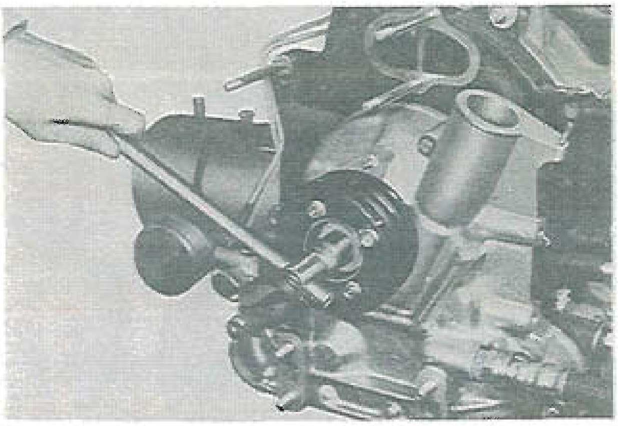


Fig. 1–11 Removing eccentric shaft pulley

19. Turn the engine on the work stand so that the front end of the engine is up.
20. Remove the front cover attaching bolts, and remove the front cover and gasket.

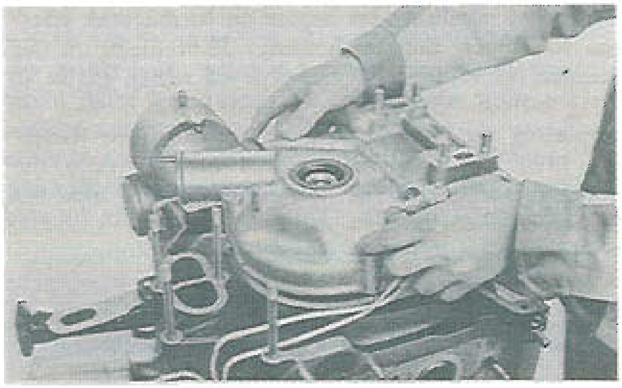


Fig. 1–12 Removing front cover

21. Remove the "O" ring from the oil passage on the front housing.
22. Slide the oil thrower and distributor drive gear off the shaft.
23. Remove the nuts attaching the chain adjuster and remove the chain adjuster.

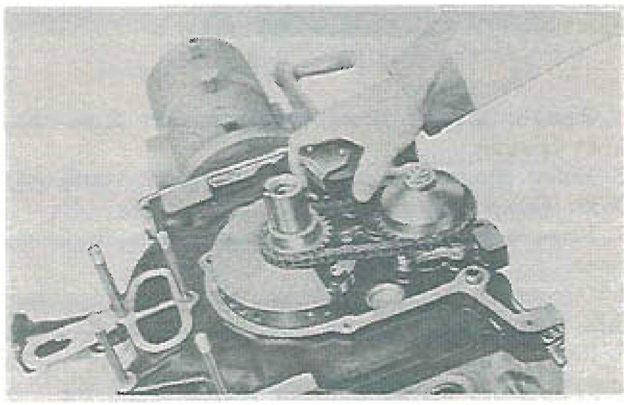


Fig. 1–13 Removing chain adjuster

24. Remove the lock nut and washer for the oil pump driven sprocket.
25. Slide the oil pump drive sprocket and driven sprocket together with the drive chain off the eccentric shaft and oil pump shaft simultaneously.

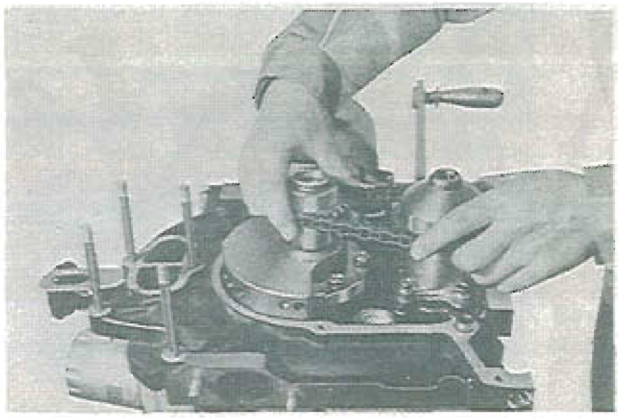


Fig. 1–14 Removing chain and sprockets

26. Remove the keys on the eccentric shaft and pump shaft.
27. Slide the balance weight, thrust washer and needle bearing off the shaft.
28. Remove the bolts attaching the bearing housing, and slide the bearing housing, needle bearing, spacer and thrust plate off the shaft.
29. Turn the engine on the work stand so that the top of the engine is up.
30. To remove the flywheel in case of engine mounted with manual transmission, proceed as follows:
1) Remove the clutch pressure plate assembly attaching bolts, and remove the pressure plate assembly and clutch disk.
2) Straighten the tab of the lock washer and remove the flywheel nut using the **special wrench** (49 0820 035).

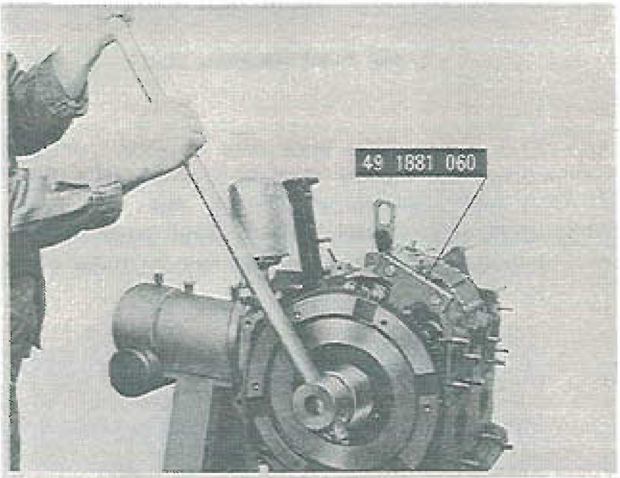


Fig. 1–15 Removing flywheel nut

3) Remove the flywheel by using the **flywheel puller** (49 0823 300), turning the handle of the puller and lightly hitting the head of the puller.

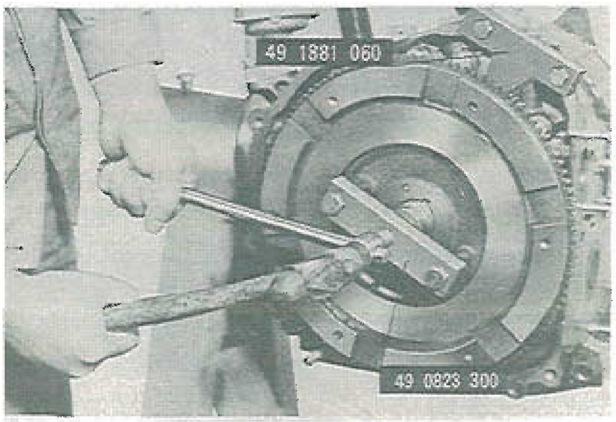


Fig. 1–16 Removing flywheel

31. To remove the counter weight in case of engine mounted with automatic transmission, proceed as follows.
1) Remove the drive plate, and then remove the **ring gear brake** (49 1881 060).
2) Attach the **counter weight brake** (49 1881 055). Then straighten the tab of the lock washer and remove the counter weight nut using the **special wrench** (49 0820 035).
3) Remove the counter weight by using the **counter weight puller** (49 0839 305), turning the handle of the puller and lightly hitting the head of the puller.
32. Turn the engine on the work stand so that the rear of the engine is up.
33. Loosen the tension bolts in the sequence shown in Fig. 1–17, and remove the tension bolts.

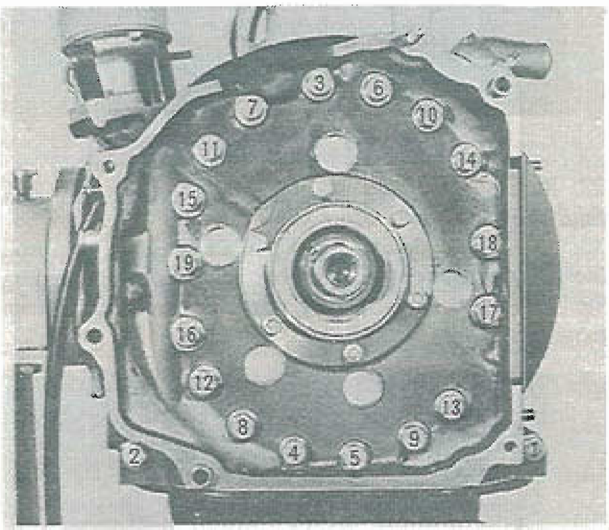


Fig. 1–17 Tension bolts loosening order

Note:
Do not loosen the tension bolts at one time. Perform the removal in two or three procedures.

34. Lift the rear housing off the shaft.

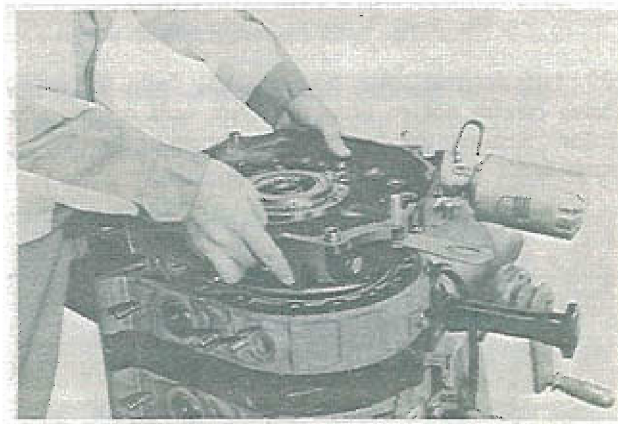


Fig. 1–18 Removing rear housing

35. Remove any seals stuck to the rotor sliding surface of the rear housing and place them back into their respective original positions.
36. Remove the all corner seals, corner seal springs, side seals and side seal springs from the rear side of the rotor, and place them in the **seal case** (49 0813 250), in accordance with the numbers near each respective groove on the face of the rotor. These marks are made in order to prevent each seal from changing its original position in reassembling.

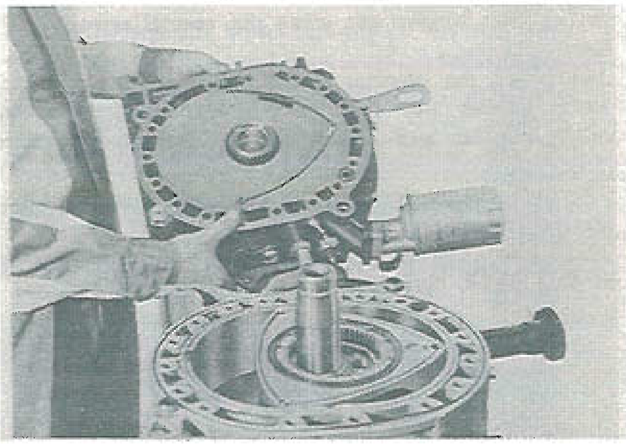


Fig. 1–19 Removing seals

37. Remove the two sealing rubbers and two "O" rings from the rear rotor housing.
38. Attach the **dowel puller** (49 0813 215), and pull the tubular dowels off the rear rotor housing holding the rotor housing down by hand to prevent it from moving up.

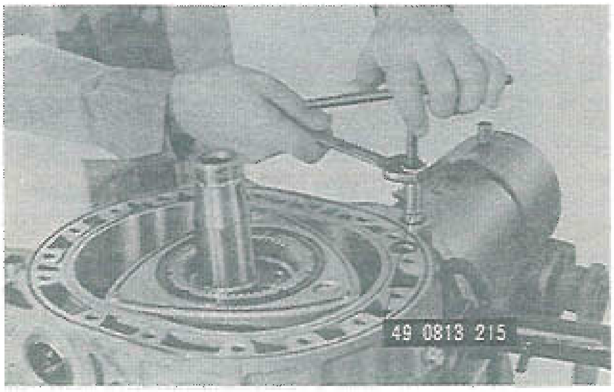


Fig. 1–20 Removing tubular dowel

39. Lift the rear rotor housing away from the rotor, being careful not to drop the apex seals on the rear rotor. Remove the two sealing rubbers and two "O" rings from the rear rotor housing.

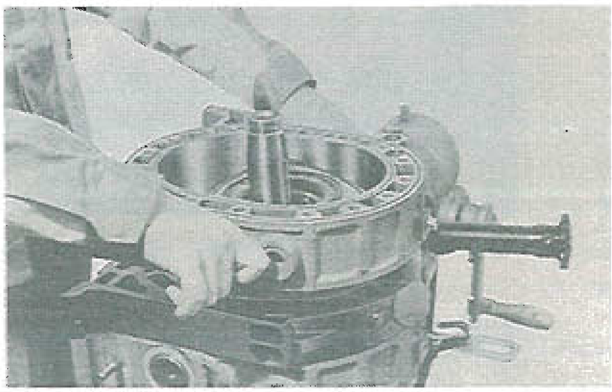


Fig. 1–21 Removing rear rotor housing

40. Remove the each apex seal, side piece and spring from the rear rotor and place them in the seal case.
41. Remove the rear rotor away from the eccentric shaft and place it upside down on a clean sheet of cloth.
42. Remove each seal and spring on the other side of the rear rotor, and place them in the seal case as shown in Fig. 1–22.

Fig. 1–22 Removing seals

Note:
1) If some of the seals drop off, be careful not to change the original position of each seal on the rotor.
2) Apply identification mark onto the rear rotor, which is a common part to front rotor, so that when reassembling the engine the rotor can be installed in its original position.

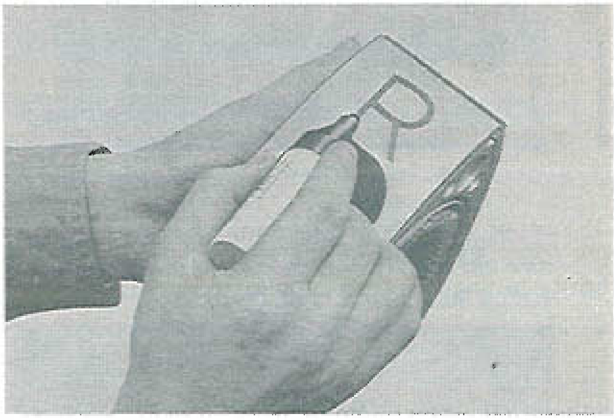


Fig. 1–23 Putting identification mark

43. Remove the oil seals by using the **oil seal remover** (49 0813 225). Remove the oil seal springs.

Fig. 1–24 Removing oil seal

Note:
1) Do not exert strong pressure at only one place to prevent deformation of the oil seal.
2) Be careful not to damage the oil seal lip. Use a suitable protector shown in Fig. 1–24.
3) Replace the "O" rings in the oil seals when the engine is overhauled.

44. Holding the intermediate housing down by hand, pull the tubular dowel off the intermediate housing using the **dowel puller** (49 0813 215).
45. Lift the intermediate housing off the shaft being careful not to damage the shaft. The intermediate housing should be removed by sliding it beyond the rear rotor journal on the eccentric shaft while holding the intermediate housing up and at the same time pushing up the eccentric shaft.

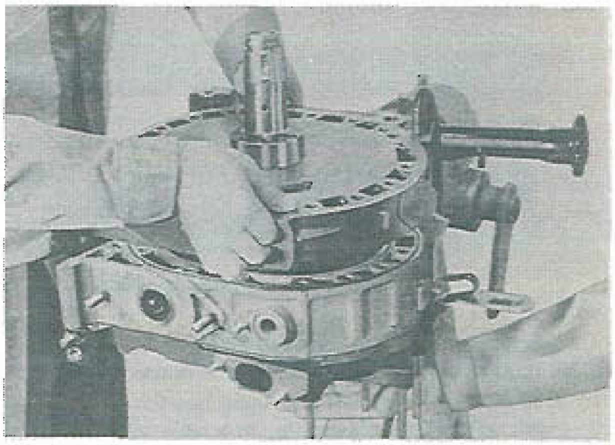


Fig. 1–25 Removing intermediate housing

46. Lift out the eccentric shaft.
47. Repeat the above procedures to remove the front rotor housing and the front rotor assembly.

1–B. INSPECTION AND REPAIR

1–B–1. Inspecting Front, Intermediate and Rear Housing

1. Check the side housings for traces of gas or water leakage.
2. Remove all carbon on the housings with an extra-fine emery paper. When using a carbon scraper, be careful not to damage the finished surfaces of the housings.

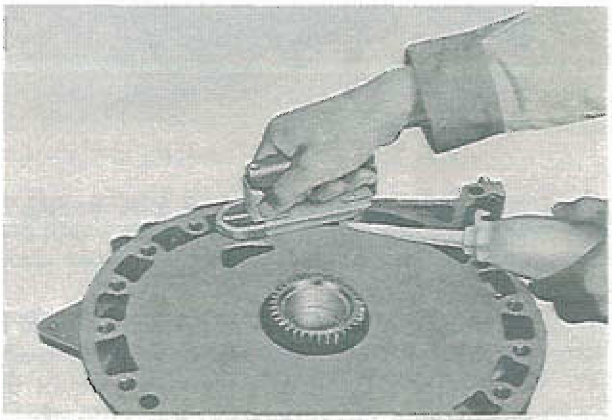


Fig. 1–26 Removing sealing agent

3. Remove the sealing agent on the housings by using a cloth or a brush soaked in a solution of ketone or thinner.
4. Check for housing distortion by placing a straight edge on the housing surface. Measure the clearance between the straight edge and the housing surface with a feeler gauge, as shown in Fig. 1–27. If the distortion exceeds **0.04 mm (0.0016 in)**, reface or replace the housing.

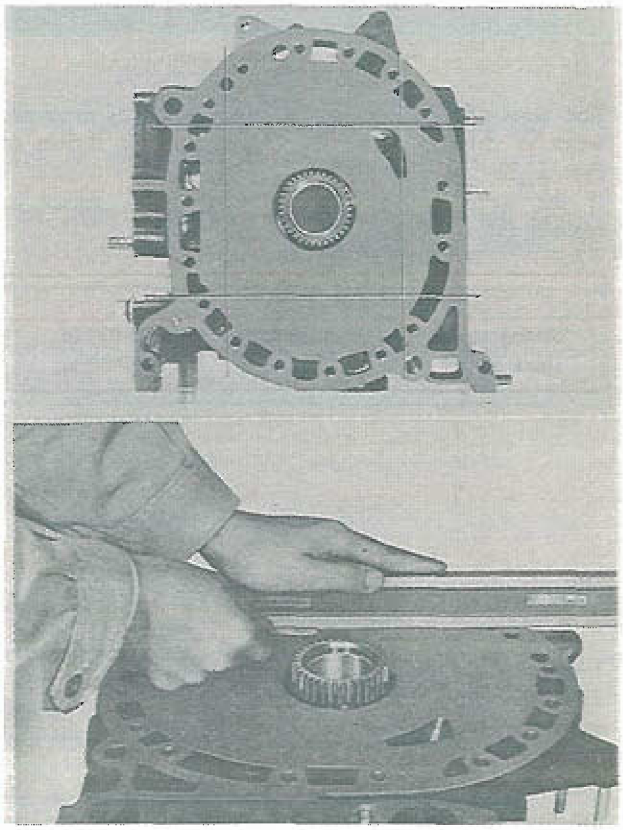


Fig. 1–27 Checking distortion

5. Check for wear on the rotor sliding surfaces of the housing and joint surfaces with rotor housing. The wear of sliding surface has a tendency of excessive wear occurring at following minor axis area of the housing.

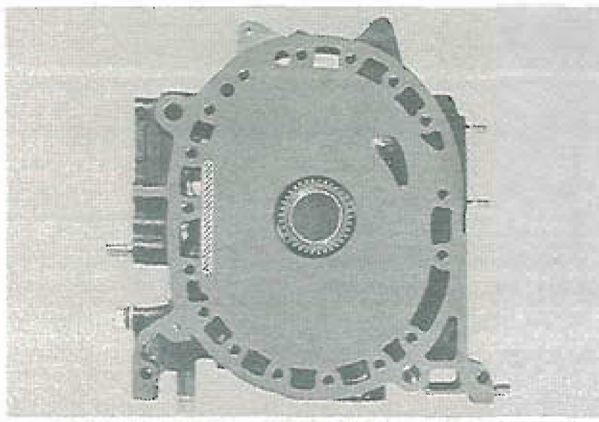


Fig. 1–28 Checking position of wear

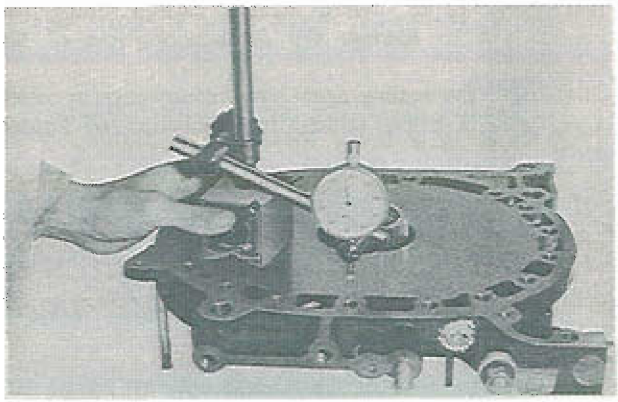


Fig. 1—29 Checking wear

The wear of joint surface has a tendency of excessive wear at the hot zone of the engine as shown in Fig. 1—28
If the wear exceeds the following limit, reface or replace the housing.

	Limit	
Sliding surface	0.10 mm	(0.0039 in)
Joint surface	0.05 mm	(0.0020 in)

1—B—2. Regrinding Side Housings

The side housings (front housing, intermediate housing and rear housing) can be reused by grinding them if the required finish can be maintained.
And when this work is performed on the markets, ask the detailed informations of Toyo Kogyo, and follow them.

1—B—3. Inspecting Front Stationary Gear and Main Bearing

1. Check the teeth on the stationary gear for wear, crack or damage.
2. Check the main bearing for wear, scratching, flaking or other damages.
3. Check the clearance between the main bearing and eccentric shaft main journal by measuring the inner diameter of the main bearing and outer diameter of the eccentric shaft main journal.

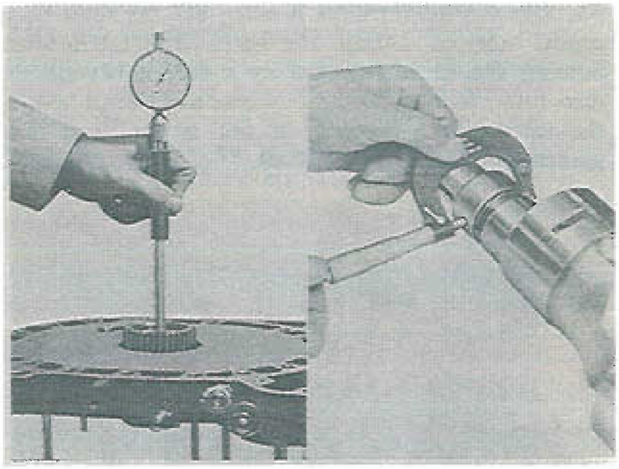


Fig. 1—30 Checking main bearing clearance

The standard clearance is **0.04 ~ 0.07 mm (0.0016 ~ 0.0028 in)**. If the bearing clearance exceeds **0.10 mm (0.0039 in)**, replace the main bearing or eccentric shaft.
To replace the main bearing, proceeds as follows:
1) Remove the stationary gear and main bearing assembly from the housing, using the **main bearing replacer** (49 0813 235), shown in Fig. 1—31.

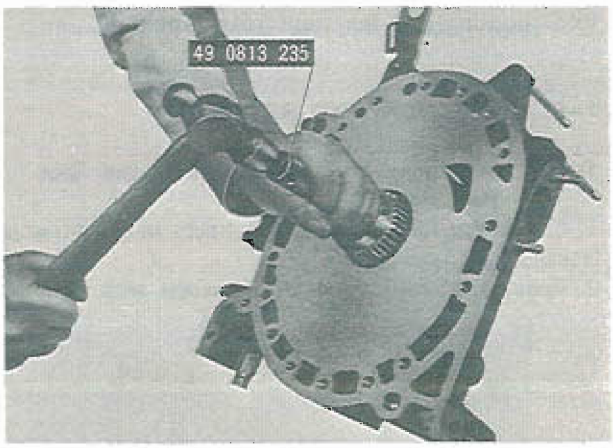


Fig. 1—31 Removing stationary gear assembly

2) Remove the adaptor on the main bearing replacer and press the main bearing out of the stationary gear by using the **main bearing replacer** (49 0813 235), as shown in Fig. 1—32.
3) Attach the adaptor onto the **main bearing replacer** (49 0813 235), aligning the tang of the bearing and the slot of the stationary gear, and press fit the main bearing into the stationary gear until the adaptor touches the stationary gear flange.

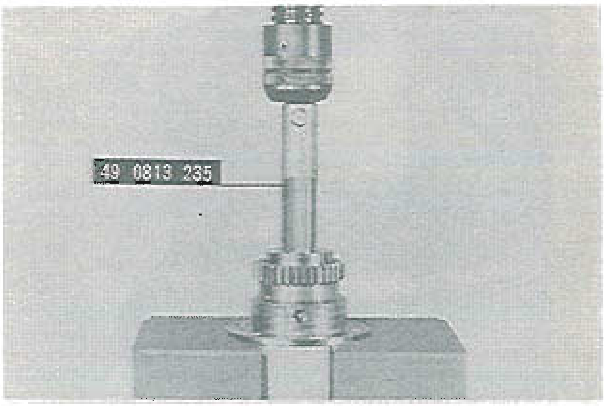


Fig. 1–32 Removing main bearing

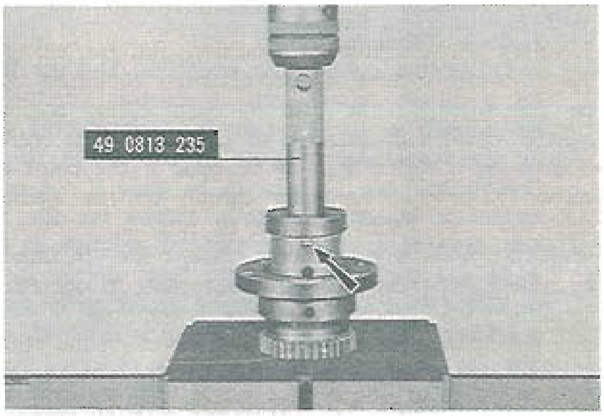


Fig. 1–33 Installing main bearing

4. Press in the stationary gear to the housing with the **main bearing replacer** (49 0813 235), aligning the slot of the stationary gear flange and the dowel pin on the housing, as shown in Fig. 1–34

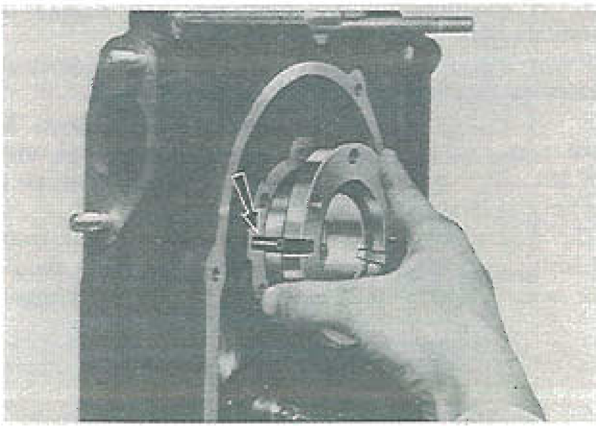


Fig. 1–34 Installing stationary gear

1–B–4. Inspecting Rear Stationary Gear and Main Bearing

1. Check the rear stationary gear and main bearing according to Par. 1–B–3.
2. The "O" ring in the stationary gear for a damage. Replace the "O" ring if necessary.

To remove and install the stationary gear, proceed as follows:

1) Remove the bolts attaching the stationary gear to the rear housing.
2) Using the **main bearing replacer** (49 0813 235), remove the stationary gear from the rear housing.
3) Apply a thin coat of grease on the "O" ring and place it in the groove of the stationary gear.

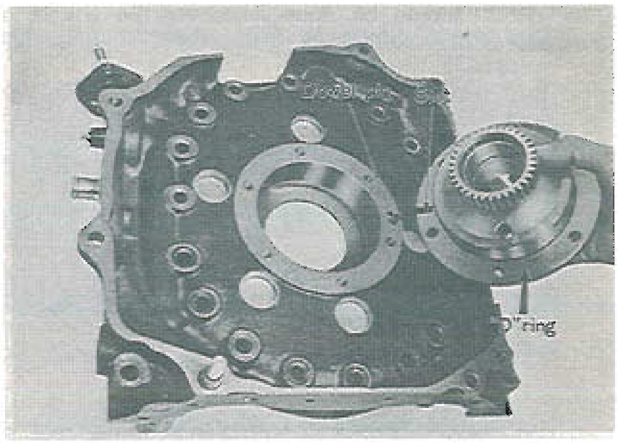


Fig. 1–35 Assembling stationary gear

4) Apply sealing agent onto the stationary gear flange.
5) Install the stationary gear to the rear housing being careful not to damage the "O" ring and aligning the slot of the stationary gear with the dowel pin on the rear housing.
6) Tighten the bolts attaching the stationary gear.

1–B–5 Inspecting Rotor Housing

1. Check for traces of gas or water leakage along the inner margin of each side face of the rotor housing.
2. Remove all carbon from the inner surface of the rotor housing by wiping with cloth. Soak the cloth in a solution of ketone or thinner if the carbon is difficult to remove.
3. Remove all deposits and rust from the cooling water passages on the housing.
4. Remove sealing agent by wiping with a cloth or brush soaked in a solution of ketone or thinner.

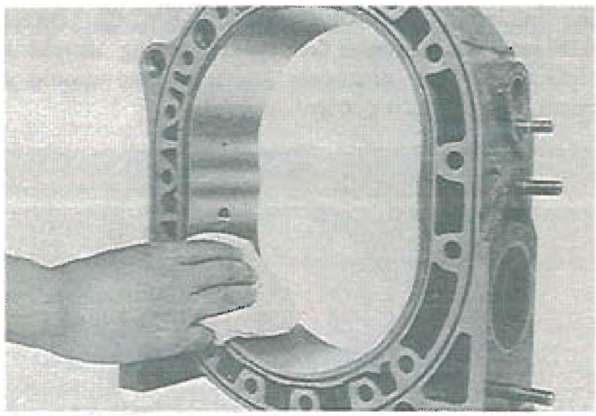


Fig. 1–36 Removing carbon

5. Check the chromium plated surface on the rotor housing for scoring, flaking or any other damage.
If any of these condition exists, replace the rotor housing.

6. Check for rotor housing distortion by placing a straight edge at the position shown in Fig. 1–37. Measure the clearance between the straight edge and rotor housing surface with a feeler gauge. If the distortion exceeds **0.04 mm (0.0016 in)**, replace the rotor housing.
This check should be done whenever the engine is overhauled.

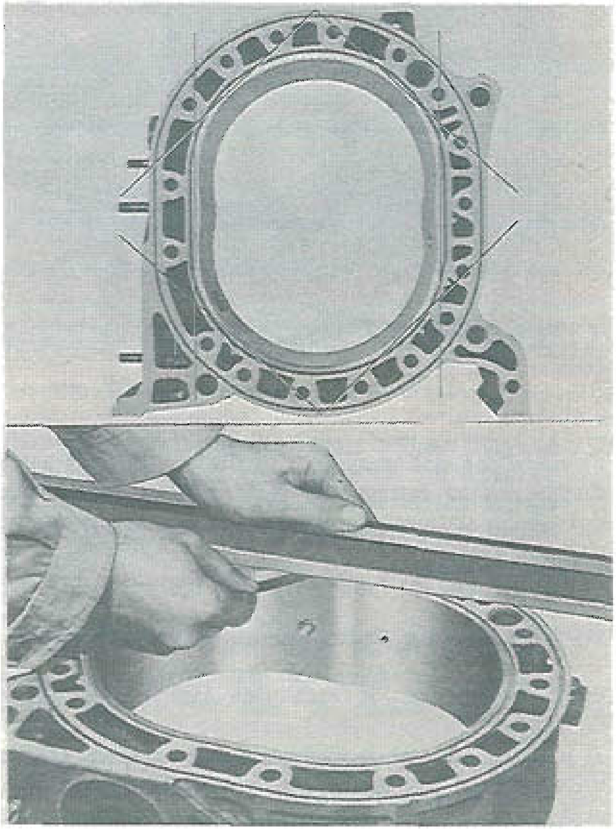


Fig. 1–37 Checking distortion

7. Check the rotor housing width at points close to the trochoid surface by using a micrometer. The measurements should be taken at least at 4 points. If the difference between the value of Ⓐ point and the minimum value of the points ⒷⒸⒹ, exceeds **0.06 mm (0.0024 in)**, the rotor housing should be replaced with a new one, because there should be possibility of gas or water leakage.

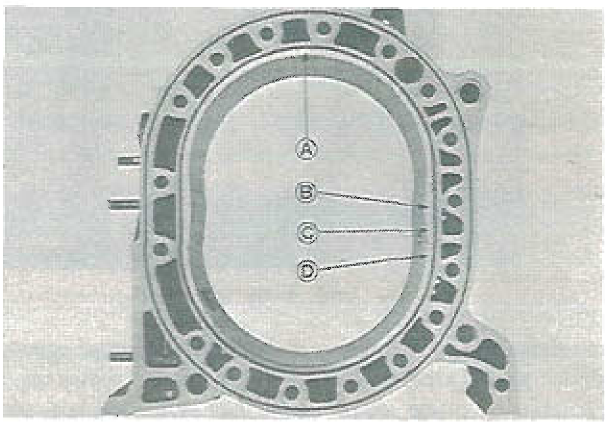


Fig. 1–38 Checking points

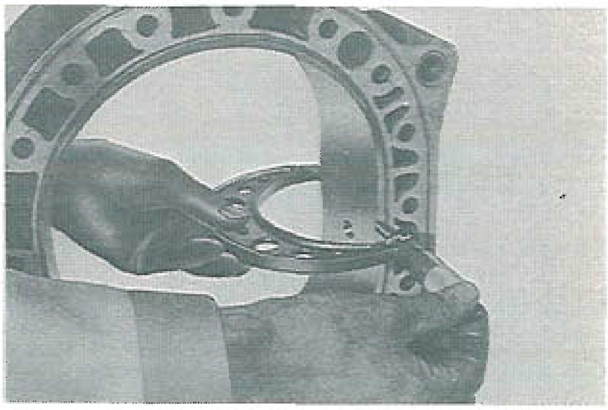


Fig. 1–39 Checking rotor housing width

1–B–6. Inspecting Rotor

1. Check the combustion condition and gas leakage. To a certain extent, the combustion condition can be judged as in the case of reciprocating engines by the color and quantity of carbon on the rotor. Combustion can be said to be good if the color of carbon is brown. Generally carbon on the leading side seen from the direction of rotation is brown, while the trailing side shows black color. It should be noted that this color varies according to operating conditions just before the engine is removed.
The gas leakage can be judged by checking the color of the rotor side surface for blow-by traces originating from the side seals and corner seals.
2. Remove the carbon on the rotor by using a carbon remover or emery paper. Carbon in the seal grooves of the rotor should be removed with a carbon remover being careful not to damage the grooves. Wash the rotor in cleaning solution and dry by blowing with compressed air.
3. Carefully inspect the rotor and replace if it is severely worn or damaged.
4. Check the internal gear for cracks, score, worn or chipped teeth.
5. Check the gap between the side housing and the rotor by measuring the rotor housing width and rotor width. The rotor width should be measured at 3 points as shown in Fig. 1–40.
The difference between the minimum width of rotor housing and the maximum width of the rotor should be within **0.10 ~ 0.21 mm (0.0039 ~ 0.0083 in).**

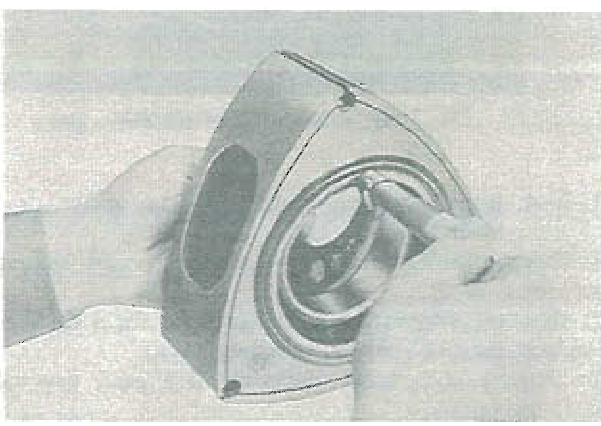


Fig. 1–40 Checking rotor width

If the clearance is more than the specifications, replace the rotor assembly. If the clearance is less than the specifications, it indicates that the internal gear has come out, so strike the internal gear lightly with plastic hammer being careful not to damage.

1–B–7. Inspecting Rotor Bearing

1. Check the rotor bearing for wear, flaking, scoring or any damage. If any of these conditions is found, replace the bearing.
2. Check the rotor bearing clearance by measuring the inner diameter of the rotor bearing and outer diameter of the eccentric shaft rotor journal. The standard clearance is **0.04 ~ 0.08 mm (0.0016 ~ 0.0031 in)**. Replace the bearing if it is more than **0.10 mm (0.0039 in)**.

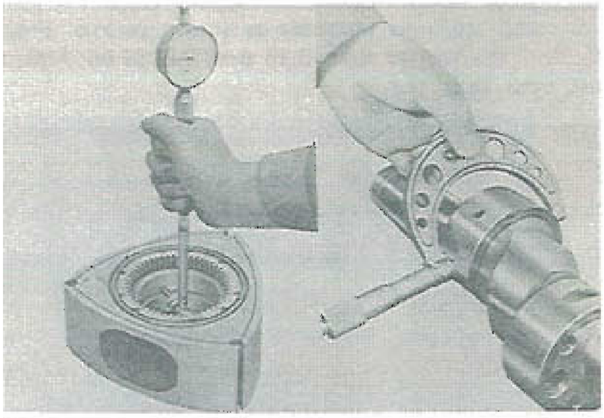


Fig. 1–41 Checking rotor bearing clearance

To replace the rotor bearing, proceed as follows:

1) Place the rotor on the support so that the internal gear is facing downward. Using the **rotor bearing replacer** (49 0813 240) without the adaptor ring, press the bearing out of the rotor, being careful not to damage the internal gear. If the bearing bore in the rotor is damaged, finish the bore with emery paper and blow with compressed air.

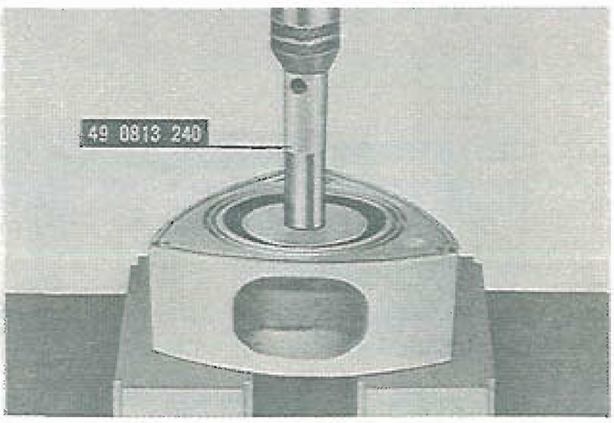


Fig. 1–42 Removing rotor bearing

2) Place the rotor on the support with internal gear faced upward. And place the new rotor bearing on the rotor so that the rotor bore is in line with the bearing lug.

3) Press fit the new bearing using the **rotor bearing replacer** (49 0813 240) with the adaptor removed attaching screws, until the bearing is flush with the rotor boss.

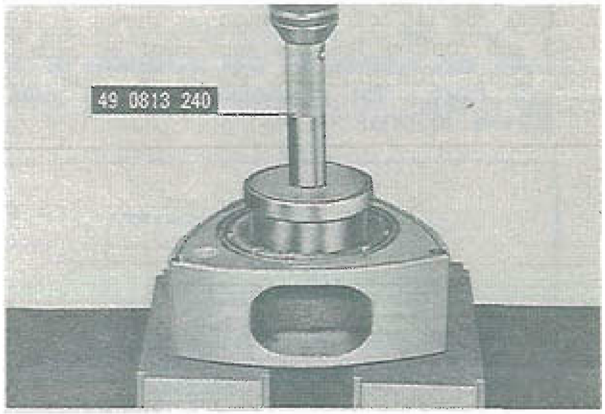


Fig. 1–43 Installing rotor bearing

4) Wash the rotor thoroughly and blow with compressed air.

Note:

The rotors are classified into five grades according to their weight and marked a, b, c, d, and e on the internal gear side.

In order to balance the front rotor and rear rotor, the following combinations are adopted in the factory.

Combination of rotor

a – b	c – b, c, d	e – e
b – a, b, c	d – c, d, e	

If it becomes necessary to replace a rotor, use the rotor marked "C" in all cases.

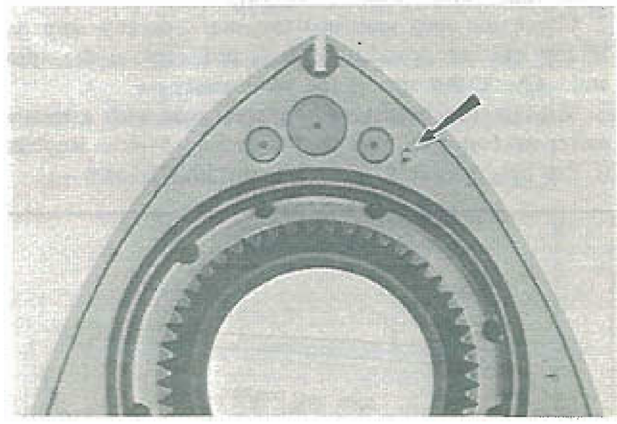


Fig. 1–44 Rotor weight mark

1–B–8. Inspecting Seal Springs

1. Check for weakness, wear or damage of the seal springs, especially the sections of the springs contacting the rotor or seal.
2. Check the free height of the apex seal spring. It should be more than **5.5 mm (0.22 in)**.

Note:

About the springs of oil seal, side seal and corner seal, confirm the protrusion of seals when installing seals to the rotor.

1–B–9. Inspecting Rotor Oil Seal

1. Check the oil seal for wear or any damage. If the lip width of the oil seal is more than **0.8 mm (0.031 in)**, replace the oil seal.
2. Check the oil seal protrusion as shown in Fig. 1–45 and confirm the free movement by pressing with finger. The protrusion should be more than **0.5 mm (0.02 in)**

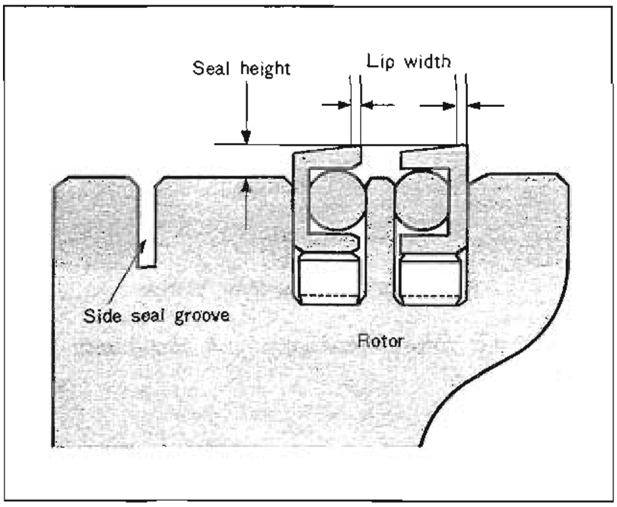


Fig. 1–45 Checking oil seal

Note:
When installing oil seal, refer to Par. 1–C–1.

1–B–10. Inspecting Apex Seal

1. Remove all carbon from the apex seal and spring, being careful not to damage the apex seal. **Never use** emery paper as it will damage the apex seal. Wash them with cleaning solution.
2. Check the apex seal for wear, crack or any damage. If any of these conditions is found, replace the apex seal. Check the spring for weakness.
3. Measure the height of the apex seal with a micrometer at two positions shown in Fig. 1–46. Replace if the height is less than **7.0 mm (0.275 in)**.

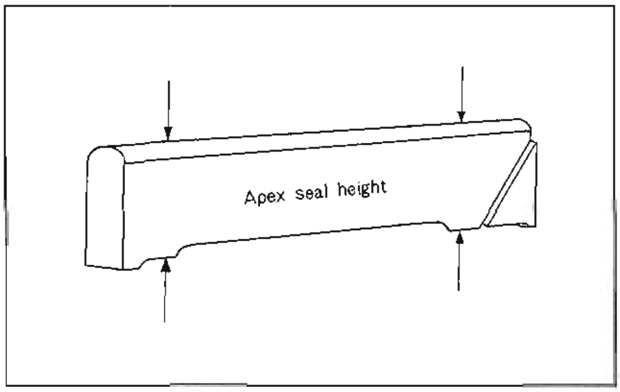


Fig. 1–46 Apex seal height

4. Check the gap between the apex seal and the groove. To check the gap, place the apex seal in its respective groove on the rotor and measure the gap between the apex seal and the groove with a feeler gauge. The feeler gauge should be inserted until the tip of the

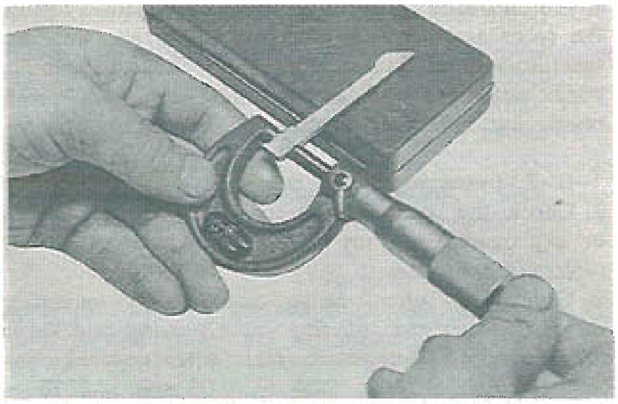


Fig. 1–47 Checking apex seal

gauge reaches the bottom of the groove, for the apex seal tends to wear unevenly as shown in Fig. 1–48. If the gap is more than **0.15 mm (0.0059 in)**, replace the apex seal.

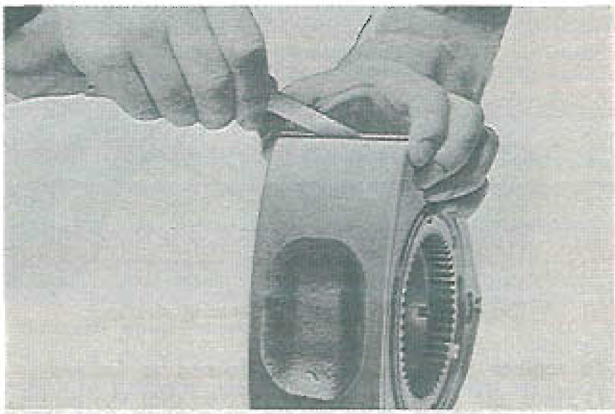


Fig. 1–48 Checking apex seal and groove

5. Check the gap between the apex seal and side housing. To check, measure the length of the apex seal with a micrometer.

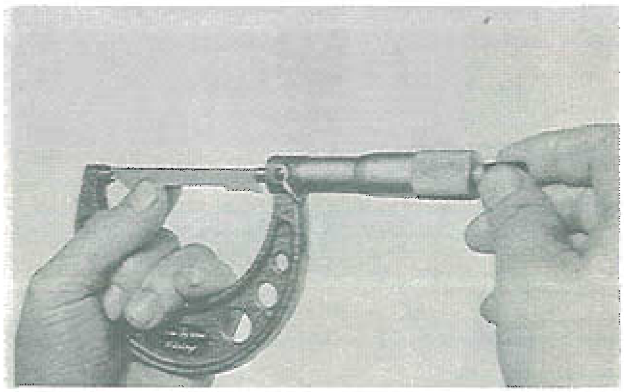


Fig. 1–49 Measuring apex seal length

Compare the measured apex seal length with the minimum value among Ⓑ Ⓒ and Ⓓ points of the rotor housing (see Fig. 1–38). The standard gap is **0.13 ~ 0.17 mm (0.0051 ~ 0.0067 in)**.
If it is more than **0.30 mm (0.0118 in)**, replace the apex seal. If necessary, correct the apex seal length with emery paper.

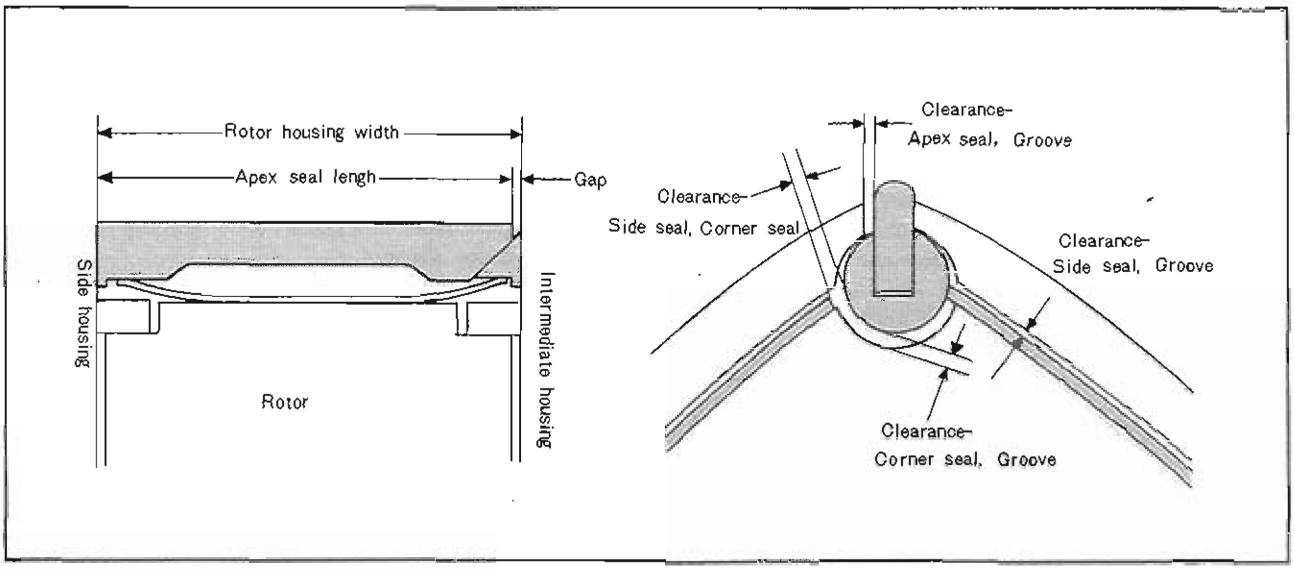


Fig. 1–50 Clearance of seals

1–B–11. Inspecting Side Seal

1. Remove all carbon from the side seal and spring with a carbon remover.
2. Check the side seal for wear, crack or any other damage and replace if any of these conditions is found.
3. Check the side seal protrusion from the rotor surface, and also confirm the free movement by pressing with finger. The protrusion should be more than **0.5 mm (0.02 in)**.
4. Check the gap between the side seal and the groove with a feeler gauge as shown in Fig. 1–51. The standard gap is **0.04 ~ 0.07 mm (0.0016 ~ 0.0028 in)**. If the gap exceeds **0.10 mm (0.0040 in)**, replace the side seal.
5. Check the gap between the side seal and the corner seal with these seals installed on the rotor.

To check, insert a feeler gauge between the end of the side seal (against the rotating direction of rotor) and the corner seal. If the gap exceeds **0.4 mm (0.016 in)**, replace the side seal.

When the side seal is replaced, adjust the gap between the side seal and the corner seal by grinding the one end of the side seal along the round shape of the corner seal with a fine file so that the gap will be **0.05 ~ 0.15 mm (0.002 ~ 0.006 in)**. And then make respective identification notches on the reverse side of the side seal. If this gap is too large, gas-sealing performance will deteriorate.

Fig. 1–51 Checking side seal gap

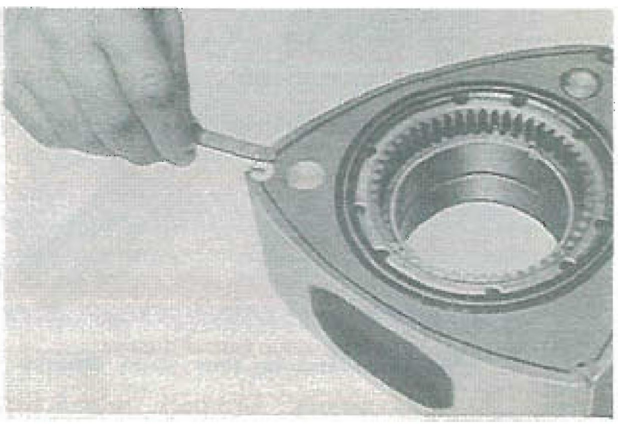


Fig. 1–52 Checking corner seal and side seal gap

1–B–12. Inspecting Corner Seal

1. Remove carbon from the corner seal.
2. Check the corner seal for wear or damage.
3. Check the corner seal protrusion from the rotor surface, and also confirm the free movement by pressing with finger. The protrusion should be more than **0.5 mm (0.02 in)**.
4. Check the gap between the corner seal and the corner seal groove. The standard gap is **0.020 ~ 0.048 mm (0.0008 ~ 0.0019 in)** and the limit is **0.08 mm (0.0031 in)**. This gap enlargement shows uneven wear of the corner seal groove, which occur when the engine is operated with dust entering through a clogged element, damaged air cleaner or any other cause. When the wear is permitted to increase, the engine power will be reduced and the engine will become hard to start. The extent of wear of the corner seal groove is determined by the **bar limit gauge** (49 0839 165) and classified into three conditions.

a. Neither end of the gauge goes into the groove. This means that the gap conforms to the specifications.

b. While the go-end of the gauge goes into the groove,

the not-go-end does not. This means the gap is more than standard dimension and less than the limit. In this case, replace the corner seal with a **0.03 mm (0.0012 in)** oversize one. **Do not** rebore the groove.
c. If the both ends of the gauge go into the bore, it means that the gap exceeds the limit of 0.8 mm (0.0031 in). Rebore the corner seal groove with the **Jig and reamer** (49 2113 030 and 49 0839 170) to 11.2 mm (0.4410 in) diameter and use a **0.2 mm (0.0079 in)** oversize corner seal.

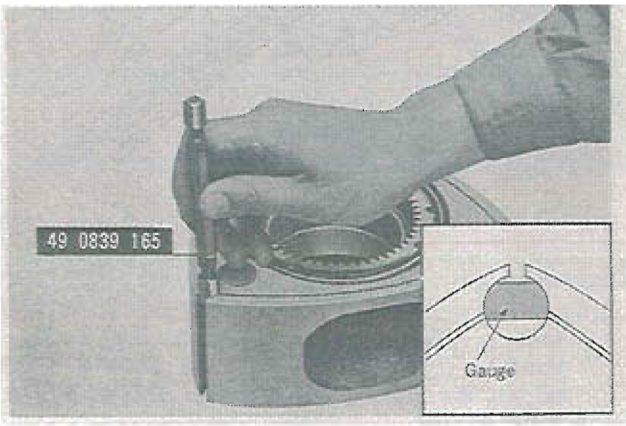


Fig. 1–53 Checking corner seal groove

Note:
a. As the corner seal groove tends to show a heavy wear in the direction of the rotation, the side arcs on the gauge are partially cut off. Be sure to take the measurement in the direction of the maximum wear of the groove.
b. If the gauge is not available, use a feeler gauge.
c. The dimensions of the outer diameter of the gauge are as follows:

Go-end	$11.0^{+0.019}_{+0.021}$ mm ($0.4331^{+0.0007}_{+0.0008}$ in)
Not-go-end	$11.0^{+0.044}_{+0.046}$ mm ($0.4331^{+0.0017}_{+0.0018}$ in)

To rebore the corner seal groove, proceed as follows:
1) Remove carbon, rust and other deposits from the groove, being careful not to damage.
2) Install the **jig** (49 2113 030) onto the rotor and tighten the correct bar being careful not to damage

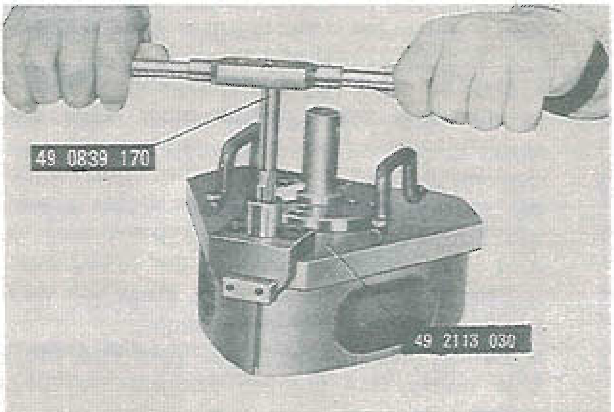


Fig. 1–54 Reaming corner seal groove

the rotor bearing and apex seal groove.
3) Ream the groove with the **Reamer** (49 0839 170) by hand applying sufficient engine oil as a coolant. When feeding the reamer, it must be turned by about 20 rotations or over before the reaming work is accomplished completely.
4) Remove the reamer and jig from the rotor.
5) Repeat the same procedure when reaming the other grooves of the rotor.
6) Thoroughly clean the rotor, and check and confirm by visual inspection the condition of the reaming groove and to see if there is any damage to the rotor.
7) Fit a **0.2 mm (0.0079 in)** oversize corner seal into the groove, and check the gap between the corner seal and the groove. The standard gap is 0.020 ~ 0.048 mm (0.0008 ~ 0.0019 in).

Note:
a. When installing or removing the jig, be careful not to hit the rotor.
b. If the reaming is carried out without applying oil, it will be difficult to obtain the proper surface roughness no matter how many times the reaming may be repeated.
c. Avoid two stage reaming, that is, drawing the reamer halfway during the reaming work and then resuming the reaming, because chips may affect the surface roughness.
d. Before starting the reaming work, it must be confirmed that the reamer diameter is up to specifications, because the reamer could be worn in excess of the limit if it was used many times.

1–B–13. Inspecting Eccentric Shaft

1. Wash the shaft in a cleaning solution and blow the oil passage with compressed air.
2. Check the shaft for cracks, scratches, wear or any other damage. Be sure that the oil passages are open.
3. Measure the diameter of the shaft journals with a micrometer. Replace the shaft if the wear is excessive. The standard diameter is **43 mm (1.6929 in)** on the main journal and **74 mm (2.9134 in)** on the rotor journal.

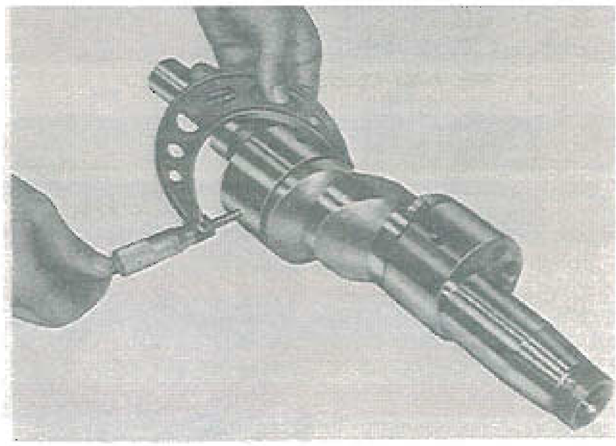


Fig. 1–55 Measuring rotor journal diameter

4. Check the shaft run-out. To check, mount the shaft on "V"-blocks and apply a dial indicator. Slowly

rotate the shaft and note the reading on the indicator. If the run-out is more than **0.06 mm (0.0024 in)**, replace the shaft with a new one.

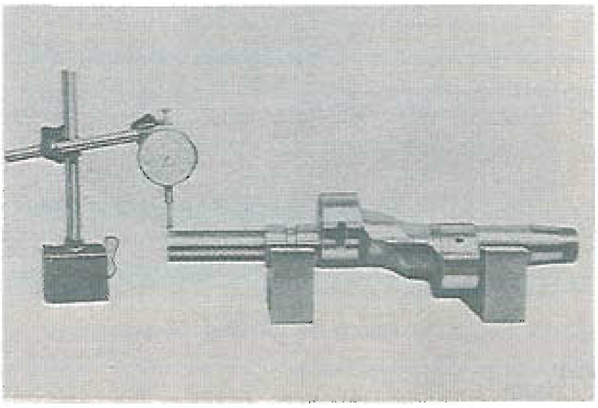


Fig. 1–56 Checking run-out

5. Check the blind plug in the shaft end for oil leakage or looseness. If any oil leakage is found, remove the blind plug with a hexagonal Allen key and replace the "O" ring.

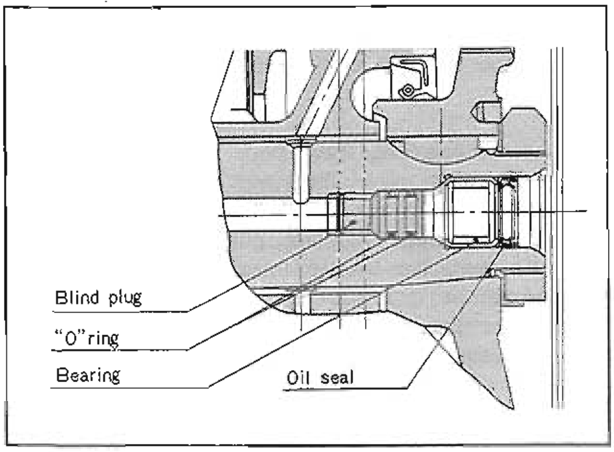


Fig. 1–57 Blind plug

6. Check the needle roller bearing in the shaft end for wear or any damage. Then insert the main drive shaft into the needle roller bearing and check the needle bearing for smooth operation and proper clearance. (Only the car with manual transmission)

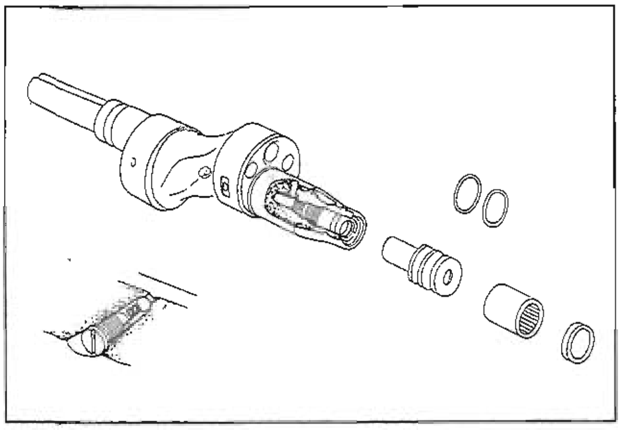


Fig. 1–58 Roller bearing and oil jet

To replace the bearing, use the **bearing replacer** (49 0823 070A).

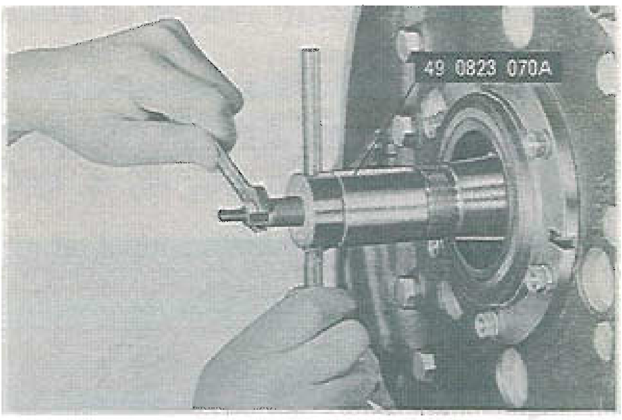


Fig. 1–59 Removing roller bearing

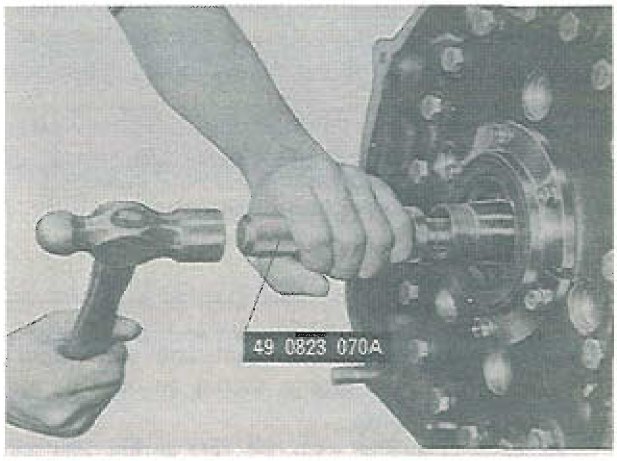


Fig. 1–60 Installing roller bearing

7. The oil jets are installed in the eccentric shaft. The oil jets open when the number of engine revolutions increases and the oil pressure rises. Check for spring weakness, stick or damage of the steel ball. (Fig. 1–58)

1–B–14. Inspecting Needle Bearing

Check the needle bearing for wear or damage.
Inspect the bearing housing and thrust plate for wear or any damage.

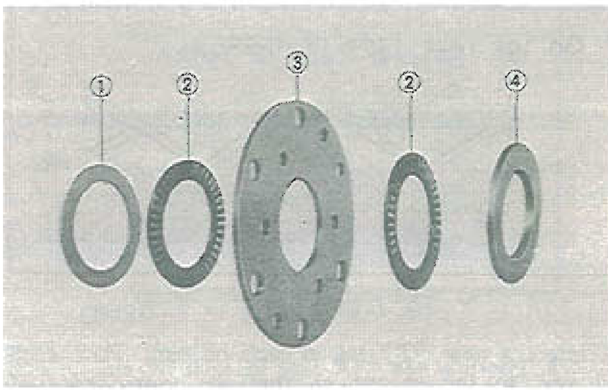


Fig. 1–61 Needle bearings

1. Thrust washer
2. Needle bearing
3. Bearing housing
4. Thrust plate

1–C. ENGINE ASSEMBLY

The procedures for assembling the engine when the engine is to be completely overhauled are as follows:

1–C–1. Installing Oil Seal

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

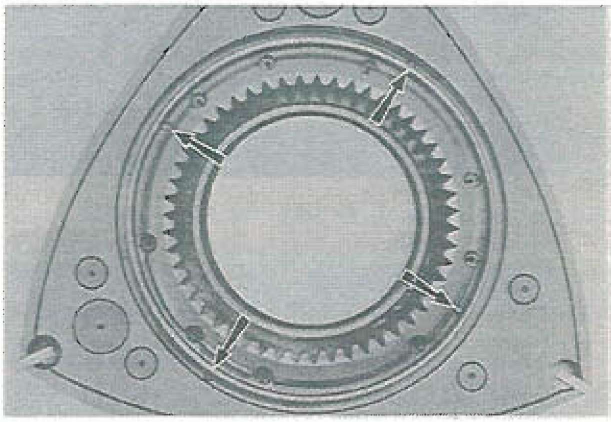


Fig. 1–62 Stopper hole of oil seal spring

Caution:

a. The oil seal springs have been painted in cream or blue color. The **cream-colored** springs must be fitted on the front faces of both front and rear rotors. While the **blue-colored** springs should be on the rear faces of the rotors.

b. When installing each oil seal spring, the painted side of spring must be faced to the oil seal (upward), that is the square edge of spring faces to the oil seal (upward).

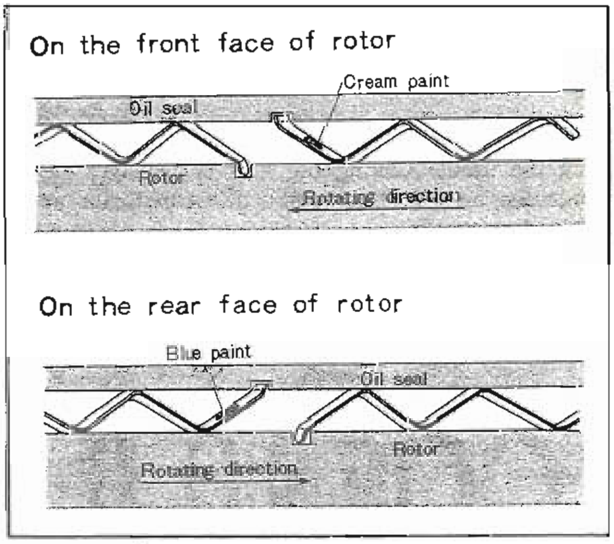


Fig. 1–63 Installing oil seal springs

3. Insert a new "O" ring in each oil seal. Place each oil seal to the groove so that the square edge of spring fit in the stopper hole of the oil seal and push the head of the oil seal slowly with fingers. Be careful not to deform the oil seal.

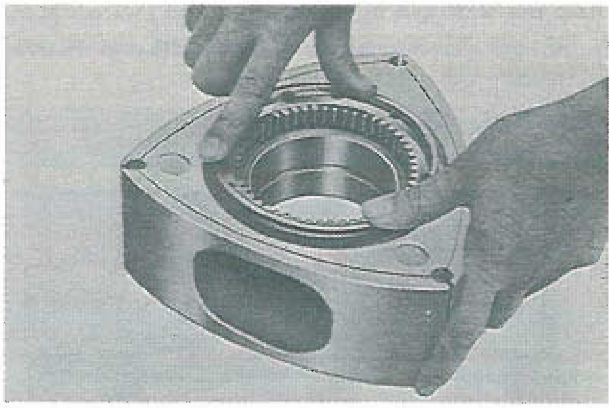


Fig. 1–64 Installing oil seal

Note:

When replacing the oil seal, confirm the smooth movement of oil seal by placing the oil seal on the oil seal spring in the groove before inserting the "O" ring.

4. Apply sufficient engine lubricant onto each oil seal and groove, and confirm the smooth movement of each oil seal by pressing the head of oil seal.
5. Check the oil seal protrusion. (Ref. Par. 1–B–9)
6. Install the oil seal on the other side.

1–C–2. Installing Each Seal

1. Place the rotor which has been fitted with the oil seals on the rubber pad or cloth.
2. Fit the apex seals without springs and side pieces into their respective grooves so that each side piece positions on the rear side of each rotor.
3. Place the corner seal springs and corner seals into their respective grooves.
4. Fit the side seal springs and side seals into their respective grooves.

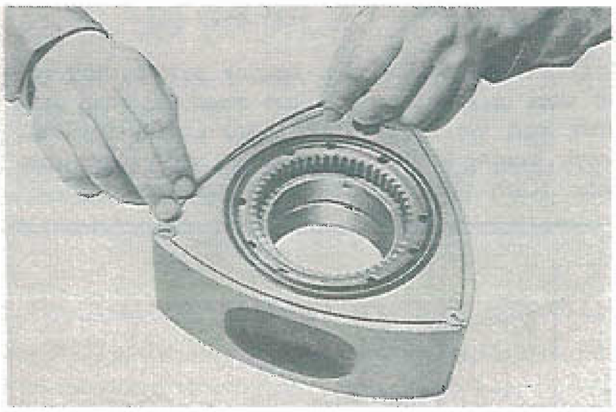


Fig. 1–65 Installing side seal

5. Apply engine lubricant onto each spring, and confirm the smooth movement of each spring by pressing its head.
6. Check each seal protrusion. (Ref. Par. 1–B–11, 12)
7. Invert the rotor, being careful not to drop the seals on the rubber pad or cloth, and install the oil seals on the other side in the same manner as above.

1—C—3. Installing Front Rotor

1. Mount the front housing on the **work stand** (49 0839 000) with the **hanger** (49 1114 005).
2. Turn the front housing on the work stand so that the top of the housing is up.
3. Apply engine lubricant onto the internal gear of the rotor.
4. Hold the apex seals by using the used "O" ring to keep the apex seals in position and place the rotor assembly on the front housing taking care not to drop the seals. Then turn the front housing with the rotor so that the sliding surface of the front housing faces upward.

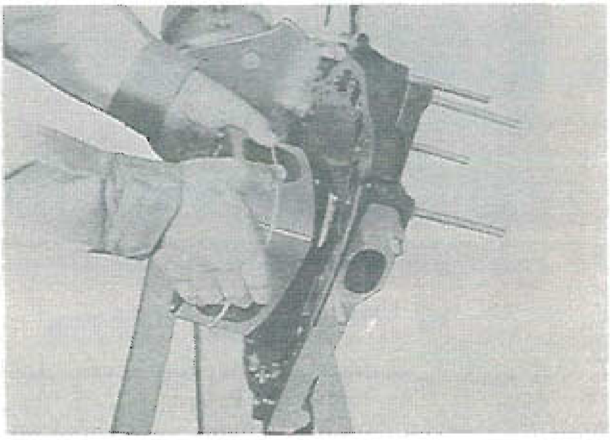


Fig. 1—66 Install front rotor assembly

5. Mesh the internal gear and stationary gear so that one of the rotor apexes is set to any one of the four places shown in Fig. 1—67, and remove the used "O" ring.

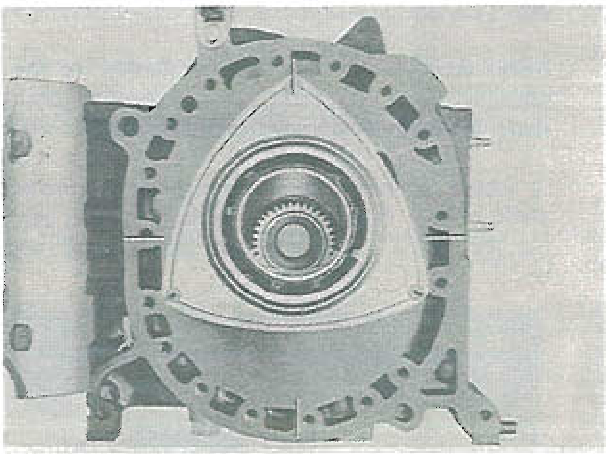


Fig. 1—67 Positioning front rotor

Note:
In this case, be careful not to drop the corner seal into the ports.

1—C—4. Installing Eccentric Shaft

1. Lubricate the front rotor journal and main journal on the shaft with engine lubricant.
2. Insert the eccentric shaft being careful not to damage the rotor bearing and main bearing.

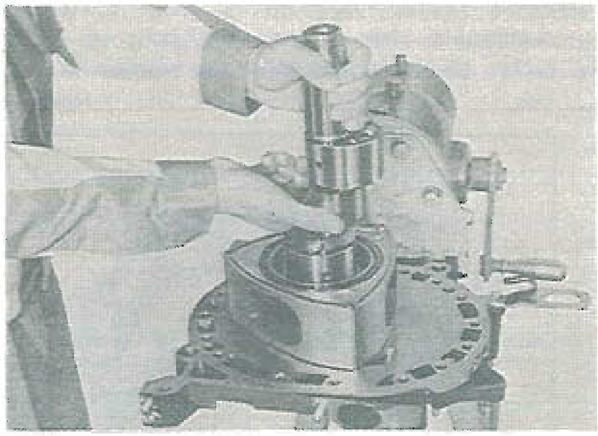


Fig. 1—68 Installing eccentric shaft

1—C—5. Installing Front Rotor Housing

1. Apply sealing agent onto the front side of the rotor housing, as shown in Fig. 1—69.

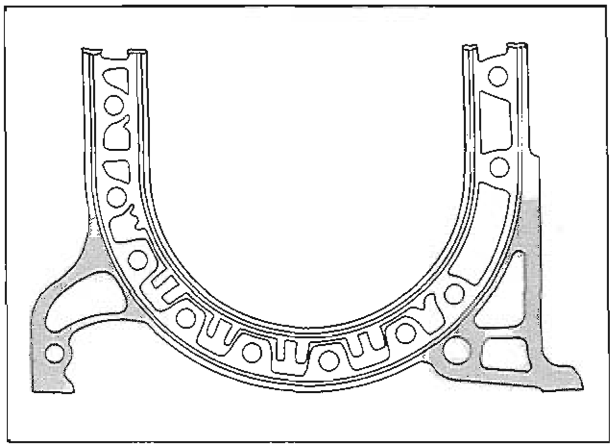


Fig. 1—69 Applying sealing agent

2. Slightly apply vaseline or petrolatum onto new "O" rings and sealing rubbers to prevent them from coming off, and place the "O" rings and sealing rubbers on the front side of the rotor housing.

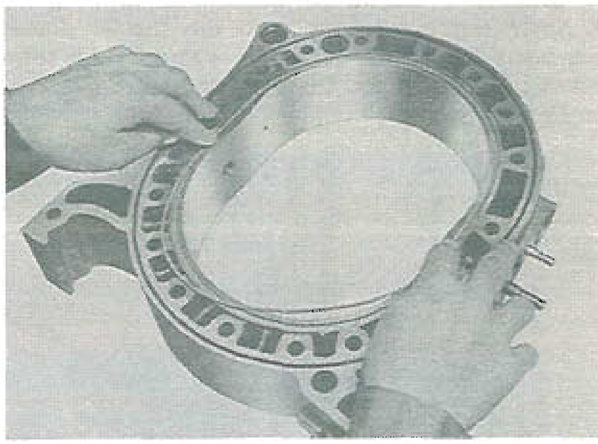


Fig. 1—70 Installing sealing rubber

Note:
The inner sealing rubber is square type. The wider white line of the sealing rubber should face with

combustion chamber and the seam of the sealing rubber should be placed at the position as shown in Fig. 1−71. Do not stretch the inner sealing rubber.

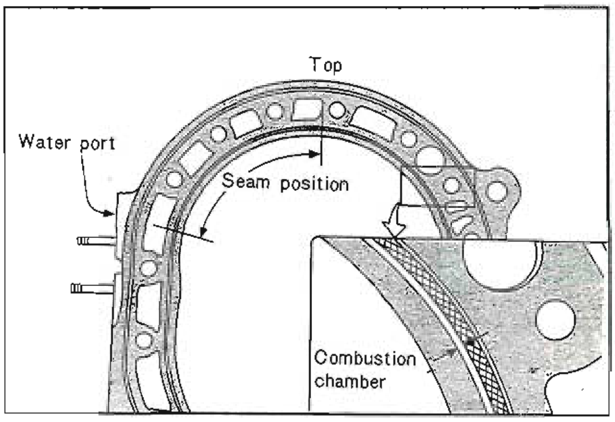


Fig. 1−71 Positioning inner sealing rubber

When engine overhauling, install the protector to only inner sealing rubber as shown in Fig. 1−72 to improve the durability of the sealing rubber.

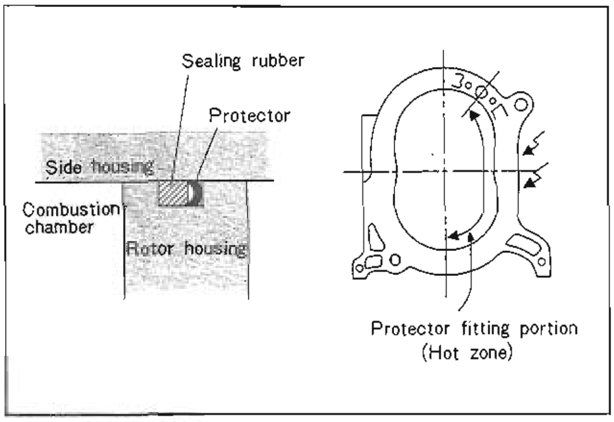


Fig. 1−72 Installing sealing rubber protector

3. Invert the front rotor housing being careful not to let the sealing rubbers and "O" rings drop out of the grooves, and mount it on the front housing.
4. Apply engine lubricant onto the tubular dowels and insert the tubular dowels through the front rotor housing holes into the front housing holes as shown in Fig. 1−73.

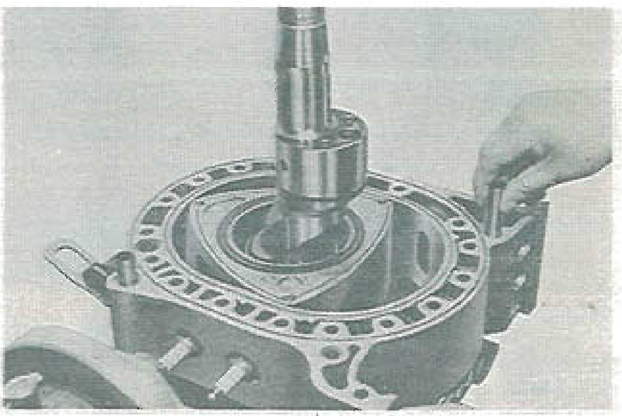


Fig. 1−73 Installing tubular dowel

5. Apply the sealing agent on the front side of the rotor housing reffering to the other side.
6. Place new "O" rings and sealing rubbers on the front rotor housing,in the same manner as on the other side.
7. Insert the each apex seal spring confirming the spring direction.
8. Fit the each side piece to its original position. And confirm that the spring should be set correctly on the side piece.

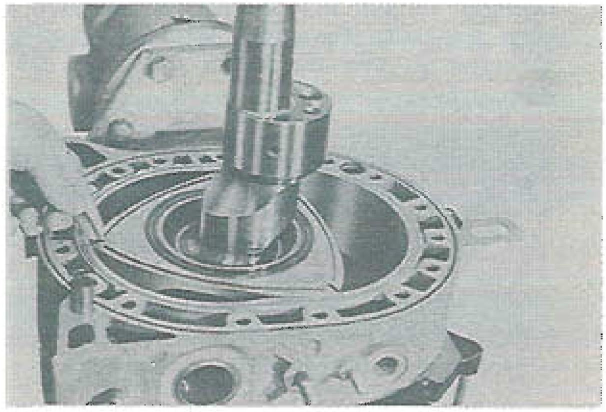


Fig. 1−74 Fitting side piece and spring

9. Apply engine lubricant on the side pieces. And make sure that the front rotor housing is free from any foreign matter and apply some engine lubricant onto the sliding surface of the front housing.

1−C−6. Installing Intermediate Housing

1. Turn the front housing with rotor assembly so that the top of the housing is up, and pull the eccentric shaft about 25 mm (1 in), but do not pull over 35 mm (1.5 in).

Note: As the easy way of installation of the intermediate housing, position the eccentric portion of shaft in diagonally upper right direction.

2. Install the intermediate housing through the eccentric shaft on the front rotor housing, and turn the engine on the work stand so that the rear of engine is up.

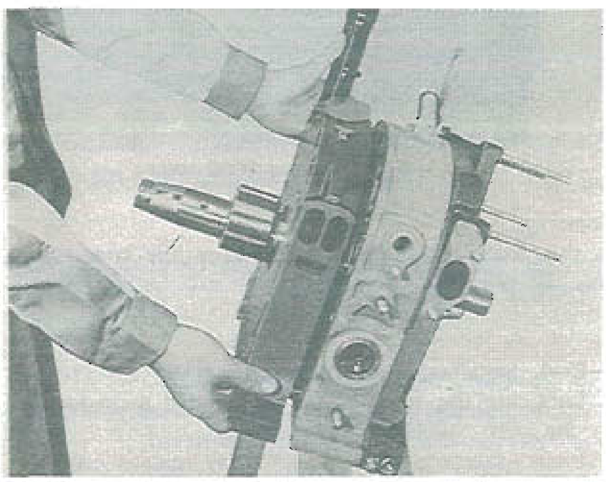


Fig. 1−75 Installing intermediate housing

1–C–7. Installing Rear Rotor and Rear Rotor Housing

Refer to steps 1–C–1 to 1–C–5 and install the rear rotor and rear rotor housing.

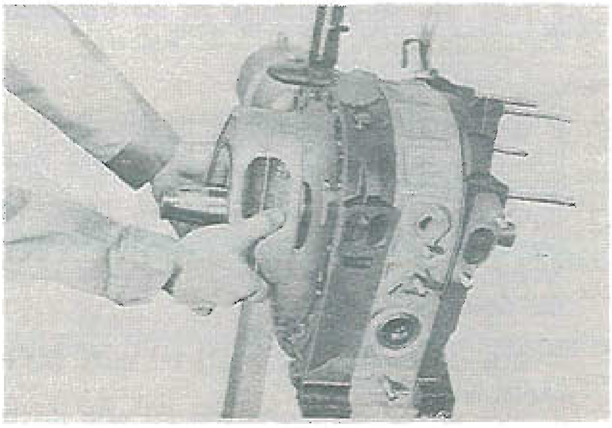


Fig. 1–76 Installing rear rotor assembly

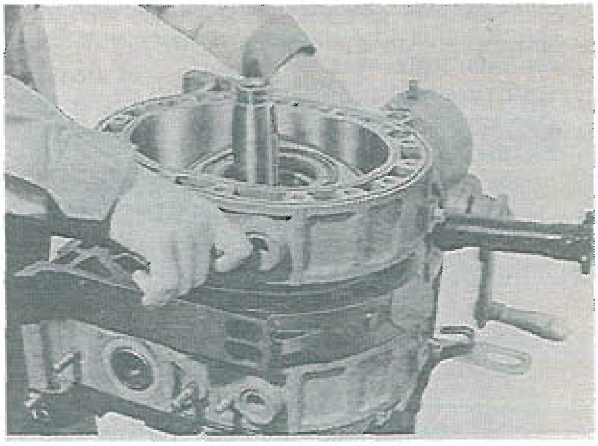


Fig. 1–77 Installing rear rotor housing

1–C–8. Installing Rear Housing

1. Turn the engine on the work stand so that the rear of engine is up.
2. Apply sufficient engine lubricant onto the stationary gear and main bearing.
3. Install the rear housing on the rear rotor housing. If necessary, turn the rear rotor slightly to engage the rear housing stationary gear with the rear rotor internal gear.

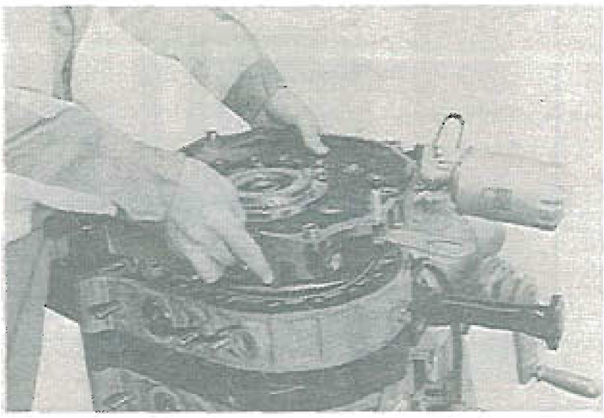


Fig. 1–78 Installing rear housing

1–C–9. Tightening Tension Bolts

1. Place a new sealing washer in each tension bolt.
2. Apply engine oil onto the thread of the bolt.
3. Fit the tension bolts and tighten the bolts gradually in the order shown in Fig. 1–79. The specified torque is **3.2 ~ 3.8 m-kg (23 ~ 27 ft-lb)**. Do not tighten the tension bolts at one time.

Note:

Replace the sealing washer in the tension bolt when the engine is overhauled.

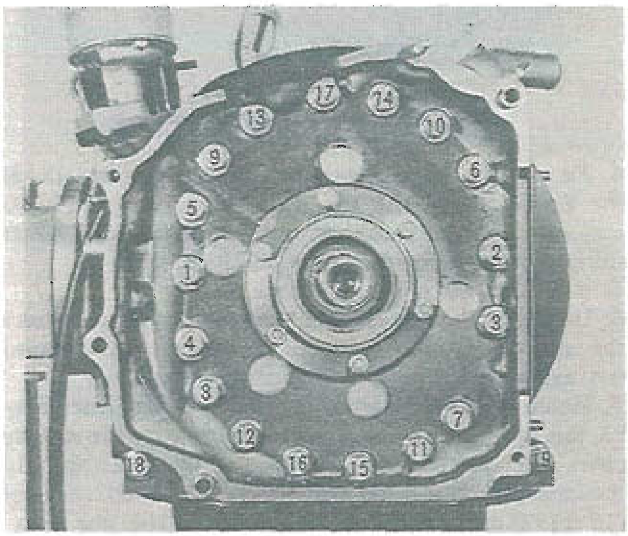


Fig. 1–79 Tension bolt tightening order

4. After tightening, turn the eccentric shaft and make sure that the rotation is light and smooth.

1–C–10. Installing Flywheel or Counter Weight

a. Manual transmission

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

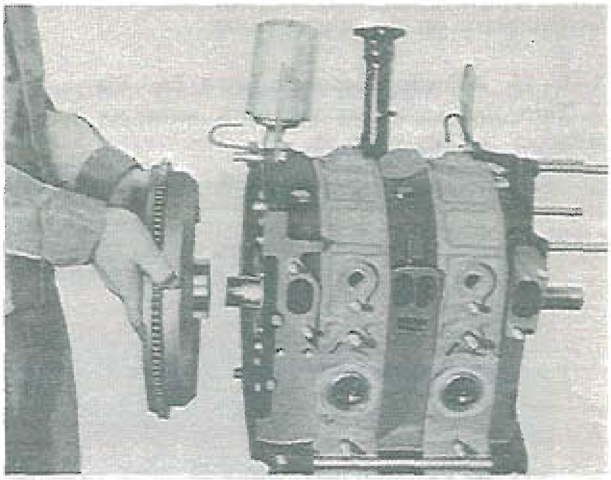


Fig. 1–80 Installing flywheel

3. Apply sealing agent to both sides of the flywheel lock washer and place the lock washer in position.

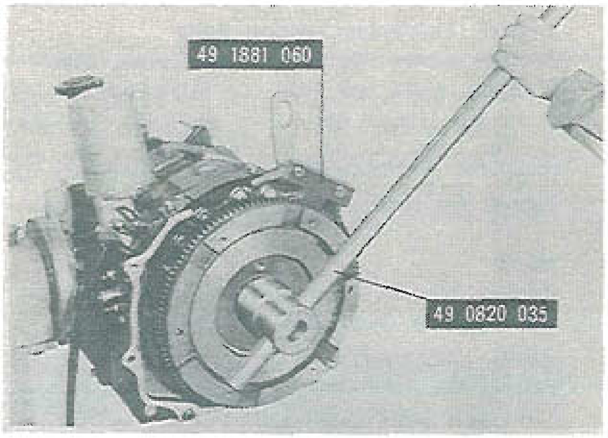


Fig. 1–81 Tightening flywheel nut

4. Fit the flywheel lock nut by the fingers. Hold the flywheel with the **ring gear brake** (49 1881 060) and tighten the lock nut to **45.0 m-kg (350 ft-lb)** using the **special wrench** (49 0820 035).
5. Bent the tab of the lock washer.
6. Hold the clutch disc in its mounting position with the **clutch disc arbor** (49 0813 310). If the arbor is not available, use a spare main drive shaft.
7. Mount the clutch cover and pressure plate assembly on the flywheel, and align the "O" mark on the clutch cover with the reamed hole of the flywheel. Install the attaching bolts and tighten the bolts to 2.0 m-kg (15 ft-lb), using the ring gear brake. Use the two reamer bolts in the reamed holes.

b. Automatic transmission
1. Referring to the above manners (1–C–10. a), fit the key, counter weight, lock washer and nut on the eccentric shaft.
2. Hold the counter weight with the **counter weight brake** (49 1881 055) and tighten the lock nut to **45.0 m-kg (350 ft-lb)** using the **special wrench** (49 0820 035).
3. Fit the drive plate on the counter weight and tighten attaching nuts. After installing the flywheel or counter weight, leave the ring gear brake or counter weight brake on the engine alone.

1–C–11. Adjusting Eccentric Shaft End Play
1. Turn the engine on the work stand so that the front of the engine is up.

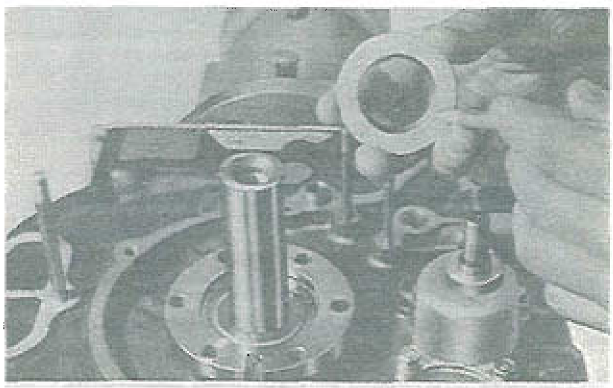


Fig. 1–82 Fitting thrust plate

2. Fit the thrust plate with the tapered face down, and slide the spacer and needle bearing onto the eccentric shaft. Then apply sufficient engine lubricant onto them.
3. Place the bearing housing on the front housing. Tighten the attaching bolts with washers.

Note :
If the bearing housing has been installed to the front housing, special care should be taken when installing the spacer.
Install the spacer so that the center of the needle bearing in the bearing housing comes to the center of eccentric shaft, and the spacer should be seated to the thrust plate.

4. Slide the needle bearing onto the shaft, and apply engine lubricant onto it.
5. Slide the balance weight together with the thrust washer onto the shaft.
6. Engage the oil pump drive chain with the driven sprocket and drive sprocket, and then slide the sprockets with chain onto the eccentric shaft and oil pump shaft simultaneously aligning the keyway of the driven gear sprocket with the key on the oil pump shaft. Fit the key onto the eccentric shaft.

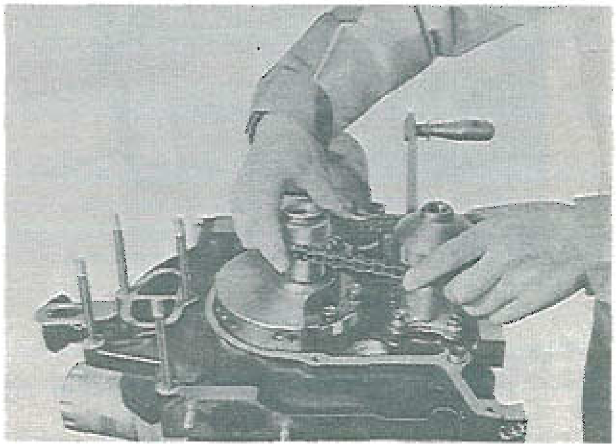


Fig. 1–83 Installing chain and sprockets

7. Slide the distributor drive gear onto the eccentric shaft with "F" mark on the gear faced the front of

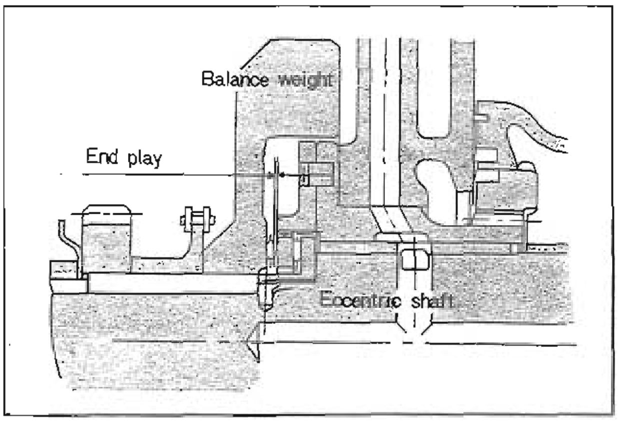


Fig. 1–84 Eccentric shaft end play

engine, and then slide the spacer and oil thrower onto the eccentric shaft.

8. Install the eccentric shaft pulley onto the shaft aligning the keyway of the pulley with the key.

9. Tighten the pulley bolt to **8.5 m-kg (60 ft-lb).**

10. Turn the engine on the work stand so that the top of the engine is up.

11. Apply a dial indicator onto the flywheel as shown in Fig. 1-85. Move the flywheel fore and aft, and note the reading of the indicator. The standard end play is **0.04 ~ 0.07 mm (0.0016 ~ 0.0028 in).**

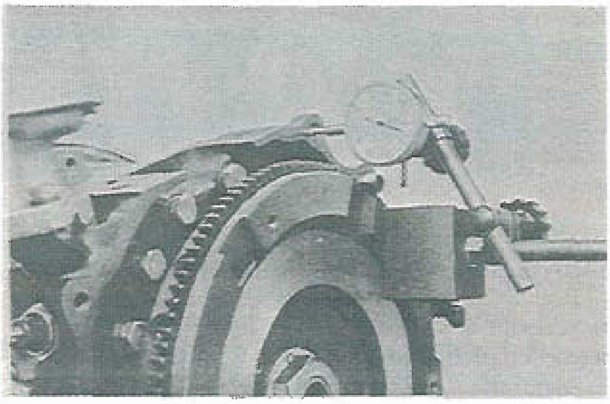


Fig. 1–85 Checking end play

If the end play is more than **0.09 mm (0.0035 in),** adjust it by grinding the spacer on a surface plate using an emery paper or replace the spacer. And then recheck the end play in the same manner as above.

Fig. 1–86 Adjusting spacer

Note :

(1) If the end play is below the specified amount, the spacer thickness is too small. If the end play is above the specified amount, the spacer thickness is too big.

(2) The spacers are available in the following thicknesses :

Identification Mark	Thickness
X	8.08 ± 0.01 mm (0.3181 ± 0.0004 in)
Y	8.04 ± 0.01 mm (0.3165 ± 0.0004 in)
V	8.02 ± 0.01 mm (0.3158 ± 0.0004 in)
Z	8.00 ± 0.01 mm (0.3150 ± 0.0004 in)

If the end play is 0.04 ~ 0.07 mm (0.0016 ~ 0.0028 in), remove the eccentric shaft pulley, and proceed as follows to install the front cover.

1–C–12. Installing Front Cover and Eccentric Shaft Pulley

1. Turn the engine on the work stand so that the front of the engine is up.

2. Tighten the oil pump driven sprocket nut and bend the tab of the lock washer.

3. Place the chain adjuster in position and tighten the attaching nuts.

4. Place a new "O" ring on the oil passage of the front cover.

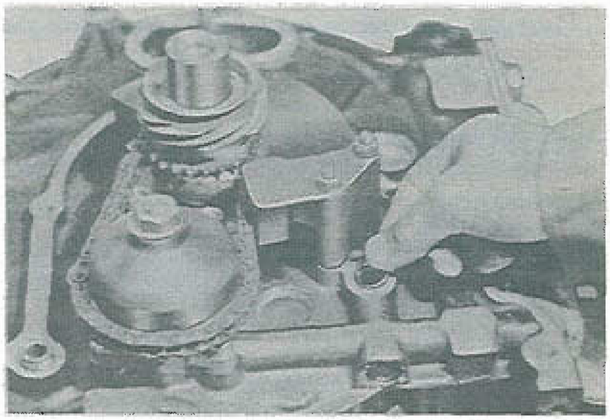


Fig. 1–87 Placing "O" ring

5. Place the gasket and front cover on the front housing, and tighten the attaching bolts.

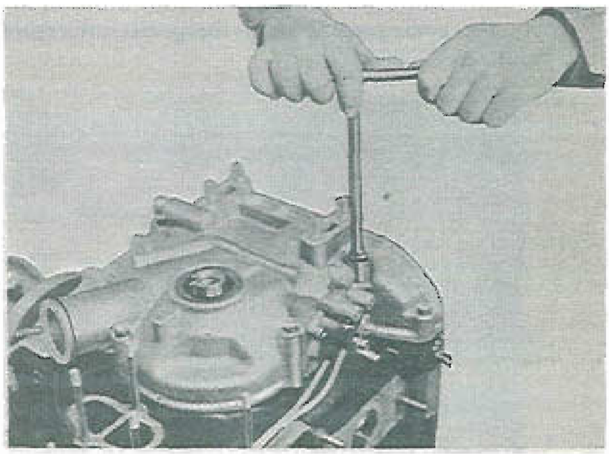


Fig. 1–88 Installing front cover

6. Apply engine lubricant onto the oil seal in the front cover.

7. Install the eccentric shaft pulley onto the shaft and tighten the pulley bolt to 8.5 m-kg (60 ft-lb).

1–C–13. Installing Oil Strainer and Oil Pan

1. Turn the engine on the work stand so that the bottom of the engine is up.

2. Cut off the excess gasket on the front cover along the mounting surface of the oil pan.

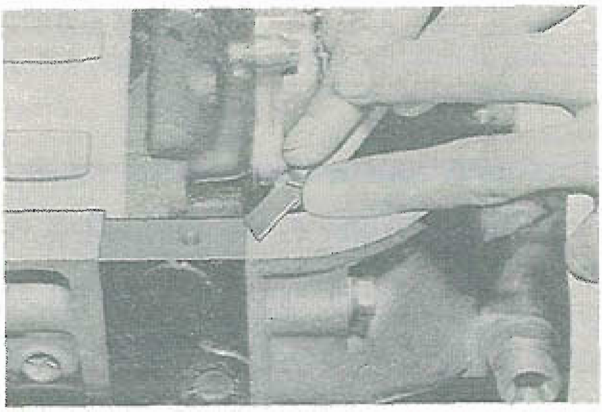


Fig. 1–89 Cutting off excess gasket

3. Place the oil strainer gasket and strianer on the front housing and tighten the attaching bolts.

Fig. 1–90 Installing oil strainer

4. Apply the sealing agent onto the joint surfaces of each housing.

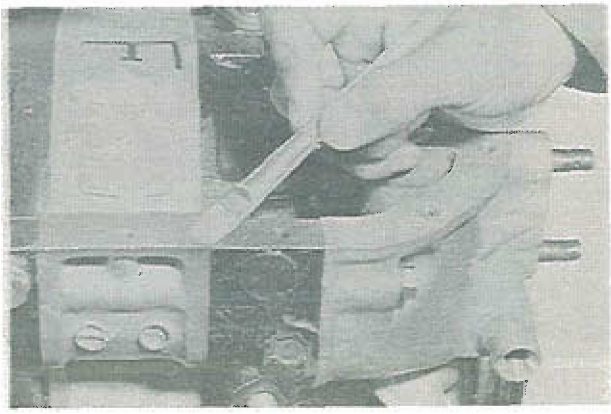


Fig. 1–91 Applying sealing agent

5. Place the gasket and oil pan in position.
6. Insert the bolts through the stiffeners, and tighten the bolts little by little in turn until the torque becomes 0.55 m-kg (3.5 ft-lb) evenly.

1–C–14. Installing Water Pump

1. Turn the engine on the work stand so that the top of the engine is up.
2. Place the gasket and water pump on the front housing, and tighten the attaching nuts.

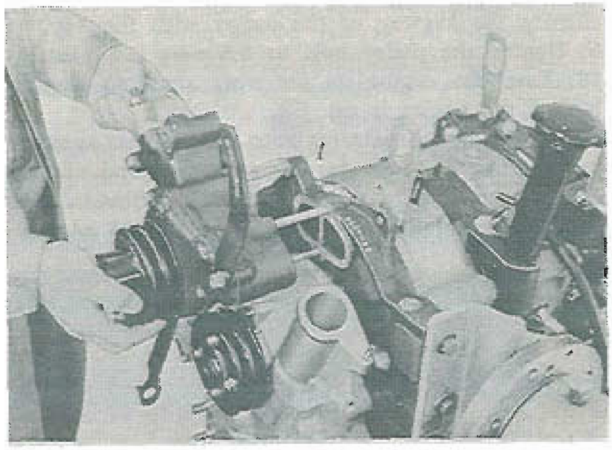


Fig. 1–92 Installing water pump

1–C–15. Installing Distributor

1. Rotate the eccentric shaft until the yellow mark or leading side mark on the pulley aligns with the needle on the front cover.
2. Align the tally mark on the distributor housing and driven gear as shown in Fig. 1–93.

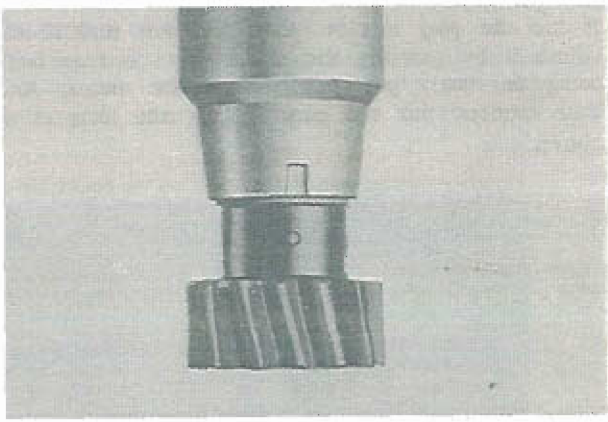


Fig. 1–93 Aligning tally mark

3. Insert the distributor so that the distributor lock bolt is located in the center of the slit, and engage the gears.

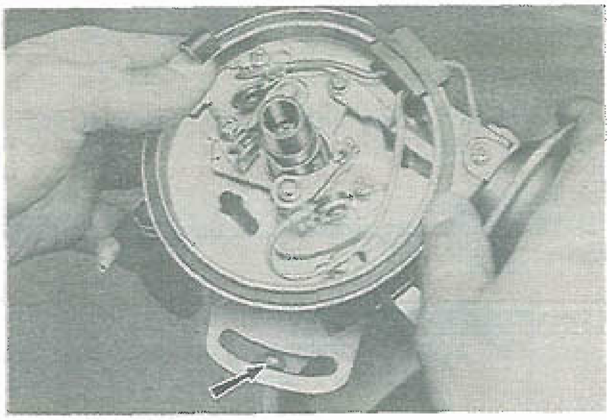


Fig. 1–94 Installing distributor

4. Rotate the distributor clockwise until the leading contact point starts to separate, and tighten the distributor lock nut.
5. Fit the distributor cap.

1–C–16. Installing Exhaust Manifold
1. Remove the engine from the work stand.
2. Place the gaskets and the thermal reactor (or exhaust manifold) in position, and tighten the attaching nuts.
3. Place the hot air duct in position and tighten the attaching nuts.

1–C–17. Installing Intake Manifold
1. Place the carburetor and intake manifold assembly, with the gaskets in position and tighten the attaching nuts.

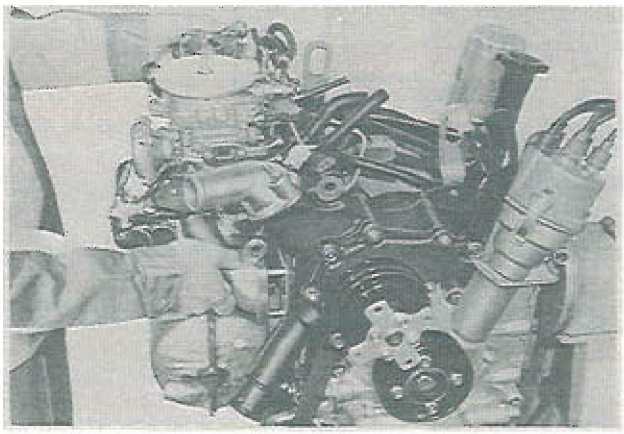


Fig. 1–95 Installing intake manifold assembly

2. Connect the oil tubes, vacuum tube and metering oil pump connecting rod with the carburetor.
3. Install the deceleration valve if equipped and connect the vacuum hoses, air hoses and wires.

1–C–18. Installing Alternator and Air Pump
1. Place the alternator to the bracket with the bolt, and check the clearance Ⓐ as shown in Fig. 1–96.

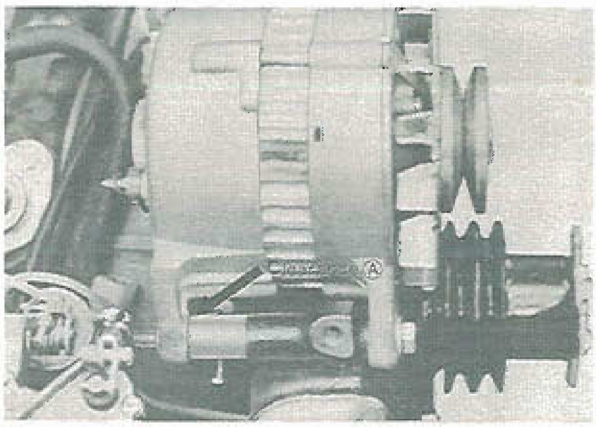


Fig. 1–96 Adjusting alternator fitting

If the clearance is more than 0.15 mm (0.0059 in), adjust it by using the following adjust shim.

0.15 mm	(0.0059 in)
0.3 mm	(0.0118 in)
0.5 mm	(0.0197 in)

2. Attach the upper end of the alternator flange to the adjusting bar, and fit the "V" belt.
3. Adjust the belt deflection.
The belt deflaction should be **15 mm (0.59 in)** when thumb pressure of about 10 kg (22 lb) is applied to the middle of the belt between the alternator pulley and eccentric shaft pulley.mOn a new belt, the deflaction should be **13 mm (0.51 in)**. After adjusting, tighten the bolts and nuts.

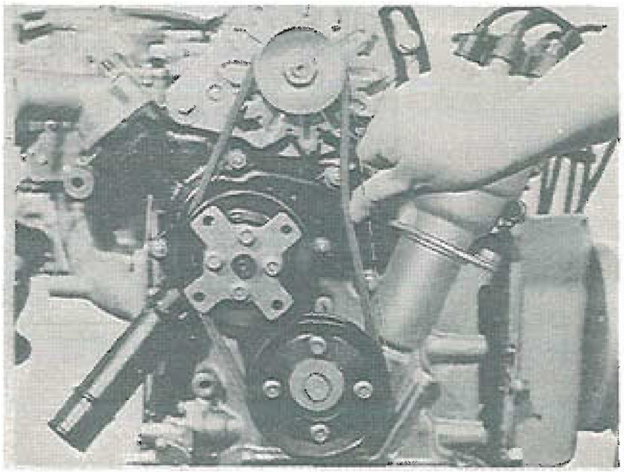


Fig. 1–97 Adjusting alternator belt

4. Install the air pump with the attaching bar and bolts, if equipped. Fit the "V" belt.
5. To adjust the "V" belt tension, push the "V" belt with about 10 kg (22 lb) as shown in Fig. 1–98. The belt deflection should be **10 mm (0.39 in)**. On the new belt, it should be **8 mm (0.31 in)**. After adjusting, tighten the bolts and nuts.

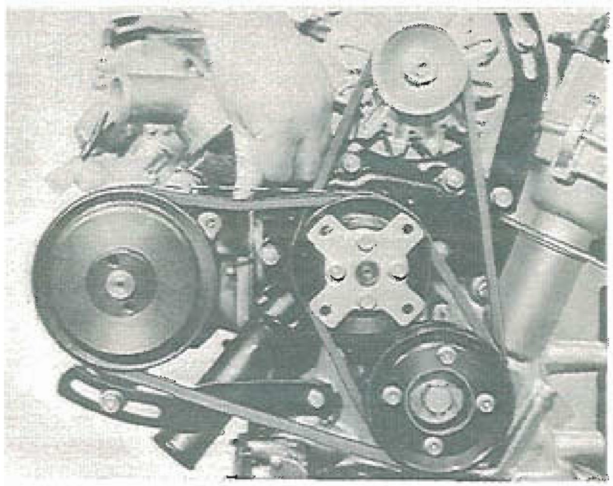


Fig. 1–98 Adjusting air pump belt

6. Before removing the engine from the work stand, install the engine hanger bracket to the front cover.

SPECIAL TOOLS

49 0839 000	Engine work stand
49 1114 005	Engine hanger
49 0820 035	Special wrench
49 0823 300	Flywheel puller
49 0839 305	Counter weight puller
49 0813 250	Seal case
49 0813 215	Tubular dowel puller
49 0813 235	Main bearing replacer
49 0813 240	Rotor bearing replacer
49 0813 225	Oil seal remover
49 0839 165	Bar limit gauge (for corner seal groove)
49 2113 030	Reboring jig (for corner seal groove)
49 0839 170	Reamer (for corner seal groove)
49 1881 060	Ring gear brake
49 1881 055	Counter weight brake
49 0877 435	Special wrench (for automatic transmission)
49 0813 310	Clutch disk arbor
49 0823 070A	Eccentric shaft bearing replacer
49 1881 135	Special wrench (for P.C.V. valve)
49 1881 125	Special wrench (for thermal reactor)

1974 EMISSION CONTROL SYSTEM

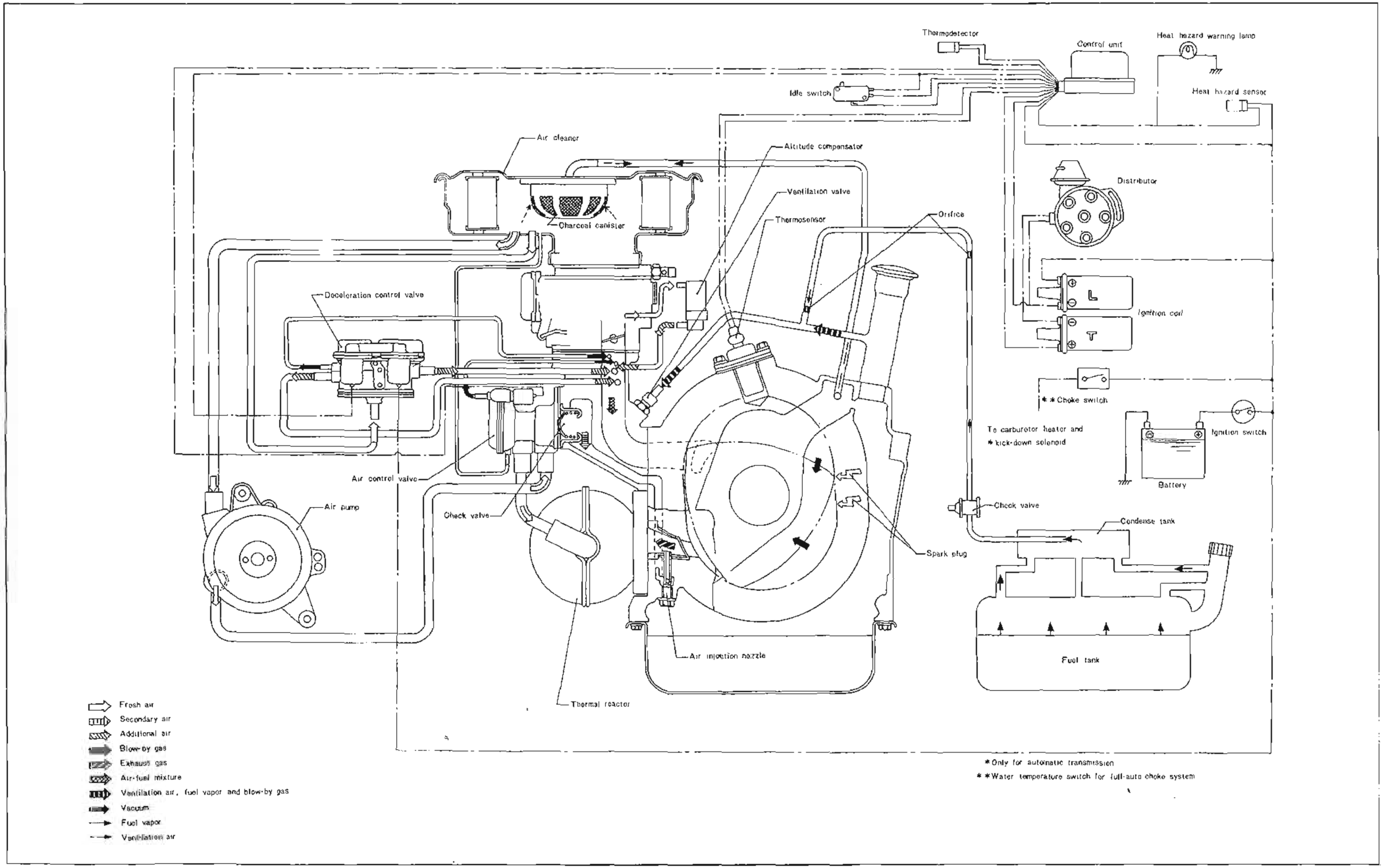


Fig. 1A–1 Emission control system (For U.S.A. and Canada spec. models)

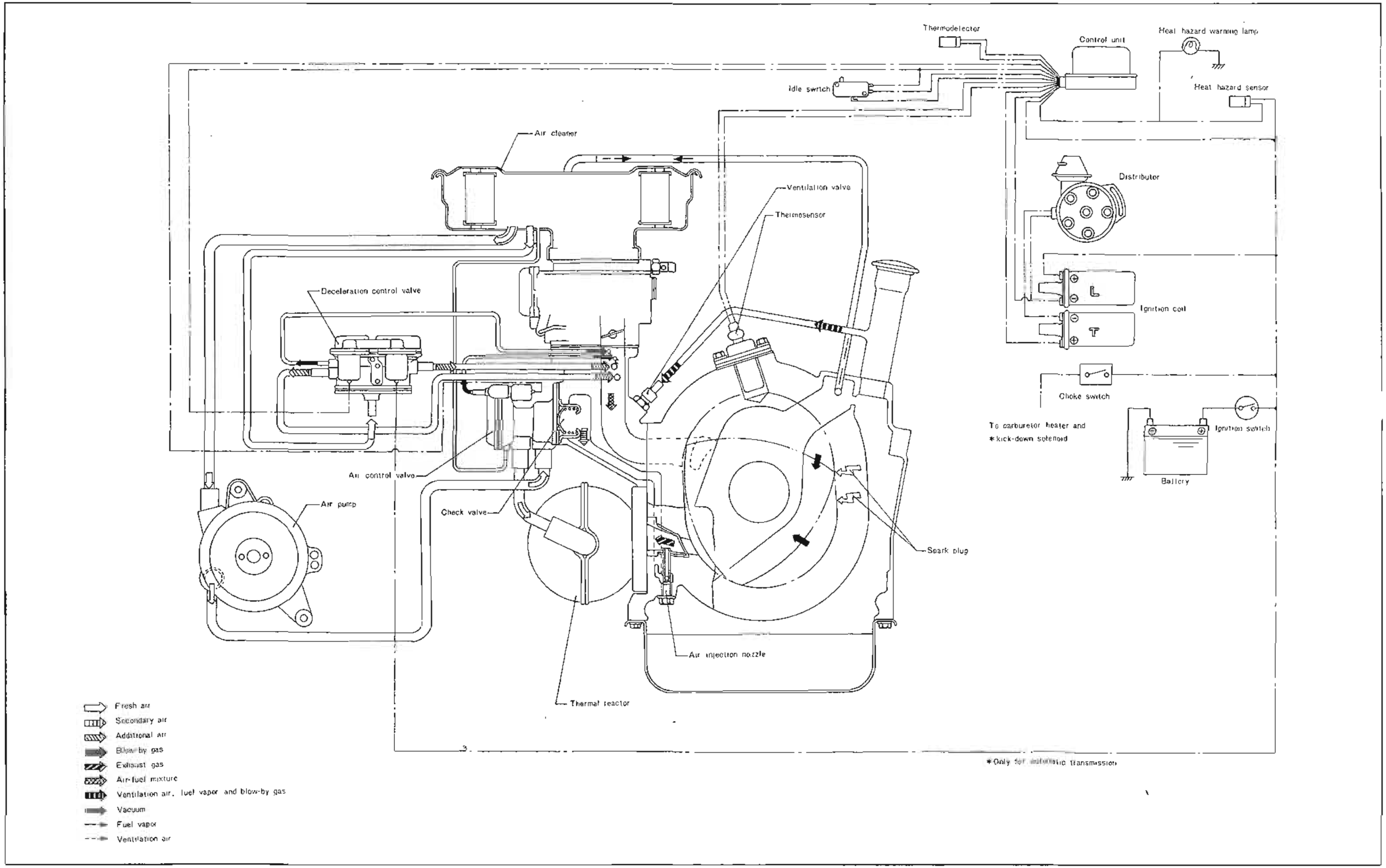


Fig. 1A–2 Emission control system (For Australia and ECE spec models)

DESCRIPTION

The emission control system consists of an exhaust emission control system, a crankcase emission control system (ventilation system), an evaporative emission control system and a protective system.

Note: The vehicles for U.S.A. and Canada are equipped with an evaporative emission control system and an altitude compensator in the additional air control system.

1A–A. EXHAUST EMISSION CONTROL SYSTEM

The exhaust emission control system, consisting of an air injection and thermal reactor system, an ignition and air flow control system, an additional air control system and a kick-down control system (automatic transmission), reduces air polluting hydrocarbon and carbon monoxide contained in the exhaust gas of the operating engine.

1A–A–1. Air Injection and Thermal Reactor System

The air injection and thermal reactor system, consisting of a thermal reactor, an air pump, a check valve, air injection nozzles and an air control valve, injects into the exhaust port secondary air necessary for oxidation of hydrocarbon and carbon monoxide contained in the exhaust gas.

The air sucked from the air cleaner by the air pump is sent into the air control valve. The air (secondary air) form the air control valve ordinarily flows into the exhaust ports through the check valve and the air injection nozzles. However, under the conditions mentioned below, the flow of the secondary air into the exhaust ports is stopped by the ignition and air flow control system as well as protective system (operation of air cut valve), and the air (cooling air) flows into the thermal reactor cooling air jacket to properly maintain the temperature of the reactor.

1. When the engine speed is over 4,000 rpm (in case of automatic transmission, 4,800 rpm when engine is cold and 3,400 rpm when engine is hot)–operation of ignition and air flow control system–
2. When the engine speed is over 1,200 rpm during deceleration (1,400 rpm in case of automatic transmission)–operation of ignition and air flow control system–
3. When running under full load (throttle valve is nearly wide open)
4. When the floor temperature is over approximately

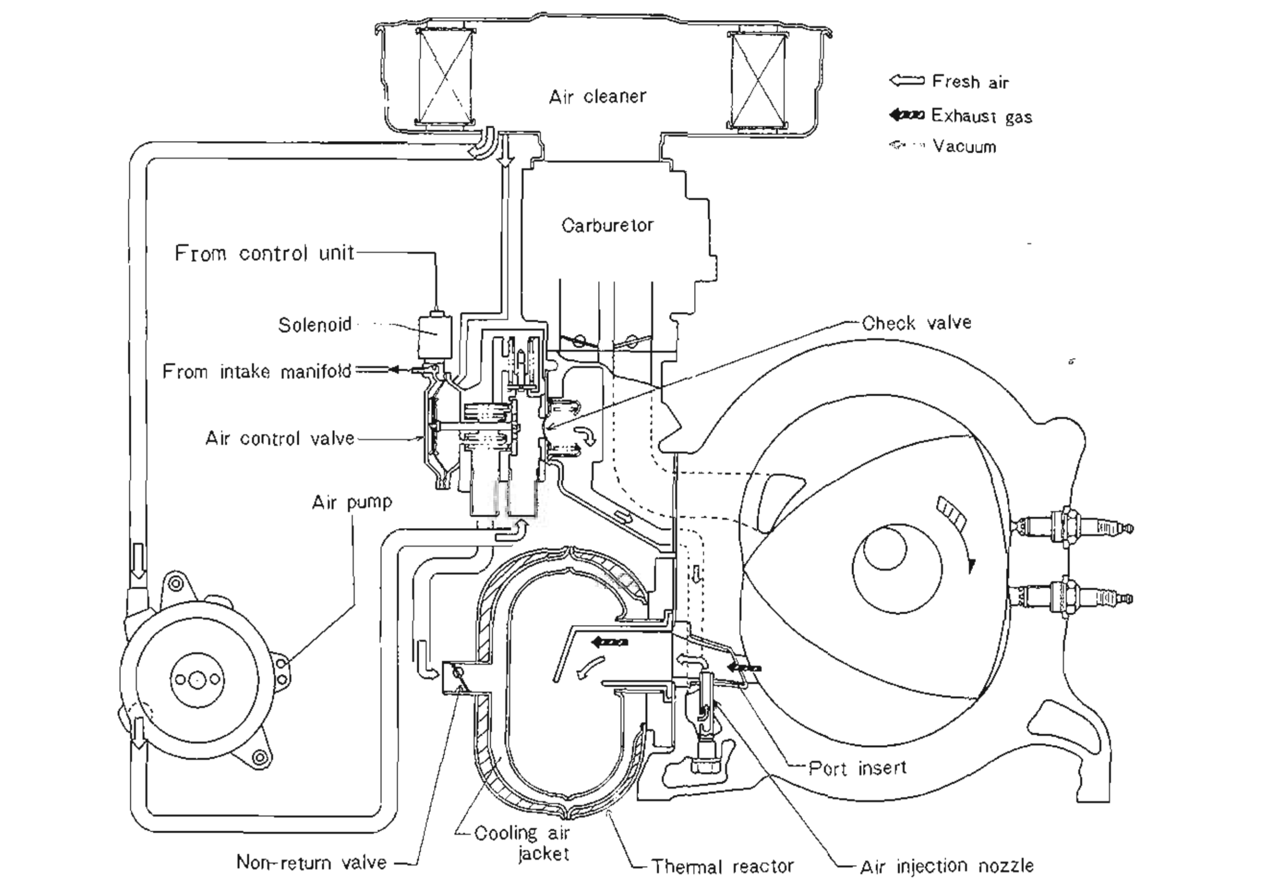


Abb. 1A–3 Air injection and thermal reactor system

120°C (248°F)—operation of protective system—
The timing of supplying the secondary air into the exhaust ports and the cooling air into the thermal reactor cooling air jacket is controlled in accordance with the operating conditions of the vehicle (See Par. 1A—A—2).

a. Air pump
The air pump is a vane type driven by the V-belt mounted on the eccentric shaft pulley. The air pump sucks fresh filtered air from the air cleaner, compresses the air and injects it through the air control valve, check valve and air injection nozzles into the exhaust ports adjacent to the thermal reactor.

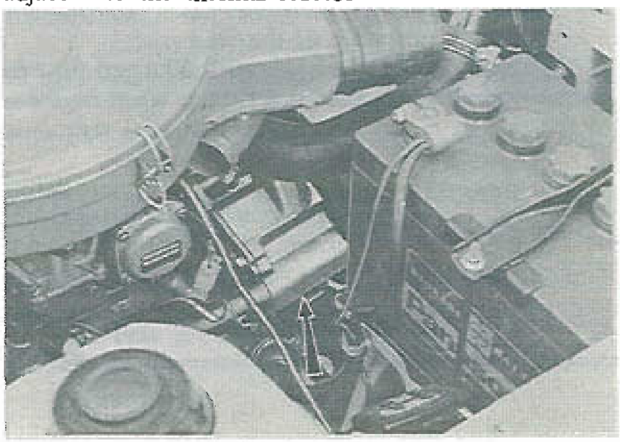


Fig. 1A—4 Air pump

b. Check valve
The check valve opens and closes according to the pressure difference between secondary air and exhaust gas to prevent exhaust gas from backflowing into the air injection system and scorching the air pump, hoses, etc. When the pressure of secondary air in the air injection system exceeds the exhaust gas pressure, the secondary air opens the check valve and flows through the air injection nozzles into the exhaust ports.
When the secondary air pressure drops lower than the exhaust gas pressure due to failure of the air pump belt, breaking of the secondary air hose, etc., the check valve closes to prevent the backflow of the exhaust gas into the air injection system.

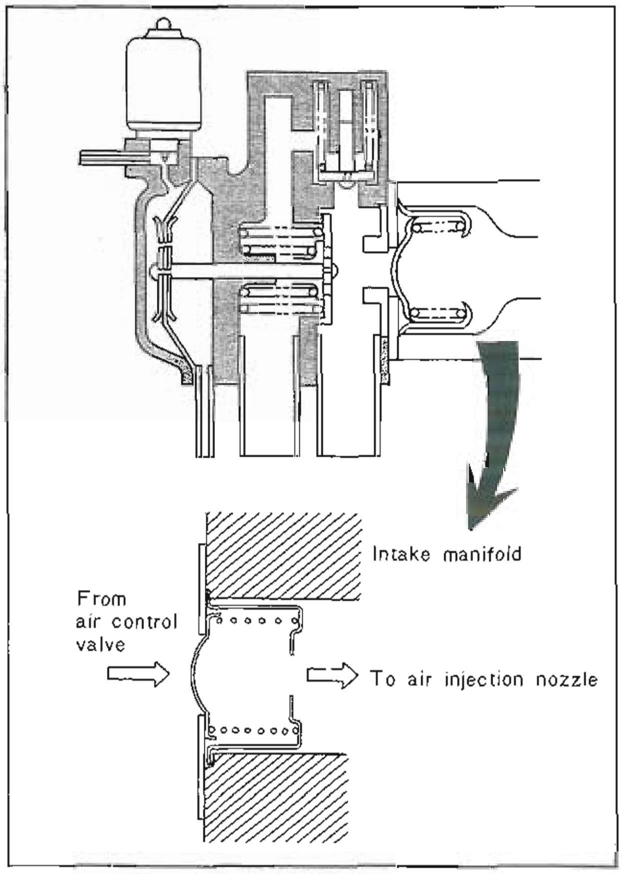


Fig. 1A—5 Check valve

c. Air injection nozzles
The air injection nozzles are attached to each of the front and rear rotor housings. The secondary air channeled via the air pump and the check valve is injected through the nozzles into the exhaust ports adjacent to the thermal reactor.

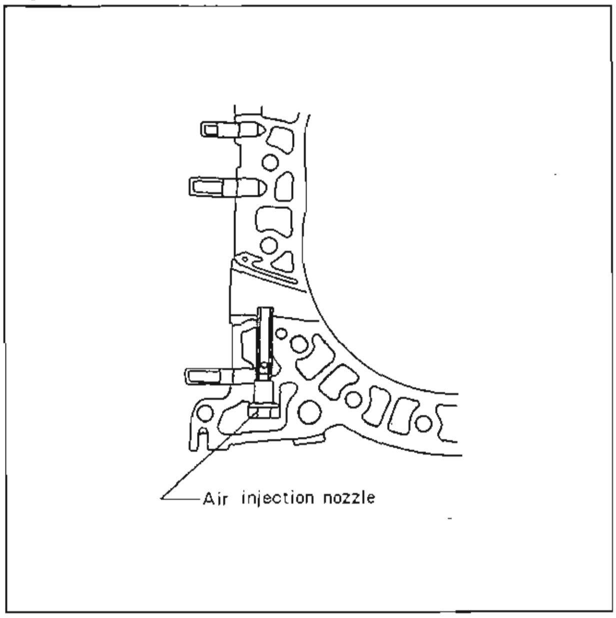


Fig. 1A—6 Air injection nozzle

d. Air control valve
The air control valve, consisting of an air cut valve, a No. 1 relief valve and a No. 2 relief valve, has the following functions.

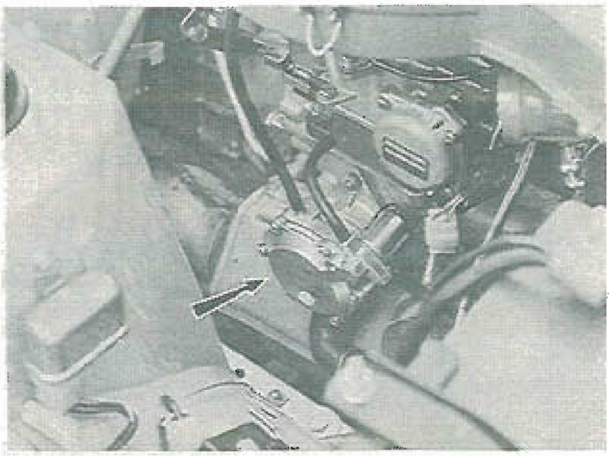


Fig. 1A—7 Air control valve

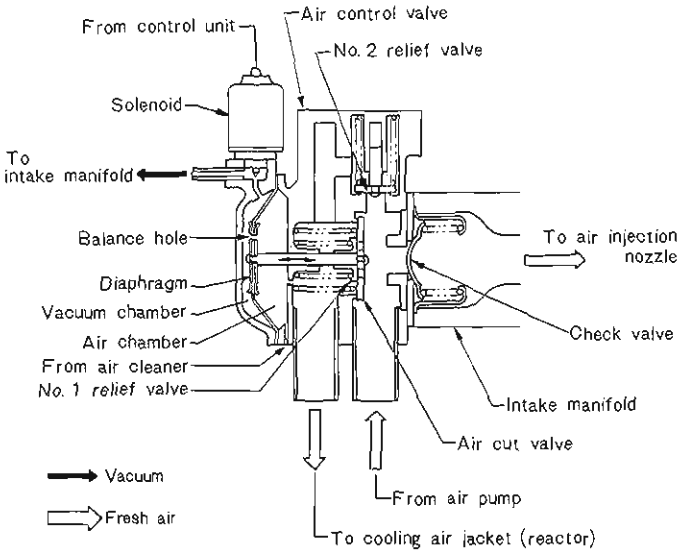


Fig. 1A–8 *Air control valve cross section*

1. When the air cut valve is not operating, it becomes the passage of the secnodary air from the air pump into the exhaust ports through the check valve and air injection nozzles. —operation of air control valve—
2. When the engine speed is over 4,000 rpm (in case of automatic transmission, 3,400 rpm when the engine is hot and 4,800 rpm when it is cold), the supply of the secondary air into the exhaust ports stops and the secondary air (cooling air) flows into the thermal reactor cooling air jacket to cool the reactor to properly maintain the temperature of the reactor. —operation of air cut valve—
3. When the engine speed is over 1,200 rpm during deceleration (1,400 rpm in case of automatic transmission), supply of the secondary air into the exhaust ports stops and the secondary air (cooling air) flows to the thermal reactor cooling air jacket. The secondary air cutting in this instance prevents excessive supply of the secondary air into the exhaust ports and deteriorated reaction efficiency of the exhaust gas in the reactor. —operation of air cut valve—
4. When the air pressure in the air injection system exceeds, the supply of the secondary air into the exhaust ports is adjusted properly and the excessive secondary air (cooling air) is relieved to the thermal reactor cooling air jacket to cool the reactor. —operation of No. 1 relief valve and No. 2 relief valve—

The air cut valve opens and closes according to the difference of pressure between the vacuum chamber and the air chamber. This valve, which is connected to the diaphragm, is closed during normal operation by the intake manifold vacuum.

When the engine speed exceeds 4,000 rpm (in case of automatic transmission 3,400 rpm at warm condition, 4,800 rpm at cold condition), the control unit actuates the solenoid to close the vacuum sensing way. This equalizes the pressures in the two chambers, the spring force causes the valve to open and the air in the air injection system is channeled to the thermal reactor cooling air jacket before being expelled to the atmosphere. At the same time, the air cut valve closes the secondary air passage to cut secondary air supply into the exhaust ports.

During deceleration with the accelerator pedal released completely when the engine speed is over 1,200 rpm (1,400 rpm in case of automatic transmission), the solenoid of the air control valve closes the vacuum sensing way between the intake manifold and the air control valve by means of the low speed switch in the control unit and the idle switch. Consequently, the spring force causes the valve to open and the air in the air injection system is channeled to the thermal reactor cooling air jacket before being expelled to the atmosphere. At the same time, the air cut valve closes the secondary air passage to cut secondary air supply into the exhaust ports.

When the engine is running with full load, the difference of pressure between the vacuum chamber and the air chamber of the air control valve diminishes because the intake manifold vacuum which is led to the vacuum chamber decreases. Consequently, the spring force causes the valve to open and the air in the air injection system is channeled to the thermal reactor cooling air jacket before being expelled to the atmosphere. At the same time, the air cut valve closes the secondary air passage to cut secondary air supply into the exhaust ports.

The No. 1 relief valve is opened and closed in accordance with air pressure in the air injection system and the force of the return spring. When the air pressure in the air injection system increases, the No. 1 relief valve is opened and the air is led to the thermal reactor cooling air jacket to cool it before being expelled to the atmosphere, thus the secondary air flow rate being controlled. When the air pressure decreases, the spring closes the valve.

The No. 2 relief valve is opened and closed in accordance with air pressure in the air injection system and the force of the return spring. When the air pressure in the air injection system exceeds the specified value, the No. 2 relief valve is opened and the air is led to the thermal reactor cooling air jacket to cool it before being expelled to the atmosphere, thus the secondary air flow rate being controlled. When the air pressure decreases, the spring closes the valve.

e. Thermal reactor

The thermal reactor is mounted just outside the exhaust ports. It oxidizes the unburned exhaust gas expelled from the engine, to reduce the noxious components such as hydrocarbon and carbon monoxide. When the engine speed is high or during deceleration or full load running, the air control valve feeds fresh air from the air pump to the thermal reactor cooling air jacket to properly maintain the temperature of the reactor. The non-return valve which prevents backflow of exhaust gas from the reactor is attached at the air inlet of the reactor.

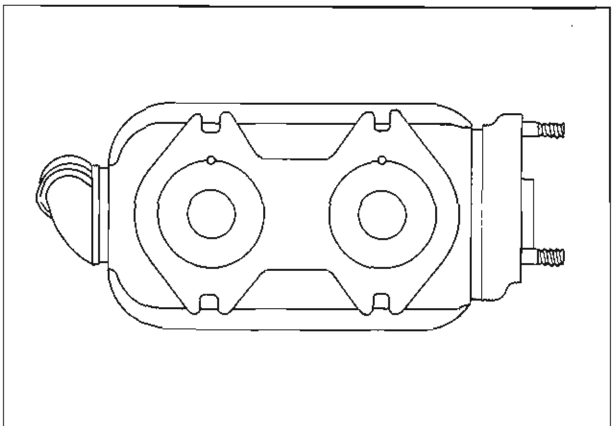


Fig. 1A–9 Thermal reactor

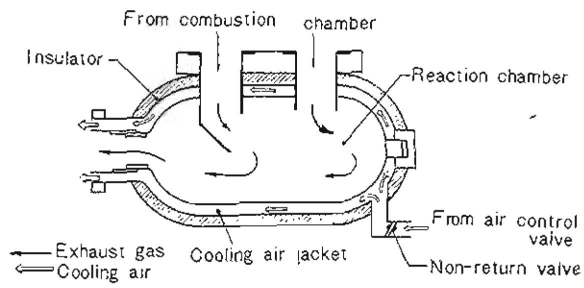


Fig. 1A–10 Cooling air circuit

1A–A–2. Ignition and Air Flow Control System

The ignition and air flow control system consists of a thermosensor, a thermodetector, an idle switch, and a control unit including high speed switch, low speed switch, thermoswitch and trailing ignition switch. This system ignites and cuts the trailing spark plug to suit engine temperature and engine speed in order to enhance the reactivity of the thermal reactor when the engine is cold. This system has an additional function of regulating the air control valve and the deceleration control valve.

The operating time of the ignition and air flow control system is shown by the following table.

Secondary Air Injection Cut

Manual transmission

Operating time	Parts that operate coordinately
When engine speed is over 4,000 rpm	solenoid of air control valve, air cut valve, high speed switch
During deceleration when engine speed is over 1,200 rpm	solenoid of air control valve, air cut valve, low speed switch, idle switch
When running under full load (throttle valve is nearly wide open)	air cut valve
When floor temperature is over approximately 120°C (248°F) (Protective System)	heat hazard sensor, control unit, solenoid of air control valve, air cut valve

Automatic transmission

Operating time	Parts that operate coordinately
When engine speed is over the specified value 4,800 rpm when cold 3,400 rpm when hot	solenoid of air control valve, air cut valve, high speed switch, thermosensor, thermoswitch (the last two parts when engine is hot)
During deceleration when engine speed is 1,400 rpm	solenoid of air control valve, air cut valve, low speed switch, idle switch
When running with full load (throttle valve is nearly wide open)	air cut valve
When floor temperature is over approximately 120°C (248°F) (Protective system)	heat hazard sensor, control unit, solenoid of air control valve, air cut valve

Control of Trailing Spark Plug Ignition

Manual transmission

Operating time	Parts that operate coordinately
1. Trailing spark plug does not ignite.(Only leading spark plug ignites.)	
During cruising and acceleration (deceleration excluded) when engine speed is 1,200 ~ 4,000 rpm at cold condition	low speed switch, high speed switch, idle switch, trailing ignition switch
2. Trailing spark plug ignites. (Both leading and trailing spark plugs ignite.)	
When engine is hot	thermosensor, thermoswitch, trailing ignition switch
During cruising, acceleration and deceleration when engine speed is below 1,200 rpm or over 4,000 rpm at cold condition	low speed switch, high speed switch, trailing ignition switch, idle switch

Automatic transmission

Operating time	Parts that operate coordinately
1. Trailing spark plug does not ignite. (Only leading spark plug ignites.)	
During cruising and acceleration (deceleration excluded) when engine speed is 1,400 ~4,800 rpm at cold condition	low speed switch, high speed switch, idle switch, trailing ignition switch
2. Trailing spark plug ignites. (Both leading and trailing spark plugs ignite.)	
When engine is hot	thermosensor, thermoswitch, trailing ignition switch
During cruising, acceleration and deceleration when engine speed is below 1,400 rpm or over 4,800 rpm at cold condition	low speed switch, high speed switch, trailing ignition switch, idle switch

a. Thermosensor

The thermosensor, which is placed in the cooling water passage, detects the water temperature and sends the signal to the control unit.

When the water temperature rises to the specified value, the thermoswitch and the trailing ignition switch in the control unit close by means of the thermosensor. The electric current then flows to the trailing side ignition coil and the trailing spark plug is ignited. In case of automatic transmission, the opening/closing time of the high speed switch in the control unit becomes from 4,800 rpm when the engine is cold to 3,400 rpm when it is hot. Consequently, when the engine speed is over 3,400 rpm at hot condition, the high speed switch closes and the electric current flows to the solenoid of the air control valve and the solenoid cuts the vacuum sensing way between the intake manifold and the air chamber of the air control valve. The air cut valve of the air control valve then stops the supply of the secondary air into the exhaust ports by means of the spring force. The secondary air flows into the thermal reactor cooling air jacket to cool the reactor.

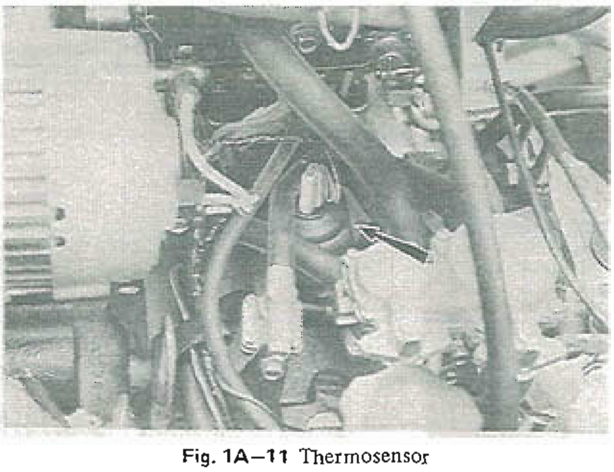


Fig. 1A–11 Thermosensor

b. Thermodetector

The thermodetector which detects the ambient temperature corrects the operating temperature of the thermosensor to resume the ignition of the trailing spark plug after the minimum time required for the thermal reactor warm-up.

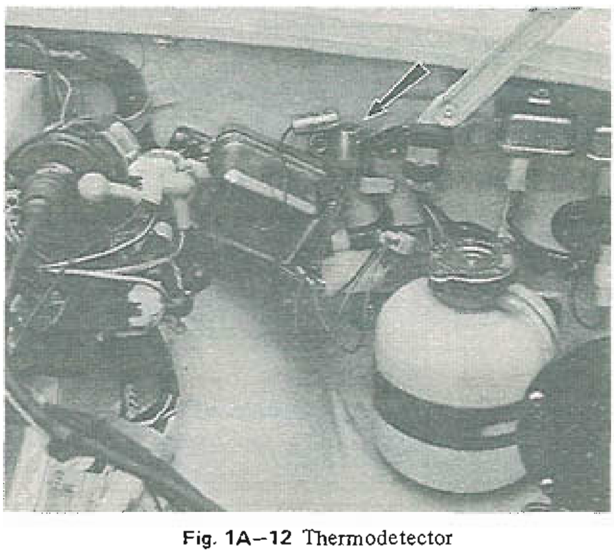


Fig. 1A–12 Thermodetector

c. Control unit
In the control unit are the thermoswitch, trailing ignition switch, low speed switch and high speed switch. The functions are as follows. (Refer to electric diagram in Fig. 1A–14)

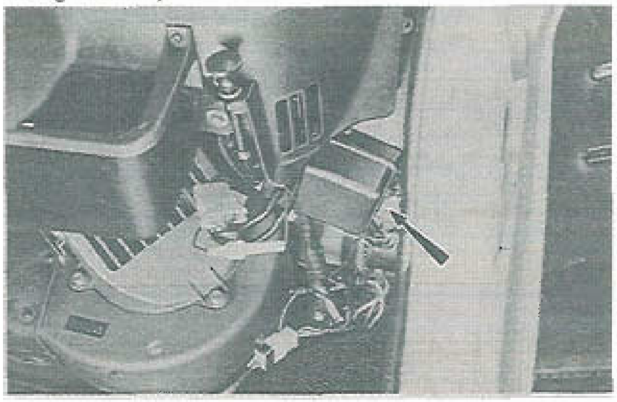


Fig. 1A–13 Control unit

1. In the whole operating range at hot condition, the thermoswitch and the trailing ignition switch close and the electric current flows to the trailing side ignition coil and the trailing spark plug is ignited. –operation of thermoswitch and trailing ignition switch–
2. When the engine speed is over 3,400 rpm at hot condition, the thermoswitch and the high speed switch close and the electric current flows to the solenoid of the air control valve. Consequently, the solenoid cuts the vacuum sensing way between the intake manifold and the vacuum chamber. This actuates the air cut valve to stop the supply of the secondary air into the exhaust ports and the air flows into the thermal reactor cooling air jacket (only in case of automatic transmission). –operation of thermoswitch and high speed switch–
3. When the engine speed becomes over 4,000 rpm (in case of automatic transmission, 4,800 rpm at cold condition and 3,400 rpm at hot condition), the high speed switch closes and the electric current flows to the solenoid of the air control valve. The solenoid consequently cuts the vacuum sensing way between the intake manifold and the vacuum chamber of the air control valve. This actuates the air cut valve to stop the supply of the secondary air into the exhaust ports and the air flows to the thermal reactor cooling air jacket.–operation of high speed switch–
4. Whether at cold or hot condition, when the engine speed is over 1,200 rpm (1,400 rpm in case of automatic transmission), point Ⓐ of the low speed switch closes and the electric current flows to the idle switch, during deceleration when the accelerator pedal is relieved completely, point Ⓐ of the idle switch closes, and so the electric current from the low speed switch flows to the solenoid of the air control valve. The solenoid then closes the vacuum sensing way between the intake manifold and the air control valve, and this actuates the air cut valve to stop the supply of the secondary air into the exhaust port and the air flows into the thermal reactor cooling air jacket. At the same time, since the electric current to the solenoid of the coasting valve stops, the solenoid opens the atmospheric pressure sensing line. This actuates the coasting valve and the fresh air from the air cleaner enters the intake manifold and prevents afterburn. –operation of low speed switch–
5. When the engine speed is below 1,200 rpm (1,400 rpm in case of automatic transmission), point Ⓑ of the

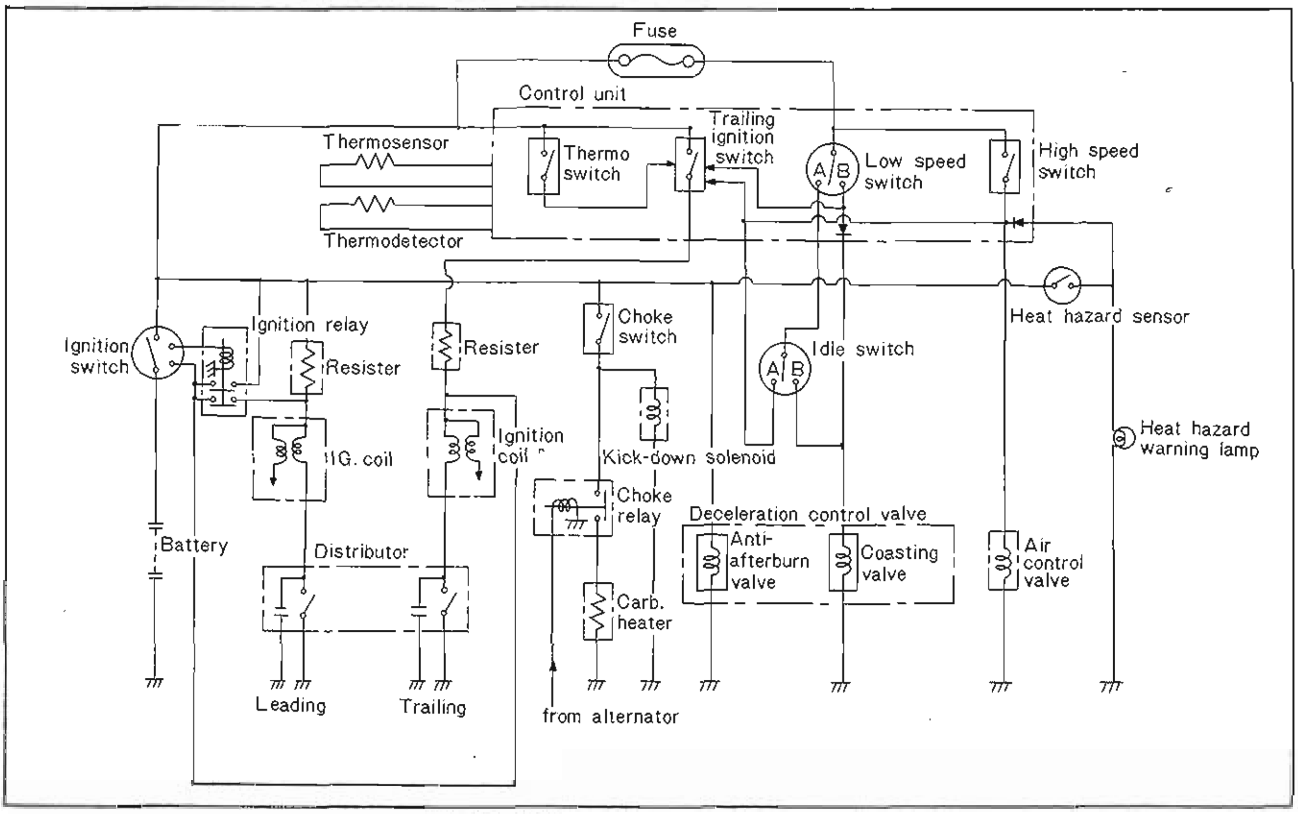


Fig. 1A–14 Electric diagram of control unit low speed switch closes. The electric current flows to the trailing side ignition coil through the trailing ignition switch, and ignites the trailing spark plug. —operation of low speed switch and trailing ignition switch—

d. Idle switch

The idle switch detects the deceleration condition of the car. It sends the decelerating condition signal to the control unit and the coasting valve. The functions

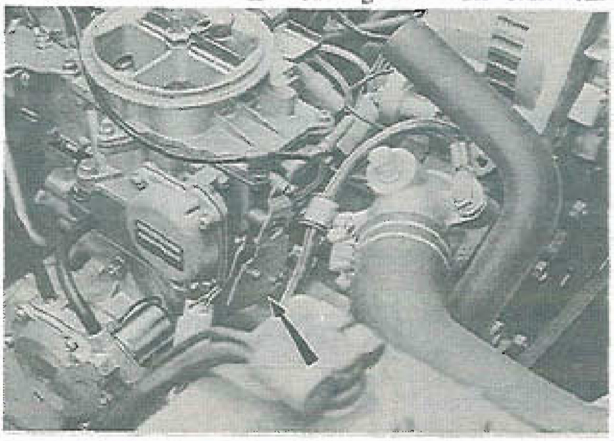


Fig. 1A–15 Idle switch

are as follows. (Refer to electric diagram in Fig. 1A–14)

1. While deceleration (with accelerator padal released) when the engine speed is over 1,200 rpm (1,400 rpm in case of automatic transmission), point Ⓐ of the idle switch closes and the electric current flows to the air control valve solenoid from the low speed switch. The solenoid consequently cuts the vacuum sensing way between the intake manifold and the vacuum chamber of the air control valve. This actuates the air cut valve to stop the supply of the secondary air into the exhaust ports and the air flows to the thermal reactor cooling air jacket.
2. At the same time, since the electric current to the solenoid of the coasting valve stops, the solenoid opens the atmospheric pressure sensing line. This actuates the coasting valve and the fresh air from the air cleaner enters the intake manifold and prevents afterburn.
3. When the point Ⓑ of the low speed switch and point Ⓐ of the idle switch are closed, the electric current flows to the trailing side ignition coil through the trailing ignition switch, and ignites the trailing spark plug.

1A–A–3. Additional Air Control System

The additional air control system consists of the deceleration control valve and the altitude compensator. During deceleration and gear shifting and immediately after turning off the ignition switch, the additional air control system sends the fresh air from the air cleaner to the intake manifold and adjusts the excessively rich fuel-air mixture preventing afterburn and reducing emissions during deceleration. (operation of deceleration control valve) In order to adjust the excessively rich fuel-air mixture in running in the highland area, the air is supplied to the intake manifold to improve the combustion. (operation of altitude compensator)

Note: The vehicles for U.S.A. and Canada are equipped with the altitude compensator.

a. Deceleration control valve

The deceleration control valve consists of an anti-afterburn valve and the coasting valve and the functions are as follows.

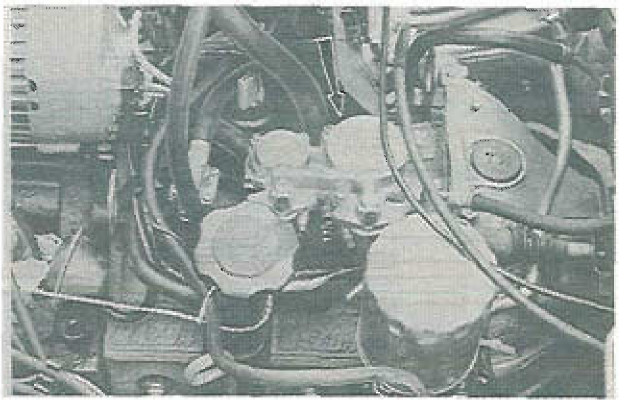


Fig. 1A–16 Deceleration control valve

1. When the engine speed is over 1,200 rpm (1,400 rpm in case of automatic transmission), and during deceleration when the accelerator pedal is relieved completely, the deceleration control valve sends the fresh air from the air cleaner to the intake manifold. —operation of coasting valve—
2. Immediately after deceleration and during gear shifting, the deceleration control valve sends the fresh air from the air cleaner to the intake manifold. —operation of anti-afterburn valve—
3. Immediately after turning off the ignition switch, the deceleration control valve sends the fresh air from the air cleaner to the intake manifold. —operation of anti-afterburn valve and coasting valve—

The anti-afterburn valve operates by pressure difference between the vacuum chamber and the air chamber, and the spring force. The balance hole in the diaphragm connects the vacuum chamber and the air chamber to control the duration of valve opening.

The intake manifold vacuum rises during deceleration and gear shifting, and the pressure difference between the two chambers opens the valve connected to the diaphragm, so that fresh air from the air cleaner is led into the intake manifold to correct overrich mixture, thus preventing afterburn. When the balance hole equalizes pressure difference, the valve is closed to shut off air. When the ignition switch is turned on, the solenoid shuts the atmospheric pressure sensing line leading to the air chamber. When the engine is switched off the solenoid opens the sensing line, and, due to the resulting pressure difference between the vacuum chamber and the air chamber, the valve connected to the diaphragm is opened, and fresh air is led from the air cleaner into the intake manifold to prevent afterburn.

The coasting valve operates by pressure difference between the vacuum chamber and the air chamber, and the spring force. The rise of intake manifold vacuum during deceleration and gear shifting causes the valve to

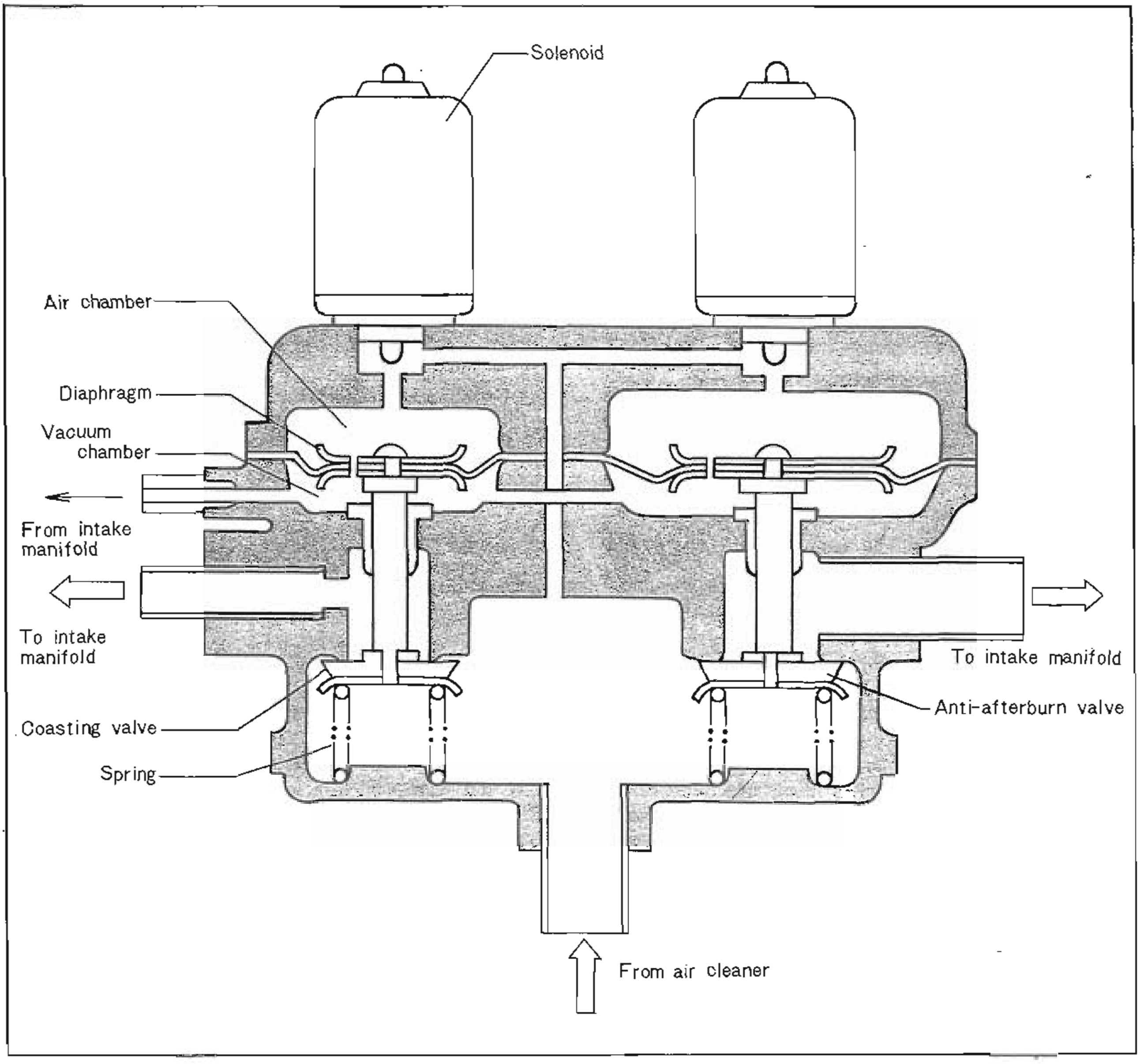


Fig. 1A–17 Deceleration control valve cross section

open, and air from the air cleaner is supplied into the intake manifold to prevent afterburn and to keep the thermal reactor operating.

During deceleration when the engine speed is above 1,200 rpm, (1,400 rpm for automatic transmission) the control unit and idle switch command solenoid to open the atmospheric pressure sensing line leading to the air chamber, and, due to resulting pressure difference between the vacuum chamber and the air chamber, the valve connected to the diaphragm is opened, and fresh air is led from the air cleaner into the intake manifold to prevent afterburn. When the ignition switch is turned on, the solenoid shuts the atmospheric pressure sensing line leading to the air chamber. When the engine is switched off the solenoid opens the sensing line, and, due to the resulting pressure difference between the vacuum chamber and the air chamber, the valve connected to the diaphragm is opened, and fresh air is led from the air cleaner into the intake manifold to prevent afterburn.

b. Altitude compensator (U.S.A. and Canada spec models only)

In order to prevent the fuel-air mixture from becoming excessively rich because of the low atmospheric pressure in the highland area, the altitude compensator sends the air to the intake manifold and adjusts the fuel-air mixture.

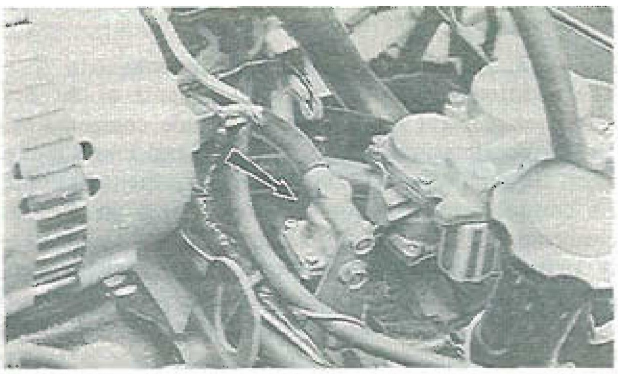


Fig. 1A–18 Altitude compensator

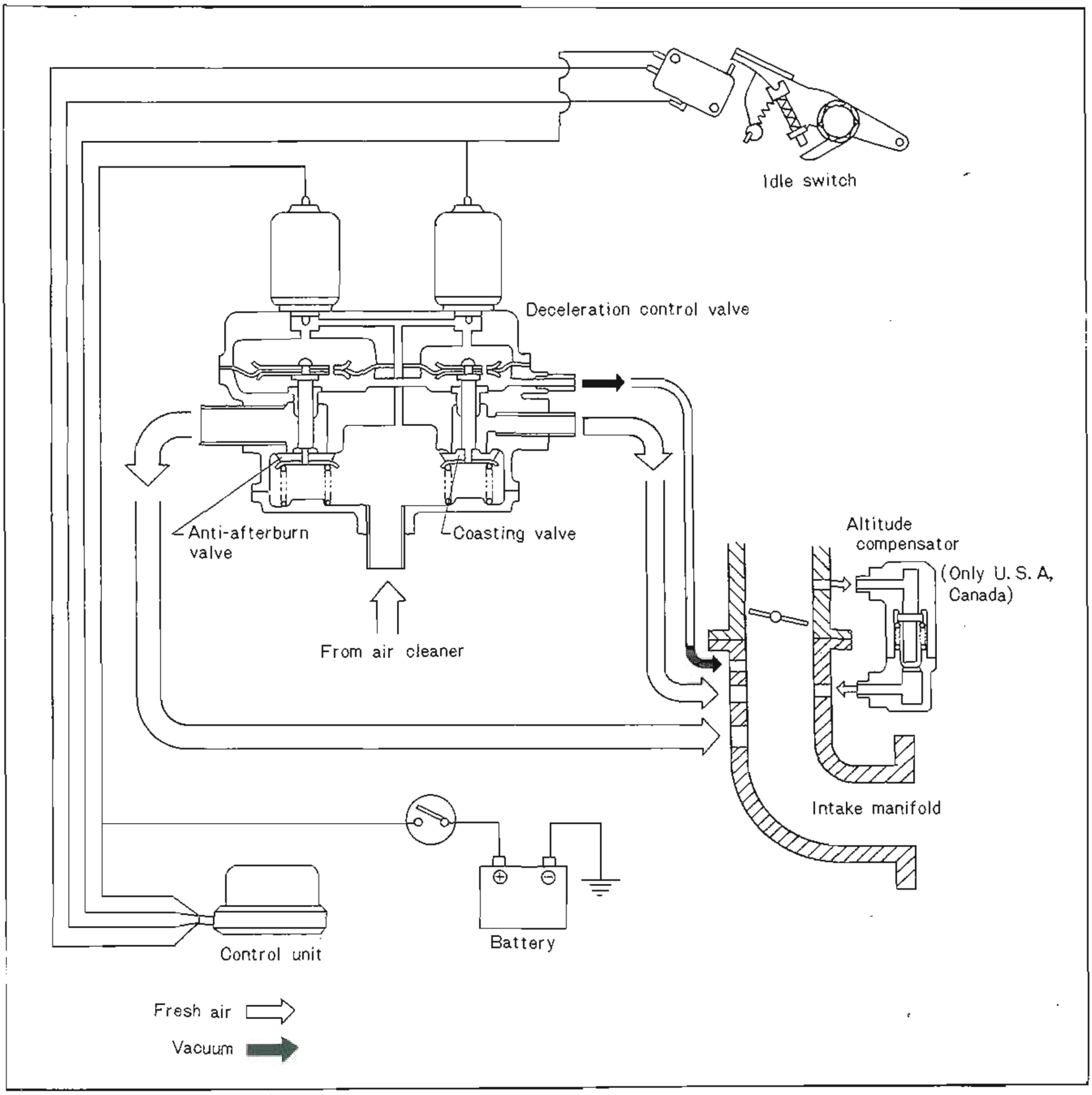


Fig. 1A–19 Additional air control system

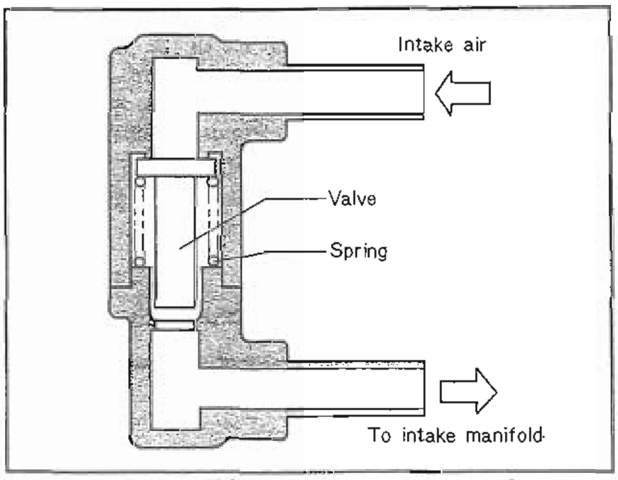


Fig. 1A–20 *Altitude compensator cross section*

In the highland area, especially during idling, part of the inhaled air is controlled by the altitude compensator and enters the intake manifold directly. This enables the overrich mixture to be properly adjusted. The hoses for altitude compensator are colored in Blue for identification.

1A–A–4. Kick-down Control System (For automatic transmission only)

As well as the normal kick-down operation for the transmission shifting, the kick-down solenoid is energized to cause the kick-down when the choke system is in operating condition (the choke switch is closed) for semi-automatic choke system or when the engine water temperature is cold (the water temperature switch is closed) for full-automatic choke system, in order to obtain quicker warm-up.

a. Water temperature switch (Full-automatic choke system, U.S.A. and Canada spec models only)
The water temperature switch detects the engine water temperature and sends the signal to the kick-down solenoid. And it operates the kick-down solenoid when the engine is cold.

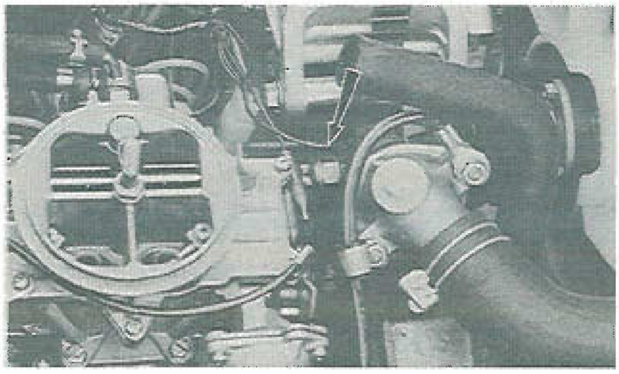


Fig. 1A–21 Water temperature switch

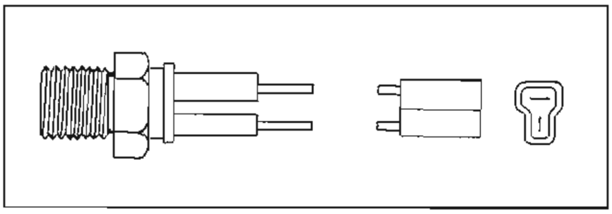


Fig. 1A–22 Water temperature switch

b. Choke switch (Semi-automatic choke system)
The choke switch is equipped in order to detect whether the choke knob is pulled or not and it sends the signal to the kick-down solenoid. The choke switch has the function to operate the kick-down solenoid when the choke knob is pulled.

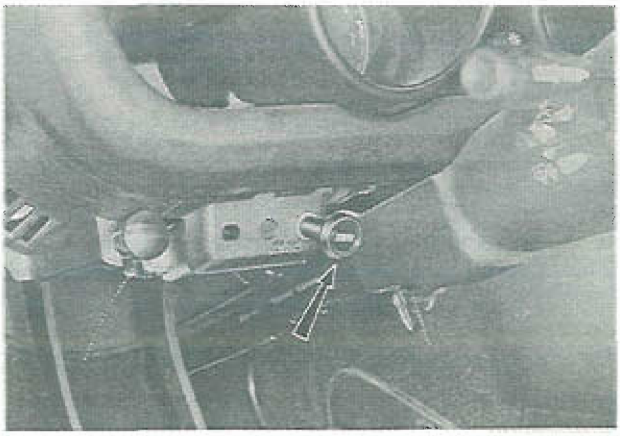


Fig. 1A–23 Choke switch

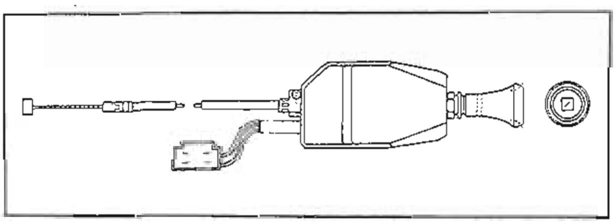


Fig. 1A–24 Choke switch

1A–B. CRANKCASE EMISSION CONTROL SYSTEM (VENTILATION SYSTEM)
The crankcase emission control system channels blow-by gas into the intake manifold to burn it up in the combustion chamber and helps to control air pollution caused by engine blow-by gas. This system consists mainly of a ventilation valve and hose necessary to connect the ventilation valve. All connecting hoses in a ventilation system are colored in Red for identification. The air and blow-by gases flow in the ventilation system as shown in Fig. 1A–25.
Ventilating air from the air cleaner enters the engine air space. The ventilating air with blow-by gas enters the ventilation valve which regulates the amount of air flow to meet the change of operating conditions and then is directed to the engine.

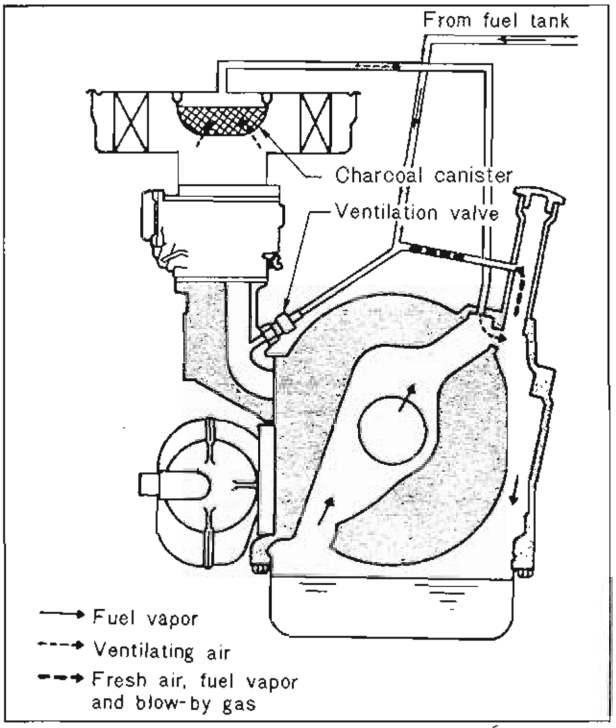


Fig. 1A–25 Crankcase emission control system

1A–B–1. Ventilation Valve
The ventilation valve is operated by the difference of the pressure between the intake manifold and engine air space. When there is no difference of the pressure (engine at stall condition) or the pressure of the intake manifold is more than that of the engine air space (backfire) the ventilation valve is closed by the tension of

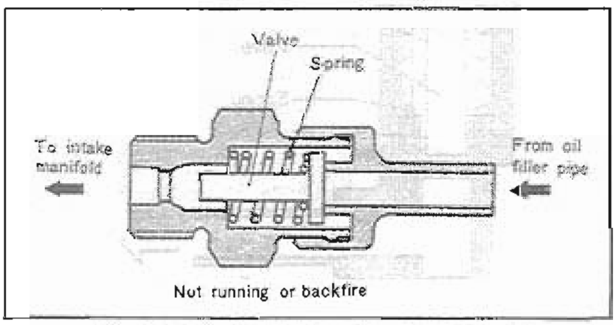


Fig. 1A–26. Ventilation valve operation (1) valve spring as shown in Fig. 1A–26.

If there is large difference (during idling or deceleration), the high vacuum of the intake manifold overcomes the tension of the valve spring, and the valve is pulled towards intake manifold side by the manifold vacuum as shown in Fig. 1A–27. Therefore, the air passes through the restricted passage in the valve.

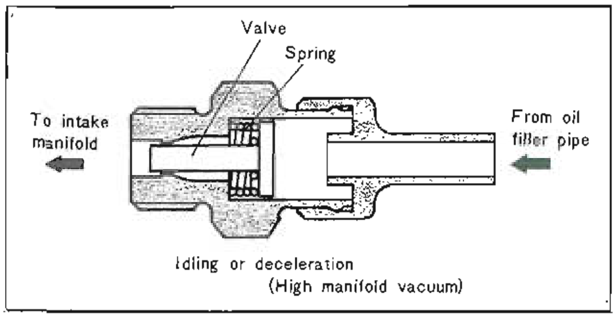


Fig. 1A–27 Ventilation valve operation (2)

When the difference is small (at normal operation), the valve is balanced by the tension of valve spring and intake manifold vacuum. This increases the flow of blow-by gas. (Fig. 1A–28)

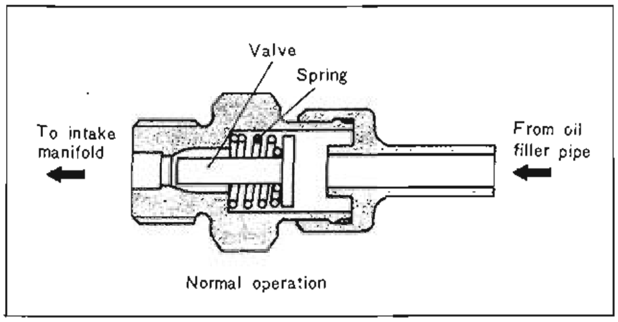


Fig. 1A–28 Ventilation valve operation (3)

1A–C. EVAPORATIVE EMISSION CONTROL SYSTEM (U.S.A. and Canada spec models only)

The evaporative emission control system is so designed as to prevent the escape of fuel vapor into the air from the fuel system. The fuel vapor rising from the surface of fuel in the fuel tank due to the ambient temperature is channeled into the condense tank and then fed back to the fuel tank when the engine is not running. Any fuel vapor that has not condensed in the condense tank is led into the air space of the engine and into the charcoal canister in the air cleaner, and is trapped there. When running, the fuel vapor trapped in the charcoal canister is vaporized again by fresh air from the air cleaner and by the engine temperature, and goes to the ventilation valve from which it is sucked into the intake manifold together with the fuel vapor trapped in the air space of engine and blow-by gas to be burned up in the combustion chamber.
The fuel vapor from the condense tank when the engine is running is directly sucked into the intake manifold via the ventilation valve to be burned up in the combustion chamber.
All connecting hoses in an evaporative emission control system are colored in Red for identification as same as ventilation hoses.

1A–C–1. Charcoal Canister

While the engine is stopped, some of the fuel vapor generated in the fuel tank does not condense in the condense tank and, when channeled into the engine air space without being fed back to the fuel tank, still cannot be trapped in the air space. Such vapor is absorbed by the charcoal canister.
While the engine is running, the fuel vapor trapped in the charcoal canister is released into the intake manifold together with fresh air from the air cleaner and burned

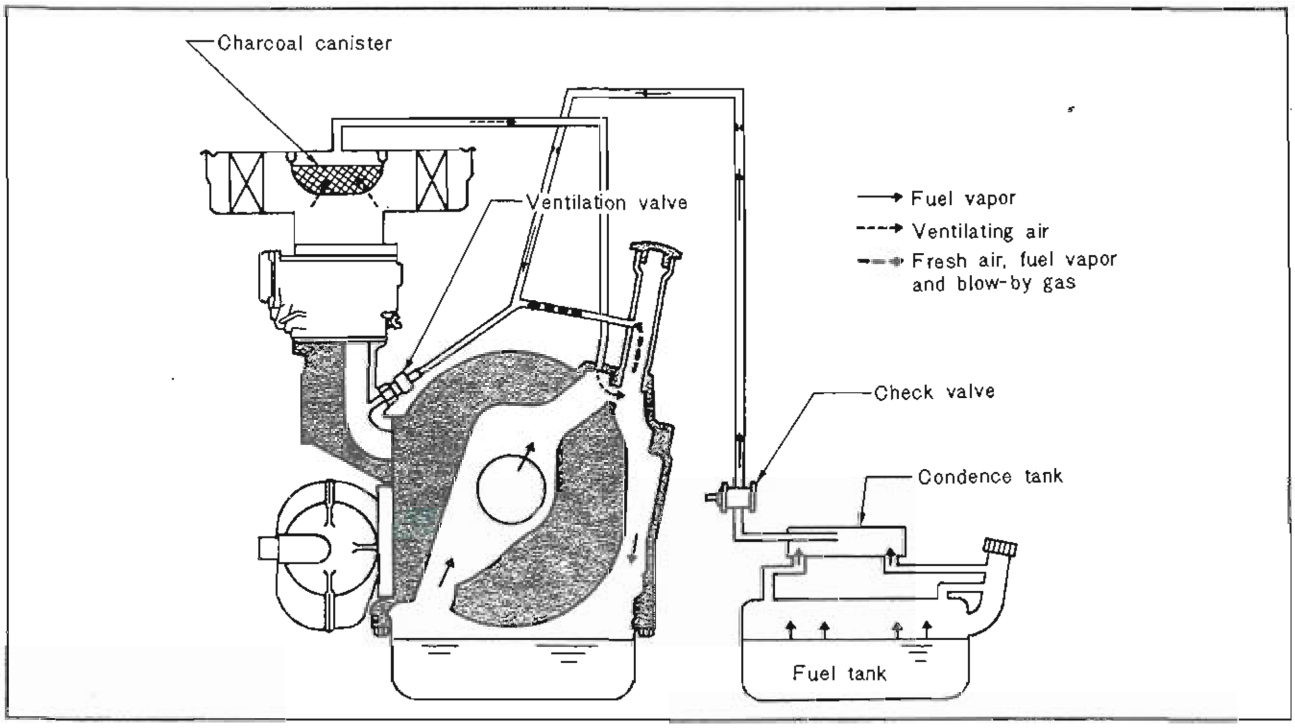


Fig. 1A–29 Evaporative emission control system

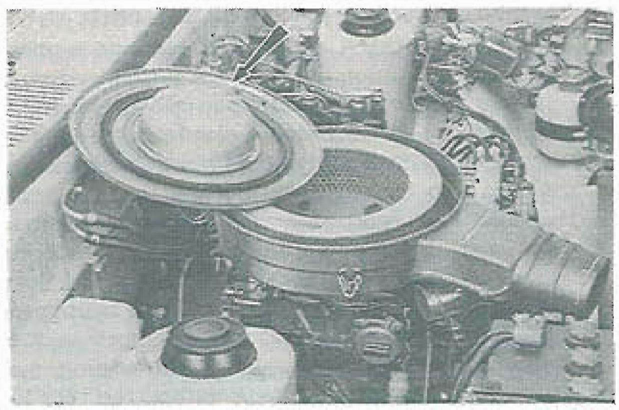


Fig. 1A–30 Charcoal canister

up in the engine. The canister is always being purged by fresh air during engine operation.

1A–C–2. Condense Tank

The condense tank condenses the fuel vapor coming from the fuel tank and returns it to the fuel tank.

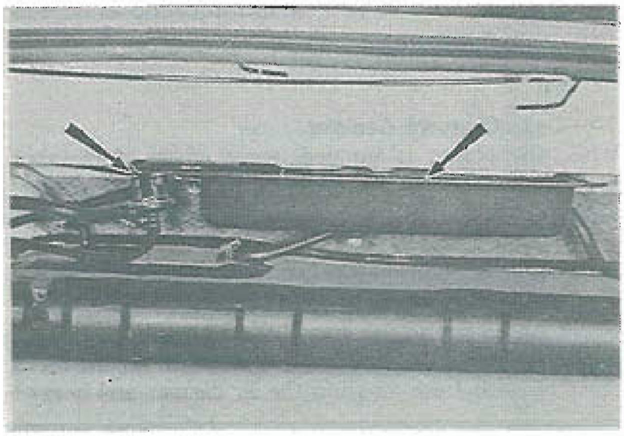


Fig. 1A–31 Condense tank and check valve (Sedan)

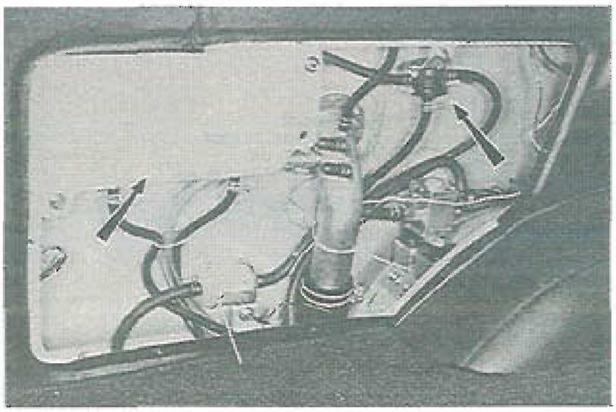


Fig. 1A–32 Condense tank and check valve (RX-3 wagon)

1A–C–3. Check Valve

The check valve located between the condense tank and the charcoal canister in the air cleaner works appropriately when the conditoins mentioned below take place, relating to the completely sealed ventilation type fuel system.

1. When the evaporative system is normal, the flows of fuel vapor and ventilation during engine operation are as shown in Fig. 1A–33.

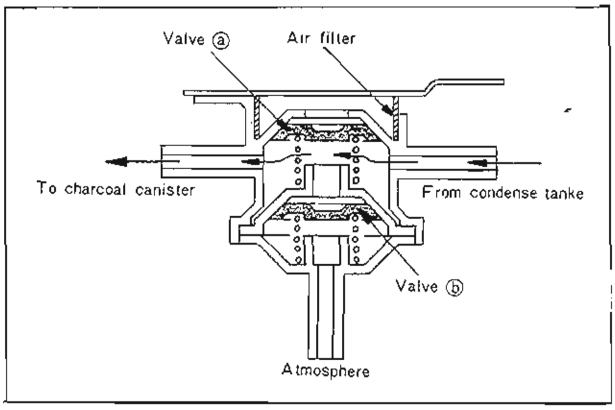


Fig. 1A–33 Check valve cross section

2. If the hose between the check valve and the canister is clogged or frozen, system would not be ventilated at all and as the result, the fuel supply to the engine is cut off. Therefore, when the evaporative line is clogged, the valve ⓐ is opened by the negative pressure in the fuel tank and the ventilation passage to the atmosphere is opened.

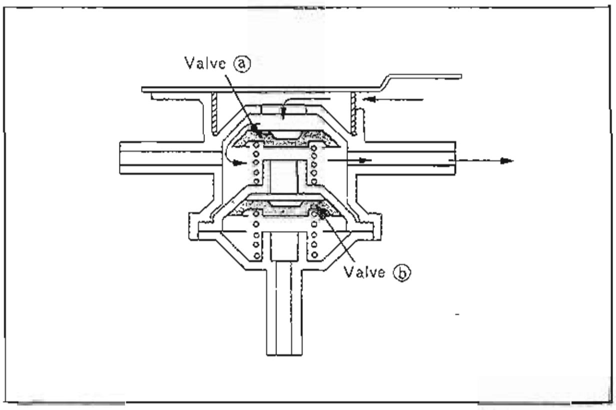


Fig. 1A–34 Check valve operation (1)

3. When the fuel vapor in the fuel tank is expanded due to intense heat, the pressure in the fuel tank will increase. In order to prevent the increase of the pressure in the fuel tank, the valve ⓑ is opened to release the pressure to the atmosphere.

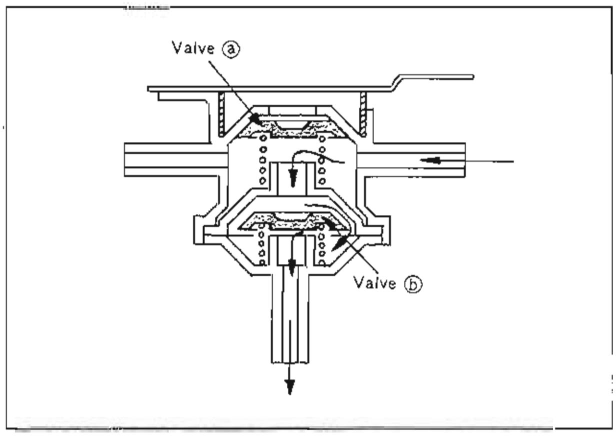


Fig. 1A–35 Check valve operation (2)

1A–D. PROTECTIVE SYSTEM

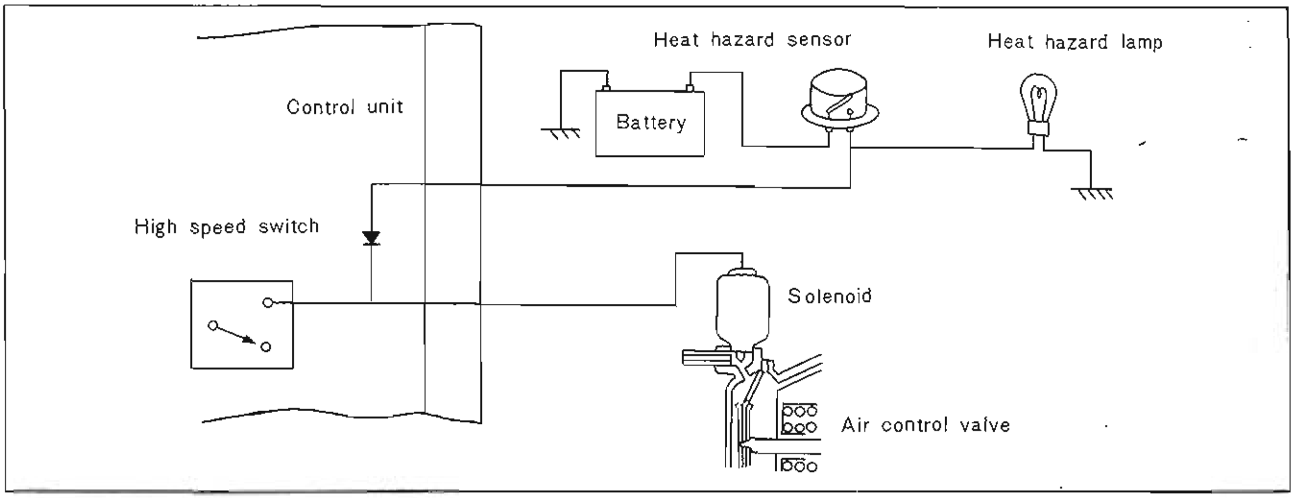


Fig. 1A–36 Heat hazard warning system

This system consisting of a heat hazard sensor and a heat hazard warning lamp is employed to prevent potential heat hazard to the vehicle due to excessive heat radiation from the exhaust system under specific driving conditions. This system is not operative under a normal driving condition, but it is operative under such a specific driving condition as the engine idle speed is kept raised intensionally for a considerable period so that efficient air conditioning may be obtained while the vehicle is standing.

1A–D–1. Heat Hazard Sensor and Heat Hazard Warning Lamp

When the floor temperature becomes more than 120°C (248°F), the heat hazard sensor becomes operative and the heat hazard warning lamp on the instrument panel lights up. At the same time, the electric current from the heat hazard sensor flows to the solenoid of the air control valve through the control unit. Consequently, the solenoid closes the vacuum sensing way between the intake manifold and the air control valve, and so the air cut valve of the air control valve actuates and stops the supply of the secondary air into the exhaust ports, which prevents the floor temperature from rising. When the floor temperature becomes lower than the specified value (approximately 120°C), the heat hazard sensor becomes inoperative and the heat hazard lamp goes off and at the same time, the electric current stops flowing to the solenoid of the air control valve, and so the secondary air is injected into the exhaust ports.
The heat hazard sensor is located inside trunk as shown in Fig. 1A–37.

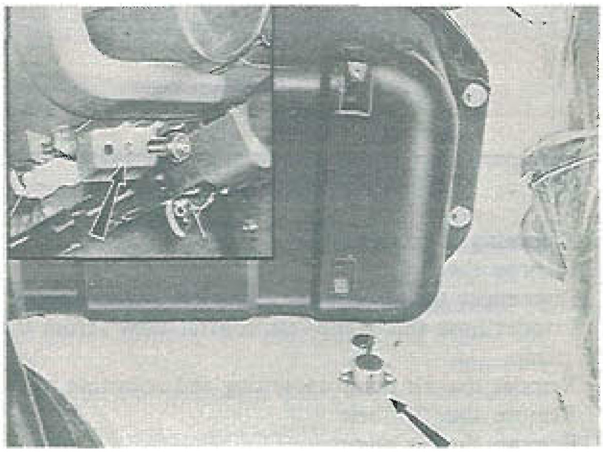


Fig. 1A–37 Heat hazard sensor

1A–E. MAINTENANCE PROCEDURE

This section explains the procedures for checking, adjusting and replacing the parts of the exhaust emission control system.

1A–E–1. Air pump

a. Checking air pump

1. Check to see that the air pump "V" belt tension is proper.
2. Check to see that air hoses are free of air leaks.
3. Attach the **air pump gauge set** (49 2113 010) as shown in Fig. 1A–38.
4. Run the engine at idle speed (Manual transmission: 900 rpm, Automatic transmission: 750 rpm "D" range). If the pressure gauge reading is more than **0.048 kg/cm^2 (0.68 lb/in^2)** for manual transmission or **0.034 kg/cm^2 (0.48 lb/in^2)** for automatic transmission, the air pump is normal.

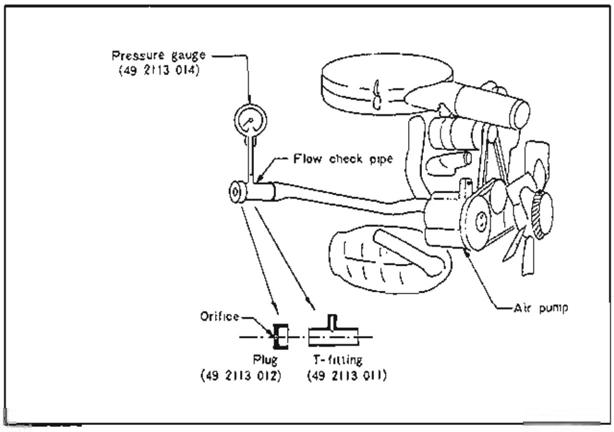


Fig. 1A–38 Checking air pump

b. Removing air pump

1. Remove the hot air duct for the air cleaner.
2. Disconnect the air inlet hose (air cleaner–air pump) and outlet hose (air pump–air control valve) from the air pump.
3. Remove the air pump mounting and adjusting bolts.
4. Remove the "V" belt.
5. Remove the air pump.

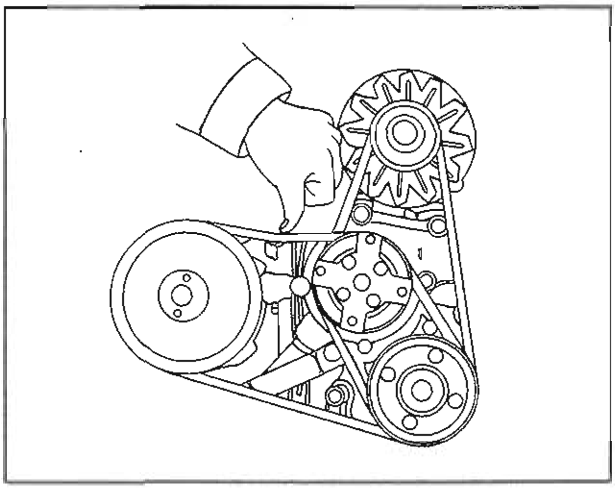


Fig. 1A–39 Checking belt tension

c. Installing air pump

Mount the air pump in the reverse sequence, and adjust the tension of the "V" belt in the procedure described below.

d. Adjusting air pump "V" belt

When a **10 kg (22 lb) pressure** is given to a spot midway between the air pump pulley and water pump pulley, belt deflection should be **8~10 mm (0.32~0.39 in)**; when new, the belt should have a deflection of **7~8 mm (0.28~0.32 in)**.

1A–E–2. Check Valve (Air Injection System)

a. Checking check valve

1. Disconnect the air hose (air pump–air control valve) from the air control valve.
2. Run the engine at idle speed.
3. Hold a finger over the inlet of the air control valve (the inlet from which the air hose is removed).

If exhaust gas flow is felt, replace the check valve, spring and gasket.

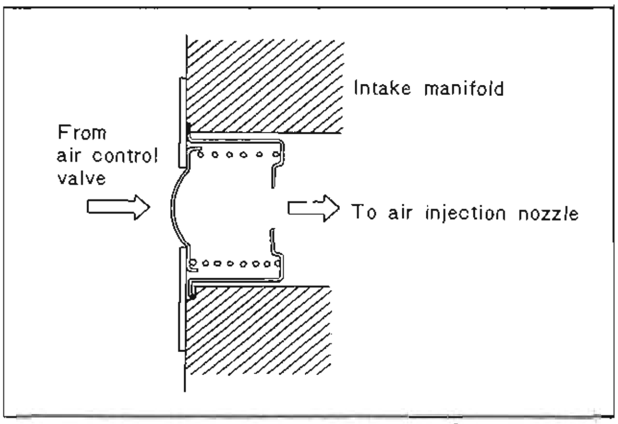


Fig. 1A–40 Check valve

b. Removing check valve

1. Remove the air control valve as described in Par. 1A–E–4.
2. Remove the gasket, valve and spring.

c. Installing check valve

Install the check valve in the reverse sequence.

1A–E–3. Thermal Reactor.

a. Checking thermal reactor

1. Check to see that the thermal reactor is not damaged or cracked.

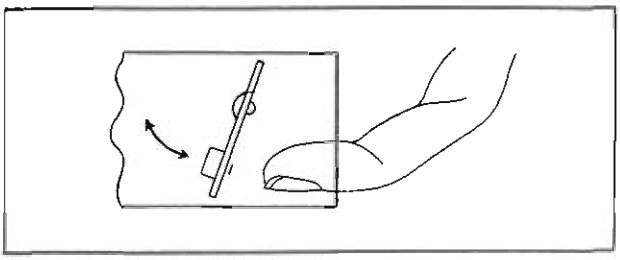


Fig. 1A–41 Checking non-return valve

2. Remove the air hose leading to the air control valve and check to see that the non-return valve works smoothly.
3. Start the engine and keep it running at idle speed.
4. Make sure that most exhaust gas is not released from the tail of cooling air pipe.

b. Removing thermal reactor

1. Remove the air control valve as described in Par. 1A–E–4.
2. Remove the bolts attaching the heat insulator to the intake manifold and remove the heat insulator.
3. Raise the front of vehicle and support with stands.
4. Disconnect the exhaust pipe from the thermal reactor.
5. Remove the engine under cover attaching bolts and remove the engine under cover.
6. Remove the nuts attaching the thermal reactor to the engine.

Note: The upper nuts should be removed with the **thermal reactor remover** (49 1881 125).

7. Remove the thermal reactor.

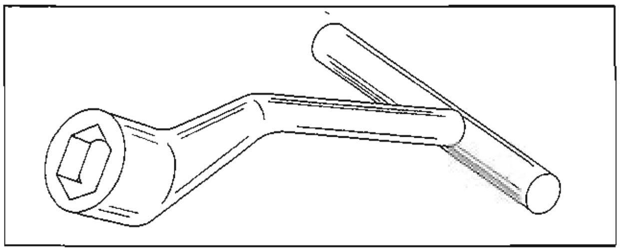


Fig. 1A–42 Thermal reactor

1A–E–4. Air Control Valve

a. Checking air control valve

1. Check the air pump according to the procedures in Par. 1A–E–1.
2. Connect the connector of the solenoid terminal to the battery and check the operation of the solenoid. If the clicking sound is audible, the solenoid is normal.
3. Attach the pressure gauge as shown in Fig. 1A–43.
4. Remove the air hose from outlet Ⓐ of the air control valve.
5. Start the engine and keep it running at idle speed (900 rpm for manual transmission, 750 rpm for automatic transmission). Check to see that there is no air leak from outlet Ⓐ of the air control valve.

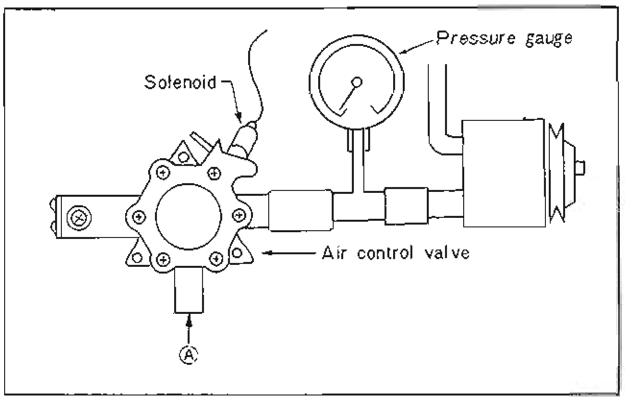


Fig. 1A–43 Checking air control valve

Manual transmission:
Make sure that the pressure gauge reads **0.12~0.20 kg/cm² (1.2~2.8 lb/in²)** when the engine speed is 3,500 rpm and that there is air leak from outlet Ⓐ.

Automatic transmission:
Make sure that the pressure gauge reads **0.12~0.18 kg/cm² (1.2~2.6 lb/in²)** when the engine speed is 3,000 rpm and that there is air leak from outlet Ⓐ.

6. Connect the solenoid terminal to the battery. Make sure that the pressure gauge reads 0~0.053 kg/cm² (0~0.75 lb/in²) and that air flows from outlet Ⓐ of the air control valve.
7. Simply checking of air control valve (check every valve incorporated) when the No. 1 relief valve, No. 2 relief valve or the air cut valve is faulty, the air sent from the air pump during idling flows into the air cooling pipe.

b. Removing air control valve

1. Remove the hot air duct for the air cleaner.
2. Disconnect the air hose (air pump ~ air control valve) from the air control valve.
3. Disconnect the cooling air hose (air control valve ~ thermal reactor) from the air control valve.
4. Disconnect the vacuum and atmospheric sensing tubes from the air control valve.
5. Disconnect the lead wire for the air control valve solenoid at the quick disconnect.
6. Remove the air control valve attaching nuts and remove the air control valve.

c. Installing air control valve

Install the air control valve in the reverse sequence.

1A–E–5. Thermosensor

a. Checking thermosensor

1. Make sure that there is no boot breakage.
2. Connect the ohm meter as shown in Fig. 1A–44, and check the resistance. The readings as shown below indicate that the thermosensor is normal;

Over 7 kΩ before warm-up the engine [when ambient and water temperatures are under 30°C (86°F)].

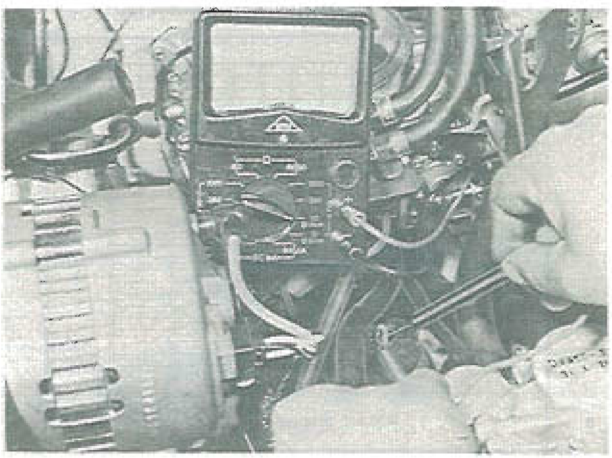


Fig. 1A–44 Checking thermosensor

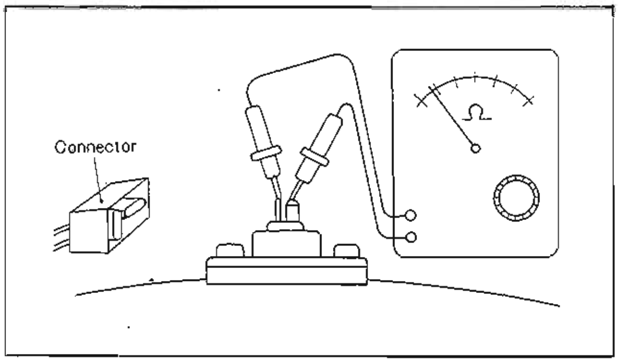


Fig. 1A–45 Checking thermosensor

Under 2.3 kΩ after warm-up the engine [when temperature is over 70°C (156°F)].

b. Removing thermosensor
1. Remove the air cleaner.
2. Remove the deceleration control valve and remove the starting motor if necessary.
3. Disconnect the multiple coupler from the thermosensor.
4. Remove the rubber boot from the thermosensor.
5. Remove the nuts attaching the thermosensor to the engine and remove the thermosensor.

c. Installing thermosensor
Install the thermosensor in the reverse sequence.

1A–E–6. Thermodetector

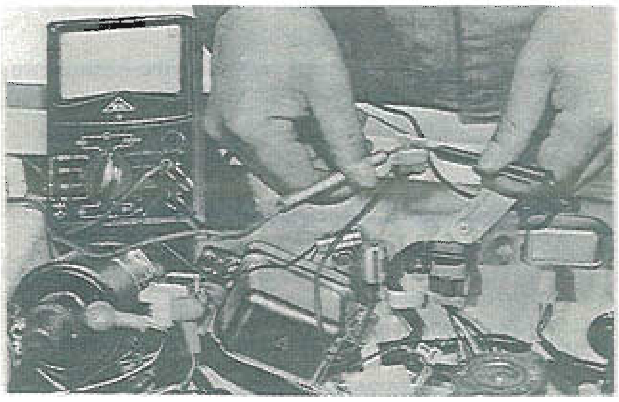


Fig. 1A–46 Checking thermodetector

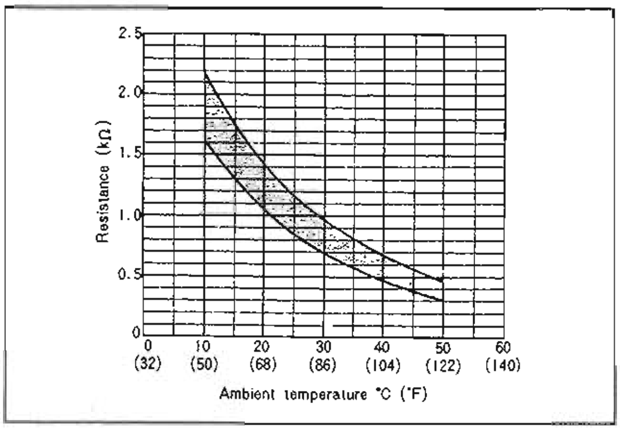


Fig. 1A–47 Resistance of thermodetector

a. Checking thermodetector
Connect the ohm meter to the terminals of the thermodetector as shown in Fig. 1A–46, and check the resistance. If the ohm meter readings are within the range shown in Fig. 1A–47, the thermodetector is normal.

b. Removing thermodetector
1. Remove the front grille (RX-2 only).
2. Disconnect the multiple coupler of thermodetector.
3. Remove the screw attaching the thermodetector and remove the thermodetector.

c. Installing thermodetector
Install the thermodetector in the reverse sequence.

1A–E–7. Control Unit

a. Checking contorl unit
1. Make sure that the fuse of the control unit is in good condition.

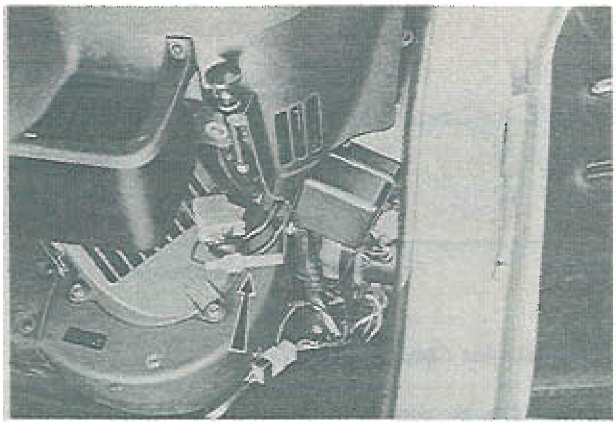


Fig. 1A–48 Checking control unit fuse

2. Disconnect the couplers of thermosensor and idle switch. And check the following point:
1) Connect the timing light to the high tension cord of the trailing side distributor. Check to see that the timing light does not go on when the engine speed is **under 3,600~4,400 rpm** (Automatic transmission: **4,320~5,280 rpm**), and goes on when the engine speed is raised to **more than 3,600~4,400 rpm** (Automatic transmission: **4,320~5,280 rpm**).

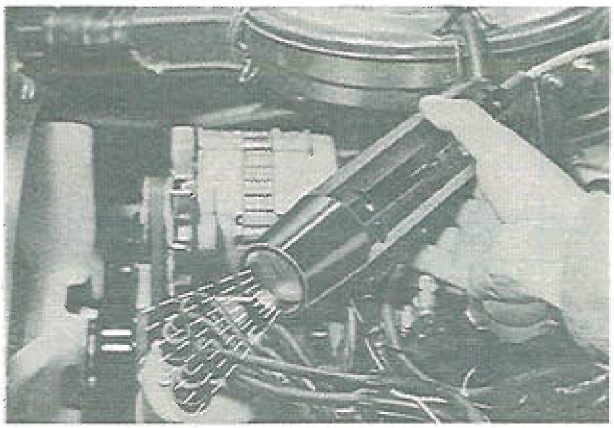


Fig. 1A–49 Checking control unit (1)

2) Connect an ammeter to the air control valve solenoid. Check to see that the current does not flows to the solenoid when the engine speed is **under 3,600~4,400 rpm** (Automatic transmission: **4,320~5,280 rpm**), and there is flow to the solenoid when the engine speed is **above 3,600~4,400 rpm** (Automatic transmission: **4,320~5,280 rpm**).

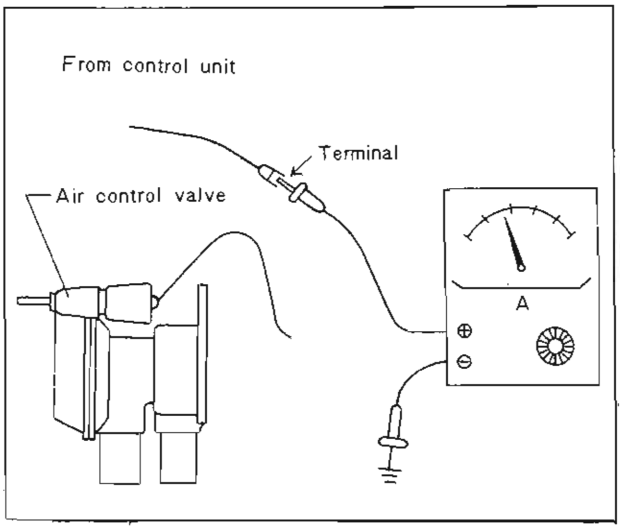


Fig. 1A–50 Checking control unit (2)

3. With the thermosensor connector terminal short-circuited as shown in Fig. 1A–51, check the following points:

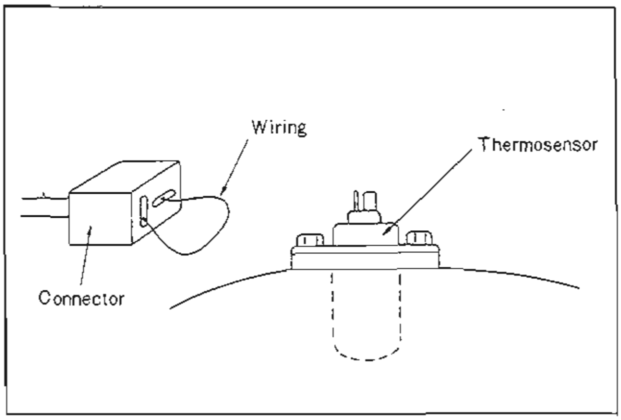


Fig. 1A–51 Connector short-circuit

1) Connect the timing light to the high tension cord of the trailing side distributor and check to see that the timing light goes on in the whole range of revolution including **under 3,600~4,400 rpm** (Automatic transmission: **4,320~5,280 rpm**).
2) Only automatic transmission:
Connect an ammeter to the air control valve solenoid. Check to see that the current does not flow to the solenoid when the engine speed is **under 3,060~3,740 rpm**, and there is flow to the solenoid when the engine speed is **above 3,060~3,740 rpm.**
4. Connect the thermosensor coupler as before. With the idle switch coupler removed, check the following point:
1) Connect an ammeter to the coasting valve solenoid and check to see that there is current flows to the ammeter when idling.

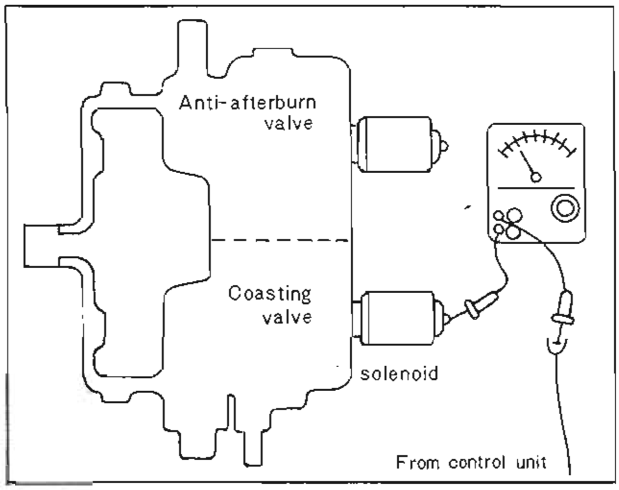


Fig. 1A–52 Checking control unit (3)

2) Disconnect the hose (air cleaner-deceleration control valve) from the deceleration control valve and plug the air suction port of the deceleration control valve.

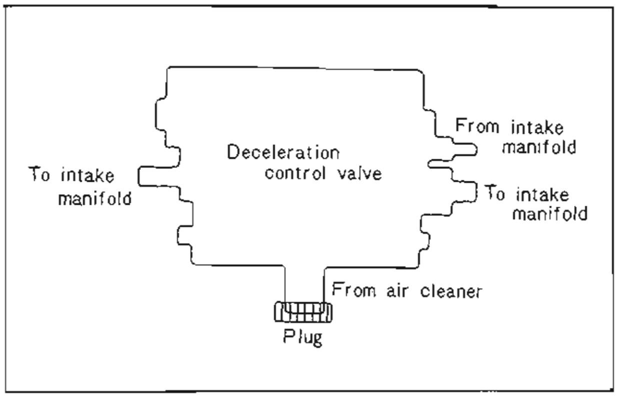


Fig. 1A–53 Blinding deceleration control valve

3) When the engine speed is gradually lowered from 2,000~3,000 rpm, the current begins to flow at **1,100~1,450 rpm** (Automatic transmission: **1,250~1,650 rpm**).
4. Connect the idle switch coupler as before.
5. Connect the hose to the deceleration control valve.

b. Removing control unit
1. Disconnect the multiple coupler of control unit.
2. Remove the control unit attaching nuts and remove the control unit.

c. Installing control unit
Install the control unit in the reverse sequence.

1A–E–8. Deceleration Control Valve

a. Checking deceleration control valve
1. Disconnect the hose (air cleaner–deceleration control valve) from the air cleaner.
2. Run the engine at idle speed.
3. Make sure that air is not sucked in through the air suction hose of the deceleration control valve.
4. Stop the engine.
5. Disconnect the hose (coasting valve–intake manifold)

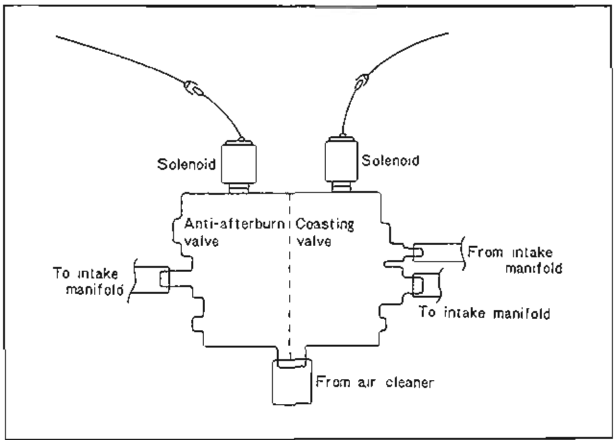


Fig. 1A-54 Checking deceleration control valve (1)

from the deceleration control valve and plug the air suction port of the deceleration control valve (coasting valve).
6. Run the engine at idle speed.
7. Disconnect the solenoid terminal for the anti-afterburn valve at the quick disconnect.
8. Hold the hand over the opening of the air suction hose for the deceleration control valve. If the vacuum felt, the deceleration control valve (anti-afterburn valve) is normal.

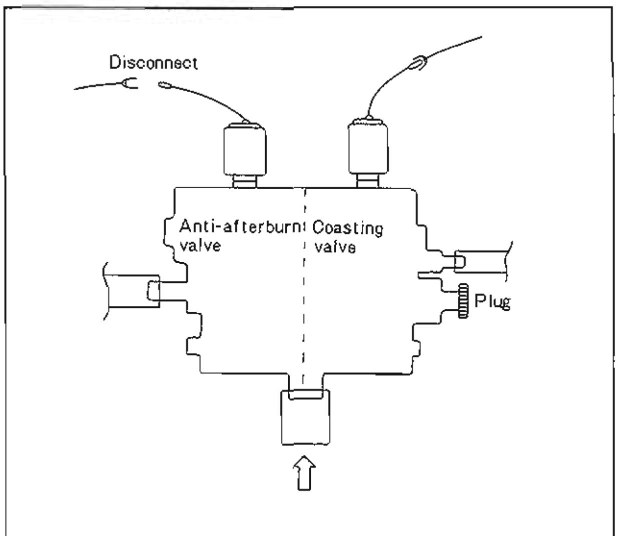


Fig. 1A-55 Checking deceleration control valve (2)

9. Stop the engine
10. Connect the solenoid terminal at the quick disconnect.
11. Connect the hose to the deceleration control valve (coasting valve).
12. Disconnect the hose (anti-afterburn valve–intake manifold) from the deceleration control valve and plug the air suction port of the deceleration control valve (anti-afterburn valve).
13. Run the engine at idle speed.
14. Disconnect the solenoid terminal for the coasting valve at the quick disconnect.
15. Hold the hand over the opening of the air suction hose for the deceleration control valve. If the vacuum felt, the deceleration control valve (coasing valve) is normal.

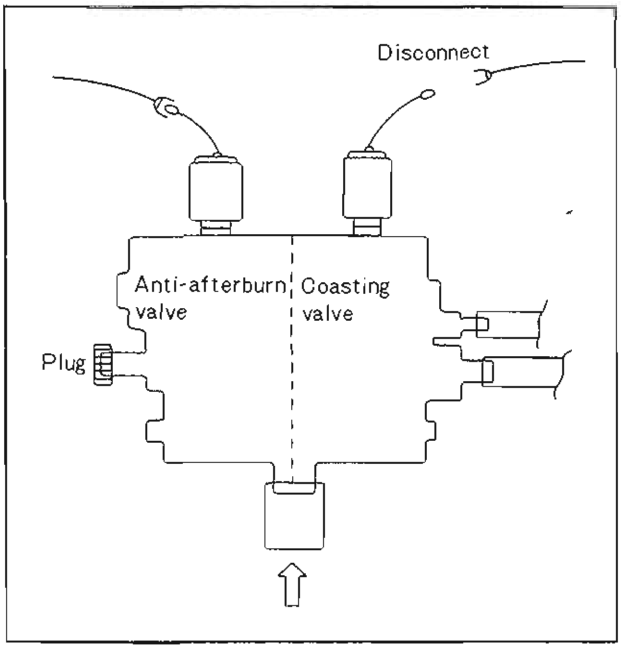


Fig. 1A-56 Checking deceleration control valve (3)

16. Stop the engine.
17. Connect the solenoid terminal at the quick disconnect.
18. Connect the hoses to the air cleaner and deceleration control valve (anti-afterburn valve).

1A-E-9. Altitude Compensator (U.S.A. and Canada spec models only)

a. Checking altitude compensator

1. Disconnect the air inlet hose from the altitude compensator.
2. Run the engine at idle speed.
3. Hold a finger over the inlet of the altitude compensator (the inlet from which the air inlet hose is removed). At this moment, decrease in the number of engine revolutions indicates a good conditoin of the altitude compensator. The inspection on high elevation areas will cause further decrease of the number of engine revolutions.

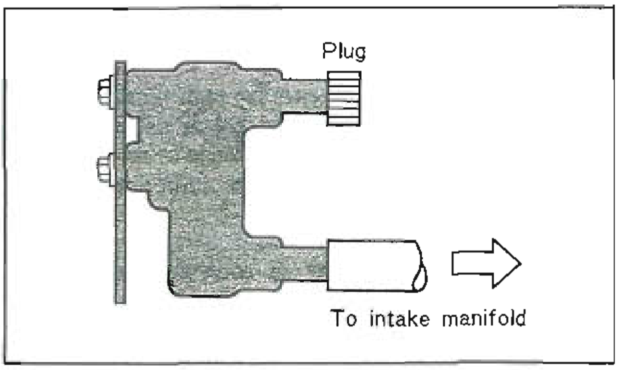


Fig. 1A-57 Checking altitude compensator

b. Removing altitude compensator

1. Disconnect the hoses from the altitude compensator.
2. Remove the bolts attaching the altitude compensator and remove the altitude compensator.

1A-E-10. Water Temperature Switch (U.S.A. and Canada spec models only)

a. Checking water temperature switch

1. Make sure that the conduction between the terminals under the normal temperature (20°C or 68°F).
2. Start and warm up the engine.

If the two terminals of the switch are disconducted, the water temperature switch is in good condition.

3. If there is something extraordinary in the steps 1 and 2, replace the switch with a new one.

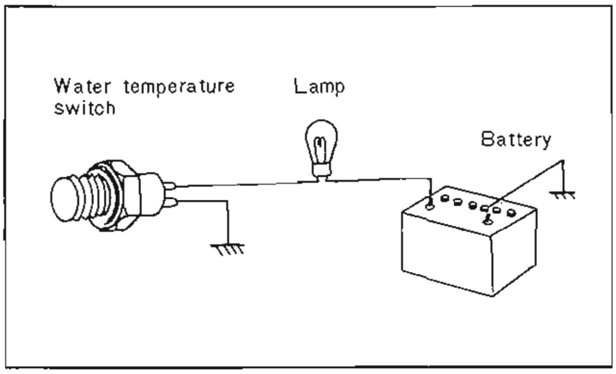


Fig. 1A-58 Checking water temperature switch

b. Removing water temperature switch

1. Drain the coolant from the radiator until the coolant level is below water temperature switch.
2. Remove the alternator and "V" belt if necessary.
3. Disconnect the multiple coupler from the water temperature switch.
4. Loosen and remove the water temperature switch.

c. Installing water temperature switch

Install the water temperature switch in the reverse sequence.

1A-E-11. Idle Switch

a. Checking idle switch

1. Remove the idle switch coupler.
2. If there is conduction between terminal Ⓐ and Ⓒ (Fig. 1A-60), and there is no conduction between terminal Ⓐ and Ⓑ when an external force is not applied to the idle switch lever (when the primary throttle valve is idle position) and if there is no conduction between terminal Ⓐ and Ⓒ, and there is conduction between

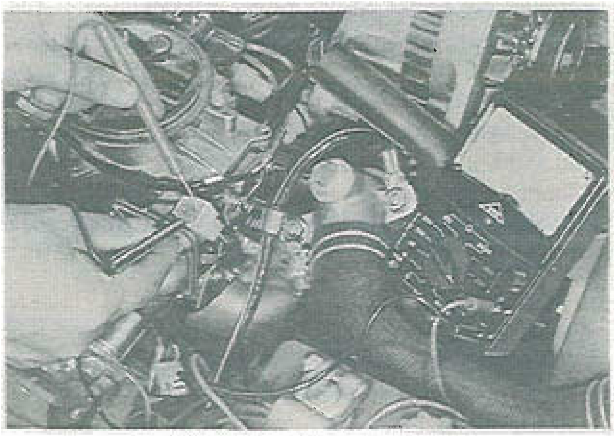


Fig. 1A-59 Checking idle switch (1)

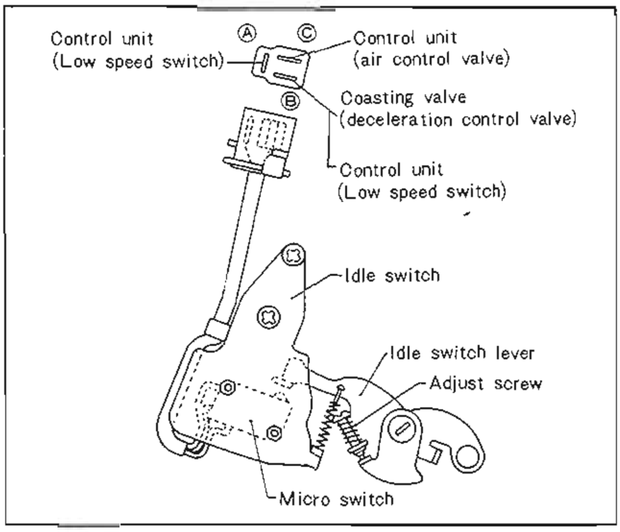


Fig. 1A-60 Checking idle switch (2)

terminal Ⓐ and Ⓑ when an external force is applied (when the primary throttle valve is open), the idle switch is normal.

b. Removing idle switch

1. Remove the air cleaner.
2. Disconnect the multiple coupler of idle switch.
3. Remove the screws attaching the idle switch and remove the idle switch.

c. Installing idle switch

Install the idle switch in the reverse sequence.

d. Adjusting idle switch

1. Install the idle switch in the reverse sequence.
2. Warm up the engine until the water termperature rises about 70°C (159°F).
3. Set the engine speed to **900 rpm** (Automatic transmission: **750 rpm** in "D" range) by turning the air adjusting screw.
4. By increasing and decreasing the engine speed with the accelerator pedal, make sure that switch changes over from "OFF" to "ON" or "ON" to "OFF" at the engine speed of **1,000~1,100 rpm** (**1,100~1,250 rpm** for Automatic transmission).
5. If the switch doesn't change within the range of specified RPM, adjust it by turning adjusting screw of

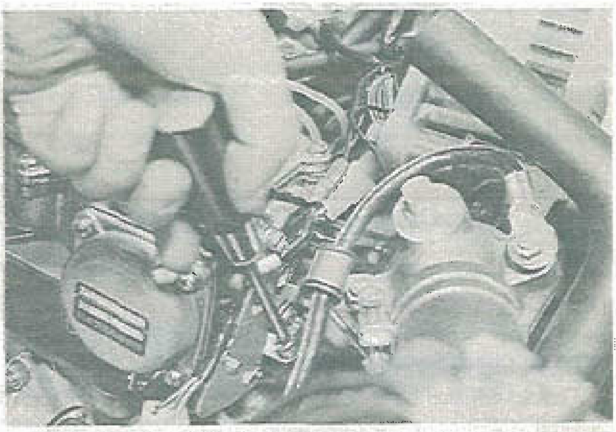


Fig. 1A-61 Adjusting idle switch

idle switch lever. Turn the adjusting screw couter-clockwise when the setting revolution is higher than specified RPM. Turn it clockwise when the setting revolution is lower than specified RPM.
6. Repeat the above procedure (4, 5) and set the engine speed within the range of specified RPM.
7. Make sure that the engine speed is 900 rpm (Automatic transmission: 750 rpm in "D" range) by carrying out no load running two or three times.

1A–E–12. Choke Switch (For semi-automatic choke system)

a. Checking choke switch
1. Remove the choke switch terminal.
2. If the two terminals of the switch are disconducted by pulling the choke control knob about 10 mm (0.4 in) or 25 mm (1.0 in) for automatic transmission and conducted by returning the knob, the choke switch is normal.

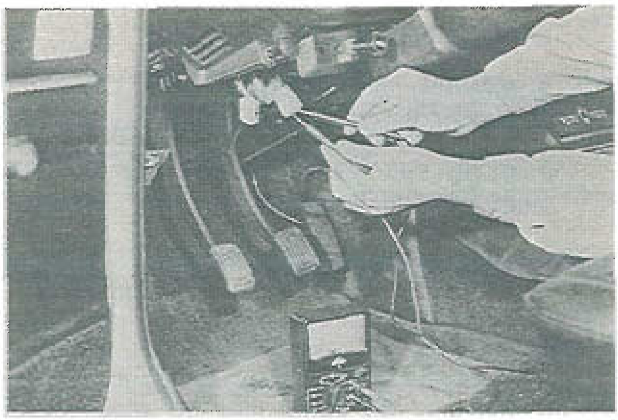


Fig. 1A–63 Checking choke switch (1)

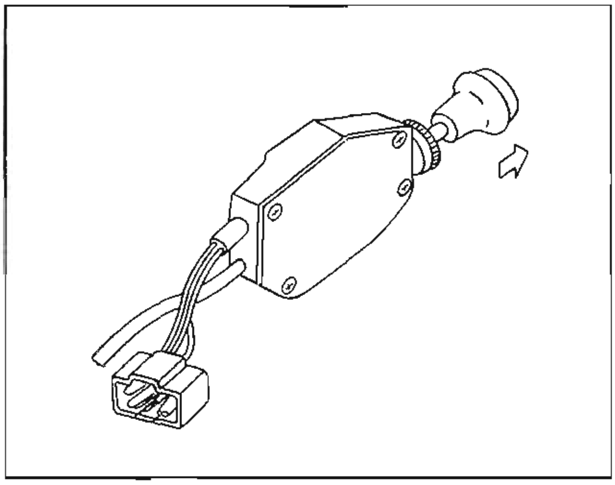


Fig. 1A–63 Checking choke switch (2)

1A–E–13. Ventilation valve

a. Checking ventilation valve
1. Check to see that the air cleaner element is not clogged.
2. Install a vacuum gauge as shown in Fig. 1A–64.

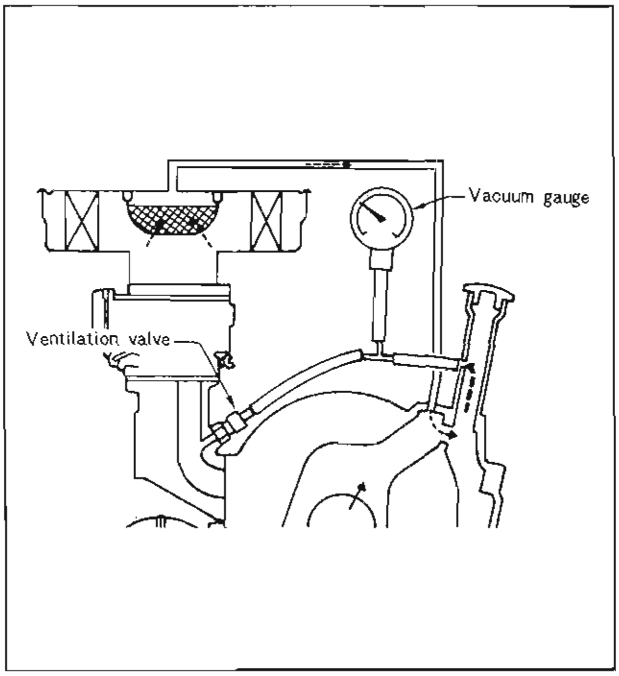


Fig. 1A–64 Checking ventilation valve

3. Start the engine. When the engine speed is raised to 2,500~3,000 rpm, the vacuum reading must be **under 60 mm-Hg.**

b. Removing ventilation valve
1. Remove the deceleration control valve, as described in Par. 1A–E–8.
2. Remove the starting motor if necessary.
3. Disconnect the ventilation hose at the ventilation valve.
4. Loosen and remove the ventilation valve with the **ventilation valve wrench** (49 1881 135).

c. Installing ventilation valve
Install the ventilation valve in the reverse sequence.

1A–E–14. Evaporative line (U.S.A. and Canada spec models only)

a. Checking evaporative line
1. Disconnect the evaporative hose from the "T" joint which is connected to the ventilation hose.
2. Connect the disconnected hose to the "U" type manometer as shown in Fig. 1A–65.
3. Apply a compressed air gradually into the manometer and the difference of water level should be **356 mm (14.0 in).** After that, blind the inlet of the manometer.
4. Leave the manometer for five minutes, with the inlet blind. Then, if the difference of water level is **over 343 mm (13.5 in),** the evaporative line will be in good condition. If the difference is not within the specifications, inspect the following parts. If any defect, repair or replace.
(1) Leaky or loosen hoses
(2) Leaky condense tank
(3) Leaky fuel tank
(4) Leaky or loosen fuel line
(5) Leaky filler cap
(6) Leaky fuel gauge unit

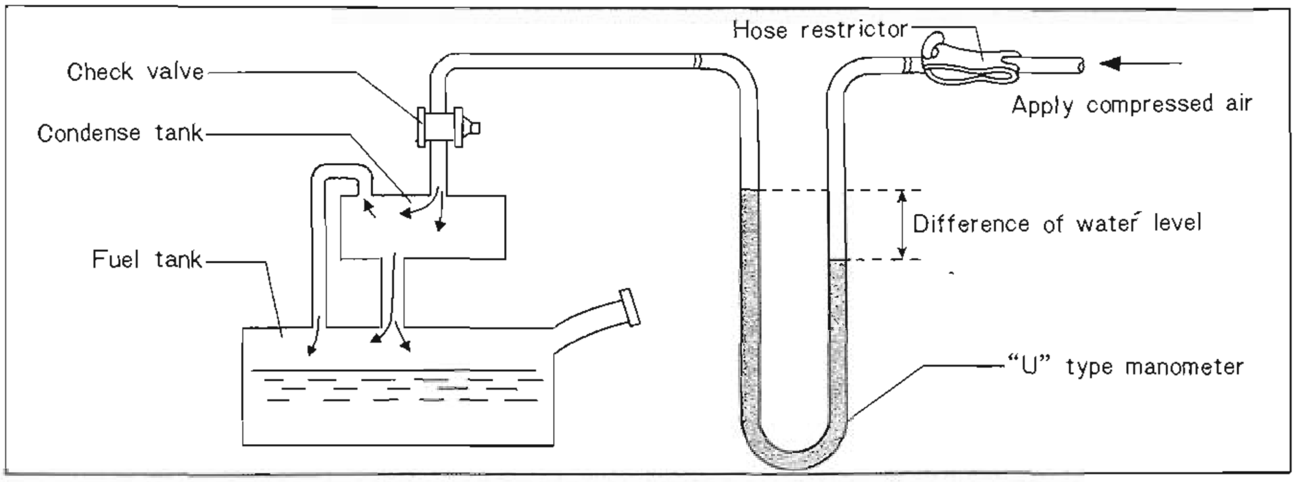


Fig. 1A–65 Checking evaporative line

1A–E–15. Charcoal Canister (U.S.A. and Canada spec models only)

a. Checking charcoal canister

1. Check to see that the air cleaner element is not clogged.
2. Visually check the adhering condition of oil. When the whole surface is damp with oil, measure the ventilation resistance.
3. Attach a vacuum gauge as shown in Fig. 1A–66. Check to see that when the engine speed is raised to 2,500~3,000 rpm, the vacuum gauge reads **under 60 mm-hg.**

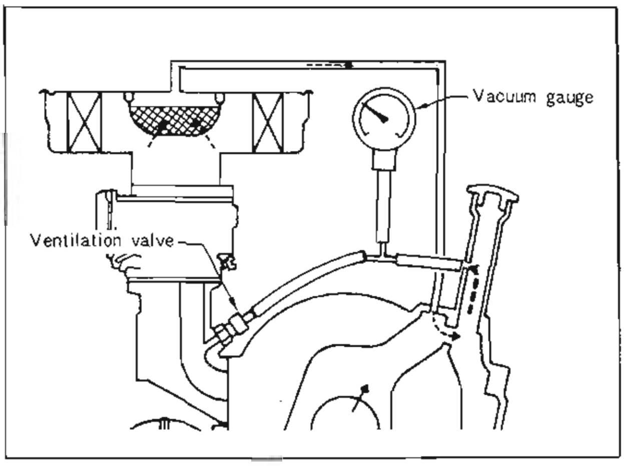


Fig. 1A–66 Checking charcoal canister

Note: The charcoal canister and air cleaner cover should be replaced as an assembly only.

1A–E–16. Condense Tank (U.S.A. and Canada spec models only)

a. Removing condense tank

Sedan and Coupe:

1. Disconnect the hoses from the condense tank.
2. Remove the rear package tray trim.
3. Remove the screws attaching the condense tank and remove the condense tank.

Rotary wagon (RX-3 only):

1. Remove the service hole cover.
2. Disconnect the hoses from the condense tank.
3. Remove the screws attaching the condense tank and remove the condense tank.

b. Installing condense tank

Install the condense tank in the reverse sequence.

1A–E–17. Check Valve (Evaporative emission control system, U.S.A. and Canada spec models only)

a. Checking check valve

1. Remove the check valve.
2. Blind one end of the check valve by hand, and install the pressure gauge to the other end as shown in Fig. 1A–67.

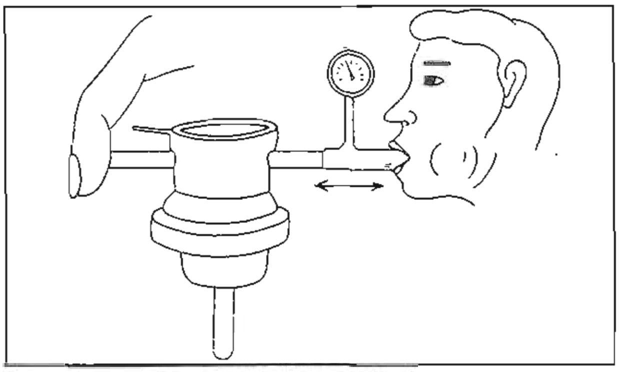


Fig. 1A–67 Checking check valve

3. Breath in and out the check valve with the pressure of **about 0.5 kg/cm^2 (7.1 lb/in^2)**, and if the valve operates, it will be satisfactory. But, if not, replace it with new one.

b. Removing check valve

Sedan and Coupe:

1. Disconnect the hoses from the check valve.
2. Remove the nuts attaching the check valve and remove the check valve.

Rotary wagon (RX-3 only):

1. Remove the service hole cover.
2. Disconnect the hoses from the check valve.

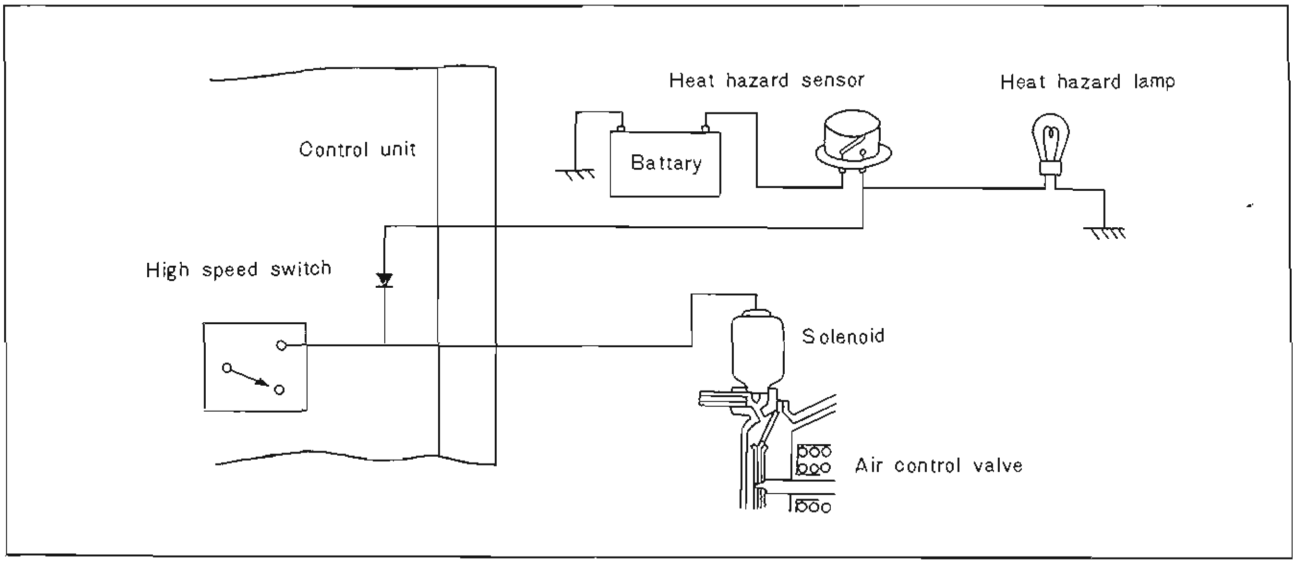


Fig. 1A–68 Checking heat hazard warning system

3. Remove the nuts attaching the check valve and remove the check valve.

c. Installing check valve
Install the check valve in the reverse sequence.

1A–E–18. Heat Hazard Warning System

a. Checking heat hazard warning system
1. Remove the heat hazard sensor from the body.
2. Disconnect the air control valve lead and connect the test light as shown in Fig. 1A–69.

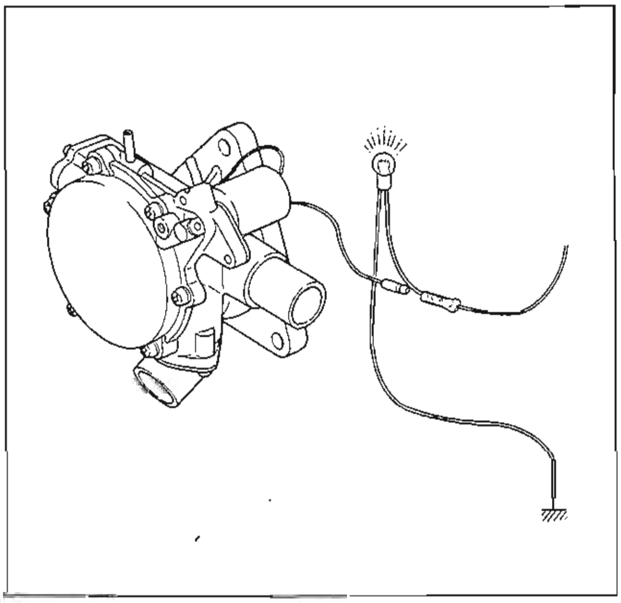


Fig. 1A–69 Connecting test lamp

3. Place it in engine oil with a thermometer. Be sure to prevent the oil entering into the inside of the sensor.
4. Gradually heat the oil so as to raise its temperature at the rate of one degree a minute. The test lamp which is connected to the air control valve lead and the heat hazard warning lamp should light at the temperature of $120 \pm 5°C$ ($248 \pm 10°F$) when the engine is running at idle speed.

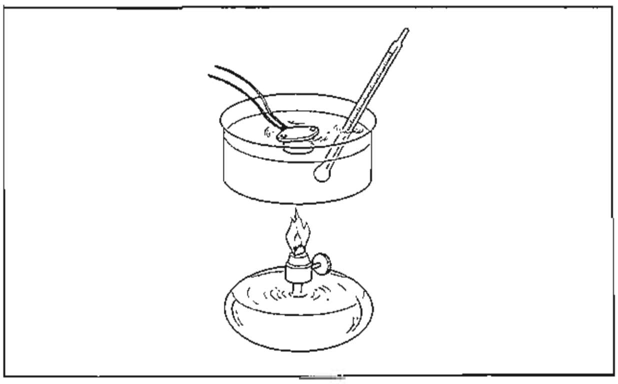


Fig. 1A–70 Heating up heat hazard sensor

b. Removing heat hazard sensor
Sedan and Coupe:
1. Open the luggage compartment door and remove the mat.
2. Disconnect the multiple coupler from the heat hazard sensor.
3. Remove the screws attaching the heat hazard sensor and remove the heat hazard sensor.

Rotary wagon (RX-3 only):
1. Fold the rear seat back forward.
2. Disconnect the multiple coupler from the heat hazard sensor.
3. Remove the screws attaching the heat hazard sensor and remove the heat hazard sensor.

1A–E–19. Hoses and Tubes (All systems)

a. Inspecting hoses and tubes
1. Inspect all hoses and tubes for deterioration or holes and all tubes for cracks or holes.
2. Check all hoses and tubes for improper connections.
3. If any defect is suspected, fit properly or replace if necessary.

1A–F. TROUBLE SHOOTING

1A–F–1. Symptoms, Causes and Remedies

The possible faults and their remedies are listed in the following table. When the symptoms of troubles are detected, proper care must be taken immediately before proceeding to the next probable cause.

Symptoms and probable causes	Remedies	
1. Poor acceleration		
* The engine does not fully respond to the depression of the accelerator pedal.		
* The accelerative force is poor.		
* The climbing capacity is insufficient		
* The max. speed can not be obtained.		
1) Improper ignition timings for leading and trailing plugs	See 5–C–2	Adjust
2) Improper opening of carburetor secondary throttle valve	Check	
3) Fouling and excessive gap of spark plugs (Fouling by lead or carbon)	See 5–E	Clean or replace
4) Burned or improperly adjusted distributor contact point	See 5–C–1	Replace if necessary
5) Lack of fuel supply at high speed running	See 4–B	Replace if necessary
6) Clogging of air cleaner	Clean	
2. Rough engine idling and hard starting		
* The idling speed can not be lowered.		
* Too much engine vibration at idling.		
* The engine starting is too hard.		
* The engine stalls immediately even if it starts.		
1) Air leak from each hose	See 1A–E–19	Replace if necessary
2) Clogging of carburetor jets	Clean	
3) Improper seating of carburetor secondary throttle valve	Check	
4) Fouled spark plug	See 5–E–3	Clean or replace
5) Burned or improperly adjusted distributor contact point	See 5–C–1	Clean or replace
6) Improper ignition timings of leading and trailing plugs.	See 5–C–2	Adjust
7) Defective ventilation valve	See 1A–E–13	Replace if necessary
8) Internal disconnection of leading and trailing ignition coils	Replace	
9) Air leak from air intake system	Repair or replace if necessary	
10) Defective deceleration control valve	See 1A–E–8	Replace if necessary
11) Low compression pressure	Repair	
12) Defective altitude compensator	See 1A–E–9	Replace if necessary
3. Noisy air pump		
* The noise is generated by the air pump when the engine is idling.		
* The noise is generated by the air pump when the engine is racing.		
1) Improperly adjusted "V"belt	See 1A–E–1	Adjust
2) Defective air pump	See 1A–E–1	Replace
3) Disconnected or leaky air hose	Connect and replace	
4) Insufficient tightening of pump attaching bolts	Tighten	
4. Improper fuel connection between slow and main zones (Flat spot)		
* Shock is felt when depressing the accelerator pedal to accelerate from the low speed cruising condition.		
* Shock is felt when depressing the accelerator pedal after turning left at low speed.		
1) Improper injection of carburetor accelerator pump	See 4–A–5	
2) Clogging of carburetor jets	Clean	
3) Fouled leading spark plug	See 5–E–3	
4) Excessively low carburetor fuel level	See 4–A–3	Adjust
5) Continuously opened anti-afterburn valve	See 1A–E–8	Replace if necessary
5. Improper fuel connection between primary and secondary zones		
* Shock is caused when accelerating from running at aroud 3,000 rpm by depressing the accelerator pedal.		

Symptons and probable causes	Remedies
* Shock is caused when promptly accelerating from the middle speed or the decelerating contition.	
1) Clogging of carburetor jets	Clean
2) Excessively low carburetor fuel level	See 4–A–3 Adjust
3) Serious clogging of air cleaner element	Clean or replace
4) Continuously opened anti-afterburn valve and coasting valve (deceleration control valve)	See 1A–E–8 Replace if necessary
6. Large car knocking during cruising	
* It is impossible to cruise constantly in any gear.	
* Shock is sometimes caused during running in top gear.	
Note: These phenomena are more or less inevitable. Therefore, unless the car knocking is excessive, it can be regarded to be normal.	
1) Clogging of carburetor jets or excessively low fuel level	Clean or adjust (See 4–A–3)
2) Trailing side ignition does not occur.	Check and replace if necessary
3) Air leak from each hose	See 1A–E–19 Repair and replace if necessary
4) Air leak from each valve	Replace if necessary
5) Fouled spark plug	See 5–E–3 Clean or replace
6) Improper distributor vacuum advance (no advance)	See 5–C–4 Repair and replace parts
7. Abnormally large engine knocking	
1) Improper ignition timings of leading and trailing sides (excessive advance)	See 5–C–2 Adjust
2) Excessive distriburor vacuum advance	See 5–C–4 Adjust
3) Excessive distributor centrifugal advance	See 5–C–4 Adjust
4) Too poor fuel	Clean
5) Insufficient heat range or extreme gap erosion of spark plug	See 5–E–1 Adjust or replace
8. Pre-ignition or spit back	
* Large noise comes from the engine compartment at high speed running, e.g. on the free way, and the engine horse-power falls.	
Note: If the car is run continuously under the condition mentioned above, the insulator of the spark plug is broken and bites into the combustion chamber, causing the vehicle to the inoperable.	
Pre-ignition / Spit back: 1) Excessive spark plug gap for trailing side; 2) Excessive advanee of trailing side ignition; 3) Excessive advance of leading side ignition; 4) Insufficient heat range of spark plug; 5) Insufficient metering oil; 6) Sticky apex seal; 7) Improper alignment of high tension cords	
9. Large car bucking or deceleration vibration	
* Within the range where the coasting valve should operate (when decelerating from 1,200 rpm [automatic transmission: 1,400 rpm] or over) large car bucking occurs.	
Note: Even if the car bucking happens to occur within the range of engine speed less than 1,200 rpm (automatic transmission: 1,400 rpm) where the coasting valve does not operate, it may be regarded as normal.	
1) Improper operation of coasting valve (deceleration control valve)	See 1A–E–8 Replace
2) Defective control unit	See 1A–E–7 Replace
3) Improper idle fuel flow or idle speed	See 4–A–1 Adjust
4) Air leak from each hose	See 1A–E–19 Repair and replace if necessary
5) Air leak from each valve	Repair and replace if necessary
6) Defective idle switch	See 1A–E–11 Replace
7) Improperly adjusted idle switch	See 1A–E–11 Adjust
8) Fouled spark plug	Clean and replace

Symptoms and probable causes	Remedies	
10. Afterburning		
* Extremely annoying afterburning occurs during deceleration.		
* Afterburning occurs when turning off the ignition switch.		
1) Deceleration control valve not opening properly	See 1A–E–8	Replace
2) Coasting valve (deceleration control valve) not opening properly	See 1A–E–8	Replace
3) Rich idle mixture	See 4–A–1	Adjust
4) Gas leak from exhaust system		
5) Too low idle revolution		
11. Over flow from carburetor		
1) Dust biting into needle valve	Clean	
2) Improper sealing of needle valve	Clean and replace parts	
3) Improper movement of float	Adjust and replace parts	
4) Large fuel pressure or fuel pump	See 4–B	Replace if necessary
12. The engine brake does not work even if the accelerator pedal is released.		
* Even if the accelerator pedal is released when running, the engine brake does not work, which causes the overrunning and makes the driver uneasy.		
1) Improper returning of carburetor primary throttle valve	Clean	
2) Improper returning of carburetor secondary throttle valve	Clean	
13. The air jets out from the tail pipe for the forced air cooling during idling.		
1) Improper operation of air control valve	See 1A–E–4	Replace if necessary
2) Electric current flowing from the control unit to air control valve	See 1A–E–7	Replace
14. Factors which adversely affect overall emission under proper procedure		
1) Improper operation of air control valve (Air cut valve, No. 1 relief valve and No. 2 relief valve)	See 1A–E–4	Replace if necessary
2) Defective control unit	See 1A–E–7	Replace
3) Trailing side spark plug is not controlled. (when the engine is cold.)	See 1A–E–7	Replace if necessary
4) Improper ignition timings of leading and trailing plugs.	See 5–C–2	Adjust
5) Improper engine idling speed	See 4–A–1	Adjust
6) Defective carburetor (improper fuel level, jet, etc.)	See 4–A	Adjust or repair
7) Improper operation of deceleration control valve	See 1A–E–8	Replace if necessary
8) Fouled spark plug	See 5–E–3	Clean or replace
9) Breakage of reactor	See 1A–E–3	Replace
10) Air leak from secondary air passage	Repair and replace	
11) Air leak from each sensing tube to intake manifold	Repair and replace	
15. Factors which adversely affect idling emissions		
1) Improper idling speed or mixture	See 4–A–1	Adjust
2) Defective spark plug	See 5–E	Clean or replace
3) Improper ignition timings of leading and trailing sides	See 5–C–2	Adjust
4) Defective distributor contact point	See 5–C–1	Clean or replace
5) Deteriorated air pump	See 1A–E–1	Replace
6) Improper operation of air control valve	See 1A–E–4	Replace if necessary
7) Defective control unit	See 1A–E–7	Replace
8) Air leak from each valve into intake manifold	Repair and replace	
9) Breakagc of reactor	See 1A–E–3	Replace
16. Factors which adversely affect deceleration emissions		
1) Improper idling speed and fuel flow	See 4–A–1	Adjust
2) Improper operation of deceleration control valve	See 1A–E–8	Replace if necessary
3) Improper operation of air control valve (Air cut valve, No. 1 relief valve and No. 2 relief valve)	See 1A–E–4	Replace if necessary
4) Defective idle switch	See 1A–E–11	Replace
5) Breakage of reactor	See 1A–E–3	Replace

Symptoms and probable causes	Remedies	
17. Factors which adversely affect acceleration emissions		
1) Improper air pump flow	See 1A–E–1	Replace
2) Defective air control valve (air cut valve, No. 1 relief valve and No. 2 relief valve)	See 1A–E–4	Replace if necessary
3) Trailing side spark plug also ignited (when the engine is cold)	See 1A–E–7	Replace if necessary
4) Defective thermosensor	See 1A–E–5	Replace
5) Defective thermodetector	See 1A–E–6	Replace
6) Defective carburetor (improper fuel level and other)	See 4–A	Adjust
7) Defective control unit	See 1A–E–7	Replace
8) Defective reactor	See 1A–E–3	Replace
9) Defective spark plug	See 5–E	Replace

1A–F–2. Detects, Conditions of Trouble and Causes of Defects Related to Each System

a. Air control valve

Possible troubles	Corresponded item
1. Number of revolutions during idling decreases	B
2. Emission during idling becomes unfavourable.	B, C
3. Emission during acceleration becomes unfavourable.	B
4. Emission during cruising becomes unfavourable.	B
5. Emission during deceleration becomes unfavourable.	B
6. Damage is liable to occur on reactor	A
7. Rough engine idling	B
Conditions of trouble of system	**Corresponded item**
A. Remains constantly open (air inject)	a, b
B. Remains contsantly closed (air cut)	a, b
C. Excessive air leakage from valve	b
Probable causes	
a. Defective control unit	
b. Defective air control valve	

b. Thermosensor

Possible troubles	Corresponded item
1. Exhaust emission becomes abnormally unfavourable.	A
2. Possibility of the reactor being damaged is great.	B
3. Penalty in fuel economy	B
4. Power drop	B
Conditions of trouble of system	**Corresponded item**
A. Trailing ignition does not cut off in driving ranges other than "idling, deceleration or wide open throttle" at normal temperature cold start.	a, b
B. Trailing ignition remains constantly off in driving ranges other than "idling, deceleration, or wide open throttle" when the engine is warm.	a, b
Probable causes	
a. Defective control unit	
b. Defective thermosensor	

c. Thermodetector

Possible trouble	Corresponded item
1. Trailing ignition does not cut off at normal temperature cold condition and 4 plugs are in operation.	A, B
Conditions of trouble of system	**Corresponded item**
A. Disconnection of connector	a
B. Broken connection of wires inside thermodetector	a
Probable cause	
a. Defective thermodetector	

d. Control Unit

Possible troubles	Corresponded item
1. Exhaust emission becomes abnormally unfavourable.	A, C, D
2. Power drop	B, C
3. Driveability shows abnormally deterioration	B, D
Condition of trouble of system	**Corresponded item**
A. Trailing ignition does not cut off when engine is cold. (4 plugs in all ranges)	a, b
B. Trailing ignition remains constantly off.	a, b
C. Deceleration control valve or air control valve operate improperly.	a
Probable causes	
a. Defective control unit	
b. Defective thermosensor	

e. Fuse of the control unit

Possible troubles	Corresponded item
1. Possibility of the reactor being damage is grate.	A
2. Rough engine idling	B
3. Abnormal CO, HC readings at engine idling and decelerating	B
4. Flat spot occurs during driving	B
5. Excessive periodical engine knocks (Serzing)	B
6. Flat spot occurs during light acceleration from low speed running or deceleration condition.	B
7. Engine idle speed becomes high.	B
Condition of trouble of system	**Corresponded item**
A. Air control valve remains open (air injection)	a, b, c
B. Deceleration control valve (coasting valve) remains open.	a, b, d
Probable causes	
a. Fuse of control unit blows	
b. Defective control unit	
c. Defective air control valve	
d. Defective deceleration control valve	

f. Deceleration control valve

Possible troubles	Corresponded items
1. Extremely annoying afterburning occurs during deceleration or after turnnig off the ignition switch.	B, C
2. Rough engine idling	A, C
3. Hard engine starting	A, C
4. Abnormal CO, HC readings at engine idling and decelerating	A, C
5. Flat spot occurs during driving	A, C
6. Excessive periodical engine knocks (Serzing)	A, C
7. Flat spot occurs during light acceleration from low speed running or deceleration condition	A, C
8. Engine idle speed becomes high	A, C
Conditions of trouble of system	**Corresponded item**
A. Valve stay open or delay to close	a, b, c
B. Valve stay closed or delay to open	a, b, c
C. Excessive air leak at valve	c
Probable causes	
a. Defective idle switch	
b. Defective control unit	
d. Defective deceleration control valve	

g. Idle switch

Possible troubles	Corresponded item
1. Exhaust emission becomes abnormally unfavourable.	B
2. Driveability deteriorates.	A
3. Abnormal afterburn occurs.	B

4. Car bucking becomes abnormally excessive.	B
Conditions of trouble of system	**Corresponded item**
A. Coasting valve remains constantly open at acceleration and normal speed running.	b, c
B. Coasting valve does not open during deceleration.	a, b, c, d
Probable causes	
a. Defective control unit b. Defective coasting valve solenoid c. Defective idle switch d. Improper return of the carburetor primary throttle valve	

h. Ventilation valve

Possible troubles	Corresponded item
1. Misfiring frequently occurs during idling and fluctuations in number of revolutions increase.	B
2. Number of revolutions at idling decreases.	A
3. Dilution of engine oil with gasoline increases.	B
4. Defective purging occurs in charcoal canister.	A
Conditions of trouble of system	**Corresponded item**
A. Remains constantly closed	a
B. Remains constantly open	a
Probable cause	
a. Defective ventilation valve	

SPECIAL TOOLS

49 2113 010	Air pump gauge set
49 2113 011	T–fitting
49 2113 012	Plug
49 2113 014	Pressure gauge
49 1881 125	Thermal reactor remover
49 1881 135	Ventilation valve wrench

LUBRICATING SYSTEM

2–A. LUBRICATING CIRCUIT

1. The oil pump which is driven by the eccentric shaft, draws up the oil from the oil pan through the strainer and sends it to the oil cooler through the pressure control valve.
2. The pressure control valve sends the surplus oil back to the oil pan when the oil pressure exceeds 11 kg/cm² (156 lb/in²) in order to prevent the oil cooler and the oil hose from damage by the exceeding pressure which is generated at the starting in the very cold weather.
3. The by-pass valve is installed on the oil cooler in order to prevent drop of oil supply which is caused by resistance of oil cooler in the cold weather and regulate the temperature of the oil circulating in the engine. The oil is sent directly to the engine without passing through the oil cooler when the difference of the oil pressure of inlet and outlet pipes is more than 3.56 kg/cm² (50.7 lb/in²) at 70°C (158°F) and/or the temperature of the oil is under 60°C (140°F).
4. The oil from the oil cooler is forced to the pressure regulator on the rear housing.
5. The oil of which pressure is regulated to 5 kg/cm² (71.1 lb/in²), is forced to the oil filter.
6. The oil that has been filtered by the oil filter is forced to the front main bearing through the tubular dowel and to the rear main bearing through the passage of the rear housing.
7. The oil that has passed through the oil holes of the bearings, lubricate the front and rear main bearings and enters the oil passage provided in the eccentric shaft.
8. The oil passing through the eccentric shaft passage lubricates the rotor bearings.
9. Needle bearings which are provided in front of the front housing are lubricated by the oil forced through the little hole led to the oil passage of the eccentric shaft and the oil coming after lubricating the front main bearing.
10. The eccentric shaft is equipped with two oil jets. The oil in the passage of the eccentric shaft is injected through the oil jets into the front and rear rotors and cools the rotors.
11. Stationary gears and internal gears are lubricated by the oil coming after cooling the rotors and after lubricating the main bearings.
12. The oil passing through the tubular dowel is sent to the front cover and led to the metering oil pump.
13. From the metering oil pump, the oil is forced to the carburetor and is supplied into the combustion chambers together with the air-fuel mixture to lubricate the apex seals, corner seals, side seals and housings.

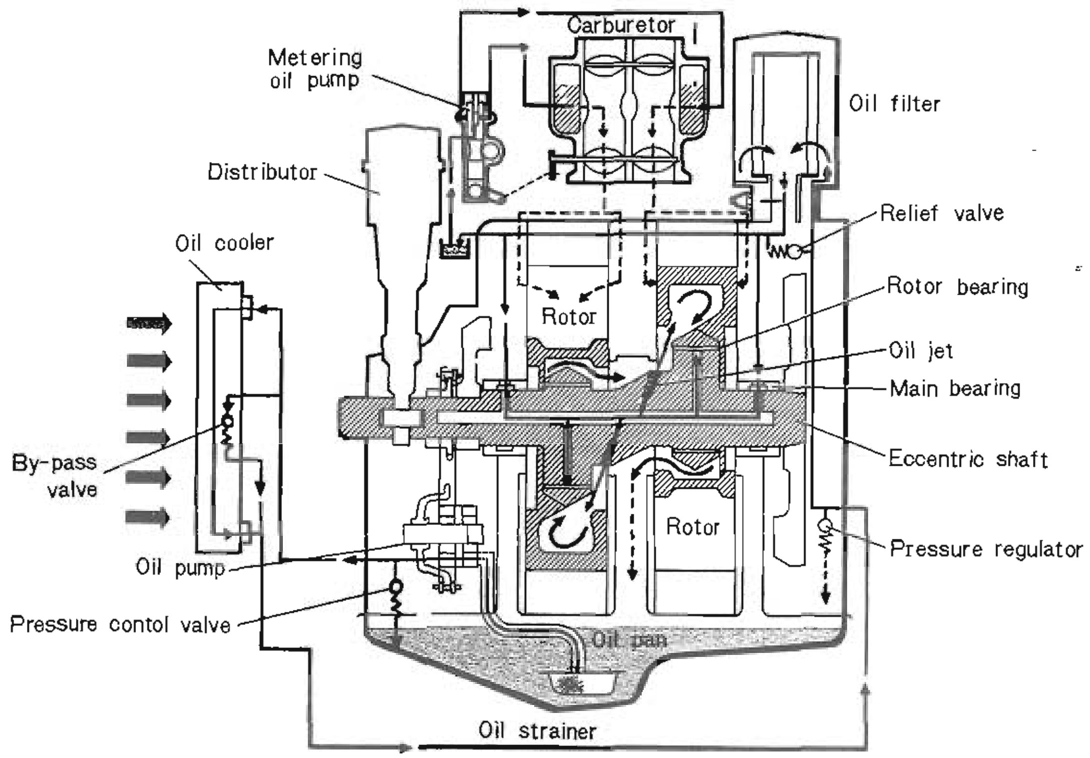


Fig. 2–1 Lubricating circuit

2-B. OIL PUMP

The oil pump is of a rotor type based on a trochoid curve and consists of the parts as shown in Fig. 2-5. The feeding capacity is 6 liters/min. (12.7 U.S. pints/min., 10.6 Imp. pints/min.) at 1,000 rpm of engine speed.

2-B-1. Disassembling Oil Pump

1. Remove the oil pump from the front housing.
2. Remove the snap ring from the shaft, and remove the rear rotors and key.
3. Remove the middle plate attaching screw and remove the middle plate.
4. Remove the front rotors and key from the shaft.

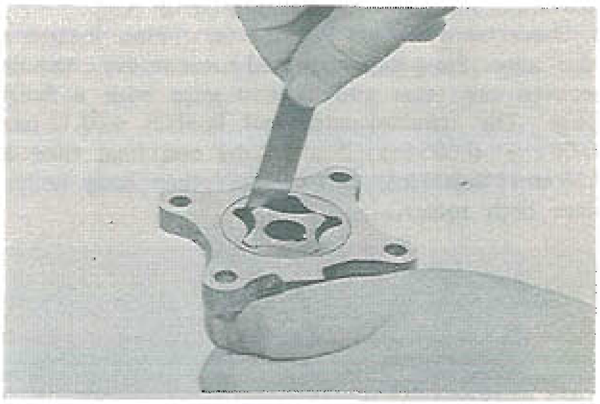


Fig. 2-3 Checking rotor clearance

2-B-2. Inspecting Oil Pump

1. Check the clearance between the lobes of the rotors with a feeler gauge, as shown in Fig. 2-3. The standard clearance is 0.01 ~ 0.09 mm (0.0004 ~ 0.0035 in). *If the clearance exceeds* **0.15 mm (0.006 in)**, replace both inner rotor and outer rotor.
2. Check the clearance between the outer rotor and pump body with a feeler gauge as shown in Fig. 2-4. The specified clearance is 0.20 ~ 0.25 mm (0.008 ~ 0.01 in). *If the clearance is more than* **0.30 mm**

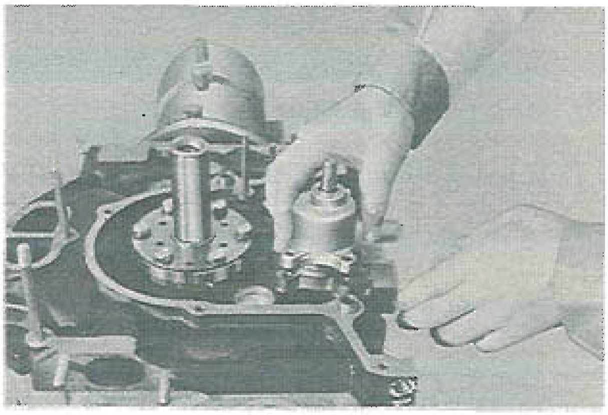


Fig. 2-2 Removing oil pump

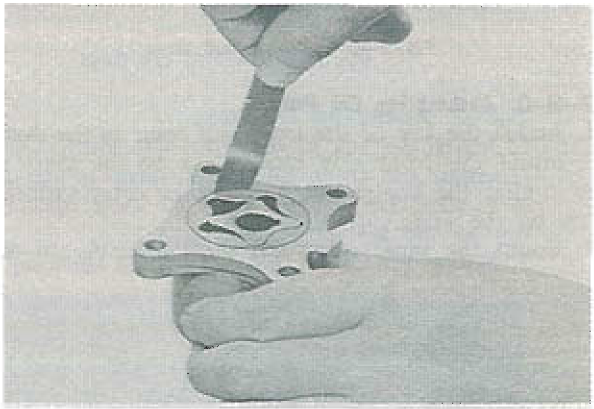


Fig. 2-4 Checking outer-rotor clearance

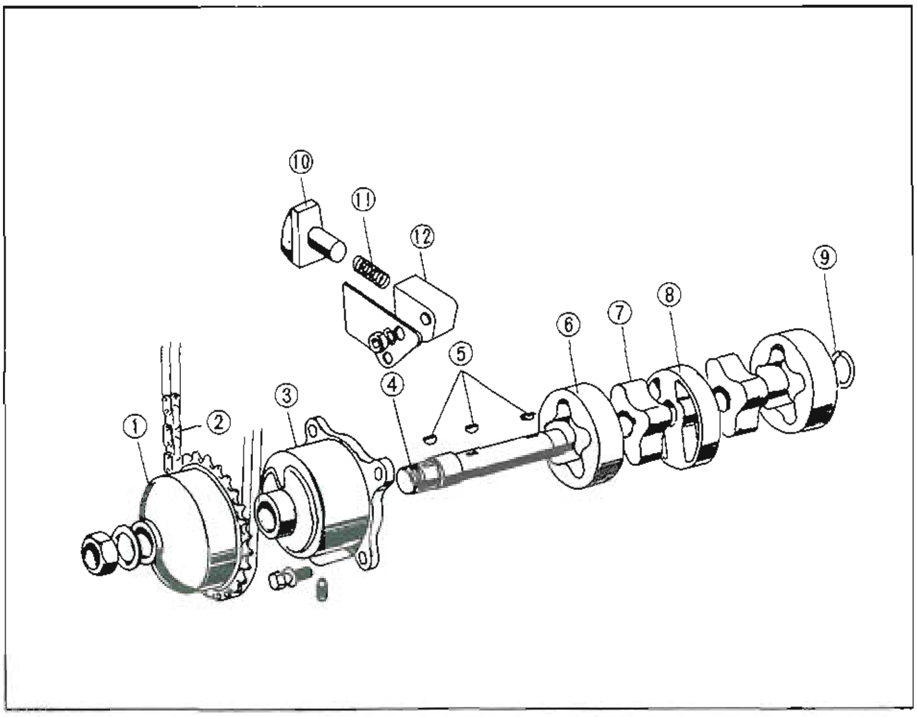


Fig. 2-5 Oil-pump components

1. Oil pump driven sprocket
2. Oil pump chain
3. Pump body
4. Shaft
5. Keys
6. Outer rotor
7. Inner rotor
8. Middle plate
9. Snap ring
10. Slipper head
11. Spring
12. Body

(0.012 in), replace the rotor(s) or body.
3. Check the end float of the rotors. Place a straight edge across the pump body and measure the clearance between the rotor and straight edge with a feeler gauge. The standard end float is 0.03 ~ 0.13 mm (0.001 ~ 0.005 in). If the total end float exceeds **0.15 mm (0.006 in)**, correct the pump body or replace both rotors.

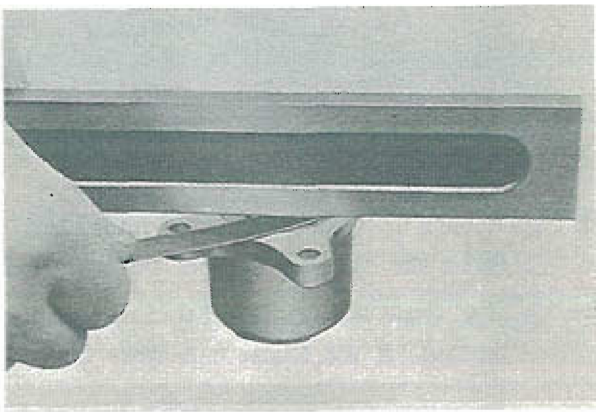


Fig. 2–6 Checking end float

2–B–3. Assembling Oil Pump

1. Attach the key of the front side rotor to the shaft.
2. Install the front side inner rotor to the shaft so as to align the key groove of the inner rotor with the key on the shaft.
3. Mount the inner rotor and shaft assembly to the pump body.

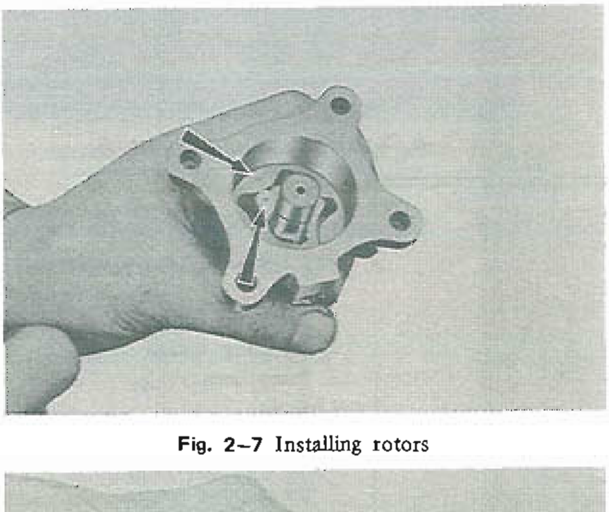


Fig. 2–7 Installing rotors

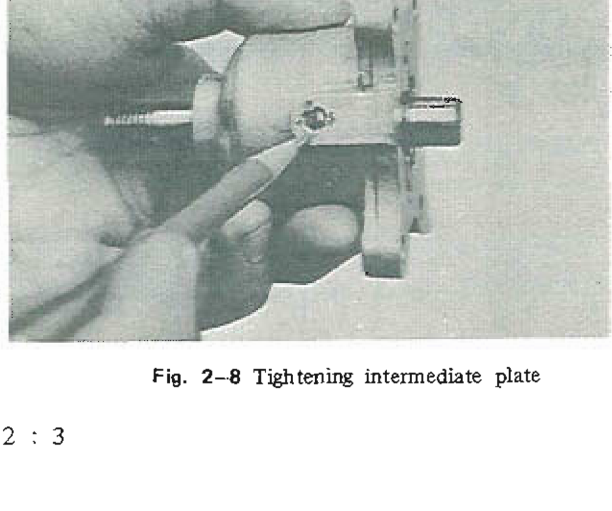


Fig. 2–8 Tightening intermediate plate

4. Install the outer rotor to the body so as to see the identification marks of triangle. Apply oil to the rotors. (Fig. 2–7)
5. Install the middle plate to the body. Tighten the set screw. (Fig. 2–8)
6. Attach the key of the rear side rotor to the shaft.
7. Install the rear side inner rotor and outer rotor.
8. Fit the snap ring on the shaft. Apply oil to the rotors.

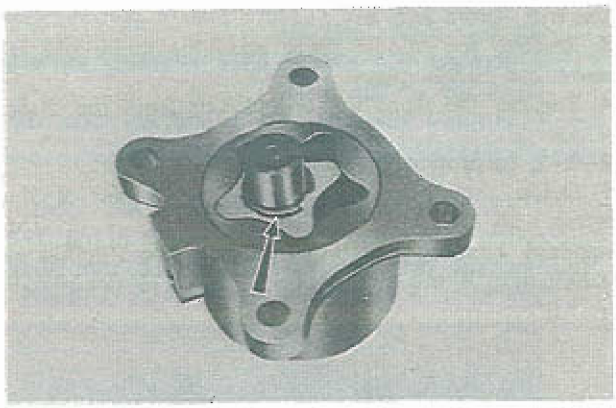


Fig. 2–9 Fitting snap ring

9. Mount the oil pump assembly on the front housing and fix it with the bolts. Rotate the shaft by hand to see whether it rotates smoothly.

2–C. OIL PUMP DRIVING

2–C–1. Chain Adjuster Inspection

1. Check the amount of protrusion of the chain adjuster, as shown in Fig. 2–10. If the protrusion exceeds **12 mm (0.47 in)**, replace the adjuster or chain.
2. Check the rubber on the contacting surface of the chain adjuster for wear or damage and spring for weakness. If necessary, replace the chain adjuster.

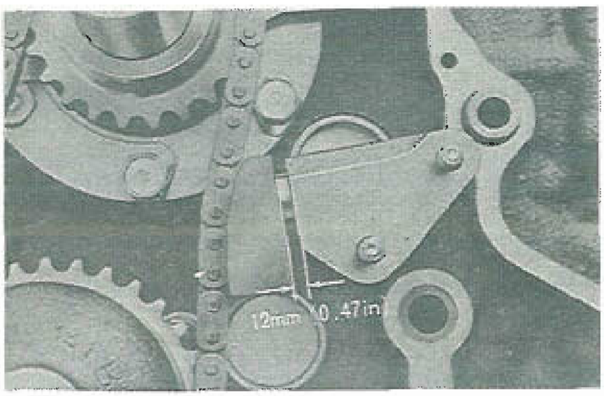


Fig. 2–10 Checking chain adjuster

2–C–2. Oil Pump Chain and Sprocket Inspection

1. Check the chain for broken links.
2. Check the sprockets for cracks and worn or damaged teeth. If any defects are found, replace with new parts.

2–D. PRESSURE CONTROL VALVE

The pressure control valve mounted on the front cover sends the surplus oil back to the oil pan when the pressure exceeds 11 kg/cm² (156 lb/in²) in order to prevent the oil cooler and the oil hose from damage by the exceeding pressure which is generated at the starting in the very cold weather.

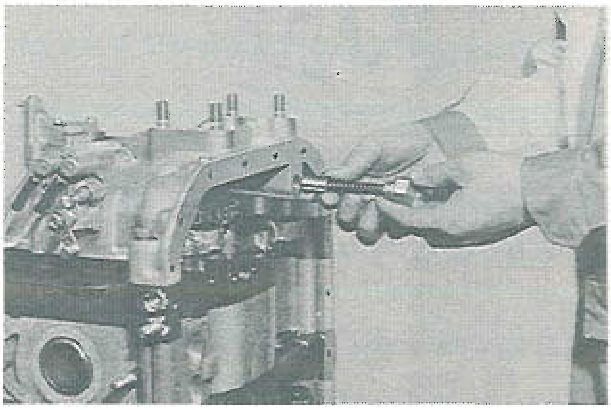


Fig. 2–11 Pressure control valve

2–D–1. Checking Pressure Control Valve

Remove the cap of the pressure control valve from the front cover.
Examine the spring and the plunger for corrosion or any damage. If it is severe, replace with new ones. Measure the free length, set length and set pressure. Replace with new spring if these are not in the specifications.

2–E. OIL COOLER

The rotor is cooled by the lubricating oil, and the oil cooler is employed to cool the oil.
The oil cooler is of the corrugated fin type like a water radiator and is mounted under the radiator through insulation rubber. The oil cooler is made of aluminum which has outstanding cooling efficiency.

2–E–1. Repairing Oil Cooler

The inner pressure of the oil cooler is much higher than the cooling radiator, so it should be repaired by

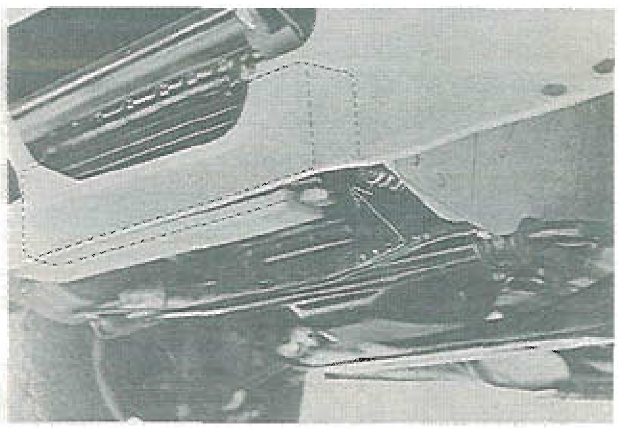


Fig. 2–12 Oil cooler

aluminum welding when damaged.

2–F. BY-PASS VALVE

The by-pass valve is installed on the oil cooler in order to prevent drop of oil supply which is caused by the resistance of the oil cooler in the cold weather and regulate the temperature of the oil circulating in the engine. The oil is sent directly to the engine without passing through the oil cooler when the difference of the oil pressure of inlet and outlet pipes is more than 3.56 kg/cm² (50.7 lb/in²) at 70°C (158°F) and/or the temperature of the oil is under 60°C (140°F).

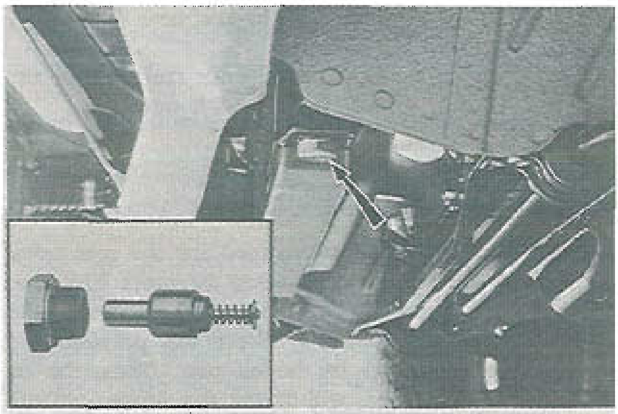


Fig. 2–13 By-pass valve

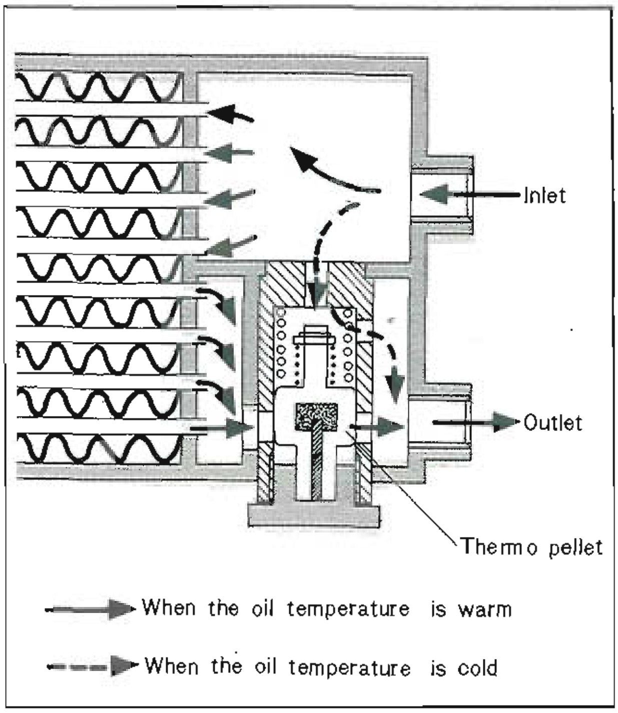


Fig. 2–14 By-pass valve

2–F–1. Checking By-pass Valve

1. Remove the cap nut and pull out the by-pass valve.
2. Soak the by-pass valve in hot oil of 75°C ~ 80°C (167°F ~ 176°C). If the protrusion of piston is more than 5 mm (0.2 in), the by-pass valve is normal. (Fig. 2–15)

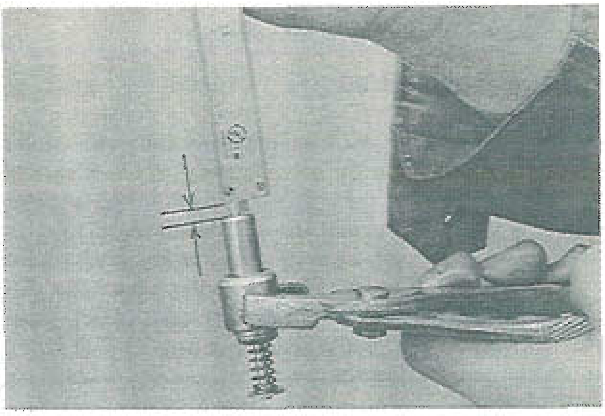


Fig. 2–15 Checking by-pass valve

3. Check the spring and the valve for corrosion or any damage. If it is severe, replace with new ones.

2–G. PRESSURE REGULATOR

The pressure regulator is provided on the rear housing. When the engine revolution becomes high and excessive oil pressure develops in the system, the pressure regulator opens to relieve the pressure and to send the excess oil to the oil pan. Thus, the oil pressure is maintained within the maximum pressure of 5 kg/cm² (71.1 lb/in²).

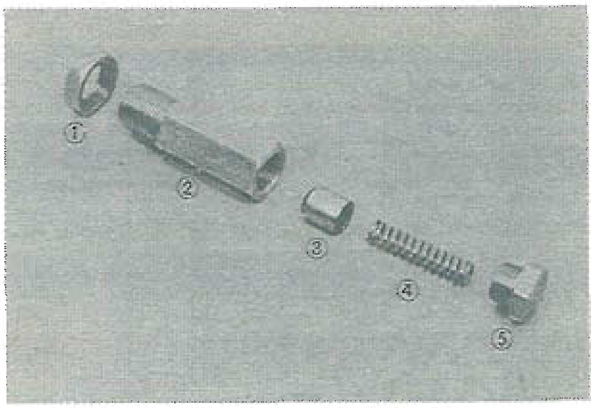


Fig. 2–16 Pressure regulator

1. Lock nut
2. Regulator body
3. Plunger
4. Spring
5. Plug

2–G–1. Checking Pressure Regulator

Remove the cap or regulator assembly from the rear housing.
Check the spring and the plunger for corrosion or any damage. If it is severe, replace with new ones. Measure the free length, set length and set pressure. Replace with new spring if these are not in specifications.

2–G–2. Checking Oil Pressure

To check the oil pressure, proceed as follows :
1. Warm up the engine to the normal operating temperature and remove the oil pressure switch and install an oil pressure gauge **(49 0187 280)** in its place.

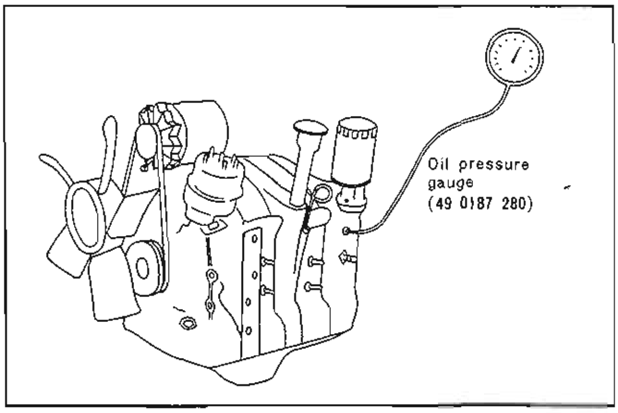


Fig. 2–17 Checking oil pressure

2. Run the engine at **3,000 rpm** and take a reading of the gauge. If the reading of the gauge is **5.0 kg/cm² (71.1 lb/in²)**, the oil pressure is normal.

3. Run the engine at idling speed and take a reading of the gauge. If the reading of the gauge is **2.5 kg/cm² (35.6 lb/in²)**, the idling pressure is normal.
If the oil pressure is extremely low, check the following points :
1. Ensure that the oil level is between the "F" and "L" marks of the dipstick gauge.
2. Check the oil pump, as described in **Par. 2–B–2.**
3. Check the pressure regulator for wear on the plunger and fatigue on the spring. The free length of the spring is **46.4 mm (1.827 in).**

2–H. OIL PRESSURE SWITCH

The oil pressure switch fitted to the rear housing is connected by the wiring to the oil préssure warning lamp. The safe minimum pressure is **0.3 kg/cm² (4.3 lb/in²)** at idle. If the oil pressure drops below 0.3 kg/cm² (4.3 lb/in²) the warning lamp lights up to indicate a trouble in the lubricating system. Therefore, when the warning lamp goes on, the oil pressure should be checked immediately.

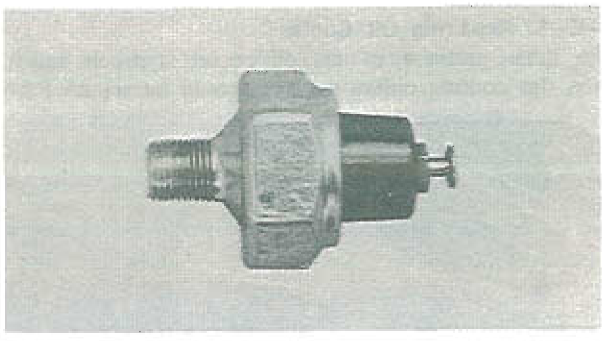


Fig. 2–18 Oil pressure switch

2–I. OIL FILTER

The oil filter is of a cartridge type. The element of the filter is sealed in the container as a unit. The oil filter is provided with a relief valve. If the

oil filter is clogged by impurities in the oil and the filtering resistance reaches **1.0 kg/cm^2 (14.2 lb/in^2)**, the oil can not pass through the element. In this case, the oil pushes the relief valve open and unfiltered oil is supplied to the engine.
The oil filter should be replaced **every 12,000 km (8,000 miles)**.

2–I–1. Replacing Oil Filter
1. Remove the oil filter cartridge with a suitable oil filter wrench.

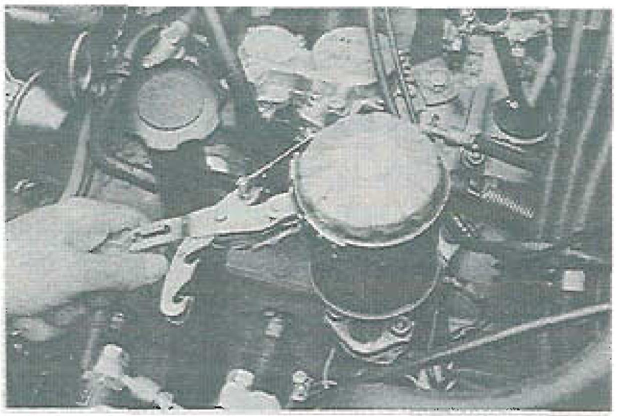


Fig. 2–19 Removing oil filter

2. Apply oil onto the rubber gasket on the new filter cartridge.
3. Place the cartridge on the cover and screw in until it just touches the cover.
4. Tighten the cartridge further 2/3 turn but absolutely no more.
Do not use the oil filter wrench.
5. Start the engine and check to see that the oil is not leaking from the joints. Top up with oil if necessary.

2–J. METERING OIL PUMP

The oil enters the metering oil pump from the lubricating oil passage in the front cover and the oil which is measured and discharged from the metering oil pump enters the carburetor through a hose. The oil entering the carburetor is discharged from a portion of venturi to the working chamber to lubricate the gas seals. The plunger type metering oil pump is provided to send the proper amount of oil to the carburetor and is driven by the distributor drive gear.

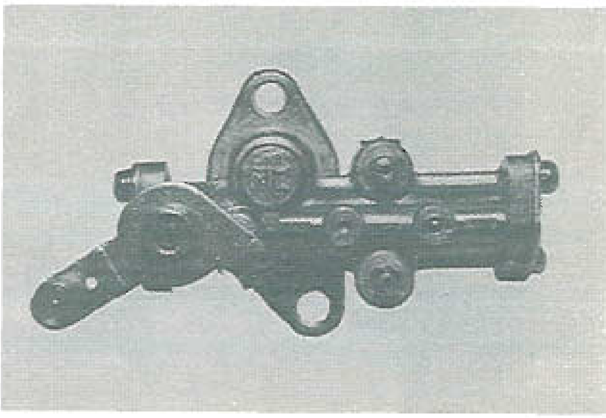


Fig. 2–20 Metering oil pump

2–J–1. Checking Metering Oil Pump
As sufficient consideration is being given on the performance and durability of the metering oil pump in its production process, generally there is no need of adjustment.
But as previously mentioned, the metering oil pump is the heart of the operation of the gas seals and insufficient amount of oil discharge could cause troubles such as drop in engine power and development of noise, because of insufficient lubrication, while excessive amount of oil discharge could cause problems as white smoke.
Therefore, the amount of oil discharge should always be within the proper range.
In case the engine tends to show any of the above troubles, the amount of oil discharge should be checked, proceeding as follows.
1. Disconnect the connecting rod by removing the cotter pin.
2. Disconnect the 2 metering oil hoses from the carburetor.
3. Install the tachodwell tester and set the engine at a constant speed of **2,000 rpm.** Wait until the oil discharge from the end of the metering oil hoses becomes steady and, when it is steady receive the oil in the measuring cylinder and start measuring the time simultaneously.
4. Stop the engine after **6 minutes** and check the amount of oil discharge. If it is within the proper range shown below, the discharge is satisfactory. Otherwise, adjust the oil metering pump.

2.2 cc /6 min. /2,000 rpm

Note :
As lubricating oil is not being supplied to the gas seals while the measurements are being taken, a proper amount of clean engine oil should be added into the carburetor or the engine should be run on mixed gasoline into which oil has been mixed at the ratio of 100 : 1.

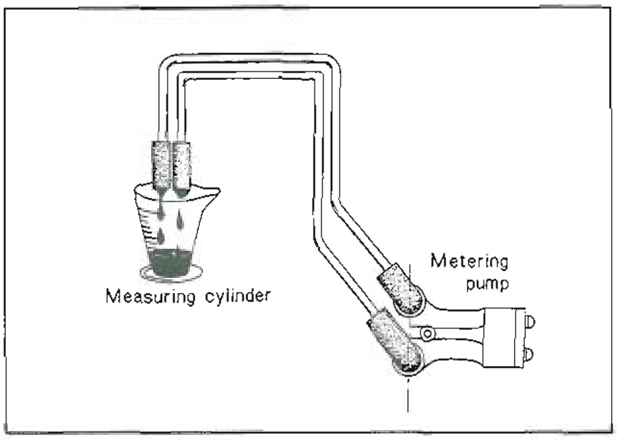


Fig. 2–21 Checking oil discharge

2–J–2. Adjusting Metering Oil Pump

If the amount of oil discharge measured by the procedure shown in the previous paragraph is not proper it would be adjusted by the adjusting screw.

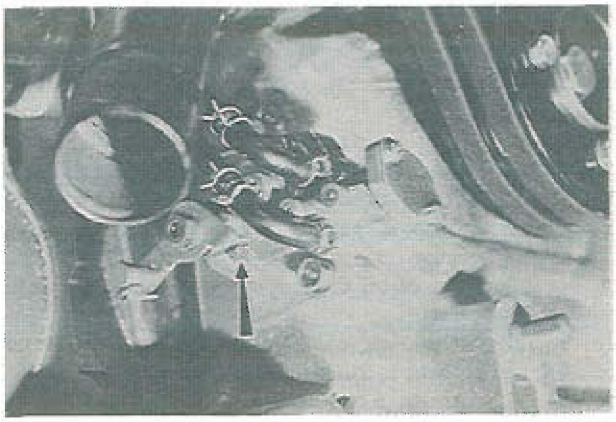


Fig. 2–22 Adjusting screw of metering oil pump

The amount of oil discharge increases when the adjusting screw is tightened, and decreases when loosened. As the amount of oil discharge changes by **0.2 ~ 0.3 cc/6 min./2,000 rpm** per rotation of the screw, adjust the screw after calculating the number of rotations necessary to obtain the proper adjustment.
Also check to ensure that the lock nut of the adjusting screw will lock without fail and be sure not to bend the lever when adjusting. After adjustment has been completed, measure the amount of oil discharge again and make sure that it is within the proper range.
In case the metering oil pump cannot be adjusted, it should be replaced as a damaged parts or a pump assembly.

Connecting rod setting

Set the clearance of connecting rod stopper pin and metering oil pump lever to **0 ~ 1.0 mm (0 ~ 0.04 in)** by using a suitable washer.

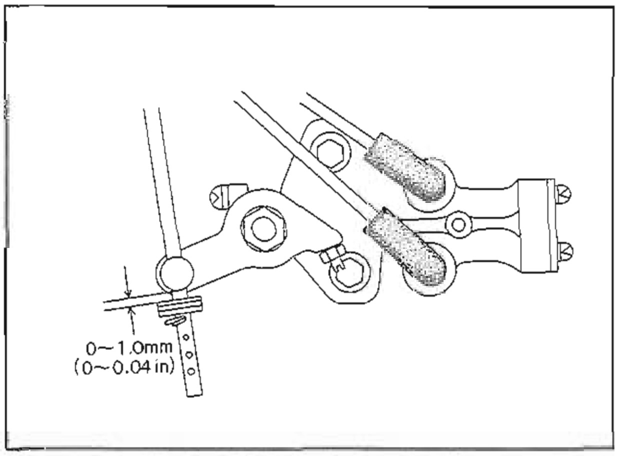


Fig. 2–23 Connecting rod setting

2–J–3. Disassembling Metering Oil Pump

1. Remove the control lever, return spring and cap by loosening the nut.
2. Remove the front plate carefully as it is the spring-loaded, and remove the sub plunger, plunger spring and oil seal ring.
3. Remove the rear plate and oil seal ring.
4. Push in the plunger slightly from the rear plate side by using a small screw driver and pull the control pin out from the pump body.
5. Pull the driving worm with the worm bearing out from the pump body by using a plier and remove the thrust plate.
6. Push out the plunger and differential plunger from rear side to front side.

2–J–4. Assembling Metering Oil Pump

Wash all the parts in clean kerosene before reassembling them. As the pump has a highly delicate mechanism, the greatest possible care should be taken in reassembling the pump not to admit any foreign matter in it and not to cause any small scar.
1. Apply the clean oil in the cylinder. Slide the plunger into the body from front side of the body and then slide the differential plunger into the body until the gear of the plunger reaches the position of the hole for the driving worm.

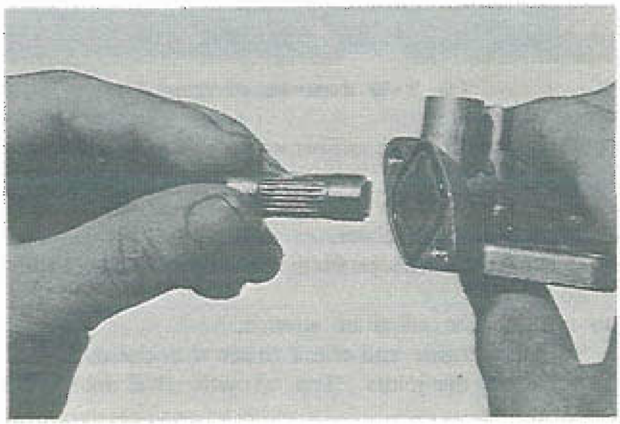


Fig. 2–24 Assembling plunger

Note :
Make sure that the slot of the differential plunger matches the key of the plunger.

2. Carefully insert the thrust plate, driving worm and worm bearing.

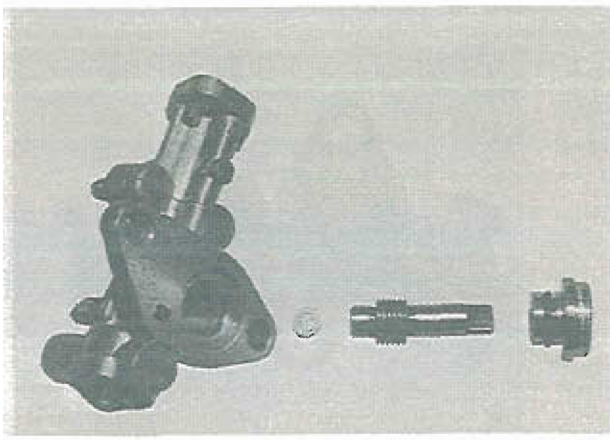


Fig. 2–25 Assembling drive worm

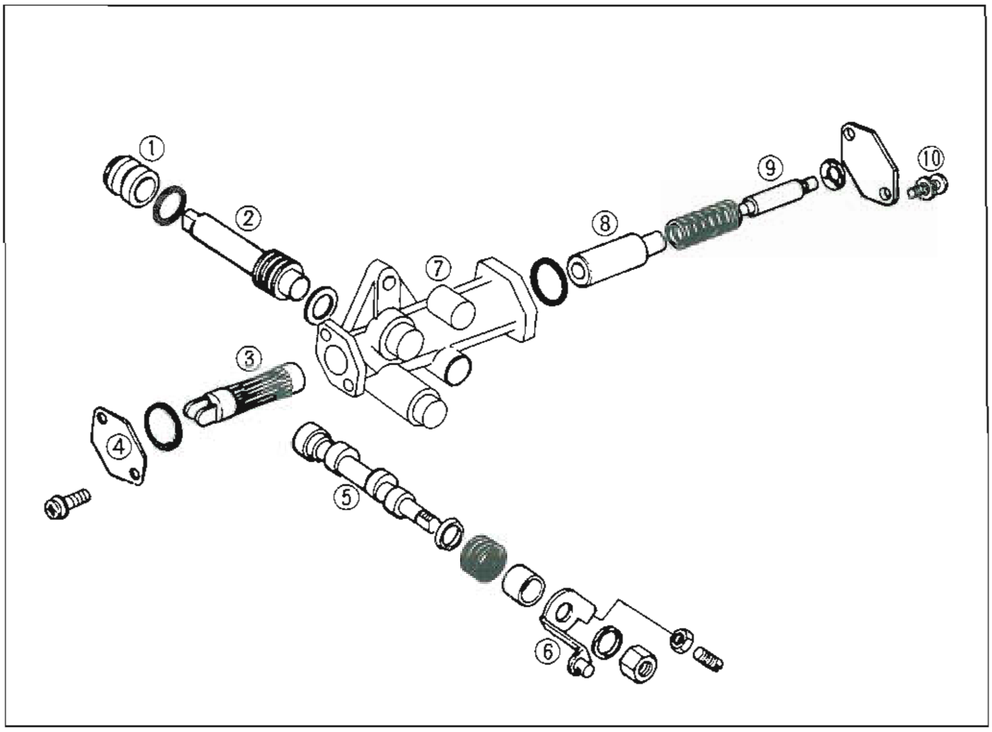


Fig. 2–26
Metering oil pump component

1. Worm bearing
2. Driving worm
3. Plunger
4. Rear plate
5. Control pin
6. Control lever
7. Body
8. Differential plunger
9. Sub plunger
10. Front plate

3. Insert the control pin.

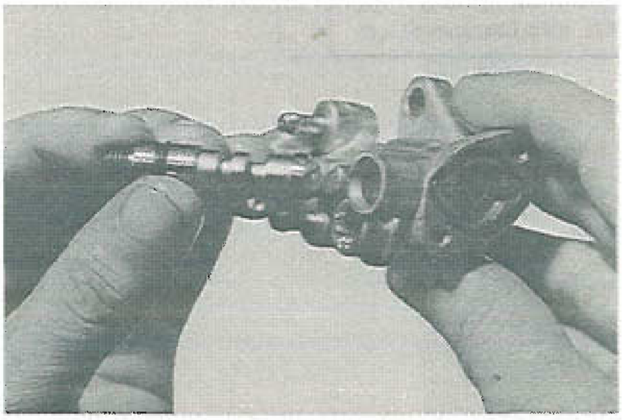


Fig. 2–27 Inserting control pin

4. Place the oil seal ring on the groove.
5. Fit the rear plate on the body making sure the stopper for the control pin facing the control lever.

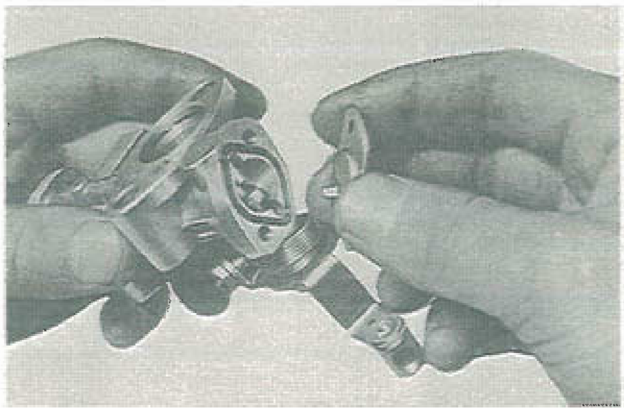


Fig. 2–28 Fitting rear plate

6. Insert the plunger spring and sub plunger from the front side of the body.

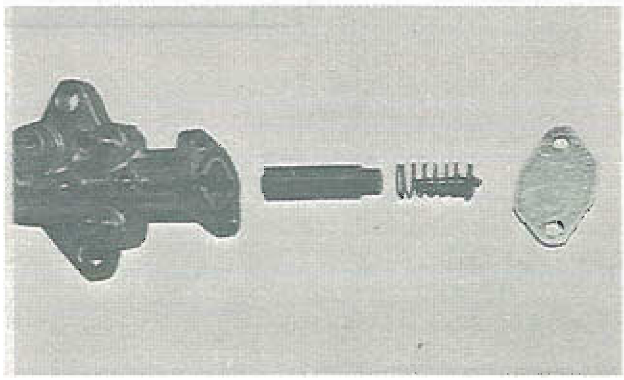


Fig. 2–29 Inserting sub plunger

7. Place the oil seal ring on the groove and fit the front plate.
8. Install the spring, control lever and connectors.

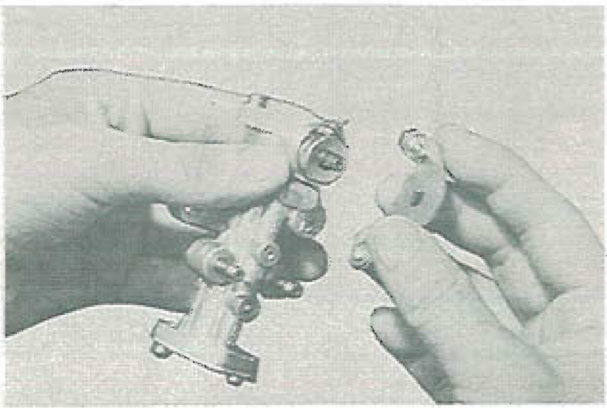


Fig. 2–30 Installing control lever

2–K. CHECK VALVE

The check valve operates to prevent oil from flowing back into the metering oil pump.
Confirm the tapered shoulder of the check valve before installing it so that the direction of the check valve will not be mistaken for upside down. It should face to the metering oil pump.

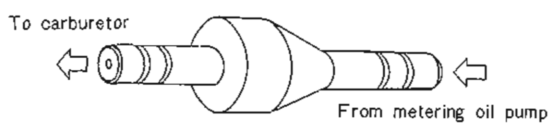


Fig. 2–31 Direction of check valve

2–L. OIL PAN

2–L–1. Oil Pan Removal

1. Raise the vehicle and support with stands.
2. Drain the engine lubricant.
3. Remove the bolts attaching the engine under cover, and remove the engine under cover.
4. Remove the bolts attaching the oil pan, and remove the oil pan and gasket.

2–L–2. Oil Pan Inspection

Scrape off any dirt or metal particles from the inside of the oil pan. Wash the oil pan in a solvent and dry it with compressed air.
Check the oil pan for any cracks and damaged drain plug threads. Inspect for damage (uneven surface) at the bolt holes caused by over-torqueing the bolts. Straighten surfaces as required. Repair any damage, or replace the oil pan if repairs can not be made satisfactorily.

SPECIAL TOOL

49 0187 280	Oil pressure gauge

COOLING SYSTEM

DESCRIPTION

The completely sealed cooling system consists of a radiator with a sealed filler cap, an expansion chamber (sub-tank) with a pressure cap, centrifugal water pump, a thermostat and a fan.
The radiator and the expansion chamber are connected by hose. When the engine is heated sufficiently, the coolant in the radiator flows out and is led into the expansion chamber through the hose. The coolant is then returned to the radiator by negative pressure which builds up in the cooling system when the engine cools down. The coolant should be changed every two years or every **48,000 km (32,000 miles).**

3–A. COOLANT CIRCULATION

The water pump is driven by the eccentric shaft pulley over a V-belt and discharges the cooling water to the front housing. The water circulates from the front housing through the water passage provided in each housing and flows to the rear housing. From the rear housing, the water is returned to the front housing. At low engine temperature, the thermostat is closed to keep the water from entering the radiator. The water is then recirculated directly to the water pump and discharged to each housing. As the thermostat opens when the engine is warmed up, the water flows into the radiator. The cooled water flows from the radiator to the water pump through the connecting hose and cools the engine by circulation.

3–B. FLUSHING OF COOLING SYSTEM

The cooling system should be flushed **every two years or 48,000 km (32,000 miles).**
The flushing procedures are as follows:
1. Open the drain plugs and drain the coolant.
2. Close the drain plugs and supply clean soft water.

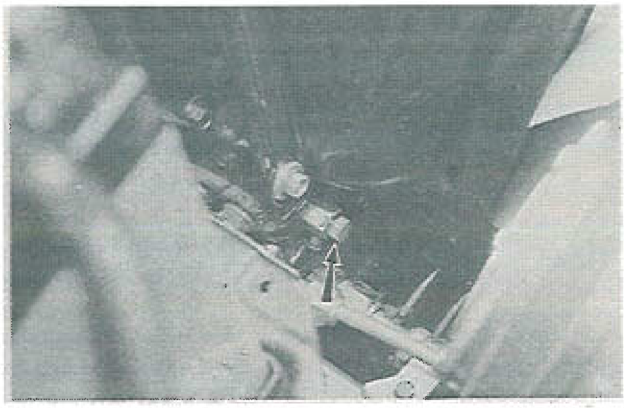


Fig. 3–2 Radiator drain plug

Note:
If necessary, use cleaning solution to loosen rust and scale, by following the instructions given by the maker of the cleaning solution.

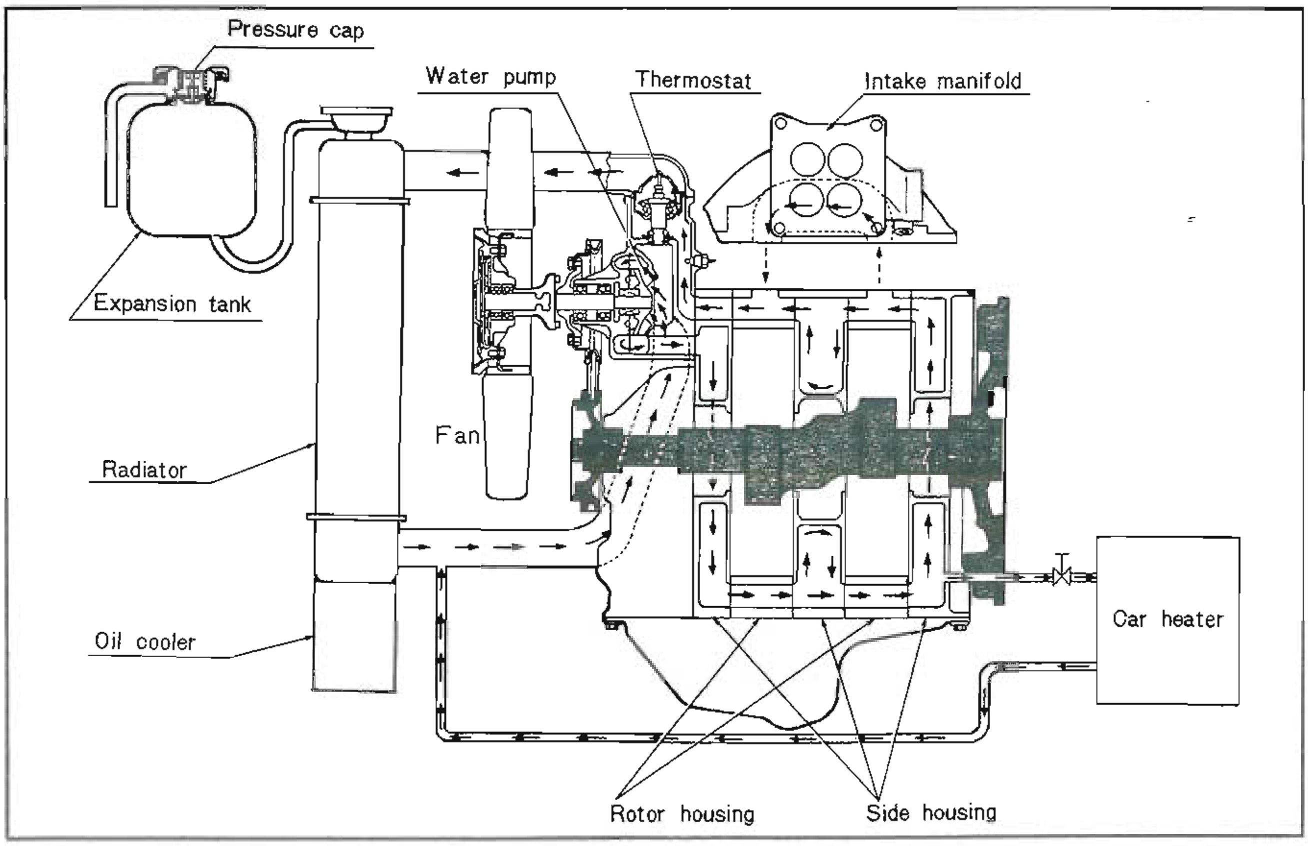


Fig. 3–1 Cooling circuit

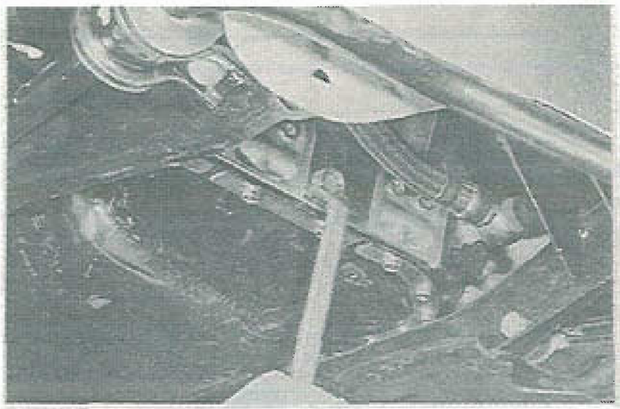


Fig. 3–3 Engine drain plug

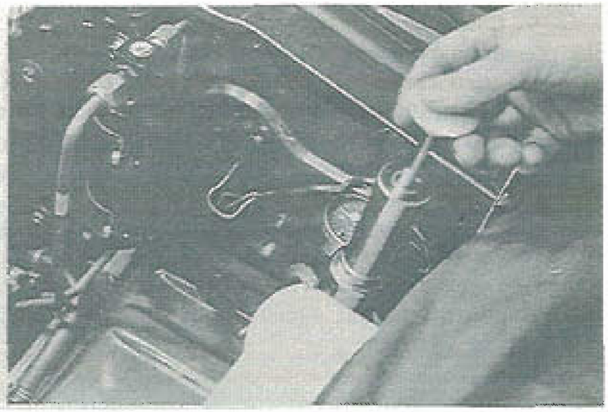


Fig. 3–4 Checking coolant leakage

3. Run the engine for about one hour, at the normal operating temperature.
4. Drain the water completely.
5. Fill with soft water (demineralized water) and genuine long life coolant, referring to **Par. 3–C.**

3–C. COOLANT

The genuine **long life coolant** (Parts Nos. 0866 77 264, 0880 77 264 or 0884 77 264) is used in the cooling system.
The genuine long life coolant was developed for the aluminum engine. Antifreeze solution and anticorrosive solution are included in this coolant. The table below shows the mixing rate of water and genuine long life coolant. Follow the table when changing the coolant.

Freezing point °C	Freezing point °F	Mixture ratio % Antifreeze solution	Mixture ratio % Water	Specific gravity of mixture at 20°C (68°F)
- 6.3	20.7	15	85	1.022
- 9.3	15.3	20	80	1.029
-12.6	9.3	25	75	1.037
-16.2	2.8	30	70	1.044
-20.5	- 4.9	35	65	1.051
-25.2	-13.4	40	60	1.058
-31.2	-24.2	45	55	1.066

The mixture ratio of antifreeze solution to water must be under 45 to 55% in the area where the temperature does not fall to -30°C (-22°F).
Avoid to use the rich mixture coolant.

3–C–1. Checking Coolant Leakage

Carefully check the various parts for any leakage of cooling water by using a radiator cap tester. Refill the coolant full in the radiator and 1/3 full in the expansion tank.
Run the engine until it reaches normal operating temperature. With the engine running and tester installed, pump up the system to approximately 0.9 kg/cm² (13 lb/in²).

Note: Never allow the pressure to build up to more than 1.1 kg/cm² (14 lb/in²).

If pressure drops rapidly, visually inspect all external parts for leaks. If no external leaks appear and pressure continues to drop, inspect the engine oil to determine whether or not coolant is leaking into the rotor housing due to a cracked rotor housing or leaking "O" rings.

3–D. RADIATOR

The radiator is of the corrugated fin type with a sealed filler cap, and an expansion tank is adopted.

3–D–1. Checking Radiator

Carefully check the radiator for water leakage. (Refer to Par. 3–C–1.) A clogged radiator badly influences the cooling effect and should be cleaned with the compressed air.

3–D–2. Repairing Radiator

The radiator used on this model is made of copper. Any minor leakage must be completely eliminated by soldering.

3–D–3. Checking Radiator Sealed Cap

The radiator cap is sealed type and pull out the stop wire in the direction of arrow when this cap removes. Check the cap rubber gasket to insure an airtight seal.

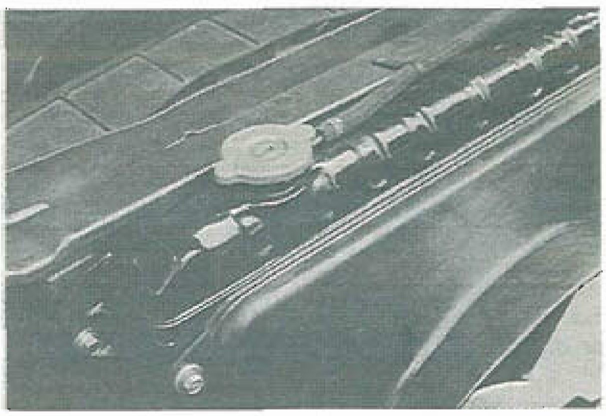


Fig. 3–5 Radiator cap

3–D–4. Checking Expansion Tank Cap

The pressure cap is provided on the expansion chamber. The expansion chamber and the radiator are connected by hose. When the cooling water is pressurized, the boiling point rises and this prevents overheating and minimizes the loss of water. When the pressure in the cooling system exceeds 0.9 kg/cm² (13.0 lb/in²), the cap opens. When the coolant temperature falls, the vacuum release valve open at 0.1 kg/cm² (1.4 lb/in²) to prevent vacuum from building up in the cooling system.

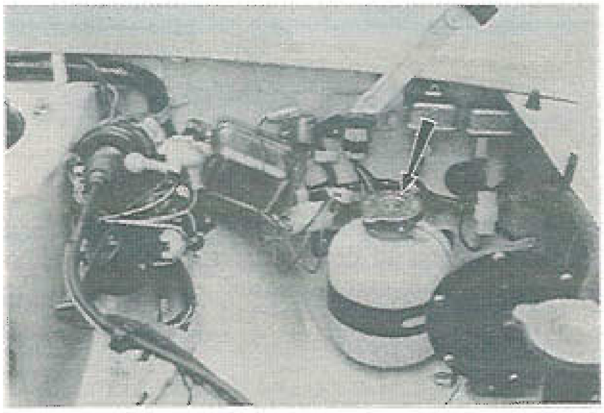


Fig. 3–6 Expansion tank cap

To test the expansion tank cap, first wet the cap rubber gasket to insure an air tight seal then attach the radiator cap tester. The cap should be capable of retaining pressure 0.9 kg/cm² (13 lb/in²).

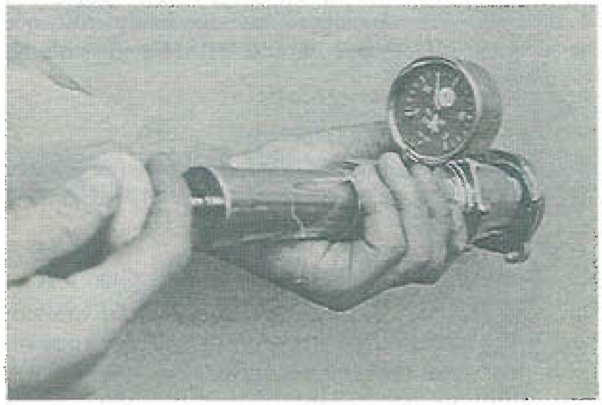


Fig. 3–7 Checking expansion tank cap

3–E. FAN DRIVE

As shown in Fig. 3–8, the fan drive is driven with the water pump pulley, and by the work of the silicon oil in the body, prevents the fan from marking more than a certain number of rotations.
As may be seen from this structure, the number of fan rotations will presumably drop if a defect, such as oil leakage, should occur on the fan drive.
If an engine has the tendency to overheat, the number of fan rotations should be checked in the following manner.

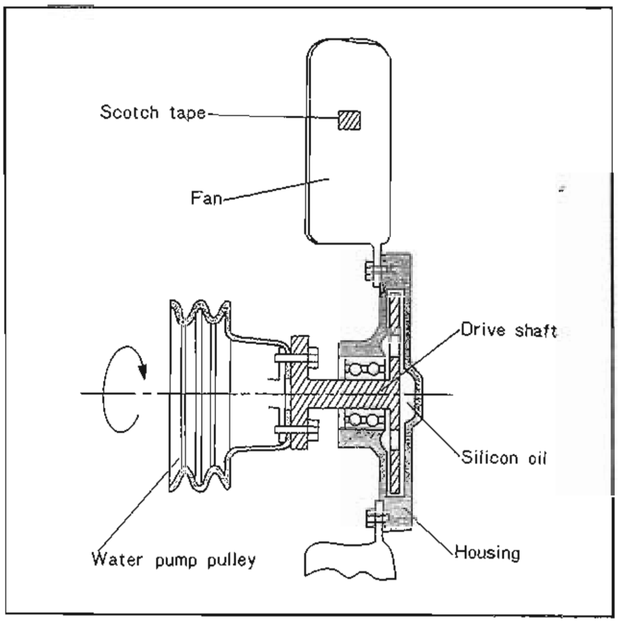


Fig. 3–8 Fan drive

3–E–1. Checking Fan Drive

Testers to be used : Photoelectric revolution counter and tochodwell tester.
1. Apply scotch tape to the positions on the fan as shown in Fig. 3–8.
2. Set the tachodwell tester to the engine. Then start the engine and run it at 1,500 rpm.
3. Then turn the photoelectric revolution counter toward the fan and read the speed of the fan rotation. The fan speed should be within the standards shown in the following table.

Prescribed Revolution	
Engine	Fan
1,500 rpm	1,400 rpm or more
5,000 rpm	2,000 rpm ~ 2,500 rpm

If the reading is below the standard, replace the fan drive assembly.
If the reading is more than the standard–Make a recheck in the following manner.
4. When the reading exceeds the standard, warm up the engine for five minutes at engine speed of more than 3,000 rpm, and then read the speed of the fan rotation at engine speed of 5,000 rpm. If the speed of the fan rotation is within the standard shown in the above table, the operation of the fan drive is satisfactory.

Note :
When the photoelectric revolution counter is not prepared, the revolution of the fan will be also checked by the procedure as follows:
1. Prepare another car, and set the tachodwell tester and the timing light to the engine.
2. Apply the scotch tape on the fan of the checking car and run the engine at 1,500 rpm.
3. Start the engine set the timing light to and aim the light to the scotch tape of the fan.
Regulate the engine rpm of the car being set the

timing light so as to coincide with the fan speed, and read the engine speed on the tachodwell tester, which is the speed of fan revolution.
4. The fan speed at 5,000 rpm of engine, if necessary, can be checked in the same manner as above.

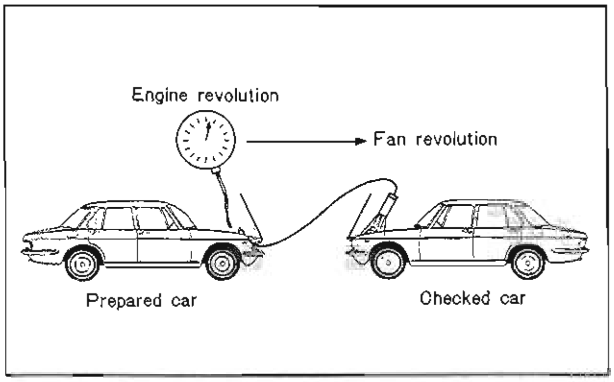


Fig. 3–9 Checking fan drive

3–F. THERMOSTAT

To regulate the temperature of the cooling water circulating in the engine, a wax type thermostat is adopted. The thermostat is of a bottom by-pass type, which has outstanding cooling efficiency, and is different from the conventional in-line type thermostat in the undermentioned points. Therefore, it should be handled with particular care.

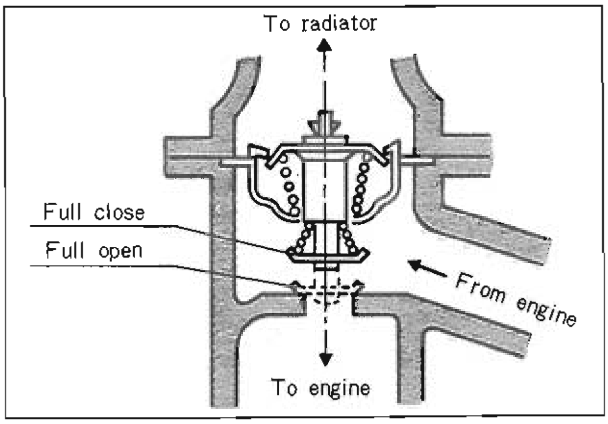


Fig. 3–10 Thermostat and by-pass hole

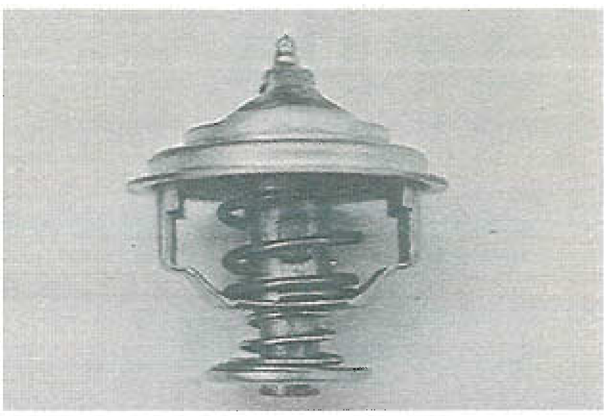


Fig. 3–11 Thermostat

As shown in Fig. 3–10, a by-pass hole is provided at the bottom of the thermostat. The by-pass hole on the bottom by-pass type thermostat is larger than that on the in-line type. The bottom by-pass type thermostat, therefore, has the following advantages: when the thermostat is fully closed, a large amount of cooling water circulates, thus preventing any local rise in the cooling water temperature, and, when the thermostat is fully opened, the valve of the thermostat closes the by-pass hole and so all of the cooling water flows into the radiator, making effective use of the radiator. But, if the thermostat is removed, a large amount of cooling water flows through the by-pass hole because the hole is large, and so the amount of cooling water flowing into the radiator decreases to half, causing the cooling water temperature to rise.
Therefore, **the thermostat should never be removed** and **no other type of thermostat should be used.**

3–F–1. Removing Thermostat

1. Drain the cooling system.
2. Remove the bolts attaching the thermostat cover to the water pump and remove the cover.
3. Lift out the thermostat.

3–F–2. Inspecting Thermostat

To inspect the thermostat, place it in water with a thermometer and gradually heat the water.
Check the temperature when the thermostat starts to open and when it is fully opened, and also, measure the lift height when the thermostat is fully opened. If the reading shows a large difference from the standard specifications, replace the thermostat. The specifications of the thermostat are shown in the following table :

Starts to open	82°C (180°F)
Fully opens	95°C (203°F)
Lift height	8 mm (0.31 in)

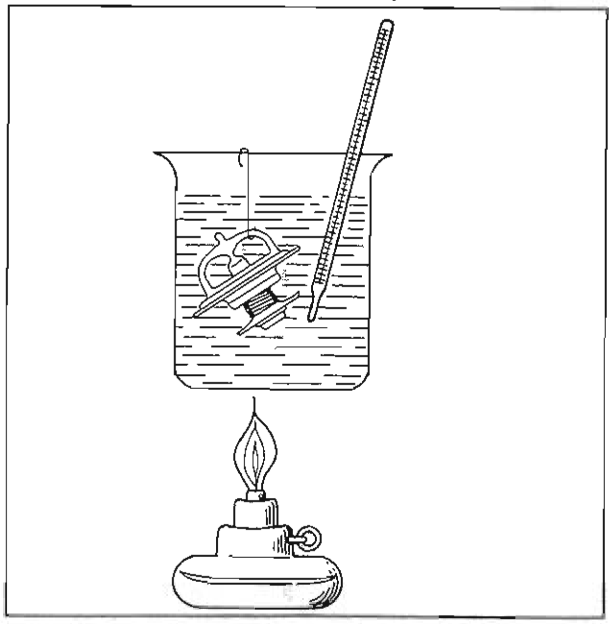


Fig. 3–12 Checking thermostat

3–G. WATER PUMP

The water pump employs a centrifugal impeller. In the pump body, the shaft is supported by two bearings. The impeller is fitted to the rear end of the shaft. The seal assembly prevents water leakage.

3–G–1. Inspecting Water Pump

Check the water pump for leaks and excessive end play or looseness of the shaft and bearings. If there is evidence of excessive play when the pulley is manually moved up and down, this indicates that the bearings are rough. If water leaks from the hole located on the body, this is an indication of a defective seal necessitating overhaul of the pump and check of the seal and seat surface. If defective, replace the seal assembly.

3–G–2. Removing Water Pump

1. Drain the cooling system.
2. Remove the air cleaner.
3. Remove the bolts attaching back of the fan drive and remove the fan drive assembly.

Fig. 3–13 Removing fan drive

4. Loosen the bolts attaching the water pump pulley to the water pump boss if it is necessary to disassemble the water pump.
5. Remove the air pump and disengage the air pump drive V-belt. (if equipped)
6. Remove the alternator and disengage the V-belt.
7. Remove the water pump pulley attaching bolts and remove the pulley if necessary.
8. Remove the nuts and bolts attaching the water pump body and remove the pump body. In case the water pump is removed assembly, only four nuts will be removed.

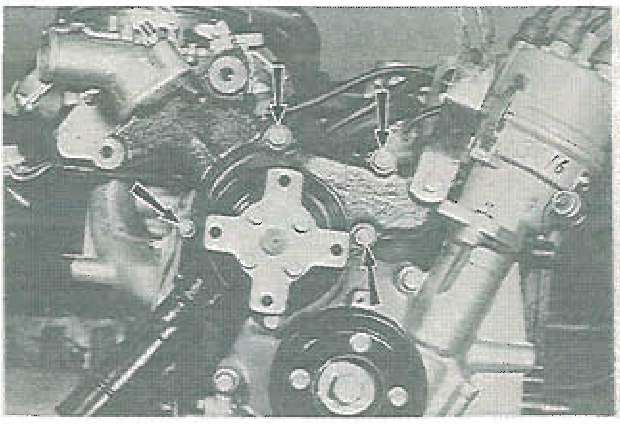


Fig. 3–14 Pump body attaching bolts

3–G–3. Disassembling Water Pump

1. Using the **pulley boss support** (Part No. 49 0813 145A), press the shaft slowly, and remove the pulley boss and dust seal plate.

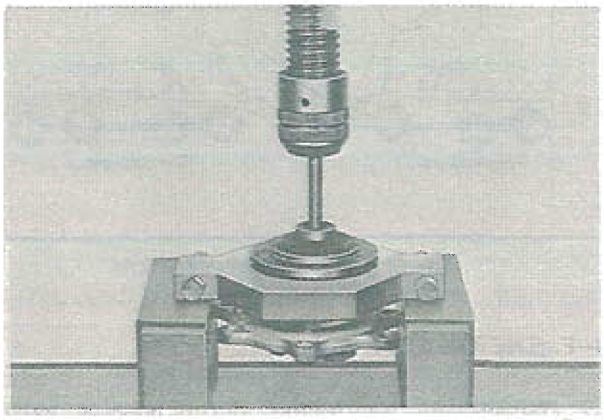


Fig. 3–15 Removing pulley boss

2. Remove the snap ring retaining the shaft and bearing assembly in the pump body.

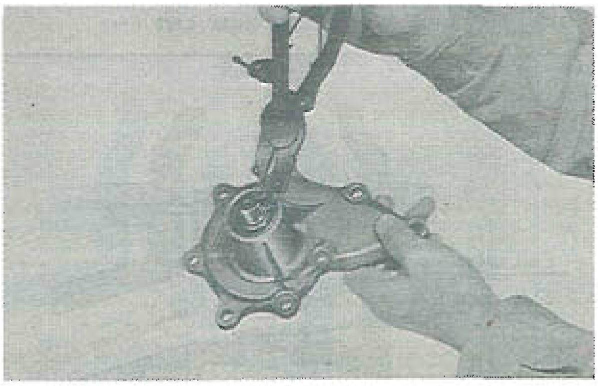


Fig. 3–16 Removing snap ring

3. Place the front side of the pump body on the **support** (Part No. 49 0813 145A) and apply pressure

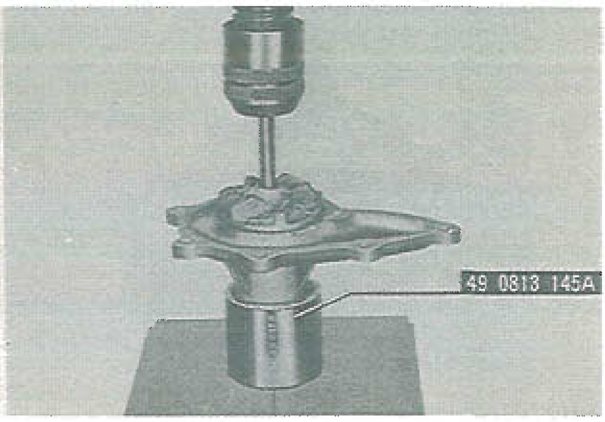


Fig. 3–17 Removing impeller

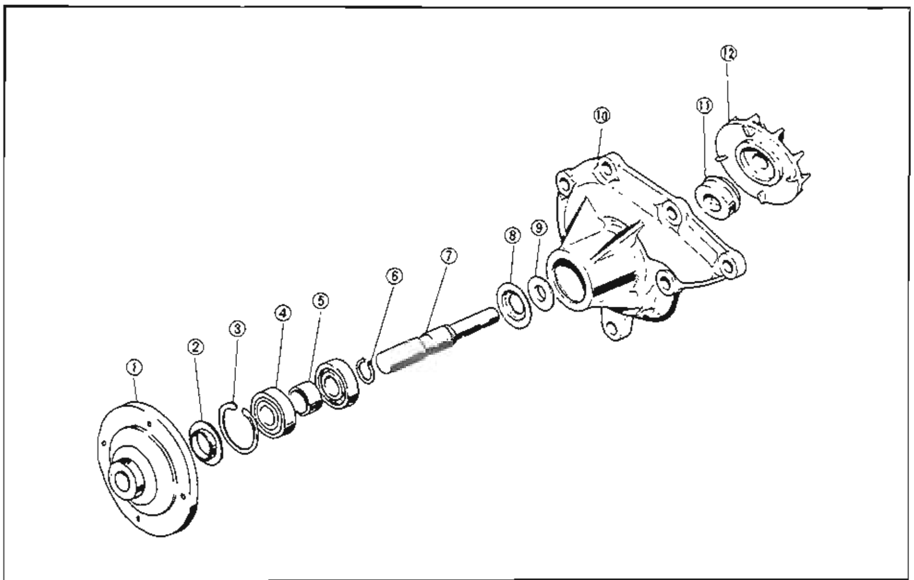


Fig. 3–18
Water pump components

1. Pulley boss
2. Dust seal plate
3. Snap ring
4. Bearing
5. Spacer
6. Stop ring
7. Shaft
8. Dust seal
9. Baffle plate
10. Pump body
11. Seal assembly
12. Impeller

to the rear end of the shaft to press the shaft and remove the impeller from the shaft.
Then press the shaft and bearing assembly out of the pump body.
4. Remove the seal assembly from the pump body.
5. Slide the baffle plate and dust seal plate off the shaft.
6. Remove the bearing stop ring from the shaft.
7. Remove the bearings and spacer from the shaft.

3–G–4. Assembling Water Pump
1. Fit the bearing stop ring onto the groove of the shaft.
2. Slide the dust seal plate onto the shaft.
3. Slide the baffle plate onto the taper of the shaft.
4. Press fit the bearing onto the shaft with sealed side rearward.
5. Press the shaft and bearing into the pump body.
6. Slide the spacer onto the shaft and **fill 1/3 of the space** between the two bearings with grease.
7. Press fit the bearing onto the shaft with the sealed side forward until the snap ring can be installed.
8. Install the snap ring onto the groove of the pump body to retain the shaft and bearing assembly in position.
9. Slide the dust seal plate onto the shaft, and press the pulley boss onto the shaft until it is flush with the front end of the shaft.
10. Apply lubricant onto the seal assembly and install the seal assembly into the pump body.
11. Press the impeller onto the shaft until it is flush with the end of the shaft.

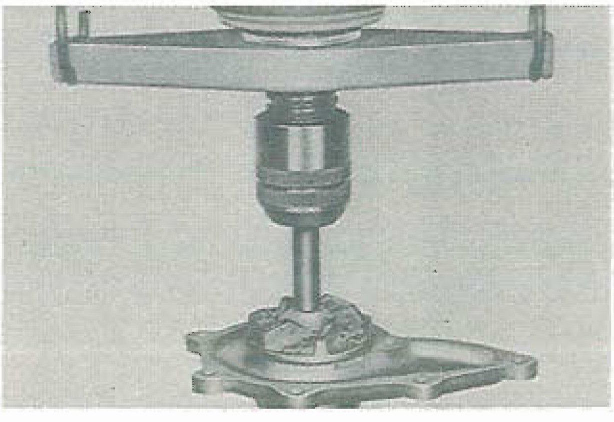


Fig. 3–19 Assembling impeller

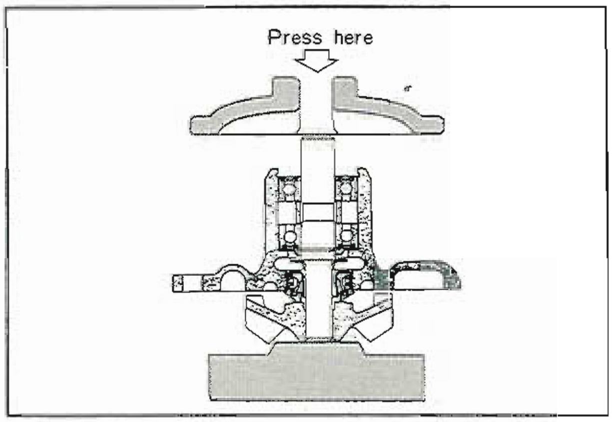


Fig. 3–20 Assembling pulley

SPECIAL TOOL

49 0813 145A	Water pump pulley boss support

FUEL SYSTEM

FUEL SYSTEM

The fuel system consists of the carburetor, fuel pump, fuel filter, fuel tank, fuel line, accelerator linkage and air cleaner.

By the suction of the fuel pump, the fuel flows through the fuel line into the fuel filter. The fuel passes through the filter element from the outside to the inside of the element. During this fuel flow, the filter element cleans out all the dirt. The fuel pump is producing a constant controlled pressure, and the fuel volume required for engine operations. The fuel supplied by. the fuel pump flows passing through the fuel hose into the carburetor.

The carburetor mixes the air and fuel in varying proportions for different operating conditions. As the air passes through the carburetor before entering the engine, fuel is supplied into the engine through the various circuits of the carburetor.

The air cleaner operates primarily to remove dust and dirt from the air which is drawn into the carburetor and then into the engine.

4–A. CARBURETOR

MAZDA RX-2 and RX-3 make use of a two-stage, four-barrel, down-draft carburetor.

This carburetor comprises two sets each of primary barrels and secondary barrels.

The primary stage includes an idle system, slow system, accelerator pump system, choke system, and main metering system. In addition, an idle switch for exhaust emission control system is attached to primary throttle shaft. The fluid of sub-zero starting assist device and the oil from the metering oil pump are admitted from primary stage barrels to combustion chamber.

The altitude compensator takes the air from primary stage barrels and controls the air supply to the intake manifold at low atmospheric pressure such as high altitudes driving.

The secondary stage includes a secondary operating diaphragm system, step system and main metering system. Choking action is accomplished by means of a semi-automatic choke.

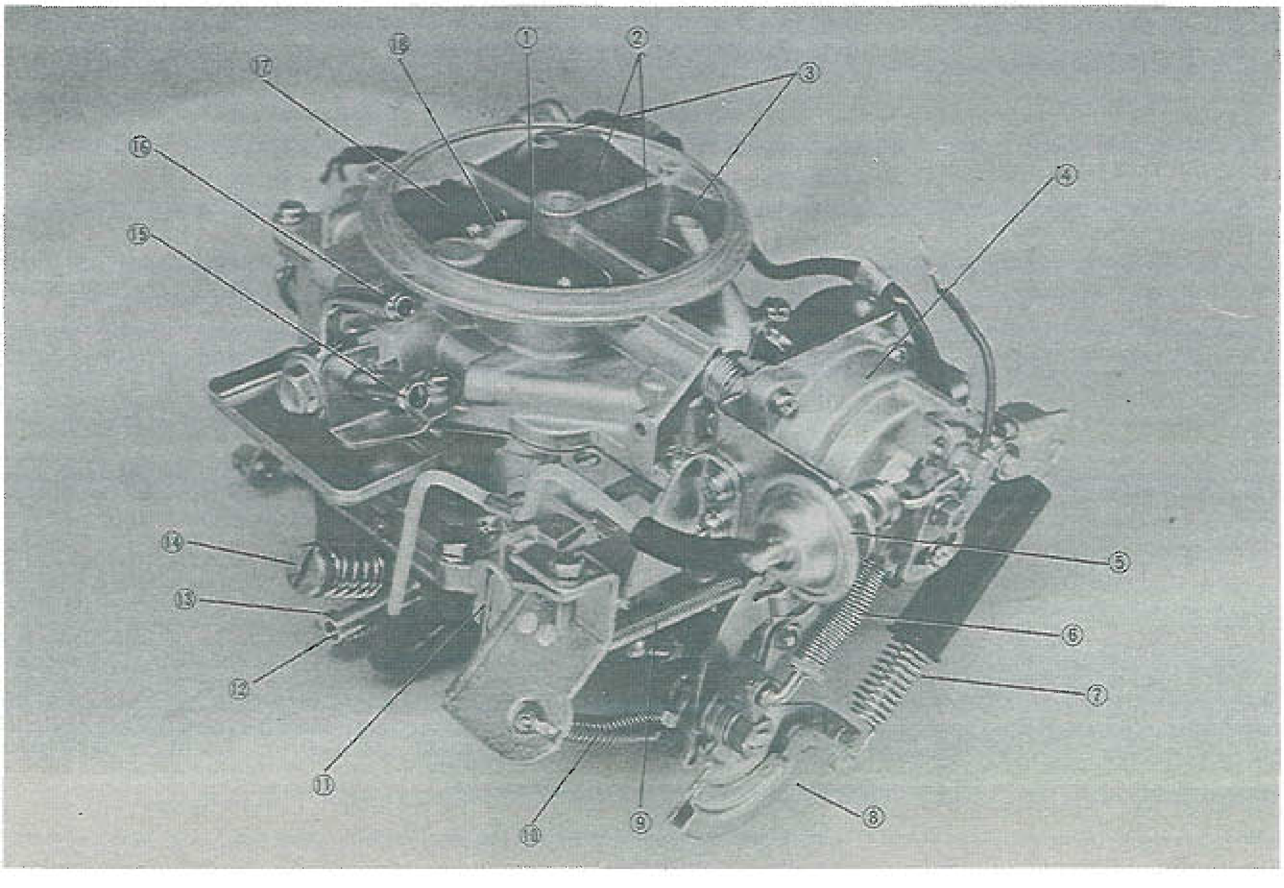


Fig. 4–1 Carburetor

1. Primary stage
2. Secondary stage
3. Secondary air bent
4. Bimetal spring housing
5. Vacuum break diaphragm
6. Safety return spring
7. Throttle return spring
8. Throttle lever
9. No. 3 spring
10. Accelerator pump operating rod
11. Accelerator pump
12. To altitude compensator
13. Idle adjust screw (locked)
14. Air adjust screw (for idle adjustment)
15. Fuel inlet fitting (inlet side)
16. Fuel inlet fitting (return side)
17. Choke valve
18. Primary air bent

4–A–1. Idle Adjustment

a. Normal adjustment

1. Fully warm up the engine.
2. Make sure that the return of the secondary throttle valve is proper.
3. Adjust the idling speed so that the engine revolution will be in specifications by manipulating the air adjust screw. **Never meddle with the idle adjust screw and throttle adjust screw.**

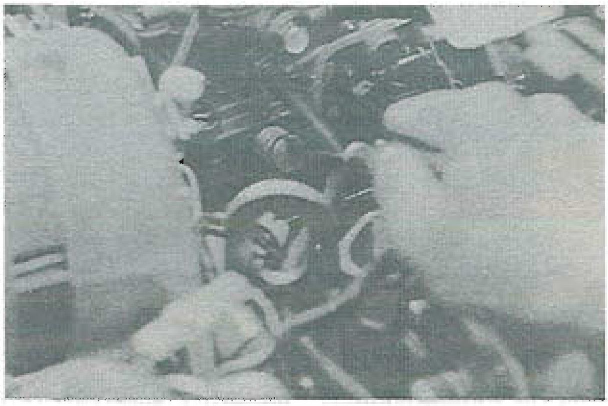


Fig. 4–2 Idle adjustment

Note :
To measure the engine revolution, be sure to use a revolution counter intended for general servicing instead of the tachometer equipped on the vehicle.

Specifications – Idling Speed :

Car with Manual Transmission	900 rpm
Car with Automatic Transmission	750 rpm in "D" range

b. Particular adjustment
Idle adjust screw and throttle adjust screw are adjusted by the manufacturer. These screws should not be adjusted. However, if the idle adjust screw and/or throttle adjust screw get out of order for some reason, or after overhauling the carburetor, adjust them in the following procedures.

b-1.

1. Adjust throttle opening to specifications from fully closed position by the throttle adjust screw. Lock the screw lock nut firmly after adjustment.
2. Start the engine and adjust the idling speed to the specified value by the air adjust screw.
3. Set the idle CO, HC gas analyzer.
4. Adjust the idle CO gas reading as close to 0.1% as possible by the idle adjust screw. The idle HC reading must be less than 200 ppm.
5. Recheck or readjust the engine idle speed and CO, HC readings until they meet their respective specifications.

Note:
The gas analyzer should be adopted for checking purpose only, and no adjustment is needed if CO reading is within 0.1% ~ 2.0% and HC reading is less than 200 ppm.

b-2.
It is better for the idle adjustment to use the fuel flow checker (49 2113 015) than to use the gas analyzer. The adjustment by the fuel flow checker should be done as follows.

1. Adjust throttle opening angle to specifications from fully closed position by the throttle adjust screw. Lock the screw lock nut firmly after adjustment.
2. Set the fuel flow checker (49 2113 015) as shown in Fig. 4–3.
3. Start the engine and adjust the idling speed approximately to specifications by the air adjust screw.
4. Adjust the idle fuel flow to specifications by the idle adjust screw.
5. Adjust the idle speed to specifications by the air adjust screw.
6. Recheck the idle fuel flow and the idle speed.

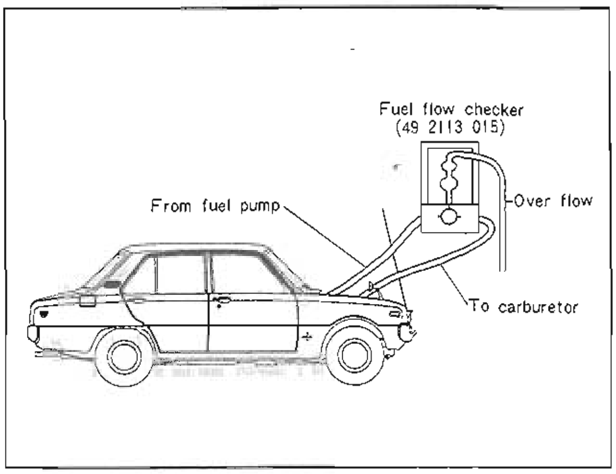


Fig. 4–3 Fuel flow check

Specifications – Idling fuel adjustment :

	Throttle opening angle	Idling fuel flow	Time required to consume 50 cc
Car with Manual Transmission	2.0 ~ 2.5 degrees	2.09 ~ 2.31 liters/h (0.54 ~ 0.60 U.S. gallons/h)	82 sec ~ 90 sec/50 cc
Car with Automatic Transmission	2.0 ~ 2.5 degrees	2.23 ~ 2.47 liters/h (0.57 ~ 0.64 U.S. gallons/h)	73 sec ~ 81 sec/50 cc

4–A–2. Fast Idle Adjustment

1. With the choke knob or choke lever, fully pulled out, measure the primary throttle opening angle (A) or the clearance (B) between the primary throttle valve and the wall of the throttle bore when the carburetor is disassembled.

Note :
To measure the angle (A), install a protractor to the primary throttle shaft centering correctly.
To measure the clearance (B), use a suitable wire gauge or drill.

2. If the clearance is not within specifications, bend the fast idle adjust lever tang at the point of which it contacts the starting throttle lever, until the proper angle or clearance is obtained.

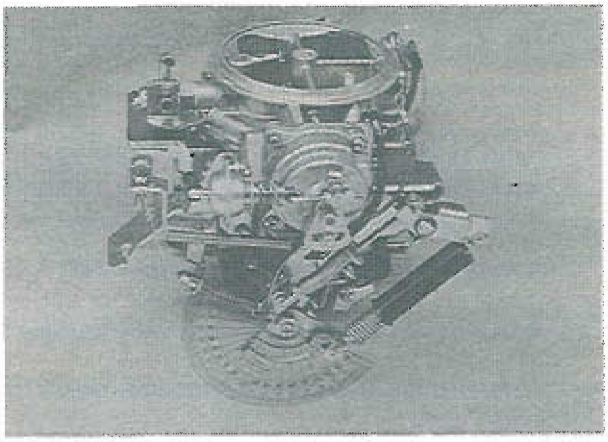


Fig. 4–4 Checking fast idle

4–A–3. Float Adjustment

a. Float level adjustment

1. With engine operating, check the fuel levels in the fuel bowl through the sight glasses using a suitable mirror.

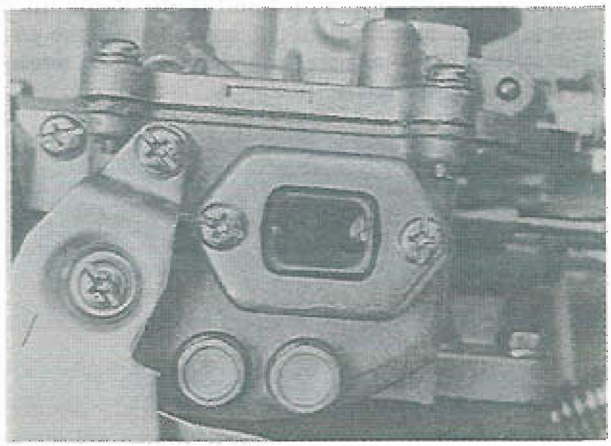


Fig. 4–6 Fuel bowl sight glass

2. If the fuel levels are not within the specified mark in the sight glasses, remove the air horn with the floats. Then adjust the float level as follows.
3. Invert the air horn on a stand and allow the float to lower by its own weight.
4. Measure the clearance between the float and the face of air horn gasket. Standard of this clearance is 5.0 mm (0.197 in).
5. If the clearance is not standard, adjust the clearance by means of adjusting shims at the valve body.
Following two types of adjusting shims are available.

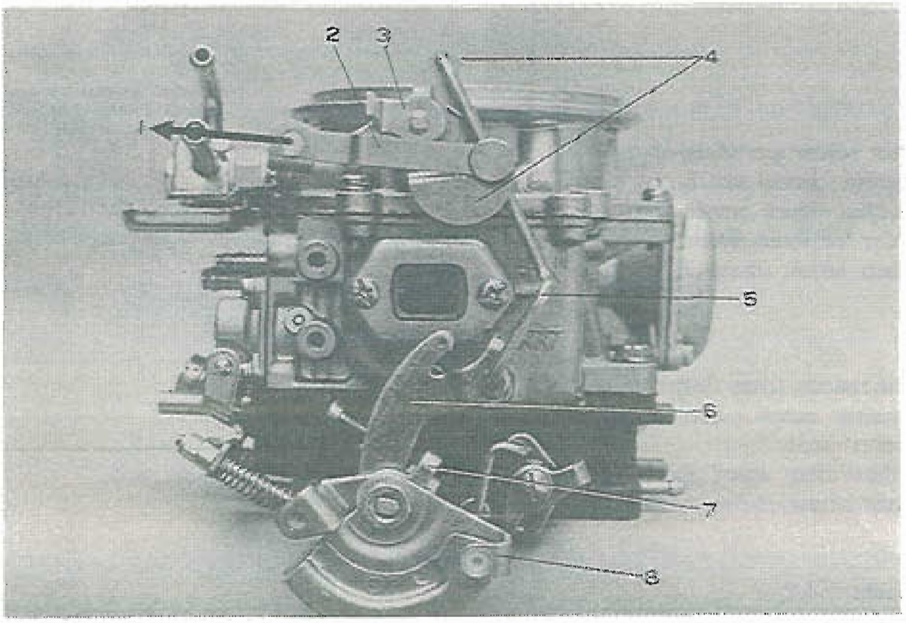


Fig. 4–5 Fast idle adjusting point

1. Pulled by choke wire
2. Link
3. Choke shaft lever
4. Choke lever
5. Fast idle rod
6. Fast idle lever
7. Fast idle adjust lever
   (Bend this tang for adjustment)
8. Throttle lever

Specifications – Fast Idle Adjustment :

	Throttle valve opening angle (A)	Clearance between throttle valve and bore (B)
Car with Manual Transmission	15.5 ~ 18.5 degrees	1.17 ~ 1.56 mm (0.0461 ~ 0.0616 in)
Car with Automatic Transmission	16.0 ~ 19.0 degrees	1.22 ~ 1.57 mm (0.0480 ~ 0.0618 in)

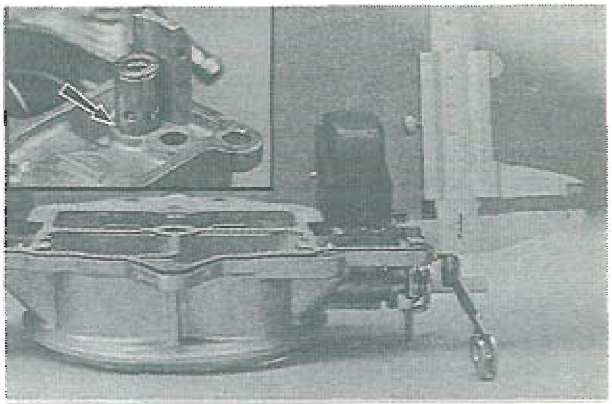


Fig. 4–7 Checking float level and needle valve

0.2 mm (0.0078 in)
0.5 mm (0.0197 in)

6. If the expecting shim is not provided, adjust the clearance by bending the float seat lip (A)
7. Install the air horn and recheck the fuel levels through the sight glasses.

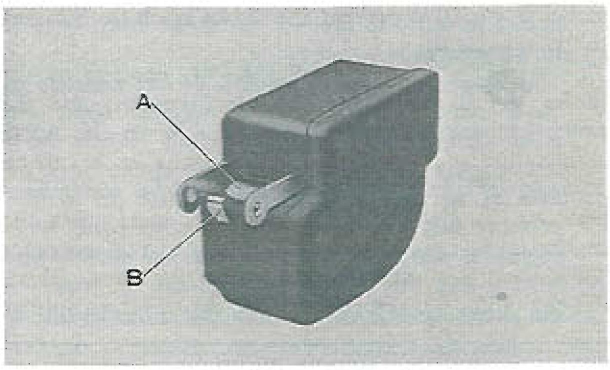


Fig. 4–8 Adjusting float
A. Float seat lip
B. Float stopper

b. Float drop adjustment
Allow the float to lower by its own weight, and measure the distance between the bottom of float and the face of air horn gasket. The distance should be 55 ~ 56 mm (2.1 ~ 2.2 in). (Fig. 4–9)
If the distance is not within specifications, adjust it by bending the float stopper (B) as shown in Fig. 4–8.

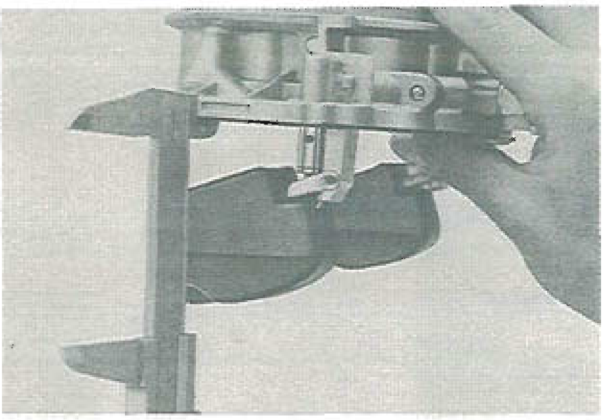


Fig. 4–9 Checking float drop

4–A–4. Automatic Choke System

The carburetor for MAZDA RX-2 and RX-3 is equipped with a semi-automatic choke system.
The semi-automatic choke control is accurately adjusted when originally assembled. Under normal service operations, it is recommended not to change the setting or to disassemble the components for servicing. However, if the setting has been disturbed, adjust it in the following procedures.

a. Bimetal spring adjustment
The bimetal spring should be adjusted before engine starting. In the case of adjustment that is made after the engine warmed-up, it can not obtain a correct adjustment because the ambient temperature is different from the atmospheric temperature.

1) Atmospheric temperature over 30°C (86°F)
Remove the air cleaner cover. Pull out the choke control knob fully and check the clearance Ⓐ shown in Fig. 4–10 by using a wire gauge or suitable gauge.

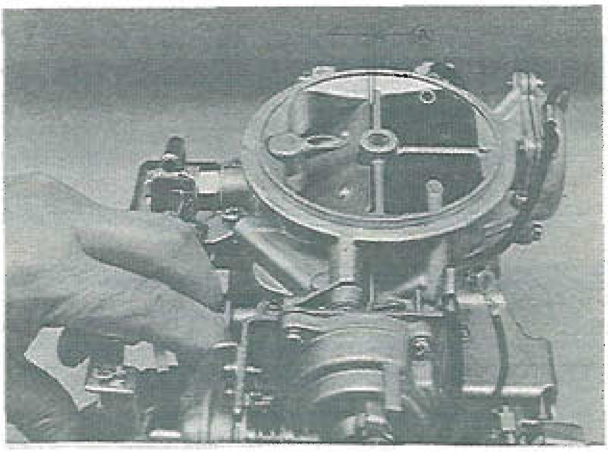


Fig. 4–10 Checking choke valve clearance

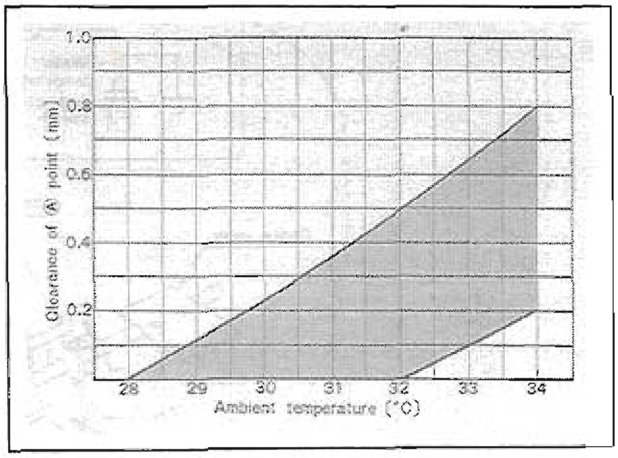


Fig. 4–11 Temperature and valve clearance

If the setting has been disturbed, loosen the set screw Ⓑ for the bimetal spring and adjust the clearance Ⓐ to the specification by moving the adjusting plate Ⓒ. Hold in correct position with fingers while tightening the set screw.

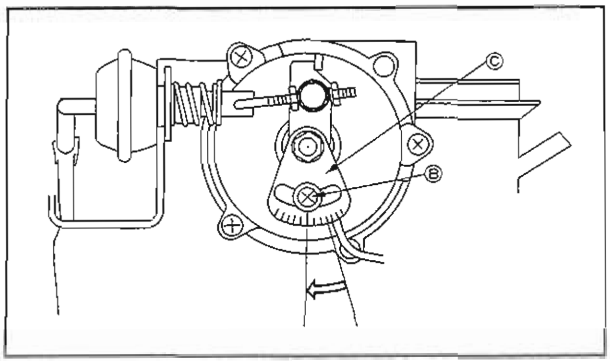


Fig. 4–12 Setting bimetal spring

2) Autospheric temperature below 30°C (86°F)
Loosen the set screw Ⓑ for the bimetal spring and move, the adjusting plate Ⓒ to the direction that makes the spring tension higher, $\frac{30-x}{5}$ notches from the position of the adjusting plate where the clearance Ⓐ is just zero. Hold in correct position with fingers while tightening the set screw Ⓑ.

[x = Atmospheric temperature (°C)]

Example : (In the case of x is 15°C)
$\frac{30-15}{5}$ = 3 So, loosen the set screw Ⓑ and move the adjust plate Ⓒ **three** notches of the plate to the direction that makes the spring tension higher from the position of the adjusting plate where the clearance Ⓐ comes just zero.

b. Vacuum break diaphragm adjustment
Push the diaphragm plunger in until seated and check the stroke of it. This stroke should be in the specifications. If the stroke is not within specification, loosen th lock nut and adjust the adjusting nuts until the proper stroke is obtained.

Specifications – Diaphragm stroke

Manual transmission	8.1 ± 0.2 mm (0.319 ± 0.008 in)
Automatic transmission	7.0 ± 0.2 mm (0.276 ± 0.008 in)

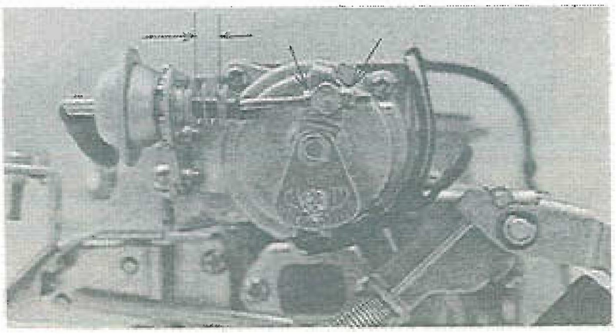


Fig. 4–13 Adjusting diaphragm stroke

c. Automatic choke return system
The automatic choke return system is adopted on this model in order to prevent the choke knob from failing to be returned.
This system, as shown in Fig. 4–14, consists of the choke wire attached with an electromagnet and the water temperature detection switch. When the water temperature of engine is low, the choke knob can be held at an optional position because the water temperature switch is 'ON'. On the other hand, when the engine is warmed up, the detection switch becomes 'OFF', and the electromagnet loses its force. Then, the choke knob is returned by the choke return spring.

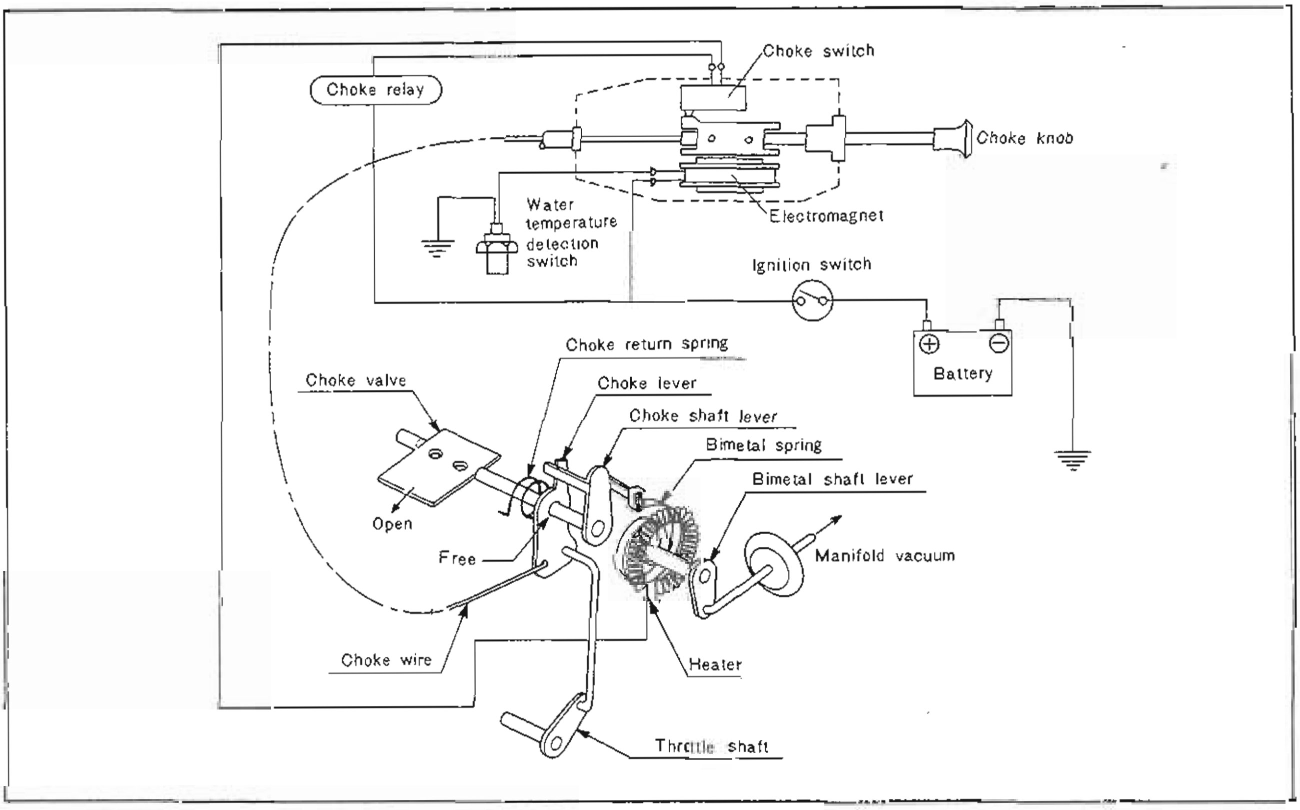


Fig. 4–14 Automatic choke system

4–A–5. Accelerator Pump

a. Normal checking

1. Remove the air cleaner.
2. Check the pump for discharge by moving the primary throttle valve.
3. Check the pump for lever's movement and nozzle's clogging.
4. When the pump nozzle is clogged, remove the nozzle and clean up the nozzle.

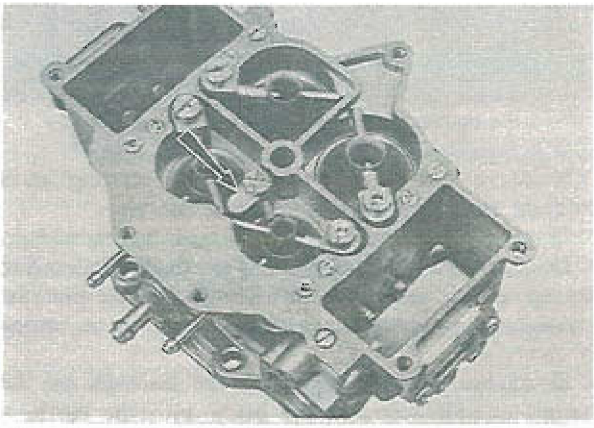


Fig. 4–15 Accelerator pump nozzle

5. When the pump lever does not operate or operates sluggishly, finish the sliding face with emery paper or supply oil to the sliding face.

b. Checking and adjusting amount of accelerator pump discharge

As the accelerator pump is adjusted by manufacturer, do not meddle with it. However, if it is discovered that the customers, etc. have inadvertently meddled with accelerator pump or that the pump must be adjusted, check and adjust it in the following manner.

1. Place the vehicle on a level ground.
2. Set the burette at the fuel inlet of the carburetor and fill it with fuel.
3. Fully operate the throttle valve about five times and confirm the fuel discharged from the accelerating pump jet.
4. Set the fuel level in the burette at 300 mm (11.8 in) above the fuel inlet, as shown in Fig. 4–16.
5. Fully operate the throttle valve ten times according to the cycle as shown in Fig. 4–17 by means of the throttle lever or accelerator pedal and check the amount of discharge by reading the decrease of fuel in the burette.

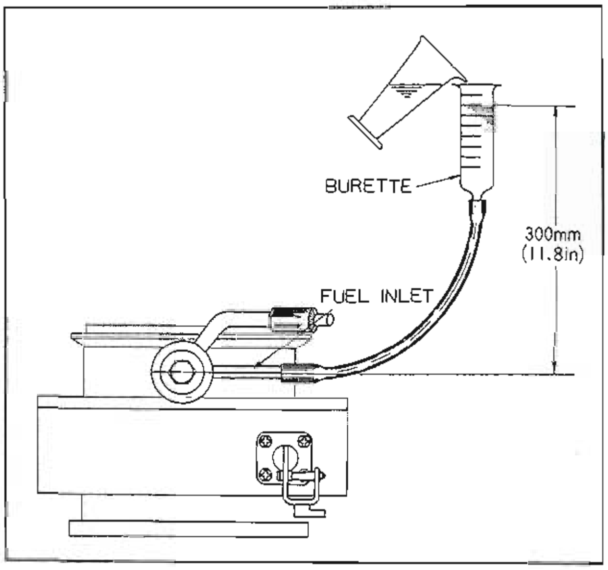


Fig. 4–16 Checking fuel discharge

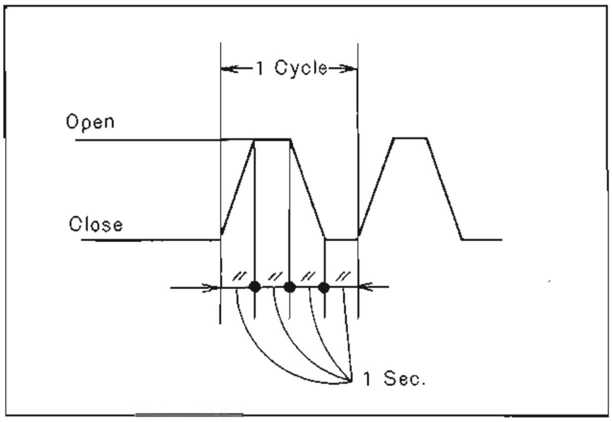


Fig. 4–17 Test pattern

6. In case the discharged amount is not within the specified limits, measure again more than two times in succession and confirm whether there is any error in measurements.
7. To adjust it, rotate the lock nut of accelerating pump connecting rod as shown in Fig. 4–18. The amount of discharge increases about 0.06 cc per clockwise turn and decreases the same amount by counterclockwise turn.

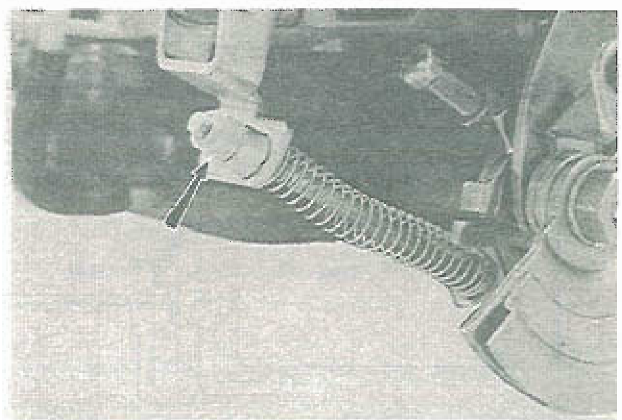


Fig. 4–18 Adjusting accelerator pump

Specifications – Standard amount of fuel discharged out of accelerating pump

	Standard	Measurement
Manual transmission	0.7 cc ± 15%/stroke	6.0 ~ 8.1 cc/10 strokes
Automatic transmission	0.7 cc ± 15%/stroke	6.0 ~ 8.1 cc/10 strokes

4–A–6. Fuel Inlet Fitting

The carburetor inlet fitting is provided with a fuel return device to prevent percolation. Whenever the key switch is on, a small amount of fuel which is led to the carburetor, returns to the fuel tank through the orifice of fuel return pipe.
Check the orifice for clog. When it is clogged, remove the fuel inlet fitting and clean it by compressed air.

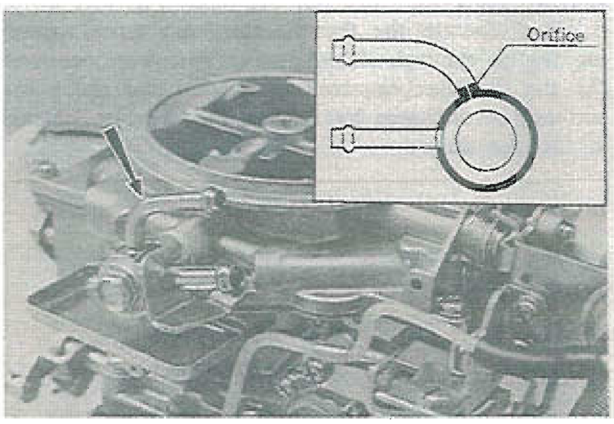


Fig. 4–19 Fuel inlet fitting

4–A–7. Sub-Zero Starting Assist Device (U.S.A., Canada and Arctic spec. models only)

This is the device for increasing the starting ability of the engine in extreme cold. When the ignition key is turned to the position of "start" under the circumstances where the temperature is below –18°C (0°F), a certain amount of starting assist fluid is supplied into the carburetor by a pump installed for supplying the starting assist fluid.

Check whether the device is operating normally or not by the following procedure.

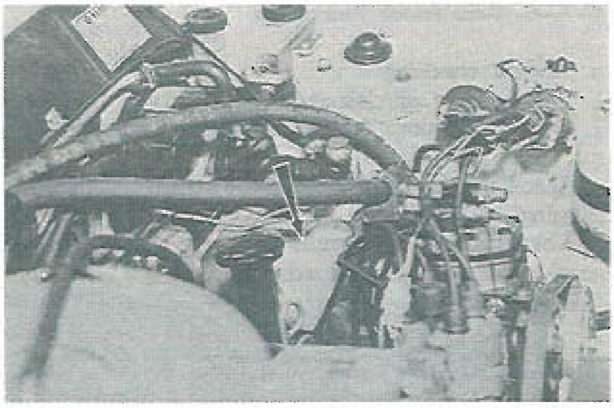


Fig. 4–20 Starting assist fluid tank (RX-2)

1. Make sure that there is sufficient starting assist fluid in the tank. Replenish if necessary.
2. Disconnect the hose on the side of the carburetor.
3. Disconnect the lead line of (S) terminal connected to the starter magnetic switch. This is to prevent the engine from revolving when the ignition key is turned to "start".
4. Disconnect the connector of the lead line of the thermo-unit and connect the body with the earth.
5. Turn the ignition key to the position of "start" and make sure that the starting assist fluid sprouts out from the tip of a hose for about 5 seconds.
6. Make sure that the check valve fitted on the carburetor is in proper working condition by blowing through it with your mouth.
7. Reinstall the rubber hose and wires, which have been removed for the check-up to their proper positions.

Note :

a. Check the level of the starting assist fluid at suitable internals and replenish as required so that it will not run short.
b. The mixture proportion of starting assist fluid should be 90% of anti-freeze solution for Aluminum engine plus 10% of water.

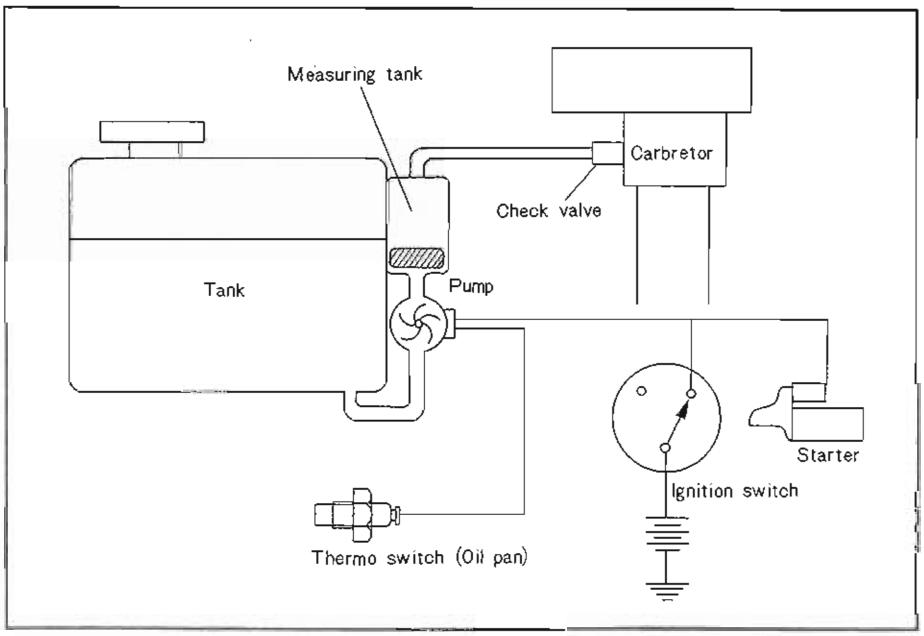


Fig. 4–21 Sub-zero starting assist system

4–A–8. Safety Throttle Return System

The safety throttle return system is adopted in order to prevent any possible danger from occurring when the accelerator return spring should become broken during operation and at that instant the accelerator should get out of control.
Under normal conditions, only spring Ⓐ operates a return spring by pulling throttle lever ④ which is connected to the accelerator wire. Link ③ is fixed by rod ② (whose upper end is fixed by counter ①) and does not have any connection with the movement of link ④. In case spring Ⓐ should become broken, the upper end of rod ② slips off of counter ① by spring Ⓑ and throttle lever ④ is pushed by the movement of link ③ instantaneously.
Compression spring Ⓑ works as an accelerator return spring with the same force as when spring Ⓐ is in operation. Consequently even if spring Ⓐ should become broken during operation, no adverse effects will occur in the operation of the accelerator control.

Checking:
1. Check that the throttle valve opens completely with the safety return system in set position.
2. Check that the link ③ is free with the safety return system in set position.
3. Turn the counter ① by hand anticlockwise and make sure that the upper end of rod ② slips off of counter ① instantaneously.

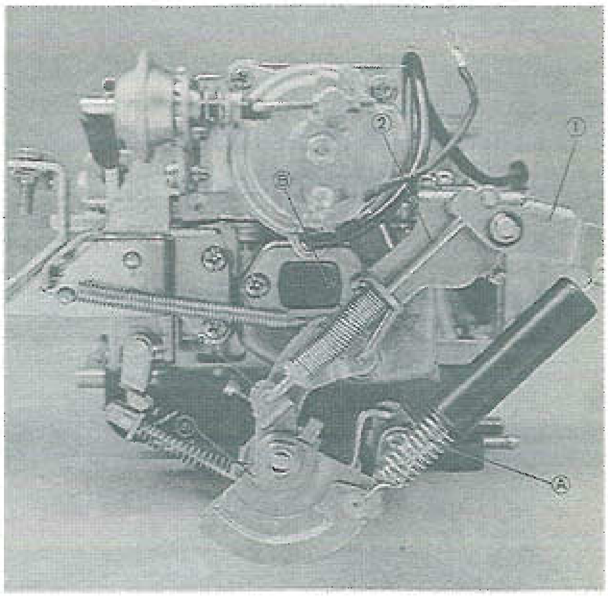


Fig. 4–22 Safety throttle return system

A. Throttle return spring
B. Safety return spring
1. Counter
2. Safety return spring rod
3. Link
4. Throttle lever

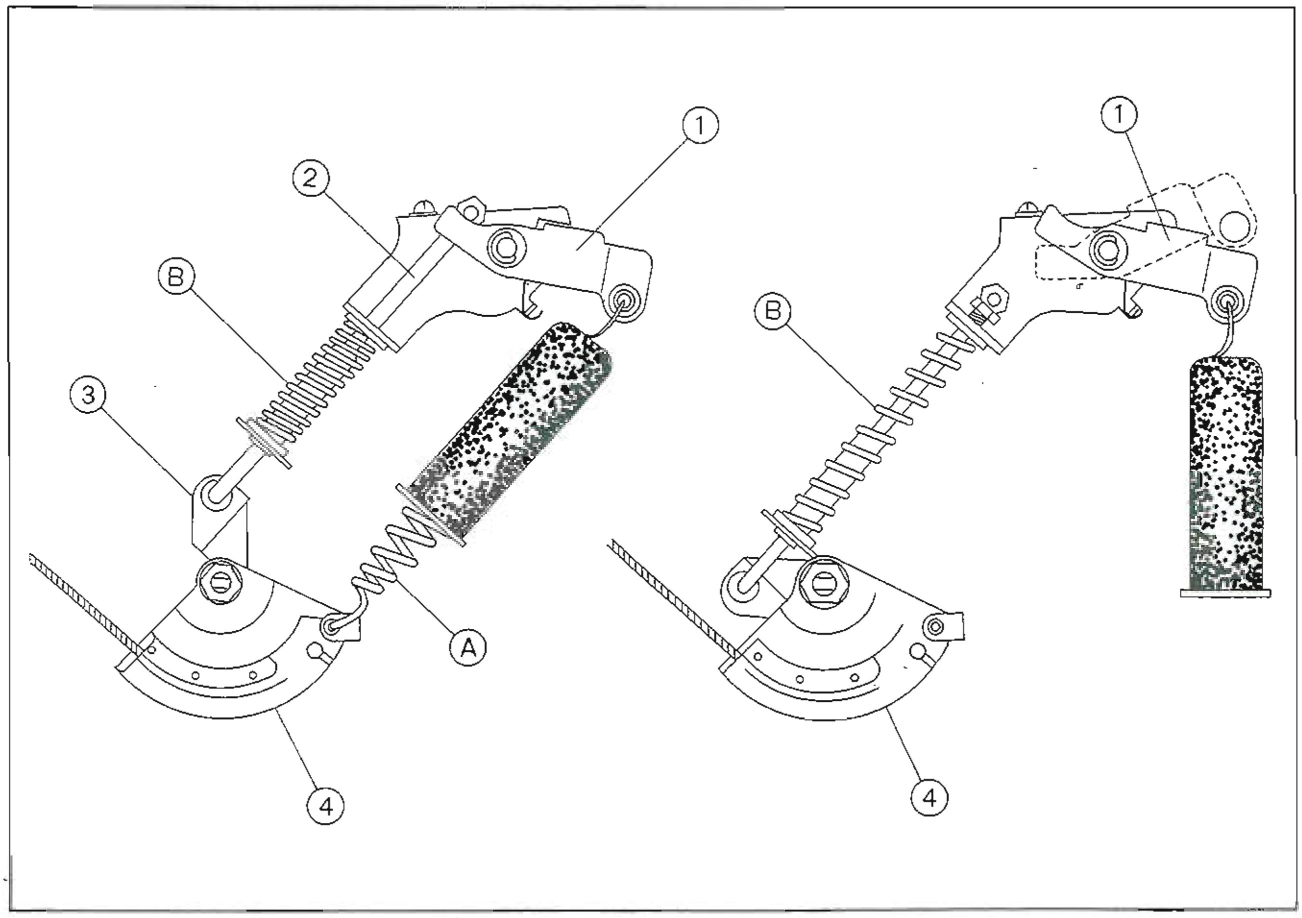


Fig. 4–23 Safety throttle return system

4–A–9. Disassembling Carburetor

a. Removing bimetal housing assembly and throttle return spring bracket.

1. Disconnect the vacuum sensing tube ①.
2. Dislocate the safety return spring rod ② by turning the counter ③ anticlockwise.
3. Disconnect the safety return spring rod ② by removing the cotter pin ④.
4. Remove the screws ⑤ attaching the return spring bracket ⑥ and remove the bracket.
5. Remove the throttle return spring ⑦.
6. Remove the 'No. 3 spring' ⑧.
7. Remove the lead ⑨ for the bimetal from the vacuum diaphragm ⑩ cover.
8. Remove the screws ⑪ attaching the bimetal housing bracket ⑫ and remove the bracket.

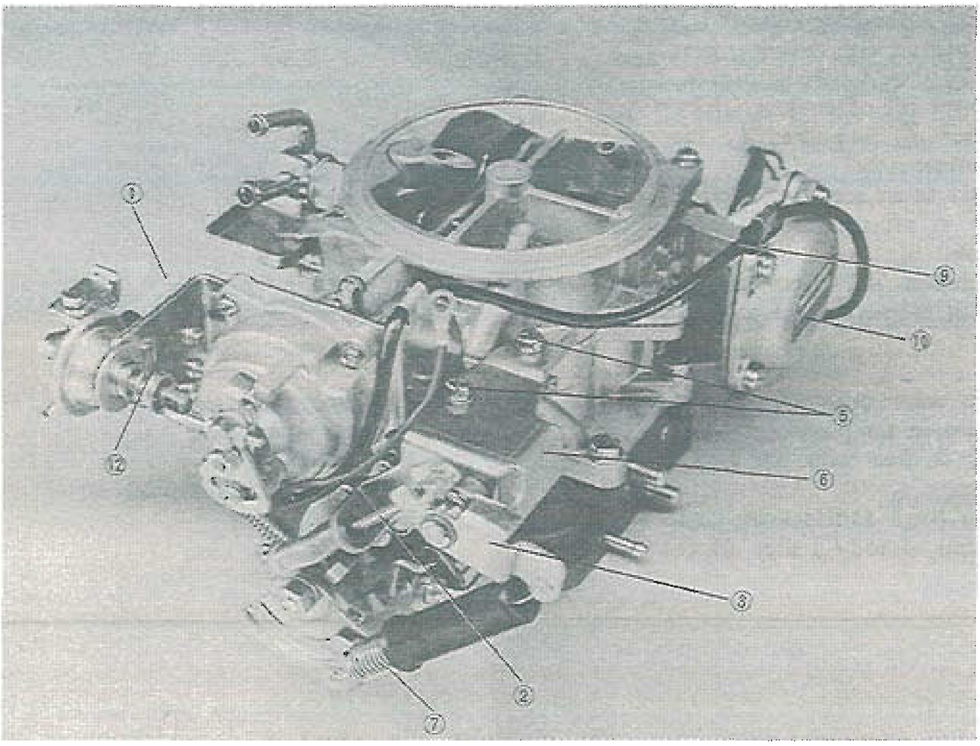


Fig. 4–24

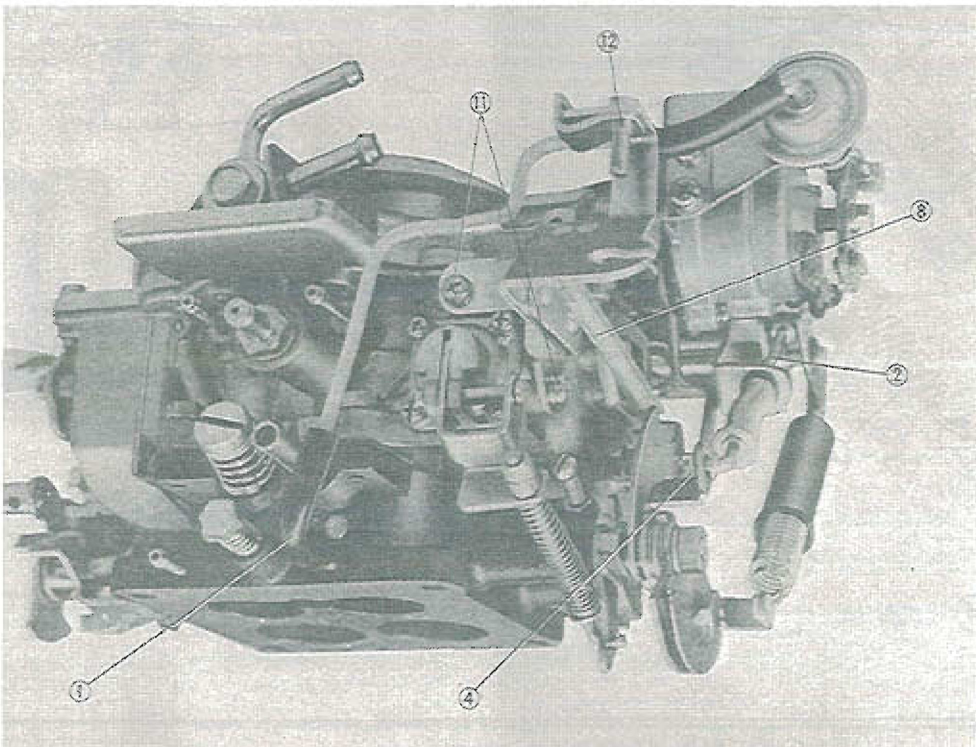


Fig. 4–25

b. Removing air horn

1. Disconnect the fast idle connecting rod (13) from the choke lever (14) by removing the cotter pin (15).
2. If necessary, remove the fuel inlet fitting (16) before removing the air horn.
3. Remove the screws attaching the air horn (17) to the body (18) and remove the air horn.

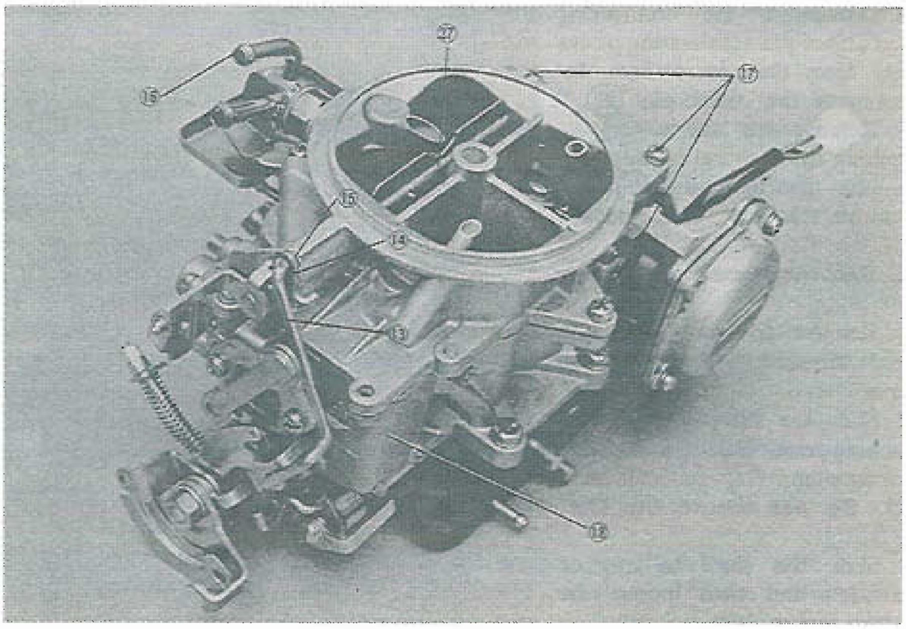


Fig. 4–26

c. Removing carburetor body

1. Remove the idle switch (19) by removing the screws (20) attaching the idle switch to the body. Remove the idle switch lever spring (21).
2. Disconnect the connecting rod (22) of the secondary throttle valve from the vacuum diaphragm (8) by removing the cotter pin (23).
3. Remove the screws (24) attaching the vacuum diaphragm (8) and remove the diaphragm assembly.

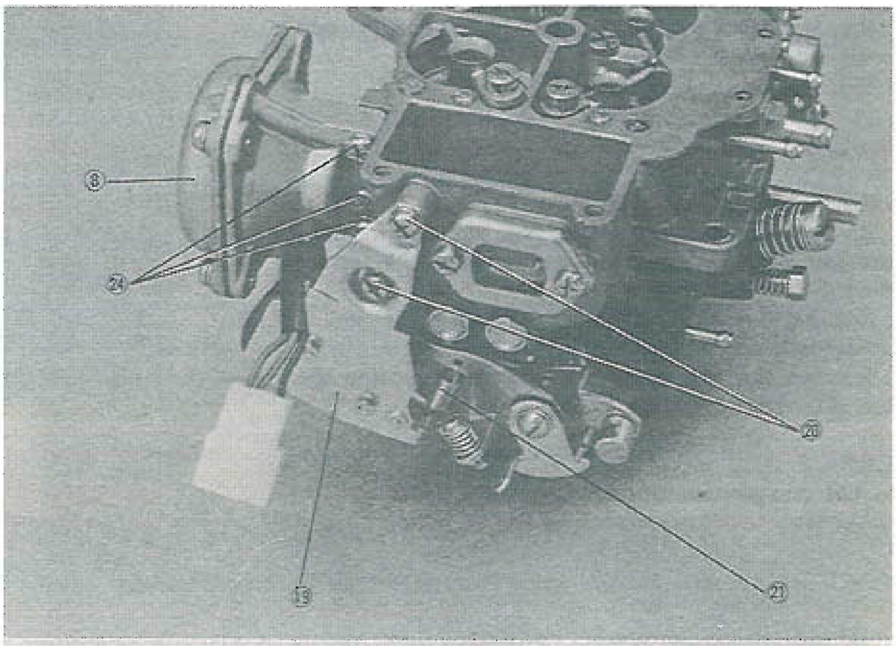


Fig. 4–27

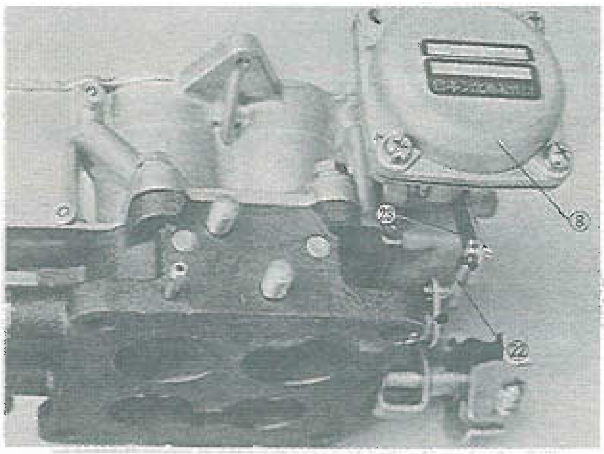


Fig. 4–28

4. Disconnect the connecting rod (25) of the accelerating pump (26) from the control lever by removing the cotter pin (27).
5. Remove the screws (28) attaching the carburetor body (19) to the throttle body (29) and remove the carburetor body.

d. Removing accelerating pump

1. Remove the snap ring (30) from the shaft (31) of the pump lever.
2. Slide the shaft until the attaching screw (32) of the accelerating pump (26) can be loosened. **Do not** remove the shaft (31).
3. Slide the shaft to original position and then loosen the other screws (32).

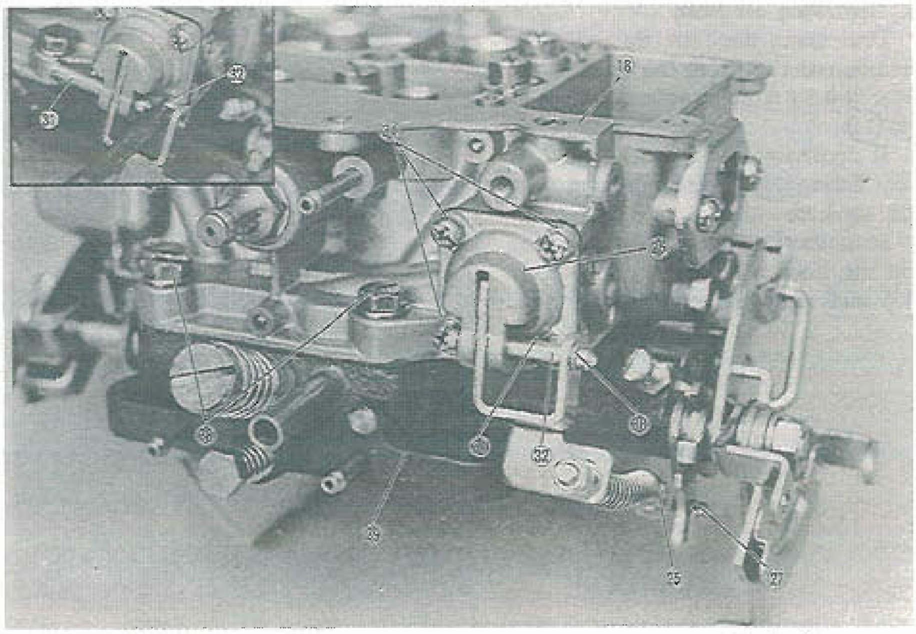


Fig. 4-29

e. Disassembling air horn
1. Remove the float retaining pin (33), float (34) and needle valve assembly (35).
2. Remove the gasket (36).

Note : Do not remove the choke shaft (37).

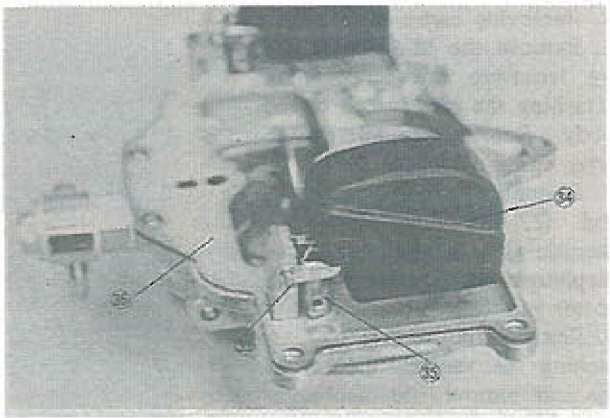


Fig. 4-30

f. Disassembling carburetor body
1. Remove the screws (38) (39), and remove the pump inlet ball (38) (inlet valve) and outlet ball (39) (outlet valve).
2. Remove the each slow air bleed and slow jet of primary and secondary stages from the body.
3. Remove the main jets (46) (47) by removing the plug (48) from the body (18).

Note :
Do not remove the venturis (49) (50).

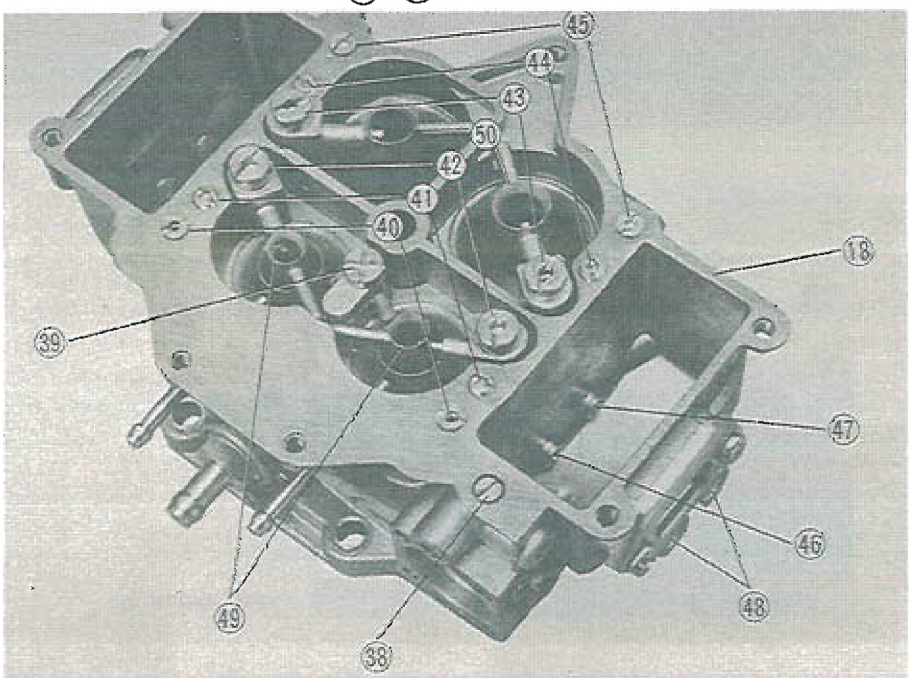


Fig. 4-31

40. Primary No. 2 slow air bleed
41. Primary No. 1 slow air bleed and slow jet
42. Primary main air bleed
43. Secondary main air bleed
44. Secondary No. 1 slow air bleed and slow jet (Step jet)
45. Secondary No. 2 slow air bleed
46. Primary main jet
47. Secondary main jet

g. Throttle chamber
1. Remove the air adjust screw.
2. Remove the idle adjust screw.

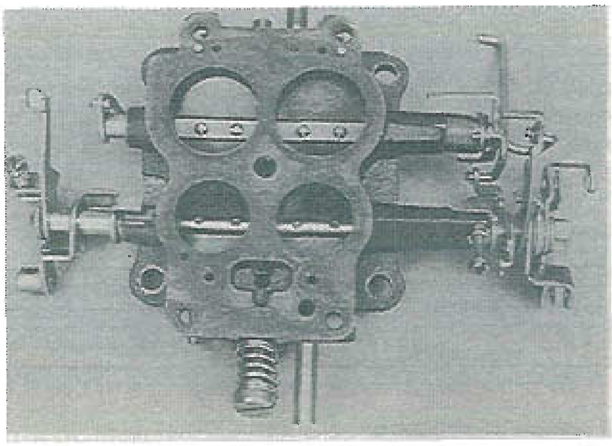


Fig. 4–32 Throttle chamber

4–A–10. Inspecting Carburetor

1. Wash all parts in clean gasoline and dry with compressed air. All passages of the carburetor must be blown very carefully.
Never use a wire for cleaning the jets.
2. Inspect the air horn, body and body flange for cracks, nicks or burrs on their respective gasket surfaces.
3. Inspect the float for deformation, damaged tab and worn retaining pin bore.
4. Check the float needle valve for wear and for proper seating.
5. Inspect the filter for rust and damage.
6. Check the choke valve for proper choking, smooth movement and excessive play of choke shaft.
7. Check all jets and air bleeds for clog, damaged threads, damaged head slots and damaged holes.
8. Check the primary and secondary throttle valves if these close firmly or not, check them for smooth movement and excessive play of the shafts.

Note :
Worn throttle valve shaft allows air to enter into the combustion and air-fuel mixture at low speed becomes lean.

9. Check the diaphragm of vacuum control unit for damage. Check the spring for weakness.

4–A–11. Assembling Carburetor

To assemble, follow the disassembly procedures in the reverse order with the following cautions.
1. Discard the old gaskets and use new ones.
2. Confirm that all parts are in good condition and clean.
3. Both the primary and secondary systems have their respective parts which are of a shape. Therefore, when installing, care should be taken so as not to mistake one for the other.

The jets and air bleeds for the secondary stage has been **plated in silver,** and jets and air bleeds for the primary stage in **bronze.** These colours are made in order to prevent each jet from changing its original position when reassembling.
4. When putting the gasket on the throttle body, take care not to put upside down.

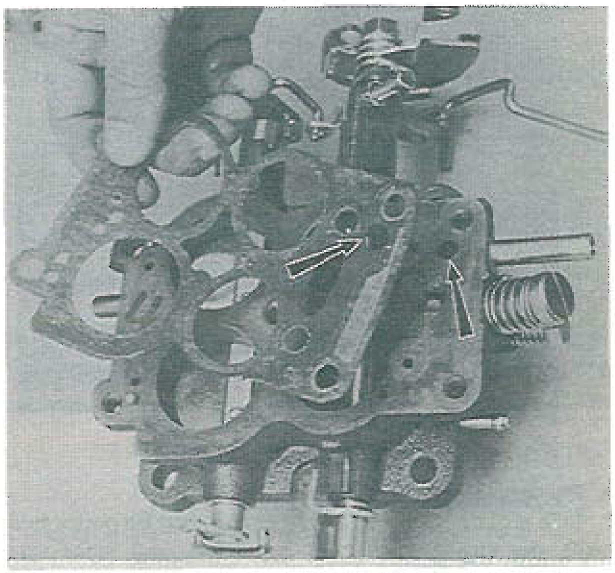
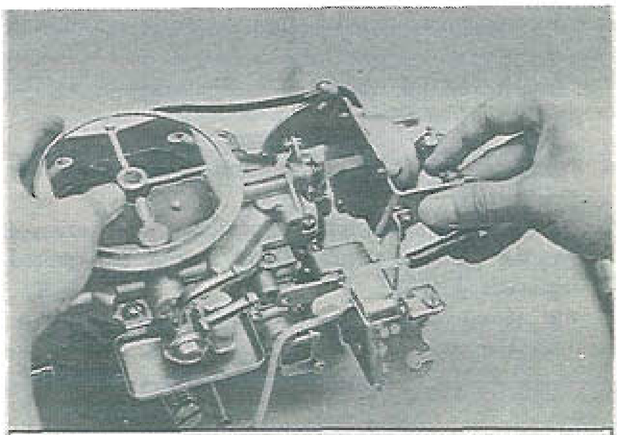


Fig. 4–33 Putting gasket

5. When installing the bimetal spring housing to the carburetor, fit the choke shaft lever to the bimetal spring end accurately by means of closing the choke valve and pulling the vacuum break diaphragm shaft.



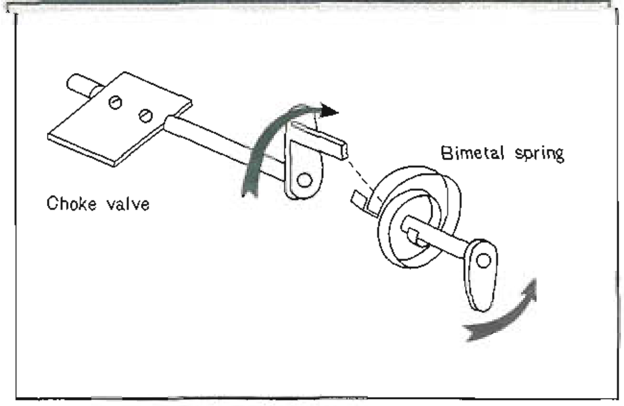


Fig. 4–34 Installing bimetal spring housing

4–B. FUEL PUMP

To determine that the fuel pump is in satisfactory operating condition, tests for both fuel pump pressure and fuel pump capacity (volume) should be performed. The tests are performed with the pump installed on the car.

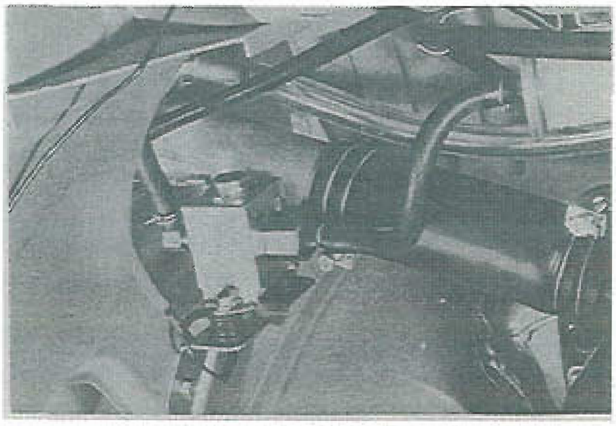


Fig. 4–35 Fuel pump

a. Pressure test

1. It is required that measurement should be performed while the engine is in cold condition, and make sure that there is no fire around.
2. Remove the aircleaner assembly. Disconnect the fuel inlet hose at the carburetor. Use care to prevent combustion due to fuel spillage.
3. Connect the pressure gauge to the fuel inlet hose.

Note:
It is recommended to place the pressure gauge outside the engine compartment using a hose of adequate length. In this case, place the gauge almost at the height of carburetor.

4. Turn the ignition switch on and note the pressure reading.
If the reading is not within the specifications mentioned below, the pump is damaged and should be repaired or replaced.
If the pump pressure is within the specifications, perform the test for volume.

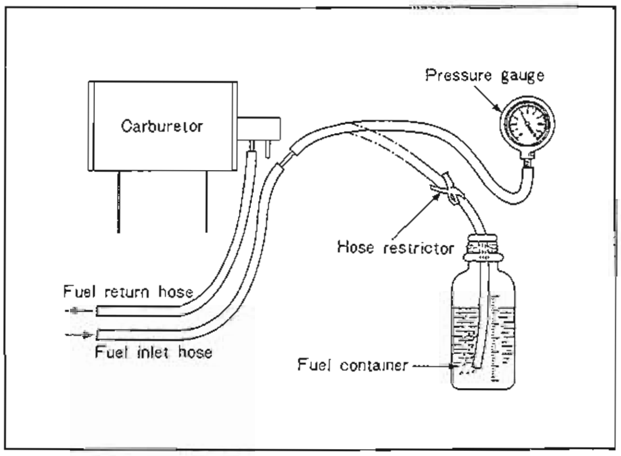


Fig. 4–36 Testing fuel pump

b. Volume test
Turn the ignition switch on, open the hose restrictor and expel the fuel into the container, while observing the expelling amount for one minute. Close the restrictor and read the amount.
If the pump volume is below specifications, repeat the test using an auxiliary fuel supply and a new fuel filter. If the pump volume meets specifications while using the auxiliary fuel supply, check for a restriction in the fuel supply from the tank and for the tank not venting properly.

Specifications – Fuel pump

Fuel pressure	0.2 ~ 0.3 kg/cm² (2.85 ~ 4.25 lb/in²)
Feeding capacity	More than 1,150 cc/min. (1.22 U.S. quart/min.)

4–C. FUEL FILTER

The fuel filter is of a cartridge type. The element of the filter is sealed cartridge and should be replaced following the maintenance schedule.

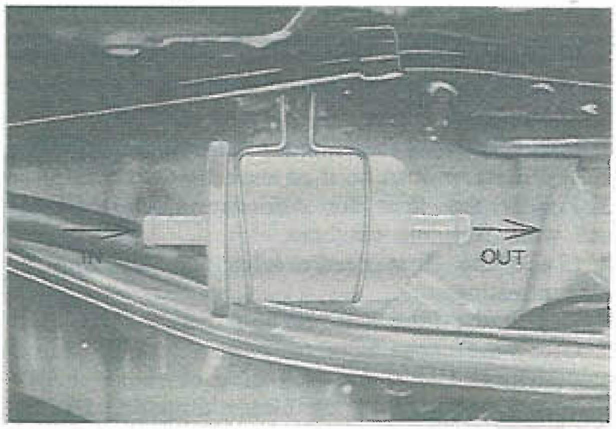


Fig. 4–37 Fuel filter

4–D. FUEL LINES

Inspect the fuel lines for leaks and tighten the fuel line connections to prevent leakage. It is important that the fuel system should be kept clean and free from water. In an excessive amount of dirt or water is found, drain the fuel from the tank and blow out the fuel lines with compressed air.

4–E. FUEL TANK

Inspect the fuel tank for cracks and corrosion. If any defect is present, repair or replace as necessary.

Note :
Before repairing, clean the fuel tank thoroughly with steam and sufficiently to remove all explosive gas.

4–F. AIR CLEANER

4–F–1. Air Cleaner Element

The air cleaner is of a paper filter type. The element should be serviced following the maintenance schedule. To clean, blow the element with compressed air at low pressure.

4–F–2. Intake Air Temperature Control System

Intake air temperature control system consisting of a control valve and a bimetal is located within the air cleaner and senses the engine room temperature for a stabilized intake air temperature.
The intake of fresh air and hot air is automatically controlled over by means of the bimetal and control valve installed in the air cleaner inlet side.

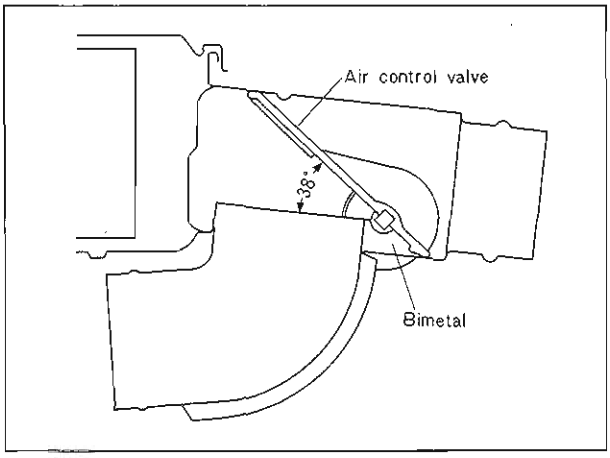


Fig. 4–38 Air control valve

The control valve closes the fresh side air completely below 7.5 ± 6°C (45.5 ± 10.8°F) of the ambient temperature and only hot air is led into the engine through the air cleaner element.
The hot air is completely closed above 45.5 ± 7°C (113.5 ± 12.6°F) and all the fresh air is sucked into the engine.

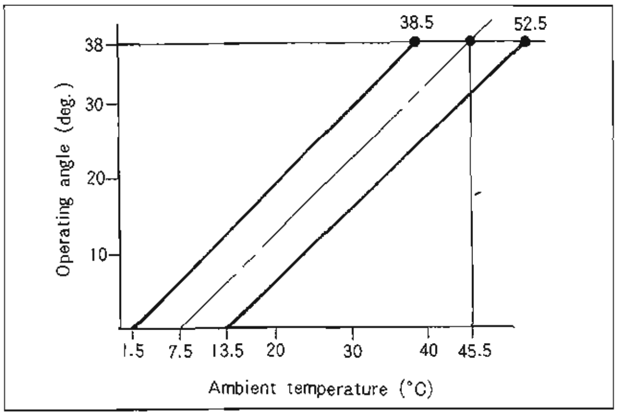


Fig. 4–39 Valve opening angle

a. Removing air control valve

1. Remove the clip and bush from the bimetal side shaft.
2. Pull out the shaft from the air cleaner body.
3. Remove the bimetal by removing the set screw.

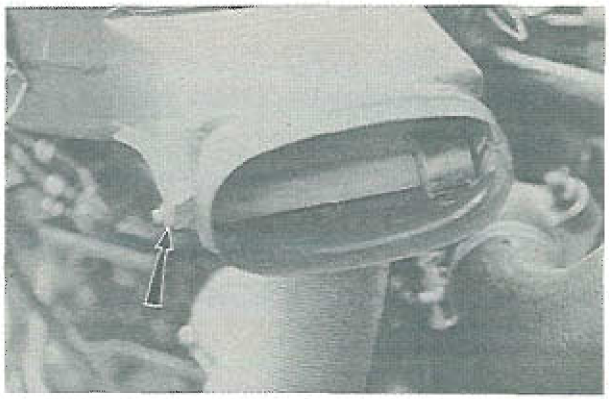


Fig. 4–40 Removing air control valve

b. Installing air control valve

To install, follow the removal procedures in the reverse order with following caution.
Assembling the shaft to the bimetal, align the slit of the shaft to the bimetal end.

ELECTRICAL SYSTEM (ENGINE)

5–A. BATTERY

5–A–1. Checking Battery

As the battery has an important influence on startability, ignition and lighting, check the following points periodically and always keep the battery in perfect condition.

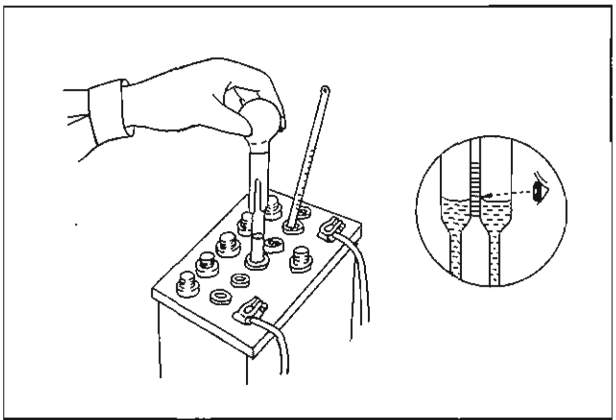


Fig. 5–1 Checking specific gravity

1. Check the electrolyte level in each cell of the battery, and add distilled water to maintain the solution 10 ~ 20 mm (0.4 ~ 0.8 in) above the plates.
Do not overfill.
2. Check the specific gravity of the electrolyte with a hydrometer, as shown in Fig. 5–1. If the reading is 1.28 or more, it indicates that the battery is fully charged. If the reading is below 1.22, the battery requires recharging.
3. Check the tightness of the terminals to ensure good electrical connections. Clean the terminals and coat the terminals with grease.
4. Inspect for corroded or frayed battery cables.

5–A–2. Charging Battery

a. Constant current charge

1. If the exterior of the battery is dirty with sulphuric acid or dust and dirt, wash these off with clean water and dry thoroughly before charging the battery.
2. Check the electrolyte level and add distilled water if necessary.

Note:
If addition of distilled water is neglected, the plates and separators will become exposed to air, causing a sulphation to occur on the plates.
Do not add dilute sulphuric acid unless the electrolyte has overflown or led out.

3. Connect the battery to the charger ensuring that the polarities are correct.

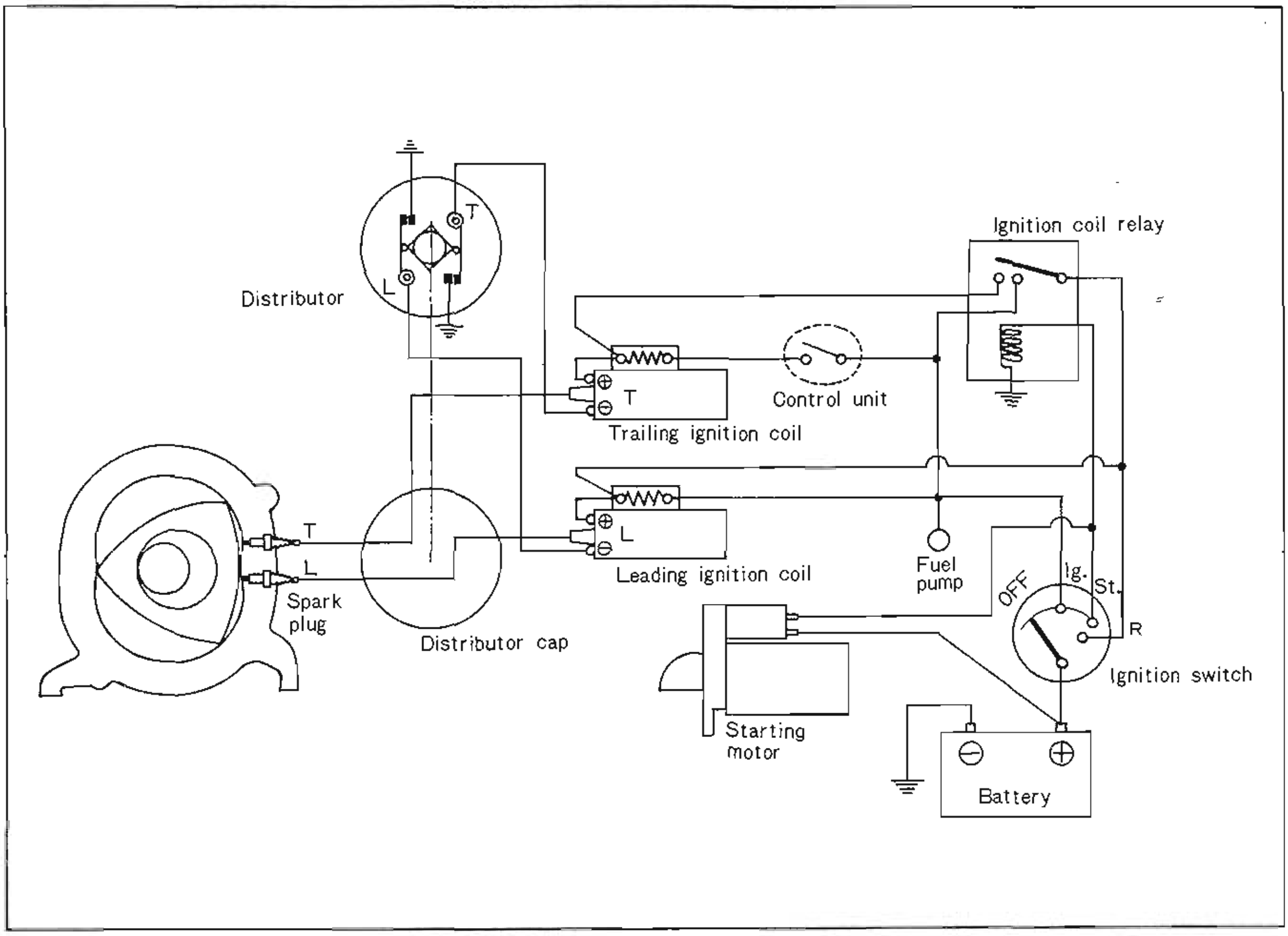


Fig. 5–2 Ignition system

4. To charge, apply an electric current of approximately 5A until the specific gravity of the electrolyte reaches 1.27 ~ 1.29.

b. Fast charge

As a fast charge causes both the temperature and the level of the electrolyte to rise suddenly, it does not have a favorable effect on the battery. Therefore, this should not be performed unless in the case of an emergency.

When a fast charge is being applied with the battery mounted on the vehicle, ensure that the cables are removed from the battery terminals before the charge is applied. If this is neglected, it could cause a damage to the diodes on the alternator.

The battery should be kept by the use of cooling water to prevent the temperature of the electrolyte from exceeding 55°C (131°F), otherwise the charging should be discontinued temporarily when the temperature rises above this point.

5–B. IGNITION SYSTEM

In the rotary engine, two spark plugs are provided in the working chamber, one above the minor axis (called the trailing side) and the other below the minor axis (called leading side) of the epitrochoid surface, so as to enable the engine to obtain the optimum combustion efficiency under any operating condition.

The primary wires from the individual breaker points for trailing and leading plugs are led to the two separate coils and the secondary wires also are separately led via the distributor to the trailing and leading plugs.

In the distributor, the vacuum advance works on the trailing side and the centrifugal advance works on both the trailing and leading sides, and the interval of the initial ignition timing between trailing and leading can be adjusted.

The coil with external resistor is used.

The ignition coil relay is equipped to short-circuit the external resistor in starting (when the starter is running) so as to increase the secondary voltage and improve the startability.

Short-circuiting of resistor by the ignition coil relay is made on the trailing side only and that on the leading side by the ignition switch. The ignition coil relay has another contact point which serves to energize the ignition circuit for the fuel pump, etc.

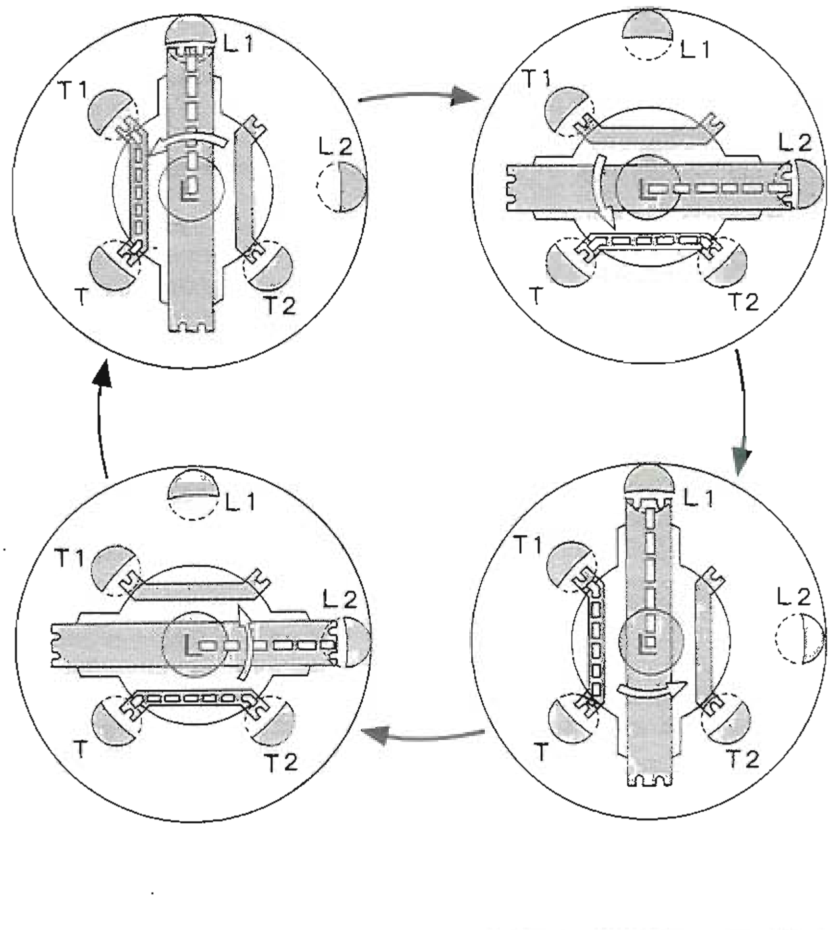


Fig. 5–3 Distribution of ignition

5–C. DISTRIBUTOR

The distributor for this model had two breaker points, one for leading spark plugs and the other for trailing spark plugs.
The distributor consists of distributing mechanism, contact breaker mechanism, and ignition timing advance control of centrifugal and vacuum.

5–C–1. Adjusting Point Gap

A scope, a dwell meter, or a feeler gauge can be used to check the gap of new breaker points. A scope or a dwell meter should be used to check the gap of used breaker points. Due to the roughness of used points, it is not advisable to use a feeler gauge to check the gap.
To check and adjust the breaker points with a feeler gauge:
1. Check the breaker points alignment. If necessary, bend the stationary point bracket so as to obtain contact in the center of the breaker points.
2. Crank and stop the engine when the rubbing block on the breaker arm just rests on the highest point of the cam.
3. Insert a feeler gauge of 0.45 mm (0.018 in) between the breaker points, loosen the two set screws and move the stationary point until the correct gap is obtained.
4. Tighten the set screws and recheck the point gap.

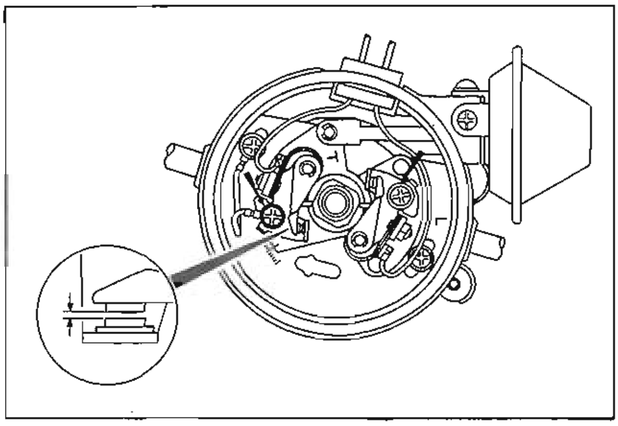


Fig. 5–4 Adjusting point gap

5–C–2. Adjusting Initial Ignition Timing

To check and adjust the timing with a timing light, proceed as follows:
* **STEP–1** *
1. Connect a tachometer to the engine.

Note:
The tacho-dwell tester can be used in the same method as when measuring the dwell angle on a 4 cylinder, 4 cycle reciprocating engine.

2. Disconnect and plug the vacuum tube on the distributor.
3. Connect a timing light to the high tension cord for leading spark plug of the front rotor housing.
4. Start the engine, and run it at specified idle speed. (See page 4 : 2)

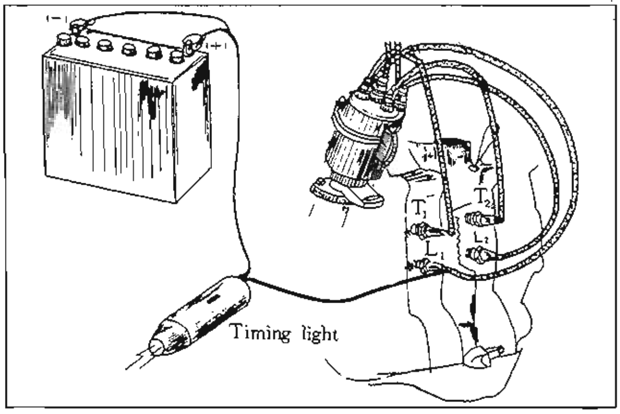


Fig. 5–5 Checking ignition timing

5. Aim the timing light at the timing indicator pin on the front cover.

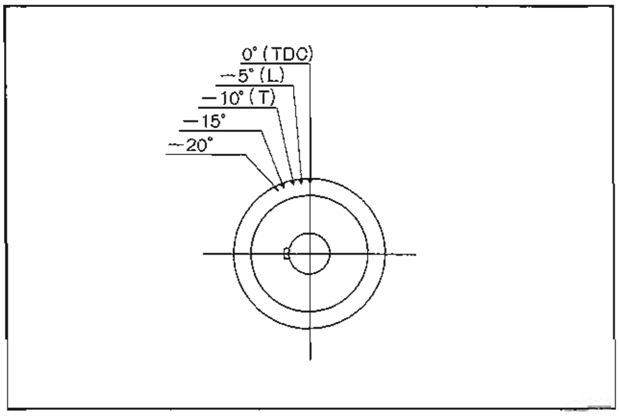


Fig. 5–6 Timing marks

6. If the leading timing is not correctly aligned, stop the engine.
7. Loosen the distributor locking nut slightly and rotate the distributor housing with engine running so that the leading timing may align with the indicator pin on the front cover.
8. Stop the engine and tighten the distributor locking nut. Recheck the timing.
9. Change connection of the timing light to the high tension cord for trailing spark plug of the front housing.
10. Aim the timing light and check the timing. If the timing is in allowance of specification, the both initial timings are satisfactory and checking of timing is finished.
* **STEP–2** *
If the trailing timing is not in specification, **adjust both the trailing and leading timings** as follows:
11. Adjust the trailing timing to specification by rotating the distributor housing.
12. Then, check the leading timing and read the error.
13. Remove the distributor cap and rotor. Turn out breaker base set screws ½ to 2 turns and turn the base as required until correct timing is obtained.

Note:
Refer to graduations on the breaker base to make adjustment easier.

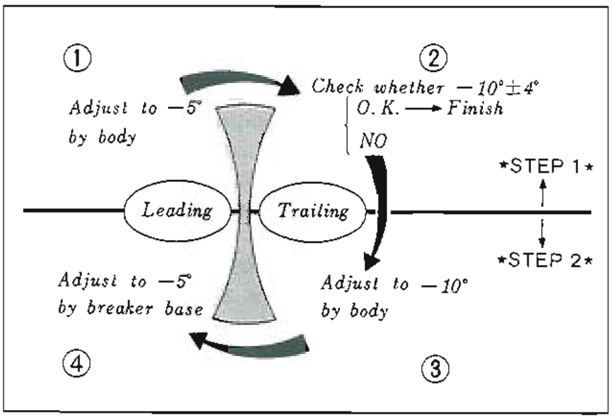


Fig. 5–7 Adjusting procedure

One graduation correspond to eccentric shaft angular displacement of 4 degrees.

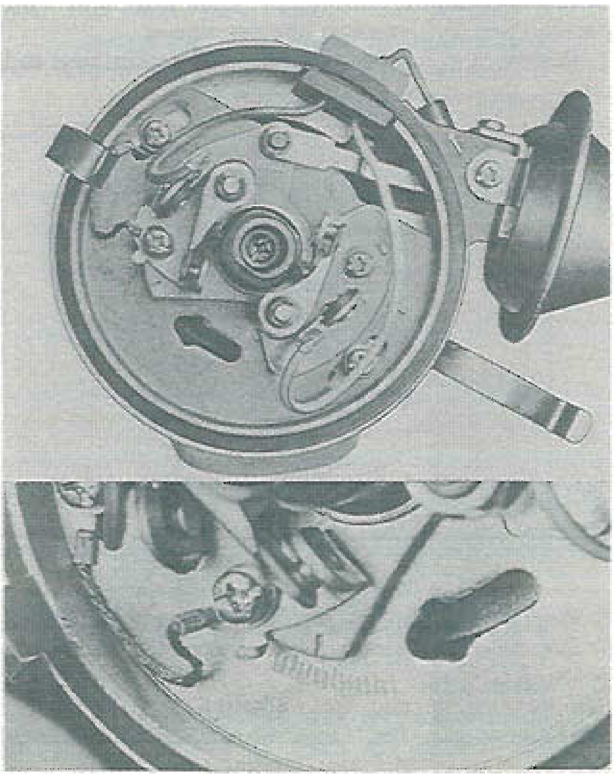


Fig. 5–8 Adjusting timing

14. Recheck the timing. If the timing mark is not correctly aligned, repeat this performing until the correct timing is obtained.

Specifications — Initial timing

Leading Trailing	−5° at idle speed −10° ± 4° at idle speed

5–C–3. Removing Distributor

1. Remove the distributor cap and disconnect the vacuum tube from the vacuum advance unit.
2. Disconnect the coupler of primary wires from the distributor.
3. Remove the distributor attaching nut.
4. Pull the distributor out of the front cover.

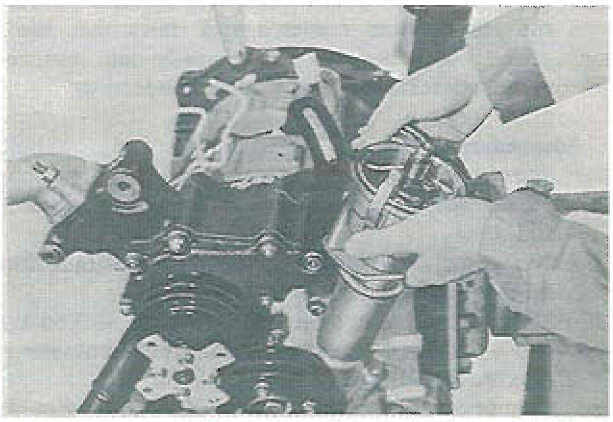


Fig. 5–9 Removing distributor

5–C–4. Testing Distributor

a. Dwell angle test

1. Disconnect and plug the distributor vacuum tube and connect the tester following the instructions of the manufacturer. Then start the engine and let it idle.
2. Turn the cylinder selector to the **4 cylinder, 4 cycle** position.
3. Read the dwell angle on the dwell meter and compare the reading to specification. (55 ~ 61° in this case)
4. If the dwell angle is below specification, the breaker point gap is too wide. If the dwell angle is above specification, the breaker point gap is too close.

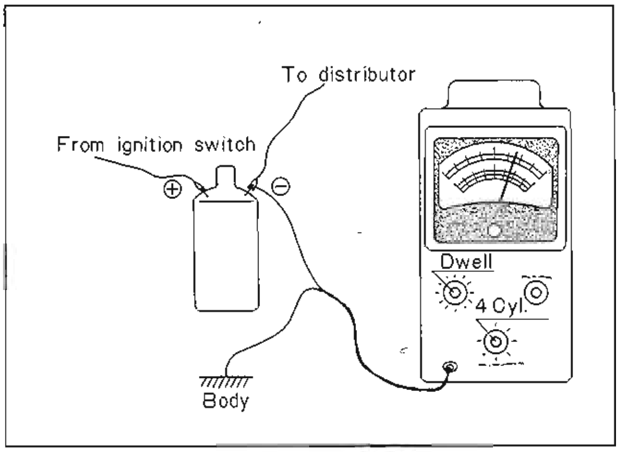


Fig. 5–10 Checking dwell angle

b. Dwell angle adjustment

If the dwell angle is not within specifications, proceed as follows:

1. Remove the coil high tension cords from the distributor and ground them.
2. Remove the distributor cap and place them out of the way.
3. Connect the **remote starter switch** (49 0242 685A) in the circuit.
4. Loosen the breaker point attaching screws.
5. With the ignition switch on, crank the engine with a remote starter switch and adjust the gap to specification.
6. Release the remote starter switch and tighten the breaker point attaching screws.
7. Since the adjustment may have changed when the attaching screw was tightened, crank the engine again

with the remote starter switch and check the dwell angle. When the dwell is properly adjusted, remove the remote starter switch and tester leads.

c. Advance test

The advance is checked to determine if the ignition timing advances in proper relation to engine speed and load.

Check the dwell angle. If the angle is not within the specifications, adjust the breaker points.

Check the breaker arm spring tension [0.5 ~ 0.65 kg (1.1 ~ 1.4 lb)] and replace the points if the spring tension is not within specifications.

The advance characteristic of the distributor should be within the range as shown in Fig. 5–12.

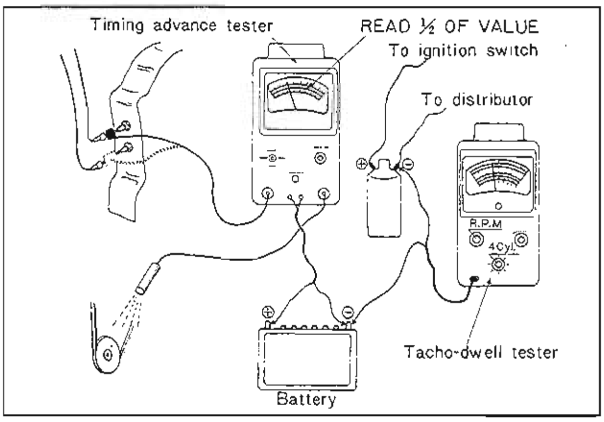


Fig. 5–11 Advance test

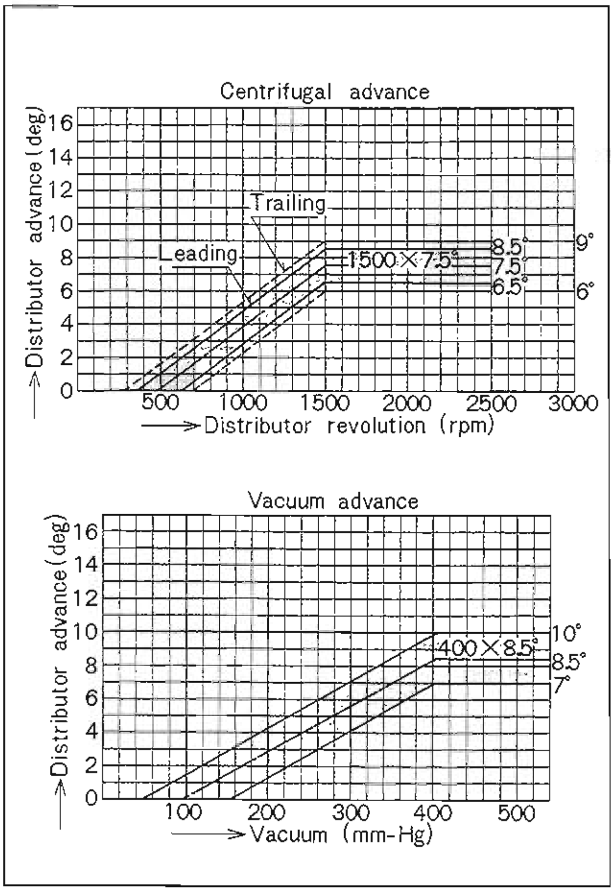


Fig. 5–12 Advance characteristic

Note:

The ignition advance tester can be used in the same method as when measuring the ignition advance on the **4 cylinder, 4 stroke reciprocating engine** but the numerical value indicated on the scale is twice as much as the actual advance degree of rotary engine. So the **indicated value should be divided into two.**

5–C–5. Disassembling Distributor

1. Loosen the cap retaining clips and lift off the cap.
2. Remove the rotor.
3. Remove the screws attaching the vacuum control unit to the distributor housing and remove the clip holding the vacuum diaphragm link. Remove the vacuum control unit.
4. Remove the screws attaching the condensers.
5. Remove the primary wires (rubber block) from the housing.
6. Remove the contact point assemblies from the breaker base by removing the set screws.
7. Remove the screws attaching the breaker base and remove the breaker base.

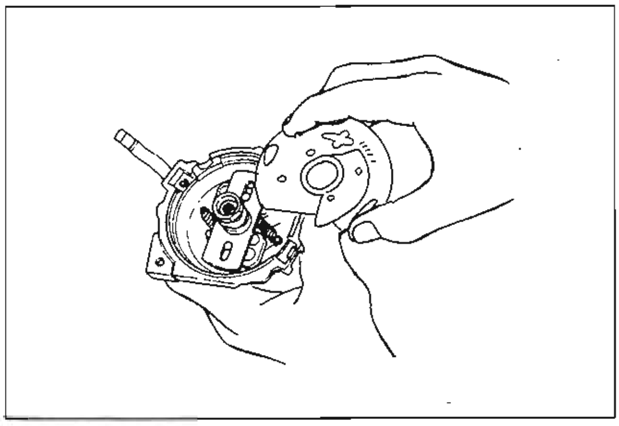


Fig. 5–13 Removing breaker base

8. Remove the cam set screw and remove the cam.
9. Remove the retaining pin attaching the distributor driven gear.

Remove the gear and the washer(s).

10. Remove the shaft in upward direction through the top of the distributor housing.
11. Remove the governors by removing the springs and clips.

5–C–6. Inspecting Distributor

a. Checking cap

Inspect the distributor cap for crack, carbon runners and evidence of arcing. If any of these conditions exists, the cap should be replaced. Clean any corroded high tension terminals.

b. Checking rotor

Inspect the rotor for cracks or evidence of excessive burning at the end of the metal strip. If any of these conditions exists, the rotor should be replaced.

c. Checking contact points

Inspect the points for wear, burning, transferred metal and pitting. If they are slight, the points can be cleaned with an oil stone. If they are severe, replace with new ones.

d. Checking tension of contact arm spring
For inspection, hook a spring scale on the contact arm and pull in a straight line at a right angle to the contact arm. Take a reading when the contact points start to separate. The reading should be between 0.5 ~ 0.65 kg (1.1 ~ 1.4 lb).

e. Checking condenser
If the condenser is leaky, it will cause a weak spark or burned contact points. Check the capacity of the condenser with a condenser tester.
The capacity is 0.24 ~ 0.30 microfarads. In the absence of a tester, check by substituting a new condenser.

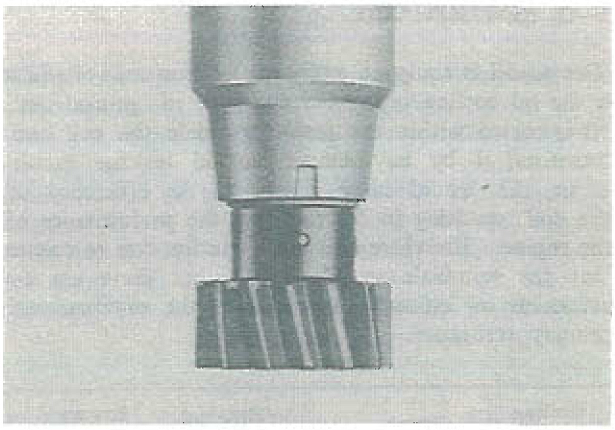


Fig. 5–14 Aligning tally mark

5–C–7. Assembling Distributor
Assemble the distributor in the reverse order of disassembling.

5–C–8. Installing Distributor
1. Turn the eccentric shaft until the TDC mark on the drive pulley aligns with the indicator pin on the front cover. (See Fig. 5–6)
2. Align the tally mark on the distributor housing and driven gear as shown in Fig. 5–14.
3. Insert the distributor so that the distributor lock bolt is located in the center of the slit, and engage the gears.
4. Rotate the distributor clockwise until the leading contact point starts to separate, and tighten the distributor attaching nut.
5. Install the distributor cap and connect the primary wires coupler.
6. Set the timing with a timing light, then tighten the distributor attaching nut. (Refer to Par. 5–C–2)
7. Connect the vacuum tube to the vacuum advance unit.

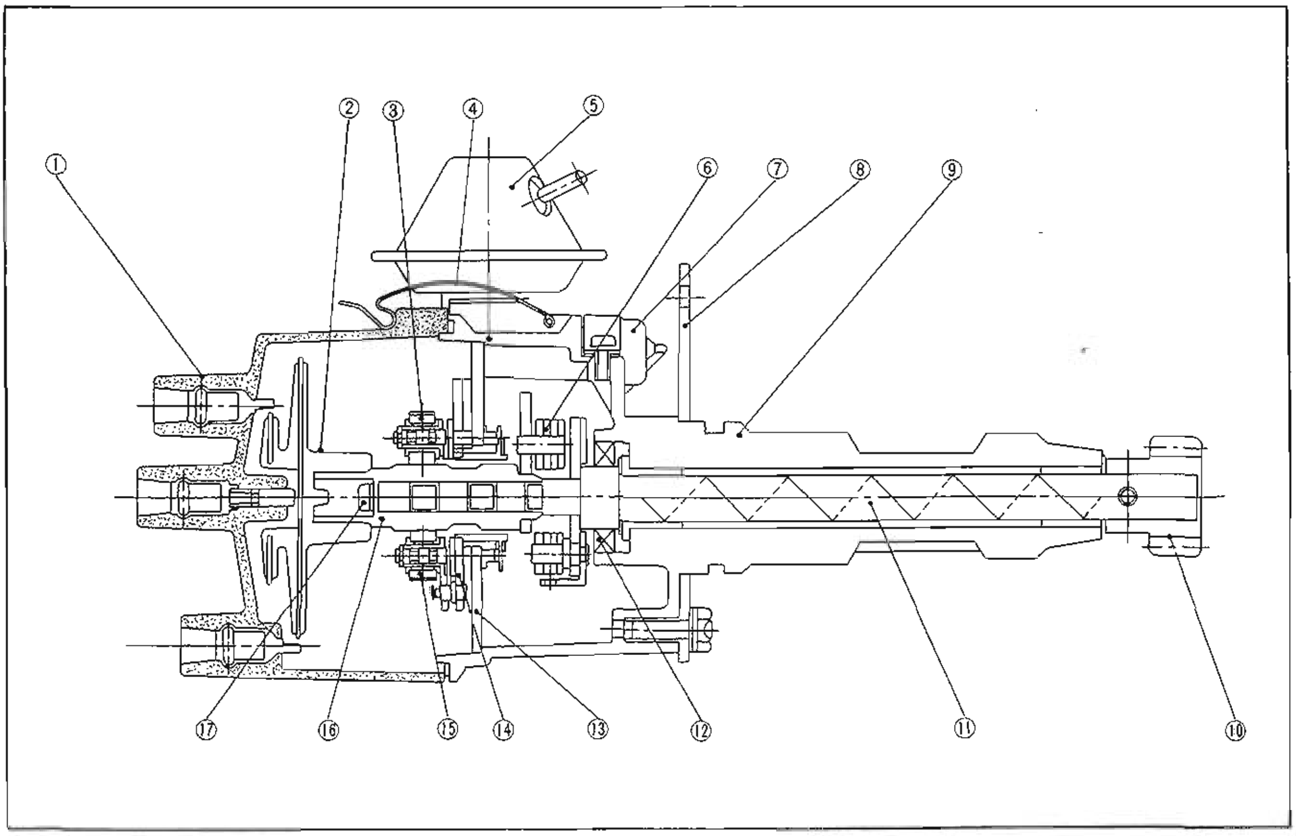


Fig. 5–15 Distributor components

1. Cap
2. Rotor
3. Leading breaker point
4. Clamp
5. Vacuum diaphragm
6. Governor
7. Condenser
8. Lock plate
9. Distributor body
10. Distributor driven gear
11. Shaft
12. Oil seal
13. Breaker base (Leading)
14. Breaker base (Trailing)
15. Trailing breaker point
16. Cam
17. Cam set screw

5–D. IGNITION COIL

This model is equipped with two ignition coils of which is the oil cooling type. On this type of ignition coil, oil is sealed within the insulator inside the coil and, therefore, if by any chance an oil leakage should occur, this would cause a drop in the efficiency of the coil, resulting in deteriorating the performance of the engine. Therefore check the ignition coil to ensure that the terminals are clean and that there are no cracks or oil leakages. Also, check the external and primary resistance.

Ignition Coil	Type	External Resistance	Primary Resistance
Leading	HP5-13J	1.4 Ω/20°C	1.35 Ω/20°C
Trailing	HP5-13E	1.6 Ω/20°C	1.46 Ω/20°C

5–E. SPARK PLUG

On this engine, 2 spark plugs are provided in each working chamber so as to enable the engine to obtain the optimum combustion efficiency under any operating condition. These spark plugs for this engine are slightly different from for the reciprocating engines in dimensions and heat values.
As you are aware, heat range of the spark plugs should be selected by owing of various conditions, otherwise durability of the spark plug, startability of the engine and running performance of the car will be down. Therefore, it is recommended that heat range of the spark plugs should be selected in each vehicle running conditions.
All spark plugs must be of the same maker and number or heat range. If spark plugs shown burning white or rapid electrode wear, replace with a **cold range type** spark plugs.
Do not use spark plug which is not specified.

5–E–1. Spark Plug Heat Range

Two types of spark plug, standard spark plug and cold type spark plug, are available and they should be selected according to the weather condition and driving condition.

a. Standard
The standard spark plugs are of the standard specification and suitable for the vehicle which is not frequently driven at a continuous speed over 150 km/h (95 miles/h).

b. Cold type
The cold type spark plugs are of a heat range higher than the standard spark plugs. They should be used in case the standard spark plugs are overheated, or for the vehicles which is frequently driven at a continuous speed of over 150 km/h (95 miles/h).

5–E–2. Removing Spark Plug

1. Disconnect the wire from each spark plug by grasping, twisting and then pulling the moulded cap of the wire only. Do not pull on the wire because the wire connection inside the cap may become separated or the boot may be damaged.
2. After loosening each spark plugs one or two turns, clean the area around each spark plug port with compressed air, then remove the spark plugs.

5–E–3. Checking Spark Plug

1. Inspect each plug individually for badly worn electrodes, glazed, broken or blistered porcelain, and replace the plug as necessary.
2. Clean the spark plugs throughly using a sand blast cleaner.
3. Inspect each spark plug for make, and heat range.

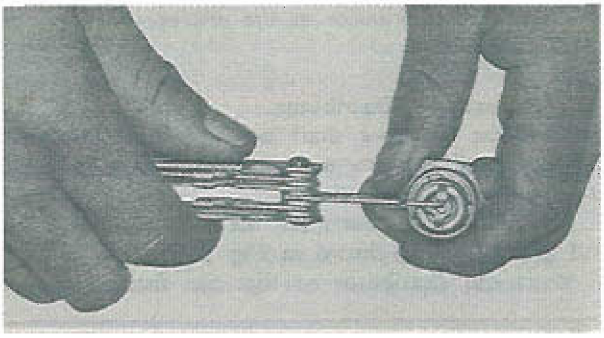


Fig. 5–16 Checking gap

Below is the table of recommended spark plugs. They are all recommended for U.S.A. and Canada spec. models, and for ECE are recommended *-marked plugs only, and for Australia ·-marked plugs only.

	Standard	Cold type	Initial gap
NGK	· B7EM * BR7EM B7EMV BR7EMV	· B8EM * BR8EM B8EMV BR8EMV	U.S.A., Canada and ECE spec: 0.6 ~ 0.7 mm (0.024 ~ 0.028 in)
NIPPON-DENSO	· W22EA * W22EAR W22EA-G W22EAR-G	· W25EA * W25EAR W25EA-G W25EAR-G	Australia spec: 0.85~0.95 mm
CHAMPION	N-80B * RN-80B	N-78B * RN-78B	(0.033 ~ 0.037 in)

5–E–4. Installing Spark Plug

1. In order to protect the thread portion of the spark plugs, it is recommended to **apply Moly Paste (0259 77 767 or 0259 77 768)** to the threaded portion of the new spark plugs.
2. Thread the spark plugs into the rotor housing finger tight until the gaskets contact the housing. If the plugs cannot be installed with finger pressure, clean the threads with a suitable greased thread chaser. Torque each plug to specifications.
3. Connect the spark plug wires.

5–F. ALTERNATOR

5–F–1. Precautiosn on Service

When servicing the charging system, observe the following precaution. If not followed, the result will be in serious damage of the system.

1. **Do not** short across or ground any of the terminals on the alternator.
2. **Never** operate the alternator on with an open circuit (with the field terminal connected and the armature terminal disconnected).
3. When installing a battery, always make sure that the negative post of the battery is attached securely to the ground strap.
4. **Never** reverse battery cables, not even for an instant, as reverse polarity current flow will damage the diodes in the alternator.
5. When charging the battery with a fast charger, disconnect the positive cable at the battery.

5–F–2. Checking Charging System on Car

If the electrical system is not charging properly, check all electrical connections and the fan belt tension prior to performing any test of the charging system, then determine whether the trouble is in the alternator or regulator before removing the alternator.

Check the alternator by using a **alternator tester** (49 0370 290). If the checker is not available, check as follows:

1. Disconnect the wire from "B" terminal of the alternator and connect the negative lead of the ammeter to the wire and the positive lead to the "B" terminal.
2. Disconnect the alternator coupler led to the regulator.
3. Start the engine and hold the alternator speed to 2,000 rpm.
4. Make the short circuit for a moment by connecting "B" terminal and "F" terminal of the alternator with the suitable wire as shown in Fig. 5–18.
5. If the meter reading increases remarkably, the trouble is in the regulator and if there is no change in current, it is in the alternator.

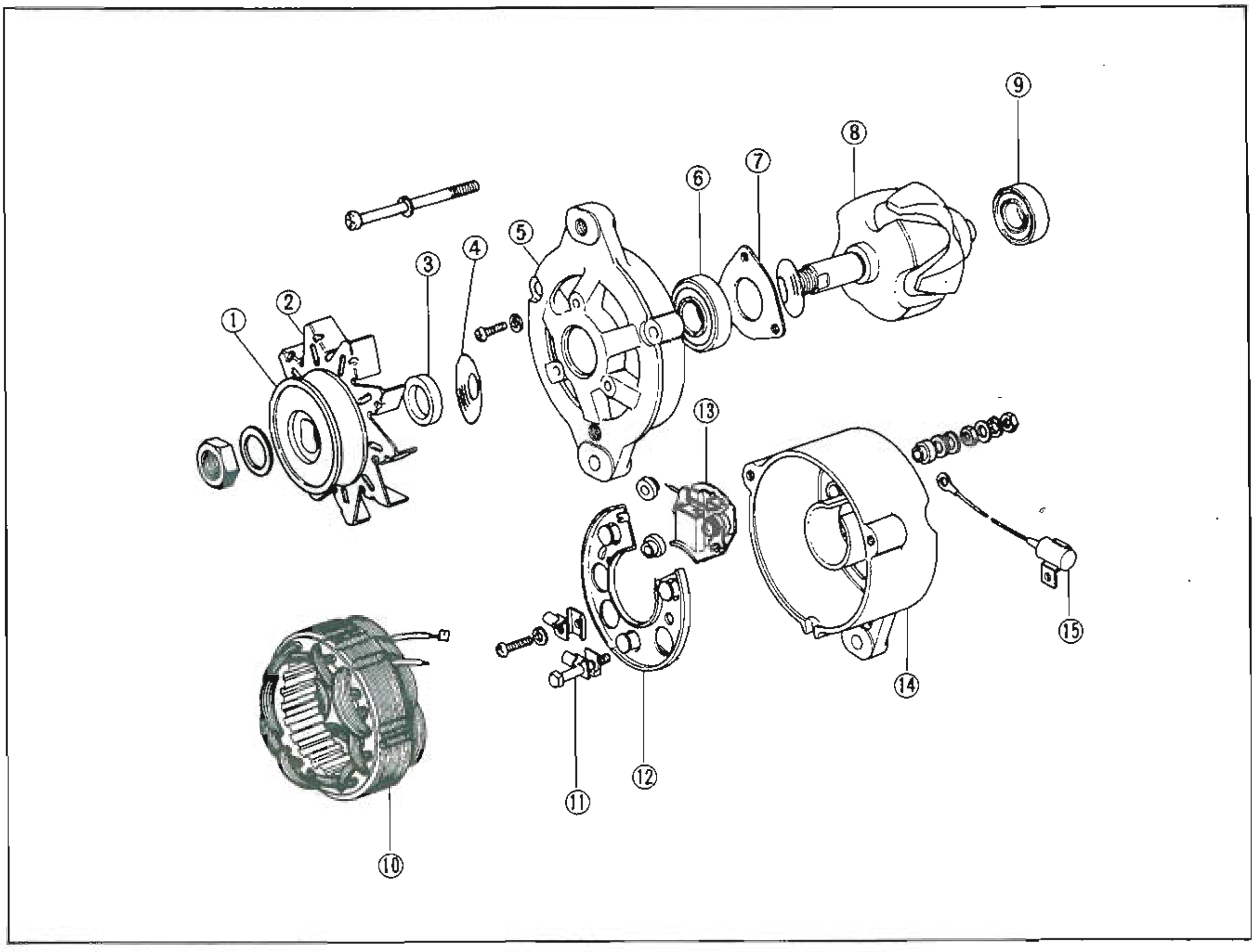


Fig. 5–17 Alternator components

1. Pulley
2. Fan
3. Spacer
4. Slinger
5. Front housing
6. Front bearing
7. Bearing retainer
8. Rotor
9. Rear bearing
10. Stator
11. Terminal bolt
12. Rectifier
13. Brush and holder
14. Rear housing
15. Condenser

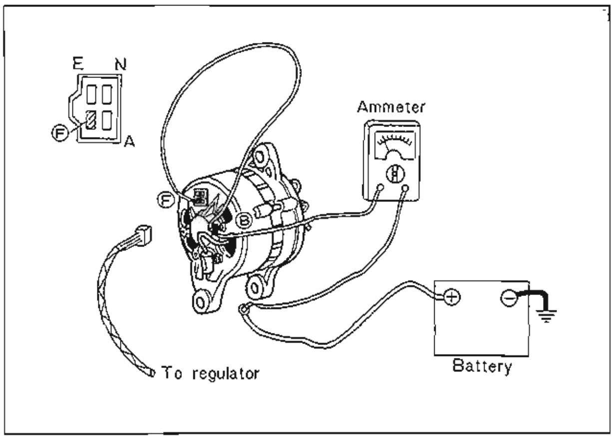


Fig. 5–18 Checking charging system

5–F–3. Disassembling Alternator

1. Remove the radio noise suppression condenser from the rear of the alternator.
2. Remove the through bolts.
3. Separate the front housing assembly by prying apart with a screwdriver at the slots of the front housing.
4. Hold the front housing and rotor assembly, clamping the rotor.

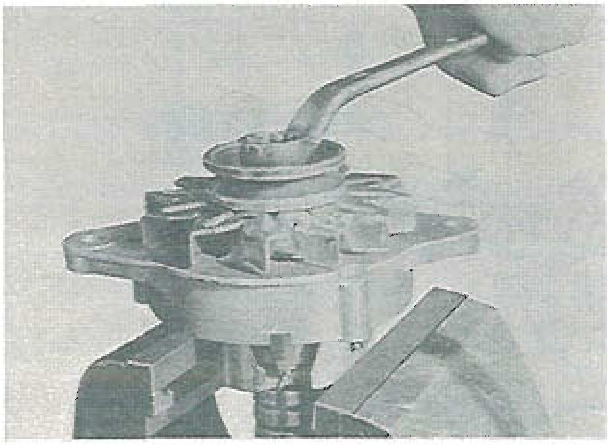


Fig. 5–19 Loosening pulley nut

5. Loosen the pulley retaining nut and remove the nut, washer, pulley, fan, spacer and front slinger.
6. Remove the front housing with bearing and remove the rear slinger.
7. Remove the nut, washers and insulator from the "B" terminal at the rear of the alternator.
8. Remove the screw attaching the rectifier to the rear housing and remove two screws attaching brush holder and rectifier.
9. Carefully remove the stator, rectifier and brush holder assembly from the rear housing. Use care to keep the brush holder assembly intact during removal from the rear housing.
10. Remove the brush holder assembly.
11. Unsolder the stator leads from the rectifier.
12. If bearing replacement is necessary, remove the rear bearing from the rotor shaft with a puller.

To replace the front bearing, remove the bearing retainer attaching screws, and press the bearing from the front housing

5–F–4. Inspecting Alternator

a. Checking stator coil

Check the stator coil for both open and grounded circuits with a tester.

To check for open, connect the prods to each of the two leads, as shown in Fig. 5–20. If there is no flow of current, the coil is open circuit and must be repaired or replaced.

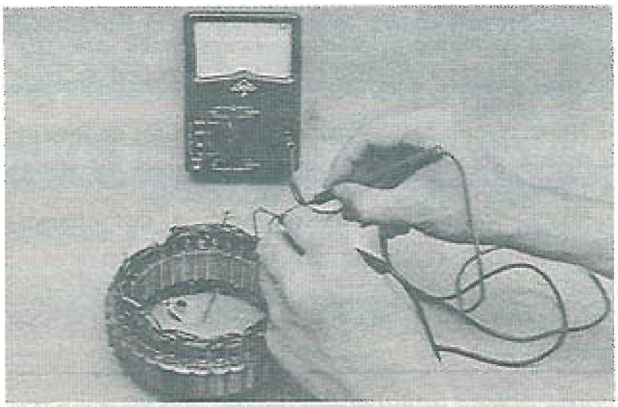


Fig. 5–20 Checking stator coil for open

To check for ground, connect one prod to the core and the other to each lead wire, as shown in Fig. 5–21. If a ground is present the current will flow and the stator coil must be repaired or replaced.

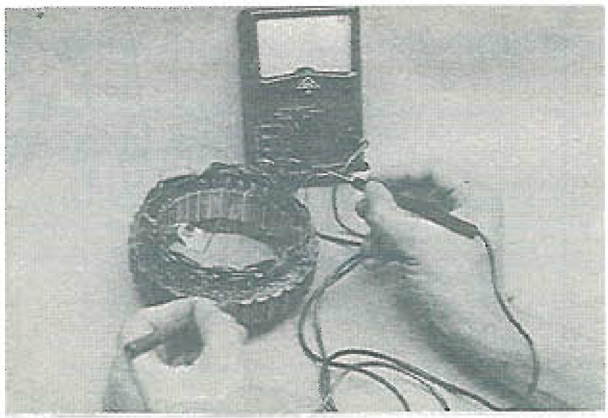


Fig. 5–21 Checking stator coil for ground

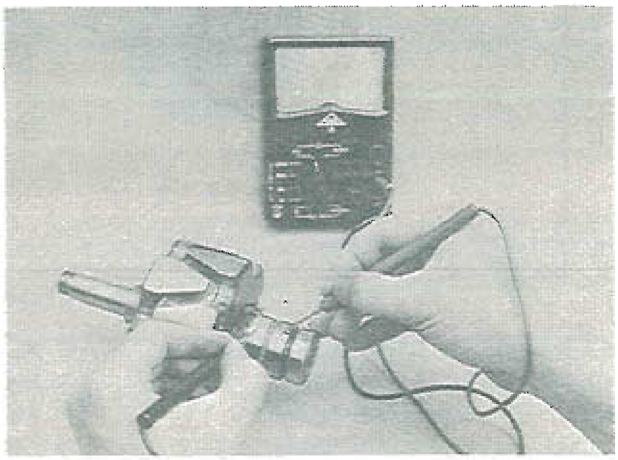


Fig. 5–22 Checking rotor for open

b. Checking rotor

To check for open circuit, place both prods of a tester on the slip rings, as shown in Fig. 5–22. If the reading is 4 to 6 ohms, there is no trouble in the rotor. To check for ground, connect one prod to the slip ring and other prod to the core, as shown in Fig. 5–23. If the current flows the rotor must be repaired or replaced.

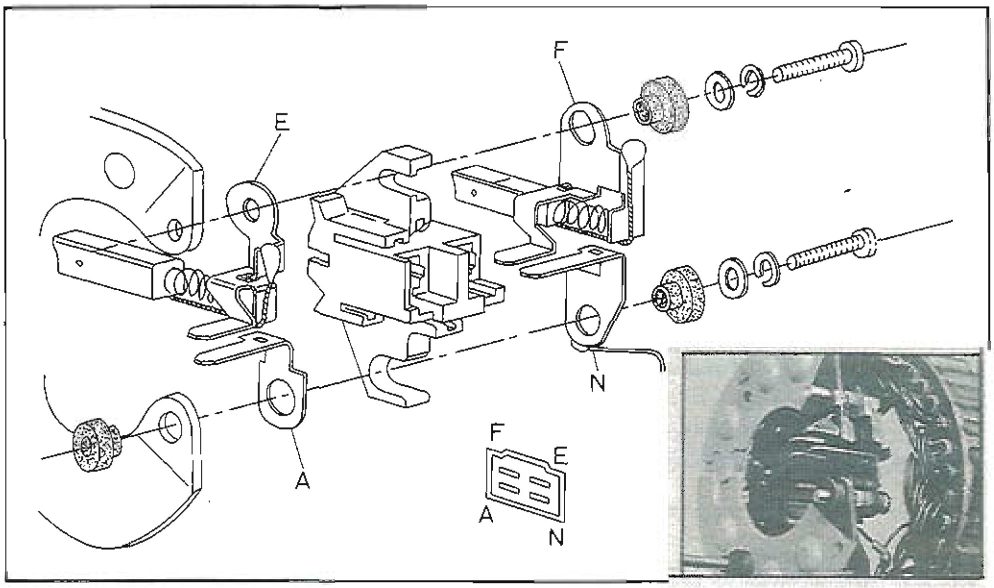


Fig. 5–25 Brush holder assembly

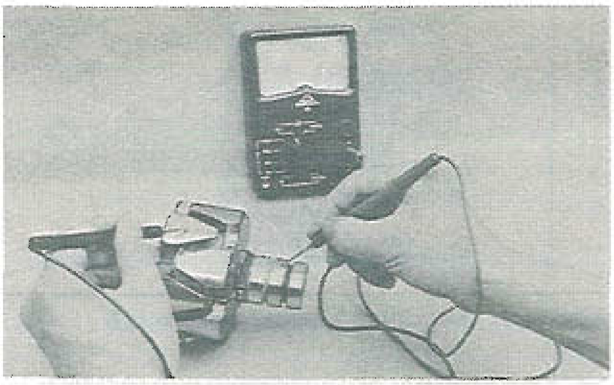


Fig. 5–23 Cheeking rotor for ground

c. Checking diodes

Diodes for use in the alternator are available in two different types, the positive diode which allows current to flow from the lead wire to the case but not from the case to the lead wire and the negative diode which has the opposite properties.

To check, read the resistance between the lead wire and case with a tester. Then reverse the tester leads and note the reading. If both readings are very low or high, the diode is defective.

A good diode will give one low reading and one high reading.

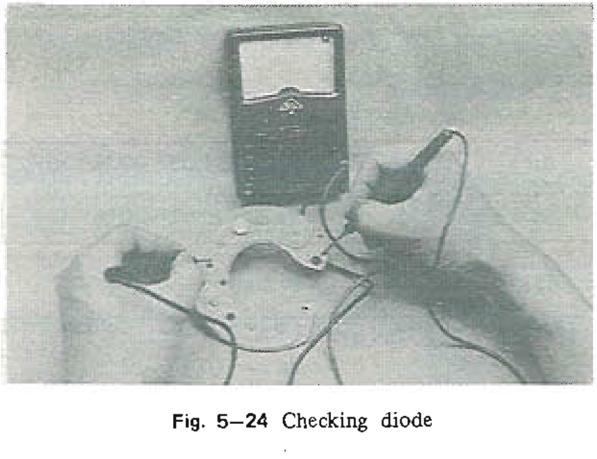


Fig. 5–24 Checking diode

d. Checking brushes and springs

The brushes should be replaced when one-third of the original length is worn away. This is indicated by a wear limit line on the side surface of each brush. Check the brush spring tension. The tension should be between 330 and 450 gr (12 and 16 oz). Replace the springs if the tension is less than 330 gr (12 oz) or if excessive corrosion exists.

e. Checking bearings

There is no need of lubricating as the bearing is pre-lubricated. In a long spell of use, when the bearing is worn or damaged, replace it with a new one.

5–F–5. Assembling Alternator

Assemble the alternator in the reverse order of dis-assembling, noting the following points.

1. When installing the rotor assembly to the rear housing and stator assembly, hold the brushes in position by inserting a piece of stiff wire into the hole of the brush through the rear housing as shown in Fig. 5–26.

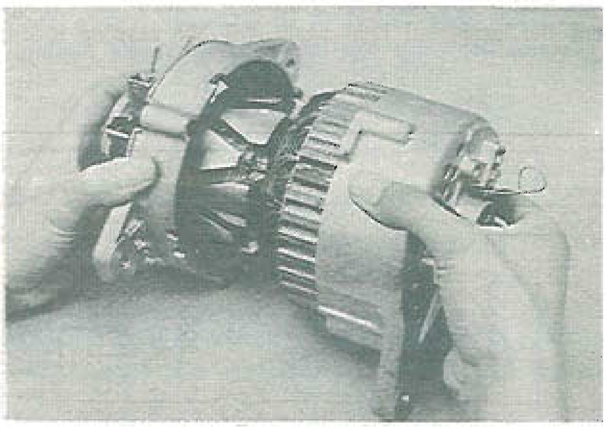


Fig. 5–26 Installing rotor assembly

2. The soldering of the diode leads should be performed in **less than twenty seconds** as the excessive heat may damage the diode.

5–G. REGULATOR

The regulator used for this model is composed of two control units, a constant voltage relay and a pilot lamp relay, mounted as an assembly.

5–G–1. Checking Constant Voltage Relay

To check, use an almost fully charged battery and connect a voltmeter between the (A) and (E) terminals of the regulator, as shown in Fig. 5–27.

Then, hold the alternator revolution to 4,000 rpm (engine revolution 1,800 rpm) and take a reading of the voltmeter. If the reading is from 14 to 15 volts, it is in proper order. If it is not within the specifications, the voltage relay must be adjusted, as instructed in Par. 5–G–3.

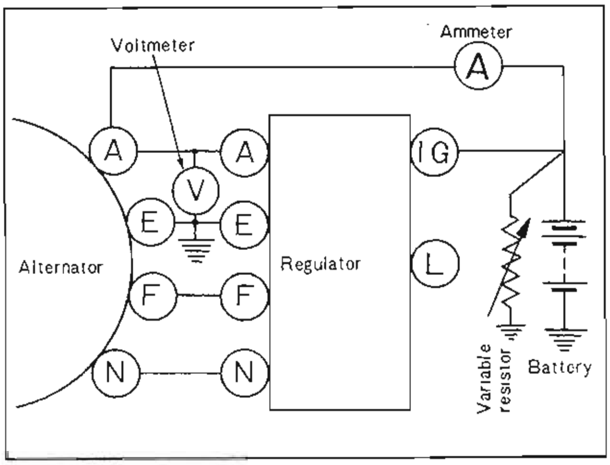


Fig. 5–27 Checking constant voltage relay

5–G–2. Checking Pilot Lamp Relay

Make a circuit, as shown in Fig. 5–28, using a voltmeter and variable resistor, and light up the pilot lamp. Then, slide the knob of the variable resistor so that the voltage gradually increases.

Read the voltage between the (N) and (E) terminal when the lamp goes out. If this voltage is 3.7 to 5.7 volts, it is normal.

Next, slide the knob to gradually reduce the voltage and the lamp will light again. If the reading is less than 3.5 volts at this time, it is proper.

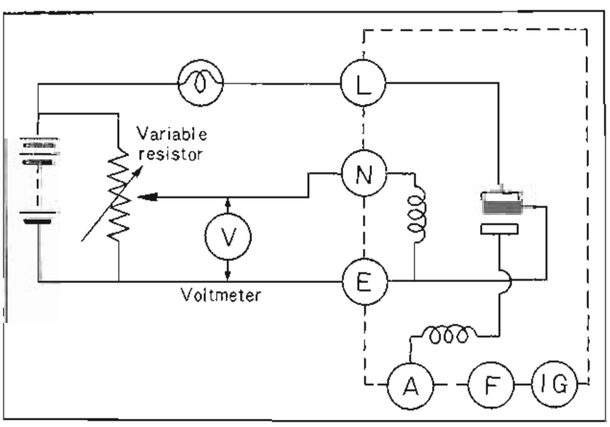


Fig. 5–28 Checking pilot lamp relay

5–G–3. Adjusting Regulator

First, check the air gap, back gap and point gap with a wire gauge. If they are not within the specifications, adjust by bending the stationary contact bracket. After correct gaps are obtained, adjust the voltage setting. Bend the upper plate down to decrease the voltage setting, up to increase the voltage setting.

In case of the pilot lamp relay, if the voltage when the lamp lights up is adjusted to the specification, the voltage when the lamp goes out may be within the specification.

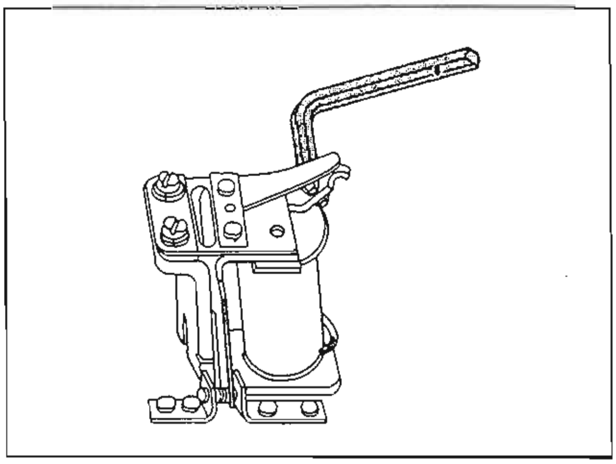


Fig. 5–29 Adjusting regulator

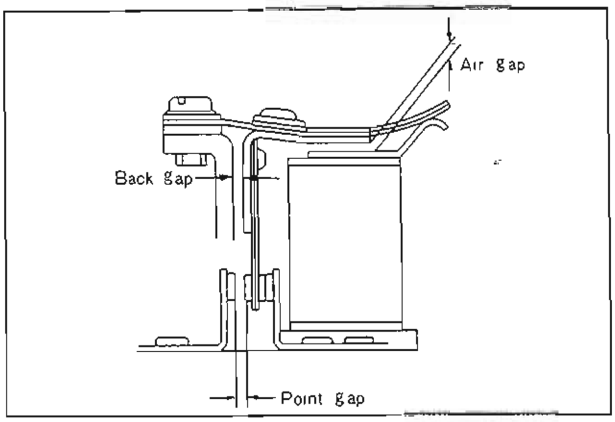


Fig. 5–30 Gaps of regulator

Specifications

Constant voltage relay

Air gap	0.7 ~ 1.1 mm (0.028 ~ 0.043 in)
Point gap	0.3 ~ 0.4 mm (0.012 ~ 0.016 in)
Back gap	0.7 ~ 1.1 mm (0.028 ~ 0.043 in)

Pilot lamp relay

Air gap	0.9 ~ 1.2 mm (0.035 ~ 0.047 in)
Point gap	0.7 ~ 1.1 mm (0.028 ~ 0.043 in)
Back gap	0.7 ~ 1.1 mm (0.028 ~ 0.043 in)

5–H. STARTING MOTOR (Under the engine type)

5–H–1. Checking Starting Circuit

When the starting motor fails to operate or does not satisfactorily operate, check the following points before removing the starting motor:

1. Weak battery
2. Corroded or loose battery terminal
3. Loose starting motor terminal
4. Broken or loose wires of the starting circuit
5. Faulty ignition switch

5–H–2. Testing Starting Motor

a. Free running test

1. Place the starting motor in a vise equipped with soft jaws and connect a fully-charged 12 volt battery to the starting motor.
2. Connect an ammeter between the (B) terminal of the starting motor and the battery.
3. Operate the starting motor and take a reading. On 1.2 KW starting motor, the current draw should be less than 75 amperes at 4,900 rpm or more. [2.0 KW: less than 100 amperes at 7,800 rpm or more]

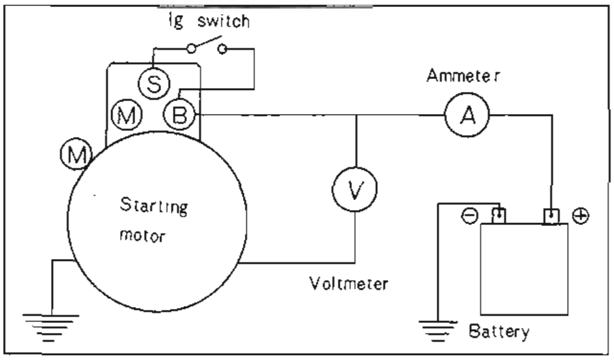


Fig. 5–31 Free running test

b. Lock resistance test

1. Install the starting motor on a test bench.
2. Test the lock resistance of the starting motor, following the instructions of the test equipment manufacturer.
3. With applied battery voltage adjusted to 5.0 volts, the current flow should be 780 amperes [1.2 KW: 1,100 amperes] or less and the torque should be 1.1 m-kg (7.95 ft-lb). [1.2 KW: 2.4 m-kg (17.3 ft-lb)].

If the starting motor does not perform to the above test requirements, repair it referring to the following list.

1) Starter rotates slowly with a large current at free running.
   a) Worn, dirty or defective bearings
   b) Short circuit of armature
   c) Grounded armature and field coil
2) Starter does not rotate with a large current.
   a) Defective field circuit
   b) Defective armature circuit
   c) Burnt commutator
3) Low torque and low current flow. Low free running speed.
   a) Breakage of field circuit
   b) Excessive internal resistance
4) Low torque. High free running speed.
   a) Short circuit of field coil

5–H–3. Disassembling Starting Motor

1. Disconnect the field strap from the terminal on the magnetic switch.
2. Remove the magnetic switch attaching screws and remove the magnetic switch, spring and washers from the driving housing.

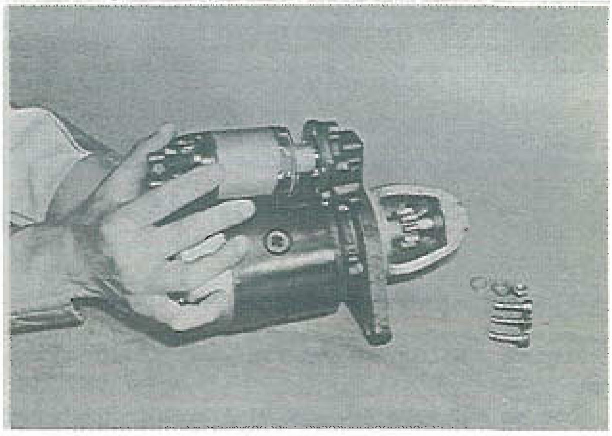


Fig. 5–32 Removing magnetic switch

3. Remove the plunger from the driving lever.

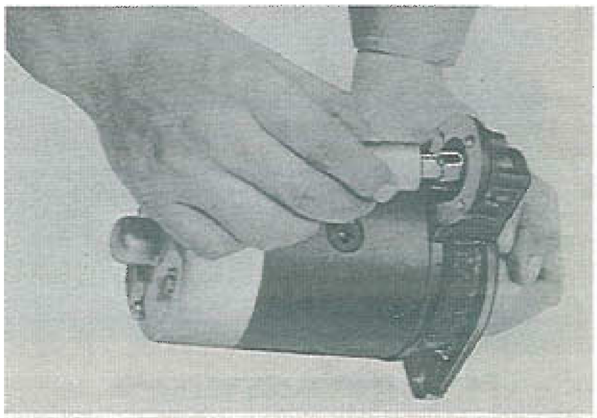


Fig. 5–33 Removing plunger

4. Remove the through bolts and brush holder attaching screws. Then, remove the rear cover.

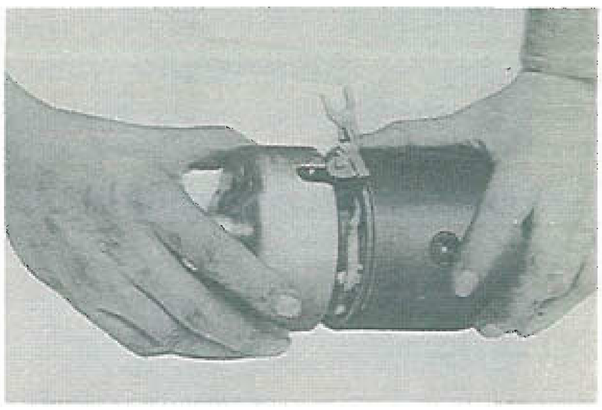


Fig. 5–34 Removing rear cover

5. Remove the insulator and washers from the rear end of the armature shaft.
6. Remove the brush holder.
7. Separate the yoke from the driving housing.

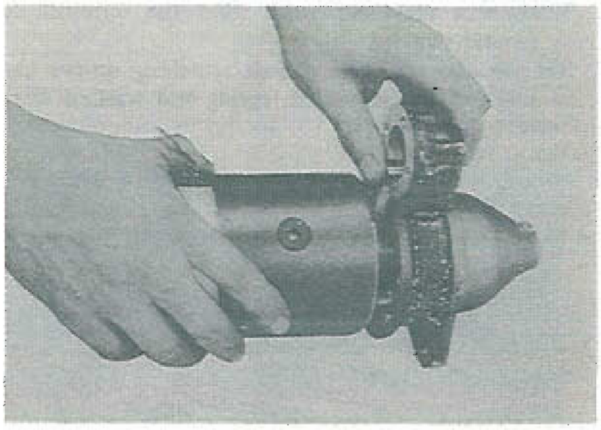


Fig. 5–35 Removing yoke assembly

8. Remove the rubber packing, springs and spring seat.
9. Remove the armature and over-running clutch assembly from the driving housing.

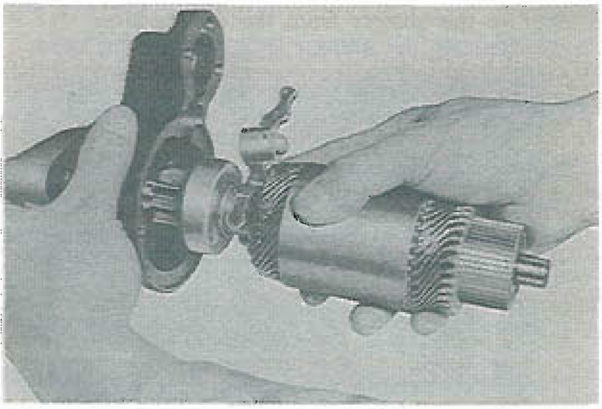


Fig. 5–36 Removing armature assembly

10. Remove the driving lever.
11. Drive the pinion stop collar toward the armature, and remove the stop ring. Then, slide the stop collar and over-running clutch off the armature shaft.

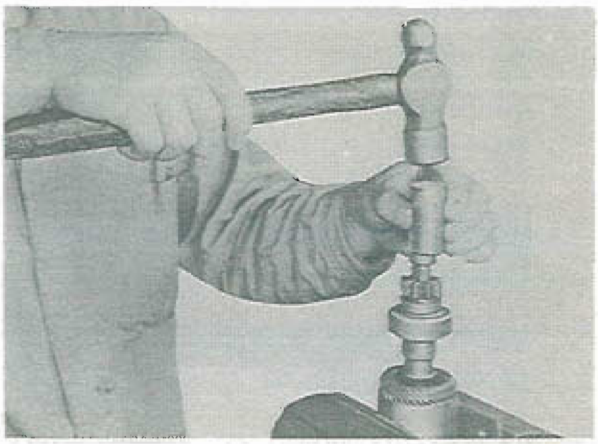


Fig. 5–37 Removing pinion stop collar

12. If the field coil removal is necessary, remove the pole shoe retaining screws. Then, remove the pole shoes and field coil from the yoke.

5–H–4. Inspecting Starting Motor

a. Checking armature

Check the armature for both ground and short circuit. To check for ground, touch one prod of an ohmmeter to each segment and the other prod to the core or shaft.

An infinite reading should be obtained for each segment. If the meter reading is not infinite, the armature windings are shorted to the core or shaft and the armature must be replaced.

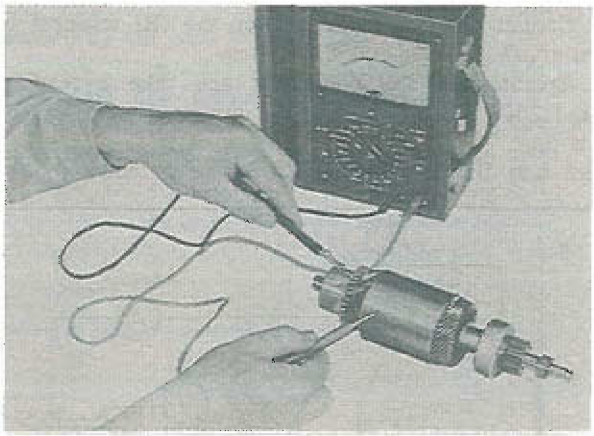


Fig. 5–38 Checking armature

To check for short circuit, use a growler tester. Place the armature against the core of the tester, and hold a steel strip on the armature. Then, rotate the armature slowly by hand. If the armature coil is shorted, the steel strip will become magnetized and vibrate. Replace the armature if a short is found.

b. Checking commutator

If the commutator is dirty, discolored or worn, clean it with emery paper and wash with clean solvent. After cleaning, undercut the mica between the segments to the depth of 0.5 ~ 0.8 mm (0.020 ~ 0.031 in), as shown in Fig. 5–39.

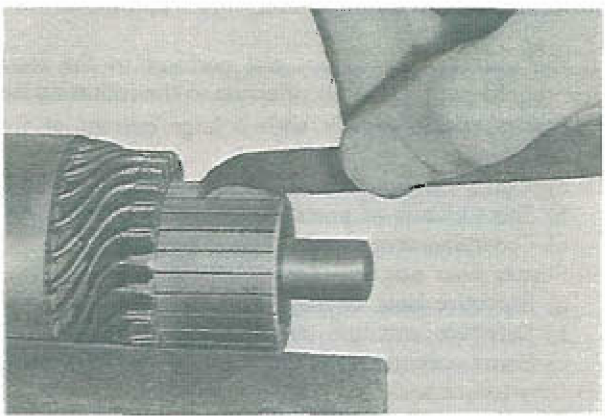


Fig. 5–39 Undercutting mica

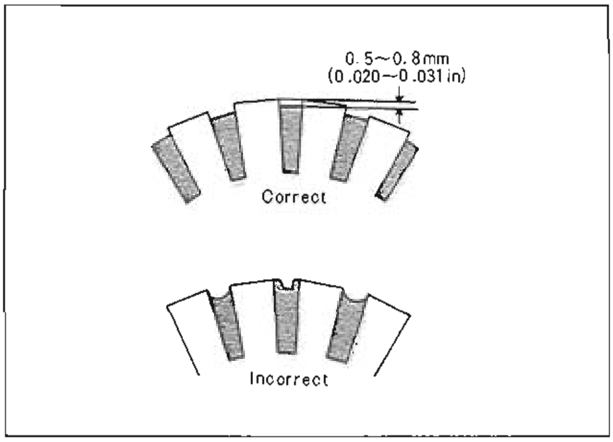


Fig. 5–40 Commutator mica depth

c. Checking field coil
To test the field coil for ground with an ohmmeter, place one prod on the yoke or pole core and the other prod to the field terminal. An infinite meter reading should be obtained. If a reading other than infinite is found, replace the field windings.

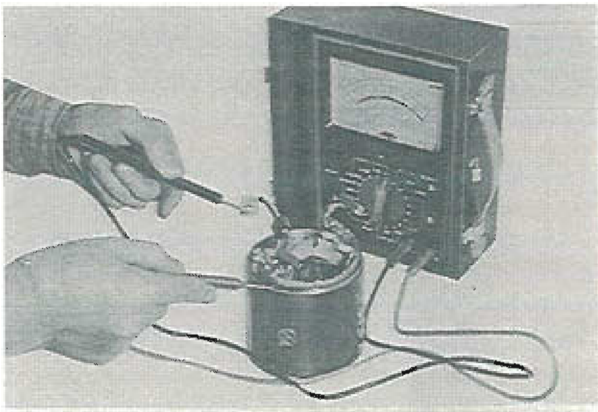


Fig. 5–41 Checking field coil for ground

d. Checking brush holder
Check the brush holder for ground. Touch one prod of an ohmmeter to the insulated brush holder and the other prod to the brush holder frame.
If the meter reading is other than infinite, the brush holder assembly is shorted and must be replaced. Repeat this test for the other insulated brush holder. Do not use this test on the two grounded brush holders.

e. Checking brushes and brush springs
Check the brushes and replace if they are worn down more than one third of their original length. Otherwise, the brush spring tension will be reduced, leading to an increase in the brush-commutator contact resistance. This will lower the torque and cause the burnt commutator surface.
The spring tension is 1.4 ~ 1.8 kg (49 ~ 63 oz). If the tension is too low, replace the springs.

f. Checking bushes
Check the clearance between the armature shaft and the bush. If it exceeds 0.2 mm (0.08 in), replace the bush.

5–H–5. Magnetic Switch Test

a. Pull-in coil test
Apply the specified voltage (12V) between the (S) termianl and (M) terminal. If the magnetic switch is forcefully attracted, the pull-in coil is in good condition.

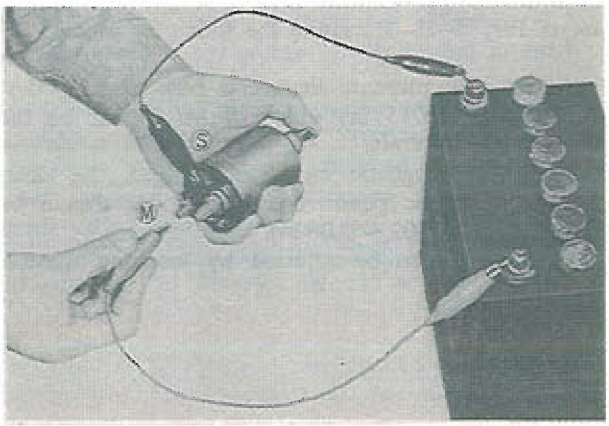


Fig. 5–42 Pull-in coil test

b. Holding coil test
Ground the (M) terminal to the magnetic switch body with a lead and impose the specified voltage (12V) upon the (S) terminal to pull in the plunger. If the plunger remains attracted after disconnecting the lead from the (M) terminal, there is no trouble with the holding coil.

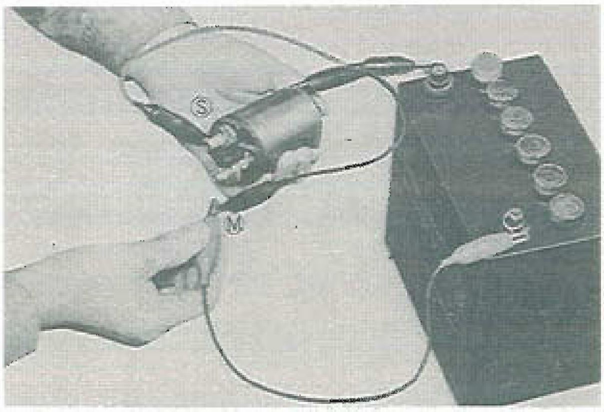


Fig. 5–43 Holding coil test

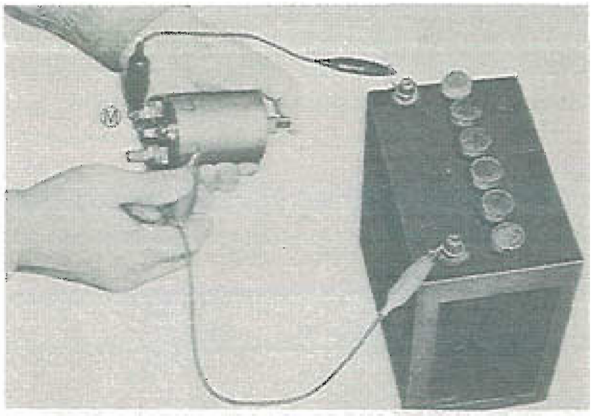


Fig. 5–44 Return test

c. Return test
Push in the plunger by hand and apply the specified voltage (12V) between the (M) terminal and the magnetic switch body. If the plunger is not attracted, there is no trouble.

5–H–6. Assembling Starting Motor
To assemble the starting motor, reverse the procedure of Par. 5–H–3, **noting** the following points.

1. Adjust the armature shaft end play to 0.1 ~ 0.4 mm (0.004 ~ 0.015 in) with a thrust washer on the rear end of the shaft.
2. When the magnetic switch is engaged, the clearance between the pinion and stop collar should be 0.5 ~ 2.0 mm (0.02 ~ 0.08 in).
This clearance can be adjusted by inserting the adjusting washer between the magnetic switch body and the driving housing.

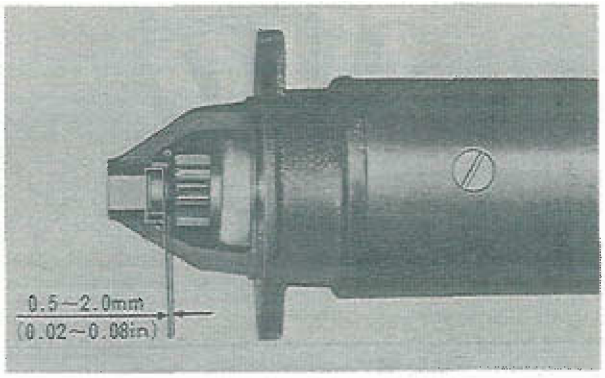


Fig. 5–45 Checking pinion position

SPECIAL TOOLS

49 0242 685A	Remote starter switch
49 0370 290	Alternator tester

TECHNICAL DATA

ENGINE (General Data)	mm	inch
Type	Rotary piston engine, in line 2 rotors, water cooled	
Displacement	573cc x 2 rotors	35.0 cu.in x 2 rotors
Compression ratio	9.4 : 1	
Compression pressure		
Limit	6.0 kg/cm^2 at 250 rpm	85 lb/in^2 at 250 rpm
Port timing:		
Intake opens	32° A.T.D.C.	
Intake closes	50° A.B.D.C.	
Exhaust opens	71° B.B.D.C.	
Exhaust eloses	48.5° A.T.D.C.	

ENGINE	mm	inch
Front and rear housing		
Limit of distoriton	0.04	0.0016
Limit of distortion (sliding surface)	0.10	0.0039
Limit of wear (joint surface)	0.05	0.0020
Rotor housing:		
Limit of distortion	0.04	0.0016
Limit of wear	0.06	0.0024
Permissible difference in width	0.06	0.0024
Intermediate housing:		
Limit of distortion	0.04	0.0016
Limit of wear (sliding surface)	0.10	0.0039
Limit of wear (joint surface)	0.05	0.0020
Rotor:		
Clearance of side housing and rotor	0.10~0.21	0.0039~0.0083
Apex seal:		
Limit of height	7.0	0.275
Clearance of apex seal and side housing:		
Standard	0.13~0.17	0.0051~0.0067
Limit	0.30	0.0118
Clearance of apex seal and rotor groove:		
Standard	0.05 ~ 0.09	0.0020 ~ 0.0035
Limit	0.15	0.0059
Apex seal spring:		
Free height	more than 6.9	0.27
Limit of free height	5.5	0.22
Corner seal:		
Outer diameter		
Standard	$11^{-0.020}_{-0.030}$	$0.4331^{-0.0008}_{-0.0012}$
0.03 over size	$11^{+0.015}_{+0}$	$0.4331^{+0.0006}_{+0}$
0.20 over siez	$11.2^{-0.020}_{-0.030}$	$0.4410^{-0.0008}_{-0.0012}$
Clearance of corner seal and rotor groove:		
Standard	0.020~0.048	0.0008 ~ 0.0019
Limit	0.08	0.0031
Clearance of side seal and rotor groove:		
Standard	0.04 ~ 0.07	0.0016 ~ 0.0028
Limit	0.10	0.0040
Clearance of side seal and corner seal:		
Standard	0.05 ~ 0.15	0.002 ~ 0.006
Limit	0.4	0.016
Oil seal:		
Contact width of oil seal lip		
Standard	0.2	0.008
Limit	0.8	0.031
Seal springs:		
Permissible seal Protrusion		
Corner seal	over 0.5	0.02
Side seal	over 0.5	0.02
Oil seal	over 0.5	0.02
Main bearing clearance:		
Standard	0.04 ~ 0.07	0.0016 ~ 0.0028
Limit	0.10	0.0039
Rotor bearing clearance:		
Standard	0.04 ~ 0.008	0.0016 ~ 0.0031
Limit	0.10	0.0039

	mm	inch
Eccentric shaft:		
Permissible run-out	Less than 0.06	Less than 0.0024
Eccentric shaft end play:		
Standard	0.04 ~ 0.07	0.0016 ~ 0.0028
Limit	0.09	0.0035
"V" belt tension:		
Air pump–New	8	0.31
Old	10	0.39
Alternator–New	13	0.51
Old	15	0.59

LUBRICATING SYSTEM

	mm	inch
Oil pump:		
Feeding capacity	6 liters/min at 1,000 rpm	12.7 U.S. pints/min, 10.6 Imp. pints/min at 1,000 rpm
Clearance of outer rotor and body		
Standard	0.20 ~ 0.25	0.008 ~ 0.010
Limit	0.30	0.012
Clearance of outer rotor and inner rotor		
Standard	0.01 ~ 0.09	0.0004 ~ 0.0035
Limit	0.15	0.006
Rotor end float		
Standard	0.03 ~ 0.13	0.001 ~ 0.005
Limit	0.15	0.06
Limit of ehain adjuster protrusion	12	0.47
Oil pressure:		
Normal	5.0 kg/cm^2 at 3,000 rpm 2.5 kb/cm^2 at engine idling	71.1 lb/in^2 at 3,000 rpm 35.6 lb/in^2 at engine idling
Warning lamp lights	0.3 kg/cm^2	4.3 lb/in^2
Pressure control valve (Front cover):		
Operating pressure	11.0 kg/cm^2	156 lb/in^2
Spring		
Free length	73.0	2.874
Pressure regulator (Rear housing):		
Operating pressure	5.0 kg/cm^2	71.1 lb/in^2
Spring		
Free length	46.4	1.827
By-pass valve (Oil cooler):		
Starts to close	60 ~ 65°C	140 ~ 149°F
Fully closes	70 ~ 75°C	158 ~ 167°F
Oil filter:		
Type	Paper element, cartridge type	
Relief valve opening pressure	1.0±0.2 kg/cm^2	14.2 ± 2.8 lb/in^2

	mm	inch
Oil metering pump:		
Freeding capacity	2.2 cc/6 min. at 2,000 rpm (Disconnected connecting rod)	
Oil capacity (RX-2):		
Oil pan	4.4 liters	9.3 U.S.pints
Full capacity	5.6 liters	11.8 U.S.pints
Oil capacity (RX-3):		
Oil pan	4.2 liters	8.9 U.S.pints
Full capacity	5.2 liters	11.0 U.S.pints
Lubricant:		
Below -18°C(0°F)	SAE 5W-20 or 5W-30	
-18°C ~ 30°C (0°F ~ 85°F)	SAE 10W-30	
-18°C ~ 40°C (0°F ~ 100°F)	SAE 10W-40	
-18°C ~ 50°C (0°F ~ 120°F)	SAE 10W-50	
-10°C ~ 40°C (15°F ~ 100°F)	SAE 20W-40 or 20W-50	

COOLING SYSTEM

	mm	inch
Water pump:		
Type	Centrifugal	
Feeding capacity	160 ~ 170 liters/min. at 6,500 rpm of engine	338~359 U.S.pints/min. at 6,500 rpm of engine
Fan:		
Standard revolution	1,400 rpm or more at 1,500 rpm of eingine 2,000~2,500 rpm at 5,000 rpm of engine	
Number of blades	8	
Thermostat:		
Starts to open	82 ± 1.5°C	180 ± 2.7°F
Fully opens	95°C	203°F
Lift	more than 8 mm at 95°C	More than 0.31 in at 203°F
Radiator:		
Type	Corrugated fm with expansion tank	
Pressure valve opens	0.9 kg/cm^2	13 lb/in^2
Cooling capaeity (RX-2):		
With heater	9.4 liters	19.9 U.S.pints
Cooling capacity (RX-3):		
With heater	9.7 liters	20.5 U.S.pints

FUEL SYSTEM

Fuel tank capacity (RX-2):	65 liters	16.9 U.S. gallons, 14.3 Imp. gallons

	mm	inch
Fuel tank capacity (RX-3):		
Sedan and Coupe	60 liters	15.6 U.S. gallons, 13.2 Imp. gallons
Rotary wagon	55 liters	14.3 U.S. gallons, 12.1 Imp. gallons
Fuel filter	Paper element, cartridge type	
Fuel pump:		
Type	Transistor	
Rated terminal voltage	12 V	
Min. operating voltage	Less than 10V	
Feeding pressure	0.2~0.3 kg/cm^2	2.85 ~4.25 lb/in^2
Feeding capacity	More than 1,150 cc/min	1.22 U.S. qurat/min
Current on full discharging	Less than 1.5 A	
Carburetor:		
Type	Down-draft, 4-barrel, 2-stage	
Throttle diameter		
Primary	28	1,102
Secondary	34	1,339
Venturi diameter		
Primary	20 x 13 x 6.5	0.787 x 0.512 x 0.256
Secondary	28 x 10	1,102 x 0.394
Main nozzle diameter		
Primary	2.4	0.095
Secondary	2.8	0.110
Main jet	(Manual/T)	(Automatic/T)
Primary	#94	#94
Secondary	#145	#145
Main air bleed		
Primary	#80	#80
Secondary	#160	#160
Slow jet		
Primary	#52	#54
Secondary	#110	#130
Slow air bleed		
Primary	#70 & #190	#50 & #190
Secondary	#60 & #60	#60 & #60
Accelerating pump		
Type	Diaphragm type	
Injection capacity	*0.7 cc ± 15%/stroke*	
Secondary throttle valve operation		
Type	Diaphragm type	
Vacuum port	Primary #1.8 Secondary#0.6	
Fast Idle throttle opening angle & clearance of valve and bore (Fully choked)		
Manual transmission	15.5° ~18.5° 1.17 ~1.56	0.0461 ~ 0.0616

	mm	inch
Automatic transmission	16.0 ~19.0° 1.22 ~1.57	0.0480 ~ 0.0618
Float:		
Float level (from upper surface of gasket)	5.0	0.197
Float drop (from upper surface of gasket)	55 ~56	2.1 ~2.2
Idling speed		
Manual transmission	900 rpm	
Automatic transmission	750 rpm in "D" range	
Battery		
Voltage	12 V	
Capacity N70Z	70 AH (20 hour rate)	
Y110-5	60 AH (20 hour rate)	
N50Z	60AH (20 hour rate)	
Terminal ground	Negative	
Specific gravity oat 20°C (68°F)	Fully charged 1.28 Recharge at: 1.22	
Distributor		
Contact point gap	0.45 ± 0.05	0.018 ± 0.002
Point pressure	500 ~650 gr	18 ~23 oz
Condenser capacity	0.27 ±0.027 μF	
Centrifugal advance:		
Trailing	Starts: 0 ± 1.5° at 500 rpm of dis. Max. 7.5 ± 1.5° at 1,500 rpm of dis.	
Leading	Starts: 0 ± 1° at 500 rpm of dis.	Max. : 7.5±1° at 1,500 rpm of dis.
Vacuum advance:		
Trailing only	Starts: 0 ± 1.5° 100 mm-Hg Max.: 8.5±1.5° 400 mm-Hg	
Dwell angle	58° ± 3°	
Firing order	1 – 2	
Ignition timing	Trailing: 10°A.T.D.C. Leading: 5° A.T.D.C.	
Marking location	Eccentric shaft pulley	
Ignition coil		
External resistance		
Leading	1.4 Ω/ 20°C	
Trailing	1.6 Ω / 20°C	
Primary resistance		
Leading	1.35 Ω / 20°C	
Trailing	1.46 Ω / 20°C	
Secondary resistance		
Leading	8.7 kΩ / 20°C	
Trailing	9.5 kΩ / 20°C	

	mm	inch
Spark plug		
Standard type		
NGK	● B7EM B7EMV, * BR7EM or BR7EMV	
NIPPONDENSO	● W22EA, W22EA-G, * W22EAR or W22EAR-G	
CHAMPION	N-80B or * RN-80B	
Cold type		
NGK	● B8EM, B8EMV, * BR8EM or BR8EMV	
NIPPONDENSO	● W25EA, W25EA-G, * W25EAR or W25EAR-G	
CHAMPION	N-78B or * RN-78B	

(All spark plugs are used for U.S.A. and Canada spec.)
* : for ECE spec. ● : for Australia spec.

Starting motor (For U.S.A, Canada and Arctic spec. models with only automatic transmission–under the engine type)

Capacity	2.0 KW	
Free running test	Voltage: 11.5 Current: Less than 100A at 7,800 rpm or more	
Lock test	Voltage: 5V Current: 1,100 A or less Torque: 2.4 m-kg or more	17.36 ft-lb or more
Brush spring tension	1.4 ~ 1.8	49 ~63 oz
Brush length		
New	18.5	0.73
Wear limit	7	0.28
Number of brushes	4	
Magnet switch operating voltage	8 V or less	

Starting motor (For models except aboves)		
Capacity	1.2 KW	
Free running test	Voltage: 11.5 V Current: Less than 75 A at 4,900 rpm or more	
Lock test	Voltage: 5,0 V Current: 780A or less Torque: 1.1 m-kg or more	7.96 ft-lb or more
Brush spring tension	1.4 ~1.8 kg	49~63 oz
Brush length		
New	18.5	0.73
Wear limit	7	0.28
Number of brush	4	
Magnet switch operating voltage	8.0 V or less	

Alternator (RX-2 left wheel only)

	mm	inch
Ground polarity	Negative	
Rated oupput	12 V 63 A	
Number of poles	12	
No load test	Voltage: 14V at 950 rpm or less Current: 0A	
Load test	Voltage: 14V at 2,500 rpm or less Current: 56 A	
Brush spring pressure	350 gr	12.5 pz
Slip ring diameter	33 ± 0.2	1.299 ± 0.008
Ratio of alternator and eccentric shaft	2.08 : 1	

Alternator (RX-2 right wheel and RX-3)

Ground polarity	Negative	
Rated output	12V 50A	
Number of poles	12	
No load test	Voltage: 14V at 1,050 rpm or less Current: 0A	
Load test	Voltage: 14V at 2,500 rpm or less Current: 40A	
Brush spring pressure	350 gr	12.5 oz
Slip ring diameter	33 ± 0.2	1.299 ± 0.008
Ratio of alternator and eccentric shaft	2.08 : 1	

Regulator:		
Constant voltage relay	Air gap: 0.7 ~ 1.1	0.028 ~ 0.043
	Point gap: 0.3 ~ 0.4	0.012 ~ 0.016
	Back gap: 0.7 ~ 1.1	0.028 ~ 0.043
Pilot lamp relay	Air gap: 0.9 ~ 1.2	0.035 ~ 0.047
	Point gap: 0.7 ~ 1.1	0.028 ~ 0.043
	Back gap: 0.7 ~ 1.1	0.028 ~ 0.043
Regulated voltage, without loat	14 ± 0.5V	

TIGHTENING TORQUE

	m-kg	ft-lb
Tension bolt	3.2 ~ 3.8	23 ~ 27
Front t cover	1.6 ~ 2.3	11.6 ~ 16.6
Eccentric shaft pulley	7.5 ~ 9.5	54.2 ~ 68.7
Bearing housing	1.6 ~ 2.3	11.6 ~ 16.6
Oil pan	0.4 ~ 0.7	3.0 ~ 5.1
Oil drain plug	2.4 ~ 3.6	17.4 ~ 26.0
Oil filter	0.7 ~ 1.0	5.1 ~ 7.2
Oil pressure switch	1.2 ~ 1.8	8.7 ~ 13.0
Thermostat cover	1.6 ~ 2.3	11.6 ~ 16.6
Cooling fan	0.7 ~ 1.0	5.1 ~ 7.2
Coolant drain plug	1.8 ~ 2.5	13.0 ~ 18.1
Water pupmp	2.3	16.6
Water pump pulley	0.7 ~ 1.0	5.1 ~ 7.2
Carburetor	1.6 ~ 2.3	11.6 ~ 16.6
Intake manifold	1.6 ~ 2.3	11.6 ~ 16.6

	m-kg	ft-lb		m-kg	ft-lb
Exhaust manifold	3.2 ~ 4.7	23.1 ~ 23.0	8 mm P=1.25	2.0	15
Spark plug	1.3 ~ 1.8	9 ~ 13	10 mm P=1.25	4.0	30
Flywheel	40.0 ~ 50.0	289.3 ~ 361.6	12 mm P=1.5	7.0	50
Clutch cover	1.6 ~ 2.3	11.6 ~ 16.6	14 mm P=1.5	9.0	60
Standard bolts:					
6 mm P=1.25	0.8	5			

Mazda RX-3·808 WORKSHOP MANUAL

CHASSIS

SECTION INDEX	
Name	Section
Clutch	6
Clutch	6A
Transmission	7
Transmission	7A
Propeller Shaft	8
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Wheels and Tires	12
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Body	14
Body	14A
Technical Data	T

FOREWORD

This workshop manual was prepared as reference material for the service personnel of authorized Mazda dealers to enable them to correctly carry out the task of rendering services and maintenance on Mazda vehicles.

In order to ensure that the customers are satisfied with Mazda products, proper servicing and maintenance must be provided. For this purpose, the service personnel must fully understand the contents of this workshop manual and at the same time, are recommended to keep the manual in a place where reference can readily be made.

The information, photographs, drawings and specifications entered in this manual were the best available at the time of printing this manual. All alterations to this manual occurring as the result of modifications will be notified by the issuance of Service Informations or supplementary volumes. It is, therefore, requested that the manual be kept up to date by carefully maintaining a follow-up of these materials.

Toyo Kogyo reserves the right to alter the specifications and contents of this manual without any obligation and advance notice.

Note: The model name, "MAZDA 808", in this material stands for "Automobiles MAZDA 818" in France and her territories, and "MAZDA 818" in other European and all African countries.

Toyo Kogyo Co.,Ltd.
HIROSHIMA, JAPAN

CLUTCH

DESCRIPTION

The clutch is a dry, single plate, and diaphragm spring type. The clutch assembly consists of the clutch disc assembly, clutch cover and pressure plate assembly, and clutch operating mechanism. The clutch operating mechanism is of a cable type and hydraulic type. This section explains the clutch system of cable type. Servicing the clutch system of hydraulic type is the same as that on the clutch system, which is explained in section **6A.**

6–A. CLUTCH ADJUSTMENT

6–A–1. Adjusting of Clutch Pedal Height

Adjust the pedal height with the pedal height adjusting bolt and nut. The height between the clutch pedal pad and the floor mat should be **185 mm (7.28 in).**

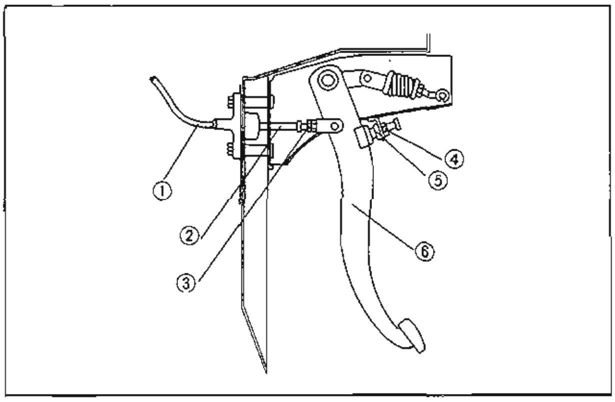


Fig. 6–1 Adjusting of pedal height

1. Clutch release cable
2. Rod
3. Lock nut
4. Adjusting bolt
5. Lock nut
6. Clutch pedal

6–A–2. Adjusting of Release Fork Free Play

There should always be a safe clearance between the release bearing and the diaphragm spring. This clearance is essential to disengage the release bearing and to prevent unnecessary wear and possible slippage. This clearance is obtained when the free play of the release fork is adjusted to **4.0 ~ 5.5 mm (0.16 ~ 0.22 in).**

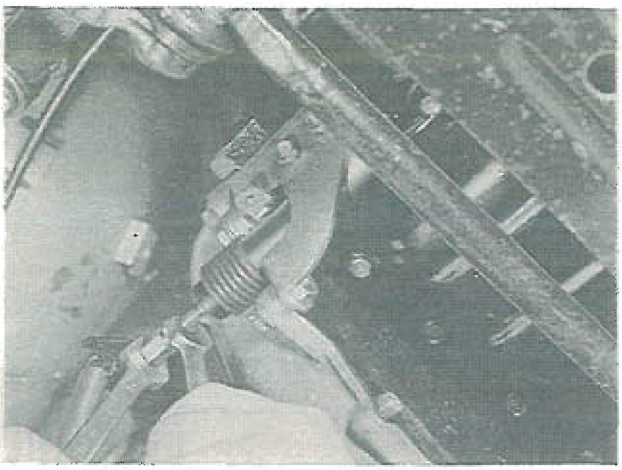


Fig. 6–2 Adjusting of release fork free play

To adjust the free play, proceed as follows:

1. Unhook the release fork return spring from the fork.
2. Loosen the release rod lock nut and turn the free play adjusting nut until the correct play is obtained.
3. Tighten the lock nut and hook the return spring.

6–B. CLUTCH RELEASE CABLE

6–B–1. Clutch Release Cable Removal

1. Disconnect the clutch release cable at the clutch pedal by removing the clip.
2. Remove the nuts attaching the outer cable to the dash panel.

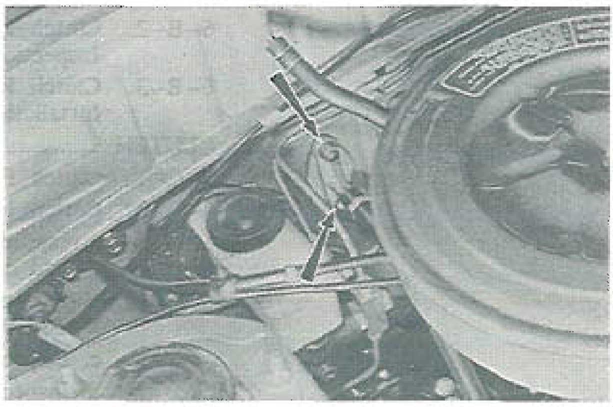


Fig. 6–3 Removing of release cable

3. Remove the bolts attaching the release cable to the bracket.
4. Remove the release cable.

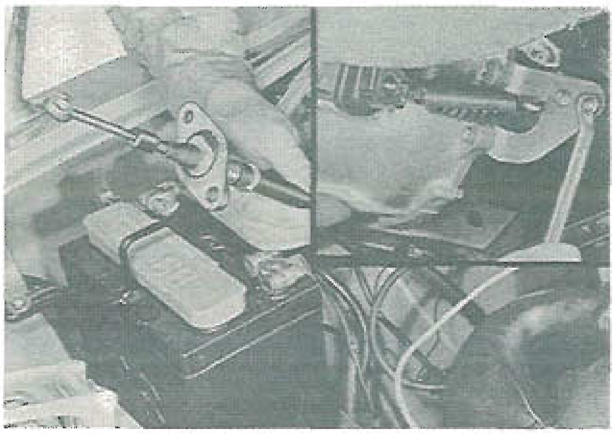


Fig. 6–4 Removing of release cable

6–B–2. Clutch Release Cable Inspection

Inspect the release cable inner wire for wear and damage. Inspect the release cable outer wire and the boot for wear. If necessary, replace the clutch release cable.

6–B–3. Clutch Release Cable Installation

Follow the removal procedures in the reverse order.

Note:
Adjust the release fork free play as described in **Par. 6–A–2** on page 6–1.

6–C. CLUTCH

6–C–1. Clutch Removal

To remove the clutch assembly from the vehicle, proceed as follows:

1. Remove the transmission, referring to **Par. 7–B–1.**
2. Install the **ring gear brake** (Part No. 49 0118 271A) to the flywheel.
3. Remove the bolts holding the clutch cover assembly to the flywheel, and remove the clutch cover assembly and the disc from the flywheel without spoiling the disc facing with oil or grease.

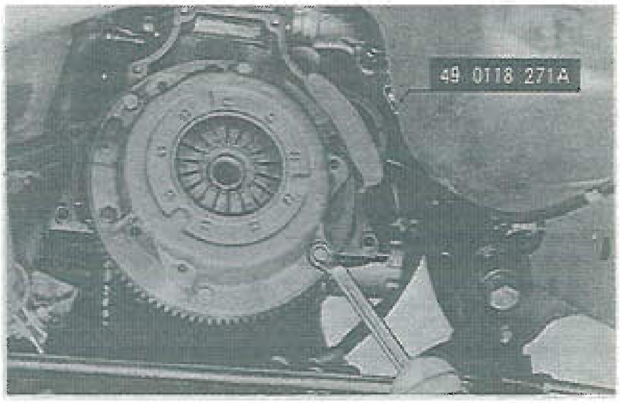


Fig. 6–5 Removing of clutch cover assembly

Note:
Loosen the clutch cover assembly to the flywheel attaching bolts **one turn at a time each** to avoid bending of the clutch cover flange until spring pressure is released.

4. Remove the bolts that attach the flywheel to the crankshaft and remove the flywheel.

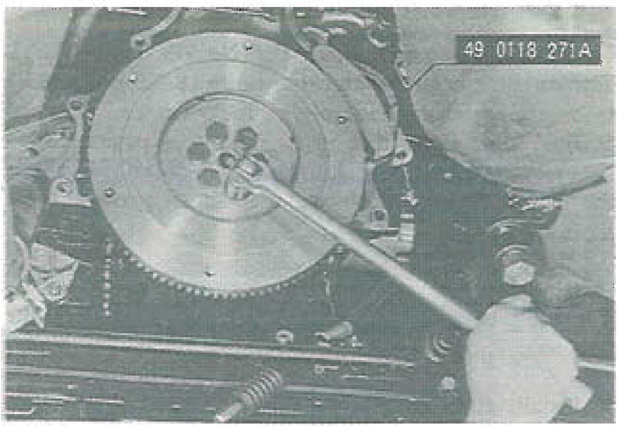


Fig. 6–6 Removing of flywheel

Note:
After removing the flywheel, inspect for oil leakage through the engine rear main bearing oil seal.

5. Unhook the release bearing return spring from the transmission front bearing cover and slide off the release bearing.
6. Pull the release fork outward until the fork retaining spring releases itself from the ball stud. Remove the fork from the transmission housing.

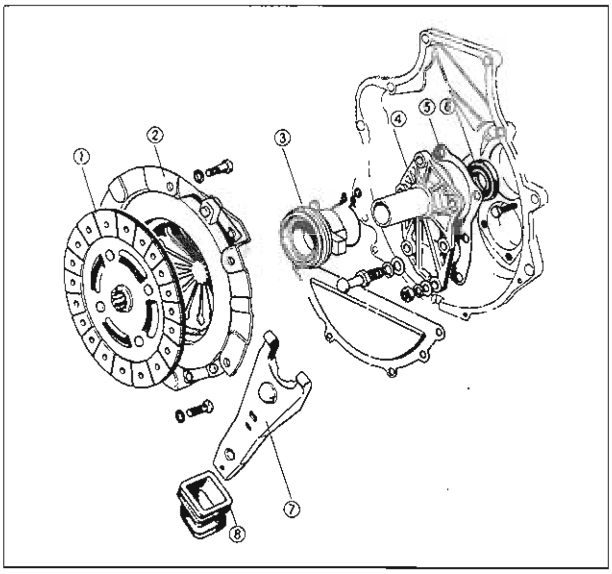


Fig. 6–7 Clutch Components

1. Clutch disc	5. Gasket
2. Clutch cover assembly	6. Oil seal
3. Release bearing	7. Release fork
4. Front bearing cover	8. Dust boot

7. Remove the transmission front bearing cover from the transmission housing.

Note:
After removing the front bearing cover, inspect for oil leakage through the main drive shaft oil seal.

6–C–2. Clutch Inspection

a. Inspecting of release bearing and fork

Check the release bearing for roughness, and noise by holding the inner race, and rotate the outer race while applying pressure with hand. If rough or noisy, replace the bearing.

Note:
The release bearing is a prelubricated permanent packed type which requires no lubrication service and should not be washed in gasoline or any other solvent.

Examine the transmission front bearing cover carefully to be certain there are no burrs on the outer surface of the front bearing cover which pilots the release bearing.
Check the release fork for crack or bend. If necessary, replace the fork.

b. Inspecting of clutch cover assembly

Check the pressure plate for warpage or scored surface. If it is slight, correct by lapping with compound or by turning a lathe. Check the diaphragm spring for wear of the release bearing contacting surface. If wear is severe, replace the cover assembly. Check the diaphragm spring securing rivets for roughness.

c. Inspecting of clutch disc

Inspect the facing for oil soaked or glazed condition. Check the facing for wear. If grooves of the facing surface are worn completely, replace the disc assembly. Inspect the disc for warpage with a dial indicator or a feeler gauge, as shown in Fig. 6–8. If it is more than **1.0 mm (0.039 in)**, replace with a new one.

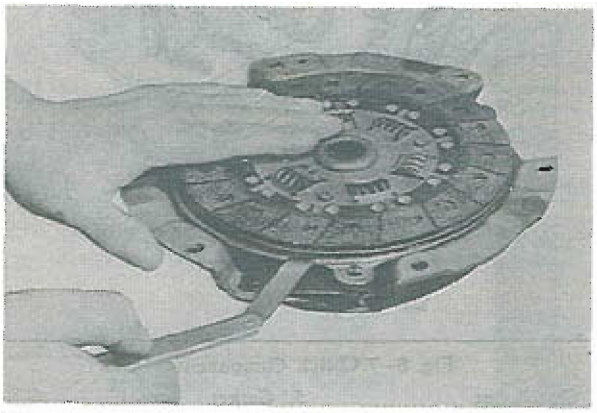


Fig. 6–8 Inspecting of clutch disc

Check the splines of the hub for free sliding condition with the transmission main drive shaft splines. If worn excessively, replace the disc assembly or the main drive shaft.

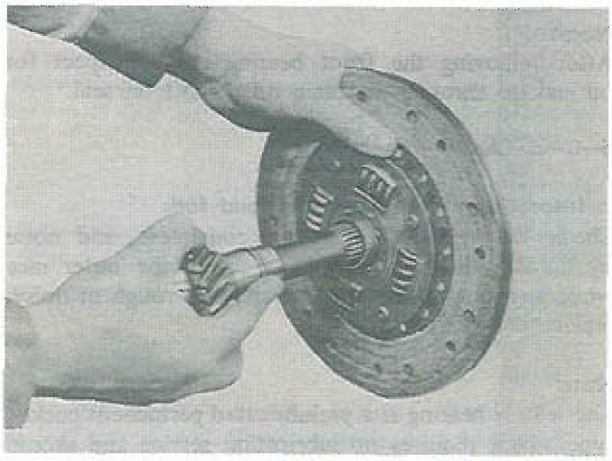


Fig. 6–9 Checking of hub splines

d. Inspecting of flywheel

Check the flywheel for wear or scores on the clutch disc contacting surface. If necessary, dress the flywheel surface with a suitable emery-cloth, or replace the flywheel. Check the ring gear teeth and replace if the ring gear teeth are broken, cracked or seriously burred.

To **replace** the ring gear, proceed as follows:
1. Heat the old ring gear and remove it from the flywheel.
2. Heat the new ring gear evenly 250 ~ 300°C (480 ~ 570°F).
3. Place the ring gear onto the cold flywheel, making sure that the **chamfer on the teeth is faced to the engine.**
4. Allow the ring gear to cool slowly to shrink it onto the flywheel.

e. Inspecting of pilot bearing

Check the transmission main drive shaft pilot bearing which is pressed into the center of the flywheel. If the bearing is loose or rough, it should be replaced.

6–C–3. Clutch Installation

1. Clean the surfaces of the flywheel and pressure plate thoroughly with fine sandpaper or crocus cloth, and make sure that all oil or grease has been removed.
2. Lubricate the pilot bearing in the flywheel with grease.
3. Install the flywheel onto the rear end of the crankshaft with six bolts through the lock washer.

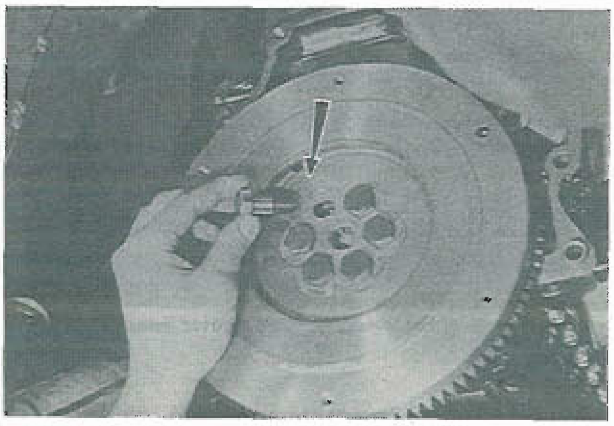


Fig. 6–10 Installing of flywheel

Note:
When installing the flywheel, align the "0" marked hole on the flywheel with the reamed hole on the crankshaft and fit the reamer bolt in the "0" marked hole.

4. Install the **ring gear brake** (Part No. 49 0118 271A). Tighten the flywheel attaching bolts to **9.0 m-kg (65.1 ft-lb)** and bend the tabs of the lock washer.
5. Hold the clutch disc in its mounting position with the **clutch disc arbor** (Part No. 49 0259 310). If the arbor is not available, use another main drive shaft.

Note:
The long end of the clutch disc hub must face the rear side (transmission side).

6. Install the clutch cover and pressure plate assembly onto the flywheel, **aligning the "O" mark**

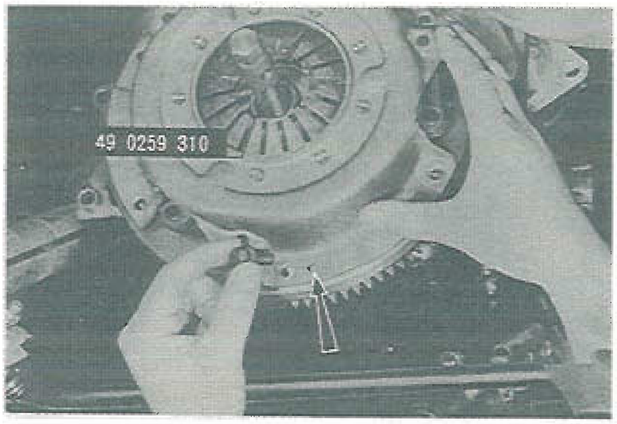


Fig. 6–11 Installing of clutch cover assembly

of the clutch cover with the reamed hole of the flywheel. Fit the two reamer bolts in the reamed holes of the flywheel. Tighten the bolts.
7. Remove the disc arbor and ring gear brake.
8. Apply grease to the ball stud in the housing. Insert the release fork and press it inward so that the retaining spring of the release fork fits to the ball stud.
9. Install the release bearing, return spring and dust boot.
10. Install the transmission and propeller shaft.

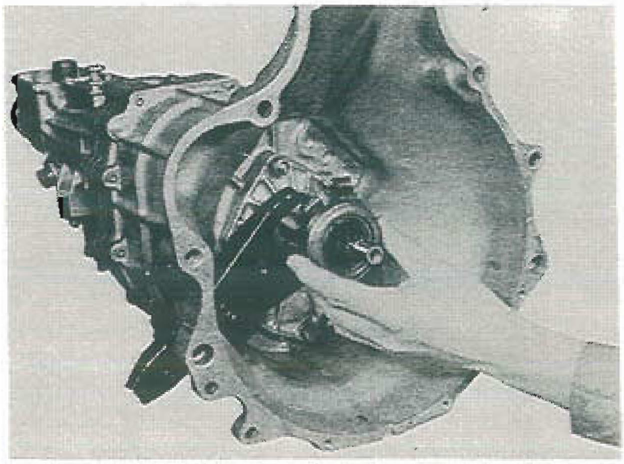


Fig. 6–12 Installing of clutch release bearing

SPECIAL TOOLS

49 0259 310	Clutch disc arbor (Clutch disc centering tool)
49 0118 271A	Ring gear brake

CLUTCH

DESCRIPTION

The clutch is a dry, single plate, and diaphragm spring type. The clutch assembly consists of the clutch disc assembly, clutch cover and pressure plate assembly, and clutch operating mechanism. The clutch operating mechanism is a hydraulic type.

6A–A. CLUTCH ADJUSTMENT

6A–A–1. Clutch Pedal Height Adjustment

Adjust the pedal height with the adjusting bolt and nut. The height between the clutch pedal pad and the floor mat should be **185 mm (7.28 in).**

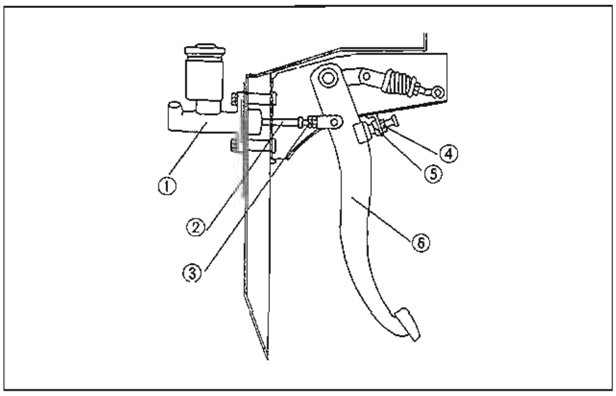


Fig. 6A–1 Adjusting of clutch pedal height

1. Master cylinder
2. Rod
3. Lock nut
4. Adjusting bolt
5. Lock nut
6. Clutch pedal

6A–A–2. Release Fork Free Play Adjustment

To adjust the free play, proceed as follows:

1. Unhook the release fork return spring from the fork.
2. Loosen the release rod lock nut and turn the free play adjusting nut until the correct free play is obtained. The free play is **2.5 ~ 3.5 mm (0.10 ~ 0.14 in).**

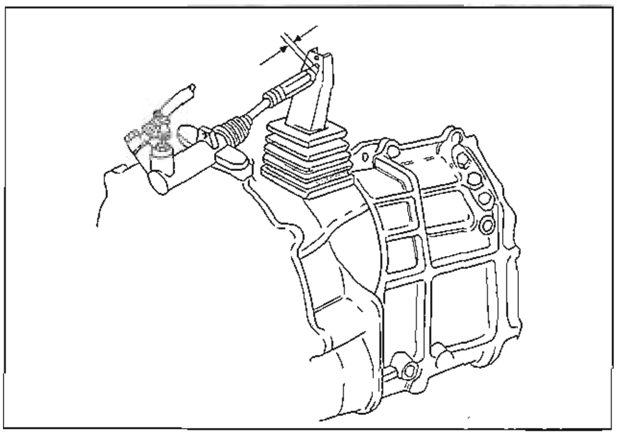


Fig. 6A–2 Adjusting of release fork free play

3. Tighten the lock nut and hook the return spring.

6A–B. CLUTCH

6A–B–1. Clutch Removal

RX-3

1. Remove the propeller shaft as described in **Par. 8–A–1.**
2. Remove the transmission as described in **Par. 7A–B–1.**
3. Attach the **ring gear brake** (Part No. 49 0820 060A) to the flywheel.
4. Install the **clutch disc arbor** (Part No. 49 0813 310) as shown in Fig. 6A–3.

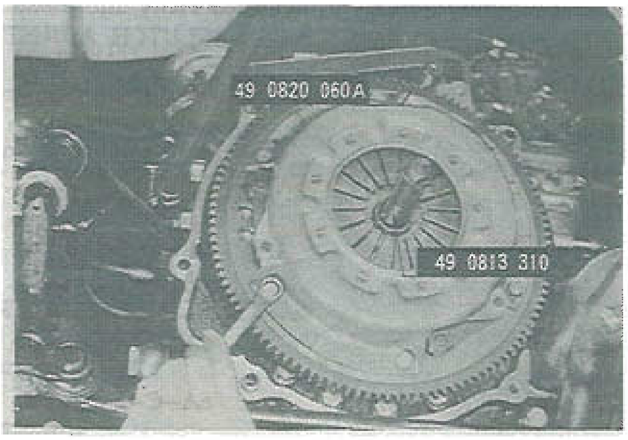


Fig. 6A–3 Removing of clutch cover assembly

5. Remove the bolts holding the clutch cover assembly to the flywheel, and remove the clutch cover assembly and disc from the flywheel without spoiling the disc facing with oil or grease.

Note:
Loosen the clutch cover assembly to the flywheel attaching bolts **one turn at a time each** to avoid bending of the clutch cover flange until spring pressure is released.

6. Loosen the nut attaching the flywheel to the eccentric shaft with the **flywheel nut wrench** (Part No. 49 0820 035).

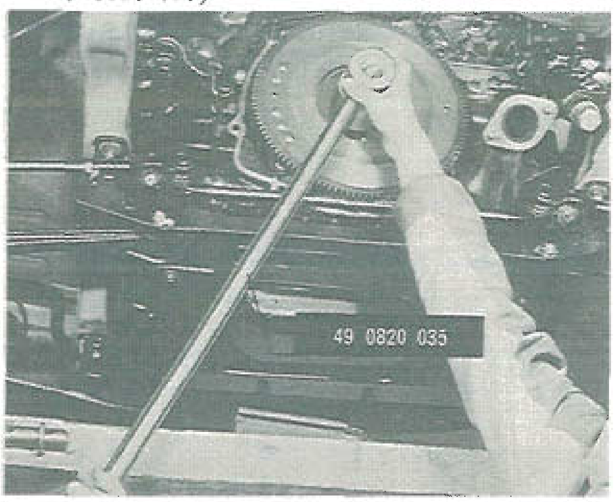


Fig. 6A–4 Loosening of flywheel attaching nut

7. Remove the flywheel by using the **flywheel puller** (Part No. 49 0823 300A), turning the handle and lightly hitting the head of the puller.

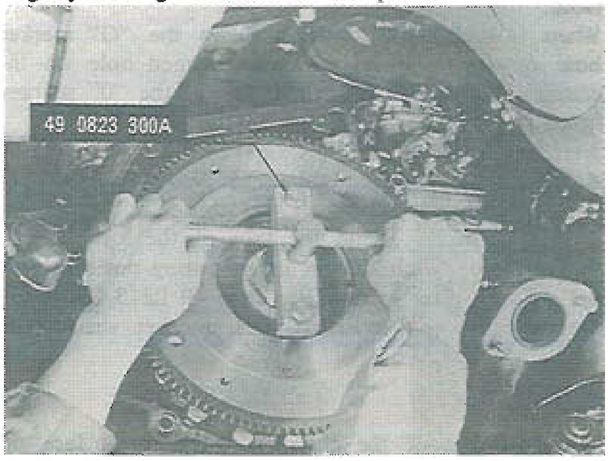


Fig. 6A–5 Removing of flywheel

8. Unhook the release bearing return spring and slide off the release bearing.
9. Pull the release fork outward until the fork retaining spring release itself from the ball stud. Remove the fork from the clutch housing.
10. Inspect the eccentric shaft rear oil seal for leakage. Replace the oil seal if necessary.
11. Inspect the main drive shaft oil seal for leakage. If necessary, replace the oil seal.
12. Check the needle bearing in the eccentric shaft end for wear or any damage. Replace the needle bearing if necessary.

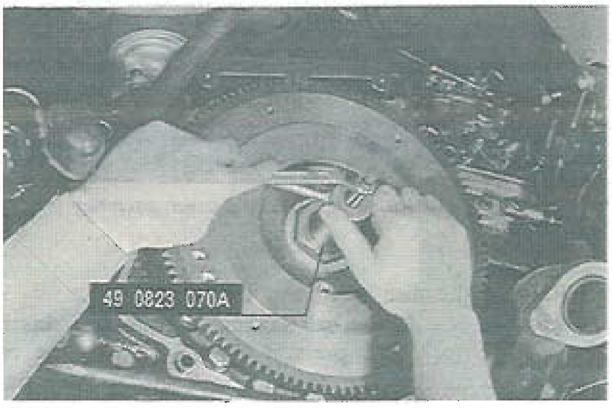


Fig. 6A–6 Removing of needle bearing

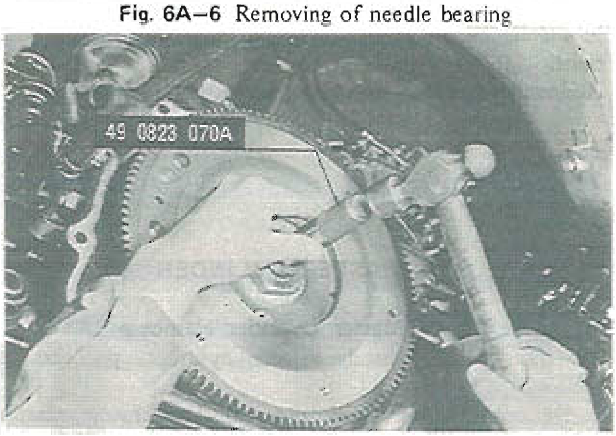


Fig. 6A–7 Installing of needle bearing

To replace the needle bearing, proceed as follows:
1) Remove the needle bearing and grease seals with the **needle bearing puller** (Part No. 49 0823 070A).
2) Install the needle bearing into the shaft end with the **puller** (Part No. 49 0823 070A).
3) Install the grease seal.

808 (1300 cc and 1600 cc)

1. Remove the propeller shaft as described in **Par. 8–A–1.**
2. Remove the transmission as described in **Par. 7–B–1.**
3. Attach the **ring gear brake** (Part No. 49 0118 271A) to the flywheel.
4. Remove the bolts holding the clutch cover assembly to the flywheel, and remove the clutch cover assembly and disc from the flywheel without spoiling the disc facing with oil or grease.

Note:
Loosen the clutch cover assembly to the flywheel attaching bolt **one turn at a time each** to avoid bending of the clutch cover flange until spring pressure is released.

5. Remove the bolts that attach the flywheel to the crankshaft and remove the flywheel.

Note:
After removing the flywheel, inspect for oil leakage through the engine rear main bearing oil seal.

6. Unhook the release bearing return spring from the transmission front bearing cover and slide off the release bearing.
7. Pull the release fork outward until the fork retaining spring release itself from the ball stud. Remove the fork from the transmission housing.
8. Remove the transmission front bearing cover from the transmission housing.

Note:
After removing the front bearing cover, inspect for oil leakage through the main drive shaft oil seal.

6A–B–2. Clutch Inspection

Refer to **Par. 6–C–2** and inspect the clutch.

6A–B–3. Clutch Installation

RX-3

1. Clean the surfaces of the flywheel and pressure plate thoroughly with fine sandpaper or crocus cloth, and make sure that all oil or grease has been removed.
2. Lubricate the needle bearing in the eccentric shaft with grease.
3. Apply locking agent onto the thread of the eccentric shaft.
4. Install the flywheel to the rear end of the eccentric shaft through the key.
5. Apply sealing agent onto the both sides of the flywheel lock washer and place the lock washer in position.

6. Start the flywheel lock nut, and tighten the lock nut to 45.0 m-kg (350 ft-lb), holding the flywheel with the **ring gear brake** (Part No. 49 0820 060A). Bend the tab of the lock washer.
7. Hold the clutch disc in its mounting position with the **clutch disc arbor** (Part No. 49 0813 310). If the arbor is not available, use a spare main drive shaft.

Note.
The long end of the clutch disc hub must face the rear side (transmission side).

8. Install the clutch cover and pressure plate assembly onto the flywheel, and **align the "O" mark** on the clutch cover with the reamed hole of the flywheel. Install the reamer bolts in the reamed holes of the flywheel. Tighten the attaching bolts. **Do not** tighten the bolts at a one time.

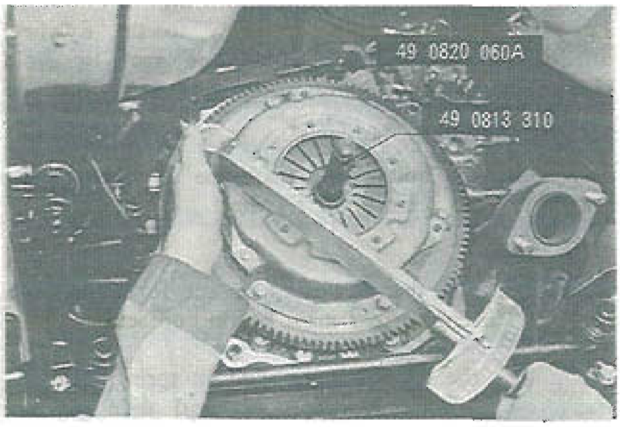


Fig. 6A–8 Installing of clutch cover assembly

9. Install the release fork, release fork boot, release bearing, and release bearing return spring.
10. Install the transmission and propeller shaft.

808 (1300 cc and 1600 cc)
1. Clean the surfaces of the flywheel and pressure plate thoroughly with fine sandpaper or crocus cloth, and make sure that all oil or grease has been removed.
2. Lubricate the pilot bearing in the flywheel with grease.

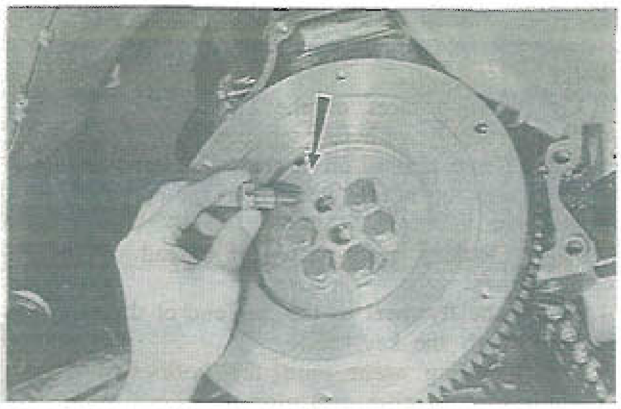


Fig. 6A–9 Installing of flywheel

3. Install the flywheel onto the rear end of the crankshaft with six bolts through the lock washer.

Note:
When installing the flywheel, **align the "O" marked hole** on the flywheel with the reamed hole on the crankshaft and fit the reamer bolt in the "0" marked hole, as shown in Fig. 6A–9.

4. Attach the **ring gear brake** (Part No. 49 0118 271A) and tighten the flywheel attaching bolts to the specified torque. Bend the tabs of the lock washer.
5. Hold the clutch disc in its mounting position with the **clutch disc arbor** (Part No. 49 0813 310). If the arbor is not available, use another main drive shaft.

Note:
The long end of the clutch disc hub must face the rear side (transmission side).

6. Install the clutch cover and pressure plate assembly onto the flywheel, **aligning the "O" mark** of the clutch cover with the reamed hole on the flywheel. Fit the two reamer bolts in the reamed holes of the flywheel.

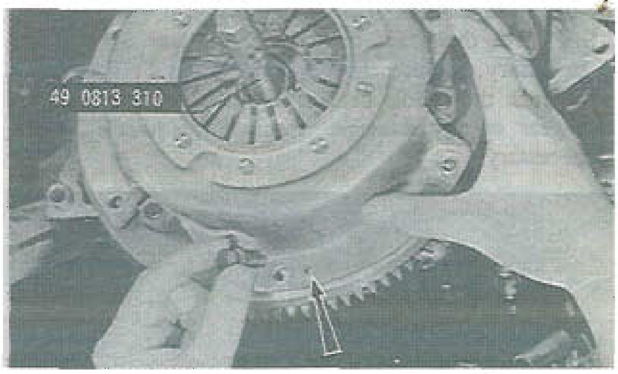


Fig. 6A-10 Installing of clutch cover assembly

7. Remove the disc arbor and ring gear brake.
8. Apply grease to the ball stud in the housing. Insert the release fork and press it inward so that the retaining spring of the release fork fit to the ball stud.
9. Install the release bearing, return spring and dust boot.
10. Install the transmission and propeller shaft.

6A–C. CLUTCH MASTER CYLINDER

6A–C–1. Clutch Master Cylinder Removal

To remove the clutch master cylinder, proceed as follows:
1. Disconnect the fluid pipe at the clutch master cylinder outlet.

Fig. 6A–11 Disconnecting of fluid pipe

2. Remove the nuts that attach the clutch master cylinder to the dash panel.
3. Pull the clutch master cylinder straight out and away from the dash panel.

6A–C–2. Clutch Master Cylinder Disassembly

The disassembling procedures of the master cylinder after removing are as follows:

1. Clean the outside of the clutch master cylinder thoroughly and drain the brake fluid.
2. Remove the reservoir from the cylinder.
3. Remove the dust boot from the cylinder.
4. Remove the piston stop wire with a screwdriver and remove the stop washer.
5. Remove the piston, piston cup and return spring from the cylinder.

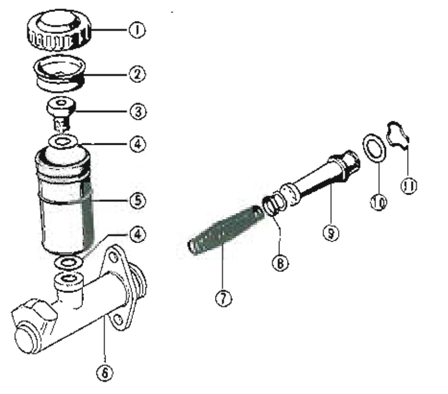


Fig. 6A–12 Clutch master cylinder components

1. Cap	7. Spring
2. Fluid baffle	8. Piston cup and spacer
3. Bolt	9. Piston
4. Washer	10. Piston stop washer
5. Reservoir	11. Piston stop wire
6. Cylinder	

6A–C–3. Checking of Clutch Master Cylinder

1. Wash the parts in clean alcohol or brake fluid. **Never use** gasoline or kerosene.
2. Check the piston cup and replace if they are damaged, worn, softened or swelled.
3. Examine the cylinder bore and piston for wear, roughness or scoring.
4. Check the clearance between the cylinder bore and the piston. If it is more than **0.15 mm (0.006 in)**, *replace the cylinder or piston.*
5. Ensure that the compensating port on the cylinder is open.

6A–C–4. Clutch Master Cylinder Assembly

1. Dip the piston and cups in clean brake fluid.
2. Install the reservoir.
3. Insert the return spring into the cylinder.
4. Install the primary piston cup so that the flat side of the cup faces the piston.
5. Fit the secondary cup onto the piston and install them in the cylinder.
6. Install the stop washer and stop wire.
7. Fill reservoir half with brake fluid and operate the piston with a screwdriver until the fluid is ejected at the outlet.
8. Install the dust boot to the cylinder.

6A–C–5. Clutch Master Cylinder Installation

1. Install the clutch master cylinder assembly onto the dash panel and tighten the nuts.
2. Connect the fluid pipe to the cylinder.
3. Fill with brake fluid and bleed the clutch hydraulic system.

6A–D. CLUTCH RELEASE CYLINDER

6A–D–1. Clutch Release Cylinder Removal

1. Disconnect the flexible pipe at the clutch release cylinder.
2. Unhook the release fork return spring.
3. Remove the nuts attaching the cylinder and remove the release cylinder.

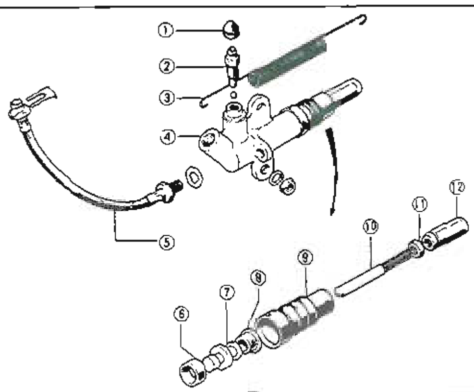


Fig. 6A–13 Clutch release cylinder components

1. Rubber cap	7. Piston
2. Bleeder valve	8. Secondary piston cup
3. Spring	9. Dust boot
4. Cylinder	10. Release rod
5. Fluid pipe	11. Nut
6. Primary piston cup	12. Adjusting nut

6A–D–2. Checking of Clutch Release Cylinder

Refer to Par. 6A–C–3 and inspect the clutch release cylinder.

6A–D–3. Clutch Release Cylidner Assembly

1. Fit the cups to the piston and install them in the cylinder.
2. Install the dust boot on the end of the cylinder.
3. Install the steel ball and bleeder into the bleeder hole.
4. Install the clutch release rod.

6A–D–4. Clutch Release Cylinder Installation

1. Install the clutch release cylinder assembly to the clutch housing with two nuts.
2. Connect the flexible pipe.
3. Fill the reservoir of the master cylinder with brake fluid and bleed the system, as described in Par. **6A–E.**
4. Adjust the free play of the release fork, as described in Par. **6A–A–2.**
5. Hook the return spring.

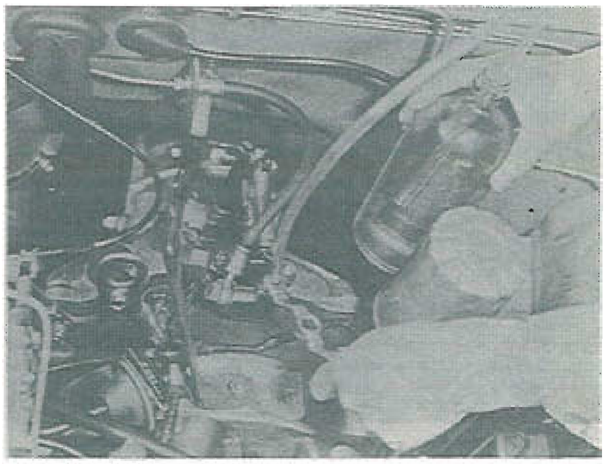


Fig. 6A–14 Bleeding of clutch hydraulic system

6A–E. AIR BLEEDING

The clutch hydraulic system must be bled whenever a fluid line has been disconnected or air enters the system. To bleed the clutch system, remove the rubber cap from the bleeder valve and attach the bleeder tube and fixture of the bleeder screw. Place the end of the tube in a glass jar and submerge in the brake pedal. Open the bleeder valve. Depress the clutch pedal and allow it to return slowly. Continue this pumping action and watch the flow of fluid in the jar. When air bubbles cease to appear, close the bleeder valve. During bleeding the reservoir of the master cylinder must be kept filled with fluid at least **3/4** of its capacity. After the bleeding operation, remove the tube, fit the cap on the bleeder valve, fill the reservoir and fit the filler cap.

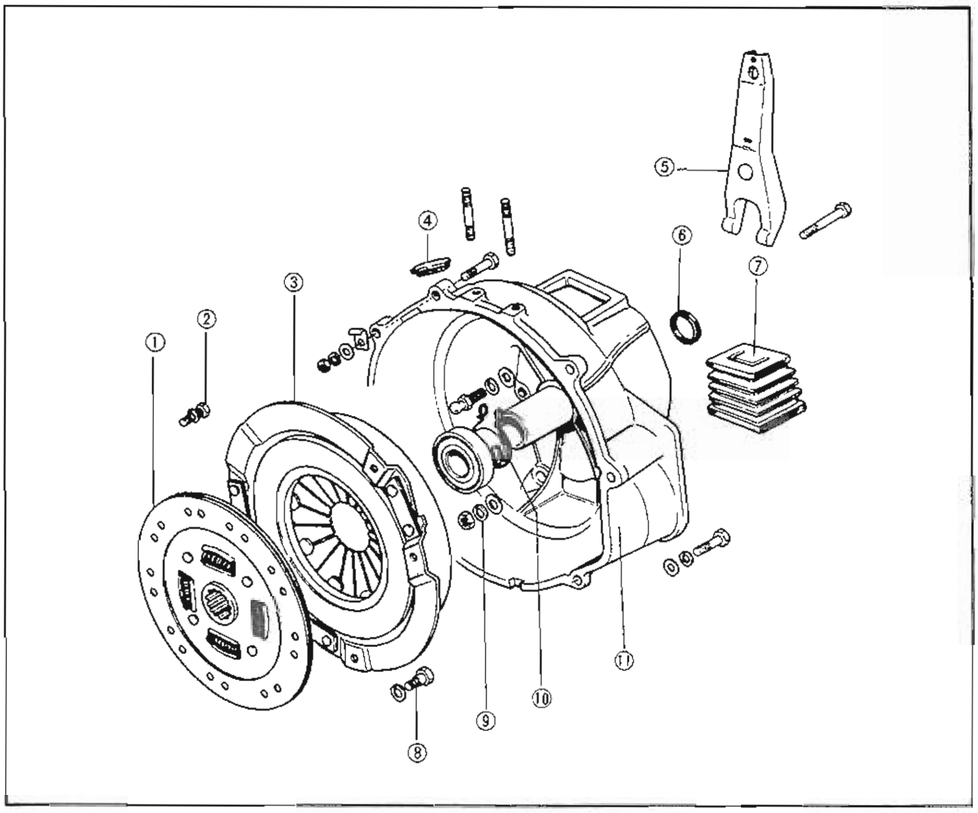


Fig. 6A–15
Clutch components
1. Clutch disc
2. Bolt
3. Clutch cover and pressure plate assembly
4. Service hole cover
5. Release fork
6. Oil seal
7. Dust boot
8. Reamer bolt
9. Release bearing
10. Spring
11. Clutch housing

SPECIAL TOOLS

49 0118 271A	Ring gear brake	49 0259 310	Clutch disc arbor
49 0823 070A	Puller, Eccentric shaft bearing	49 0820 060A	Ring gear brake
		49 0820 035	Flywheel nut wrench
49 0813 310	Clutch disc arbor	49 0823 300A	Flywheel puller

TRANSMISSION

808

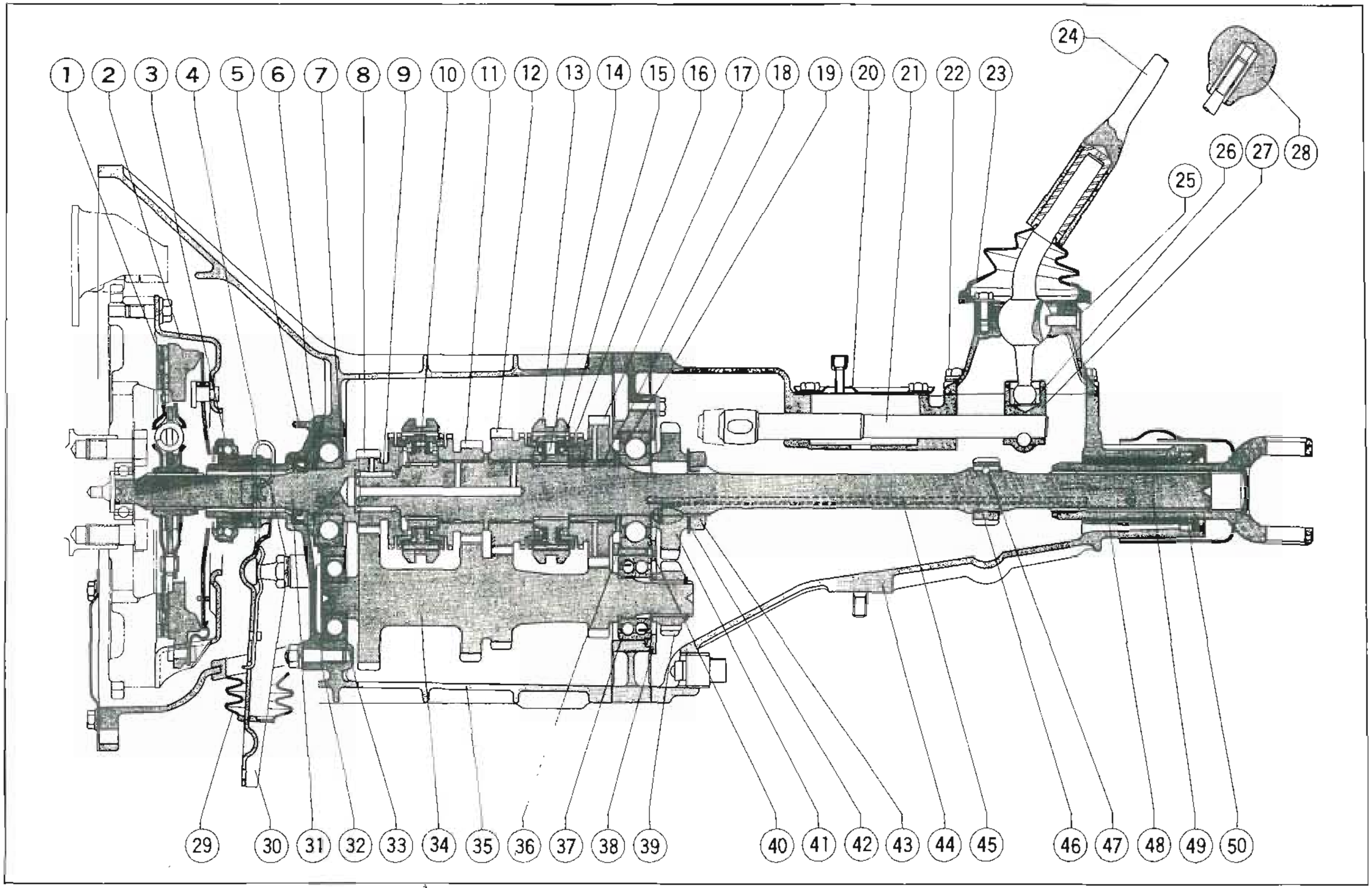


Fig. 7–1 Transmission cross section (1)

1. Clutch disc
2. Clutch cover
3. Release bearing
4. Return spring
5. Front bearing cover
6. Adjusting shim
7. Main shaft front bearing
8. Main drive shaft (Top gear)
9. Needle bearing
10. Clutch hub
11. Third gear
12. Second gear
13. Clutch hub sleeve
14. Clutch hub
15. Synchronizer key
16. Synchronizer ring
17. First gear (Low gear)
18. First gear sleeve
19. Thrust washer
20. Blind cover
21. Gearshift lever control rod
22. Gearshift lever retainer (Control case)
23. Gearshift lever boot
24. Gearshift lever
25. Gearshift lever set bolt
26. Spring seat
27. Gearshift control lever end
28. Gearshift lever knob
29. Clutch release fork boot
30. Clutch release fork
31. Main drive shaft oil seal
32. Gasket
33. Counter shaft front bearing
34. Counter shaft
35. Transmission case and clutch housing assembly
36. Counter shaft rear bearing
37. Adjusting shim
38. Rear bearing cover
39. Reverse counter gear
40. Main shaft rear bearing
41. Reverse gear
42. Lock washer
43. Lock nut
44. Extension housing
45. Oil pass
46. Speedometer drive gear
47. Lock ball
48. Bush
49. Main shaft
50. Main shaft oil seal

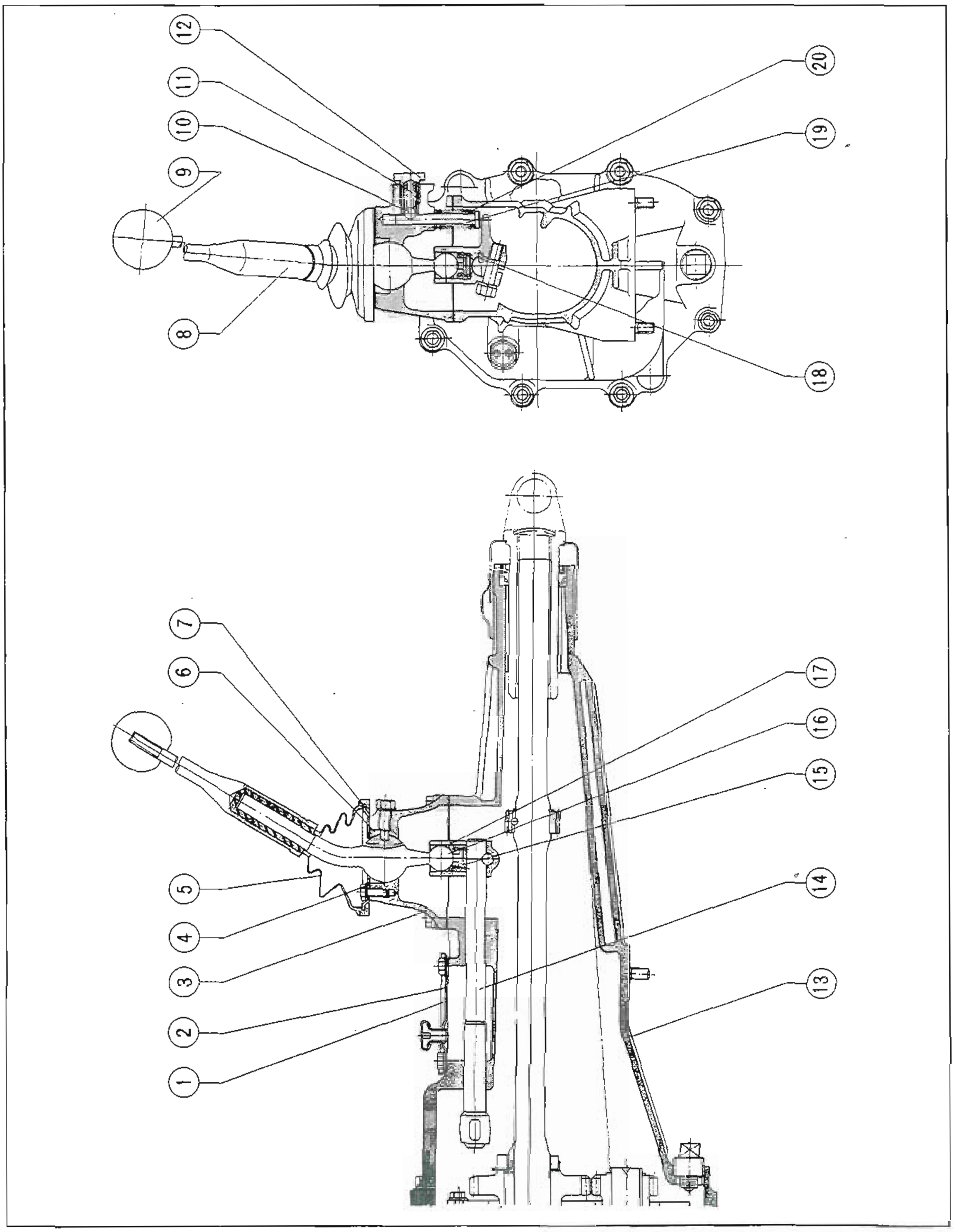


Fig. 7—2 Transmission cross section (2)

1. Blind cover
2. Gasket
3. Retainer cover (Top cover)
4. Adjusting shim
5. Gearshift lever boot
6. Bush
7. Cover plate
8. Gearshift lever
9. Gearshift lever knob
10. Lock ball (steel ball)
11. Spring
12. Spring cap bolt
13. Extension housing
14. Gearshift lever control rod
15. Spring
16. Spring seat
17. Gearshift control lever end
18. Key
19. Select lock spindle
20. Spring

DESCRIPTION

The transmission is of the fully synchronized type with all gears except the reverse sliding gear being in constant mesh. All forward-speed changes are accomplished with synchronizer sleeves. The transmission case and the clutch housing are integrally constructed, and the assembly is mounted onto the engine rear end. The gearshift mechanism is a direct control with a floor-shift type.

7–A. ON CAR SERVICE

7–A–1. Back-up Lamp Switch Replacement

1. Raise the vehicle and support with stands.
2. Remove the back-up lamp switch wire.
3. Remove the back-up lamp switch with a suitable tool.
4. Install a new back-up lamp switch and tighten the switch.
5. Connect the wire with the switch.

7–A–2. Main Shaft Oil Seal Replacement

1. Raise the vehicle and support with stands.
2. Remove the propeller shaft, as described in **Par. 8–A–1.**
3. Remove the main shaft oil seal from the extension housing.
4. Position a new oil seal in the extension housing and insert the oil seal by tapping it slightly with a plastic hammer.

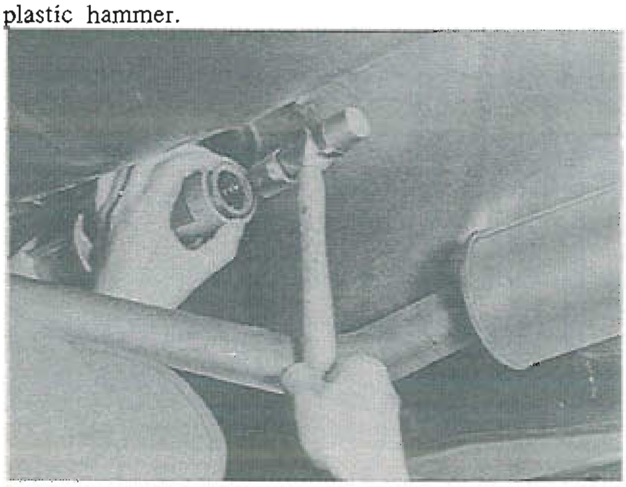


Fig. 7–3 Inserting of oil seal

5. Apply gear lubricant to the lip of the oil seal.
6. Install the propeller shaft.

7–A–3. Speedometer Driven Gear

a. Removing of speedometer driven gear

1. Disconnect the speedometer cable from the extension housing.
2. Remove the speedometer driven gear assembly attaching screw, and then remove the cable joint, sleeve and driven gear from the extension housing.

b. Installing of speedometer driven gear

Follow the removal procedures in the reverse order.

7–B. MAJOR SERVICE

7–B–1. Transmission Removal

When removing the transmission from the vehicle, proceed as follows:

1. Remove the gearshift lever knob.
2. Remove the console box attaching screws and remove the console box (if equipped).
3. Remove the front mat, six screws, and the gearshift lever boot.
4. Remove the bolts attaching the retainer cover to the gearshift lever retainer.
5. Pull the gearshift lever, shim and bush straight up and away from the gearshift lever retainer.

Fig. 7–4 Pulling of gearshift lever

6. Open the hood and disconnect the negative battery cable from the battery terminal.
7. Raise the vehicle and support with stands.
8. Remove the propeller shaft, as described in **Par. 8–A–1.**
9. Insert the **transmission oil plug** (Part No. 49 0259 440) into the extension housing.

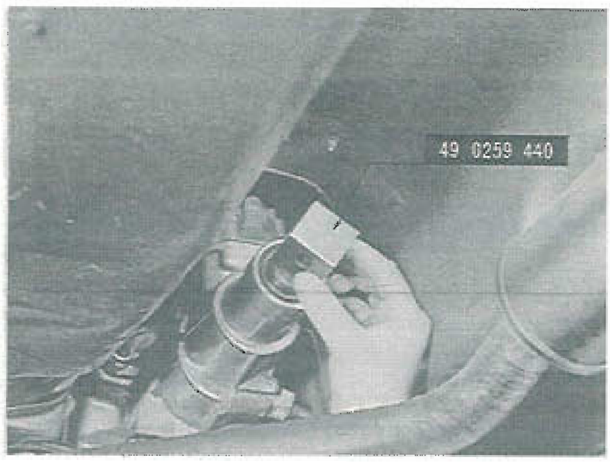


Fig. 7–5 Inserting of oil plug

10. Disconnect the speedometer cable from the extension housing.
11. Remove the bolt and nut that attach the exhaust pipe to the bracket on the transmission case.
12. Unhook the clutch release cable return spring and remove the clutch release cable bracket from the clutch housing.

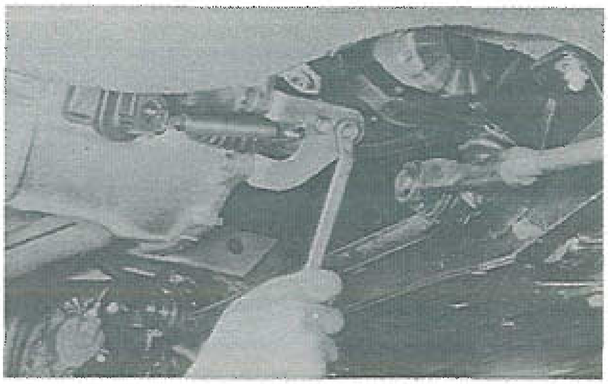


Fig. 7–6 Removing of clutch release cable bracket

13. Remove the clutch housing cover attaching bolts and remove the clutch housing cover.
14. Disconnect the connector of the back-up lamp switch near the rear and right of the engine.
15. Disconnect the wire at the starting motor. Remove the starting motor securing bolts and nuts from the clutch housing, and remove the starting motor.
16. Remove the nuts securing the transmission support onto the body and remove the transmission support from the body.
17. Remove the bolts and nuts securing the transmission to the engine rear end.
18. Slide the transmission rearward until the main drive shaft clears the clutch disc and carefully withdraw it downward from the vehicle.

7–B–2. Transmission Disassembly

The procedures for disassembling the transmission after removing the transmission from the vehicle are as follows:

a. Removing of front bearing cover

1. Place the transmission on a work stand.
2. Remove the drain plug, and drain the lubricant from the transmission. Clean the metal filings adhered on the magnet of the drain plug if necessary.
3. Remove the clutch release bearing return spring and slide the bearing off the front bearing cover.
4. Remove the clutch release fork.
5. Remove the nuts or bolts attaching the front bearing cover to the transmission case and remove the front bearing cover, shim and gasket.

Do not damage the oil seal which is inside the front bearing cover.

b. Removing of gearshift lever retainer

1. Remove the bolts that attach the gearshift lever retainer to the extension housing and remove the retainer and gasket.
2. Remove the spring cap bolt and remove the spring and steel ball, select lock spindle and spring from the gearshift lever retainer.

c. Removing of extension housing

1. Remove the nuts that attach the extension housing to the transmission case. Slide the extension housing off the main shaft, with the gearshift control lever end laid down to the left as far as it will go.

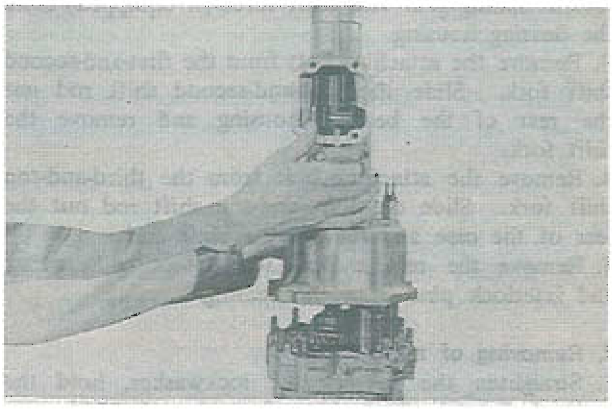


Fig. 7–7 Removing of extension housing

2. Remove the spring from the gearshift control lever end.
3. Remove the spring cap bolt and remove the spring and friction piece from the extension housing.
4. Remove the bolt that attach the gearshift control lever end to the gearshift control lever, and remove the control lever and control lever end from the extension housing.
5. Remove the speedometer driven gear assembly attaching screw and remove the cable joint, sleeve and speedometer driven gear from the extension housing.
6. Remove the back-up lamp switch from the extension housing.

d. Removing of transmission case

1. Remove the snap rings on the front ends of the main drive shaft and counter shaft.
2. Remove the snap ring that secures the speedometer drive gear to the main shaft. Slide the drive gear off the main shaft and remove the lock ball.
3. Using the **main shaft pusher** (Part No. 49 0305 430),

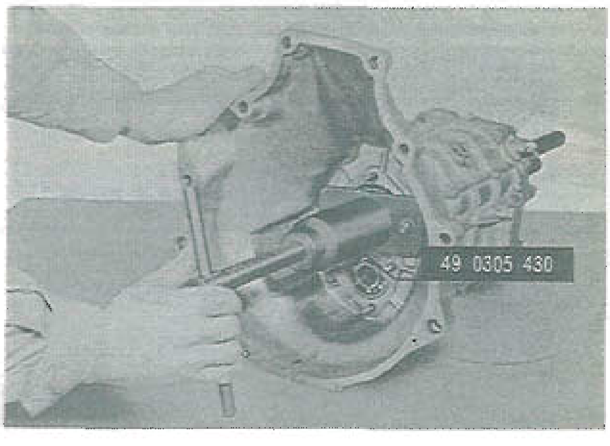


Fig. 7–8 Removing of transmission case

remove the transmission case from the bearing housing (intermediate palte) assembly.
4. Remove the bearings from the transmission case.

e. Removing of each shift rod and fork
1. Remove the three spring cap bolts and remove the detent springs (locking springs) and detent balls (locking balls) from the bearing housing.
2. Remove the shift lever attaching nut (if equipped) and remove the reverse shift rod together with the reverse sliding gear and shift lever (if equipped) from the bearing housing.
3. Remove the attaching bolt from the first-and-second shift fork. Slide the first-and-second shift rod out the rear of the bearing housing and remove the shift fork.
4. Remove the attaching bolt from the third-and-top shift fork. Slide the third-and-top shift rod out the rear of the case and remove the shift fork.
5. Remove the reverse shift rod detent ball, spring and interlock pins from the bearing housing.

f. Removing of reverse gear
1. Straighten the tab of the lockwasher, hold the main shaft with the **holder** (Part No. 49 0259 440) as shown in Fig. 7-9 and loosen the lock nut by using the **main shaft lock nut wrench** (Part No. 49 0164 631A). Slide the reverse gear off the main shaft.

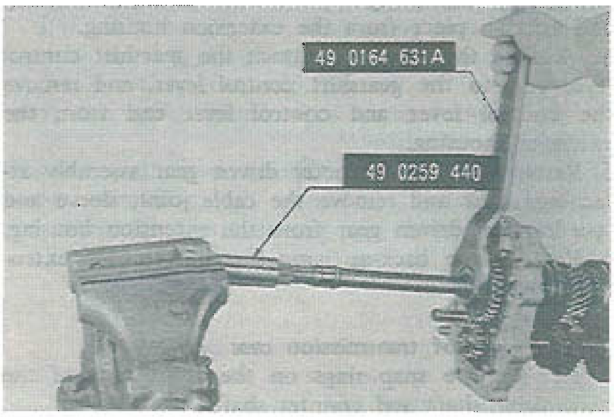


Fig. 7–9 Loosening of lock nut

2. Remove the snap ring from the rear of the counter shaft and slide off the reverse counter gear.

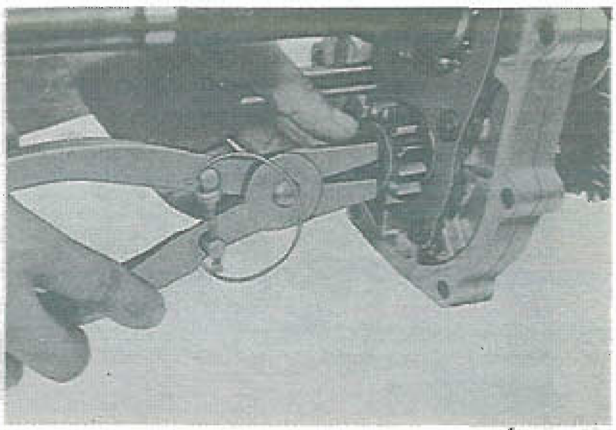


Fig. 7–10 Removing of snap ring

3. Remove the bolts that attach the rear bearing cover to the bearing housing and remove the rear bearing cover.

g. Removing of bearing housing
1. With a plastic hammer, tap the rear ends of the main shaft and counter shaft in turn, being careful not to damage the shafts, and remove these shafts from the bearing housing.

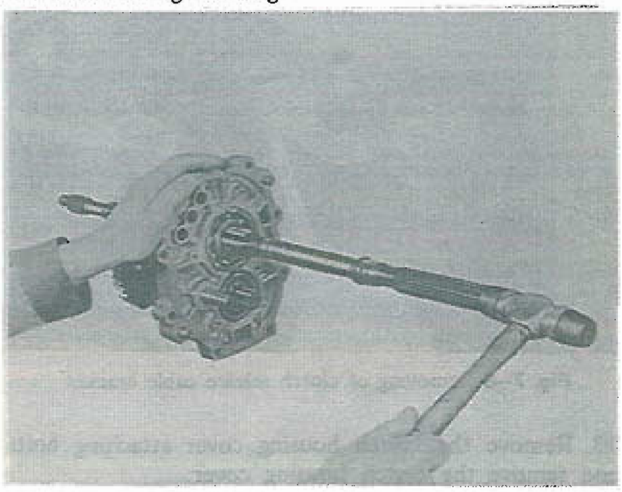


Fig. 7–11 Removing of main shaft and counter shaft

2. Remove the bearings from the bearing housing.

h. Disassembling of main shaft assembly
1. Remove the main drive shaft from the main shaft and then remove the top synchronizer ring and needle bearing from the main drive shaft.
2. Remove the snap ring from the front of the main shaft.

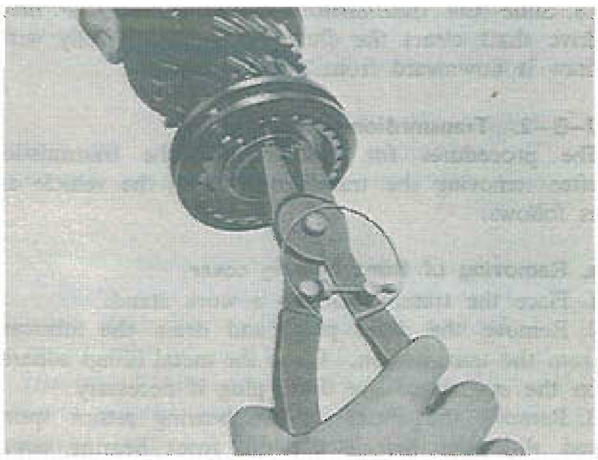


Fig. 7–12 Removing of snap ring

3. Slide the third-and-top clutch hub and sleeve assembly, third synchronizer ring and third gear out the front of the main shaft. **Do not** mix the synchronizer rings.
4. Slide the thrust washer, first gear, first synchronizer ring, first gear sleeve, first-and-second clutch hub and sleeve assembly, second synchronizer ring and second gear out the rear of the main shaft in sequence.

7–B–3. Transmission Inspection

a. Checking of transmission case and bearing housing
Inspect the case and bearing housing for cracks and the machined mating surfaces for burrs, nicks or any damage.

Note:
As the bearing housing is machined under the condition of being fitted with the transmission case, the center of the bearing housing and transmission case are completely matched. Therefore, the bearing housing only should not be replaced. Replace the front bearing cover that is bent or distorted. Replace the oil seal in the bearing cover if necessary.

b. Checking of bearings
Inspect each bearing for roughness or noise by holding the outer race, and rotating the inner race while applying pressure with hand. Replace the bearings if necessary. Replace the needle bearings that are broken, worn or rough.

c. Checking of gears
Inspect the teeth of each gear. If excessively worn, broken or chipped, replace with new gear. Excessive wear of the gears causes increase of backlash, which results in producing noises or may cause the gear to work off while running.

d. Checking of main shaft and main drive shaft
Check the main shaft run-out with a dial indicator. If the run-out exceeds **0.03 mm (0.0012 in)**, correct with a press or replace with a new one. Replace the main shaft if there is any evidence of wear or if any of the splines is damaged.

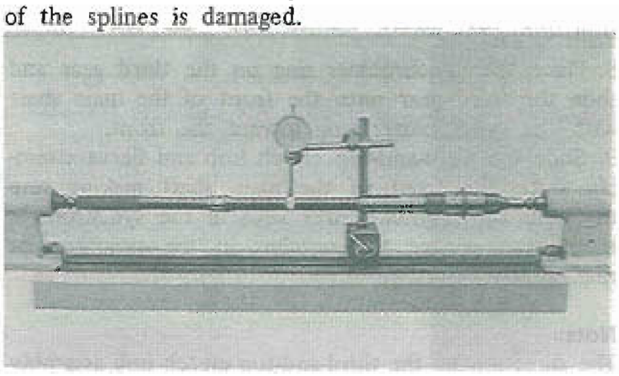


Fig. 7–13 Checking of main shaft run-out

Replace the main drive shaft if the splines are damaged. If the needle bearing surface in the bore of the bearing is worn or rough, or if the cone surface is damaged, replace with a new shaft.

e. Checking of counter shaft
Replace the counter shaft if it is bent, scored or worn.

f. Checking of shift fork and shift rod
Check the condition of the shift fork and shift rod.

g. Checking of synchronizer mechanism
1. Inspect the gear teeth on the synchronizer ring for wear or damage. Replace the synchronizer ring if necessary.
2. Check the synchronizer ring for wear. To check the wear of the synchronizer ring, place the synchronizer ring on the gear cone and measure the clearance between the face of the synchronizer ring and the gear with a feeler gauge. If the clearance is less than **0.8 mm (0.031 in)**, replace the synchronizer ring or gear. The standard clearance is 1.5 mm (0.060 in).

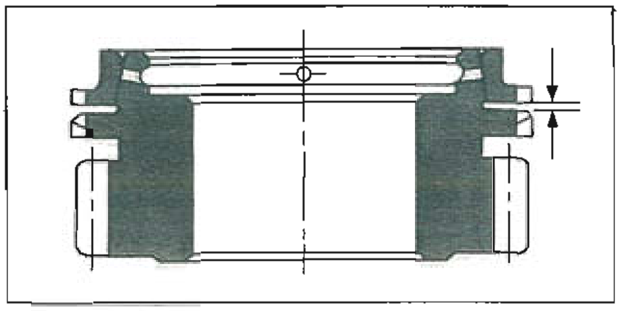


Fig. 7–14 Checking of synchronizer ring

3. Inspect the contact between the synchronizer ring and the gear. To inspect, apply a thin coat of "Prussian Blue" on the gear cone and fit it into the synchronizer ring. If the contact pattern is incorrect or if a new synchronizer ring is used, lap the synchronizer ring using a lapping compound. Apply a light pressure for lapping.
4. Check the clutch sleeves for free movement on their hubs.
5. Check the synchronizer key, inner surface of the clutch sleeve, and the synchronizer key groove on the clutch hub for wear or damage.

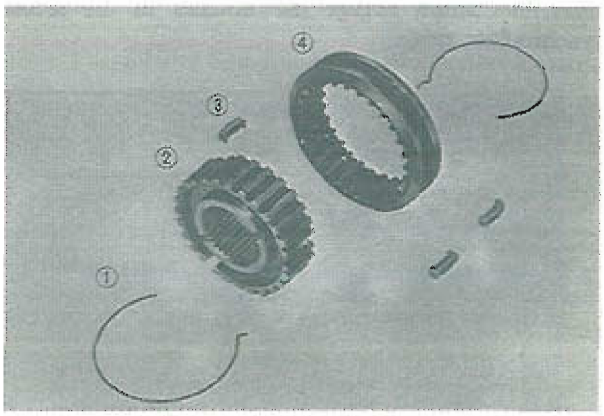


Fig. 7–15 Clutch hub components

1. Key spring
2. Clutch hub
3. Synchronizer key
4. Clutch sleeve

6. Check the synchronizer key spring for wear or weakness. Replace the spring if necessary.

h. Checking of extension housing
Inspect the extension housing for cracks and the machined mating surface for burrs, nicks or any damages. Inspect the bush and oil seal in the extension housing. Replace them if they are worn or damaged.

7–B–4. Transmission Assembly

a. Assembling of main shaft

1. Assemble the third-and-top synchronizer mechanism by installing the clutch hub onto the sleeve, placing the three synchronizer keys into the clutch hub key slots and installing the key springs onto the clutch hub. When installing the key springs, the open ends of the springs should be **kept 120° apart** as shown in Fig. 7-16, so that the spring tension on each key will be uniform.

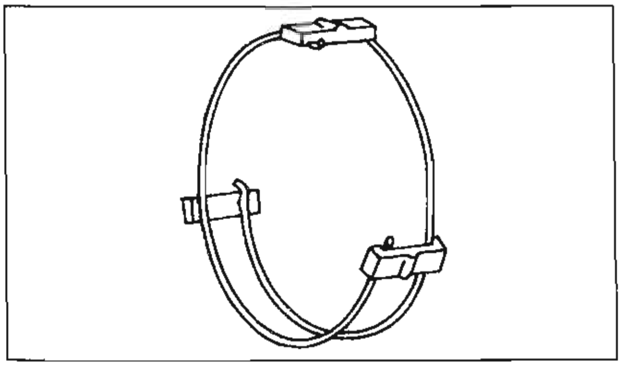


Fig. **7–16** Installing of key springs

2. Assemble the first-and-second synchronizer mechanism in the same manner as third-and-top synchronizer mechanism.
3. Place the synchronizer ring on the second gear and slide the second gear onto the main shaft with the synchronizer ring toward the rear of the shaft.
4. Slide the first-and-second clutch hub and sleeve assembly onto the main shaft with the oil grooves of the clutch hub toward the front of the shaft. Make sure that the three synchronizer keys in the synchronizer mechanism engage the notches in the second synchronizer ring.

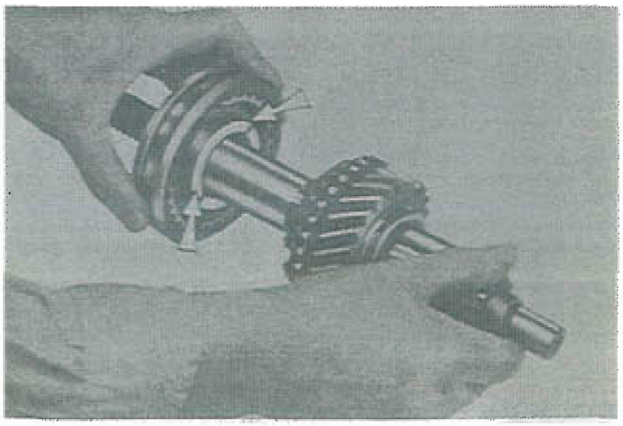


Fig. **7–17** Sliding of clutch hub assembly

5. Slide the first gear sleeve onto the main shaft.
6. Place the synchronizer ring on the first gear and slide the first gear onto the main shaft with the synchronizer ring toward the front of the shaft. Rotate the first gear as necessary to engage the three notches in the synchronizer ring with the synchronizer keys in the first-and-second.

Note:
To prevent overshift, the thrust washer is fitted so that the clearance between the synchronizer key and the top-speed synchronizer ring is 0.65~2.0mm (0.025~0.080 in) when the main shaft assembly is fitted to the case.
In case the first gear sleeve, first-and-second clutch hub and thrust washer are replaced with new ones, take the measurements of A in Fig. 7-18 for both replaced and replacing parts, and select a suitable washer so that the both dimensions are equal.
The thrust washers are available as in the following table.

2.2 mm (0.087 in) 2.7 mm (0.106 in) 2.9 mm (0.114 in)	3.2 mm (0.126 in) 3.7 mm (0.146 in)

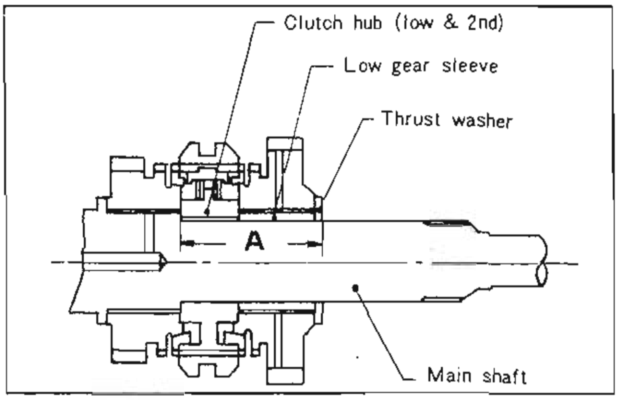


Fig. **7–18** Thrust washer

7. Install the thrust washer onto the rear of the main shaft.
8. Place the synchronizer ring on the third gear and slide the third gear onto the front of the main shaft with the synchronizer ring toward the front.
9. Slide the third-and-top clutch hub and sleeve assembly onto the front of the main shaft making sure that the three synchronizer keys in the synchronizer mechanism engage the notches in the synchronizer ring.

Note:
The direction of the third-and-top clutch hub assembly is shown in Fig. 7–19.

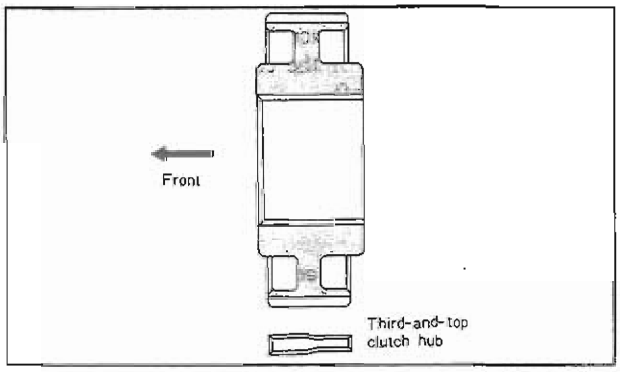


Fig. 7–19 Direction of clutch hub assembly

10. Install the snap ring onto the front of the main shaft.
11. Place the needle bearing onto the front end of the main shaft.
12. Place the synchronizer ring on the main drive shaft gear (top gear) and install the main drive shaft onto the front end of the main shaft making sure that the three synchronizer keys in the third-and-top synchronizer mechanism engage the notches in the synchronizer ring.

b. Installing of bearing housing

1. Press fit the counter shaft rear bearing with shim onto the bearing housing.
2. Install the counter shaft to the counter shaft rear bearing in the bearing housing by using a press.
3. Support the thrust washer and first gear to prevent them from sliding off the shaft. Position the main shaft assembly in the bearing housing, making sure that each gear of the main shaft assembly engages the counter shaft gear. Then, install the main shaft rear bearing with shim onto the bearing housing.

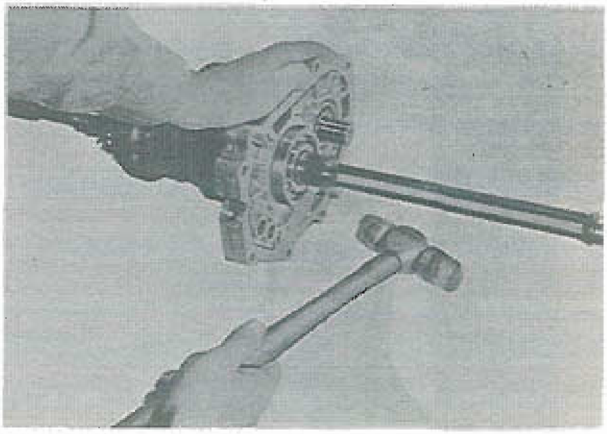


Fig. 7–20 Installing of main shaft bearing

4. Place the rear bearing cover onto the bearing housing and tighten the attaching bolts.
5. Slide the reverse counter gear onto the rear of counter shaft and secure it with the snap ring.

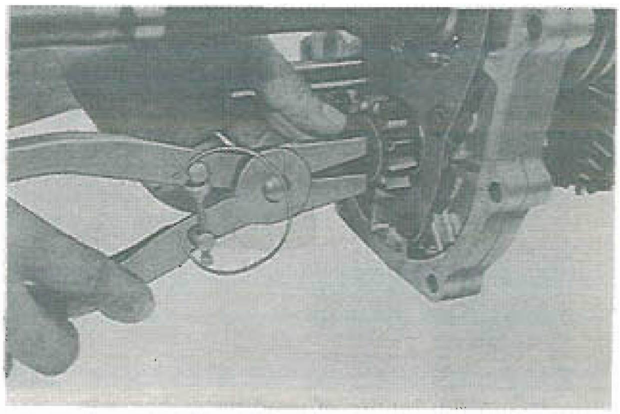


Fig. 7–21 Securing of reverse counter gear

6. Place the key on the main shaft and slide the reverse gear onto the main shaft.

Note:
When installing the reverse gear and reverse counter gear, both gears should be fitted so that the chamfer on the teeth is faced rearward.

7. Tighten the main shaft lock nut using the **main shaft holder** (Part No. 49 0259 440) and **main shaft lock nut wrench** (Part No. 49 0164 631A), and bend the tab of the lock washer.

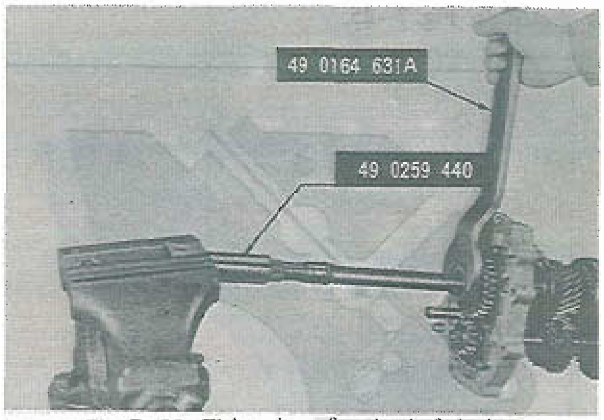


Fig. 7–22 Tightening of main shaft lock nut

c. Installing of shift fork and shift rod

1. Position the spring and detent ball in the A of the bearing housing, as shown in Fig. 7–23

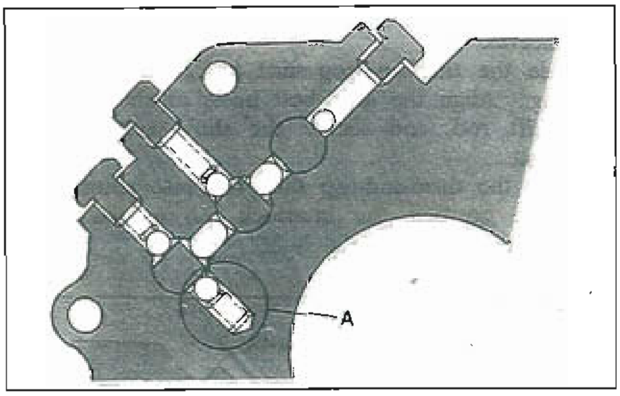


Fig. 7–23 Position of detent ball

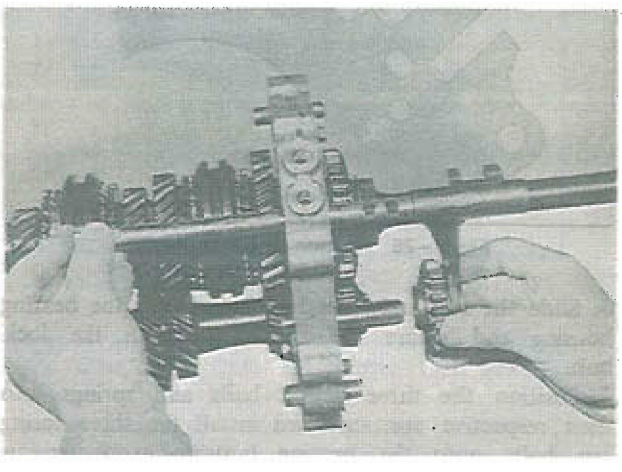


Fig. 7–24 Installing of reverse sliding gear

Install the reverse shift lever or reverse shift fork onto the reverse shift rod and position the reverse sliding gear on the reverse shift lever or reverse shift fork. Push the detent ball and spring downward with a suitable screwdriver and install the reverse shift rod assembly onto the bearing housing from the rear of the bearing housing, aligning the reverse sliding gear with the reverse sliding gear shaft.
2. Place the reverse shift rod into neutral position and position the interlock pin in the bearing housing as shown in Fig. 7–25.

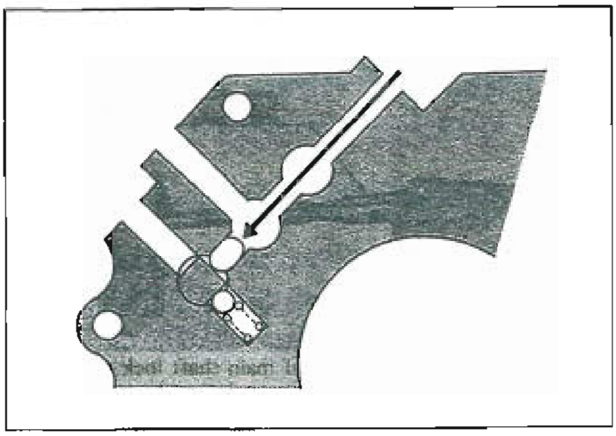


Fig. 7–25 Position of interlock pin

3. Position the third-and-top shift fork and first-and-second shift fork in place on their respective clutch hub sleeves.
4. Slide the third-and-top shift fork into the bearing housing. Align the lock bolt holes of the shift fork and shift rod, and secure the shift fork with the lock bolt.
5. Place the third-and-top shift rod into neutral position and position the interlock pin in the bearing housing as shown in Fig. 7–26.

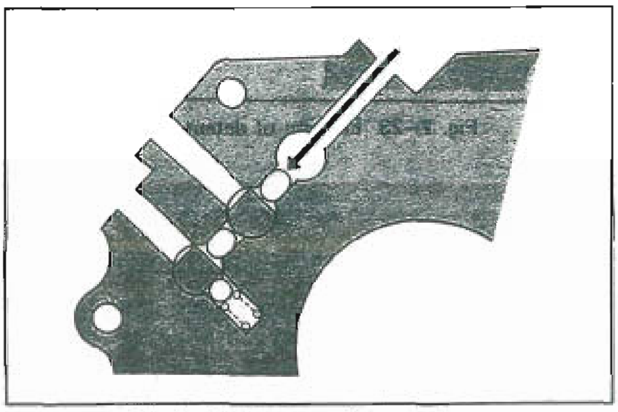


Fig. 7–26 *Position of interlock pin*

6. Slide the first-and-second shift rod into the bearing housing and secure the shift fork with the lock bolt.
7. Position the three detent balls and springs into their respective positions and install the three spring cap bolts onto the bearing housing as shown in Fig. 7–27.

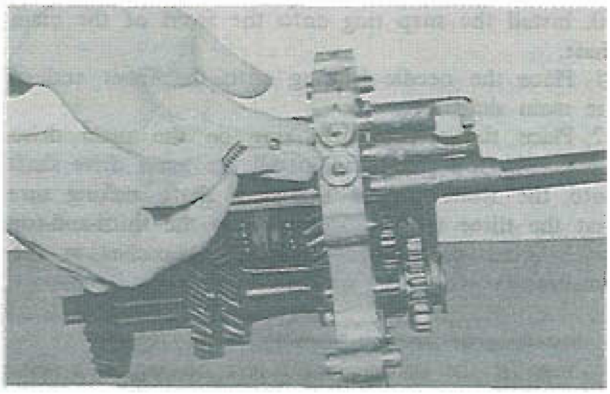


Fig. 7–27 Position of detent ball

d. Installing of bearing housing

1. Apply a thin coat of sealing agent onto contacting surfaces of the bearing housing and transmission case.
2. Position the bearing housing assembly onto the transmission case, as shown in Fig. 7–28.

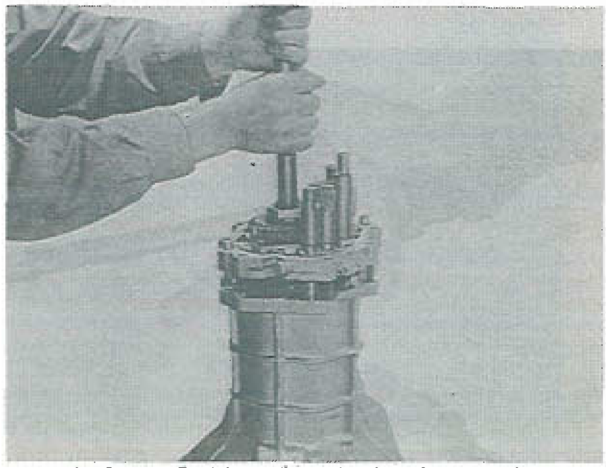


Fig. 7–28 Position of bearing housing assembly

3. Position the speedometer drive gear lock ball in place and slide the gear onto the main shaft. Secure the drive gear with the snap ring.

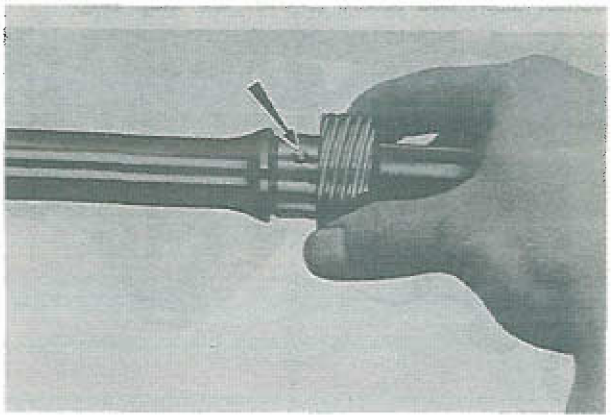


Fig. 7–29 Position of speedometer drive gear

4. Install the main shaft front bearing and counter shaft front bearing onto the transmission case and secure them with the snap rings.

e. **Installing of extension housing**

1. Position the speedometer driven gear, sleeve, cable joint in place as shown in Fig. 7–30 and fix the speedometer driven gear assembly onto the extension housing with the screw.

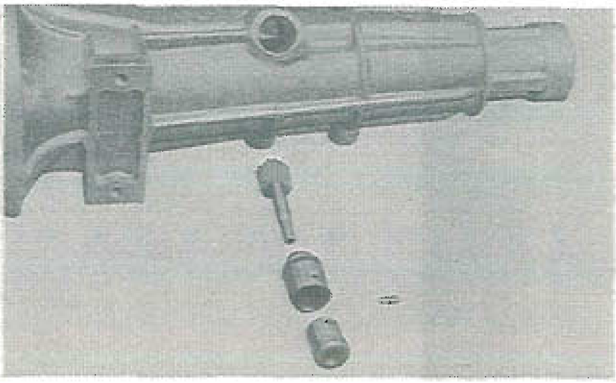


Fig. 7–30 Speedometer driven gear components

2. Insert the gearshift control lever through the holes from the front of the extension housing. Position the key in place and slide the gearshift lever end onto the gearshift control lever. Secure the gearshift lever end with the bolt.
3. Position the spring and friction piece in place and install the spring cap bolt to the extension housing.
4. Apply a thin coat of sealing agent onto contacting surfaces of the bearing housing and extension housing.
5. Position the extension housing onto the bearing housing with the gearshift lever end laid down to the left as far as it will go. Tighten the attaching nuts.

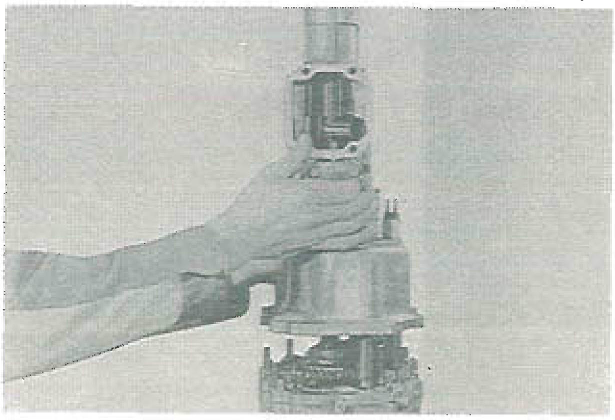


Fig. 7–31 Position of extension housing assembly

6. Check to ensure that the gearshift control lever operates properly.
7. Insert the select lock spindle and spring from the inside of the gearshift lever retainer. Position the lock ball and spring in alignment with the select lock spindle and install the spring cap bolt.
8. Position the gearshift lever retainer and gasket onto the extension housing and tighten the attaching bolts.

f. **Installing of front bearing cover**

1. Apply lubricant to the lip of the oil seal in the front bearing cover.
2. Position the front bearing cover onto the transmission case and tighten the attaching nuts.

Note:

When the front bearing cover is installed, the clearance between the main shaft front bearing outer race and the front bearing cover should be less than **0.15 mm (0.006 in)**. This clearance can be adjusted by inserting the adjusting shim of 0.15 mm (0.006 in) or 0.30 mm (0.012 in).

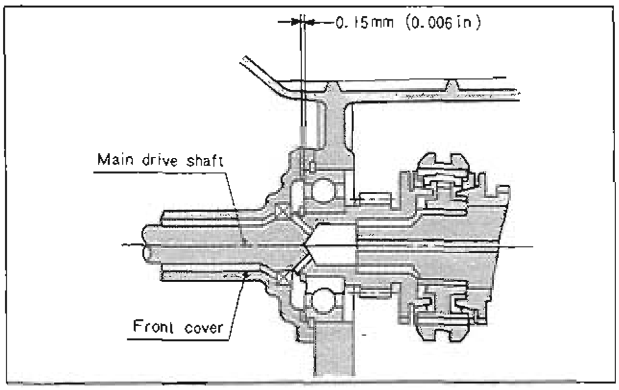


Fig. 7–32 Adjusting of bearing end play

3. Install the release bearing, return spring and release fork.

7–B–5. Transmission Installation

Follow the removal procedures in the reverse order.

Note:

1. Apply a thin coat of grease onto the splines of the main drive shaft.
2. Use the **tool** (Part No. 49 0259 310) to align the splines of the main drive shaft and clutch disc.
3. Fill the transmission case with lubricant until the lubricant overflows from the level hole. Lubricant capacity is about 1.3 liters (2.7 U.S. pints., 2.3 Imp. pints.).

SPECIAL TOOLS

49 0259 440	Transmission oil plug and main shaft holder	49 0164 631A	Main shaft lock nut wrench
49 0305 430	Main shaft pusher	49 0259 310	Clutch disc arbor

TRANSMISSION

RX–3 (General spec. models)

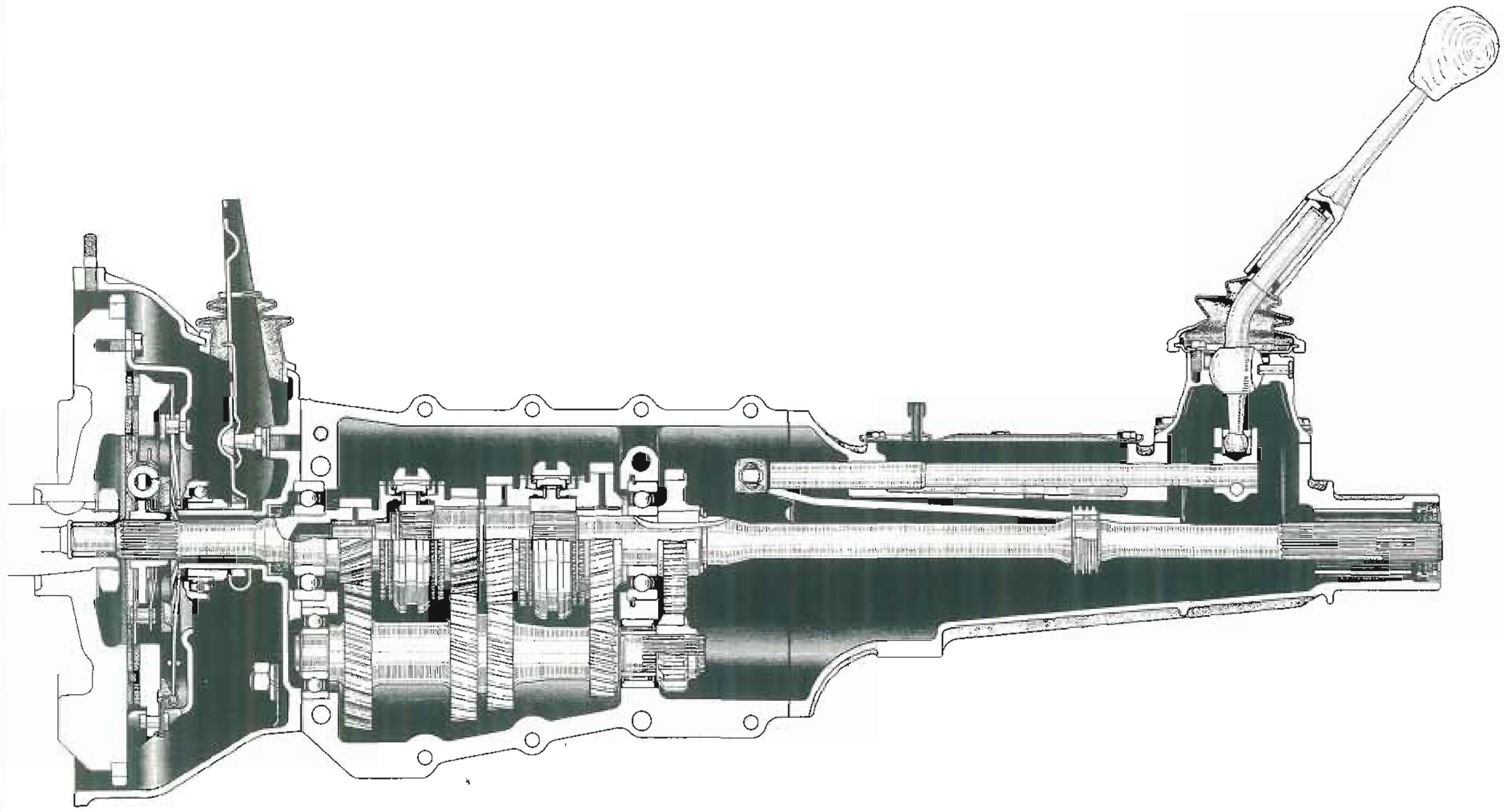


Fig. 7A–1 Transmission cross section

DESCRIPTION
RX-3 is equipped with a four-speed manual transmission which is of the synchromesh type on the low, second, third and top gears and of the selective sliding mesh type on the reverse gear. The gearshift mechanism is a direct control with a floor-shift type.

7A–A. ON CAR SERVICE

7A–A–1. Main Shaft Oil Seal

a. Replacing of main shaft oil seal
1. Raise the vehicle and support with stands.
2. Remove the propeller shaft as described in **Par. 8–A–1.**
3. Remove the main shaft oil seal from the extension housing.
4. Position a new oil seal in the extension housing and insert the oil seal by tapping it slightly with a plastic hammer.

Fig. 7A–2 Installing of oil seal

5. Apply gear lubricant to the lip of the oil seal.
6. Install the propeller shaft.

7A–B. MAJOR SERVICE

7A–B–1. Transmission Removal
When removing the transmission from the vehicle, proceed as follows:
1. Remove the gearshift lever knob.
2. Remove the screws attaching the console box and remove the console box.
3. Remove the front mat, six screws, and the gearshift lever boot.
4. Remove the bolts attaching the retainer cover to the gear shift lever retainer.
5. Pull the gearshift lever, shim and bush straight up and away from the gearshift lever retainer.

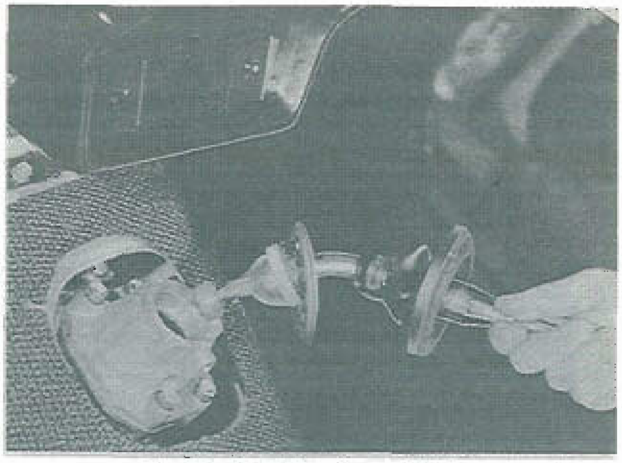


Fig. 7A–3 Pulling of gearshift lever

6. Open the hood and disconnect the negative battery cable from the battery terminal.
7. *Remove the nuts attaching the clutch release cylinder* and remove the cylinder.

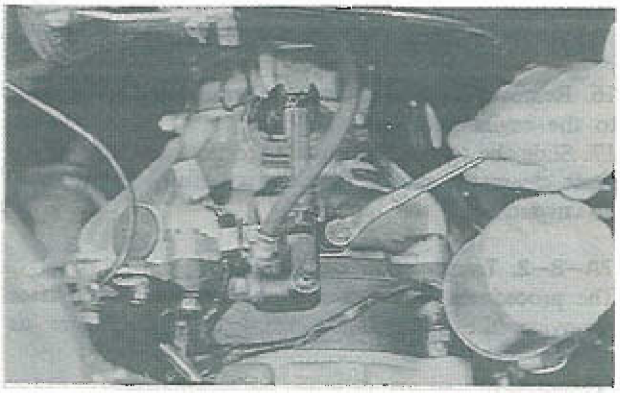


Fig. 7A–4 Removing of clutch release cylinder

8. Disconnect the connector of the back-up lamp switch near the clutch release cylinder.
9. Raise the vehicle and support with stands.
10. Remove the propeller shaft as described in **Par. 8–A–1,** and insert the **transmission oil plug** (Part No. 49 0259 440) into the extension housing.

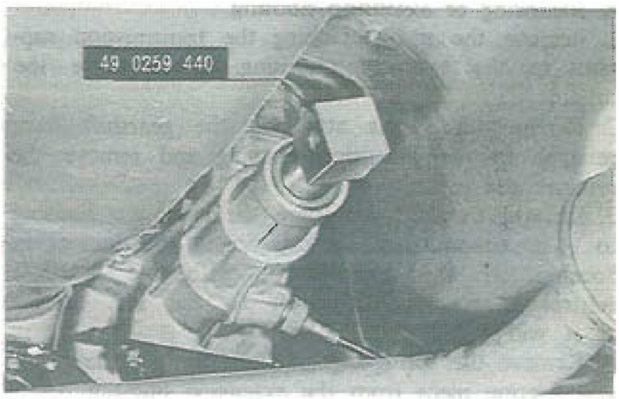


Fig. 7A–5 Inserting of oil plug

11. Disconnect the exhaust pipe from the exhaust manifold

12. Disconnect the speedometer cable from the extension housing.
13. Disconnect the wire at the starting motor.
14. Remove the bolts and nuts securing the starting motor and remove the starting motor.
15. Remove the nuts securing the transmission support onto the body.

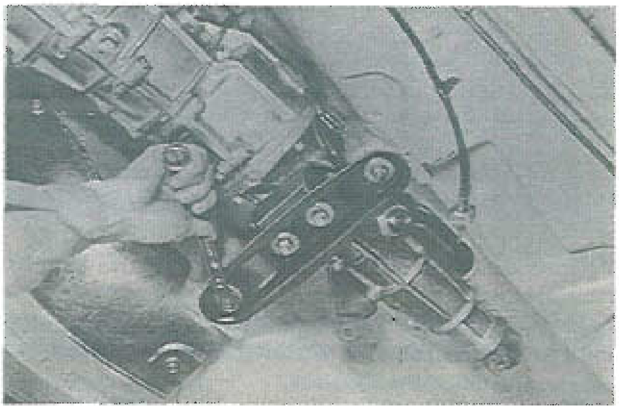


Fig. 7A–6 Removing of transmission support

16. Remove the bolts and nuts securing the transmission to the engine rear end.
17. Slide the transmission rearward until the main drive shaft clears the clutch disc and carefully withdraw it downward from the vehicle.

7A–B–2. Transmission Disassembly

The procedures for disassembling the transmission after removing the transmission from the vehicle are as follows:

a. Removing of clutch housing

1. Place the transmission on a work stand.
2. Remove the drain plug, and drain the lubricant from the transmission. Clean the metal filings adhered on the magnet of the drain plug if necessary.
3. Remove the nuts attaching the clutch housing, and remove the clutch housing.
4. Remove the oil seal from the clutch housing.

b. Removing of extension housing

1. Remove the nuts attaching the transmission support to the extention housing, and remove the support.
2. Remove the bolts attaching the gearshift lever retainer to the extension housing and remove the retainer and gasket.
3. Remove the nuts attaching the extension housing to the transmission case. Slide the extension housing off the main shaft, with the gearshift control lever end laid down to the left as far as it will go.
4. Remove the spring cap bolt and remove the spring and friction piece from the extension housing.
5. Remove the spring in the gearshift control lever end.
6. Remove the speedometer driven gear assembly attaching screw and remove the cable joint, sleeve and

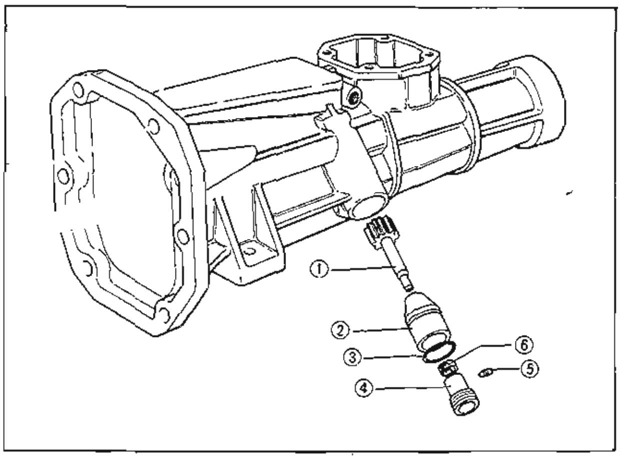


Fig. 7A–7 Speedometer driven gear assembly

1. Driven gear
2. Sleeve
3. "O" ring
4. Cable joint
5. Screw
6. Oil seal

driven gear from the extension housing.
7. Remove the back-up lamp switch from the extension housing.

c. Removing of transmission case

1. Separate the right half of the case from the left half by removing the attaching bolts and nuts.
2. Lift the main shaft and main drive shaft assembly off the case.

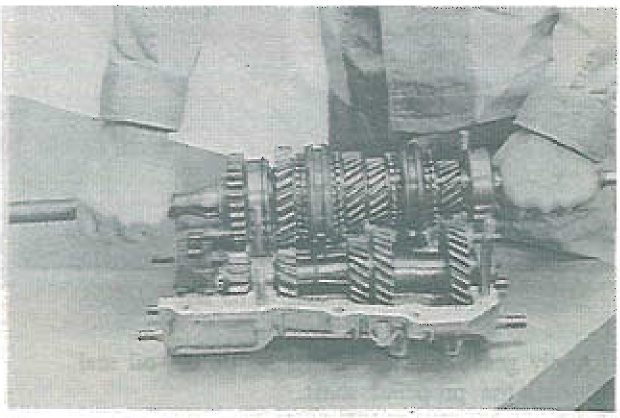


Fig. 7A–8 Lifting of main shaft assembly

3. Lift the counter shaft off the case.

d. Removing of reverse sliding gear

1. Remove the screw attaching the reverse sliding gear shaft from the outside of the case.
2. Remove the reverse sliding gear and shaft.

e. Removing of each shift fork and rod

1. Remove the three spring cap bolts, and remove the detent springs (locking springs) and detent balls (locking balls) from the bearing housing.
2. Remove the attaching bolt from the first-and-second shift fork. Slide the first-and-second shift rod out the rear of the case and remove the shift fork.

3. Remove the attaching bolt from the third-and-top shift fork. Slide the third-and-top shift rod out the rear of the case.
4. Slide the reverse shift rod and fork out the rear of the case. Remove the bolt attaching the reverse shift fork to the shift rod and slide the reverse shift fork out the shaft.
5. Remove the interlock pins from the case.

f. Disassembling of main drive shaft

1. Remove the main drive shaft from the main shaft and then remove the top synchronizer ring and needle bearing from the main drive shaft.
2. Remove the snap ring from the front of the main drive shaft and remove the bearing with a suitable puller and a press.

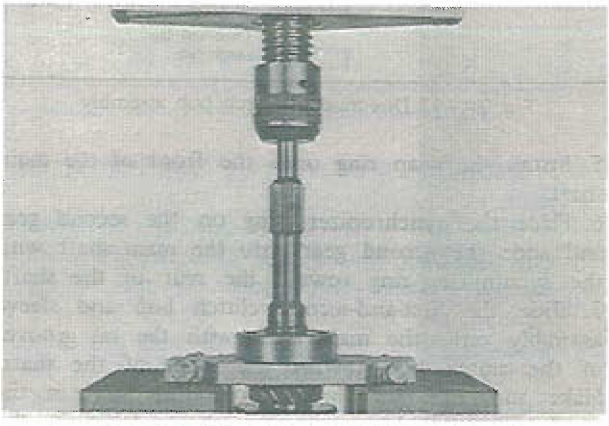


Fig. 7A–9 Removing of main shaft bearing

g. Disassembling of main shaft

1. Remove the snap ring from the front of the main shaft.
2. Slide the third-and-top clutch hub and sleeve assembly, third synchronizer ring and third gear out the front of the shaft. **Do not** mix the synchronizer rings.

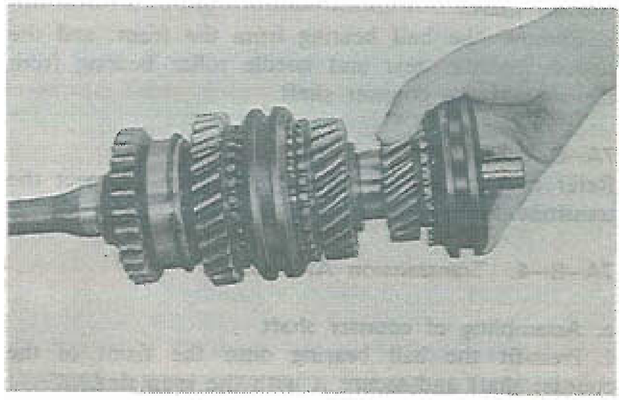


Fig. 7A–10 Sliding of clutch hub assembly

3. Remove the snap ring retaining the speedometer drive gear, and slide the drive gear out of the shaft. Then, remove the drive gear lock ball. **Do not** loose the lock ball.
4. Remove the snap ring on the rear of the reverse gear.
5. Slide the spacer, reverse gear, key and bearing out the rear of the shaft.

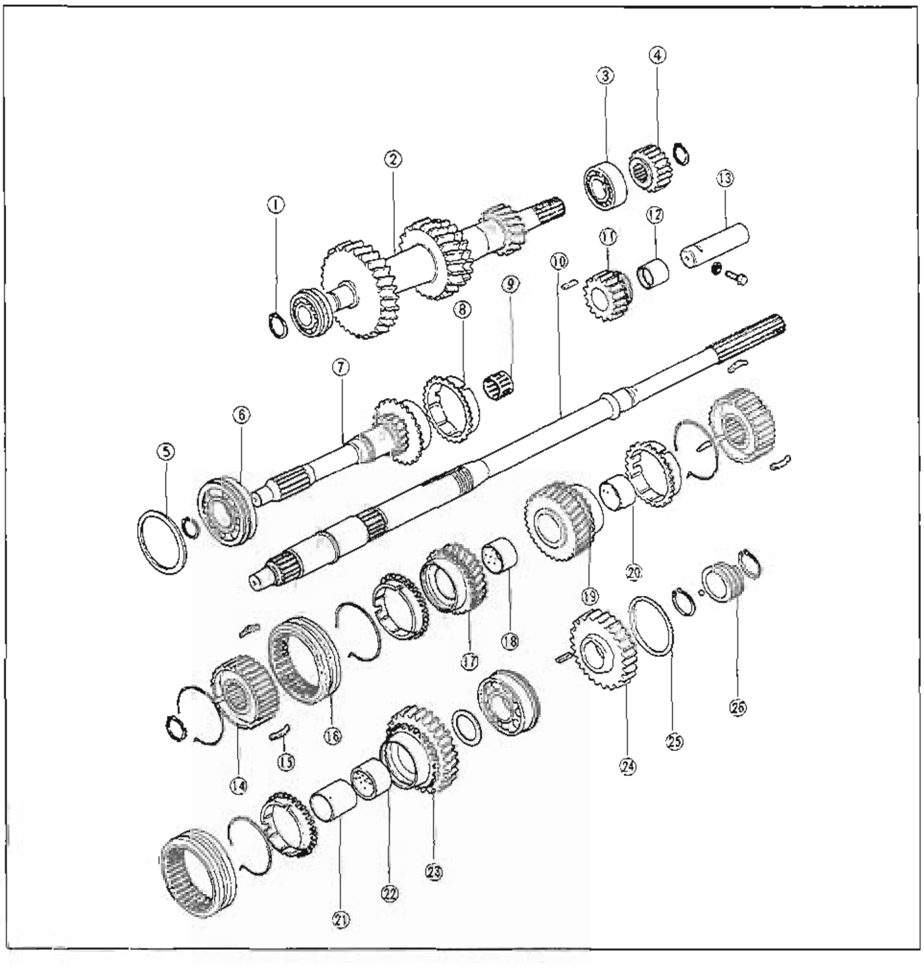


Fig. 7A–11 Shafts and gears

1. Snap ring
2. Counter shaft
3. Bearing
4. Counter reverse gear
5. Adjusting shim
6. Bearing
7. Main drive shaft
8. Synchronizer ring
9. Needle bearing
10. Main shaft
11. Reverse sliding gear
12. Bush
13. Shaft
14. Clutch hub
15. Synchronizer key
16. Clutch hub sleeve
17. Third gear
18. Bush
19. Second gear
20. Bush
21. First gear sleeve
22. Bush
23. First gear
24. Reverse gear
25. Spacer
26. Speedometer drive gear

6. Slide the spacer, first gear, first synchronizer ring and first gear sleeve out the rear of the shaft.
7. Slide the first-and-second clutch hub and sleeve assembly, second synchronizer ring and second gear out the rear of the shaft.

h. Disassembling of counter shaft
1. Remove the snap rings from both ends of the counter shaft.
2. Remove the ball bearing from the front, and the reverse counter gear and needle roller bearing from the rear of the counter shaft.

7A–B–3. Transmission Inspection
Refer to **Par. 7–B–3** on page 7–6 and inspect the transmission.

7A–B–4. Transmission Assembly

a. Assembling of counter shaft
1. Press-fit the ball bearing onto the front of the counter shaft and secure it with the snap ring.
2. Install the needle roller bearing and reverse counter gear onto the rear of the shaft, and secure them with the snap ring.

b. Assembling of main shaft
1. Assemble the third-and-top synchronizer mechanism by installing the clutch hub onto the sleeve, placing the three synchronizer keys into the clutch hub key slots and installing the key springs onto the clutch hub. When installing the key springs, the open ends of the springs should be **kept 120° apart** as shown in Fig. 7A–12, so that the spring tension on each key will be uniform

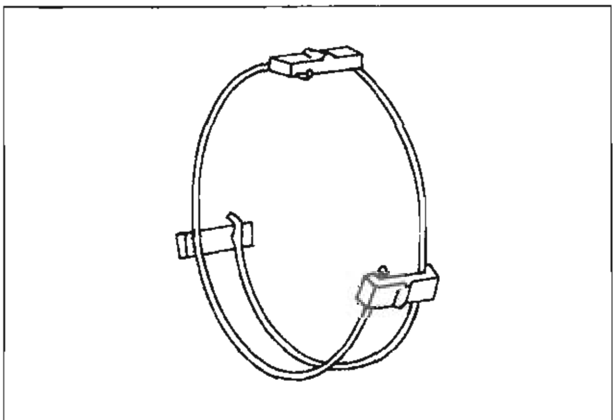


Fig. 7A–12 Installing of key springs

2. Assemble the first-and-second synchronizer mechanism in the same manner as the third-and-top synchronizer mechanism.
3. Place the synchronizer ring on the third gear and slide the third gear onto the front of the main shaft with the synchronizer ring toward the front of the shaft.
4. Slide the third-and-top clutch hub and sleeve assembly onto the front of the main shaft making sure that the three synchronizer keys in the synchronizer mechanism engage the notches in the synchronizer ring.

Note:
The direction of the third-and-top clutch hub assembly is shown in Fig. 7A–13.

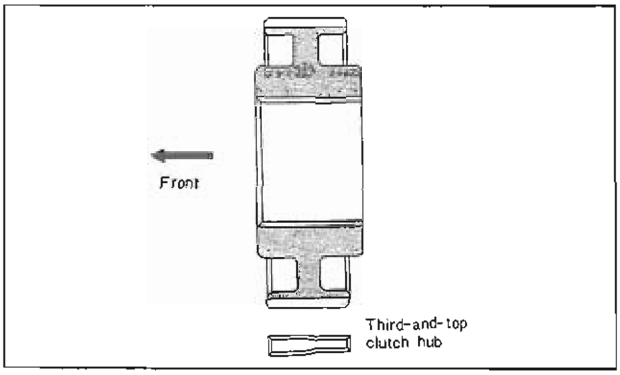


Fig. 7A–13 Direction of clutch hub assembly

5. Install the snap ring onto the front of the main shaft.
6. Place the synchronizer ring on the second gear and slide the second gear onto the main shaft with the sychronizer ring toward the rear of the shaft.
7. Slide the first-and-second clutch hub and sleeve assembly onto the main shaft with the oil grooves of the clutch hub toward the front of the shaft. Make sure that the three synchronizer keys in the synchronizer mechanism engage the notches in the second synchronizer ring.
8. Slide the first gear sleeve onto the main shaft.
9. Place the synchronizer ring on the first gear and slide the first gear onto the main shaft with the synchronizer ring toward the front of the shaft. Rotate the first gear as necessary to engage the three notches in the synchronizer ring with the synchronizer keys in the first-and-second.
10. Slide the spacer onto the shaft.
11. Press-fit the bearing onto the shaft, as shown in Fig. 7A–14.

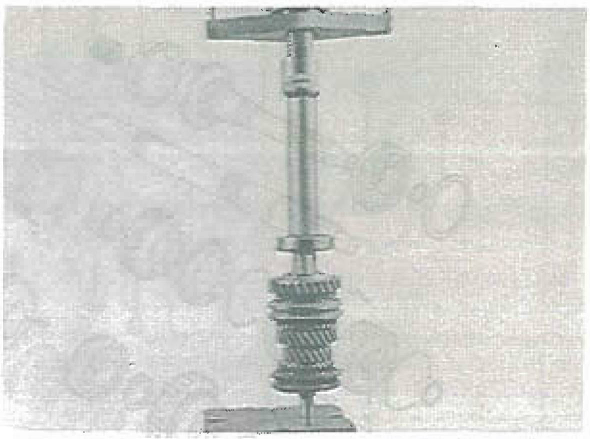


Fig. 7A–14 Press-fitting of main shaft bearing

12. Slide the reverse gear onto the shaft, and install the key and spacer.

13.Install the snap ring on the rear of the spacer, and check the clearance between the spacer and the snap ring.

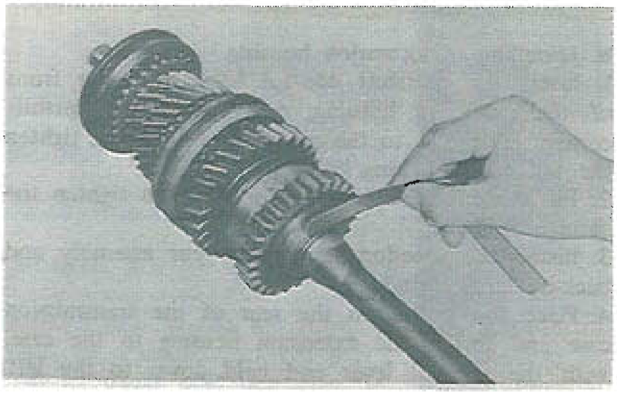


Fig. 7A–15 Checking of clearance

The standard clearance is **0 ~ 0.1 mm (0 ~ 0.004 in).** If necessary, select and use the properly sized snap ring. The snap rings are available in the following thicknesses:

2.0 mm (0.079 in) 2.1 mm (0.083 in)	2.2 mm (0.087 in) 2.3 mm (0.090 in)

c. Assembling of main drive shaft

1. Press-fit the bearing onto the main drive shaft by the **installer** (Part No. 49 0500 300) and secure it with the snap ring.

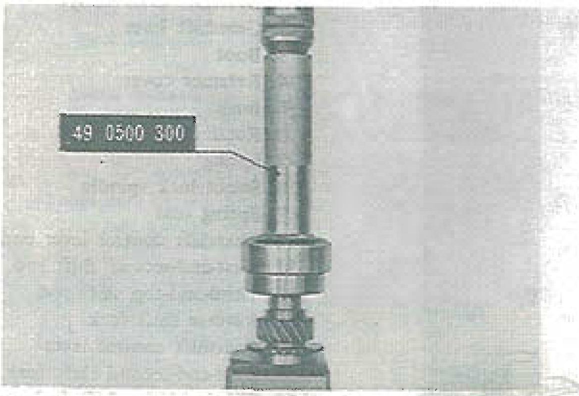


Fig. 7A–16 Press-fitting of drive shaft bearing

2. Place the needle bearing onto the front end of the main shaft.
3. Place the synchronizer ring on the main drive shaft gear (top gear) and install the main drive shaft onto the front end of the main shaft making sure that the three synchronizer keys in the third-and-top synchronizer mechanism engage the notches in the synchronizer ring.

d. Installing of each shift fork and rod

1. Install the first-and-second shift fork and rod to the case.

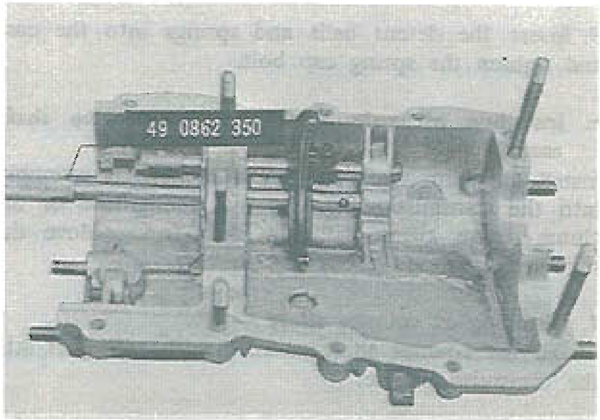


Fig. 7A–17 Installing of shift rod guide

2. Install the **shift rod guide** (Part No. 49 0862 350), and insert the interlock pin.
3. Remove the shift rod guide.
4. Install the third-and-top shift fork and rod to the case.
5. Install the shift rod guide and install the interlock pin.
6. Remove the shift rod guide and install the reverse shift rod.

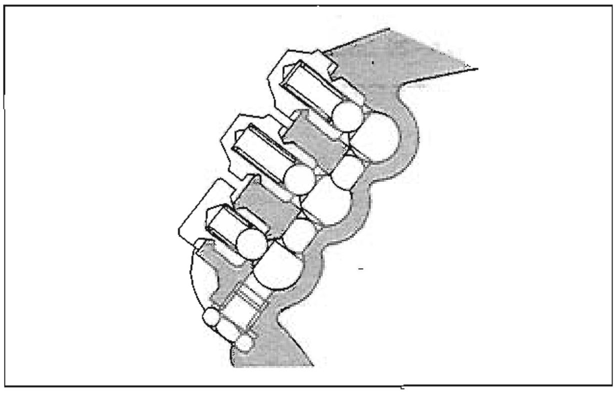


Fig. 7A–18 Position of interlock pin

7. Place the reverse shift rod into the top position.
8. Place the reverse sliding gear on the fork and install the reverse sliding gear shaft aligning the holes of the shaft and case. Secure the shaft with set bolts.

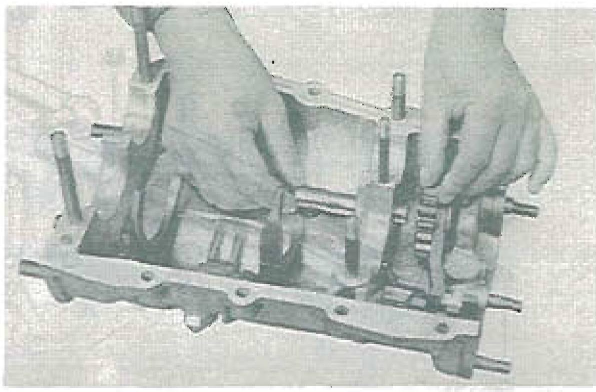


Fig. 7A–19 Installing of reverse sliding gear

9. Insert the detent balls and springs into the case and tighten the spring cap bolt.

e. Installing of main shaft and main drive shaft assembly

Install the main shaft and main drive shaft assembly into the transmission case so that the groove of the clutch sleeve aligns with the shift fork. Move the shift fork rod and check the shifting.

f. Installing of counter shaft

Install the counter shaft meshing with each gear into the transmission case.

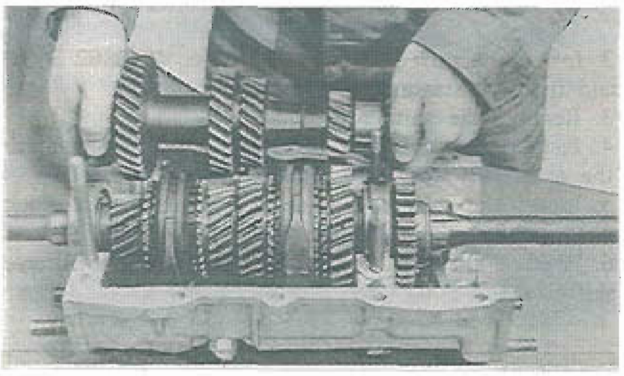


Fig. 7A–20 Installing of counter shaft

g. Installing of case

1. Apply a thin coat of sealing agent onto the contacting surface of the right half of the case.
2. Install the right half of the case and tighten the nuts and bolts.

h. Installing of extension housing

1. Insert the gearshift control lever from the front of the extension housing, and install the gearshift control lever end to the control lever. Then, tighten the rod end attaching bolt.
2. Fit the friction piece and spring, and tighten the spring cap bolt.
3. Install the speedometer driven gear assembly and back-up lamp switch.
4. Place the gasket on the rear of the transmission case and install the extension housing to the case, with the control lever end held down to the left. Tighten the nuts. Check to ensure that the control lever operates properly.

i. Installing of gearshift lever retainer

1. Insert the select lock spindle and the return spring from the inside of the retainer.
2. Install the locking ball and spring in alignment with the spindle groove and fit the spring cap bolt.
3. Install the retainer with gasket and tighten the bolt.

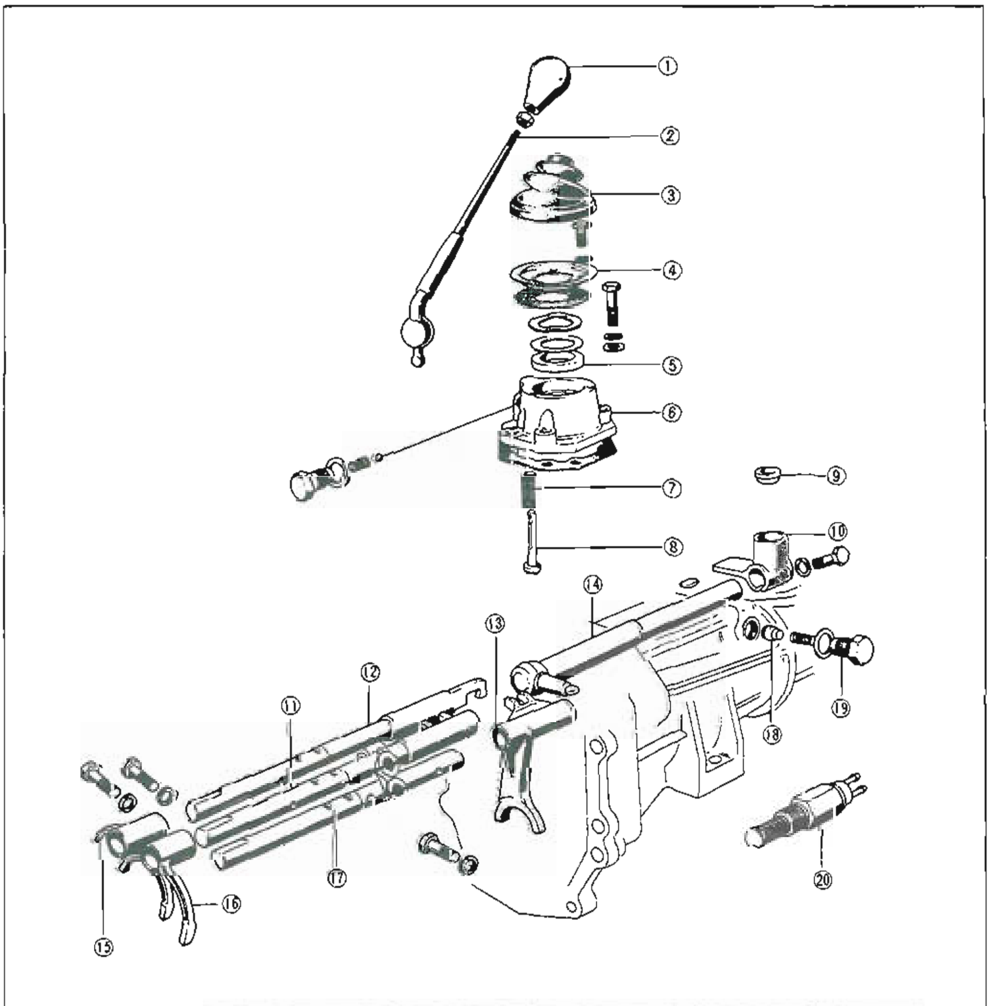


Fig. 7A–21 Gearshift mechanism components

1. Gearshift lever knob
2. Gearshift lever
3. Boot
4. Retainer cover
5. Bush
6. Retainer
7. Spring
8. Select lock spindle
9. Spring seat
10. Gearshift control lever end
11. First-and-second shift rod
12. Third-and-top shift rod
13. Reverse shift fork
14. Gearshift control lever
15. First-and-second shift fork
16. Third-and-top shift fork
17. Reverse shift rod
18. Friction piece
19. Spring cap bolt
20. Back-up lamp (Reverse lamp)

j. Installing of clutch housing

1. Check the bearing clearance as follows:
Measure the depth of the bearing seat in the clutch housing using a depth gauge. Then, measure the bearing height as shown in Fig. 7A–22. The difference between the two measurements indicates the required thickness of the adjusting shim. The standard clearance is **0 ~ 0.05 mm (0 ~ 0.0019 in).** The shims are available in thicknesses of 0.1 mm (0.0039 in) and 0.3 mm (0.0118 in).
2. Place the gasket on the front side of the case and install the clutch housing. Tighten the nuts.

7A–B–5. Transmission Installation

Follow the removal procedures in the reverse order.

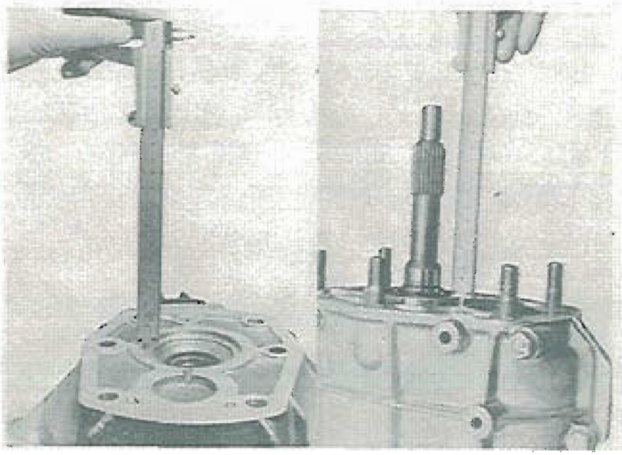


Fig. 7A–22 Checking of bearing clearance

SPECIAL TOOLS

49 0259 440	Transmission oil plug and main shaft holder
49 0500 300	Bearing installer
49 0862 350	*Shift rod guide*

TRANSMISSION

RX-3 equipped with air pollution control system

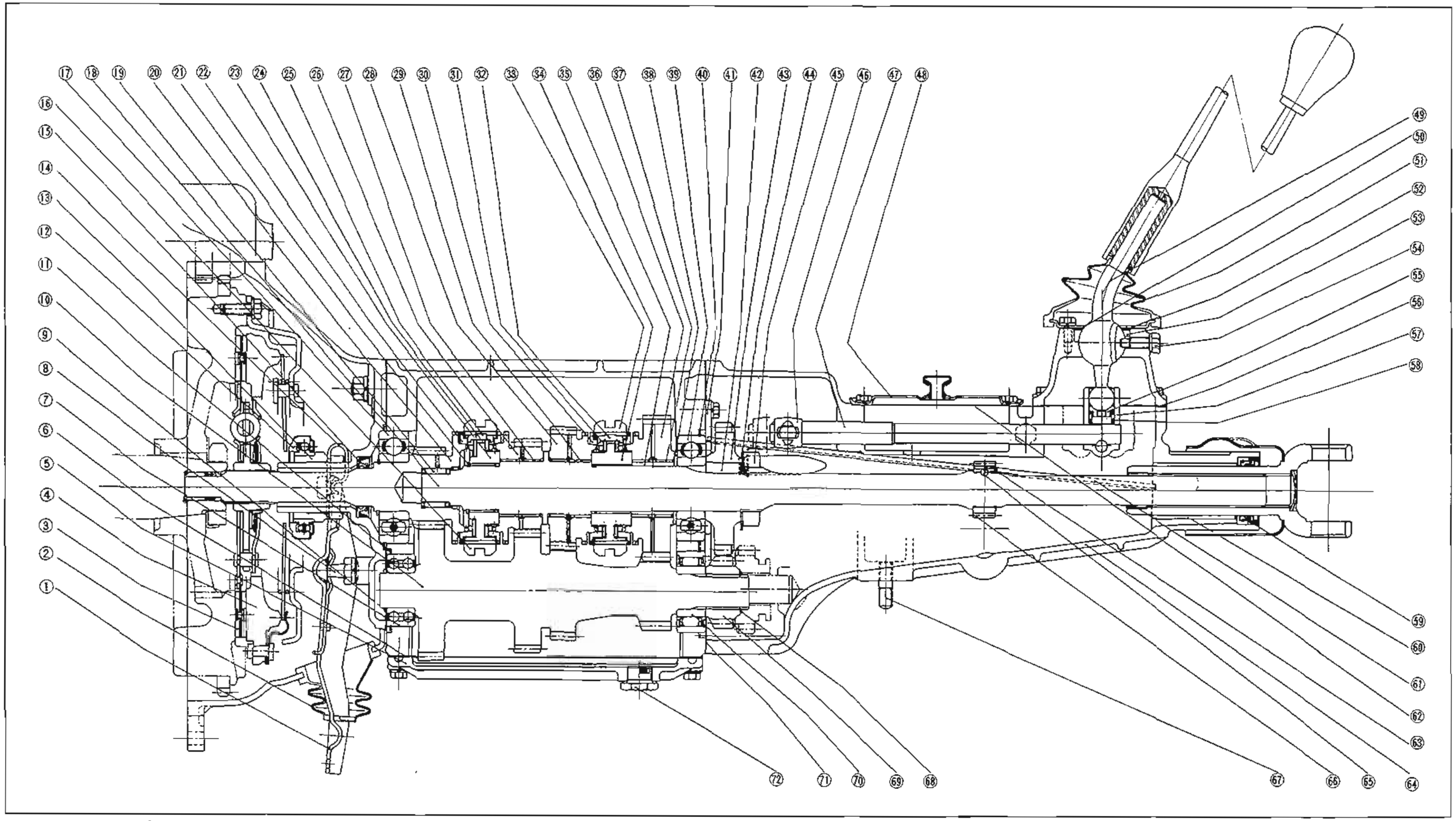


Fig. 7–1 Clutch and Transmission

1. Release Fork
2. Dust Boot
3. Clutch Disk Assembly
4. Pressure Plate Assembly
5. Under Cover
6. Gasket
7. Ball Bearing
8. Pirot Pin
9. Snap Ring
10. Counter Shaft Gear
11. Adjust Shim
12. Clutch Bearing
13. Clutch Release Collar
14. Collar Spring
15. Oil Seal
16. Clutch Hub Sleeve
17. Ball Bearing
18. Main Shaft
19. Needle Bearing
20. Main Drive Gear
21. Snap Ring
22. Sinchronizer Ring
23. 3-4 Clutch Hub
24. Sinchronizer Spring
25. Sinchronizer Key
26. Sinchronizer Ring
27. Bush
28. Second Gear
29. Bush
30. Sinchronizer Ring
31. Sinchronizer Spring
32. Sinchronizer Key
33. Clutch Hub Sleeve
34. 1-2 Clutch Hub
35. Gear Sleeve
36. Low Gear
37. Bush
38. Thrust Washer
39. Ball Bearing
40. Adjust Shim
41. Bearing Stopper
42. Key
43. Reverse
44. Washer
45. Lock Nut
46. Control Lever
47. Control Rod
48. Blind Cover
49. Change Lever
50. Shim
51. Dust Boot
52. Cover Plate
53. Bush
54. Set Screw
55. Spring Seat
56. Gasket
57. Control Rod Gate
58. Spring
59. Oil Seal
60. Bush
61. Oil Pass
62. Gasket
63. Snap Ring
64. Extension Housing
65. Steel Ball
66. Speed Drive Gear
67. Stud
68. Snap Ring
69. Counter Reverse Gear
70. Needle Bearing
71. Gasket
72. Magnet Plug

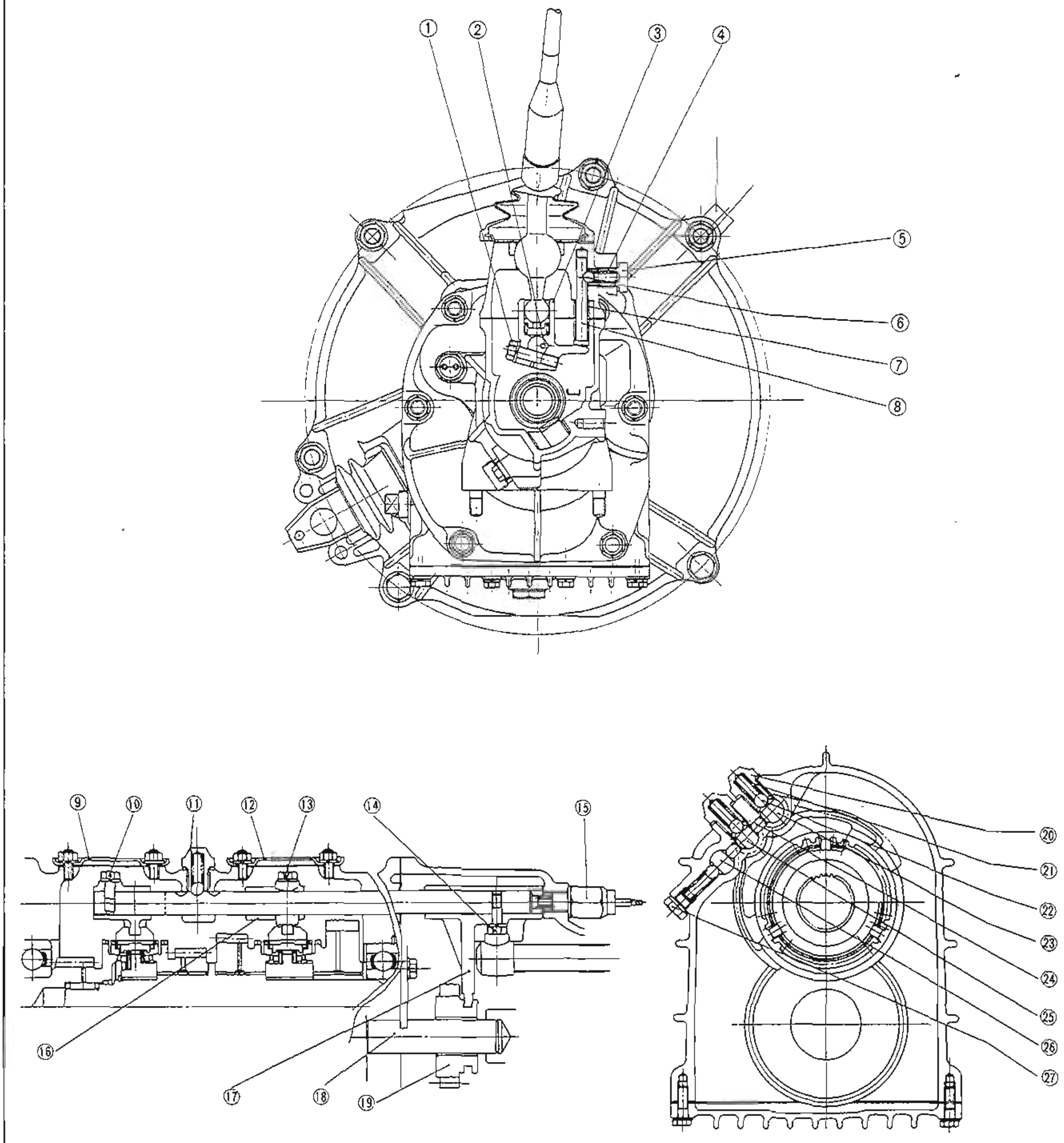


Fig. 7–2 Transmission

1. Reamer Bolt
2. Key
3. Control Lever End
4. Spring
5. Spring Cap
6. Steel Ball
7. Spring
8. Select Lock Spindle
9. Blind Cover
10. Set Screw (3rd top)
11. Spring Cap
12. Blind Cover
13. Set Screw (Low & 2nd)
14. Set Screw (reverse)
15. Reverse Lamp Switch
16. Shift Fork (Low & 2nd)
17. Shift Fork (reverse)
18. Reverse Idle Gear Shaft
19. Reverse Idle Gear
20. Spring Cap
21. Spring
22. Steel Ball
23. Shift Rod (Low & 2nd)
24. Inter Lock Pin
25. Shift Rod (3rd & top)
26. Shift Rod (reverse)
27. Spring Set Plug

DESCRIPTION
RX-3 is equipped with a four-speed manual transmission which is of the synchromesh type on the low, second, third and top gears and of the selective sliding mesh type on the reverse gear. The gearshift mechanism is a direct control with a floor-shift type.

7B–A. ON CAR SERVICE

7B–A–1. Main Shaft Oil Seal

a. Replacing of main shaft oil seal

1. Raise the vehicle and support with stands.
2. Remove the propeller shaft as described in **Par. 8–A–1.**
3. Remove the main shaft oil seal from the extension housing.
4. Position a new oil seal in the extension housing and insert the oil seal by tapping it slightly with a plastic hammer.
5. Apply gear lubricant to the lip of the oil seal.
6. Install the propeller shaft.

7B–B. MAJOR SERVICE

7B–B–1. Transmission Removal

1. Disconnect the earth wire of the battery.
2. Remove the console assembly and dust boot of the gear shift lever. Loosen the attaching bolts on the cover plate and remove the dust boots, cover plate and bush together with the shift lever from the transmission housing.
3. Disconnect the wirings of the starting motor and the reverse lamp switch and then remove the starting motor.
4. Remove the drain plug and drain the transmission oil. Clean the drain plug and reinstall after draining.
5. Disconnect the speedometer cable from the speedometer driven gear.
6. Remove the release fork return spring. Loosen the bolts and remove the clutch release cylinder with the push rod from the clutch housing.
7. Disconnect the exhaust pipe from the exhaust manifold by loosening the nuts.
8. Disconnect the propeller shaft from the transmission.
9. Support the transmission with a jack and a block of wood and remove the nuts holding the supporter on to the side frame member.
10. Remove the bolts holding the transmission on to the clutch housing.
11. Move the transmission toward the rear so as to remove the main drive shaft from the clutch disk. Lower the jack and remove the transmission from the vehicle.

7B–B–2. Transmission Disassembly

1. Remove the release bearing, spring and fork.
2. Loosen the nuts attaching the clutch housing to the case and remove the clutch.
3. Remove the change control case from the exten-

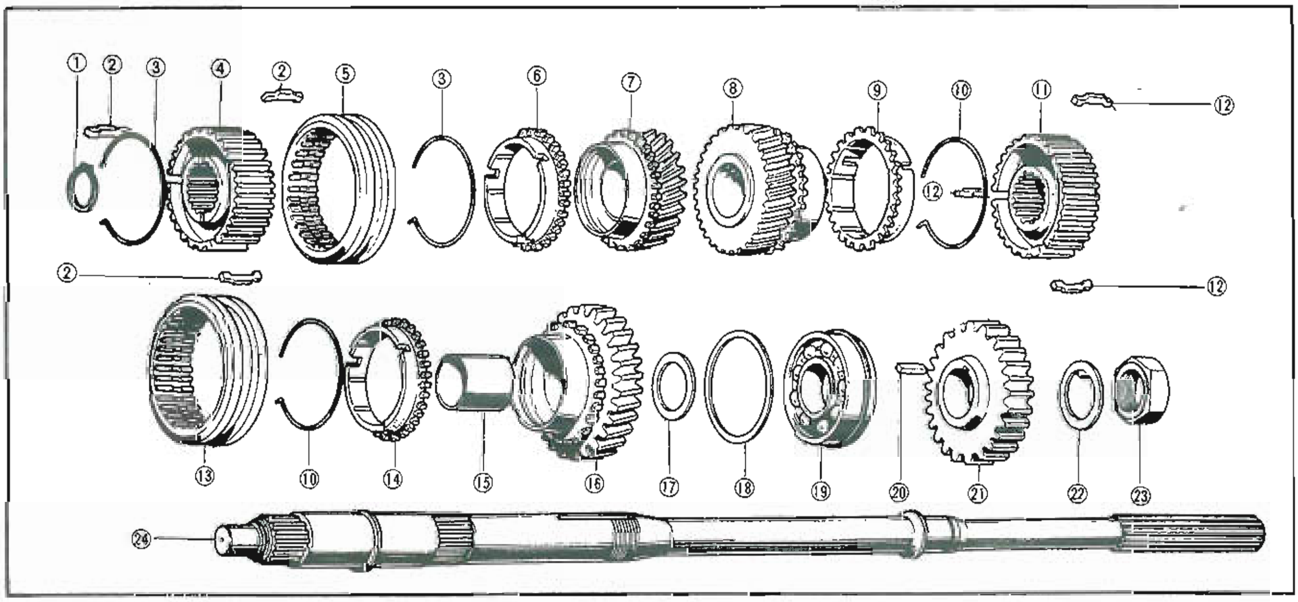


Fig. 7–3 Main shaft assembly

1. Snap ring
2. Key
3. Spring
4. Clutch hub (Low & 2nd)
5. Clutch hub sleeve (Low & 2nd)
6. Synchronizer ring (3rd)
7. Third gear
8. Second gear
9. Synchronizer ring (2nd)
10. Spring
11. Clutch hub (3rd & Top)
12. Key
13. Clutch hub sleeve (3rd & Top)
14. Synchronizer ring (low)
15. Low gear sleeve
16. Low gear
17. Thrust washer
18. Adjust shim
19. Ball bearing
20. Key
21. Reverse gear
22. Lock washer
23. Lock nut
24. Main shaft

sion housing.
4. Remove the spring seat and spring from the control lever end.
5. Loosen the nuts attaching the extension housing to the transmission case. Slide the extension housing off through the main shaft, laying down the control lever end to the left as far as it will go.
6. After removing the reamer bolt and the friction piece, remove the control lever and the control lever end.
7. Remove the speedometer driven gear from the extension housing by loosening the set screw.
8. Remove the under cover and two blind covers.
9. Remove the shift fork rod locking balls and springs, and remove the interlock pins. Loosen the shift fork bolts and remove the shift forks with reverse idle gear from the case.
10. After removing the snap ring on the rear side of the speedometer drive gear, slide the speedometer drive gear off from the main shaft and remove the steel ball.
11. Check the synchronizer key clearance as follows: Shift the transmission into third gear. Using a feeler gauge, check the clearance between the synchronizer key and the exposed edge of the synchronizer ring. This measurement should be 0.75 to 2.00 mm (0.0295 to 0.0787 in). If the measurement is greater than 2.00 mm (0.0787 in), the synchronizer key could pop out of position.
If the measurement exceeds 2.00 mm (0.0787 in), exchange the thrust washer between the low gear and the main shaft bearing with a thicker (selective fit) washer. The thrust washers are available as in the following table.

2.5 mm (0.0984 in) 3.0 mm (0.1181 in)	3.5 mm (0.1378 in)

12. Mount the main shaft assembly on the **main shaft holder** (49 0259 440) as shown in Fig. 7–4 and loosen the reverse gear lock nut, and remove the lock nut, lock washer, reverse gear and key.

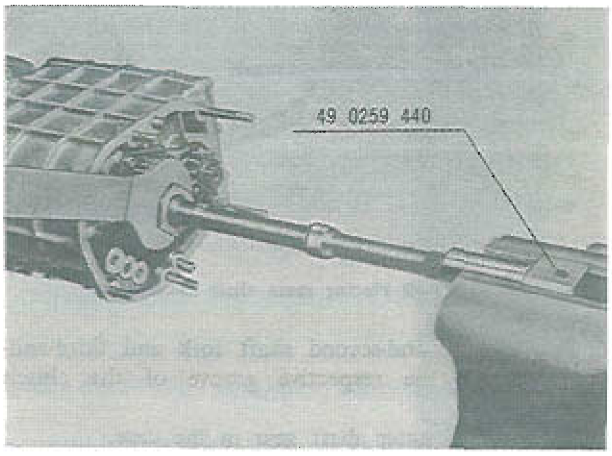


Fig. 7–4 Loosening lock nut

13. Remove the snap ring on the counter shaft gear, and remove the counter reverse gear.
14. Remove the bearing stopper, and then remove the reverse idle gear shaft.
15. Remove the ball bearing on the main shaft and roller bearing on the counter shaft from the rear side of the case using the **bearing puller set** (49 0862 426).
16. Remove the snap rings from the ball bearings of the front side of the case. Remove the ball bearings from the main drive gear and counter shaft gear using the bearing puller.

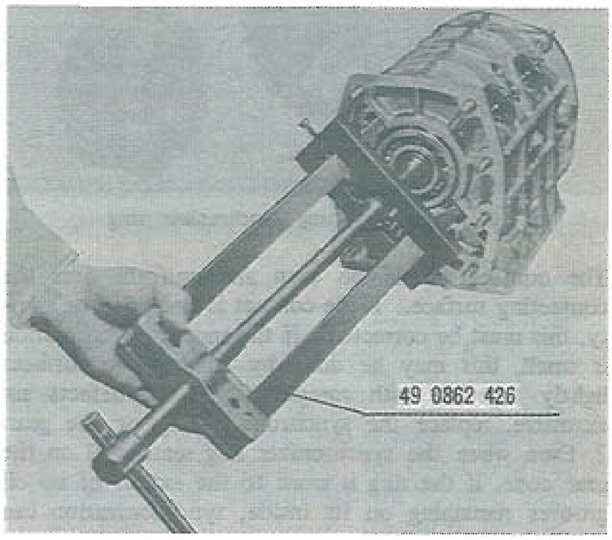


Fig. 7–5 Removing ball bearing

17. Take out the counter shaft gear, main drive gear and main shaft assembly from the case.
18. Remove the thrust washer, low gear and sleeve assembly, synchronizer ring, low and second clutch hub assembly, synchronizer ring and the second gear in that order.
19. Remove the snap ring on the front end of the main shaft. Remove the third and top clutch hub assembly, synchronizer ring and third gear.

7B–B–3. Transmission Inspection

a. Inspecting the transmission case
Clean the transmission case thoroughly with a suitable solvent, and dry with compressed air. Inspect the case for cracks or any damage.

b. Checking the bearings
Inspect each bearing for roughness and excessive wear. They can be determined by slowly turning the outer race by fingers. If excessive wear or roughness is found, replace with new bearing as it will cause the noises.

c. Checking the gears
Inspect the teeth of each gear. If excessively worn, broken or chipped, replace with new gears. Excessive wear of the gears causes increase of backlash, which results in producing noises or may cause the gear to work off while running.

d. Checking the synchronizer mechanism

1. To check the contact between the inner surface of the synchronizer ring and the cone surface of the gear, apply a thin coat of Prussian Blue on the cone surface of the gear and fit the ring to it.

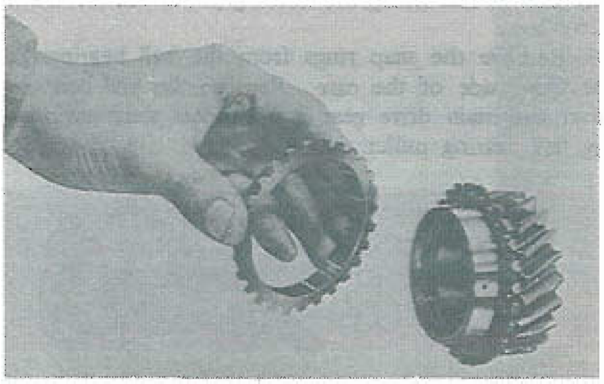


Fig. 7–6 Inspecting synchronizer ring

The contact should be even and uniform over the contacting surface. If the contact is one-sided or spotty, this must be corrected. If the amount of correction is small, this may be done by lapping the surfaces lightly together with compound. If the defects are excessive, replace the synchronizer ring or the gear.

2. Even when the synchronizer ring seats well on the gear cone, if the ring is worn to the extent of no oil grooves remaining on its inside, synchronization can not be obtained.

It is necessary, then, to check the extent of wear of the corn or ring. For this, uniformly fit the ring to the gear corn, and measure clearance (A) between the side faces of the ring teeth and gear teeth with a feeler gauge. The standard clearance is 1.6 mm (0.06 in). If the clearance is less than 0.8 mm (0.031 in), it is an indication of excessive wear of the corn or the internal surface of the ring. In such cases, check the corn and ring and replace the defective part with a new one.

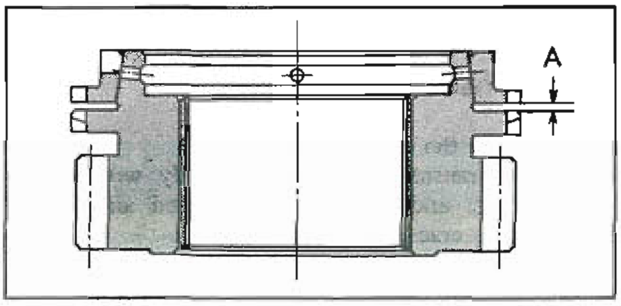


Fig. 7–7

3. Check the synchronizer key, the inner surface of the clutch sleeve, and the key groove on the clutch hub for wear. If wear is excessive, it will cause difficulties in maintaining the neutral position of the clutch sleeve or will cause inferior functioning of the synchronizer ring and make shifting difficult.

4. Check the key spring tension. Decrease tension or damaged key springs will result in uneven pressure against the three keys and will cause improper functioning of the keys and inferior synchronization.

e. Checking the run-out of main shaft

Check the run-out on the main shaft and if the deflection is excessive, correct it by using a press. The standard reading on the dial indicator for run-out should be less than 0.03 mm (0.0012 in).

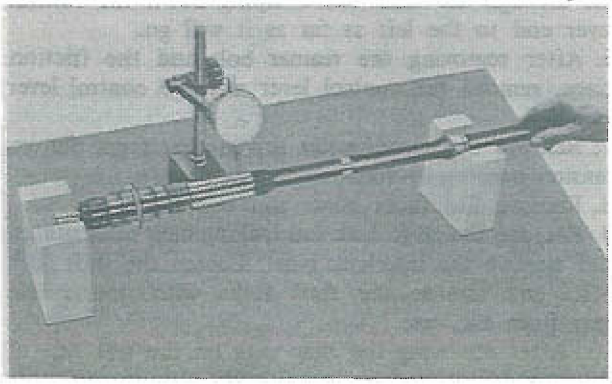


Fig. 7–8 Checking run-out of main shaft

7B–B–4. Transmission Assembly

a. Assembling the transmission case

1. Assemble the low-and-second clutch hub and sleeve, and third-and-top clutch hub and sleeve.
2. Install the second gear, synchronizer ring, low-and-second clutch hub assembly, synchronizer ring, low gear sleeve, low gear and thrust washer, in that order, onto the main shaft from the rear side.
3. Install the third gear, synchronizer ring and third-and-top clutch hub assembly onto the front side of the main shaft, and fit the snap ring on the groove.
4. Install the needle roller bearing and synchronizer ring to the main drive shaft.
5. Place the main drive gear assembly and main shaft assembly into the transmission case temporarily without ball bearings.

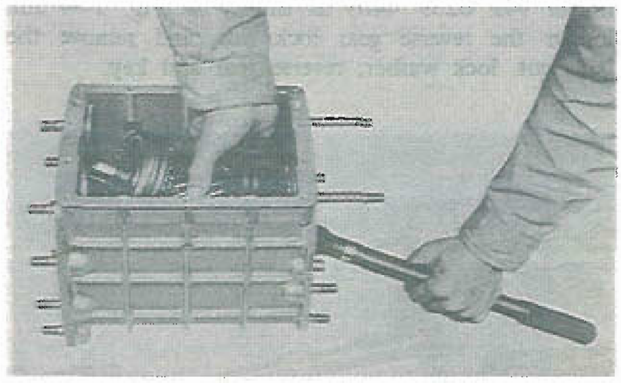


Fig. 7–9 Placing main shaft assembly

6. Put the low-and-second shaft fork and third-and-top one on the respective groove of the clutch sleeve.
7. Place the counter shaft gear in the case.
8. Install the needle roller bearing of the counter shaft to the rear side, and install the roller bearing of the counter shaft with proper size of adjust shim to the front side and fit the snap ring.

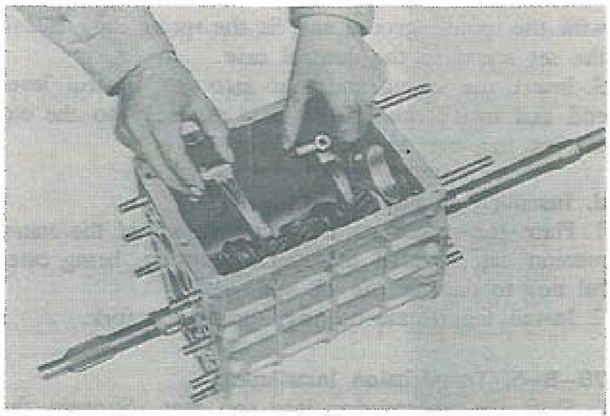


Fig. 7—10 Fitting shaft forks

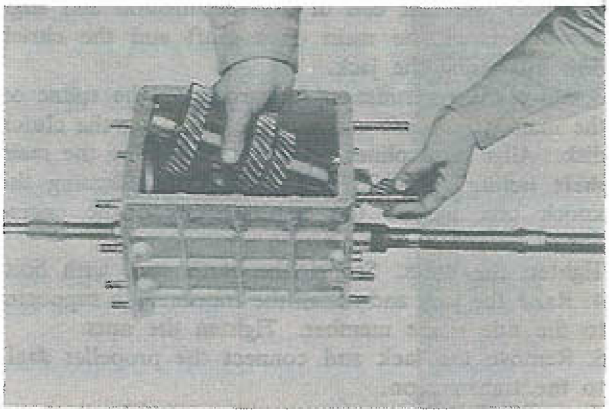


Fig. 7—11 Placing counter shaft gear

9. Install the roller bearings with proper size of shims to the main drive shaft and main shaft, and fit the snap ring on the main drive shaft.

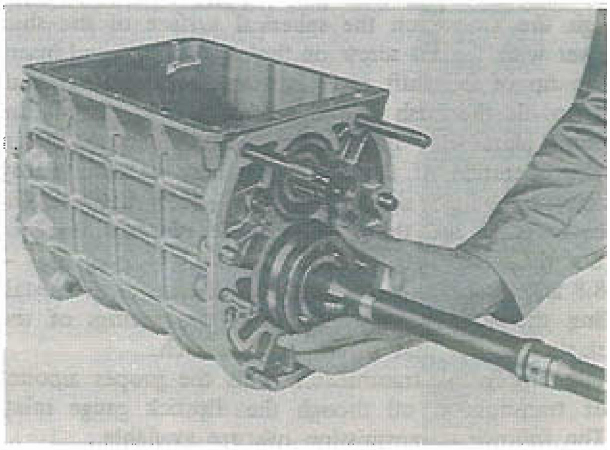


Fig. 7—12 Installing ball bearing

10. Install the reverse gear and snap ring to the counter shaft.
11. Fit the bearing stopper and reverse idle gear shaft to the case. Tighten the bolts of the bearing stopper to 1.0 m-kg (7 ft-lb).
12. Install the reverse gear with key onto the main shaft. Install the lock washer and lock nut, and tighten the lock nut to 23 m-kg (170 ft-lb) while holding the rear end of the main shaft with **main shaft holder** (49 0259 440). Then bend the lock washer.
13. Install the low-and-second shift rod into the case and set the low-and-second shift fork, which has been placed on the groove of the clutch hub temporarily, with the set screw.
14. Place the shift rod on the neutral position and insert the interlock pin.
15. Install the third-and-top shift rod and set the shift fork with set screw. Insert the interlock pin.

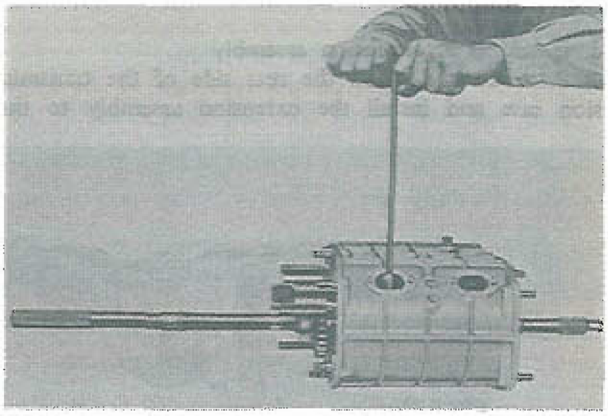


Fig. 7—13 Securing shift fork

16. Install the reverse shift rod with the reverse idle gear.
17. Put the shift locking ball and spring to the groove of each shift rod and install the spring caps.
18. Install the under cover and two blind covers.
19. Install the speedometer drive gear with locking ball onto the main shaft and secure it with a snap ring.

b. Assembling of extension

1. Install the oil seal to the rear side of the extension by using suitable tool.
2. Insert the control rod, install the control lever end with key and tighten the reamer bolt.

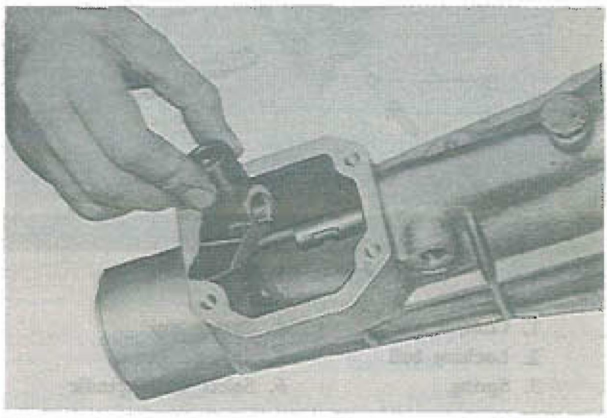


Fig. 7—14 Installing control lever end

3. Fit the friction piece and the spring to the extension and install the spring cap.
4. Install the reverse lamp switch.
5. Install the speedometer driven gear assembly and secure with the lock plate.

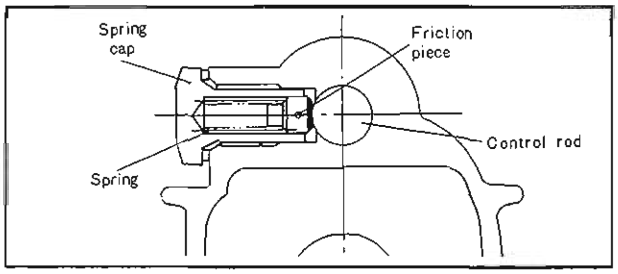


Fig. 7–15 Friction piece of control rod

c. Installing of extension assembly

1. Place the gasket on the rear side of the transmission case and install the extension assembly to the transmission case, laying down the control lever end to the left as far as it will go. Tighten the nuts and confirm that the control rod operates properly.

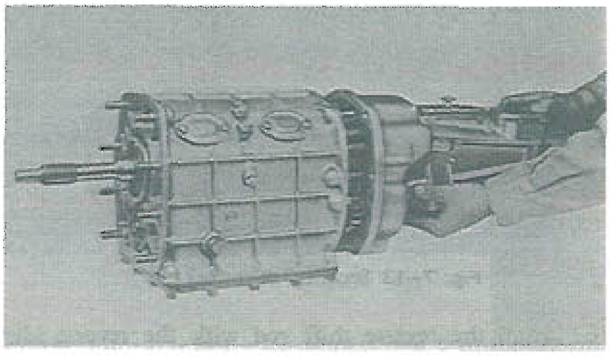


Fig. 7–16 Installing extension

2. Insert the select lock spindle and return spring. Install the locking ball and the spring in alighment with the spindle groove and fit the spring cap. Install the set screw to the control case.

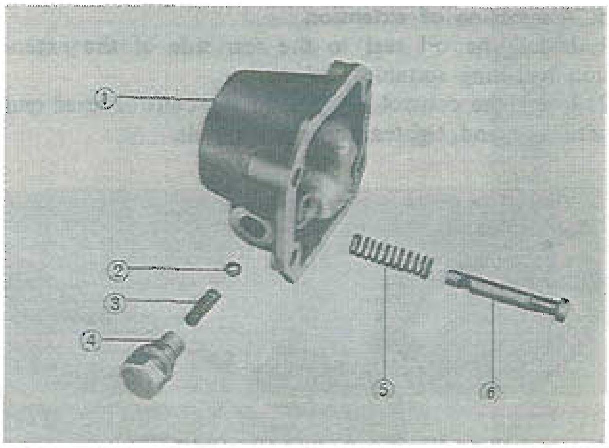


Fig. 7–17 Control case

1. Control case	4. Spring cap
2. Locking ball	5. Spring
3. Spring	6. Select lock spindle

3. Insert the spring and seat into the control lever end and install the control case assembly to the extension together with the gasket.

d. Installing of clutch housing

1. Place the gasket on the front surface of the transmission case. Install the clutch housing, being careful not to damage the oil seal.
2. Install the release bearing, spring and fork.

7B–B–5. Transmission Installation

1. Shift the transmission into top gear. Support the transmission with a jack and a block of wood and move it under the vehicle.
2. Lower the rear end of the transmission and align the centers of the main drive shaft and the clutch disk by raising the jack.
3. Move the transmission forward until the spline on the main drive shaft contacts the spline on the clutch disk. Align the splines properly by turning the **main shaft holder** (49 0259 440) and after aligning the knock pin, mount the transmission to the engine body.
Tighten the bolts. Secure the earth wire with bolt.
4. Raise the jack and install the transmission supporter to the side frame member. Tighten the nuts.
5. Remove the jack and connect the propeller shaft to the transmission.
6. Install the exhaust pipe to the manifold.
7. Connect the speedometer cable to the speedometer driven gear assembly.
8. Install the release cylinder to the clutch housing and the return spring. If necessary, adjust the free play on the release fork. (See Par. 6–B)
9. Move the lever end from top gear to neutral. Aligh the groove on the spherical surface of the shift lever with the set screw on the control case and insert the tip of the shift lever into the control lever end. Then, fit the bush into the control case. Install the cover plate with the packing and tighten the bolts. The operation of the shift lever may be adjusted by inserting adjust shims on the 3 bolts between the cover plate and the packing. The standard force of the shift lever at the knob is 2.0 ~ 4.0 kg (4.4 ~ 8.8 lb). Install the dust boots to the case. After installing the starting motor, connect the wirings of the starting motor and reverse lamp switch.
10. Supply the transmission with the proper amount of transmission oil though the dipstick gauge inlet. The following transmission oils are available :
    SAE EP 80 Below −18°C (0°F)
    SAE EP 90 Above −18°C (0°F)
11. Connect the earth wire to the battery

SPECIAL TOOLS

49 0259 440	Main shaft holder
49 0862 426	Bearing puller set

PROPELLER SHAFT

DESCRIPTION

The propeller shaft assembly consists of the tubular piece of steel, universal joints and yokes. The rear end of the propeller shaft is attached to the companion flange of the rear axle through the universal joints and the front end is attached to the main shaft of the transmission by means of the splined slip yoke, which permits fore and aft movement of the propeller shaft whenever the rear axle moves up and down. The universal joints are lubricated for life, so do not require lubricating.

8–A. PROPELLER SHAFT

8–A–1. Propeller Shaft Removal

1. Raise the rear end of the vehicle and support with stands.
2. Mark the companion flange of the rear axle and the propeller shaft so they can be reinstalled in their original position.
3. Remove the bolts that attach the propeller shaft to the companion flange of the rear axle.

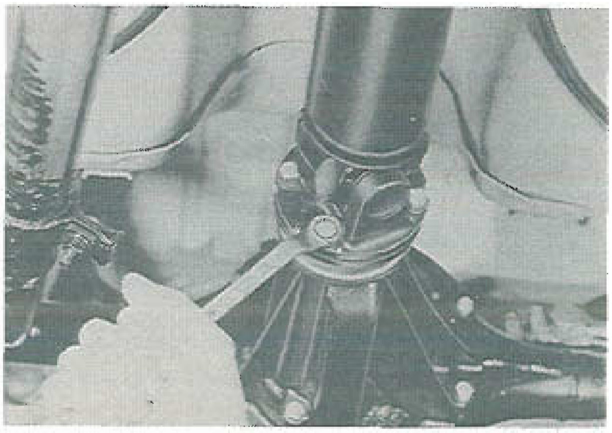


Fig. 8–1 Removing of propeller shaft

4. Lower the rear of the shaft and slide rearward.
5. Install the **transmission oil plug** (Part No. 49 0259 440) into the extension housing to prevent lubricant from running out of the housing.

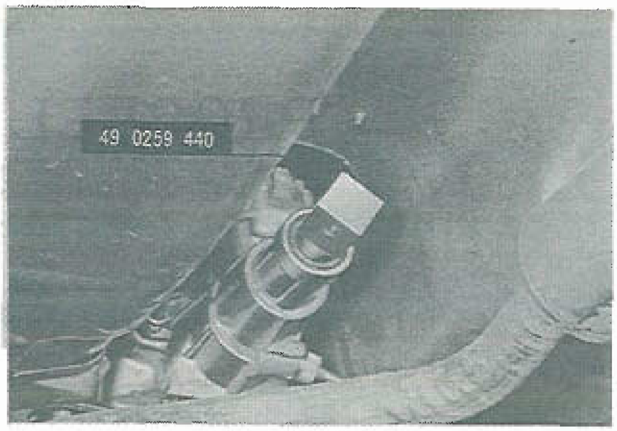


Fig. 8–2 Installing of oil plug

8–A–2. Checking of Propeller Shaft

1. Using a dial indicator, check the run-out at each end and in middle of the shaft. The shaft run-out should not exceed **0.4 mm (0.016 in)** at any one point.

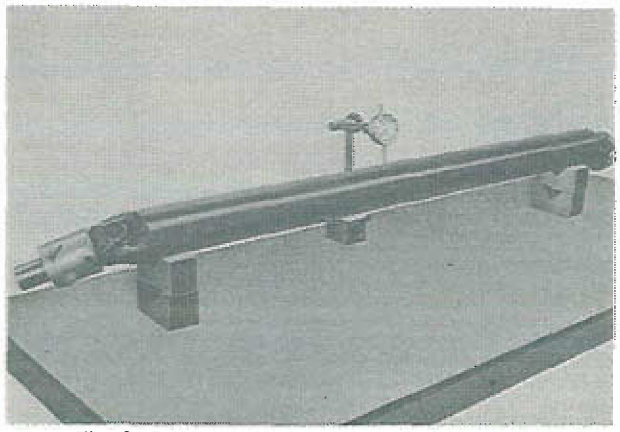


Fig. 8–3 Checking of propeller shaft run-out

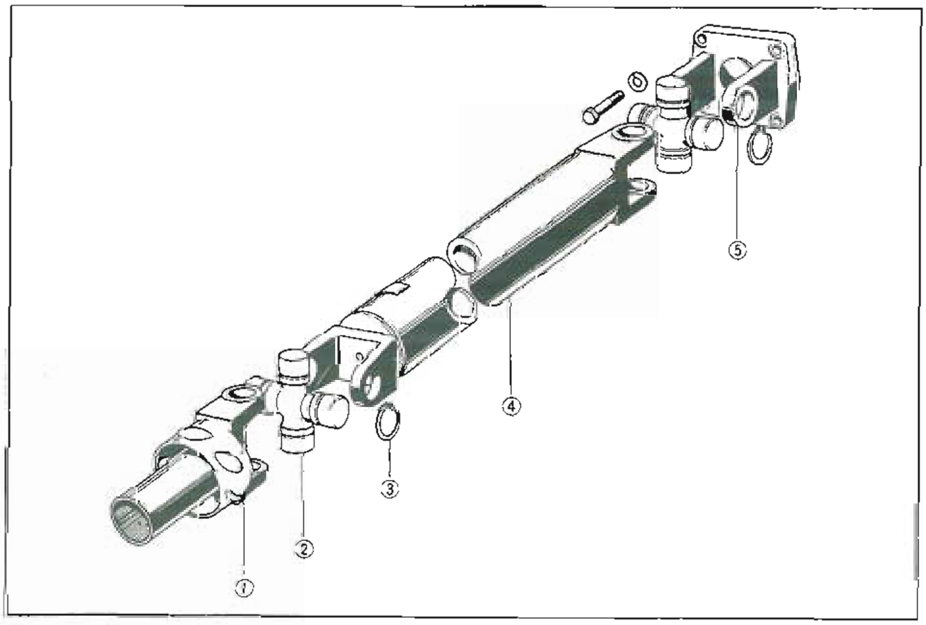


Fig. 8–4 Propeller shaft components

1. Yoke
2. Spider and bearing cup assembly
3. Snap ring
4. Shaft
5. Yoke

2. Check the shaft for dynamic unbalance. If it is more than **15 cm-g (0.21 in-oz) at 4,000 rpm,** correct or replace it. Excessive unbalance of the shaft causes vibration and noise.

8–A–3. Installing of Propeller Shaft
Follow the removal procedures in the reverse order.

8–B. UNIVERSAL JOINT

8–B–1. Universal Joint Removal
1. Remove the propeller shaft from the vehicle as described in **Par. 8–A–1** on page 8–1.
2. Mark both yoke and shaft so that the units may be reassembled in their original position in order to maintain the original balance.
3. Remove the snap rings that secure the bearings in the yoke.
4. Position the **universal joint replacer** (Part No. 49 0259 460A) as shown in Fig. 8–5 and screw in the center bolt until the bearing cup protrudes approximately 8 mm (0.32 in) out of the yoke.

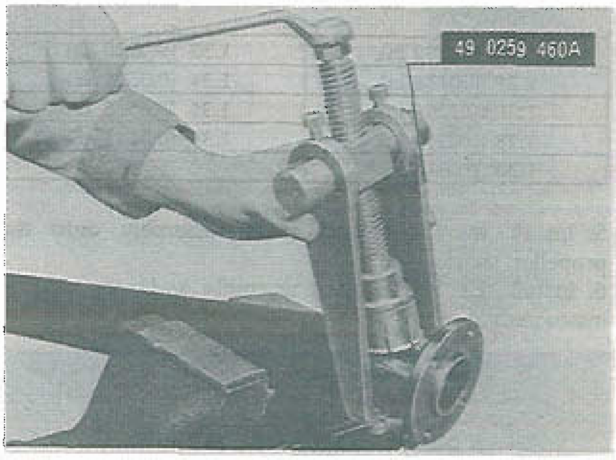


Fig. 8–5 Removing of bearing cup

5. Loosen the center bolt and install the spacer between the yoke and the spider as shown in Fig. 8–6.

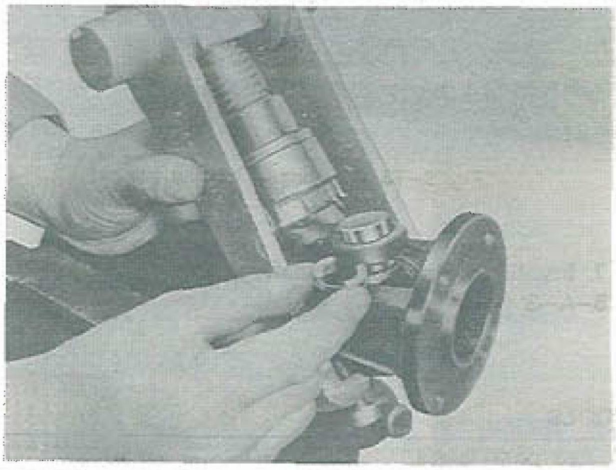


Fig. 8–6 Installing of spacer

6. Screw in the center bolt until the bearing cup comes out of the yoke.
7. Remove the replacer and remove the bearing cup.
8. Remove the yoke and spider assembly as shown in Fig. 8–7.

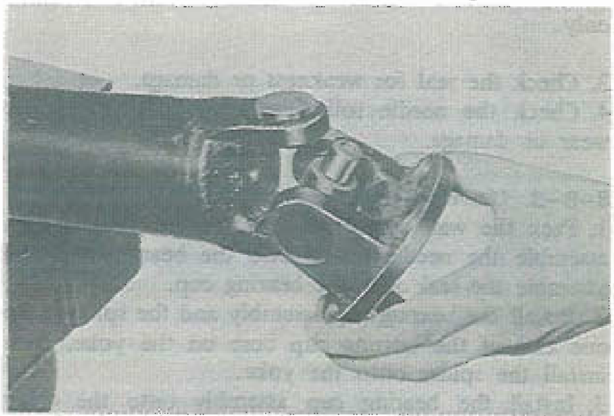


Fig. 8–7 Removing of yoke and spider assembly

9. Position the replacer on the yoke as shown in Fig. 8–8 and remove the bearing cup in the same manner.

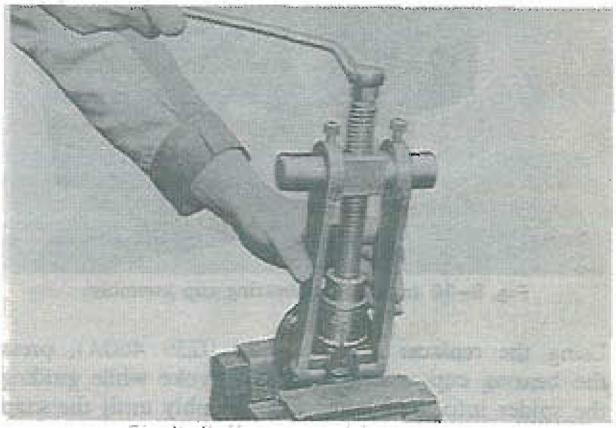


Fig. 8–8 Removing of bearing cup

10. Remove the spider from the yoke.

8–B–2. Checking of Universal Joint
1. Check the spider journals for rust and wear.
2. Measure the diameter of the spider. If the wear

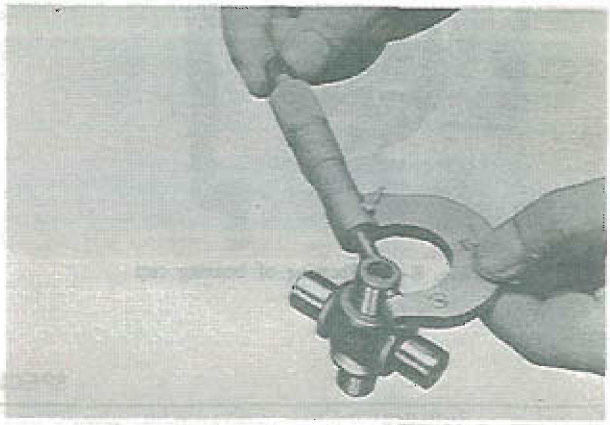


Fig. 8–9 Measuring of spider diameter

of the spider exceeds **0.2 mm (0.0079 in)**, replace with a new one. The standard diameter is **14.72 mm (0.5795 in)**.

Note:
The spider and bearing cup are serviced as an assembly only.

3. Check the seal for weakness or damage.
4. Check the needle rollers and the bearing cup for wear or damage.

8–B–3. Universal Joint Installation
1. Pack the wall of the bearing cup with grease, then assemble the needle rollers into the bearing cup and assemble the seal onto the bearing cup.
2. Install the bearing cup assembly and the spider onto one end of the bearing cup bore on the yoke, then install the spider onto the yoke.
3. Install the bearing cup assembly onto the other end of the bearing cup bore on the yoke.

Fig. 8–10 Installing of bearing cup assembly

Using the **replacer** (Part No. 49 0259 460A), press the bearing cup assembly into the yoke while guiding the spider into the bearing cup assembly until the snap ring can be installed.

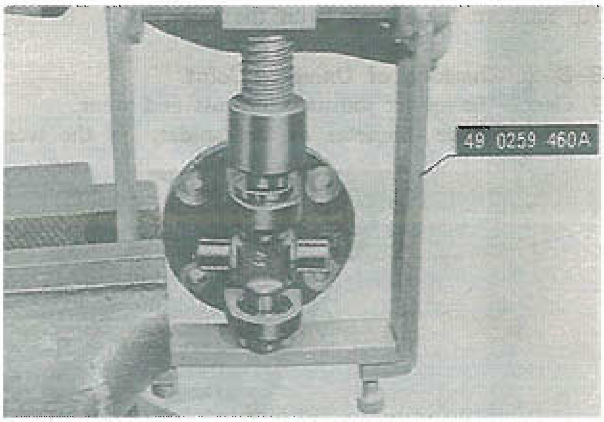


Fig. 8–11 Pressing of bearing cup

4. Select the snap ring to obtain minimum play and install the same-thickness snap rings to secure the bearing cups in the yoke.

Note:
Use the same-thickness snap rings for both sides.

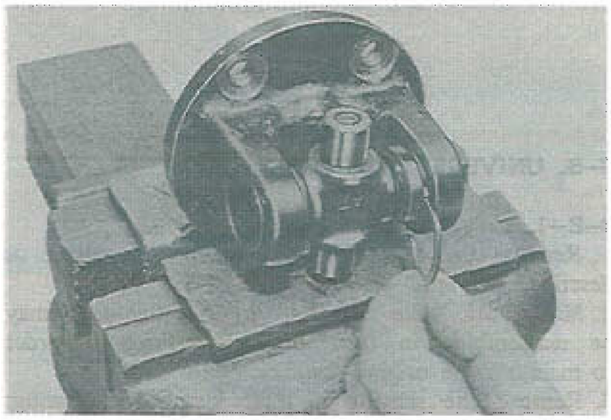


Fig. 8–12 Installing of snap ring

Check the spider by moving it. If the spider is too tight, disassemble and detect the fault.
The snap rings are available in the following thicknesses:

1.22 (0.0480 in)	1.32 (0.0520 in)
1.24 (0.0488 in)	1.34 (0.0528 in)
1.26 (0.0496 in)	1.36 (0.0535 in)
1.28 (0.0504 in)	1.38 (0.0543 in)
1.30 (0.0512 in)	

5. Install the yoke and spider assembly onto the propeller shaft.
6. Install the bearing cup assembly and snap ring as instructed above.

Fig. 8–13 Installing of bearing cup

7. Install the propeller shaft, as described in **Par. 8–A–3** on Page 8–2.

SPECIAL TOOLS

49 0259 440	Transmission oil plug	49 0259 460A	Universal joint replacer

REAR AXLE

DESCRIPTION

The rear axle is a semi-floating, integral-housing, hypoid gear drive type. The centerline of the drive pinion is mounted below the centerline of the ring gear. The rear axle shafts are retained in the housing by ball bearings and a bearing retainer at the axle housing outer ends. The left and right axle shafts are not interchangeable, the left shaft being shorter than the right shaft.

9–A. REAR AXLE SHAFT

9–A–1. Rear Axle Shaft Removal

1. Raise the rear end of the vehicle, then support the rear axle housing with stands.
2. Remove the wheel.
3. Remove the brake drum and brake shoes, as described in **Par. 11–G–1.**
4. Remove the nuts attaching the brake backing plate and bearing retainer to the axle housing.

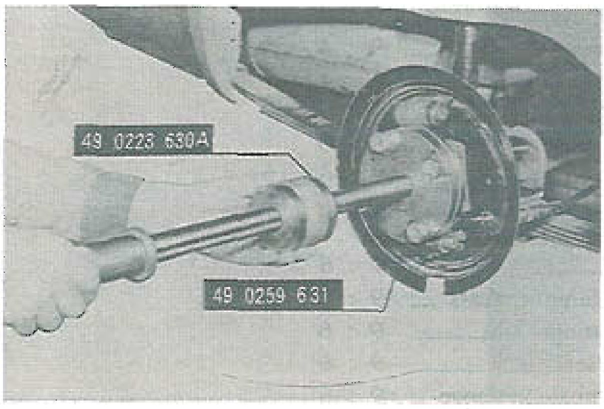


Fig. 9–1 Removing of rear axle shaft

5. Remove the rear axle shaft from the rear axle housing, using the **rear axle shaft remover** (Part Nos. 49 0223 630A and 49 0259 631), as shown in Fig. 9–1.
6. Remove the oil seal from the rear axle housing, if necessary.

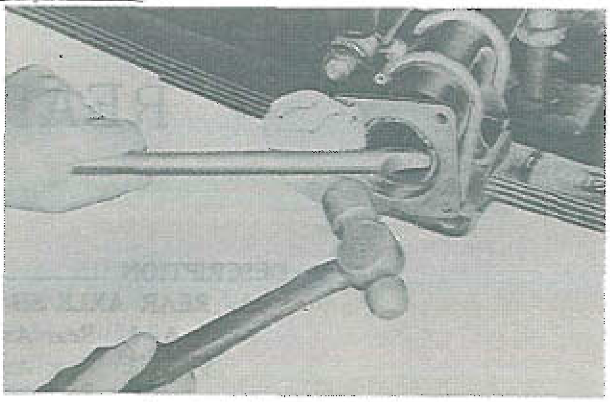


Fig. 9–2 Removing of oil seal

9–A–2. Rear Axle Shaft Bearing Replacement

1. Remove the rear axle shaft bearing with the bearing

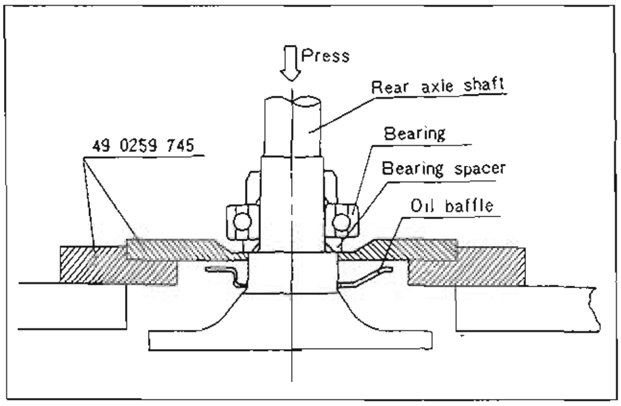


Fig. 9–3 *Bearing replacer*

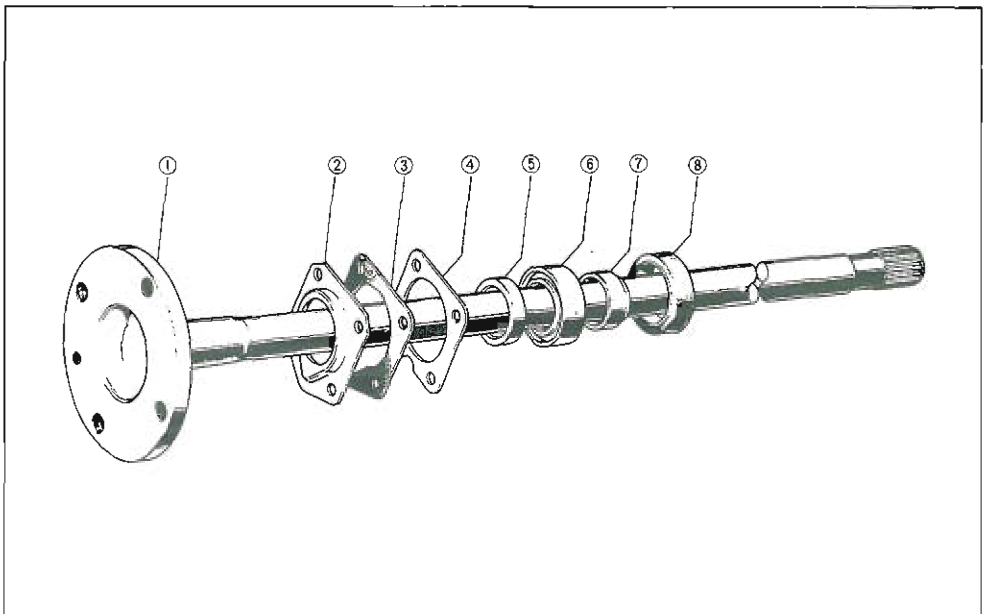


Fig. 9–4
Rear axle shaft components

1. Shaft
2. Bearing retainer
3. Gasket
4. Adjusting shim
5. Spacer
6. Bearing
7. Bearing collar
8. Oil seal

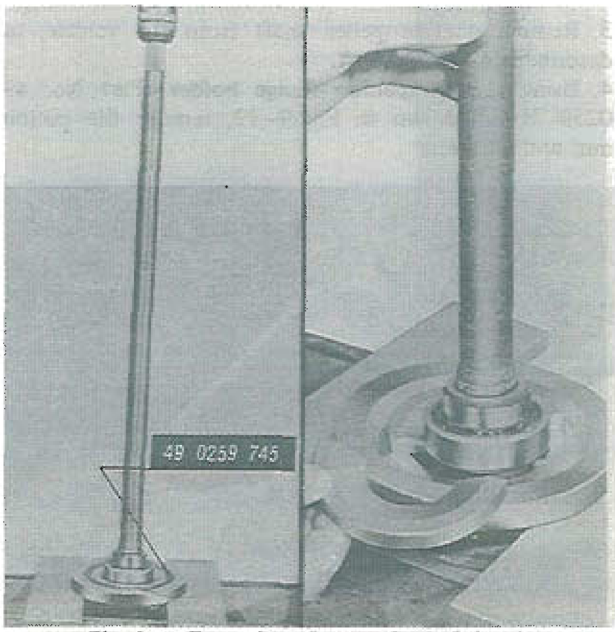


Fig. 9–5 Removing of rear axle shaft bearing

retaining collar using a press and **bearing replacer** (Part No. 49 0259 745).

Note:
In case the pressure necessary to press out the bearing exceeds **10 tons (22,000 lb)** or if the bearing replacer *is not available, grind the bearing retaining collar* with a grinder and cut it with a chisel, taking care not to damage the shaft.

2. Remove the bearing retainer from the axle shaft.
3. Clean all parts and check the conditions of the bearing retaining collar, spacer and axle shaft.
4. Install the bearing retainer and spacer onto the axle shaft.
5. Position the bearing on the axle shaft **with the sealed side toward the axle shaft flange,** and press it on until the spacer comes in contact with the shoulder of the shaft.
6. Using the **bearing replacer** (Part No. 49 0259 745), press the bearing retaining collar on the shaft until the collar seats firmly against the bearing.

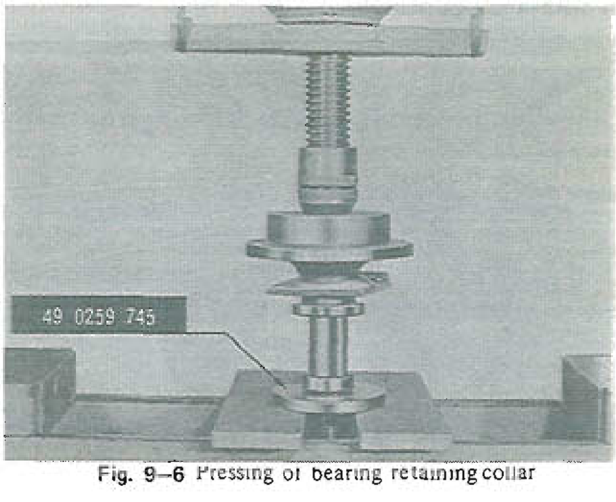


Fig. 9–6 Pressing of bearing retaining collar

Note:
(a) **Do not** attempt to press on both the bearing and bearing retaining collar at the same time.
(b) If the bearing retaining collar is press-fitted with less than **3 tons (6,600 lb)**, replace it with a new one.

9–A–3. Rear Axle Shaft Installation

1. Apply grease to the lip of the oil seal and install the oil seal into the axle housing.

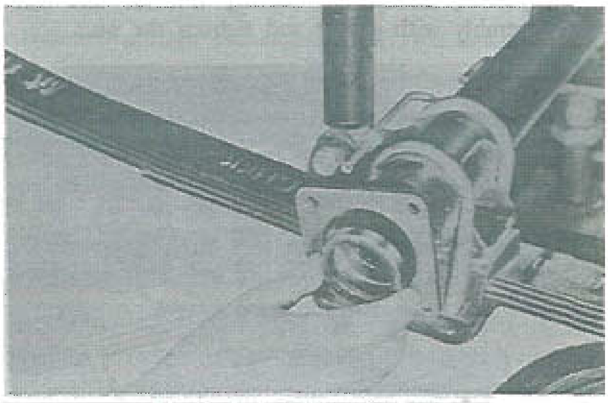


Fig. 9–7 Installing of oil seal

2. Check the rear axle shaft end play as follows: Install the brake backing plate and measure the depth of the bearing seat in the axle housing, using a depth gauge as shown in Fig. 9–8. Then, measure the width of the bearing.

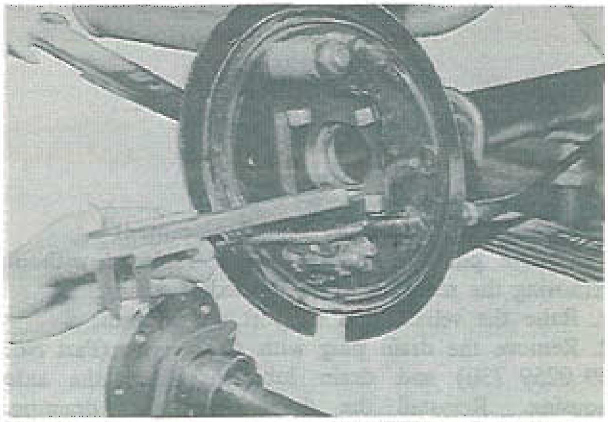


Fig. 9–8 Measuring of bearing seat depth

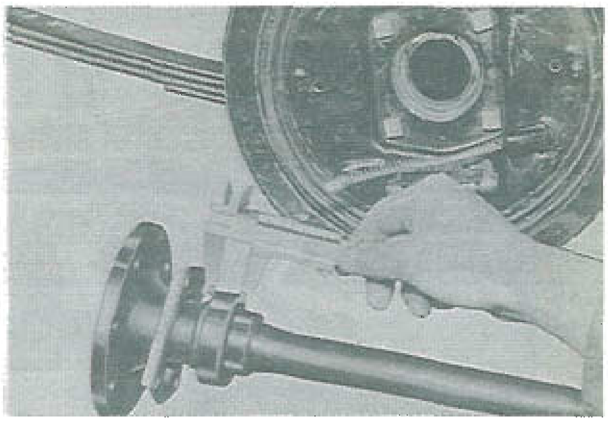


Fig. 9–9 Measuring of bearing width

The difference between the two measurements indicates the required thickness of the adjusting shims. The maximum permissible end play is **0.1 mm (0.004 in)**. The shims are available in thicknesses of 0.1 mm and 0.4 mm (0.004 in and 0.06 in).

3. Remove the brake backing plate and apply a thin coat of sealing agent onto the backing plate contacting surface of the rear axle housing.
4. Apply a thin coat of sealing agent to the shims, and position the shims and brake backing plate in place. Then, install the bearing retainer and axle shaft assembly with gasket and tighten the nuts.

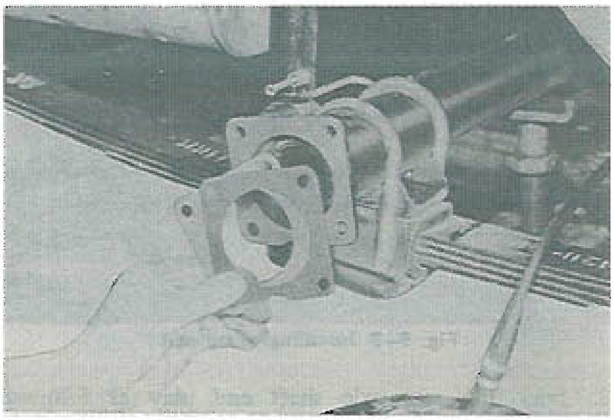


Fig. 9–10 Position of shims

5. Install the brake shoes and drum and adjust the brake shoe clearance.
6. Install the wheel.

9–B. DRIVE PINION OIL SEAL

9–B–1. Drive Pinion Oil Seal Replacement

The drive pinion oil seal can be replaced without removing the rear axle from the axle housing.

1. Raise the vehicle and support with stands.
2. Remove the drain plug with the **wrench** (Part No. 49 0259 730) and drain lubricant from the axle housing. Reinstall the drain plug after draining.

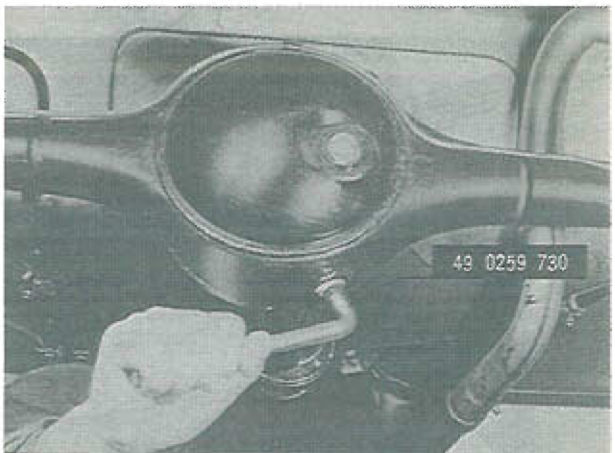


Fig. 9–11 Removing of drain plug

3. Remove the propeller shaft from the vehicle, as described in **Par. 8–A–1.**
4. Using the **companion flange holder** (Part No. 49 0259 710A) shown in Fig. 9–12, remove the pinion nut and washer.

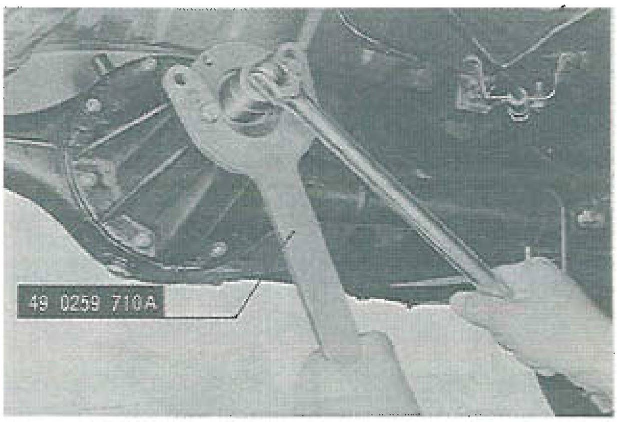


Fig. 9–12 Removing of pinion nut

5. While tapping the holder with a hammer, remove the companion flange.

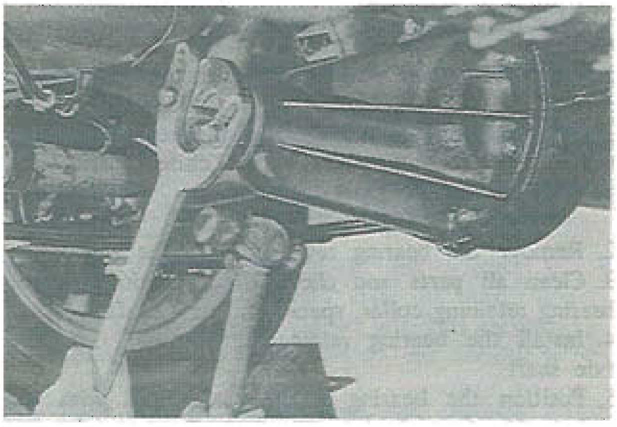


Fig. 9–13 Removing of companion flange

6. Remove the drive pinion oil seal from the rear axle.
7. Apply a small amount of lubricant to the oil seal lip.
8. Install a new oil seal to the rear axle while tapping it with a plastic hammer.

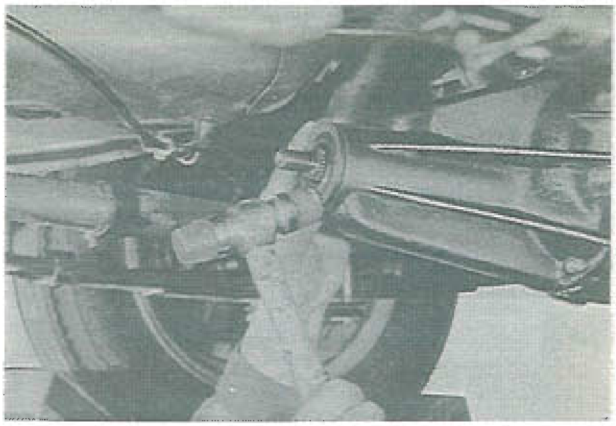


Fig. 9–14 Installing of oil seal

9. Install the companion flange together with the holder (Part No. 49 0259 710A).

10. Tighten the pinion nut **to 13 m-kg (94 ft-lb) or 12 m-kg (86.8 ft-lb)** rotating the pinion occasionally to insure proper bearing seating.

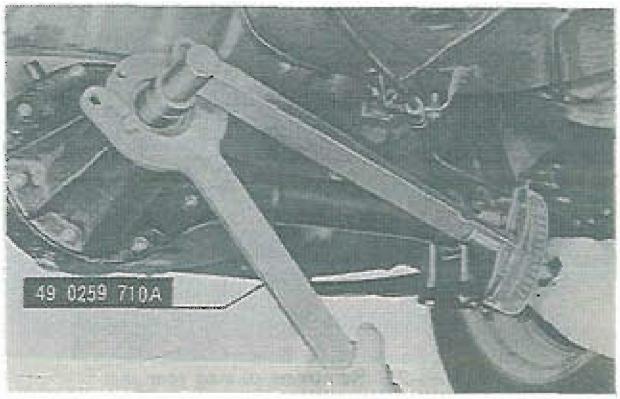


Fig. 9–15 *Tightening of pinion nut*

11. Install the propeller shaft.

9–C. REAR AXLE

9–C–1. Rear Axle Removal

1. Raise the vehicle and support with stands.
2. Remove the drain plug with the **wrench** (Part No. 49 0259 730) and drain the lubricant from the axle housing. Reinstall the drain plug after draining.
3. Remove the propeller shaft from the vehicle, as described in **Par. 8–A–1.**
4. Install the **transmission oil plug** (Part No. 49 0259 440) into the extension housing to prevent transmission oil leakage.
5. Remove the right and left rear axle shafts, as described in **Par. 9–A–1.**
6. Remove the nuts attaching the rear axle to the axle housing and remove the rear axle from the housing.

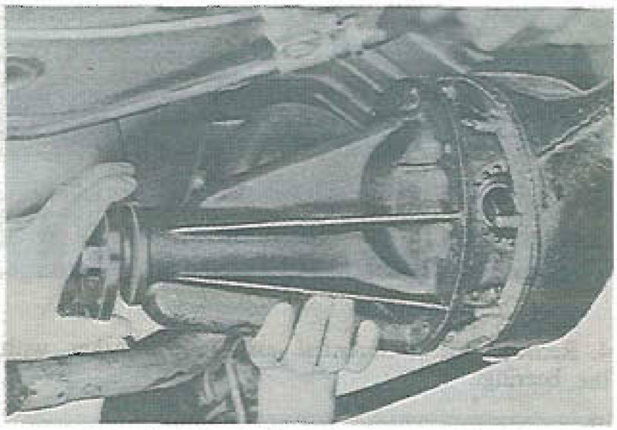


Fig. 9–16 Removing of rear axle assembly

9–C–2. Rear Axle Disassembly

a. Removing of differential

1. Mount the rear axle on the **work stand** (Part Nos. 49 0164 550D and 49 0187 550A, or 49 0164 550D and 49 0223 561A).

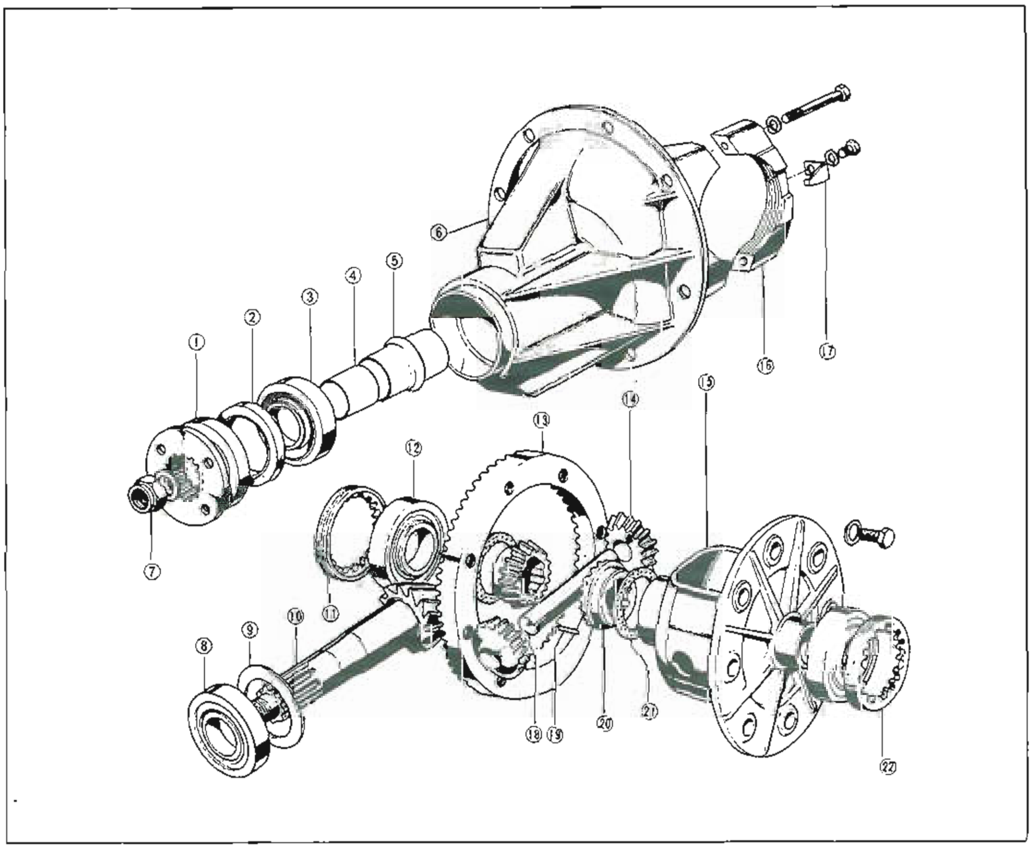


Fig. 9–17
Rear axle components
1. Companion flange
2. Pinion oil seal
3. Pinion front bearing
4. Pinion bearing collar
5. Collapsible pinion bearing spacer
6. Carrier
7. Pinion nut
8. Pinion rear bearing
9. Adjusting washer (Adjusting spacer)
10. Drive pinion
11. Pinion side adjusting nut
12. Side bearing
13. Ring gear
14. Pinion gear
15. Differential gear case
16. Bearing cap
17. Adjusting nut lock
18. Pinion shaft
19. Pinion shaft lock pin
20. Side gear
21. Thrust washer
22. Ring gear side adjusting nut

2. Remove the bolts securing the adjusting nut locks, and remove the nut locks.
3. Loosen the bearing cap attaching bolts and back off the adjusting nut slightly with the **spanner** (Part No. 49 0259 720) to relieve bearing preload. Remove the bearing caps and adjusting nuts.

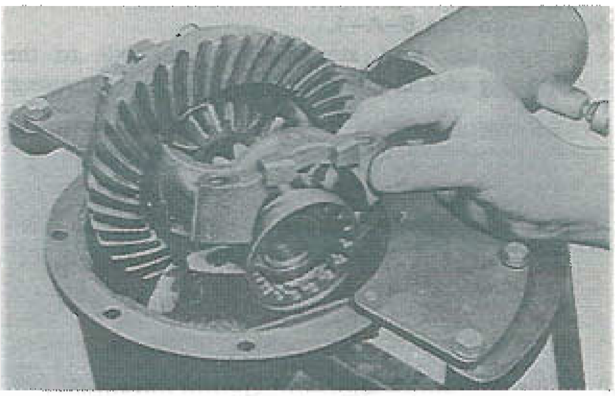


Fig. 9–18 Removing of bearing cap

4. Remove the differential assembly together with the bearings.

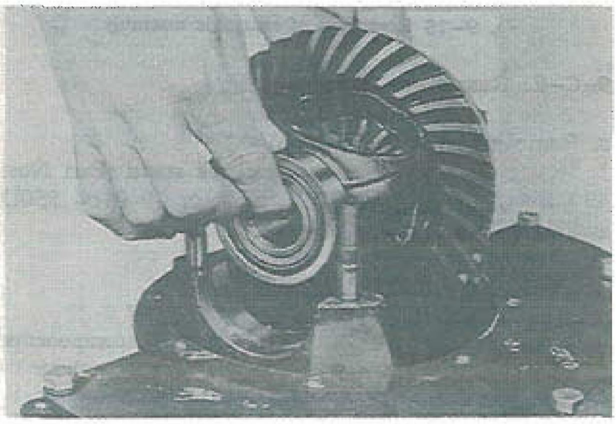


Fig. 9–19 Removing of differential assembly

b. Disassembling of differential

1. Using the suitable bearing puller, remove the bearings from the differential gear case. After removing the bearings, place them in proper sequence to obtain the original right and left positions.

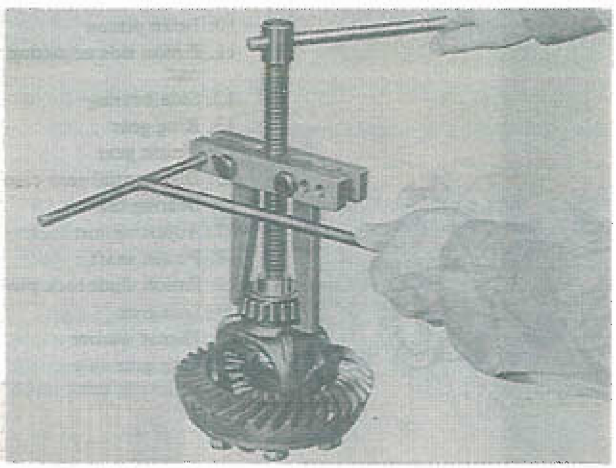


Fig. 9–20 Removing of bearing

2. Bend back and straighten the ring gear securing bolt lock plates, and remove the bolts, and the ring gear from the case.

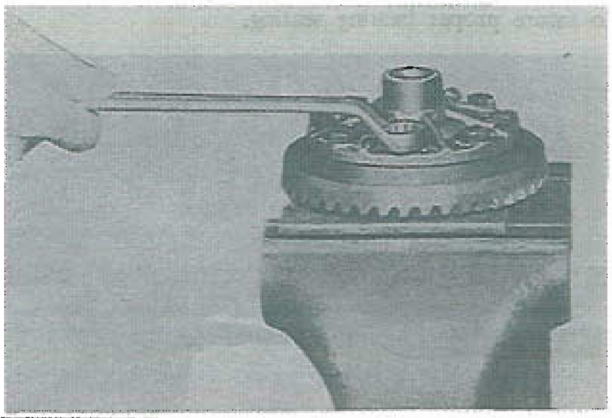


Fig. 9–21 Removing of ring gear

3. Pry and straighten the punched portion of the case, and remove the pinion shaft lock pin with a suitable brass rod.
4. Remove the pinion shaft, pinion gears, side gears and side gear thrust washers from the case.

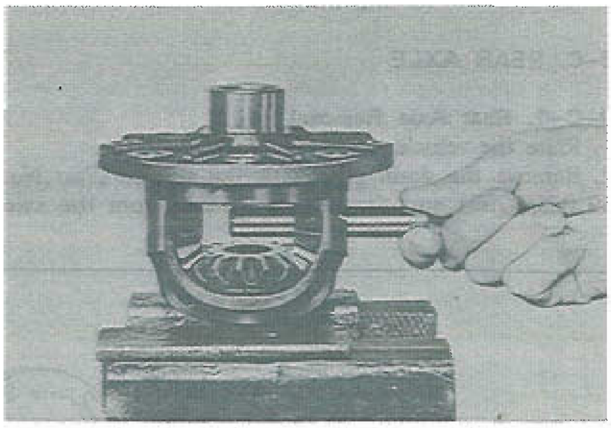


Fig. 9–22 Removing of pinion shaft

c. Removing of drive pinion

1. Invert the carrier on the work stand.
2. Using the **companion flange holder** (Part No. 49 0259 710A) shown in Fig. 9–23, remove the pinion nut and remove the companion flange.

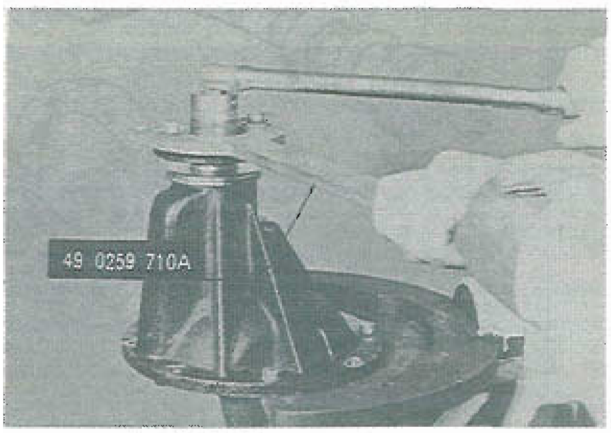


Fig. 9–23 Removing of pinion nut

3. Remove the drive pinion from the carrier. If the drive pinion is hard to remove, hold the drive pinion end and press the drive pinion out with a press.
4. Slide the pinion bearing collar (if equipped) and collapsible pinion bearing spacer off the drive pinion. Press out the pinion rear bearing with a press and remove the pinion adjusting washer from the drive pinion.
5. Remove the oil seal and pinion front bearing from the carrier.

d. Removing of pinion bearing cup
The pinion bearing cups can be removed from the carrier by using a suitable brass rod in slots provided for this purpose. **Do not** remove the pinion bearing cups from the carrier unless the cups are worn or damaged. Whenever the cups are replaced, the bearing cone should also be replaced.

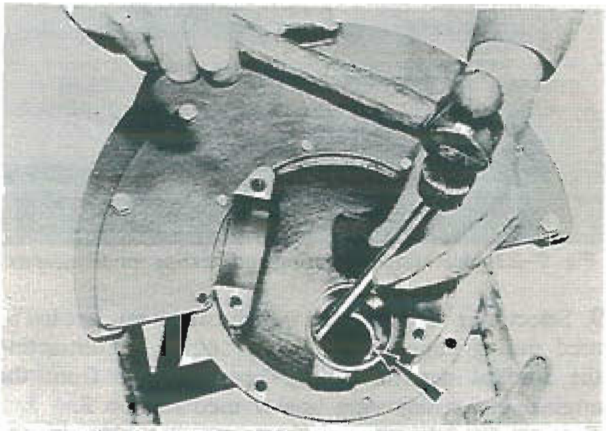


Fig. 9–24 Removing of pinion bearing cup

9–C–3. Rear Axle Inspection

a. Checking of drive pinion and ring gear
Check the drive pinion for damaged or excessively worn teeth, damaged bearing journals and splines. Inspect the ring gear for worn or chipped teeth. If any of above conditions is found, replace the ring gear and drive pinion as a set.

b. Checking of differential gears
Inspect the differential side gears and pinion gears for cracks, chipped teeth or any damage. Repalce the side gears, pinion gears or side gear thrust washers if necessary. Check the clearance between the pinion gear and pinion shaft. If excessive clearance is found due to wear, replace with new parts. Check the spline fit of the side gear and rear axle shaft. If excessive clearance is found, replace the side gear or axle shaft.

c. Checking of bearings
Inspect the diffetential bearings and pinion bearings for wear, flaking or any damage. If necessary, replace them.

Note:
The bearing cone and bearing cup should be replaced as a set if damage to either is encountered.

d. Checking of oil seal
Check the oil seal for wear or damage. If there is any possibility of oil leakage, replace the oil seal.

e. Checking of companion flange
Check the companion flange for wear at splines, and on the contact surface with oil seal.

f. Checking of differential carrier
Check the differential carrier for damage or crack.

9–C–4. Rear Axle Assembly

a. Adjusting of drive pinion
The drive pinion should be correctly positioned in relation to the ring gear by the use of the pinion adjusting washer which is placed between the front face of the drive pinion gear and pinion rear bearing.

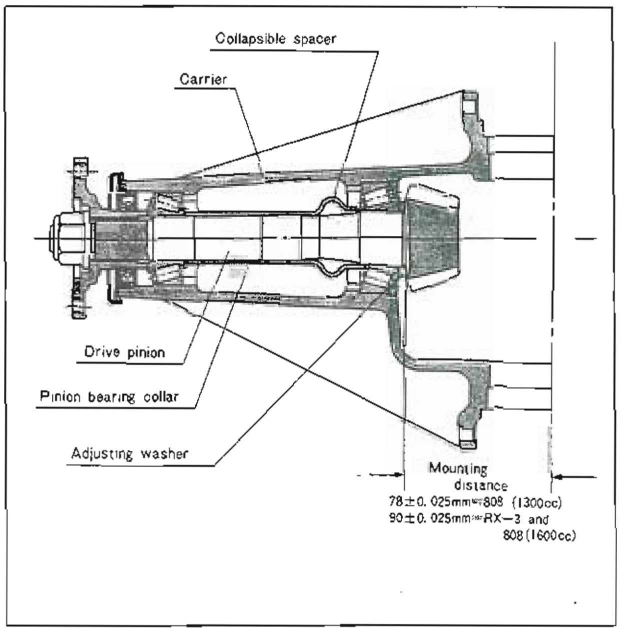


Fig. 9–25 Pinion position

808 (1300 cc)
To adjust the drive pinion position, use the **special tools** (Part Nos. 49 0180 570 and 49 0249 555) and proceed as follows:

If the **gauges** (Part Nos. 49 0727 570 and 49 0249 555A) are available, the pinion position can be adjusted by using those gauges and referring to the adjustment procedures instructed in RX-3.

1. Position a dial indicator on the **gauge body** (Part No. 49 0180 570) and place the gauge body on a surface plate. Push the dial indicator downward until the pointer rotates approximately 3/4 turn clockwise and tighten the dial indicator in this position.
2. Rotate the gauge body slowly back and forth until the dial indicator reads greatest deflection. At the point of greatest deflection, set the dial indicator to ZERO. Repeat rock action of gauge body to verify the ZERO setting, as shown in Fig. 9–26.

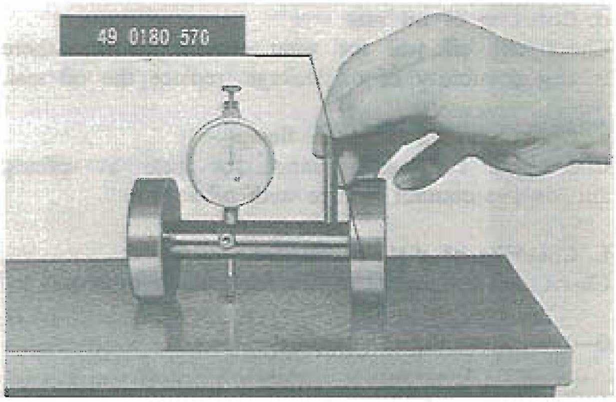


Fig. 9–26 Setting of gauge

3. Install the original pinion adjusting washer and **pinion rear bearing model** (Part No. 49 0249 555) onto the drive pinion and insert the drive pinion into the carrier.

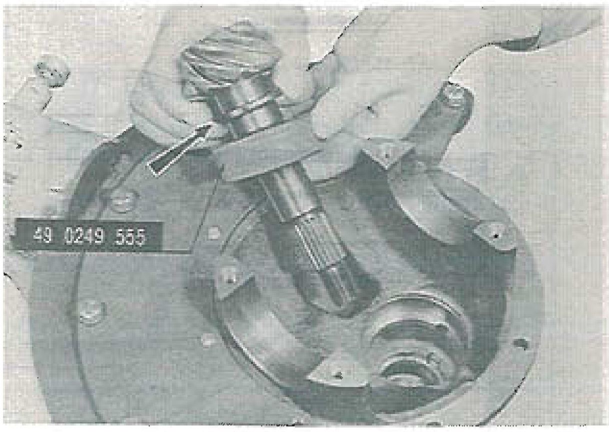


Fig. 9–27 Installing of bearing model and washer

4. Position the **gauge block** (Part No. 49 0249 555) on the drive pinion.
5. Place the gauge body on the differential bearing support bore so that the dial indicator rod is centered on the gauging area of the gauge block.
6. Rotate the gauge body slowly back and forth until the dial indicator reads greatest deflection. At the point of greatest deflection, record the dial reading moved from ZERO.

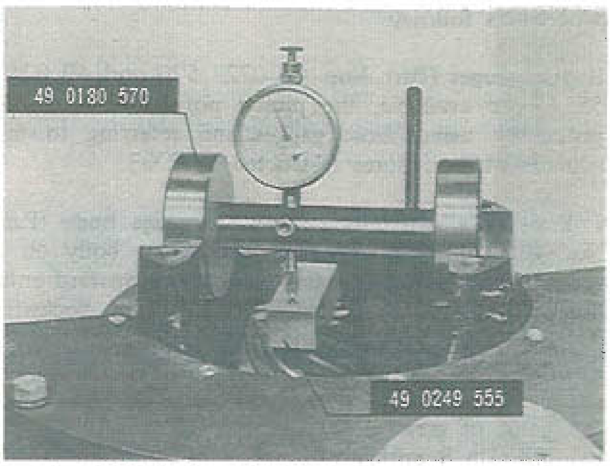


Fig. 9–28 Placing of dial indicator and gauge block

7. Remove the drive pinion from the carrier and then remove the bearing model and pinion adjusting washer from the drive pinion.
8. Place the bearing model and pinion rear bearing on the surface plate and compare their heights.
1) If the pinion rear bearing is higher than the bearing model, subtract the amount from the thickness of the pinion adjusting washer.
2) If the pinion rear bearing is lower than the bearing model, add the amount to the thickness of the pinion adjusting washer.

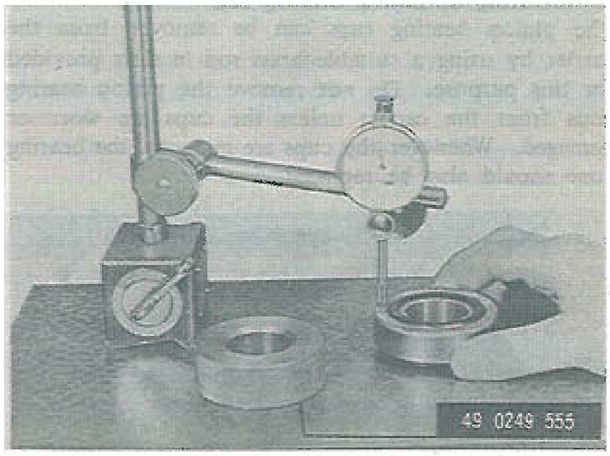


Fig. 9–29 Measuring of bearing and bearing model heights

9. Select the correct pinion adjusting washer to be used during pinion assembly by adding or subtracting the amount determined in steps 6 and 8 from the original pinion adjusting washer used in step 3.
The pinion adjusting washers are available in the following thicknesses:

Identification mark	Thickness
08	3.08 mm (0.1213 in)
11	3.11 mm (0.1224 in)
14	3.14 mm (0.1236 in)
17	3.17 mm (0.1248 in)
20	3.20 mm (0.1260 in)
23	3.23 mm (0.1271 in)
26	3.26 mm (0.1283 in)
29	3.29 mm (0.1295 in)
32	3.32 mm (0.1307 in)
35	3.35 mm (0.1319 in)
38	3.38 mm (0.1331 in)
41	3.41 mm (0.1343 in)
44	3.44 mm (0.1354 in)
47	3.47 mm (0.1366 in)

Note:
In order to compensate for all of the machining variables, the pinion has a plus or minus reading recorded in hundredth millimeters on the rear face of the pinion.
Example:
M + 2 = M + 0.02 mm (M + 0.008 in)
M - 1 = M - 0.01 mm (M - 0.001 in)
(a) If the pinion is marked "+" (plus), subtract the amount specified on the pinion from the thickness of the pinion adjusting washer as determined in step 9.

(b) If the pinion is marked "–" (minus), add the amount specified on the pinion to the thickness of the pinion adjusting washer as determined in step 9.

10. Position the correct adjusting washer selected in the step 9 on the front face of the pinion gear and press in the pinion rear bearing onto the drive pinion.

RX–3 and 808 (1600 cc)

The standard distance between the front face of the drive pinion gear and the center of the ring gear (mounting distance) is 90 ± 0.025 mm. To adjust the drive pinion position, use the **special tools** (Part Nos. 49 0727 570 and 49 0305 555) and proceed as follows:

1. Position a dial indicator on the **gauge body** (Part No. 49 0727 570) and place the gauge body on a surface plate. Push the dial indicator downward until the pointer rotates approximately 3/4 turn clockwise and tighten the dial indicator at this position. Then, set the dial indicator to ZERO.

Fig. 9–30 Setting of gauge

2. Make certain that the differential bearing support bores are free of dirt and burrs.
3. Install the original pinion adjusting washer and pinion rear bearing onto the drive pinion and insert the drive pinion into the carrier.
4. Position the **gauge block** (Part No. 49 0305 555) on the drive pinion.
5. Place the gauge body on the gauge block so that the indicator rod comes in contact with the lowest portion of the differential bearing support bore. Record the dial reading moved from ZERO.

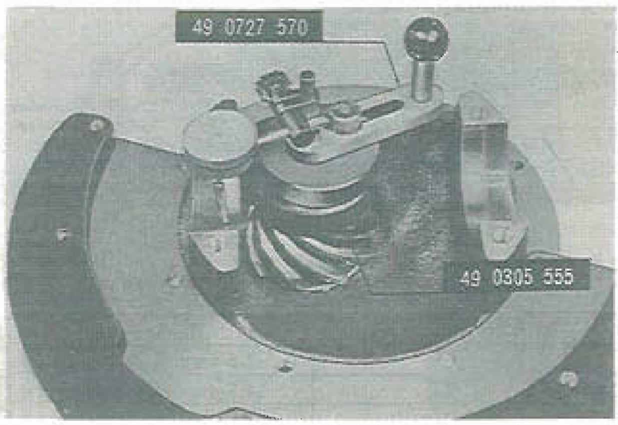


Fig. 9–31 Placing of gauge

6. Select the correct pinion adjusting washer to be used during pinion assembly by adding or subtracting the amount determined in the previous step from the thickness of the original adjusting washer used in step 3.

The pinion adjusting washers are available in the following thicknesses:

Identification mark	Thickness
08	3.08 mm (0.1213 in)
11	3.11 mm (0.1224 in)
14	3.14 mm (0.1236 in)
17	3.17 mm (0.1248 in)
20	3.20 mm (0.1260 in)
23	3.23 mm (0.1271 in)
26	3.26 mm (0.1283 in)
29	3.29 mm (0.1295 in)
32	3.32 mm (0.1307 in)
35	3.35 mm (0.1319 in)
38	3.38 mm (0.1331 in)
41	3.41 mm (0.1343 in)
44	3.44 mm (0.1354 in)
47	3.47 mm (0.1366 in)

Note:

In order to compensate for all of the machining variables, the pinion has a plus or minus reading recorded in hundredth millimeters on the rear face of the pinion.

Example:

M + 2 = M + 0.02 mm (M + 0.0008 in)

M – 2 = M – 0.01 mm (M – 0.0001 in)

(a) If the pinion is marked "+" (plus), subtract the amount specified on the pinion from the thickness of the pinion adjusting washer as determined in step 6.

(b) If the pinion is marked "–" (minus), add the amount specified on the pinion to the thickness of the pinion adjusting washer as determined in step 6.

7. Remove the drive pinion from the carrier and then remove the pinion rear bearing and original pinion adjusting washer from the drive pinion.
8. Position the correct adjusting washer selected in step 6 on the drive pinion and install the pinion rear bearing.

b. Adjusting of pinion bearing preload

1. Install the pinion bearing cups (if replaced) into

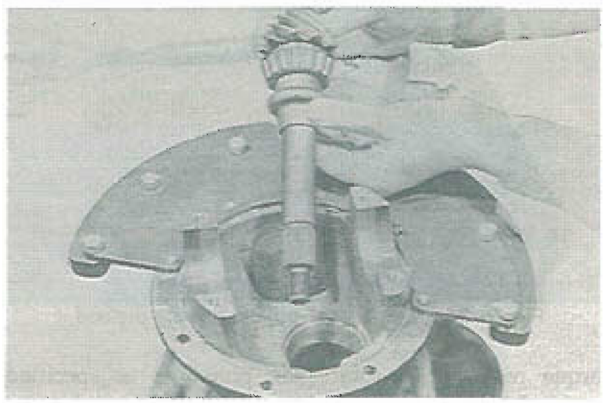


Fig. 9–32 Position of pinion assembly

the carrier. Make sure the cups are seated into the carrier.

2. Install the collapsible pinion bearing spacer and pinion bearing collar onto the pinion shaft, and position the pinion assembly in the carrier, as shown in Fig. 9–32.

3. Place the pinion front bearing in position on the pinion. Hold the pinion of fully forward and drive the pinion front bearing over the pinion until seated.

4. Install the companion flange onto the pinion by tapping with a soft hammer.

5. Install the pinion washer and nut. Before tightening the nut (when the pinion preload is ZERO), check the drag by the oil seal by using a pull scale.

6. Using the **companion flange holder** (Part No. 49 0259 710A), tighten the pinion nut to the specified torque. **Do not** exceed the specified torque at this time.

	Minimum torque required to tighten pinion nut to obtain correct pinion bearing preload
808 (1300 cc)	12 m-kg (86.8 ft-lb)
808 (1600 cc)	13 m-kg (94.0 ft-lb)
RX–3	13 m-kg (94.0 ft-lb)

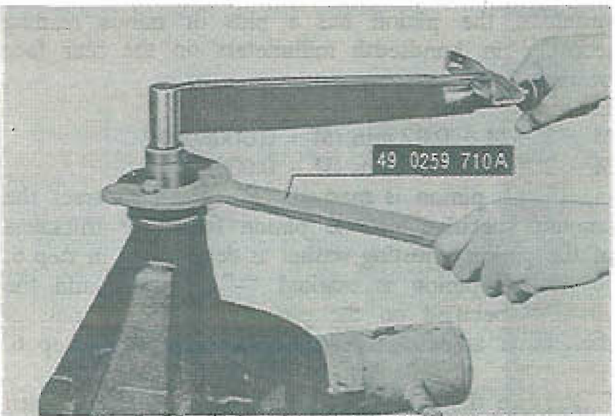


Fig. 9–33 Tightening of companion flange

7. Check the pinion bearing preload with a pull scale. Correct preload will be obtained when the torque required to rotate the pinion is as specified in the following table:

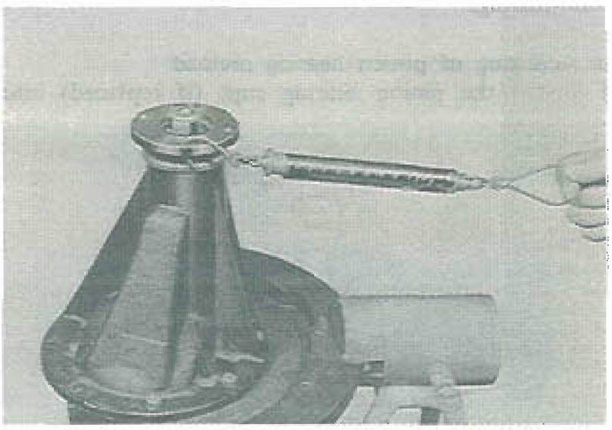


Fig. 9–34 Checking of pinion bearing preload

808 (1300 cc)	0.8 ~ 1.9 kg (1.67 ~ 3.18 lb)
808 (1600 cc)	2.5 ~ 3.9 kg (5.51 ~ 8.60 lb)
RX–3	2.5 ~ 3.9 kg (5.51 ~ 8.60 lb)

If the torque required to rotate the pinion is less than specified, tighten the pinion nut **a little at a time** until the proper preload is established. **Do not** overtighten the pinion nut. The maximum tightening torque of the pinion nut is **18 m-kg (115.8 ft-lb).** If excessive preload is obtained as a result of overtightening, replace the collapsible bearing spacer. **Do not** back off the pinion nut to establish pinion bearing preload. If the torque on the pinion nut is **less than 13 m-kg (94 ft-lb)** after bearing preload is established, a new collapsible bearing spacer must be used.

8. Add the oil seal drag determined in step 5 to the correct preload determined in the previous step.

9. Tighten the pinion nut until the preload determined in step 7 is established.

c. Assembling of differential

1. Install the thrust washer on each differential side gear and install these in the gear case.

2. Through the opening of the gear case, insert each of two pinion gears exactly 180 degrees opposite each other.

3. Rotate the gears 90 degrees so that the pinion gear shaft holes of the case come into alignment with the holes in the pinion gears.

4. Insert the pinion gear shaft through the case and pinion gears so that the pinion gear shaft lock pin holes in the pinion gear shaft will align with the hole in the case.

5. Check the backlash between the side gear and the pinion gear using a dial indicator. To check the backlash, hold the pinion gear and measure the side gear movement with a dial indicator. If the backlash is incorrect, select and install the correct side gear thrust washers to obtain the specified backlash of **0 ~ 0.1 mm (0 ~ 0.004 in).**

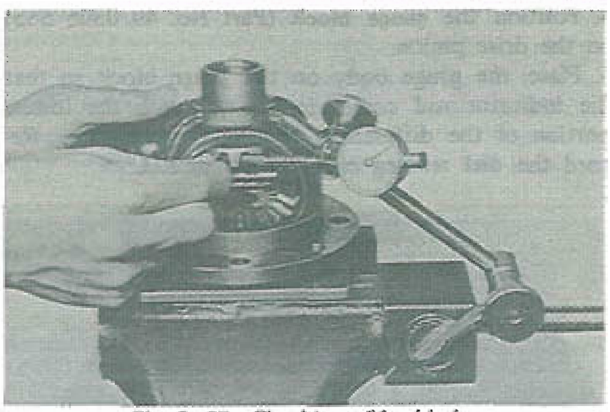


Fig. 9–35 Checking of backlash

The following side gear thrust washers are available:

Identification mark	Thickness
6	1.6 mm (0.0630 in)
7	1.7 mm (0.0670 in)
8	1.8 mm (0.0709 in)

Note:
Always use the same thickness thrust washers for both side gears.

6. Drive in the lock pin into the gear case to lock the pinion gear shaft. Next, punch the lock pin hole edge of the case with a suitable punch and hammer to prevent dropping of the lock pin.
7. Install the ring gear into the case and tighten the bolts to the specified torque.

	Tightening torque
808 (1300 cc)	5.5 ~ 6.5 m-kg (40 ~ 47 ft-lb)
808 (1600 cc)	5.5 ~ 6.5 m-kg (40 ~ 47 ft-lb)
RX-3	5.5 ~ 6.5 m-kg (40 ~ 47 ft-lb)

Next, lock each bolt by bending the lock plates over the bolts.

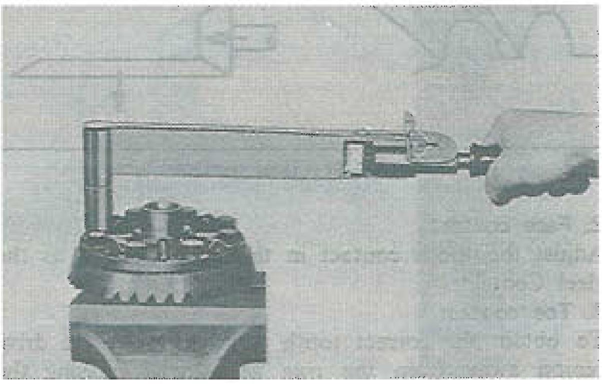


Fig. 9–36 Installing of ring gear

8. Install each differential bearing to the hubs of the gear case.
9. Install the differential bearing cups on the differential bearing cones originally installed.

d. Installing of differential
1. Place the differential gear assembly in the carrier making ensure that the marks for backlash adjustment on the face of the pinion and ring gear teeth are aligned with each other.

e. Adjusting of differential bearing preload
1. Install the differential bearing adjusting nuts on each side of the differential bearings.

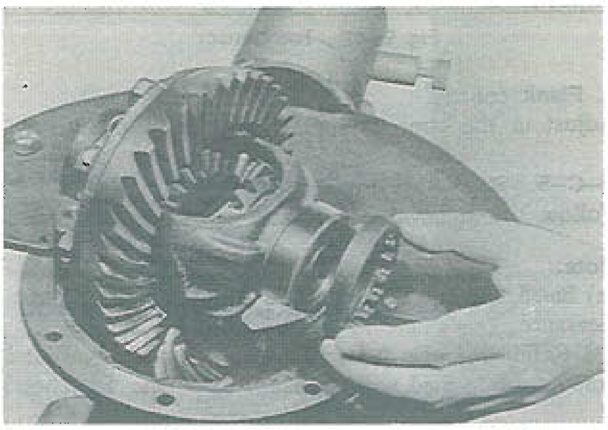


Fig. 9–37 Installing of bearing adjusting nuts

2. Install the differential bearing caps onto the carrier, ensuring that the identification marks are matched. Install the cap attaching bolts, and screw them in two or three turns. Carefully set the cap in place so that the threads of the adjusting nut and the cap fit snugly, and then tighten the attaching bolts again temporarily.
3. Loosen the drive pinion side adjusting nut and tighten the ring gear side adjusting nut using the **differential bearing adjusting nut wrench** (Part No. 49 0259 720) until the backlash between the ring gear and the drive pinion is removed. Back off the ring gear side adjusting nut approximately four notches to a point where the notch in the nut aligns with the nut lock. Tighten the drive pinion side adjusting nut firmly to force the differential bearing to contact solidly with the ring gear side adjusting nut. Loosen the drive pinion side adjusting nut until it is free from the bearing, then retighten the drive pinion side adjusting nut snugly until it just contacts the cup.

f. Adjusting of backlash
1. Contact the dial indicator rod with the ring gear tooth at right angle.
2, Check the backlash between the ring gear and the drive pinion. If the backlash is more than specified, loosen the drive pinion side nut one notch, and tighten the ring gear side nut one notch. If the backlash is less than specified, loosen the ring gear side nut one notch, and tighten the drive pinion side nut one notch.
Repeat the above procedures until the specified backlash is obtained.

	Backlash
808 (1300 cc)	0.15 ~ 0.17 mm (0.0059 ~ 0.0067 in)
808 (1600 cc)	0.17 ~ 0.19 mm (0.0067 ~ 0.0075 in)
RX-3	0.17 ~ 0.19 mm (0.0067 ~ 0.0075 in)

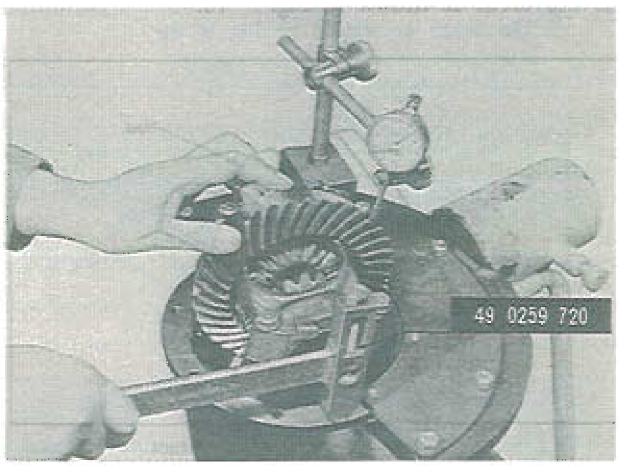


Fig. 9–38 Checking of backlash

3. The preload on the differential bearings is obtained by tightening the bearing adjusting nut. Tighten the bearing adjusting nut until the distance between both pilot sections on the bearing caps becomes the same as specification.

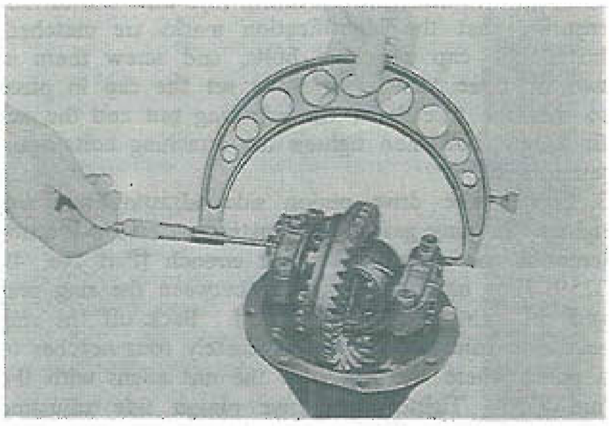


Fig. 9–39 Adjusting of preload

	Distance between both *pilot sections*
808 (1300 cc)	165.5 mm (6.516 in)
808 (1600 cc)	185.5 mm (7.306 in)
RX–3	185.5 mm (7.306 in)

Note:
When adjusting preload, care must be taken not to affect the backlash of the ring gear and drive pinion.

4. Tighten the bearing cap attaching bolts to a torque of **4.0 m-kg (30 ft-lb)**.
5. Install the bearing adjusting nut locks onto the bearing caps and tighten the attaching bolts.
6. Again recheck the backlash and differential bearing preload.

g. Checking of tooth contact
Check the ring gear and drive pinion tooth contact. To check, apply a thin coat of red lead evenly onto the ring gear teeth, and rotate the ring gear a few times to and fro. Check the contact pattern made on the teeth as shown in Fig. 9–40.

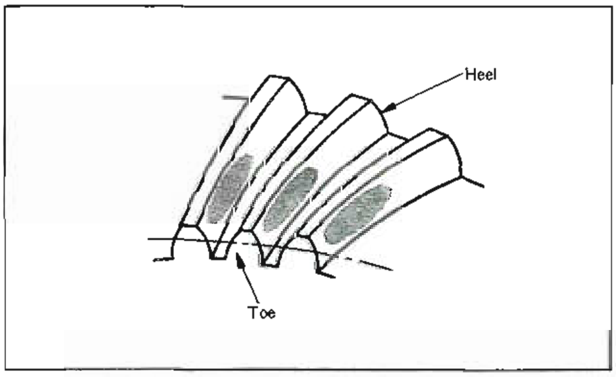


Fig. 9–40 Correct tooth contact

If the tooth contact pattern is not correct, change the drive pinion adjusting washer or backlash to obtain the correct tooth contact. The following is a typical tooth contact patterns indicating the adjusting washer or backlash change. After the correct tooth contact is obtained, wipe off the red lead from the gears.

1. Heel contact
To obtain the correct tooth contact, move the drive pinion towards the ring gear by increasing the thickness of the drive pinion adjusting washer, and/or adjust the backlash by moving the ring gear away from the drive pinion.

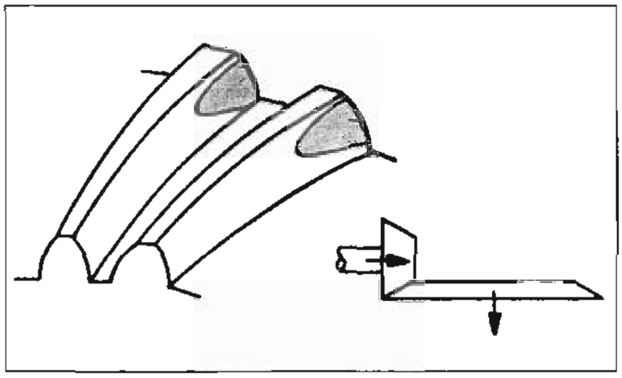


Fig. 9–41 Heel contact

2. Face contact
Adjust the tooth contact in the same manner as the Heel Contact.

3. Toe contact
To obtain the correct tooth contact, move the drive pinion away from the ring gear by decreasing the thickness of the drive pinion adjusting washer, and/or adjust the backlash by moving the ring gear towards the drive pinion.

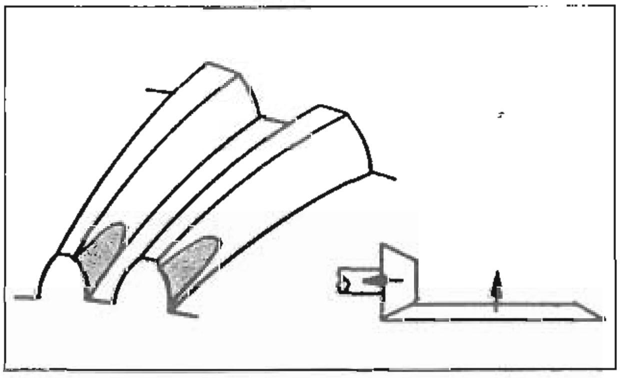


Fig. 9–42 Toe contact

4. Flank contact
Adjust in the same manner as the Toe Contact.

9–C–5. Rear Axle Installation
Follow the removal procedures in the reverse order.

Note:
(a) Bleed the brake system and adjust the brake shoe clearance.
(b) Refill the axle assembly with proper grade, and amount of hypoid gear lubricant up-to the filler hole.

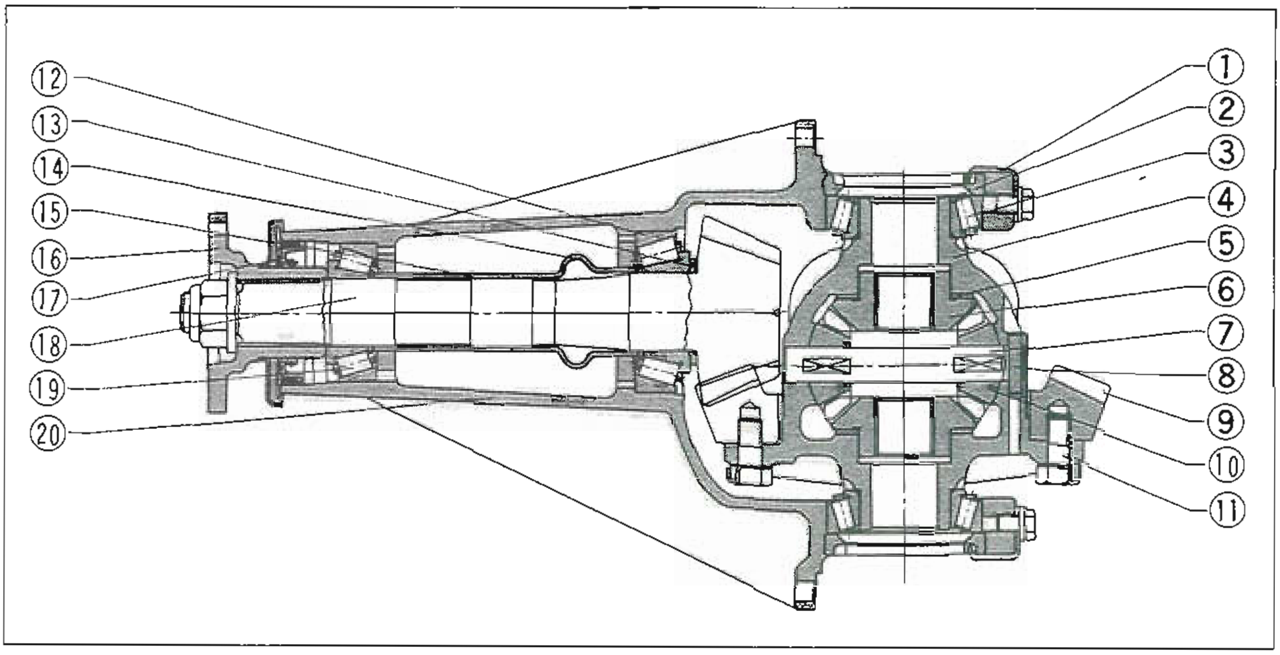


Fig. 9–43 Rear axle cross section

1. Adjusting nut lock
2. Adjusting nut
3. Differential bearing
4. Gear case
5. Side gear thrust washer
6. Side gear
7. Pinion shaft
8. Pinion shaft lock pin
9. Ring gear
10. Pinion gear
11. Bolt
12. Pinion rear bearing
13. Adjusting washer (pinion position)
14. Collapsible pinion bearing spacer
15. Pinion bearing collar
16. Companion flange
17. Oil seal
18. Drive pinion
19. Pinion front bearing
20. Differential carrier

SPECIAL TOOLS

49 0223 630A	Rear axle shaft remover
49 0259 631	Attachment (For rear axle shaft remover)
49 0259 745	Rear axle shaft bearing replacer
49 0259 730	Drain plug wrench
49 0259 710A	Companion flange holder
49 0259 440	Transmission oil plug
49 0164 550D	Rear axle work stand
49 0187 550A	Attachment (For work stand)
49 0223 561A	Attachment (For work stand)
49 0259 720	Adjusting nut spanner
49 0180 570	Pinion position adjusting gauge
49 0249 555	Gauge block
49 0727 570	Pinion position adjusting gauge
49 0249 555A	Gauge block
49 0221 572	Bearing model

STEERING

DESCRIPTION

The steering system consists of the steering gear, steering column, steering lock assembly, steering wheel and steering linkage. The steering gear is of a recirculating ball nut type and the steering gear ratio varies from 17.0 : 1 to 19.0 : 1, according to the turning angle of the sector shaft. Therefore, this steering gear provides easy steering. The steering linkage consists of the pitman arm, center link (pitman arm to idler arm), idler arm and bracket assembly, and tie-rods. The steering linkage ball joints and idler arm are filled with lithium grease and are sealed completely which require no lubrication service. The toe-in can be adjusted, but the camber, caster, and king pin inclination are set during production, and **cannot be altered.**

10–A. STEERING WHEEL

10–A–1. Checking of Steering Wheel Play

The steering wheel play should be **5 ~ 20 mm (0.2 ~ 0.8 in)**. With the front wheels on the ground and in the straight ahead position, move the steering wheel in both directions without moving the front wheels.

If excessive play is found, the following points should be carefully checked.

1. Fit of the ball joints of the steering linkage
2. Looseness of the wheel bearings
3. Backlash between the sector gear and ball nut

10–B. STEERING GEAR

10–B–1. Steering Gear Removal

1. Remove the horn cap attaching screws and remove the horn ring.
2. Punch mating marks on the steering wheel hub and the worm shaft.
3. Remove the steering wheel attaching nut and then remove the steering wheel assembly.
4. Remove the column cover of the right side.
5. Remove the combination switch assembly retaining ring and lift the switch assembly over the worm shaft.

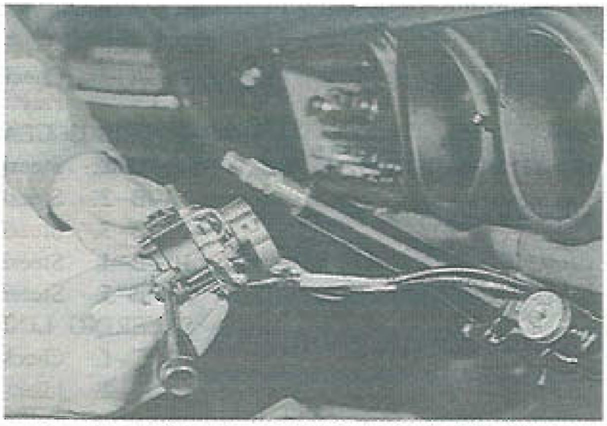


Fig. 10–1 Removing of combination switch assembly

6. Pull out the light switch knob and remove the column cover of the left side.
7. Remove the steering lock and ignition switch assembly, as described in **Par. 10–E** and attach a

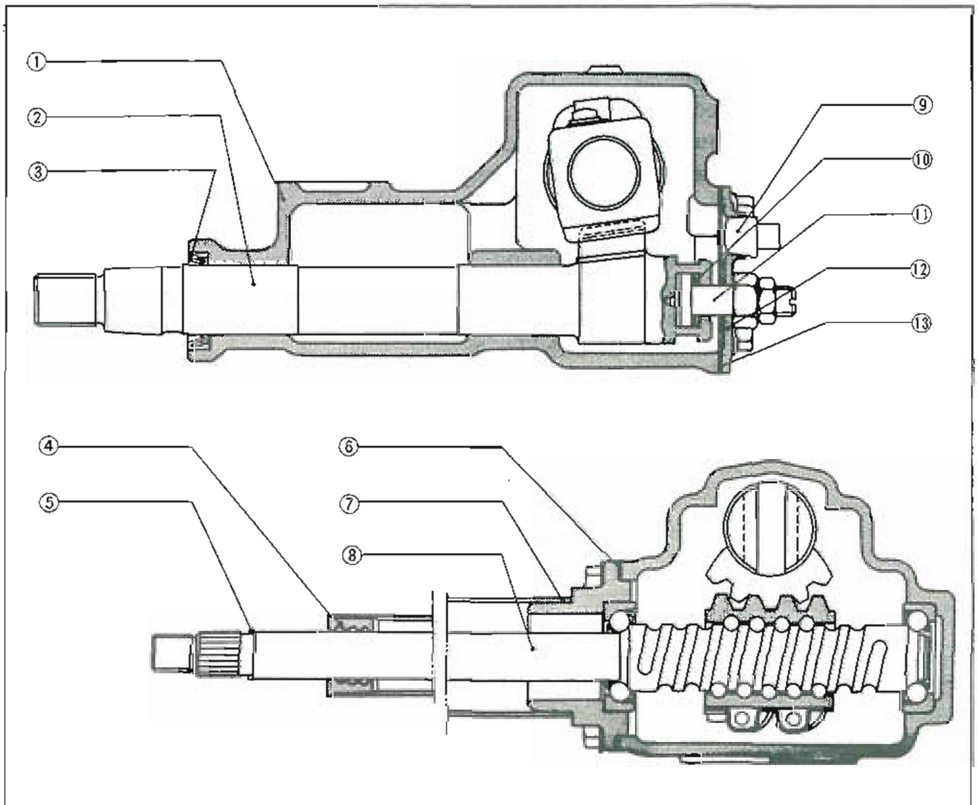


Fig. 10–2 Steering gear box

1. Steering gear housing
2. Sector shaft
3. Oil seal
4. Bush
5. Retaining ring
6. Adjusting shim
7. Column jacket
8. Worm shaft and ball nut assembly (Steering shaft)
9. Plug
10. Thrust washer
11. Sector shaft adjusting screw
12. Side cover
13. Gasket

suitable tape to the steering lock assembly attaching hole on the steering column.
8. Remove the steering column support bracket.
9. Open the hood and remove the steering column dust cover.
10. Raise the vehicle and remove the front wheel.
11. Disconnect the pitman arm from the steering center link by using the **ball joint puller** (Part No. 49 0118 850C).

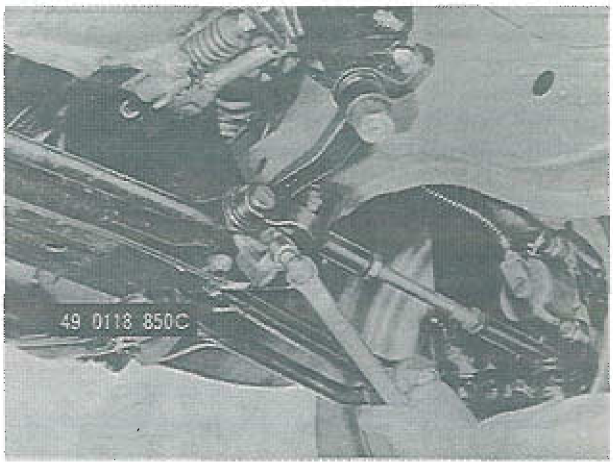


Fig. 10–3 Disconnecting of pitman arm

12. Remove the bolts and nuts that attach the steering gear housing to the body.

Note:
Confirm the position of the shim for convenience when readjusting the column shaft alignment.

13. Remove the steering gear housing assembly from the vehicle.

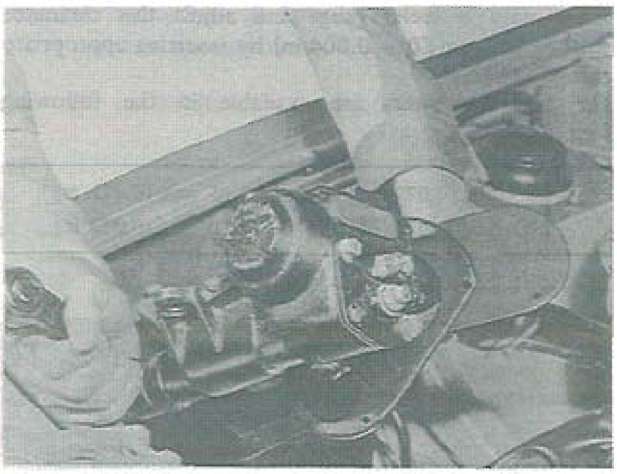


Fig. 10–4 Removing of steering gear assembly

10–B–2. Steering Gear Disassembly
1. Drain lubricant from the gear housing by removing the plug.
2. Remove the nut attaching the pitman arm and remove the pitman arm with the **pitman arm puller** (Part No. 49 0223 695D), as shown in Fig. 10–5.
3. Remove the bolts that attach the side cover to the gear housing and loosen the sector shaft adjusting

Fig. 10–5 Removing of pitman arm

screw lock nut, then remove the sector shaft side cover screwing in the sector shaft adjusting screw.
4. Remove the sector shaft adjusting screw and shim from the slot at the end of the sector shaft.
5. Remove the sector shaft from the gear housing.

Fig. 10–6 Removing of sector shaft

6. Remove the bolts that attach the column jacket to the gear housing and remove the column jacket and shims.

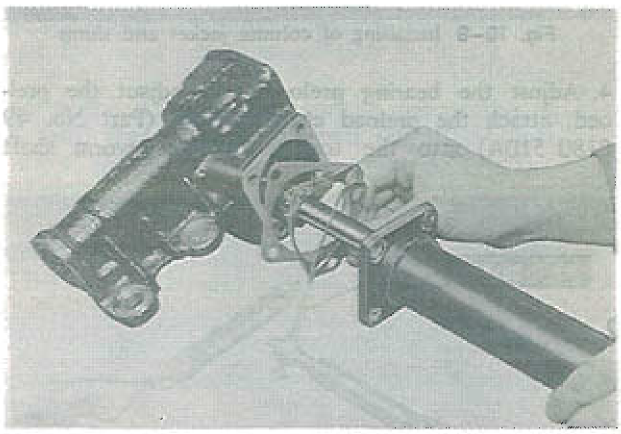


Fig. 10–7 Removing of column jacket and shims

7. Remove the worm shaft and ball nut assembly from the gear housing.
8. Remove the oil seal from the gear housing, if necessary.

10–B–3. Steering Gear Inspection

1. Check the steering wheel for cracks or damage.
2. Check the operation of the ball nut assembly on the worm shaft. If the ball nut does not travel smoothly and freely on the worm shaft, the ball nut and worm shaft assembly should be replaced.

Note:
The worm shaft and ball nut are serviced as an assembly only.

3. Check the run-out of the worm shaft with a dial indicator. The permissible run-out is under **0.15 mm (0.006 in)**. If the run-out is excessive, correct this by using a press or replace with new one.
4. Check the sector shaft for wear or damage at the gear surface.
5. Check the oil seal for wear, flaw, or any damage. If there is any possibility of oil leakage, replace the oil seal.

10–B–4. Steering Gear Assembly

1. Install the oil seal to the gear housing.
2. Insert the worm shaft and ball nut assembly into the gear housing.
3. Install the column jacket and the bearing preload adjusting shims to the gear housing and tighten the column jacket attaching bolts to 0.8 m-kg (5.8 ft-lb).

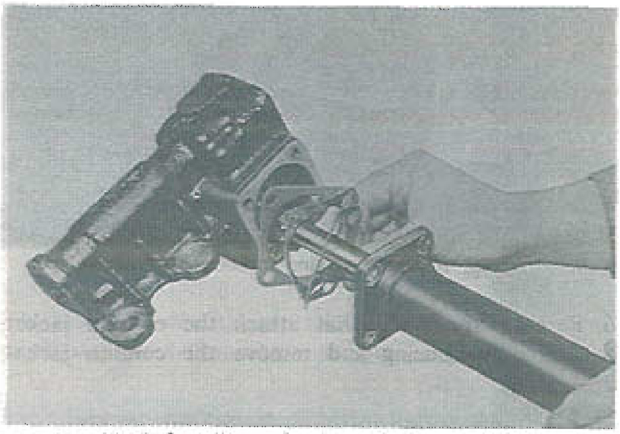


Fig. 10–8 Installing of column jacket and shims

4. Adjust the bearing preload. To adjsut the preload, attach the **preload checking tool** (Part No. 49 0180 510A) onto the top end of the worm shaft and connect a pull scale to the preload checking tool. Pull the scale at constant speed, and read the scale keeping the worm shaft rotating. If the reading is less than **0.1 kg (0.22 lb)**, reduce the shim, and add the shim if the preload is more than **0.4 (0.88 lb)**. The following shims are available.

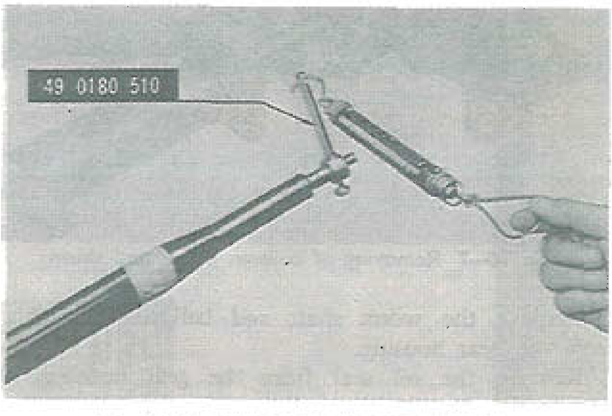


Fig. 10–9 Adjusting of bearing preload

0.050 mm (0.002 in)	0.100 mm (0.004 in)
0.075 mm (0.003 in)	0.200 mm (0.008 in)

5. Insert the sector shaft into the gear housing, being careful not to damage the oil seal, and ensuring that the center of the sector gear is in alignment with the center of the worm gear as shown in Fig. 10–10.

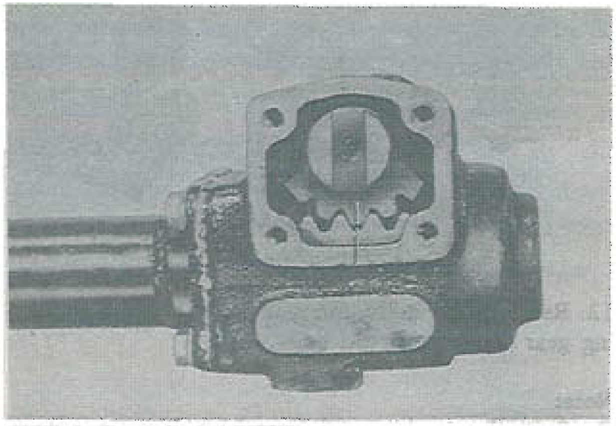


Fig. 10–10 Position of sector gear and worm gear

6. Install the sector shaft adjusting screw into the slot at the end of the sector shaft. Check the end clearance between the sector shaft and adjusting screw with a feeler gauge and adjust this clearance to **0 ~ 0.1 mm (0 ~ 0.004 in)** by inserting appropriate thrust washer.

The thrust washers are available in the following four thicknesses:

1.95 mm (0.077 in)	2.05 mm (0.081 in)
2.00 mm (0.079 in)	2.10 mm (0.083 in)

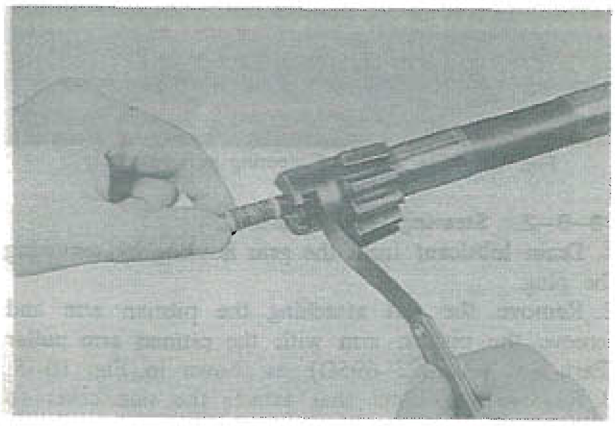


Fig. 10–11 Checking of end clearance

7. Place the side cover and the gasket onto the sector shaft adjusting screw and turn the adjusting screw until the side cover is screwed into proper position. Install the side cover attaching bolts and tighten the bolts.

Fig. 10–12 Placing of side cover

8. Install the pitman arm onto the sector shaft, aligning the identification marks of the pitman arm and sector shaft. Install the pitman arm attaching nut and tighten the nut to 15.0 m-kg (106 ft-lb).

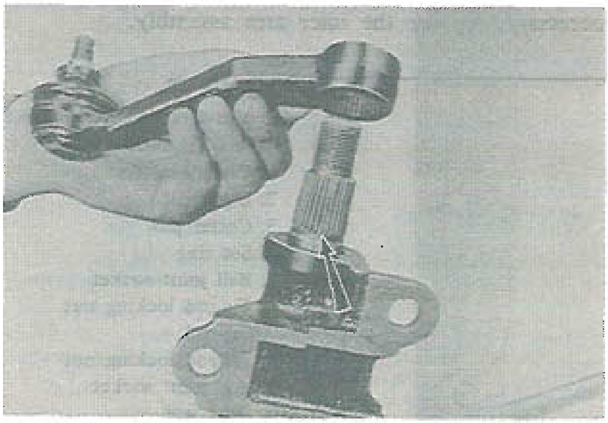


Fig. 10–13 Installing of pitman arm

9. Adjust the backlash between the worm gear and sector shaft gear. To adjust the backlash, position the sector shaft at the center of the worm gear,

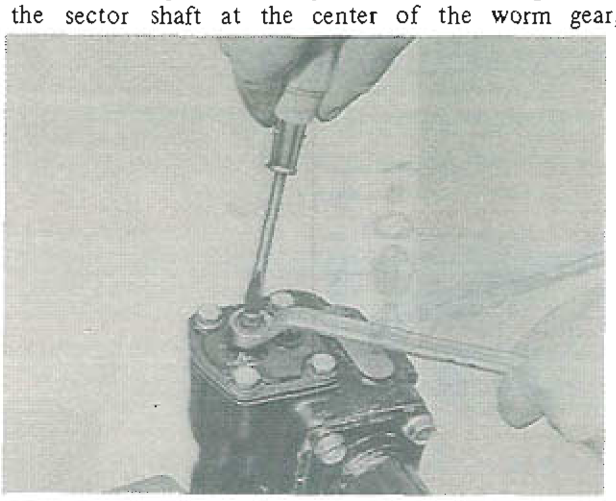


Fig. 10–14 Adjusting of backlash

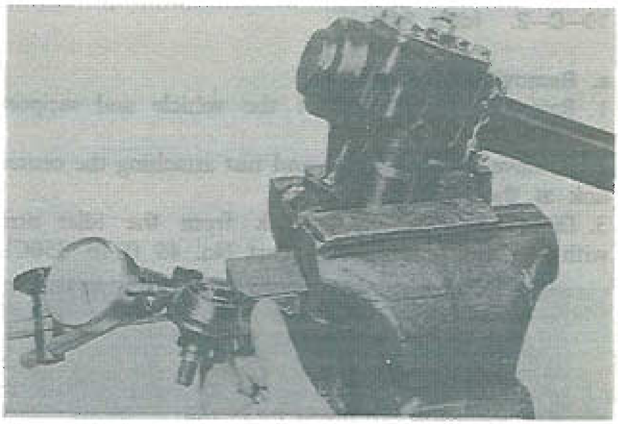


Fig. 10–15 Checking of backlash

then obtain the specified backlash of **0.42 ~ 0 mm (0.017 ~ 0 in) at the pitman arm end** by turning the sector shaft adjusting screw as shown in Fig. 10–14. Tighten the adjusting screw lock nut, taking care not to disturb the backlash. Rotate the worm shaft and check to ensure that the sector shaft **turns 40°** smoothly to the right and left.

10. Check the worm shaft rotating torque. To check, attach the ***checking tool*** (Part No. 49 0180 510) onto the top end of the worm shaft and connect a pull scale to the checking tool. Pull the scale and check the worm shaft rotating torque. If the rotating torque is less than **0.6 kg (1.32 lb)** or more than **0.8 kg (1.76 lb)**, readjust the bearing preload.

10–B–5. Steering Gear Installation

Follow the removal procedures in the reverse order.

Note:

(a) Before installing the gear housing to the body, install the column jacket to the instrument panel temporarily to obtain proper position of the gear housing.

(b) Place the shim in original position to obtain proper shaft alignment.

(c) Align the mating marks on the worm shaft and the steering wheel hub.

(d) Fill the gear housing with lubricant.

10–C. STEERING LINKAGE

10–C–1. Checking of Ball Joint

1. If it exceeds 1.0 mm, replace the ball joint in its assembled form.

2. Check the dust seal for wear, flaw or any damage. If the dust seal is defective, this will allow entry of water and dust, resulting in ball joint wear. Replace the dust seal if necessary.

10–C–2. Idler Arm

a. Removing of idler arm

1. Raise the front end of the vehicle and support with stands.
2. Remove the cotter pin and nut attaching the center link at the idler arm.
3. Disconnect the center link from the idler arm with the **ball joint puller** (Part No. 49 0118 850C).

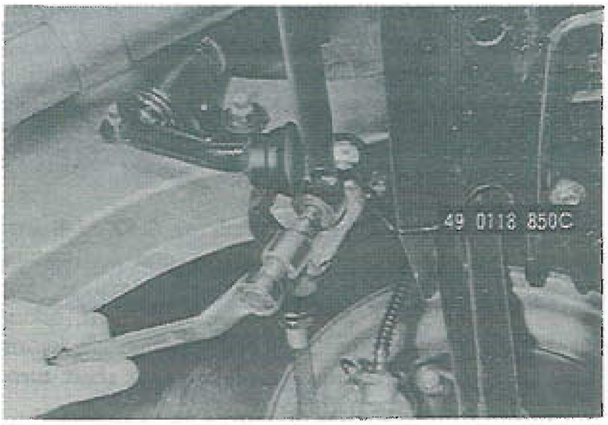


Fig. 10–16 Disconnecting of center link

4. Remove the nuts attaching the idler arm and remove the idler arm.

b. Disassembling of idler arm

1. Hold the idler arm in a vice, protecting with aluminum, remove the cotter pin and remove the bracket attaching nut.

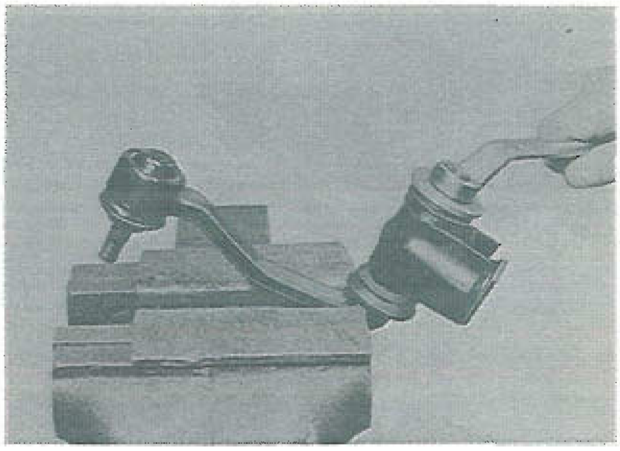


Fig. 10–17 Removing of bracket attaching nut

2. Remove the washers, bushes and bracket.

c. Checking of idler arm

1. Inspect the bush for wear or damage.
2. Check the revolving torque of the ball joint. If necessary, replace the idler arm assembly.

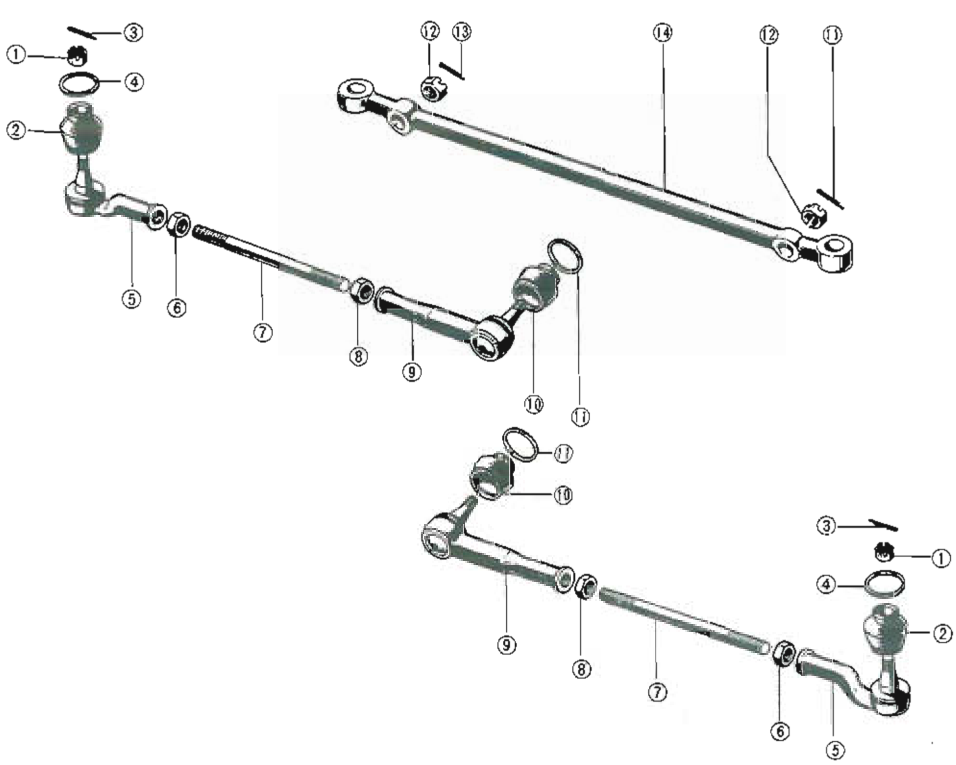


Fig. 10–18
Center link and tie-rod

1. Castellated nut
2. Dust seal
3. Cotter pin
4. Set ring
5. Ball joint socket
6. Tie-rod locking nut
7. Tie-rod
8. Tie-rod locking nut
9. Ball joint socket
10. Dust seal
11. Set ring
12. Castellated nut
13. Cotter pin
14. Center link (Pitman arm-to-idler arm)

d. Assembling of idler arm
Follow the disassembly procedures in the reverse order.

Note:
Apply grease to the bracket and bushes.

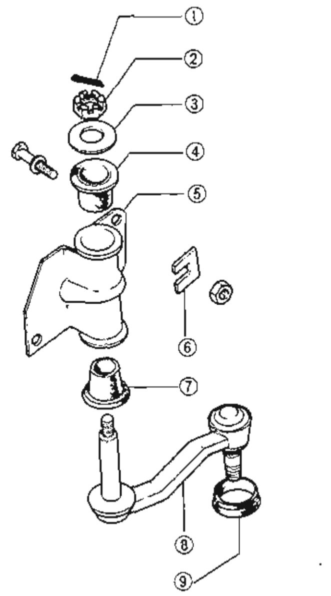


Fig. 10–19
Idler arm

1. Cotter pin
2. Nut
3. Washer
4. Bush
5. Bracket
6. Adjusting shim
7. Bush
8. Idler arm
9. Dust boot

e. Installing of idler arm
Follow the removal procedures in the reverse order.

Note:
Tighten the idler arm attaching nuts to 5.0 m-kg (40.0 ft-lb).

10–C–3. Replacing of Pitman Arm

1. Raise the front end of the vehicle and support with stands.
2. Remove the cotter pin and castellated nut that attach the steering center link to the pitman arm.
3. Disconnect the steering center link from the pitman arm with the **ball joint puller** (Part No. 49 0118 850C).
4. Remove the pitman arm attaching nut.
5. Remove the pitman arm from the sector shaft using the **pitman arm puller** (Part No. 49 0223 695A).
6. Install the pitman arm onto the sector shaft, aligning the identification marks of the pitman arm and sector shaft.
7. Install the pitman arm attaching nut and tighten the nut to 15.0 m-kg (106 ft-lb).
8. Secure the steering center link to the pitman arm with the castellated nut. Tighten the nut and install the cotter pin.

Note:
Always tighten the nut to the next castellation if necessary to install the cotter pin.

10–C–4. Replacing of Tie-rod

The tie-rod should be replaced, if it becomes worn or damaged. **Do not** attempt to straighten the tie-rod if damaged.

1. Raise the front end of the vehicle and support with stands.
2. Remove the cotter pins and castellated nuts that attach both tie-rod ends to the center link and steering knuckle.
3. Disconnect the tie-rod ends from the center link and steering knuckle with the **ball joint puller** (Part No. 49 0118 850C).
4. Remove the tie-rod.
5. Secure the tie-rod to the center link and steering knuckle with castellated nut. Tighten the nut and install the cotter pin.
6. Check and, if necessary, adjust toe-in.

Note:
Whenever the tie-rod or ball joint is replaced, the toe-in is reset.

10–C–5. Replacing of Center Link

The center link connecting the pitman arm and the idler arm is non-adjustable. The link should be replaced when damaged or when worn at the ball stud.

1. Raise the front end of the vehicle and support with stands.
2. Remove the cotter pins and castellated nuts that attach both tie-rod ends to the center link.
3. Disconnect the tie-rod ends from the center link using the **ball joint puller** (Part No. 49 0118 850C).
4. Remove the cotter pin and castellated nut attaching the idler arm to the center link.
5. Remove the cotter pin and castellated nut attaching the pitman arm to the center link.
6. Disconnect the pitman arm from the center link using the ball joint puller and remove the center link.
7. Position the center link to the pitman arm and idler arm and install the castellated nuts loosely. Tighten the nut and install the cotter pin.
8. Position the tie-rod ends to the center link and install the castellated nuts. Tighten the nut and install the cotter pin.
9. Check and, if necessary, adjust toe-in.

10–D. FRONT WHEEL ALIGNMENT

Front wheel alignment is most important if correct steering, and reasonable tire wear are to be obtained. Before attempting to check the wheel alignment, the following points should be investigated, and if necessary, corrected.

1. Tires for correct inflation
2. Unbalanced tires
3. Wobbling wheels
4. Front wheel bearing adjustment
5. Ball joints, and tie-rod end for looseness
6. Front coil springs for correct seating

When the above points are all in order, the vehicle should be stood on a perfectly level surface in the wheel alignment bay or stall.

10–D–1. Toe-in

a. Checking of toe-in

1. Raise the front end of the vehicle until the wheels clear the ground.
2. Turning the wheel by hand, mark a line in the center of the wheel with a scribing block.
3. Lower the vehicle and place the front wheels in the straight-ahead position.
4. Measure the distances between the marked lines at the front and rear of the wheels with a suitable toe-in gauge. The difference between these two distances is the toe-in. The standard toe-in is **0~6 mm (0~0.24 in).**

Fig. 10–20 Measuring of toe-in

b. Adjusting of toe-in

If the toe-in is incorrect, proceed as follows:

1. Loosen the tie-rod locking nuts at each end of the tie-rod.

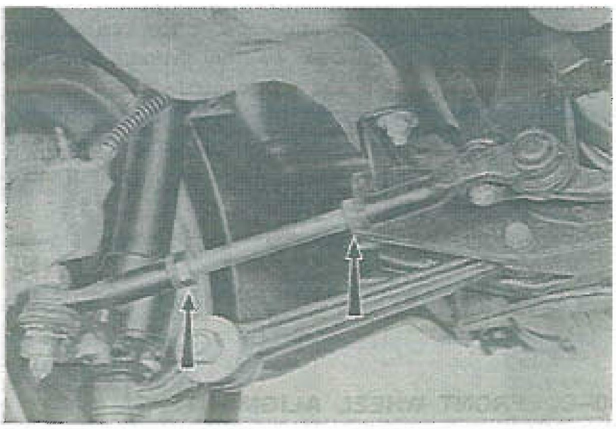


Fig. 10–21 Loosening of tie-rod locking nut

2. Check that the tie-rod ends are in the same position on each rod, thus ensuring that the tie-rods are the same length.
3. Turn the both tie-rods an equal amount until the correct toe-in is obtained.

Note:
The tie-rod is threaded with right and left hand threads.

4. Tighten the tie-rod locking nuts and recheck the toe-in.

10–D–2. Caster, Camber and King Pin Inclination

a. Checking of caster, camber and king pin inclination

There are several alignment machines available, and the instruction furnished by each manufacturer for the operation of the machine must be followed. Regardless of type of equipment used, it is essential that the vehicle is placed on absolutely level surface at all time, and before checking them, the front and rear of the vehicle is moved up and down several times to set the suspension to normal condition.

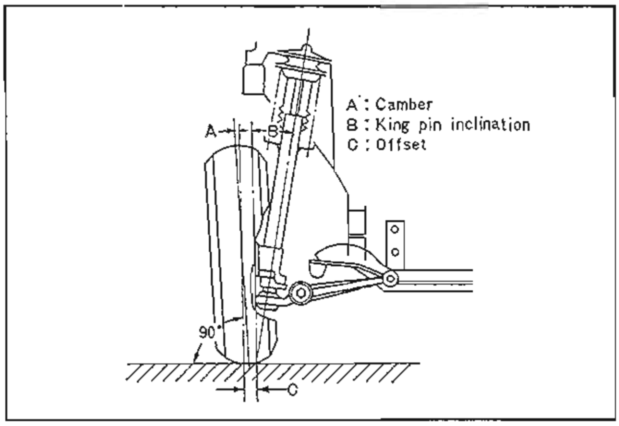


Fig. 10–22 Camber

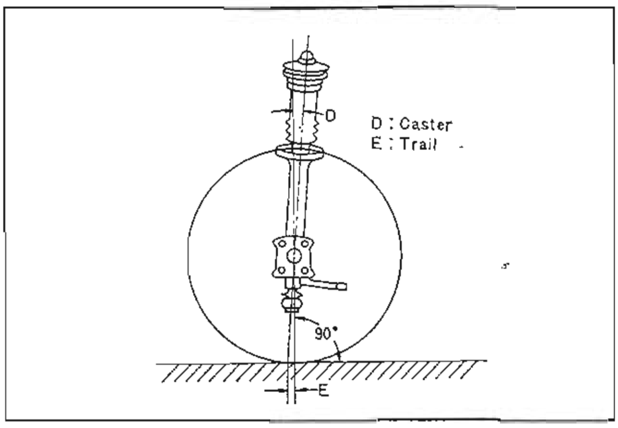


Fig. 10–23 Caster

Specified angles are shown in the Technical Data.

b. Interpretation of wheel alignment figures

The caster, camber, and king pin inclination angles are not adjustable. Whenever the caster, camber or king pin inclination is altered out of specified angle, check all parts of the front suspension and body alignment, and replace or repair necessary parts.

10–E. STEERING LOCK AND IGNITION SWITCH ASSEMBLY

10–E–1. Steering Lock and Ignition Switch Assembly Removal

1. Pull out the light switch knob.
2. Remove the column covers by removing the attaching screws.

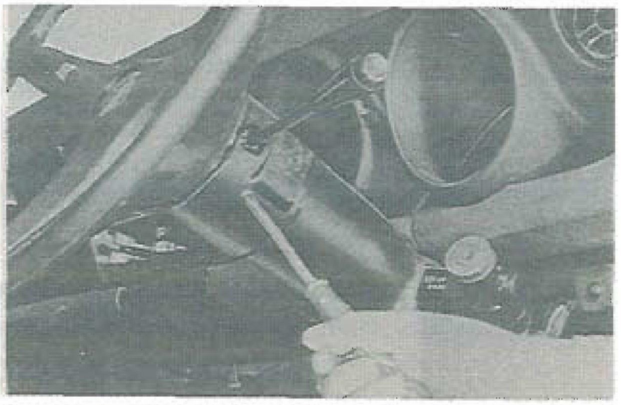


Fig. 10–24 Removing of column cover

3. Disconnect the wire connector from the lock and switch assembly.
4. Make the groove (–) on the head of the lock and switch assembly attaching bolt with a suitable tool.
5. Remove the attaching bolts with a screwdriver.

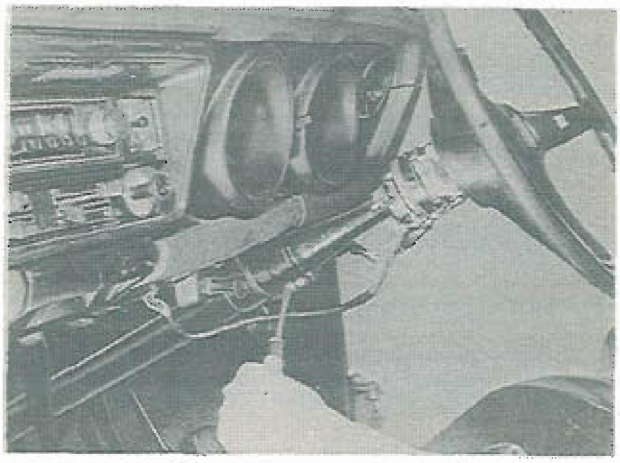


Fig. 10–25 Removing of attaching bolts

6. Remove the lock and switch assembly.

10–E–2. *Steering Lock and Ignition Switch Assembly Installation*

Follow the removal procedures in the reverse order.

Note:
After tightening the bolts, break the head section of the bolts to lock the steering lock assembly.

SPECIAL TOOLS

49 0118 850C	Ball joint puller
49 0180 510A	Preload checking tool
49 0223 695D	Pitman arm puller

BRAKES

DESCRIPTION

The brakes consist of two systems, the foot brake, and the parking brake. The front brakes are of a disc brake type.
The rear brakes are of a drum type with leading and trailing shoes. The brake pedal is of a pendant type.
The parking brake operates the brake shoes of the rear wheels through the wire linkage.

11–A. BRAKE ADJUSTMENT

11–A–1. Adjusting of Brake Pedal

1. Disconnect the stop light switch wiring terminals.
2. Loosen the lock nut and adjust the pedal height to **185 mm (7.3 in)** between the pedal and the floor mat by turning the stop light switch. Next, tighten the lock nut.

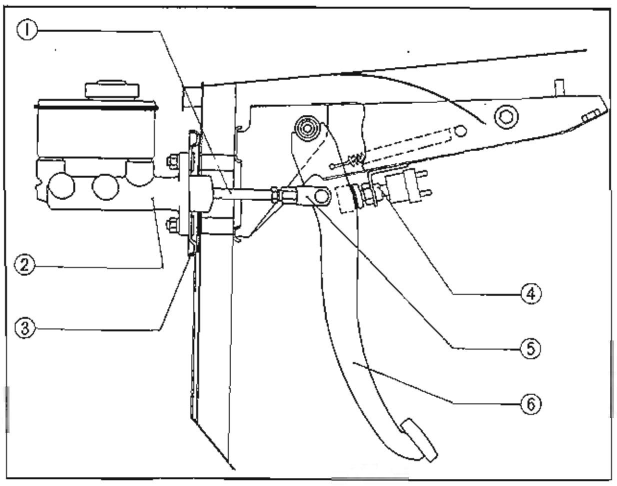


Fig. 11–1 Adjusting of brake pedal height

1. Push rod
2. Master cylinder
3. Plate
4. Stop switch
5. Push rod fork
6. Brake pedal

3. Brake pedal free travel:

808 (1300)	0.5 ~ 3.0 mm (0.02 ~ 0.12 in)	– Before push rod contacts with piston
808 (1600)·RX-3	7 ~ 9 mm (0.28 ~ 0.35 in)	– Before power brake piston operates

To adjust free travel, loosen the lock nut and turn the push rod connected to the brake pedal. After adjustment, tighten the lock nut. Further, it must be away **more than 20 mm (0.79 in)** from the toe board when the brake is fully locked.

11–A–2. Bleeding of Hydraulic System

When any parts of the hydraulic system has been disconnected for repair or replacement, air may enter into the lines, and causes spongy pedal action.
This requires the bleeding of the hydraulic system after it has been properly connected to be sure that all air is expelled from the brake cylinders and lines. When bleeding the brake system, bleed one brake bleeder screw at a time, beginning at the bleeder screw with the longest hydraulic line first. **Never use** brake fluid which has been drained from the hydraulic system.

The bleeding procedures are as follows:
1. Keep the brake master cylinder reservoir filled with new brake fluid during bleeding operation.

Note:
Never allow the brake fluid to drop on any painted surface.

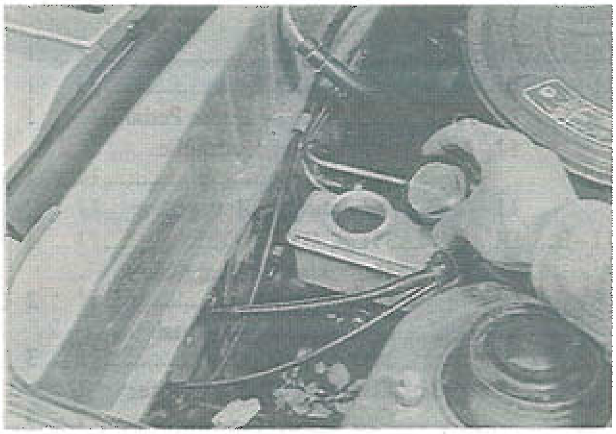


Fig. 11–2 Checking of fluid level

2. Remove the rubber cap from the bleeder screw, and connect a vinyl drain tube onto the bleeder screw. Submerge the other end of the vinyl tube into a suitable container while bleeding the brake system.
3. Depress the brake pedal slowly several times to bleed the air, and with the brake pedal depressed, loosen the bleeder screw one-third to half of a turn, then close the bleeder screw before brake pedal is released.

Note:
Do not release the brake pedal until the bleeder screw is tightened as additional air may enter into the wheel cylinder.

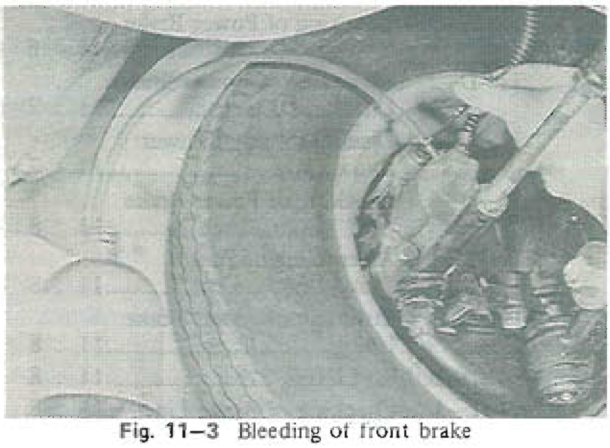


Fig. 11–3 Bleeding of front brake

4. Repeat this operation until the brake fluid flows into the container without any air bubbles.
5. After bleeding completely, tighten the bleeder screw, and install the rubber cap onto the bleeder screw.

6. Fill the reservoir with brake fluid.

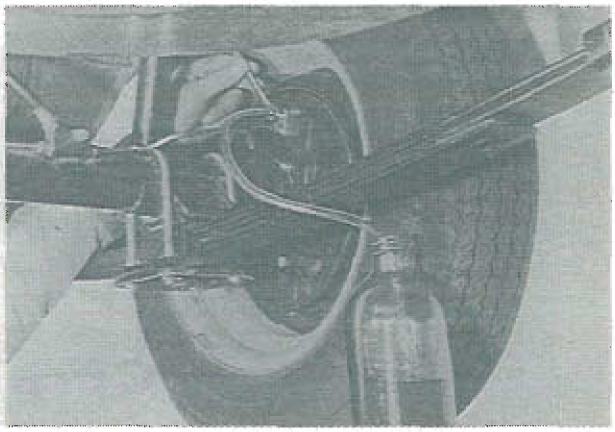


Fig. 11–4 Bleeding of rear brake

11–A–3. Adjusting of Brake Shoe

To adjust the brake shoe, proceed as follows:

1. Jack the rear end of the vehicle, then support with stands.
2. Make sure that the parking brake is fully released.
3. Remove the shoe adjusting hole plug from the backing plate, and expand one brake shoe by turning the adjuster toward the arrow direction marked on the backing plate until the wheel locks. At this time, pump the brake pedal several times to make sure that the shoes contact the drum on the entire surface. If the wheel turns after removing the foot from the brake pedal, turn the star wheel further until the wheel locks firmly.

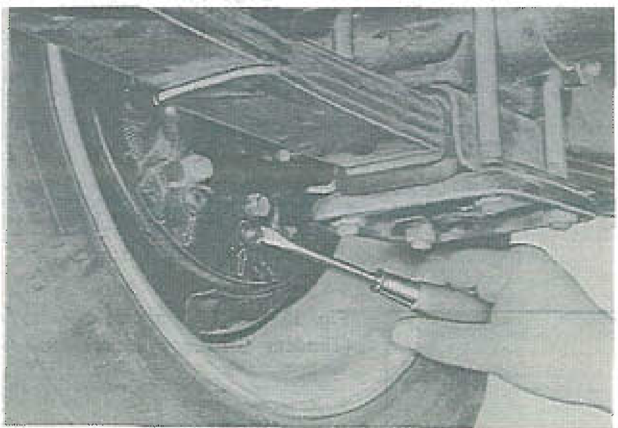


Fig. 11–5 Removing of plug

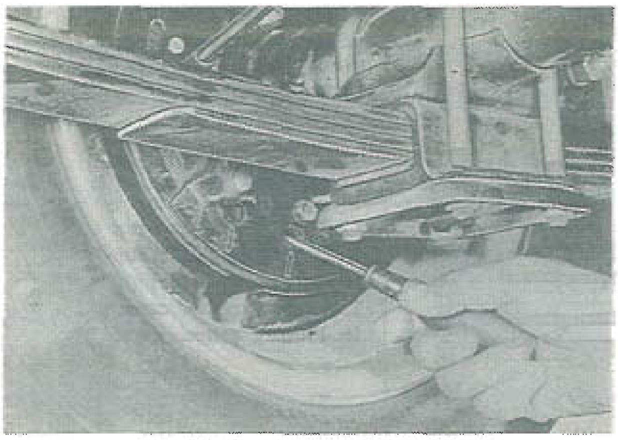


Fig. 11–6 Adjusting of brake shoe

4. Back off the adjuster about five notches so that the drum rotates freely without any drag.
5. Check that the wheel rotates freely after pumping the brake pedal several times. Next, install the adjusting hole plug onto the backing plate.

Note:
If the wheel does not rotate freely, check and repair the drum, shoes or other necessary parts.

6. Perform the same adjustment on the other three shoes of the rear wheels. The adjustments must be equal at all shoes.

11–B. DUAL MASTER CYLINDER

11–B–1. Removing of Dual Master Cylinder

1. Disconnect the fluid pipes at the master cylinder outlets.
2. Remove the nuts that attach the master cylinder to the dash panel or power brake unit.
3. Remove the master cylinder.

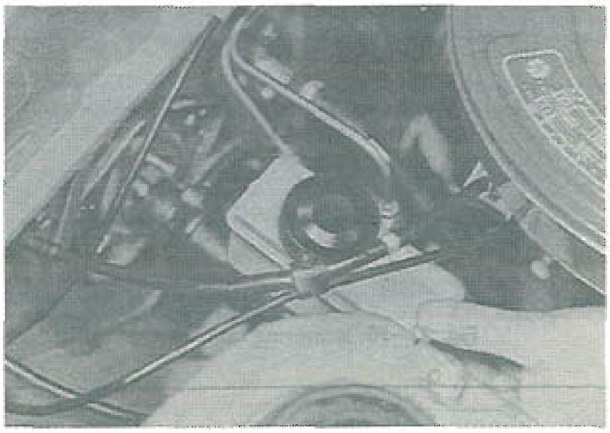


Fig. 11–7 Removing of master cylinder

4. Remove the reservoir, if required. (RX–3)

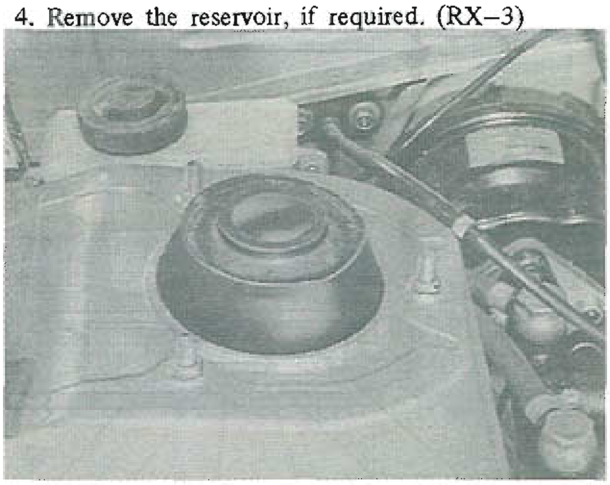


Fig. 11–8 Removing of reservoir (RX–3)

11–B–2. Disassembling of Dual Master Cylinder

1. Clean the outside of the master cylinder.
2. Pour out any brake fluid that remains in the cylinder. Discard the old brake fluid.
3. Remove the reservoir from the cylinder.
4. Remove the dust boot from the cylinder.

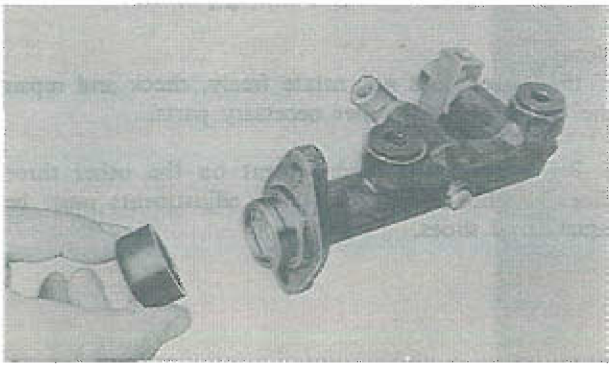


Fig. 11–9 Removing of boot

5. Depress the primary piston assembly and remove the snap ring from the retaining groove at the rear of the cylinder bore.

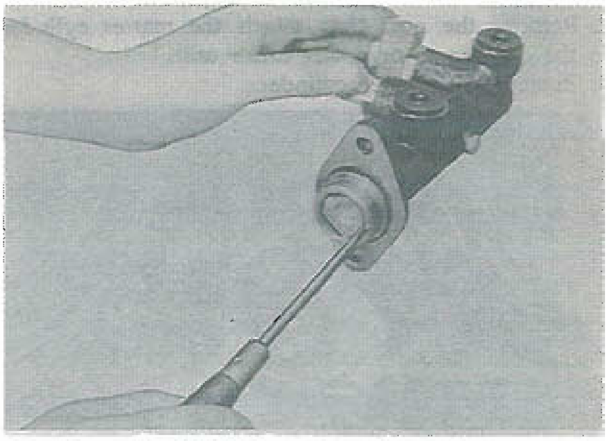


Fig. 11–10 Removing of snap ring

6. Remove the washer, primary piston assembly and return spring from the cylinder bore.

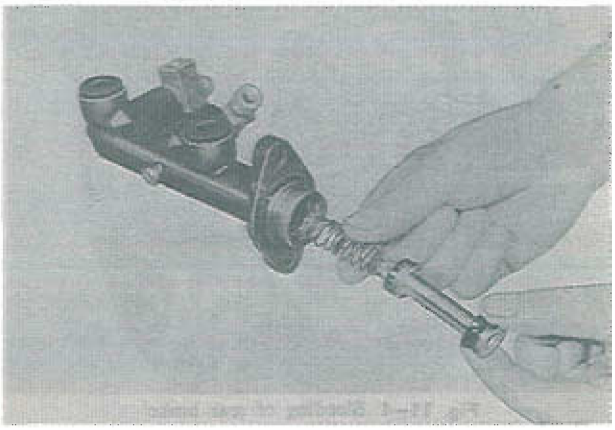


Fig. 11–11 Removing of primary piston

7. Depress the secondary piston assembly with a suitable rod and remove the secondary piston stop bolt from the outside of the cylinder.
8. Remove the secondary piston assembly and return spring. If necessary, blow out with compressed air

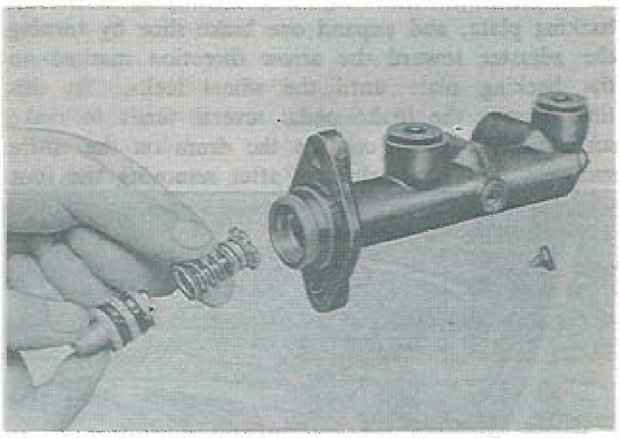


Fig. 11–12 Removing of secondary piston

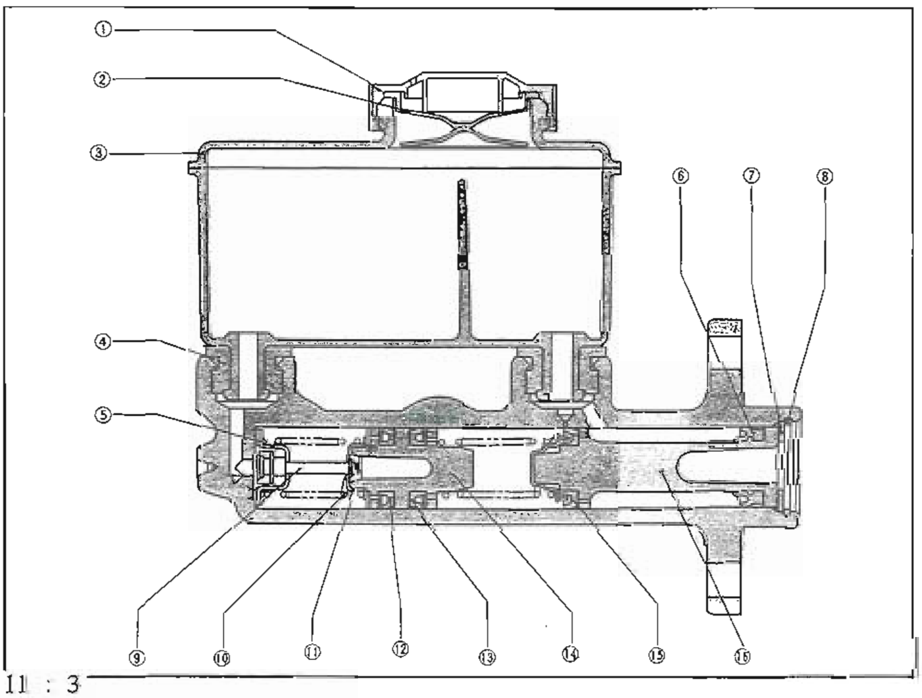


Fig. 11–13 Dual master cylinder (Tandem master cylinder) cross section

1. Reservoir cap
2. Fluid baffle
3. Reservoir
4. Elbow joint bush
5. Valve stopper
6. Primary piston cup
7. Washer
8. Snap ring
9. Valve rod
10. Spring
11. Spring seat
12. Secondary piston cup
13. Secondary piston cup
14. Secondary piston
15. Primary piston cup
16. Primary piston

from the secondary brake system outlet or inlet.
9. Remove the joint bolts from the primary brake system and secondary brake system outlets. Then, remove the check valves and return springs from the outlets.

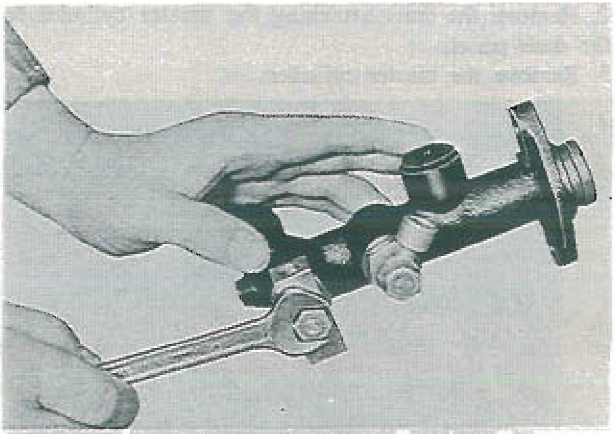


Fig. 11–14 Removing of joint bolt

10. Remove the bleeder screw, if required.

11–B–3. Checking of Dual Master Cylinder

1. Clean all parts in clean alcohol or brake fluid. **Never use** gasoline or kerosene.
2. Check the piston cups and replace if they are damaged, worn, softened, or swelled.
3. Examine the cylinder bore and piston for wear, roughness or scoring. Check the clearance between the cylinder bore and the piston. If it is more than **0.15 mm (0.006 in)**, replace the cylinder or piston.
4. Check all recesses, openings and internal passages to be sure they are open and free of foreign matter.

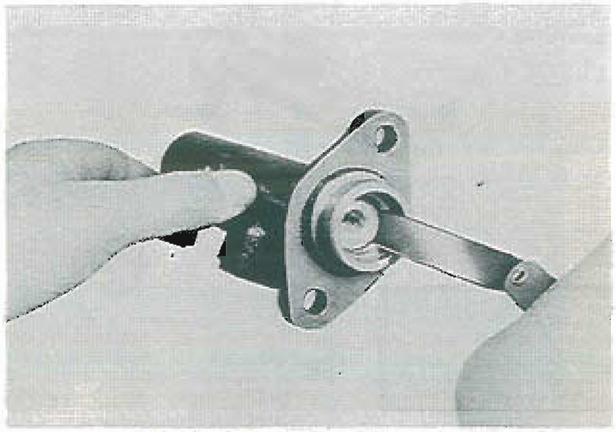


Fig. 11–15 Checking of clearance

Use compressed air to blow out dirt and cleaning solvent.
5. Check the piston return spring for weakness.

11–B–4. Assembling of Dual Master Cylinder

1. Dip all parts except the cylinder in clean brake fluid.
2. Insert the check valve springs into the outlets and place the check valves over the springs. Install the joint bolts and tighten them.
3. Assemble the tipping valve, tipping valve spring, valve stopper, secondary piston return spring and spring seat onto the tipping valve rod, and insert the tipping valve and secondary piston return spring assembly into the cylinder.
4. Assemble the secondary cup over the end of the secondary piston, so that flat side of the cup seats against the flange of the piston. Insert the secondary piston assembly into the cylinder.
5. Fit the guide pin into the secondary piston stop

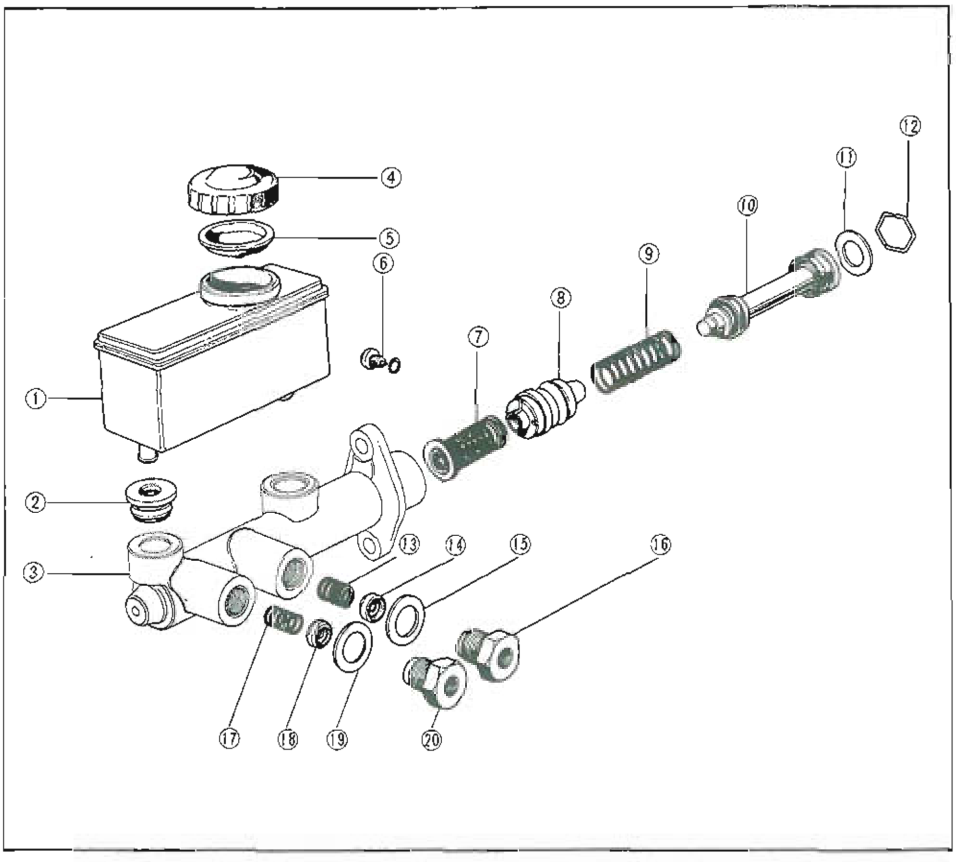


Fig. 11–16 Dual master cylinder components

1. Reservoir
2. Bush
3. Cylinder
4. Reservoir cap
5. Fluid baffle
6. Secondary piston stop bolt
7. Tipping valve and secondary piston return spring assembly
8. Secondary piston
9. Primary piston return spring
10. Primary piston
11. Snap ring
12. Washer
13. Spring
14. Check valve
15. Gasket
16. Secondary brake system outlet joint bolt (Rear brake system outlet joint bolt)
17. Spring
18. Check valve (Outlet valve)
19. Gasket
20. Primary brake system outlet joint bolt (Front brake system outlet joint bolt)

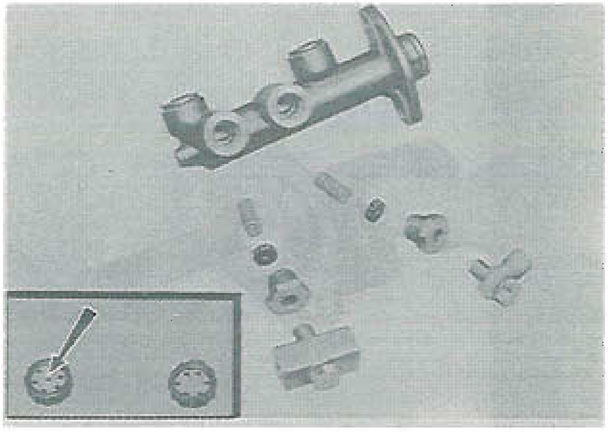


Fig. 11–17 Check valves and joint bolts

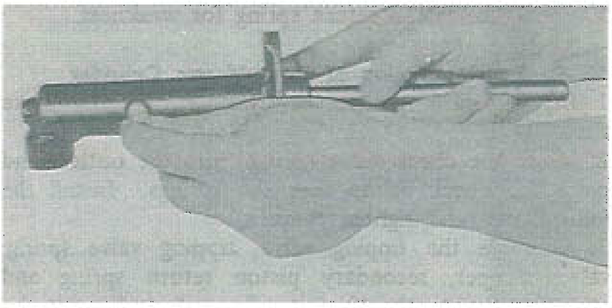


Fig. 11–18 Installing of secondary piston and stop bolt

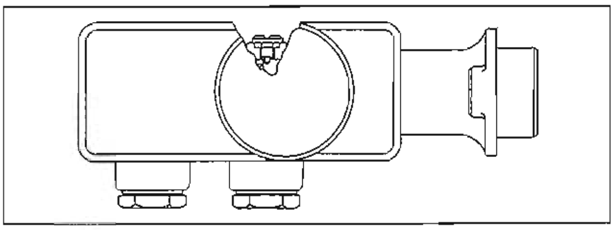


Fig. 11–19 Installing of stop bolt

bolt hole and insert the secondary piston into the cylinder. Depress the secondary piston with a suitable rod and remove the guide pin. Then, install the secondary piston stop bolt.
6. Assemble the primary cups over the ends of the primary piston, so that the flat side of the cup seat against the flange of the piston.
7. Insert the primary piston return spring and the primary piston assembly into the cylinder.
8. Hold the primary piston down and install the snap ring into position in groove of the cylinder bore.

Note:
Make sure that the piston cups do not cover the compensating ports.

9. Install the reservoir to the cylinder.
10. Install the dust boot to the cylinder.

11–B–5. Installing of Dual Master Cylinder

Follow the removal procedures in the reverse order.
Note:
Fill the reservoir and bleed the air at each bleeder screw.

11–C. SINGLE MASTER CYLINDER

11–C–1. Removing of Single Master Cylinder

1. Disconnect the fluid pipe at the brake master cylinder outlet.
2. Remove the nuts attaching the master cylinder to the dash panel.
3. Remove the master cylinder.

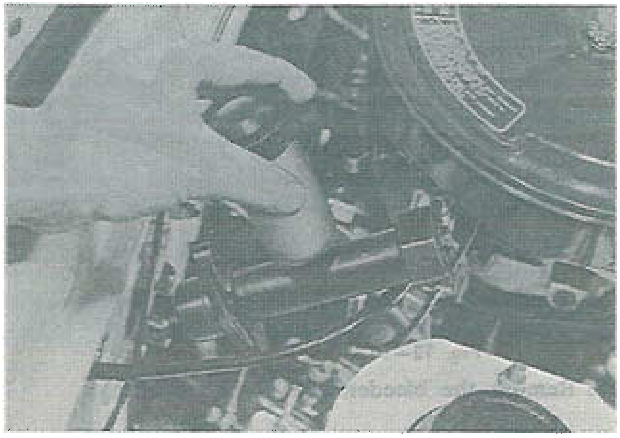


Fig. 11–20 Removing of single master cylinder

11–C–2. Disassembling of Single Master Cylinder

1. Clean the outside of the master cylinder.
2. Pour out any brake fluid that remains in the cylinder. Discard the old brake fluid.
3. Remove the dust boot from the cylinder.
4. Depress the piston assembly and remove the snap ring from the retaining groove at the rear of the cylinder bore.
5. Remove the washer, piston, piston cup, piston return spring, check valve and valve seat from the cylinder.
6. Remove the reservoir from the cylinder.

11–C–3. Checking of Single Master Cylinder

Refer to Par. 11–B–3 and inspect the single master cylinder.

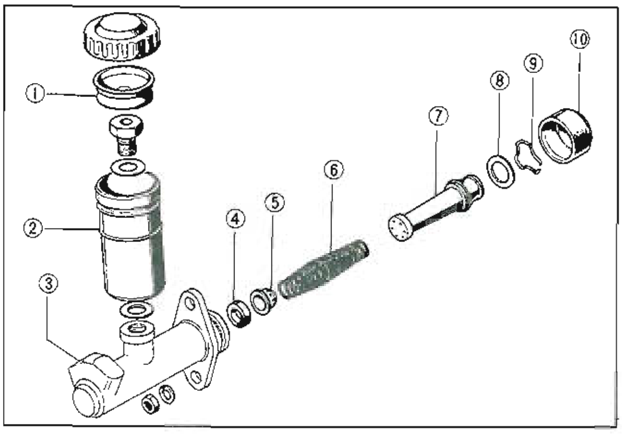


Fig. 11–21 Single master cylinder components

1. Fluid baffle
2. Reservoir
3. Cylinder
4. Valve seat
5. Check valve
6. Piston return spring
7. Piston
8. Washer
9. Snap ring
10. Dust boot

11–C–4. Assembling of Single Master Cylinder

1. Dip all parts except the cylinder in clean brake fluid.
2. Insert the valve seat, check valve, and piston return spring into the cylinder.
3. Insert the primary cup so that flat side of the cup seats against the piston.
4. Assemble the secondary cup onto the piston. The lip of the cup should face toward the compensating port in opposite end of the piston.
5. Insert the piston and secondary cup assembly into the cylinder.
6. Hold the piston assembly down and install the snap ring into position in groove in inside diameter of the cylinder bore.

Note:
Make sure that piston cup does not cover the compensating port.

7. Install the reservoir onto the cylinder.
8. Install the dust boot onto the cylinder.

11–C–5. Installing of Single Master Cylinder
Follow the removal procedures in the reverse order.

Note:
Fill the reservoir and bleed the air at each bleeder screw.

11–D. POWER BRAKE UNIT

11–D–1. Checking of Power Brake Unit on Vehicle

1. Road test the brakes by making a brake application at about 30 km (20 miles) to determine if the vehicle stops evenly and quickly. If pedal has a spongy feel when applying brakes, air may be present in hydraulic system. Bleed the system as described in **Par. 11–A–2.**
2. With the engine stopped and transmission in neutral, apply brakes several times to deplete all vacuum reverse in the power brake unit. Depress brake pedal, hold light-foot pressure on the pedal and start the engine. If vacuum system is operating, pedal will tend to fall away under foot pressure and less pressure will be required to hold pedal in applied position. If no action is felt, vacuum system is not functioning.
3. Stop the engine. Again deplete all vacuum reverse in system. Depress the brake pedal and hold foot pressure on the pedal. If pedal gradually falls away under foot pressure, hydraulic system is leaking internally or externally.
4. Start the engine with brakes off and transmission in neutral. Run the engine to medium speed and turn off ignition switch. Immediately close throttle. This build up vacuum. Wait no less than 90 seconds, then try brake action. If not vacuum assisted for two or more applications, vacuum check valve is faulty or there is a leak in vacuum system.

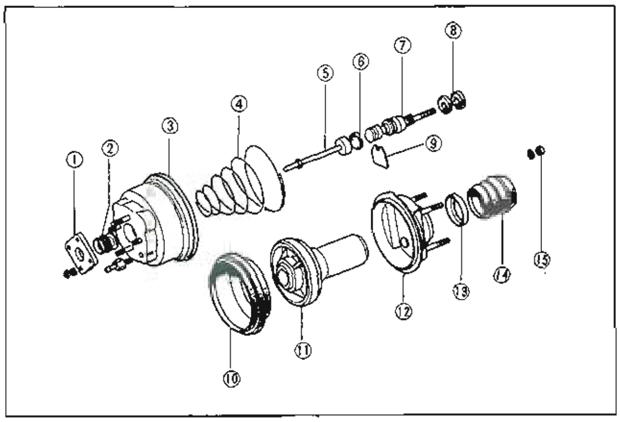


Fig. 11–23 Power brake unit components

1. Flange	8. Air silencer and filter
2. Front seal	9. Retainer key
3. Front shell	10. Diaphragm
4. Spring	11. Plate and valve body
5. Push rod	12. Rear shell
6. Reaction disc	13. Retainer
7. Valve rod and plunger assembly	14. Dust boot
	15. Washer and nut

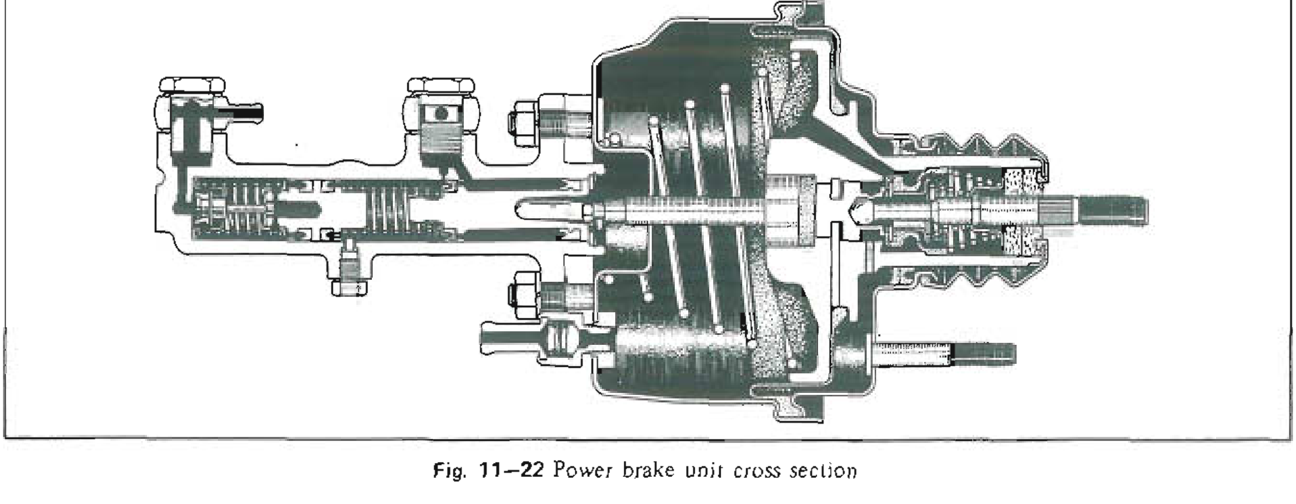


Fig. 11–22 Power brake unit cross section

11–D–2. Removing of Power Brake Unit

1. Disconnect the fluid pipes at the brake master cylinder outlets.
2. Disconnect the vacuum hose at the power brake unit.
3. Disconnect the push rod from the brake pedal by removing the cotter pin at the fork end.

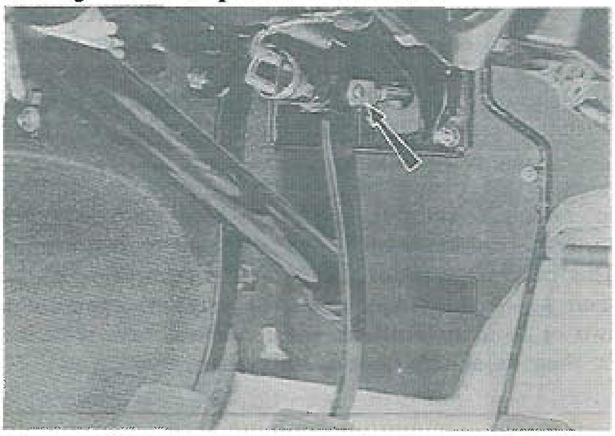


Fig. 11–24 Removing of cotter pin

4. Remove the nuts that attach the power brake unit to the dash panel.
5. Remove the power brake unit and master cylinder assembly from the dash panel, being careful not to allow brake fluid to drip on exterior paint.

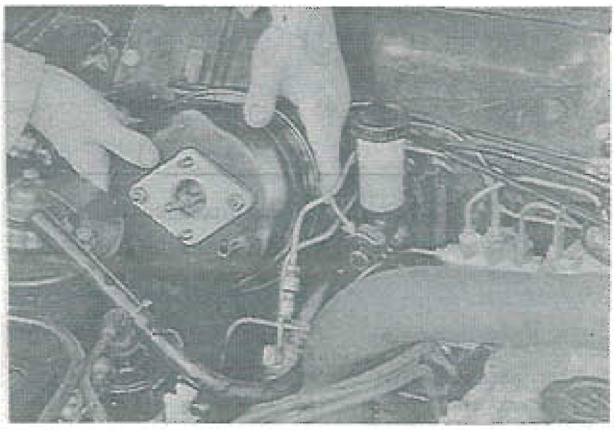


Fig. 11–25 Removing of power brake unit

11–D–3. Disassembling of Power Brake Unit

1. Remove the master cylinder and check valve from the power brake unit.

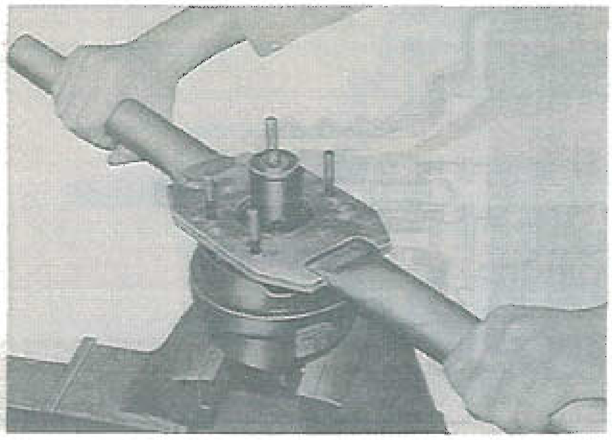


Fig. 11–26 Removing of rear shell

2. Place the power brake unit in a vice with push rod up. Clamp the unit firmly on the flange.
3. Scribe a mark on the bottom center of the front and rear shells to facilitate reassembly.
4. Remove the dust boot.
5. Attach a suitable wrench to the studs of the rear shell as shown in Fig. 11–26. Rotate the rear shell clockwise to unlocked postion.

Note:
Loosen the rear shell carefully as it is spring-loaded.

6. Lift the rear shell and plate and valve body, valve rod and plunger assembly from the unit. Then, remove the return spring.
7. Remove the plate, valve body, valve rod and plunger assembly from the rear shell.

Note:
Do not remove the rear seal from the rear shell unless seal is defective and the new seal is available. To remove the rear seal, support the rear shell and drive out the rear seal with a punch or a screwdriver.

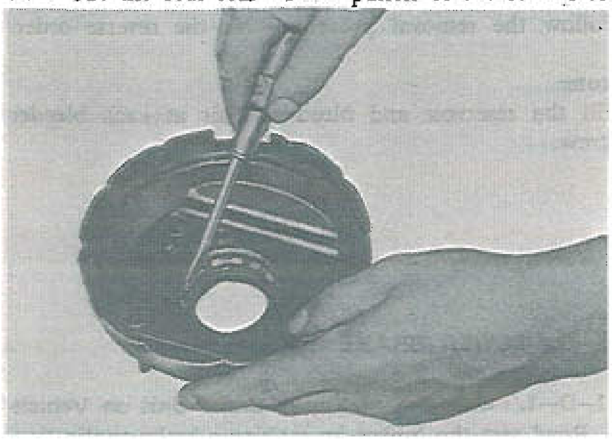


Fig. 11–27 Removing of rear seal

8. Remove the diaphragm from the plate and valve body.
9. Remove the air silencer with the air filter from the plate and valve body, being careful not to chip plastic.
10. Press in on the valve rod to remove the valve retainer key. Remove the valve rod and plunger assembly.

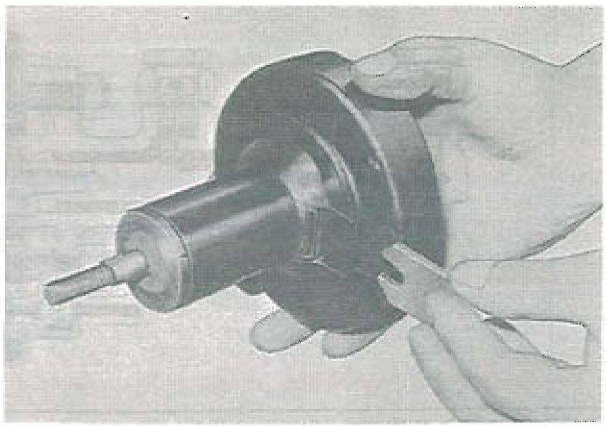


Fig. 11–28 Removing of retainer key

Note:
The valve rod and plunger are serviced as an assembly only.

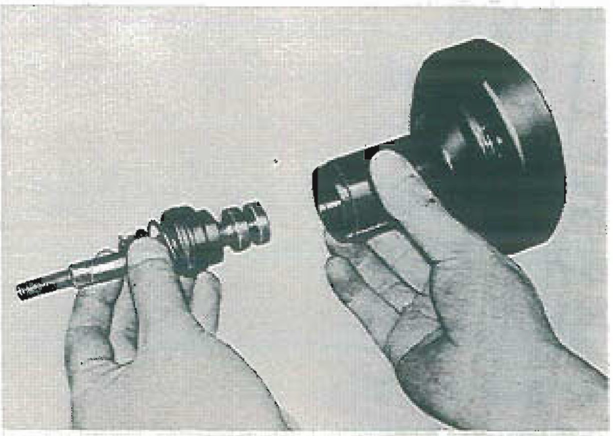


Fig. 11–29 Removing of valve rod assembly

11. Press the reaction disc out of the valve body.
12. Remove the push rod.
13. Remove the front seal from the front shell if necessary.

11–D–4. Checking of Power Brake Unit

1. Inspect all rubber parts. Wipe free of fluid and carefully inspect each rubber part for cuts, nicks or other damage.
2. Check the plate and valve body for cracks, distortion, chipping and damaged seats.
3. Inspect the reaction disc for deterioration of rubber.
4. Check the valve rod and plunger for all seats to be smooth and free of nicks and dents. Replace with a new one if defective.
5. Inspect the front and rear shells for scratches, scores, pits, dents or other damage.
6. Check the diaphragm for cuts, or other damage.

11–D–5. Assembling of Power Brake Unit

1. Apply power brake lubricant to the inner surface of the tube section of the plate and valve body and to the surfaces of the valve rod and plunger.
2. Insert the valve rod and plunger assembly into the tube section of the plate and valve body.
3. Press down on the valve rod and align the groove in the valve plunger with the slot of the valve body. Insert the retainer key.
4. Install the diaphragm on the plate and valve body making certain the diaphragm is seated in the groove.
5. Assemble the air filter and the air silencer over the rod and position in the valve body.
6. Apply power brake lubricant liberally to the entire surface of the reaction disc and install the reaction disc into the plate and valve body.
7. Coat the outer bead of the diaphragm with power brake lubricant where it bears against the outer rims of the front and rear shells to aid in assembly.
8. Apply power brake lubricant to the seal in the rear shell and carefully guide tube end of the plate and valve body, through the seal in the rear shell.
9. Install the plate and valve body into the front shell.
10. Install the push rod through the front of the plate and valve body.
11. Install the return spring.
12. Install the rear shell assembly by using the wrench to rotate the rear shell counter-clockwise until scribe marks align.

Note:
Press the front shell down firmly, maintaining a pressure until the shell flanges are fully locked.

13. Install the dust boot down against the rear shell.
14. Install the master cylinder and check valve.

11–D–6. Installing of Power Brake Unit

Follow the removal procedures in the reverse order.

Note:
After installing the unit, bleed the hydraulic system according to the procedure described in Par. **11–A–2.**

11–E. HYDRAULIC LINES

11–E–1. Checking of Brake Lines

Inspect all brake lines for any leakage with the foot brakes applied. Check all brake pipes, hoses and connections for signs of chafing, deterioration or replaced or repaired, always air bleed the hydraulic system.

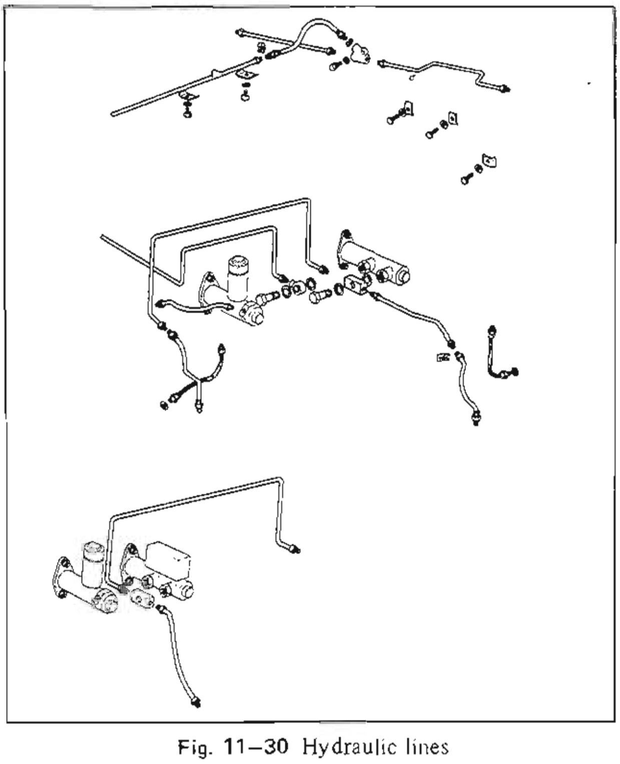


Fig. 11–30 Hydraulic lines

11–F. FRONT BRAKE

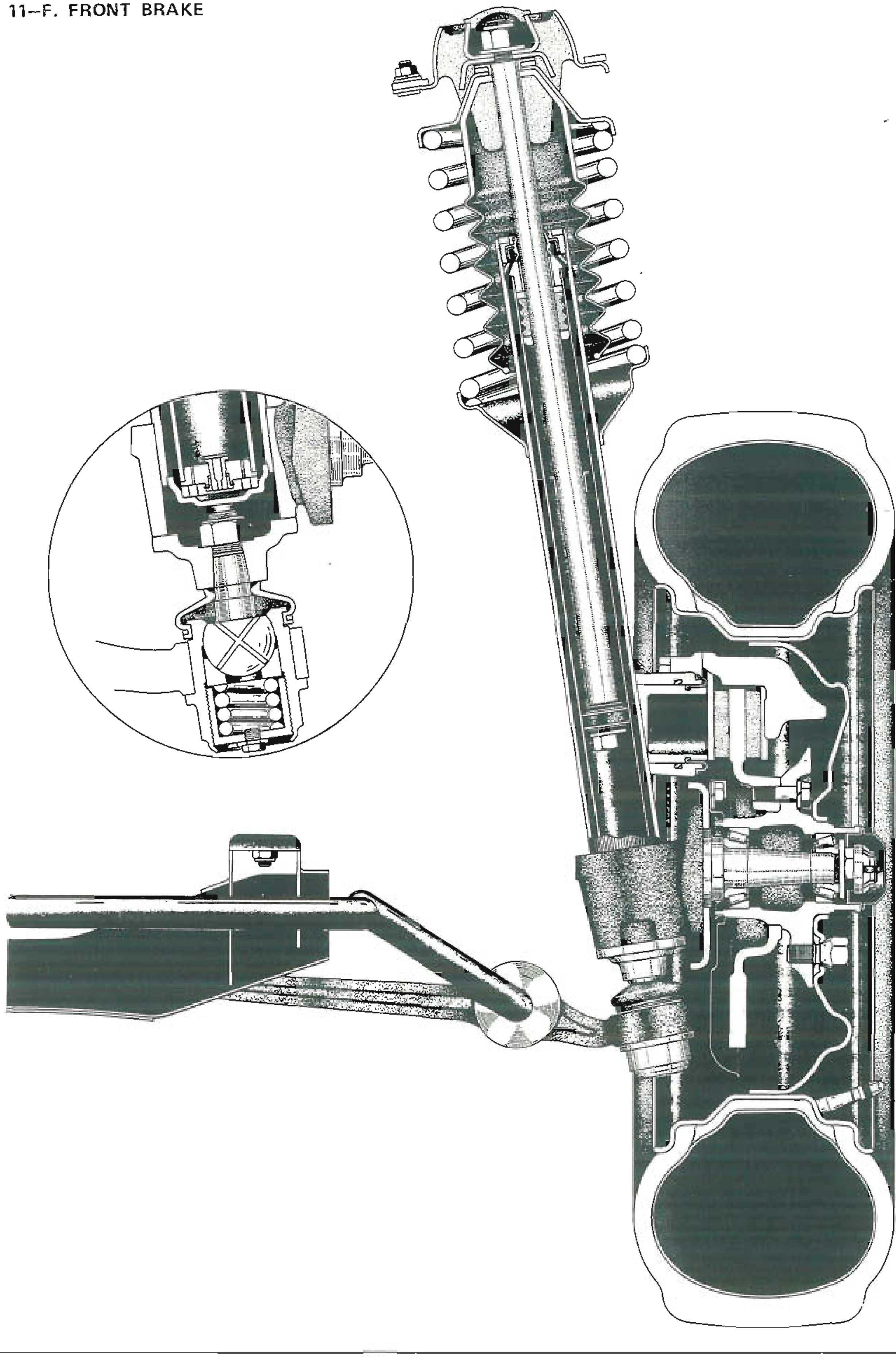


Fig. 11–31 Front brake

11–F–1. Disc Brake Shoe

a. Replacing of disc brake shoe

The lining should be inspected whenever the wheels are removed for any reason. The shoe and lining assembly should be replaced, if the thickness of the shoe and lining assembly is **6.5 mm (0.256 in)** or less due to wear.

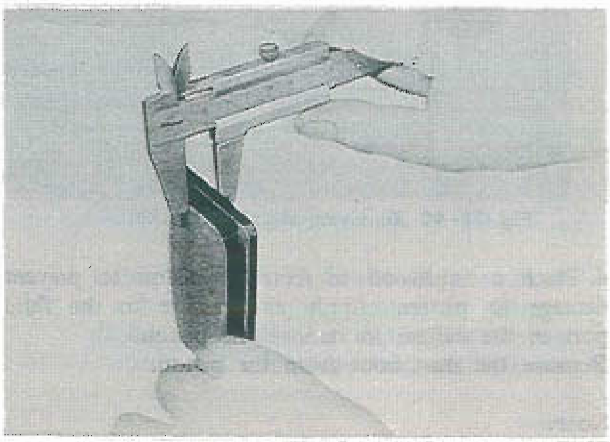


Fig. 11–32 Checking of lining thickness

To replace the disc brake shoes, proceed as follows:

1. *Raise the front end of the vehicle and support* with stands.
2. Remove the front wheel.
3. Remove the hair pin retainers and pull out the locating pins.

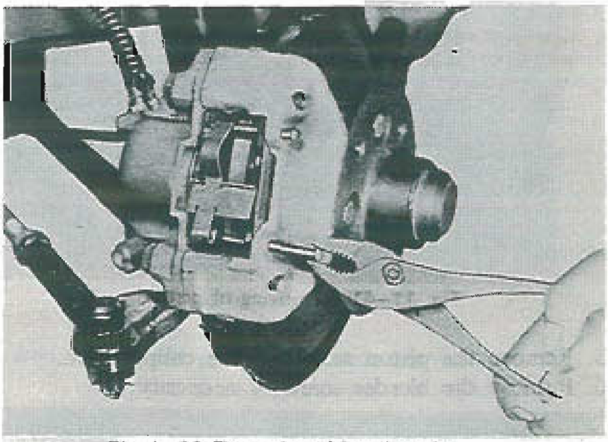


Fig. 1–33 Removing of locating pins

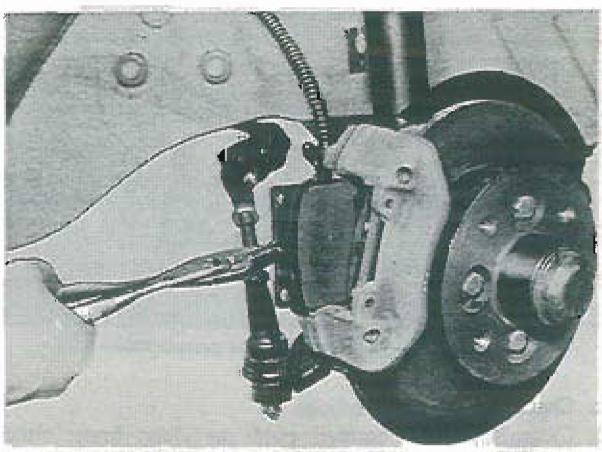


Fig. 11–34 Removing of shoe and lining assembly

4. Remove the shoe return spring and pull out the brake shoes.
5. Remove the rubber cap from the bleeder screw, and connect a vinyl drain tube onto the bleeder screw. Submerge the other end of the vinyl tube into a suitable container.
6. Open the bleeder screw and press the piston into the cylinder with the **piston retracting tool** (Part No. 49 0221 600C).

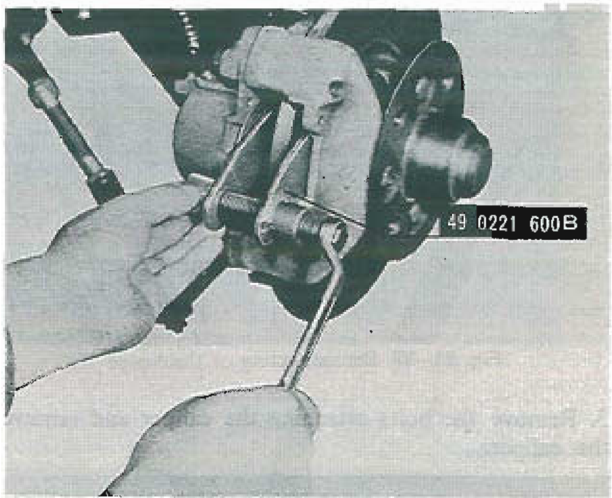


Fig. 11–35 Pressing of piston

7. Tighten the bleeder screw and remove the vinyl tube and retracting tool.
8. Install new brake shoes and shims on the caliper.

Note:

(a) When the disc brake shoes are replaced, replace all shoes on both wheels at the same time.

(b) **Do not** mix different types of linings when replacing.

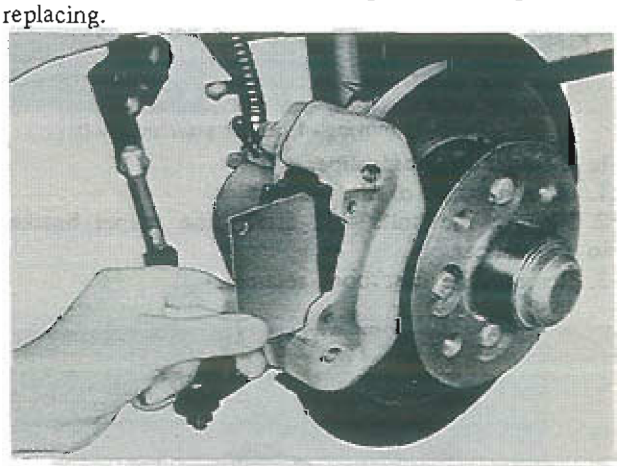


Fig. 11–36 *Installing of shim*

9. Install the shoe return spring, locating pins and hair pin retainers.
10. Install the front wheel and lower the vehicle.

11–F–2. Caliper

a. Removing of caliper

1. Raise the front end of the vehicle and support with stands.

2. Remove the front wheel.
3. Remove the shoe and lining assembly as described in **Par. 11—F—1.**
4. Disconnect the brake fluid pipe from the caliper and plug the end of the fluid pipe to prevent entrance of dirt and loss of fluid.

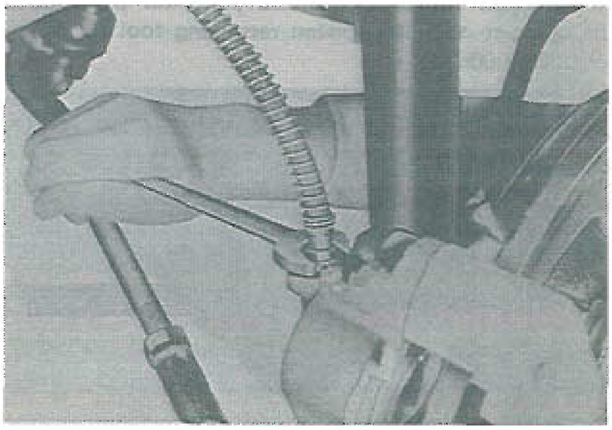


Fig. 11—37 Disconnecting of fluid pipe

5. Remove the bolts attaching the caliper and remove the caliper.

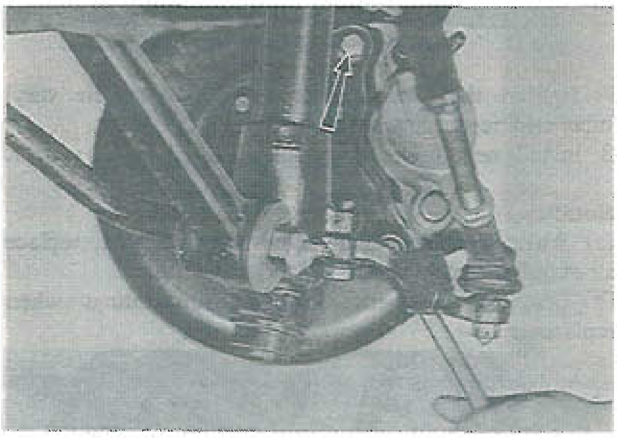


Fig. 11—38 Removing of caliper attaching bolts

b. Disassembling of caliper

1. Clean outside of the caliper.
2. Remove the bolts that attach the caliper bracket to the caliper.
3. Remove the dust boot retainer.

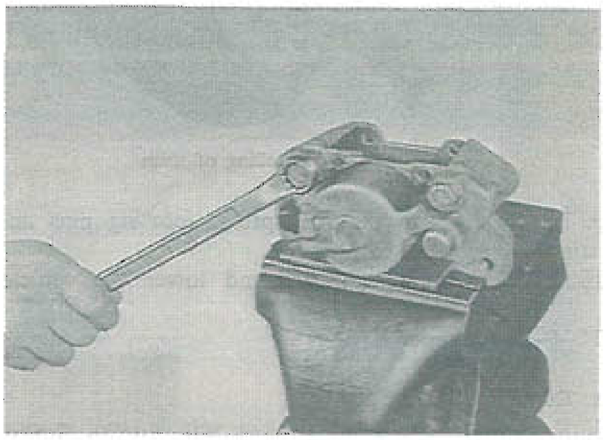


Fig. 11—39 Removing of caliper

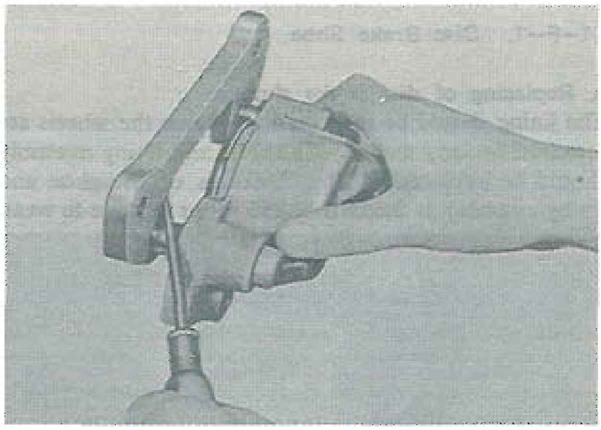


Fig. 11—40 Removing of caliper bracket

4. Place a hardwood in front of piston to prevent damage to piston. Apply air pressure to the fluid port in the caliper to remove the piston.
Remove the dust boot from the piston.

Note:
If the piston is seized and cannot be forced from the caliper, tap lightly around the piston while applying air pressure.

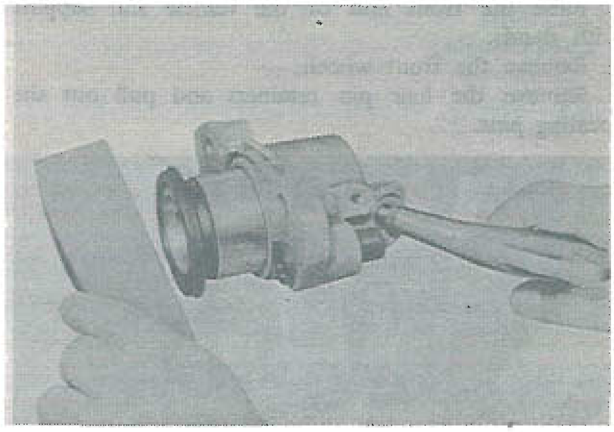


Fig. 11—41 Removing of piston

5. Remove the piston seal from the caliper bore.
6. Remove the bleeder screw, if necessary.

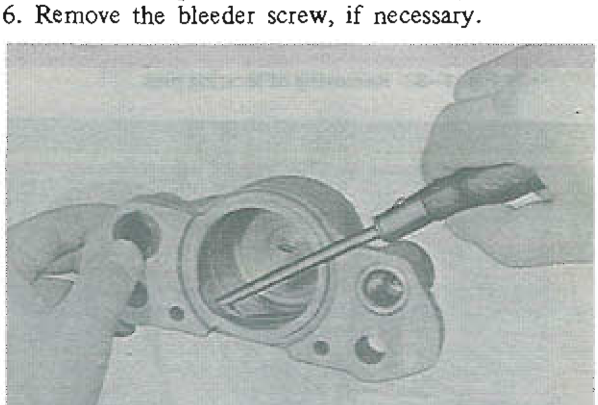


Fig. 11—42 Removing of piston seal

c. Checking of caliper

1. Clean the disassembled parts in clean brake fluid or alcohol and dry with compressed air.

Note:
Never use gasoline or kerosene.

2. Inspect the caliper bore and piston for scoring, scratches or rust. If any of these conditions are found, replace with a new piston or caliper. Minor damage can be eliminated by polishing with crocus cloth.
3. Discard the old piston seal and dust boot, and use new ones when reassembling.

d. Assembling of caliper
1. Apply brake fluid to the piston seal and install it into the groove of the caliper bore.

Note:
Be sure the piston seal does not become twisted and that it is seated fully in the groove.

2. Lubricate the piston and caliper bore.
3. Spread the dust boot over the piston as it is installed and seat the dust boot in the piston groove. Insert the piston and dust boot assembly into the cylinder bore.
4. Install the dust boot by setting the flange squarely in the outer groove of the caliper bore. Install the dust boot retainer.

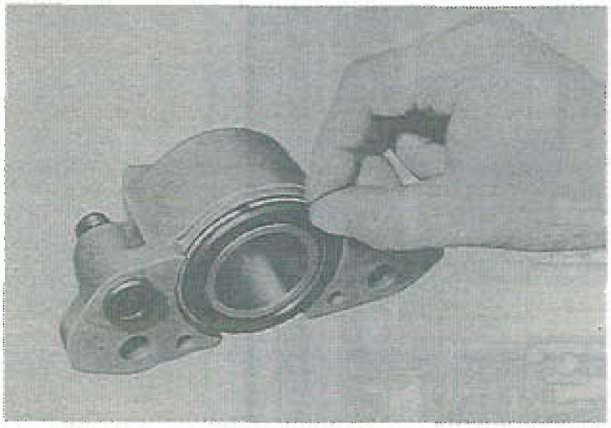


Fig. 11–43 Installing of dust boot retainer

5. Install the caliper bracket to the caliper and tighten attaching bolts.

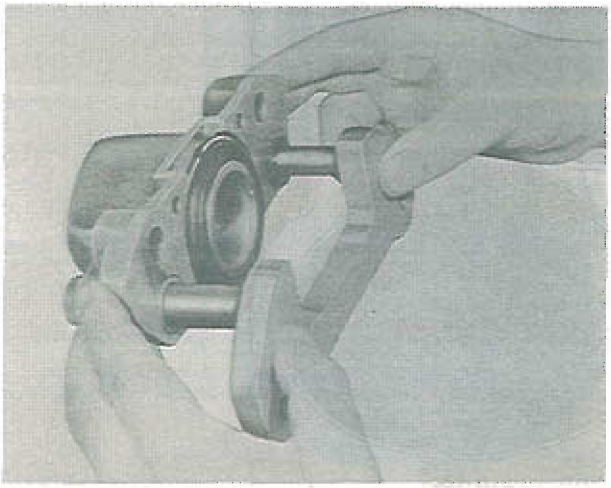


Fig. 11–44 Installing of caliper bracket

e. Installing of caliper
Follow the removal procedures in the reverse order and bleed the hydraulic system.

11–F–3. Rotor and Front Wheel Hub Assembly

a. Checking of rotor assembly
1. Inspect the friction surface of the rotor and recondition if it is scored, scratched or rusted.
2. Check the run-out of the rotor with a dial indicator.

Note:
Make sure that the wheel bearings are correctly adjusted, before checking the run-out of the rotor.

If the run-out is more than **0.1 mm (0.0039 in)**, reface the rotor. **Do not** reface any more than is necessary to clean up the rotor.

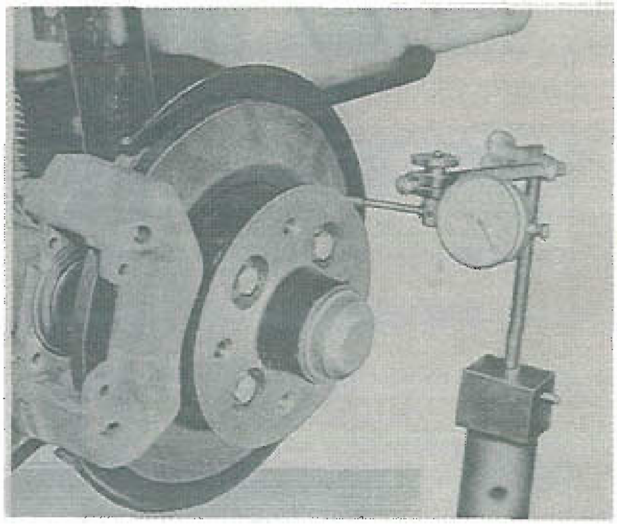


Fig. 11–45 Checking of rotor run-out

3. Check the rotor for thickness. If the thickness of the rotor becomes less than **10 mm (0.3937 in)** from excessive refacing, the rotor should be replaced.

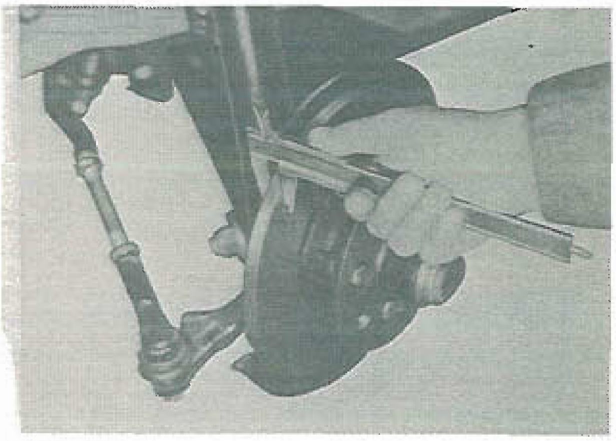


Fig. 11–46 Checking of rotor thickness

b. Replacing of Rotor assembly
Replace the rotor and front wheel hub assembly, as described in **Par. 12–C–1.**

11–G. REAR BRAKE

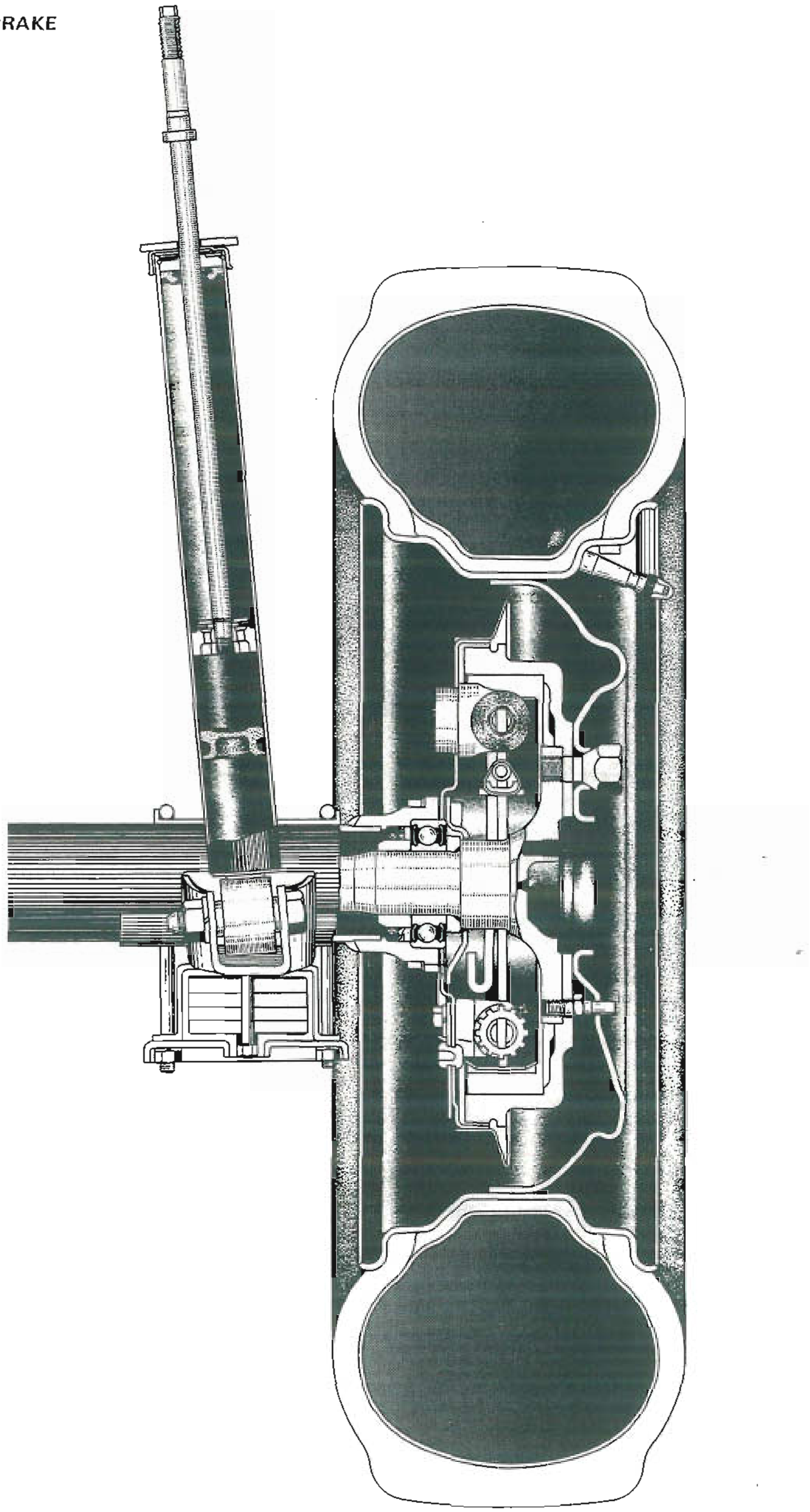


Fig. 11–47 Rear brake

11–G–1. Rear Brake Drum and Shoe

a. Removing of rear brake drum and shoe

1. Raise the rear end of the vehicle and support with stands.
2. Remove the rear wheel.
3. Make sure that the parking brake is fully released.
4. Remove the bolts that attach the brake drum to the rear axle shaft flange and pull the drum off the axle shaft flange. If the drum will not come off place the drum attaching bolts into the tapped holes on the drum. Then, tighten in evenly to force the drum away from the axle shaft flange.

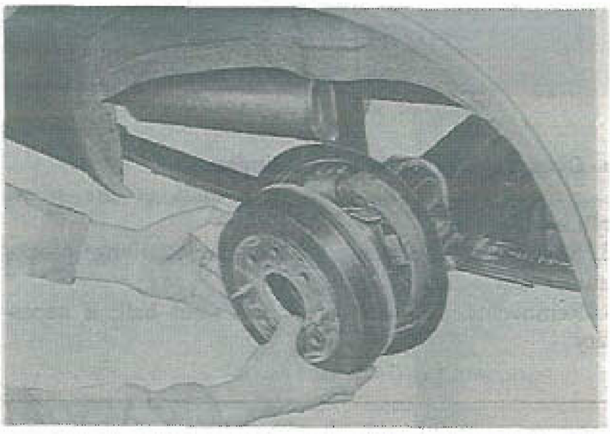


Fig. 11–48 Removing of brake drum

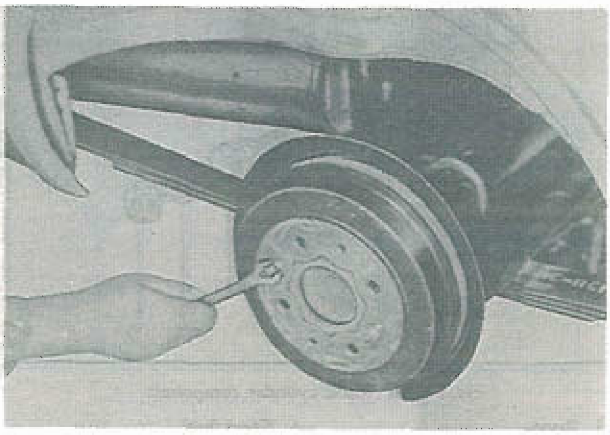


Fig. 11–49 Removing of brake drum

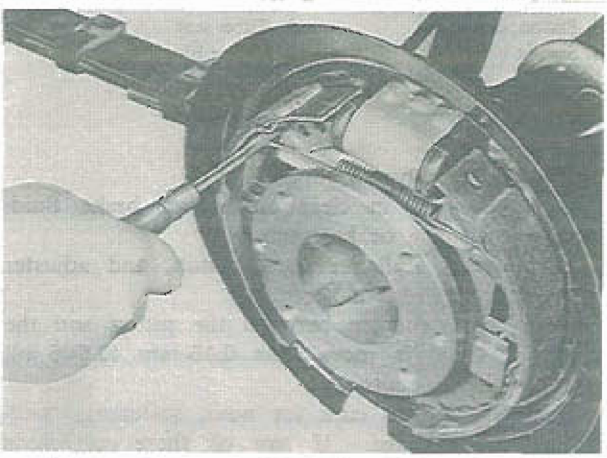


Fig. 11–50 Removing ol return spring

5. Remove the return spring located on the upper side of the brake shoes using a suitable tool, then remove the return spring located on the lower side of the brake shoes.
6. Remove the shoe hold-down spring from the brake shoe by removing the shoe hold-down spring pin with a plier.

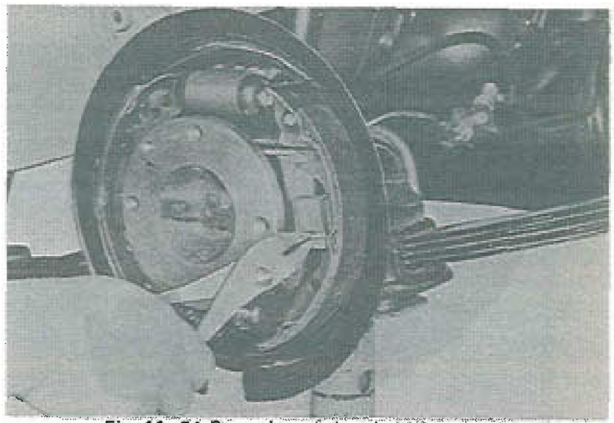


Fig. 11–51 Removing of shoe hold-down spring

7. Remove the primary brake shoe and the parking brake link.

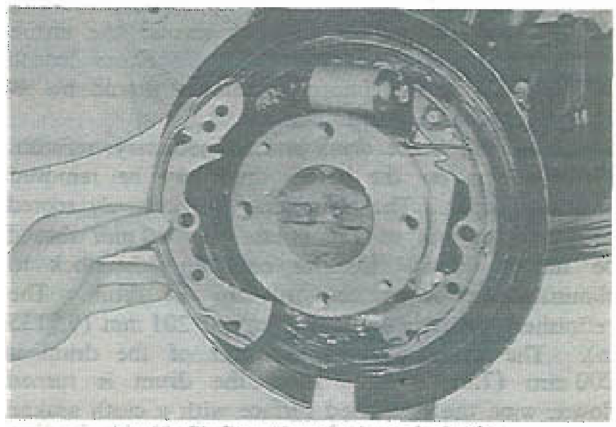


Fig. 11–52 Removing of primary brake shoe

8. Disconnect the parking brake lever from the secondary brake shoe by removing the retaining clip. Remove the secondary brake shoe. **Do not** dirty the brake lining with oil.

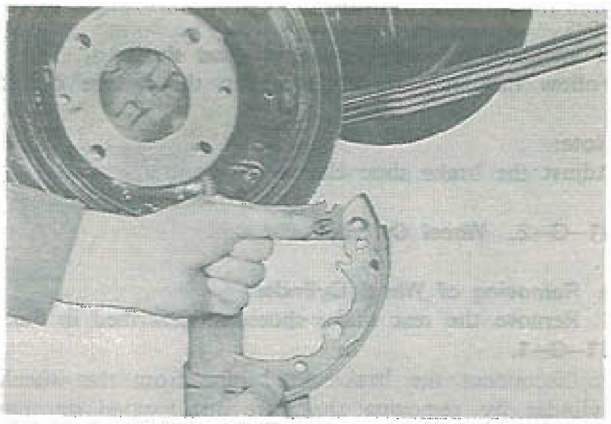


Fig. 11–53 Removing of secondary brake shoe

b. Inspecting of rear brake drum and shoe

1. Brush all dust from the backing plate and interior of the brake drum.
2. Inspect the springs for weakness.
3. Inspect the brake shoes for excessive lining wear or shoe damage. If the lining is excessively worn or if the shoes are damaged, they must he replaced. Replace any lining that had been contaminated with oil, grease or brake fluid.

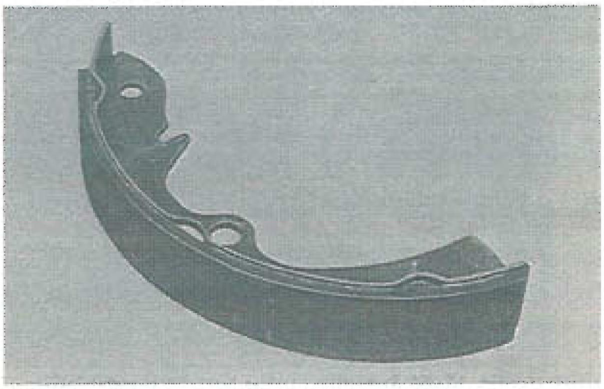


Fig. 11–54 Rear brake shoe

4. Examine the lining contact pattern. To inspect, chalk the entire inner surface of the drum and slide the lining along the chalked surface. The lining should show a uniform contact across the entire width, extending from toe to heel. Shoes having sufficient lining but improper contact should be re-ground to obtain proper contact.
5. Inspect the brake drum and, if necessary, refinish. Minor scores on the brake drum can be removed with sandpaper. The drum that is excessively scoredl or shows an out of roundness over **1.0 mm** should be turned down. Remove only enough stock to eliminate the scores and true up the drum. The refinished diameter must not exceed 201 mm (7.9135 in). The standard inner diameter of the drum is 200 mm (7.8741 in). After the drum is turned down, wipe the refinished surface with a cloth soaked in clean denatured alcohol. If one drum is turn down, the opposite drum on the same axle should also be cut down to the same size.
6. Check the condition of the brake shoes, return springs, hold-down springs and drum for signs of overheating. If the shoes and drums are head spotted, indicating a overheated condition, replace with new ones.

c. Installing of rear brake drum and shoe

Follow the removal procedures in the reverse order.

Note:
Adjust the brake shoe clearance.

11–G–2. Wheel Cylinder

a. Removing of Wheel Cylinder

1. Remove the rear brake shoes, as described in **Par. 11–G–1.**
2. Disconnect the brake fluid pipe from the wheel cylinder by removing the flare nut located on the rear side of the backing plate.
3. Remove the nuts that attach the wheel cylinder to the backing plate and remove the wheel cylinder.

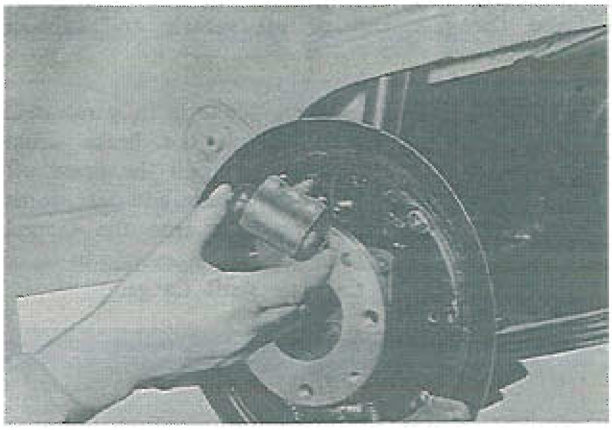


Fig. 11–55 Removing of wheel cylinder

b. Disassembling of Wheel Cylinder

1. Remove the boots from both ends of the wheel cylinder.
2. Remove the pistons, piston cups, filling blocks and return spring.
3. Remove the bleeder screw and steel ball, if necessary.

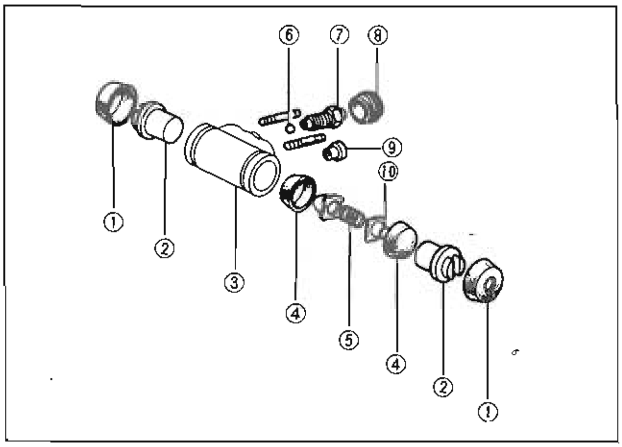


Fig. 11–56 Wheel cylinder componets

1. Boot	6. Steel ball
2. Piston	7. Bleeder screw
3. Cylinder	8. Cap
4. Piston cup	9. Tube seat
5. Spring	10. Filling block

c. Checking of Wheel Cylinder

1. Wash all parts in clean alcohol or brake fluid. **Never** use gasoline or kerosene.
2. Examine the cylinder bore, piston, and adjuster for wear, roughness, or score.
3. Check the clearance between the piston and the cylinder. If it is **more than 0.15 mm (0.006 in)**, replace with new parts.
4. Check the piston cups for wear, softening, swelling, or any damage. If any of these conditions exists, replace the cups.

d. Assembling of Wheel Cylinder

1. Apply clean brake fluid to the cylinder bore, pistons and piston cups.
2. Insert the steel ball into the bleeder hole and thread the bleeder screw into the bleeder hole.
3. Insert the return spring, filling blocks, piston cups and pistons into their respective position in the cylinder bore.

Note:
When inserting the piston cups into the cylinder bore, face the flat side of the cups outward.

4. Place the boots over each end of the cylidner.

d. Installing of Wheel Cylinder

Follow the removal procedures in the reverse order.

Note:
Bleed the hydraulic system and adjust the brake shoe clearance.

11–G–3. Adjuster Cylinder

a. Removing of adjuster cylinder

1. Remove the rear brake shoes, as described in **Par. 11–G–1.**
2. Remove the bolts that attach the adjsuter cylinder to the backing plate.
3. Remove the adjuster cylinder.

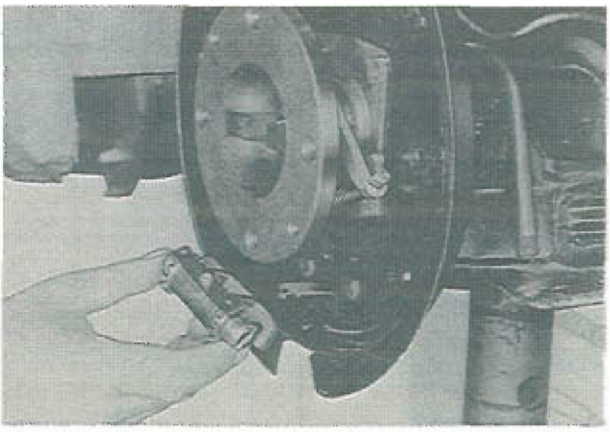


Fig. 11–57 Removing of adjuster cylinder

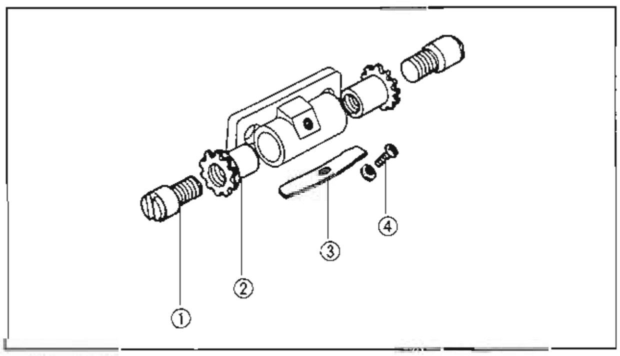


Fig. 11–58 Adjuster cylinder (Anchor block) components

1. Adjusting bolt
2. Adjusting nut
3. Locking spring
4. Screw

b. Disassembling of adjuster cylinder

1. Remove the adjuster locking spring from the cylinder by removing the attaching screw.
2. Remove the adjusting nut with the adjusting bolt from the cylinder body. Next remove the adjusting bolt from adjusting nut.

c. Checking of adjuster cylidner

Check the cylinder, adjsuting nut, adjusting bolt for damage and rust.

d. Assembling of adjusting cylinder

1. Apply grease onto the adjusting nuts and bolts, and screw in each adjusting bolt into the corresponding adjuster nut. Next, insert the adjuster nut with the bolt into the cylinder bore.

Note:
The adjusting bolt is of two types with left-hand, and right-hand threads. The right-hand thread nut is used for the secondary shoe side of the right wheel and the primary shoe side of the left wheel. The left-hand thread nut is used for the primary shoe side of the right wheel and the secondary shoe side of the left wheel.

2. Install the adjuster locking spring onto the cylinder with the attaching screw.

e. Installing of adjuster cylinder

Follow the removal procedures in the reverse order and adjust the brake shoe clearance.

11–G–4. Rear Brake Proportioning Valve (RX–3)

The rear brake proportioning valve is located in the rear brake hydraulic line and is installed to the body. The valve regulates the pressure to the rear wheel brake unit. The failure of the valve mechanism will cause only rear wheel side. The proportioning valve is serviced as an assembly and, never adjusted or overhauled.

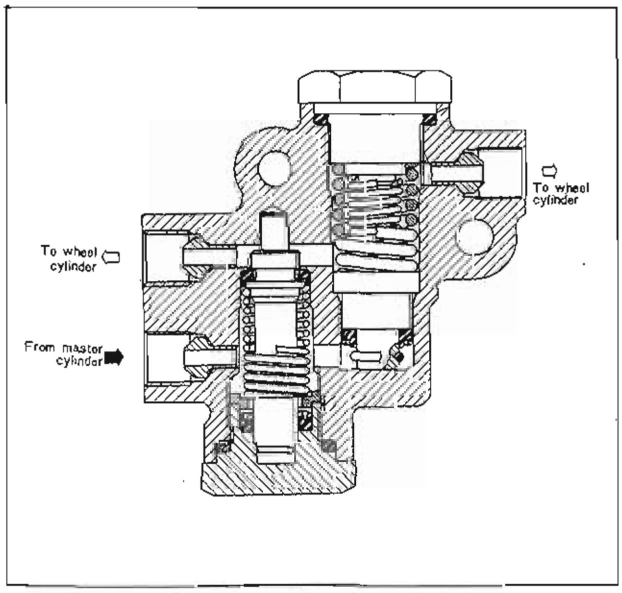


Fig. 11–59 Proportioning valve cross section

11–H. PARKING BRAKE

The parking brake operates the brake shoes of the rear wheels through the wire linkage.

11–H–1. Parking Brake Adjustment

To adjust, proceed as follows:
After adjusting the rear brake shoe clearance, adjust the parking brake lever adjusting screw so that the brake begins to apply when pulling the parking brake lever three to seven notches.

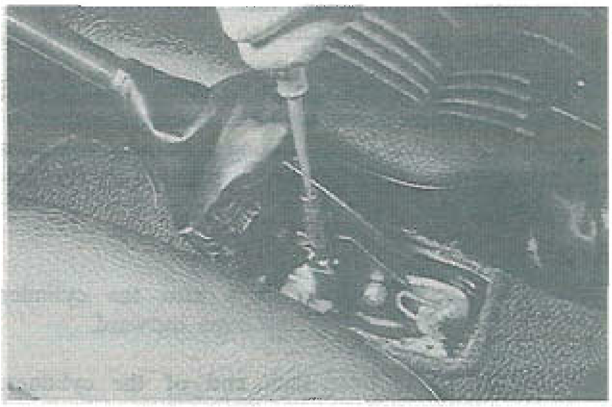


Fig. 11–60 Parking brake adjustment

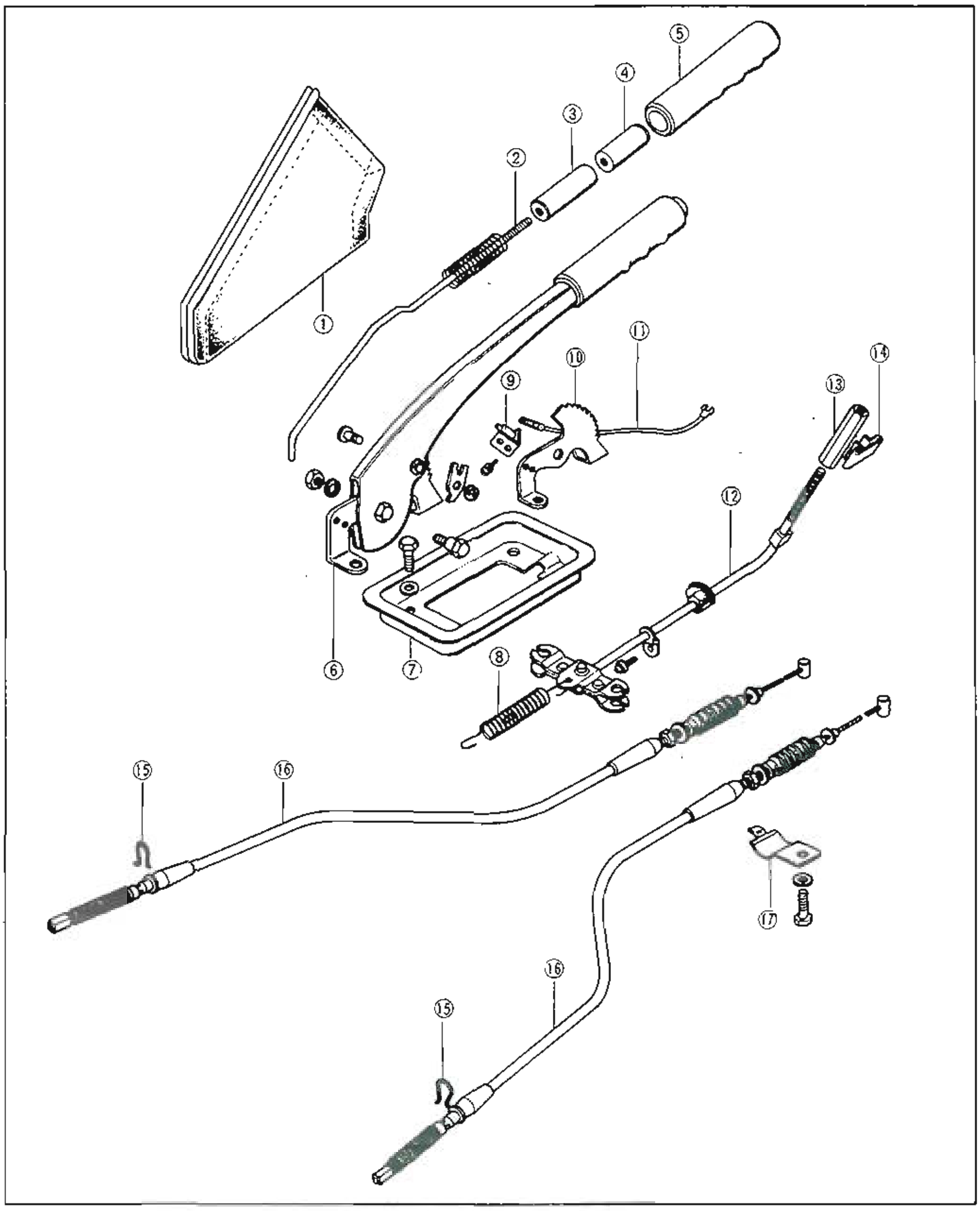


Fig. 11–61 Parking brake components

1. Boot
2. Release rod
3. Spacer
4. Button
5. Cap
6. Parking brake lever
7. Plate
8. Return spring
9. Parking lamp switch
10. Sector
11. Parking lamp switch wire
12. Front cable
13. Adjusting nut
14. Clip
15. Clip
16. Rear cable
17. Cable clip

SPECIAL TOOL

49 0221 600B	Caliper piston retracting tool

WHEELS AND TIRES

DESCRIPTION

Each front wheel is bolted to its respective front hub and rotor assembly. Two opposed tapered roller bearings are installed in each hub. A grease seal is installed at inner end of the hub to prevent grease from leaking on the rotor. The entire assembly is retained to its spindle by the adjusting nut, nut lock and cotter pin.

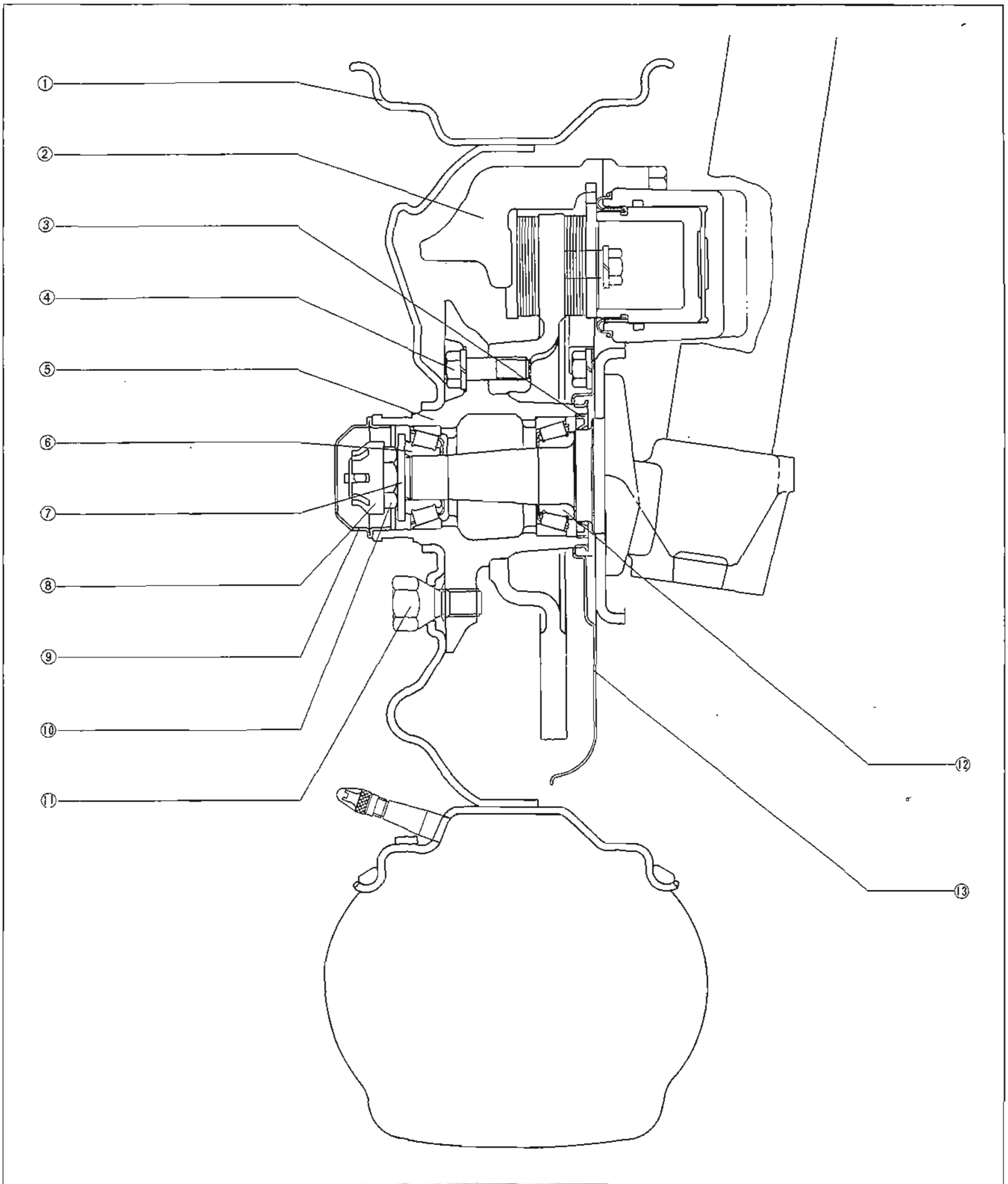


Fig. 12–1 Front wheel cross section

1. Disc wheel
2. Caliper
3. Grease seal
4. Bolt
5. Hub
6. Outer bearing
7. Flat washer
8. Nut lock (Set cover)
9. Grease cap (Hub cap)
10. Adjusting nut
11. Wheel bolt
12. Inner bearing
13. Dust plate

The rear wheel is bolted to the rear axle shaft flange. The rear wheel bearing is pressed onto axle shaft just inside the shaft flange and entire assembly is retained to the rear axle housing by the bearing retainer which is attached to the housing flange.

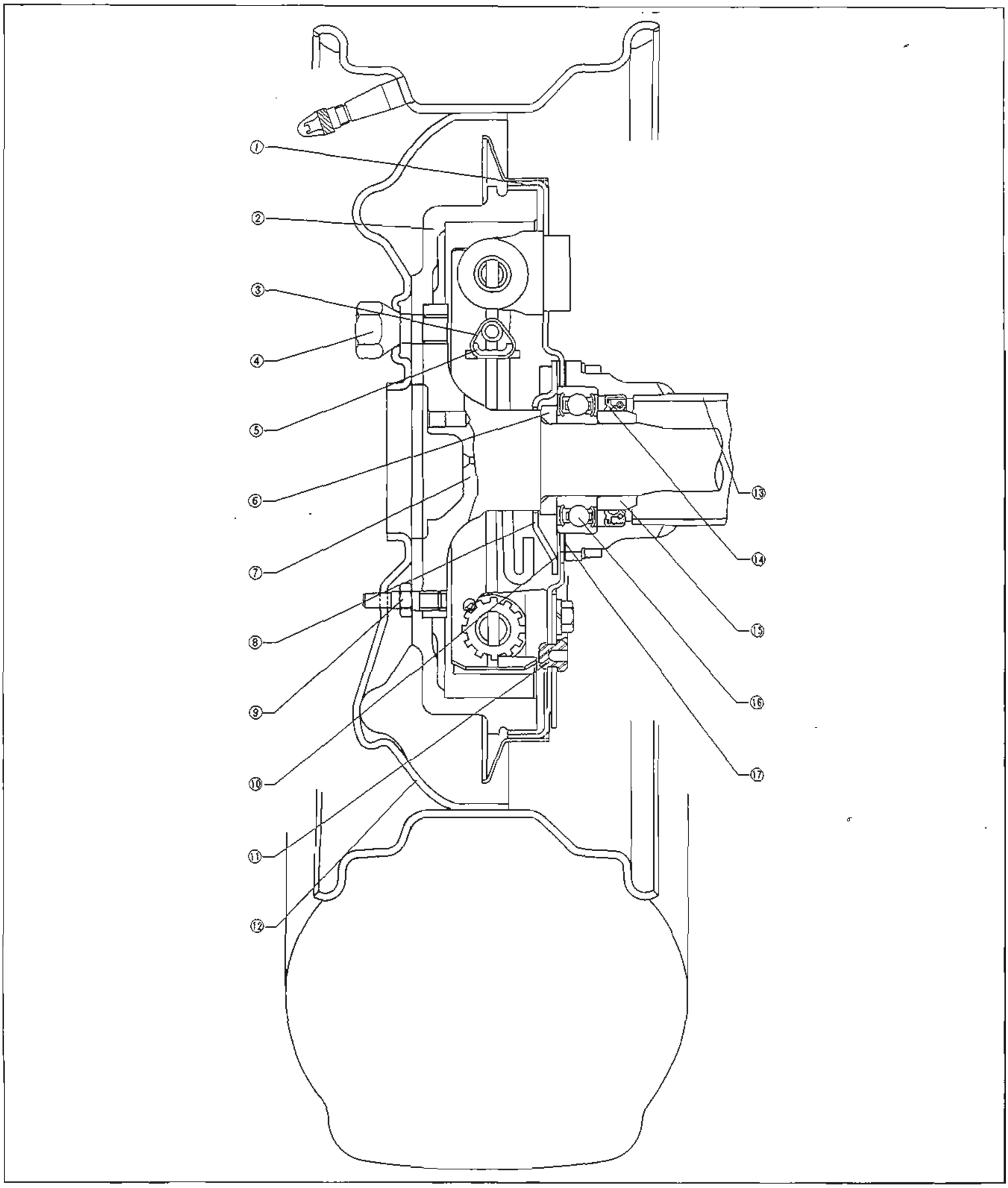


Fig. 12–2 Rear wheel cross section

1. Backing plate
2. Brake drum
3. Holder
4. Wheel bolt
5. Parking brake link (Parking brake operating strut)
6. Spacer
7. Rear axle shaft
8. Bearing retainer
9. Brake drum attaching bolt
10. Gasket
11. Plug
12. Disc wheel
13. Rear axle housing
14. Oil seal
15. Bearing retaining collar
16. Bearing
17. Adjusting shim

12–A. WHEELS AND TIRES

12–A–1. Tire Inflation
Maintenance of correct inflation pressure is one of the most important elements of tire care.

Excessive inflation pressure will cause:
1. Hard rides
2. Damage to tire carcas
3. Poor traction
4. Premature thread wear in center of tire

Low inflation pressure will cause:
1. Hard steering
2. Rapid and uneven wear on the edges of tire thread
3. Increased cord fatigue or broken tire cords
4. High tire temperature
5. Blow outs

Check the inflation pressure with a reliable gauge when the tires are cold. Refer to Par. Technical Data.

After checking or inflating the pressure, place the valve cap back on and tighten by hand. It helps to maintain the air pressure in the tires in case of any valve leak and keeps dust and water out of the valve.

12–A–2. Interchanging of Tire
To minimize the possibility of tire noise and to equalize tire wear, it is recommended that tires be interchanged **every 6,000 km (4,000 miles)** as shown in Fig. 12–3 or more frequently in the case of extremely heavy wear.

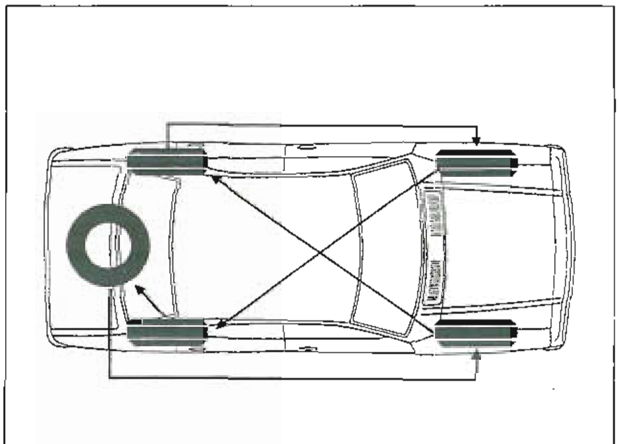


Fig. 12–3 Interchanging of tire

When interchanging the tires, inspect for signs of abnormal wear, bulging, etc., stones, gloss, and nails should be removed before reinstallation.

12–A–3. Changing of Wheels
1. Pry off the wheel cover and loosen the wheel bolts.

Note:
The wheel bolts are loosend by turning these in the counter-clockwise direction.

2. Raise the vehicle until the wheel and tire clear the gound.
3. Remove the wheel bolts and change the wheel.
4. Install the wheel bolts and alternately tighten the diametrically opposite bolts until the wheel closely touches the rear axle flange.
5. Lower the vehicle and firmly tighten the bolts to **9.0 m-kg (65.0 ft-lb).**
6. Refit the wheel cover.

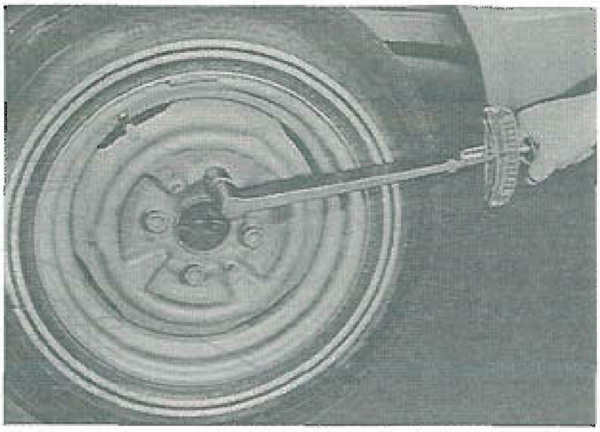


Fig. 12–4 Tightening of wheel bolt

12–A–4. Balancing of Wheel
The allowable unbalance is 360 cm-gr (5.0 in-oz), which is less than 20 gr (0.7 oz) at the rim. Excessive wheel unbalance will cause shimmy at high speed. If unbalance exceeds **360 cm-g (5.0 in-oz)**, or when a tire is disassembled for repair, the tire and wheel assembly should be statically and dynamically balanced with a wheel balancer.

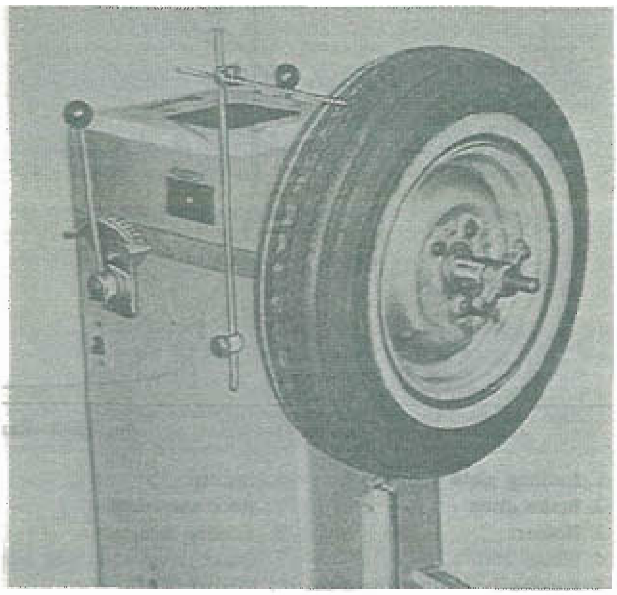


Fig. 12–5 Wheel balancer

12–B. TUBELESS TIRES

12–B–1. Tire Inflation and Inspection

Maintenance of correct inflation pressure in all tires in one of the most important elements of the care. Driving without valve caps contributes to underinflated tires. The valve cap keeps dirt and water out of the valve core and seals the valve against leakage. Whenever tires are inflated, be sure to install valve caps and tighten firmly by hand. Make sure that the rubber washer in the cap is not damaged or missing. If tires are checked at frequent intervals and adjusted to correct inflation pressure, it is often possible to detect punctures and make a correction before a tire goes flat, which may severely damage tire if vehicle is in motion.

12–B–2. Repairing of Tubeless Tire

A leak in the tubeless tire may be located by inflating the tire to recommended pressure and then submerging the tire and wheel assembly in water, or by applying water to the tire with a hose if wheel is mounted on vehicle. Remove water from area where air bubbles show and mark the area with a crayon. After removal of the puncturing object from tire, the puncture must be sealed to prevent entrance of dirt and water which would cause damage to the tire carcass. Tire repair kits are available through tire dealers. These materials should be used as directed in the instructions supplied with kits.

12–C. FRONT WHEEL HUB

12–C–1. Removing of Front Wheel Hub

1. Raise the vehicle with a jack until the front wheels clear the ground.
2. Pry off the wheel cover and remove the wheel.
3. Remove the bolts that attach the caliper to the spindle. Remove the caliper from the rotor and wire it to the underbody to prevent damage to the brake hose.
4. Remove the grease cap from the hub. Remove the cotter pin, nut lock, adjusting nut and flat washer from the spindle.

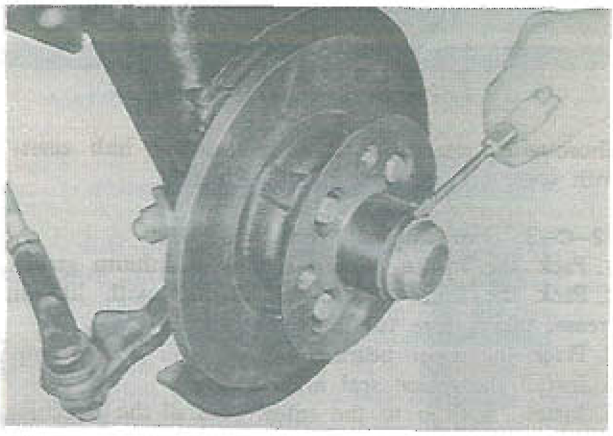


Fig. 12–6 Removing of grease cap

5. Pull the hub and rotor assembly with the outer bearing off the spindle.

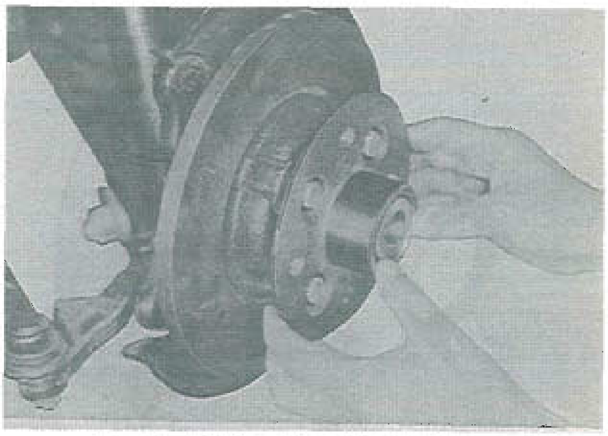


Fig. 12–7 Removing of hub and rotor assembly

6. Remove the outer bearing from the hub.

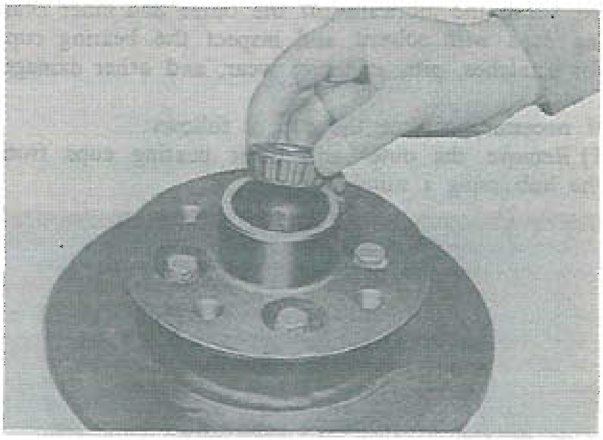


Fig. 12–8 Removing of outer bearing

7. Thoroughly clean the spindle and the inside of the hub with solvent to remove all old grease.
8. Remove the bolts that attach the hub to the rotor. Remove the hub from the rotor.

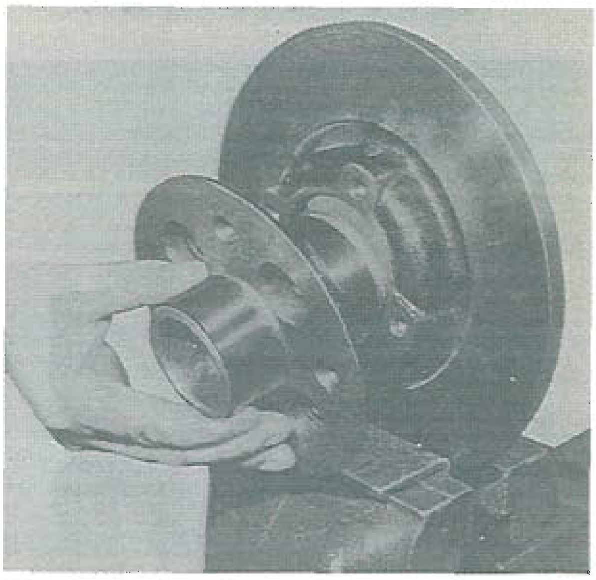


Fig. 12–9 Removing of hub

9. Drive out the grease seal and remove the inner bearing from the hub.

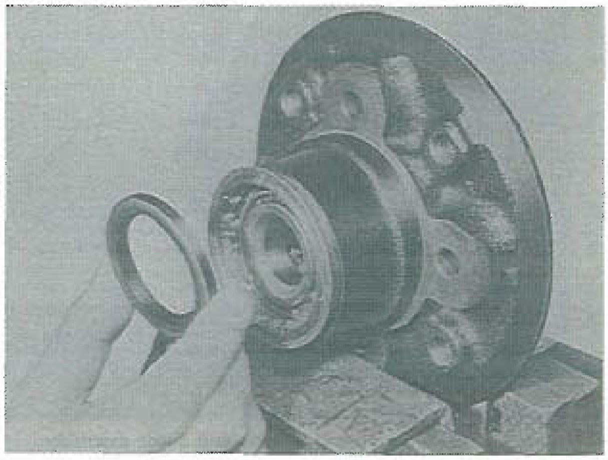


Fig. 12–10 Removing of oil seal

10. Clean the lubricant off the outer and inner bearing cups with solvent and inspect the bearing cups for scratches, pits, excessive wear, and other damage.

If necessary, replace the cup as follows:
1) Remove the outer and inner bearing cups from the hub using a suitable brass rod.

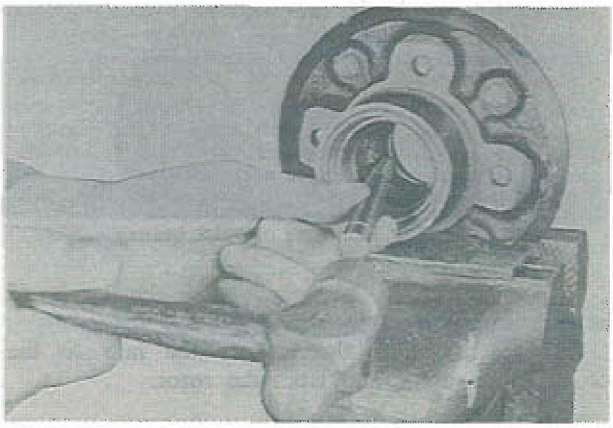


Fig. 12–11 Removing of outer bearing cup

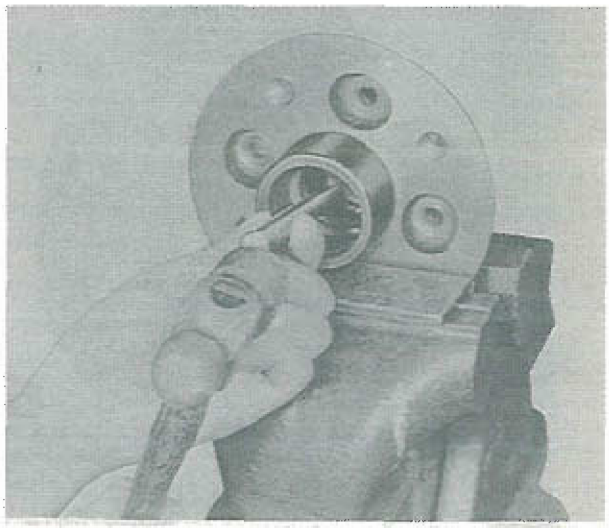


Fig. 12–12 Removing of inner bearing cup

2) Install the inner and outer bearing cups into the hub using a suitable tool. Be sure to seat the cups properly in the hub.

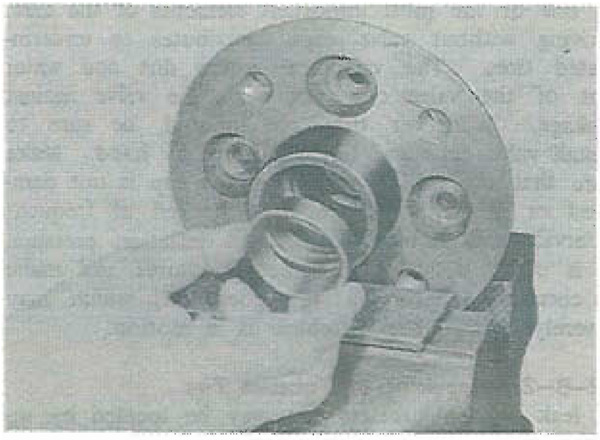


Fig. 12–13 Installing of outer bearing cup

12–C–2. Checking of Front Wheel Hub
Thoroughly clean the inner and outer bearings with solvent, and dry them thoroughly.

Note:
Do not spin the bearings dry with compressed air.

Inspect the bearing for wear and damage, and replace them if necessary. The bearing and bearing cup should be replaced as a set if damage to either is encountered.
Check the rotor for thickness. If the thickness of the rotor is less than **10 mm (0.394 in)**, rotor should be replaced.

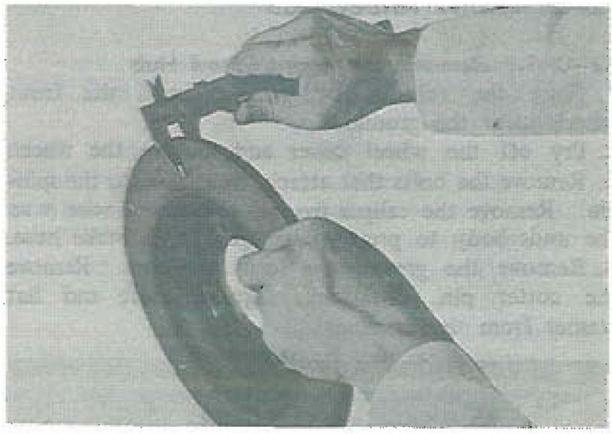


Fig. 12–14 Checking of rotor thickness

Thoroughly clean the spindle and the hub cavity with solvent to remove all old lubricant.

12–C–3. Installing of Front Wheel Hub
1. Pack the inside of the hub with lithium grease.
2. Pack the inner and outer bearings with lithium grease, taking care to fill between rollers.
3. Place the inner bearing in the inner bearing cup.
4. Install the grease seal into the hub.
5. Install the hub to the rotor. Install the attaching bolts and tighten the bolts to **5.0 m-kg (36.2 ft-lb)**.

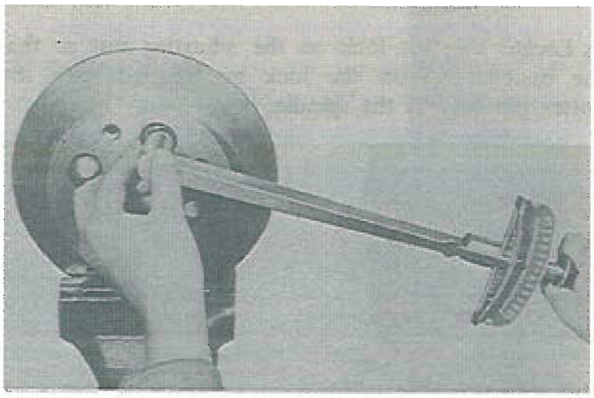


Fig. 12–15 Tightening of hub attaching bolt

6. Install the hub and rotor assembly on the spindle.
7. Install the outer bearing, flat washer and adjusting nut.
8. Adjust the wheel bearing preload as described in **Par. 12–D–2** on page 12 : 7 and install the nut lock and a new cotter pin. Pack the grease cap with lithium grease and install the grease cap.

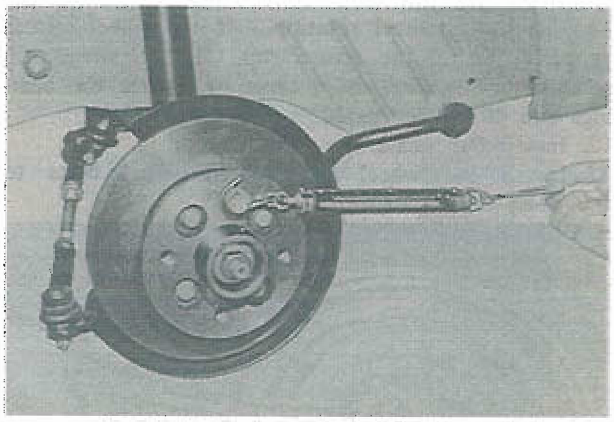


Fig. 12–16 Checking of wheel bearing preload

9. Install the caliper to the steering knuckle and tighten the attaching bolts.

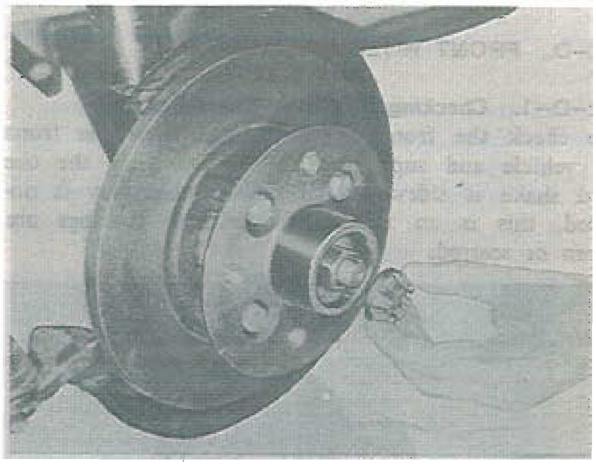


Fig. 12–17 Installing of nut lock

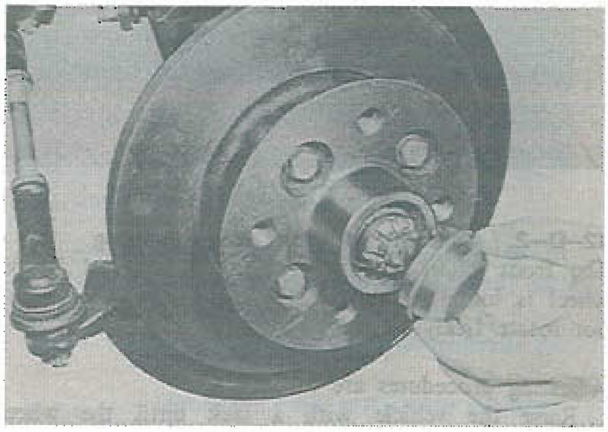


Fig 12–18 Installing of grease cap

10. Position the wheel on the hub. Install the wheel bolts and tighten them alternately in order to draw the wheel evenly against the hub.
11. Install the wheel cover.
12. Pump the brake pedal several times to obtain normal brake lining to rotor clearance and restore normal brake pedal travel.

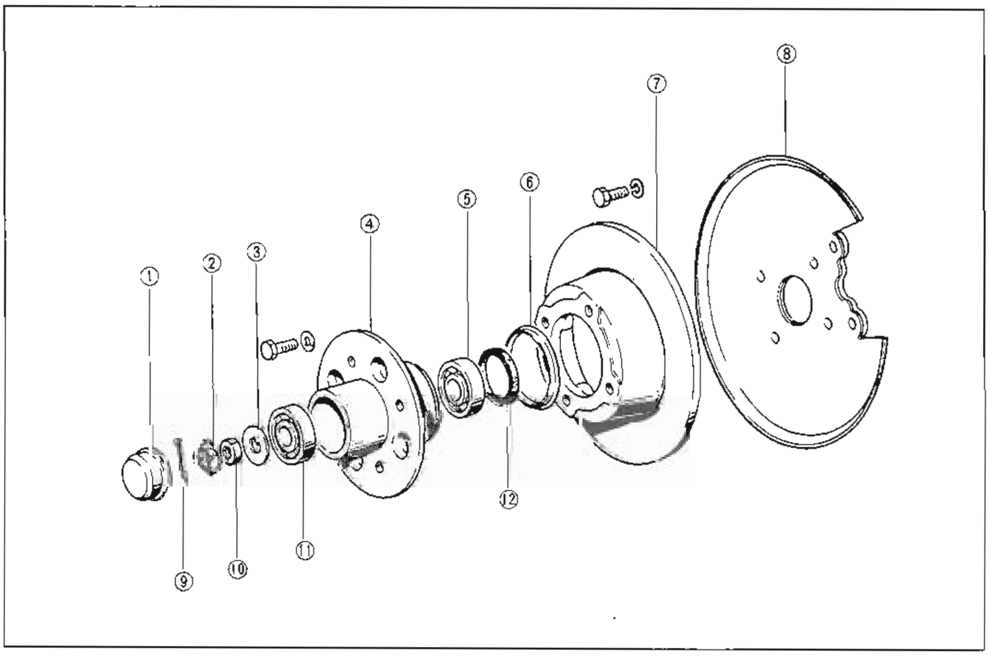


Fig. 12–19 Front wheel hub

1. Grease cap
2. Nut lock
3. Flat washer
4. Hub
5. Inner bearing
6. Dust ring
7. Rotor (Brake disc)
8. Dust plate
9. Cotter pin
10. Adjusting nut
11. Outer bearing
12. Grease seal

12–D. FRONT WHEEL BEARING

12–D–1. Checking of Front Wheel Bearing

To check the front wheel bearings, raise the front of vehicle and support with stands. Grip the tire and shake it sideways. If considerable play is noticed, this is an indication that the bearings are worn or scarred.

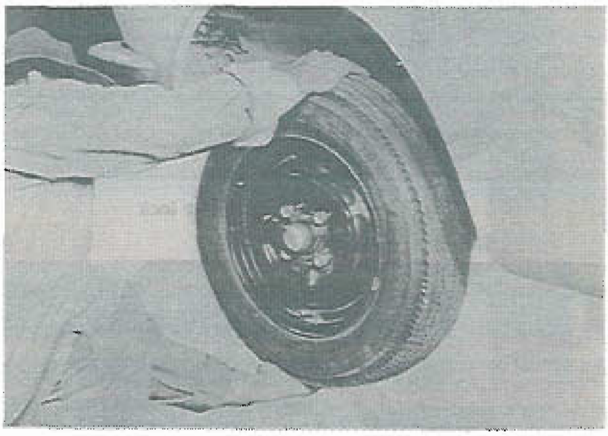


Fig. 12–20 Checking of wheel bearing

12–D–2. Adjusting of Front Wheel Bearing

The front wheel bearings should be adjusted if the wheel is loose on the spindle or if the wheel does not rotate freely.

Adjusting procedures are as follows:

1. Raise the vehicle with a jack until the wheel clears ground.
2. Pry off the wheel cover and remove the wheel.
3. Remove the grease cap from the hub.

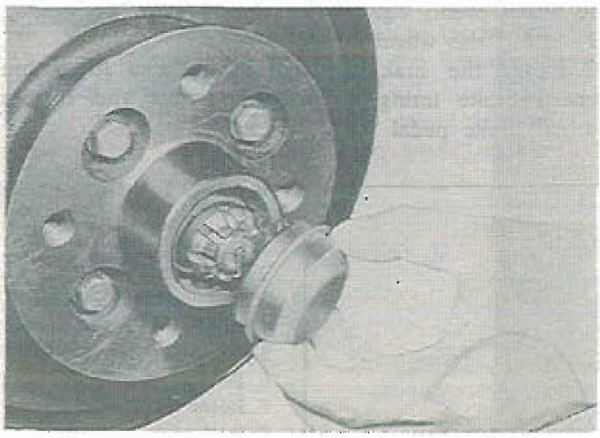


Fig. 12–21 Removing of grease cap

4. Wipe the excess grease from the end of the spindle, and remove the cotter pin and nut lock.
5. Install a hub bolt on the front wheel hub.
6. Check the bearing preload by hooking a spring scale on the hub bolt.
7. Pull the scale squarely and take a reading on the scale when the hub starts to turn. The reading should be 0.4 to 1.0 kg (0.88 to 2.2 lb).
8. Tighten the adjusting nut until the correct reading is obtained.
9. Locate the nut lock on the adjusting nut so that the castellations on the lock are aligned with the cotter pin hole in the spindle.

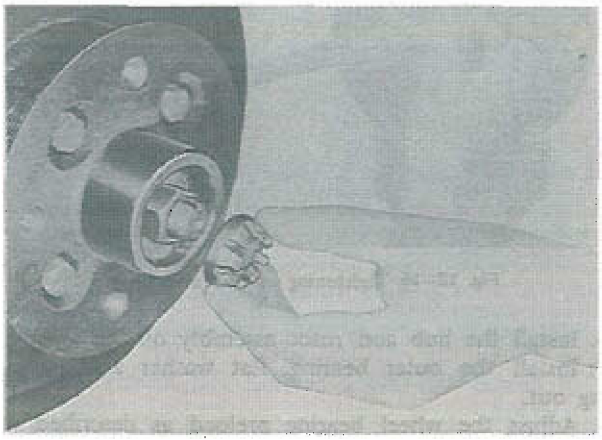


Fig. 12–22 Installing of nut lock

10. Install a new cotter pin and bend the ends of the cotter pin.
11. Check the wheel rotation. If the wheel rotates properly, install the grease cap. If the wheel still rotates roughly or noisily, clean or replace the bearings and cups as required.
12. Install the grease cap.
13. Install the wheel and tighten wheel bolts to **9.0 m-kg (65.0 ft-lb).**

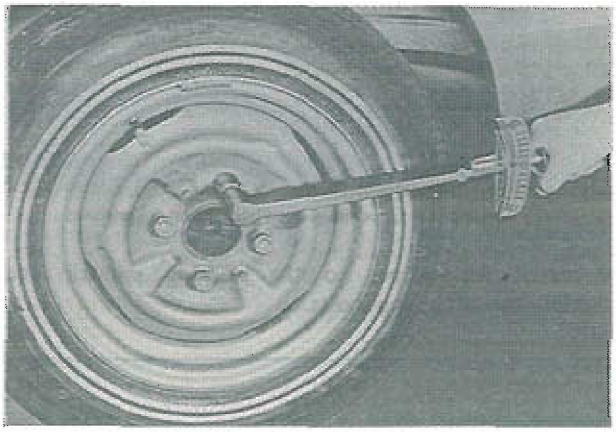


Fig. 12–23 Tightening of wheel bolt

14. Install the wheel cover.
15. Pump the brake pedal several times to obtain normal brake lining to rotor clearance and restore normal brake pedal travel.

12–E. REAR WHEEL BEARING

Servicing the rear wheel bearing is explained in **Par. 9–A** on page 9 : 1.

SUSPENSION

DESCRIPTION

The front suspension consists mainly of the vertical shock absorbers integrally made with each steering knuckle, suspension arms and stabilizer bar. This front suspension **does not require lubrication, except the lower ball joints** which are provided with plugs to attaching the grease fittings when required.
The rear suspension consists mainly of leaf springs and shock absorbers. The shock absorbers **should not be disassembled** as it contains a highly compressed gas. If it is found to be defective, replace it as assembly.

13–A. FRONT SUSPENSION

13–A–1. Front Shock Absorber

a. Removing of front shock absorber

1. Open the hood and remove the three nuts that attach the shock absorber support to the fender apron.

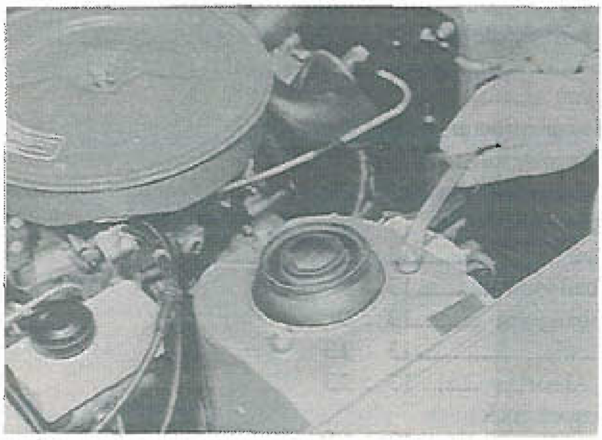


Fig. 13–1 Removing of nuts

2. Raise the front end of the vehicle and support with stands.
3. Disconnect the fluid pipe and plug the end of the fluid pipe to prevent entrance of the dirt and loss of the fluid.
4. Remove the bolts attaching the caliper and pull

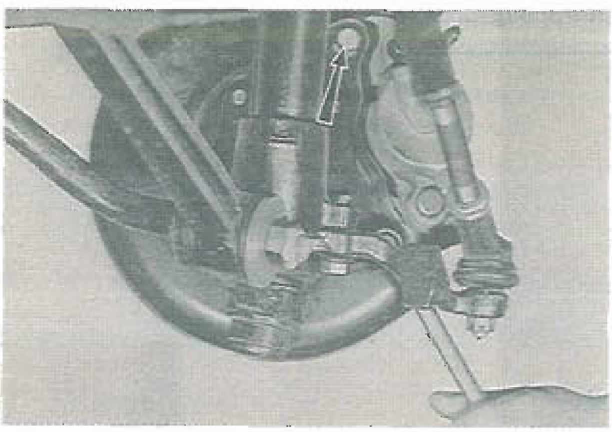


Fig. 13–2 Removing of caliper

the caliper off the rotor.
5. Remove the hub grease cap, cotter pin, nut lock and bearing adjusting nut from the steering knuckle spindle. Pull the hub and rotor assembly off the steering knuckle spindle.

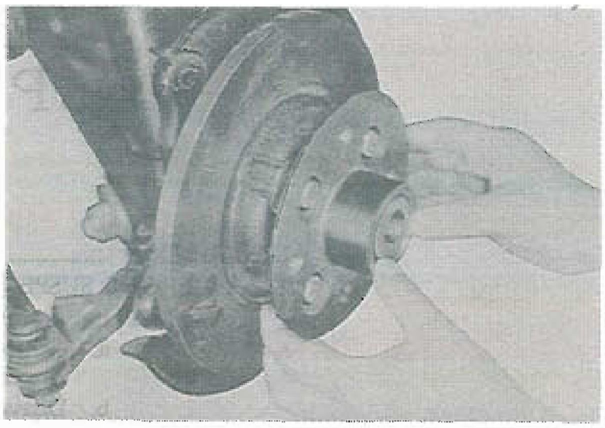


Fig. 13–3 Removing of hub assembly

6. Remove the two bolts that attach the lower end of the shock absorber onto the steering knuckle arm.

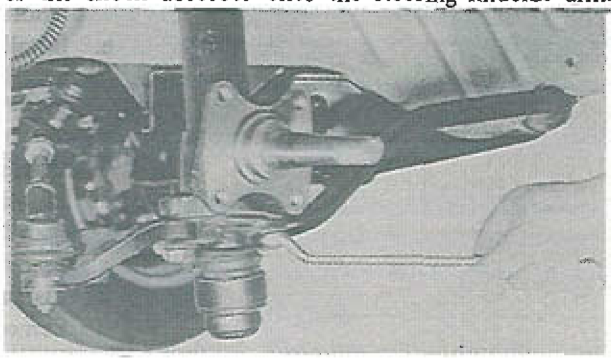


Fig. 13–4 Removing of bolts

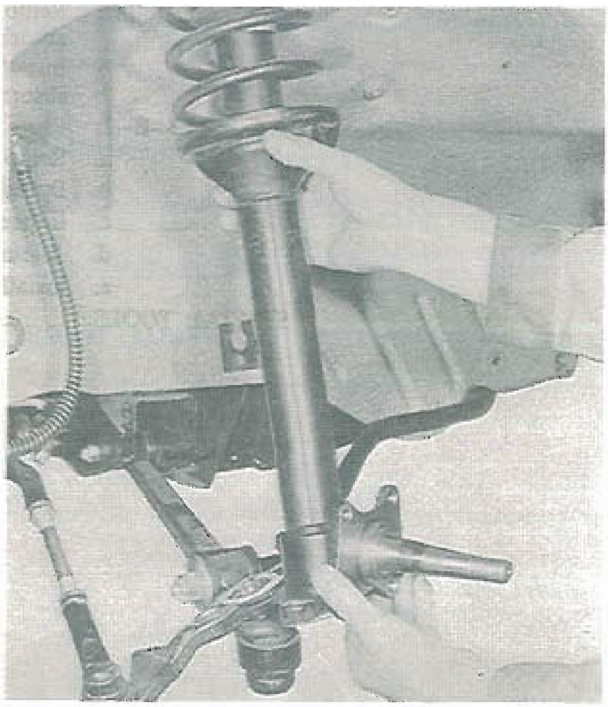


Fig. 13–5 Removing of front shock absorber

7. Lower the suspension arm and remove the shock absorber.

b. Disassembling of front shock absorber

1. Compress the coil spring with the **spring compressor** (Part Nos. 49 0223 640A and 49 0223 641).

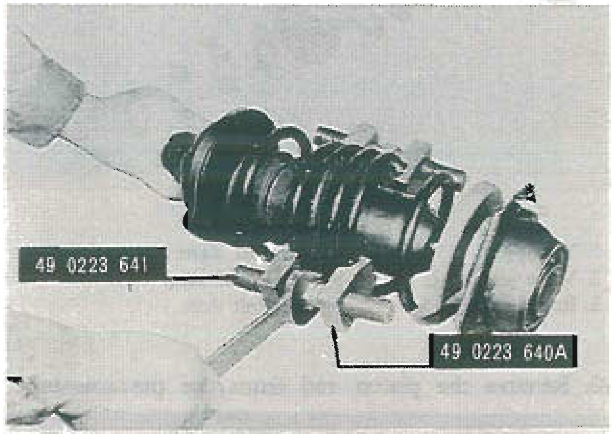


Fig. 13–6 Spring compressor

2. Hold the shock absorber support in a vise and remove the nut attaching the piston rod onto the shock absorber support.

Fig. 13–7 Removing of nut

3. Remove the shock absorber support, spring seat, coil spring, dust seal, damper stopper and dust cover from the shock absorber.
4. Hold the reservoir tube in a vise equipped with soft jaws.

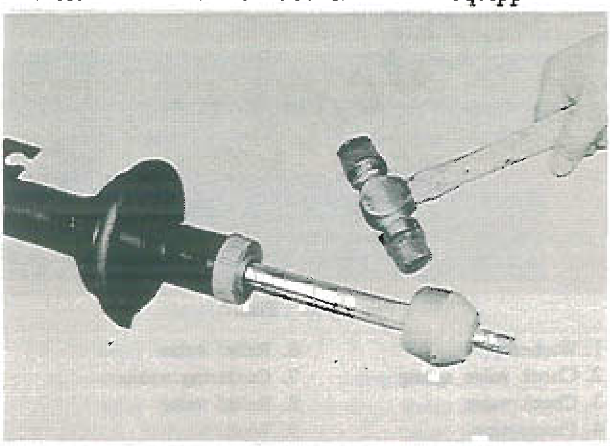


Fig. 13–8 Removing of damper stopper

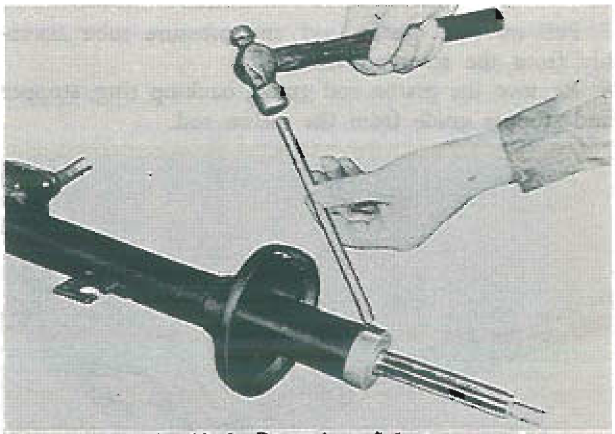


Fig. 13–9 Removing of dust cover

5. Remove the cap nut and seal assembly from the reservoir tube with the **cap nut wrench** (Part No. 49 0259 700A).

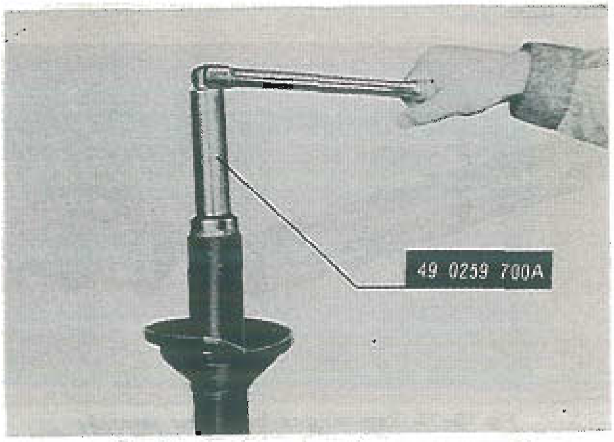


Fig. 13–10 Removing of cap nut assembly

6. Remove the "O" ring installed on the piston rod guide with a suitable tool.

Fig. 13–11 Removing of "O" ring

7. Pull out the piston rod and pressure tube assembly from the reservoir tube.
8. Remove the piston rod guide, back-up ring, stopper and stopper guide from the piston rod.

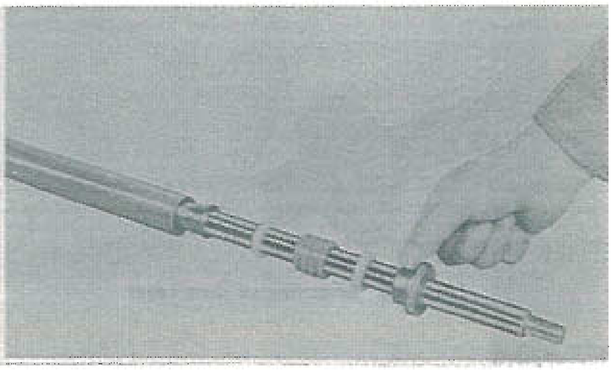


Fig. 13–12 Removing of piston rod guide

9. Remove the base valve assembly from the pressure tube.

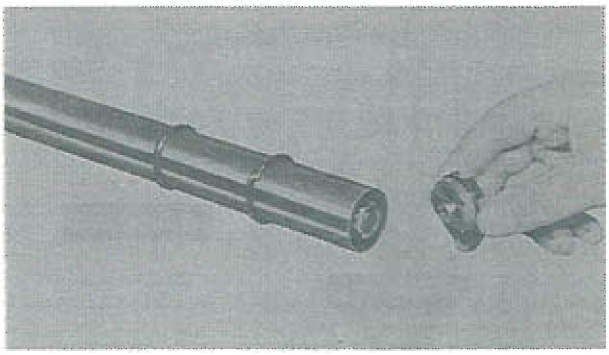


Fig. 13–13 Removing of base valve assembly

Then, remove the bolt and nut of the base valve assembly, and remove the valve seat, relief valves, base valve casing and relief valves.

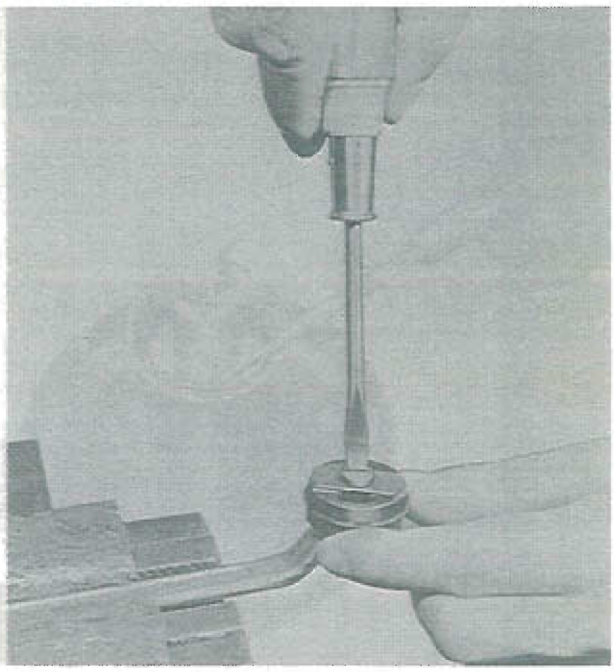


Fig. 13–14 Removing of bolt and nut

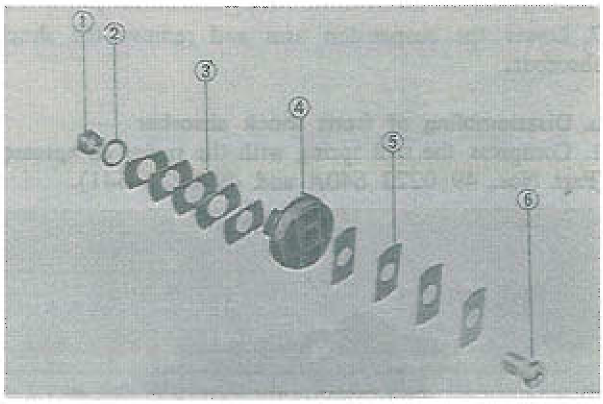


Fig. 13–15 Base valve

1. Nut
2. Valve seat
3. Relief valve
4. Base valve casing
5. Relief valve
6. Bolt

10. Remove the piston rod from the pressure tube.

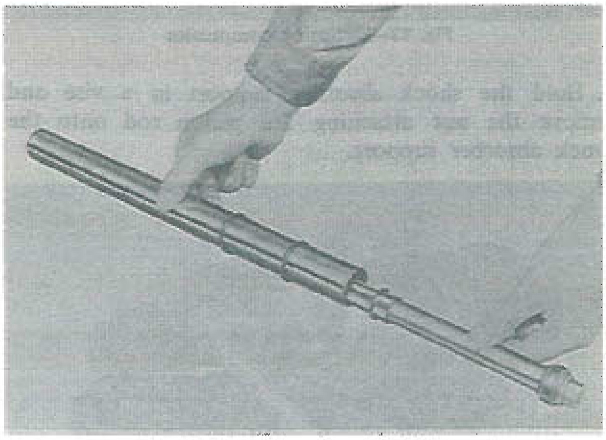


Fig. 13–16 Removing of piston rod

11. Hold the upper end of the piston rod in a vice, being careful to protect it with an alminum plate and remove the piston attaching nut. Remove the washer, centering valve, relief valves, piston check valves, check valve springs and washer from the

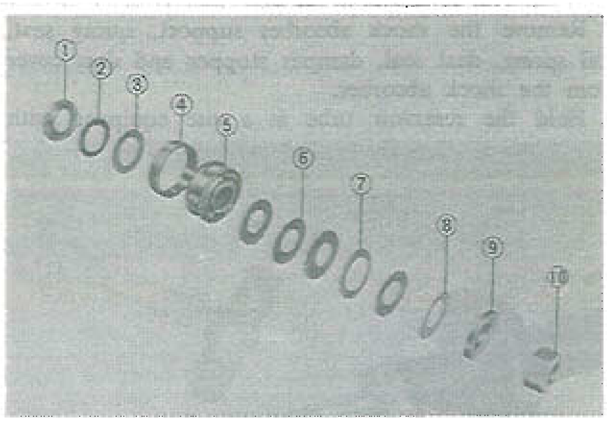


Fig. 13–17 Piston

1. Washer
2. Check valve spring
3. Check valve
4. Piston ring
5. Piston
6. Relief valve
7. Centering washer
8. Relief valve
9. Washer
10. Nut

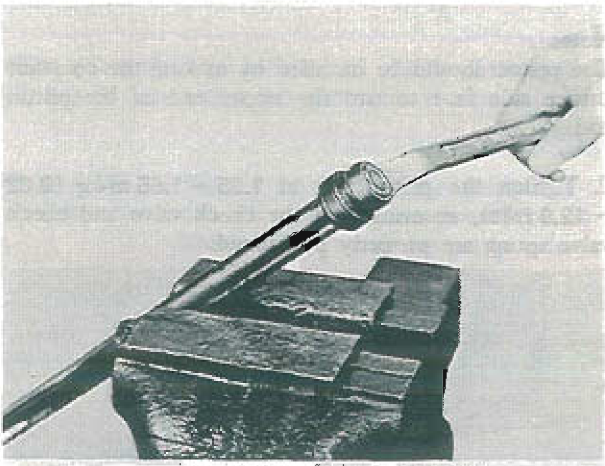


Fig. 13–18 Removing of piston nut

piston rod in that order. Then, remove the piston ring from the piston.

To replace the piston ring from the piston, proceed as follows:

1) Expand the open ends of the ring and remove the ring. **Do not** over-expand the ring.
2) Install a new piston ring.

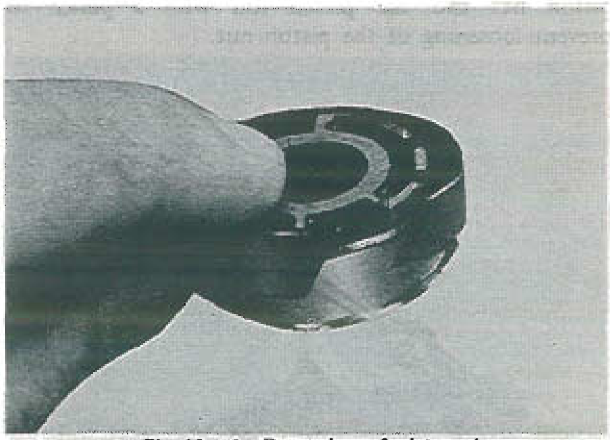


Fig. 13–19 Removing of piston ring

c. Checking of front shock absorber

1. Check the piston rod for wear, scores and bend. The piston rod diameter should be more than **19.94 mm (0.785 in)** and the piston rod run-out should

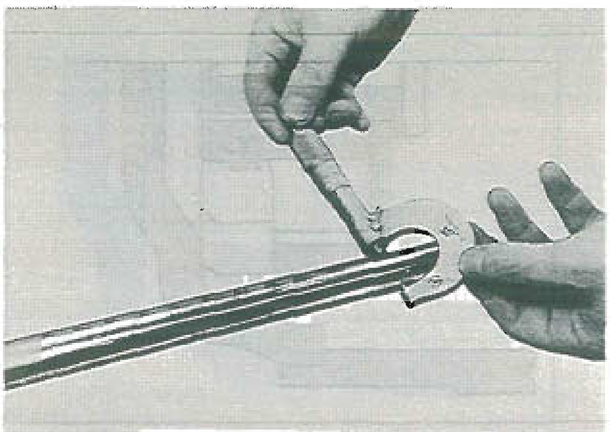


Fig. 13–20 Measuring of piston rod diameter

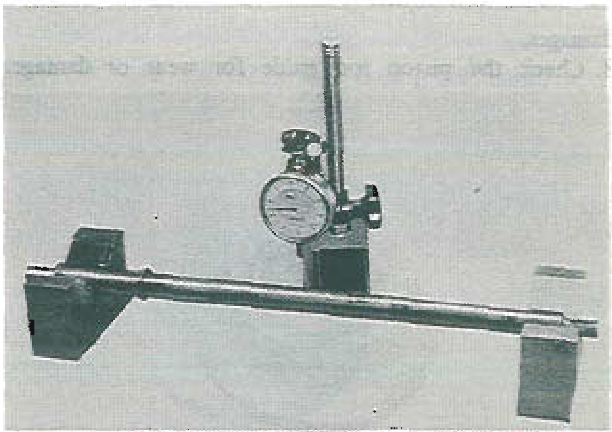


Fig. 13–21 Checking of piston rod run-out

be less than **0.15 mm (0.006 in)**.

2. Check the contacting surface of the piston with the check valve and relief valve for wear or damage.
3. Check the relief valve and check valve for wear, damages and flatness. The flatness is less than **0.02 mm (0.0008 in)**.
4. Check the reservoir tube for fluid leak or deformation and check the steering knuckle for crack.
5. Check the coil spring for weakness.
6. Inspect the pressure tube for inner diameter and bend. The inner diameter of the pressure tube should be **30.07 mm (1.184 in)** and the tube run-out should be less than **0.2 mm (0.008 in)**.

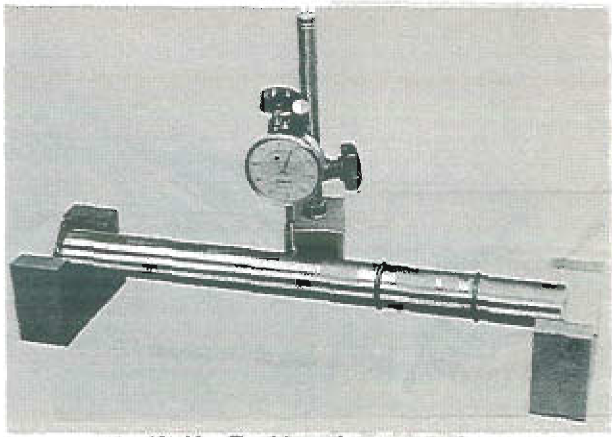


Fig. 13–22 Checking of pressure tube run-out

7. Check the cap nut for damaged thread and check the oil seal lip in the cap nut for wear or other

Fig. 13–23 Checking of cap nut and oil seal

damages.

8. Check the piston rod guide for wear or damage.

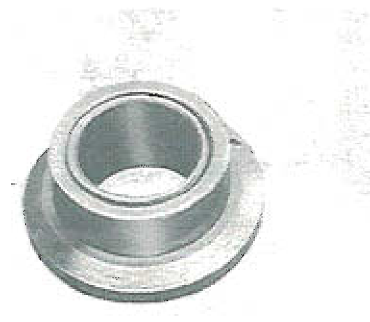


Fig. 13–24 Checking of piston rod guide

9. Check the base valve and relief valve for wear, damage or flatness. The flatness should be **0.02 mm (0.0008 in).**

d. Assembling of front shock absorber

1. Place the top end of the piston rod in a vise, being careful to protect it with alminum plates, and install the washer, check valve spring, check valve, piston, three relief valves, centering washer, two relief valves and washer.

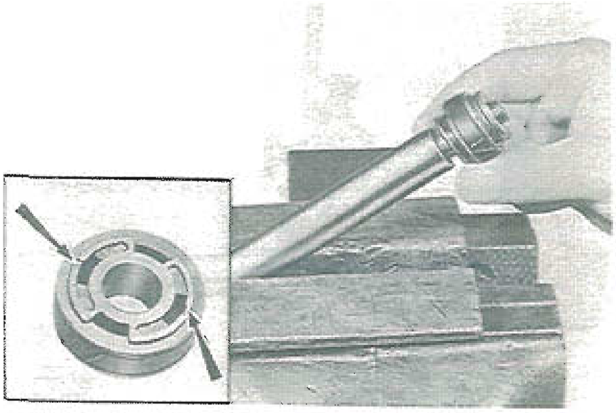


Fig. 13–25 Installing of piston

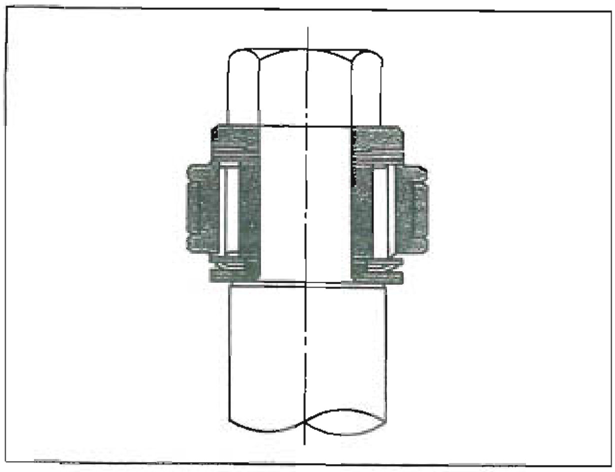


Fig. 13–26 Piston cross section

Note:
The piston should be installed by making the constant orifice side face toward the upper end of the piston rod.

2. Tighten the piston nut to **1.35 ~ 1.65 m-kg (9.02 ~ 12.9 ft-lb)**, ensuring that the check valve and check valve spring are properly positioned.

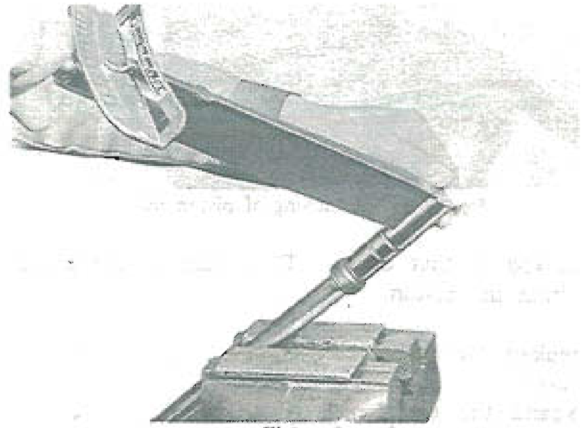


Fig. 13–27 Tightening of piston nut

3. Punch two portions of the threads between the piston nut and the piston rod with a punch to prevent loosening of the piston nut.

Fig. 13–28 Punching of threads

4. Fit the four relief valves onto the base valve bolt and install it into the base valve casing.

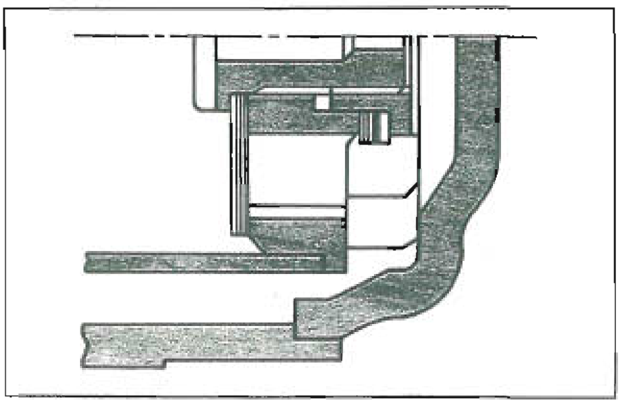


Fig. 13–29 Base valve cross section

5. Fit the five relief valves, washer and nut to the base valve casing and tighten the nut to **0.25 m-kg (1.88 ft-lb)**.
6. After tightening the nut, punch the center of the bolt with a punch.

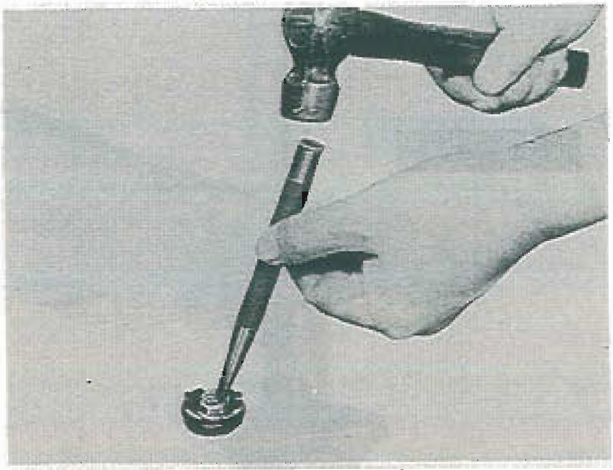


Fig. 13–30 Punching of bolt

7. Insert the piston rod into the pressure tube from the bottom side.

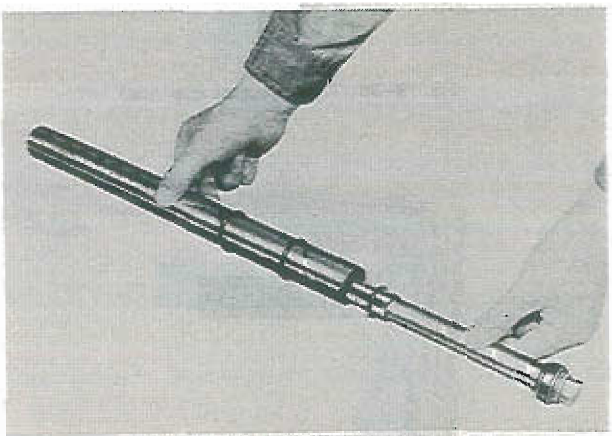


Fig. 13–31 Inserting of piston rod

8. Install the stopper guide onto the piston rod with the grooves of the stopper guide toward the base valve.
9. Install the stopper and back-up ring onto the piston rod.

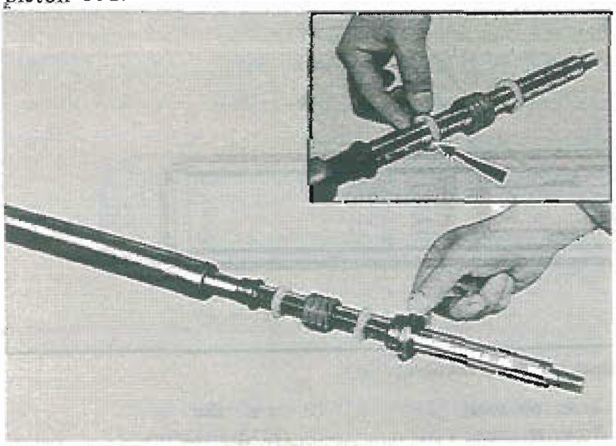


Fig. 13–32 Installing of stopper guide

10. Install the base valve assembly into the bottom of the pressure tube.

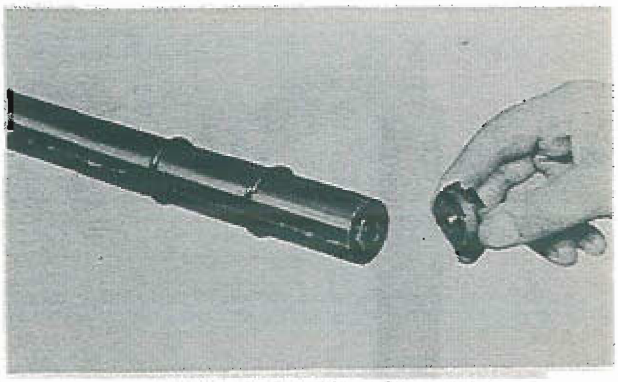


Fig. 13–33 Installing of base valve

11. Install the two oil stop rings onto the bottom side of the pressure tube as shown in Fig. 13–34.

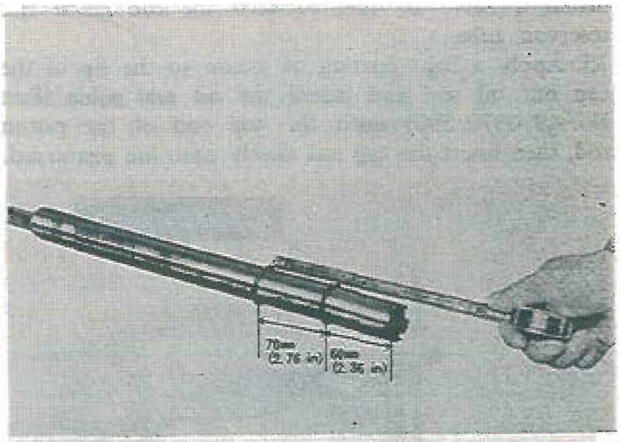


Fig. 13–34 Installing of oil stop rings

12. Insert the pressure tube and piston rod assembly into the reservoir tube.

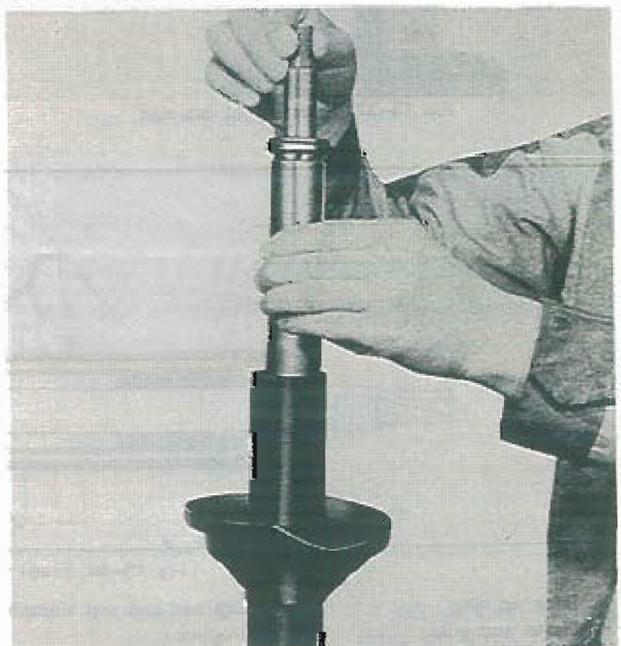


Fig. 13–35 Installing of tube and rod assembly

13. Fill the reservoir tube with shock absorber fluid. The capacity of reservoir tube should be exactly **270 cc (16.5 cu–in).**

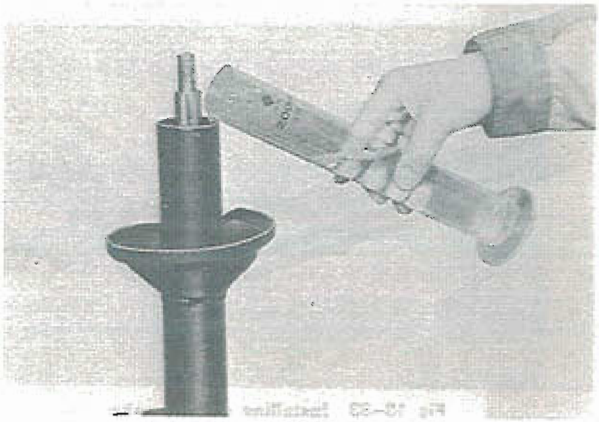


Fig. 13–36 Filling with fluid

14. Install the rod guide into the pressure tube and install a new "O" ring between the rod guide and reservoir tube.

15. Apply a light coating of grease to the lip of the cap nut oil seal and install the **oil seal guide** (Part No. 49 0370 590) onto the top end of the piston rod, then insert the cap nut slowly onto the piston rod.

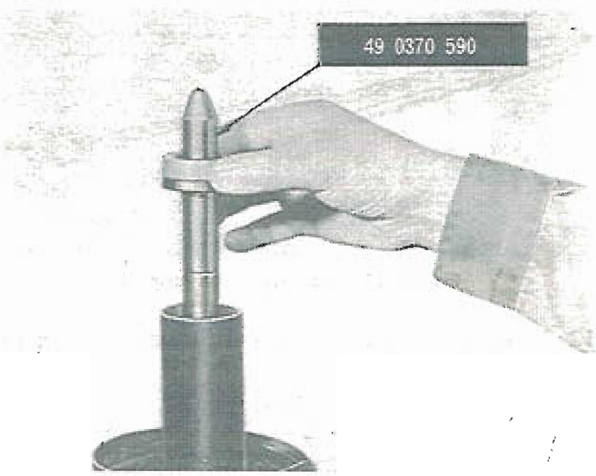


Fig. 13–37 Inserting of cap nut

16. Tighten the cap nut temporarily, ensuring that the piston rod is extended to its maximum length, with the **cap nut wrench** (Part No. 49 0259 702).

Fig. 13–38 Tightening of cap nut

Fig. 13–39 Tightening of cap nut

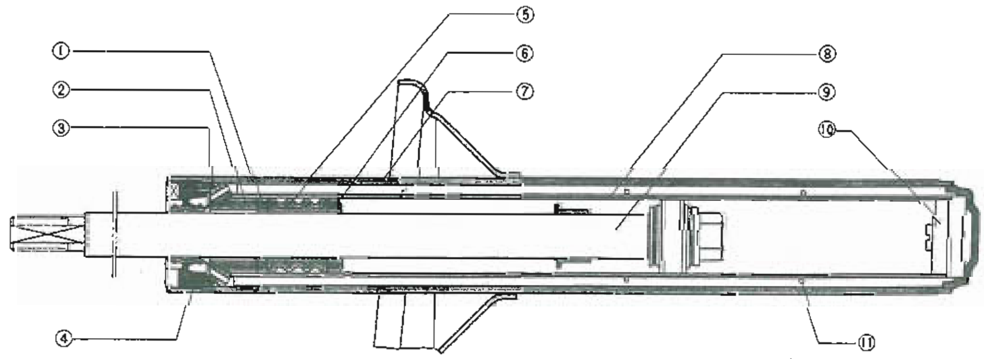


Fig. 13–40 Front shock absorber cross section

1. Back up ring
2. Piston rod guide
3. "O" ring
4. Cap nut and seal assembly
5. Stopper
6. Stopper guide
7. Reservoir tube
8. Pressure tube
9. Piston rod
10. Base valve
11. Oil stop ring

17. Fully lower the piston rod and tighten the cap nut to **5.0 ~ 6.0 m-kg (36.2 ~ 43.4 ft-lb)** with the **cap nut wrench** (Part No. 49 0259 700A). Then, install the dust cover.
18. Install the damper stopper onto the piston rod.
19. Install the dust boot onto the piston rod.

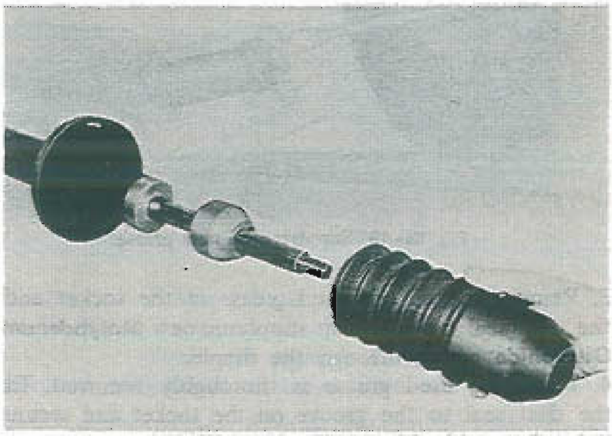


Fig. 13–41 Installing of dust boot

20. Install the rubber spring seat and coil spring onto the reservoir tube.
21. Install the spring seat, washer, thrust washer, and shock absorber support in that order.
22. Tighten the support nut.

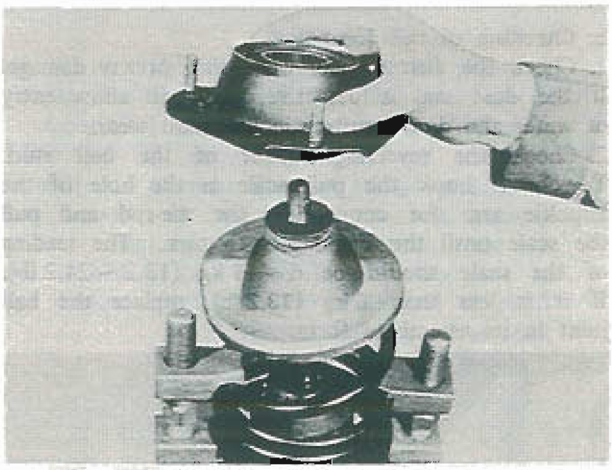


Fig. 13–42 Installing of shock absorber support

e. Installing of front shock absorber

Follow the removal procedures in the reverse order.

Note:
When replacing the coil spring or adjusting the road clearance, install a suitable coil spring and adjusting plate to equal road clearance both on the right and left. **Do not** use more than two adjusting plates at one side.

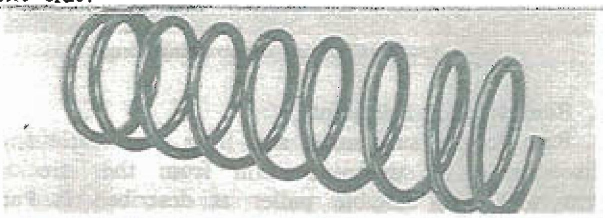


Fig. 13–43 Coil spring

13–A–2. Suspension Arm

a. Removing of suspension arm

1. Raise the front end of the vehicle and support with stands.
2. Remove the front wheel.
3. Disconnect the tie-rod from the knuckle arm with the **puller** (Part No. 49 0118 850C).

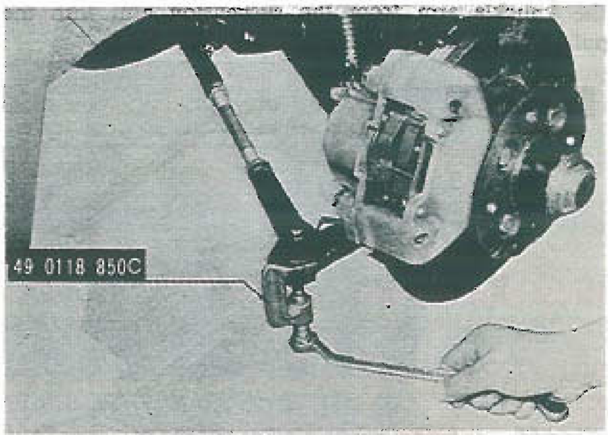


Fig. 13–44 Disconnecting of tie-rod

4. Remove the bolts attaching the knuckle arm to the lower end of the front shock absorber.
5. Refer to Par. 13–A–3 and check the ball joint revolving torque with a pull scale, as shown in Fig. 13–45. The revolving torque is **6 ~ 11 kg (13.2 ~ 24.2 lb).**
6. Remove the suspension arm to stabilizer attaching

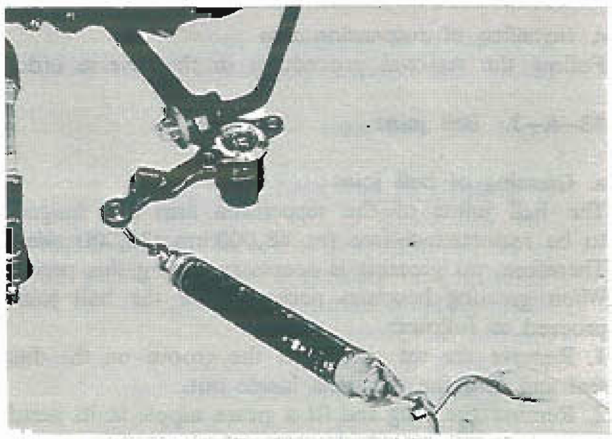


Fig. 13–45 Checking of revolving torque

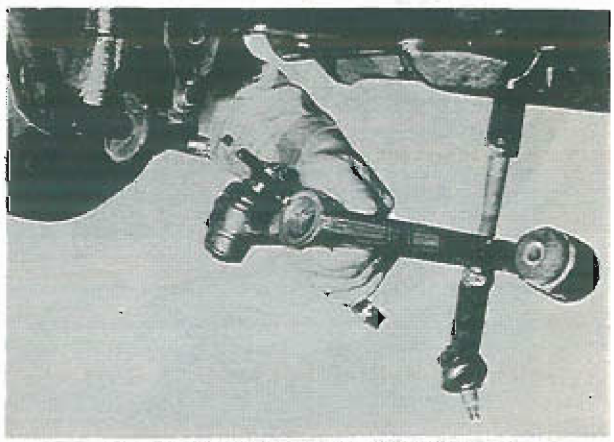


Fig. 13–46 Removing of suspension arm

nut.
7. Remove the bolt attaching the suspension arm end to the cross member.
8. Pull the front shock absorber outward and remove the suspension arm end from the cross member.
9. Remove the suspension arm.
10. Remove the cotter pin and nut, and disconnect the knuckle arm from the suspension arm with the **puller** (Part No. 49 0727 575).

Fig. 13–47 Disconnecting of knuckle arm

b. Inspecting of suspension arm
Inspect the suspension arm and knuckle arm for any crack or damage. Check the rubber bushes for weakness, wear or damage. If necessary, replace with new ones.

c. Installing of suspension arm
Follow the removal procedures in the reverse order.

13–A–3. Ball joint

a. Greasing of ball joint
The ball joints of the suspension arm are designed to be maintenance-free for **48,000 km (32,000 miles)**. Therefore, no greasing is necessary during this period. When greasing becomes necessary on the ball joint, proceed as follows:
1. Remove the set ring from the groove on the dust seal and turn the dust seal inside out.
2. Remove the plug and fit a grease nipple in its stead.

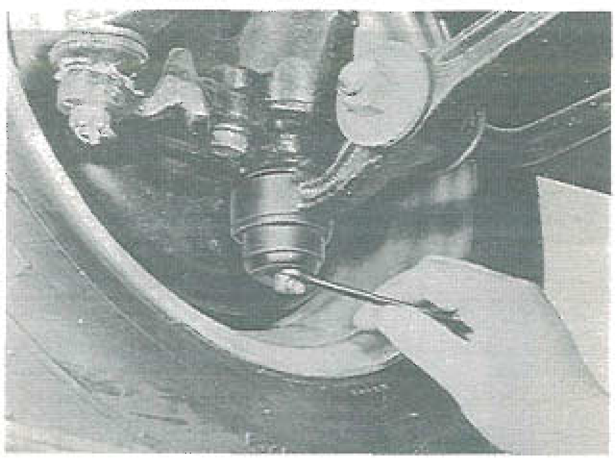


Fig. 13–48 Installing of grease nipple

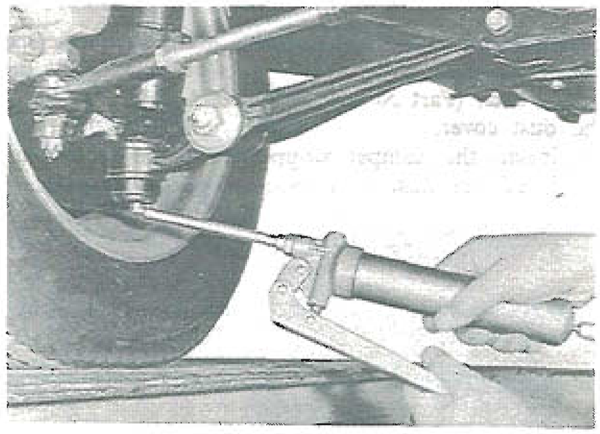


Fig. 13–49 Supplying of new grease

3. Remove all of the used grease in the socket and the dust seal by gradually supplying new **Molybdenum Disulphide grease** through the nipple.
4. When the used grease is thoroughly removed, fit the dust seal to the groove on the socket and secure it in place with the set ring.
5. Add new Molybdenum Disulphide grease until the dust seal begins to balloon. Then, depress the dust seal with the fingers so that about half of the grease remains in the dust seal.
6. Wipe off excess grease around the ball joint.
7. Remove the grease nipple and fit the plug.

b. Checking of ball joint
1. Check the dust seal for wear, flaw or any damage. If the dust seal is defective, this will allow entry of water and dirt, resulting in ball joint wear.
2. Check the revolving torque of the ball stud. To check, hook the pull scale in the hole of the knuckle arm for connecting the tie-rod and pull the scale until the ball starts to turn. The reading of the scale should be 6 ~ 11 kg (13.2 ~ 24.2 lb). *If it is less than **6 kg (13.2 lb)**, replace the ball joint in its assembled form.*

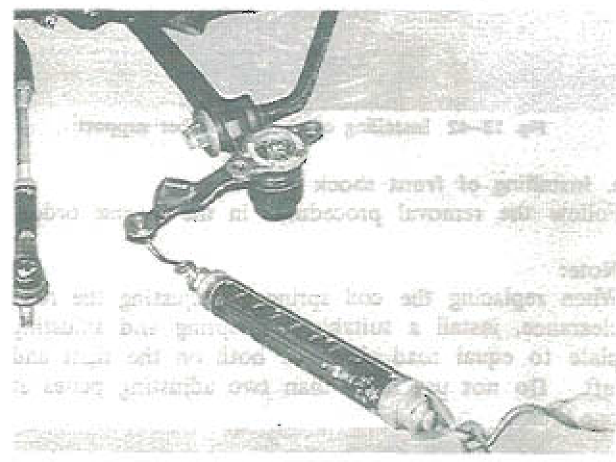


Fig. 13–50 Checking of revolving torque

c. Removing of ball joint
1. Remove the suspension arm from the vehicle and disconnect the suspension arm from the knuckle arm with the suitable puller as described in **Par. 13–A–2.**

2. Remove the set ring and dust seal from the ball joint.
3. Press the ball joint out of the suspension arm with the **ball joint remover** (Part No. 49 0370 860).

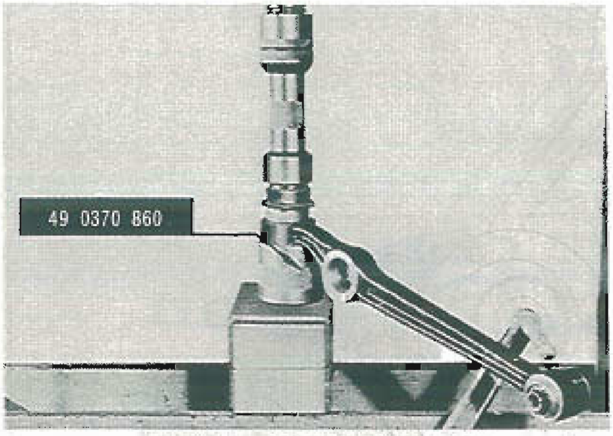


Fig. 13–51 Removing of ball joint

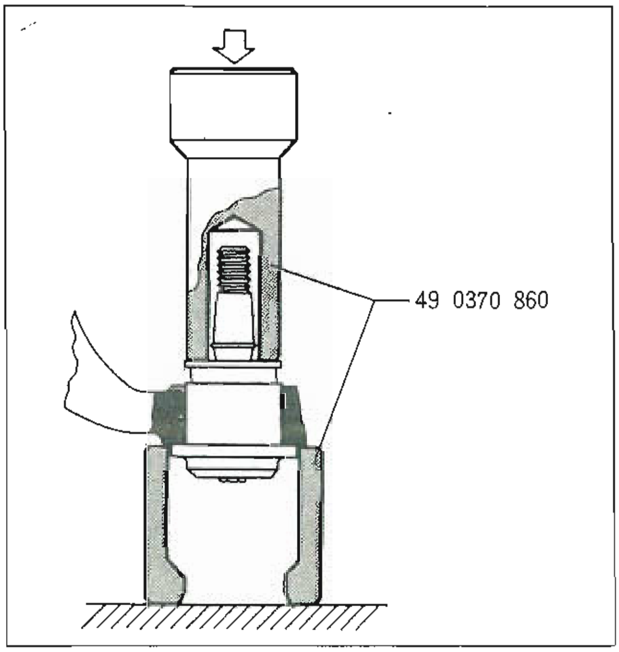


Fig. 13–52 Ball joint remover

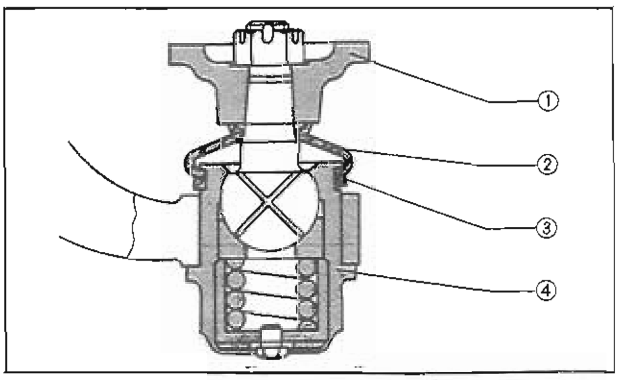


Fig. 13–53 Ball joint cross section

1. Steering knuckle arm
2. Dust seal
3. Set ring
4. Ball joint assembly

Note:
Before pressing out the ball joint, clean the ball joint and suspension arm so as not to damage the mounting bore of the suspension arm.

4. Clean the mounting bore of the suspension arm and apply kerosene.
5. Press fit the ball joint to the suspension arm with the **ball joint installer** (Part No. 49 0370 860).

Note:
If the pressure to press in the ball joint is less than **1,500 kg (3,300 lb),** the suspension arm should be replaced.

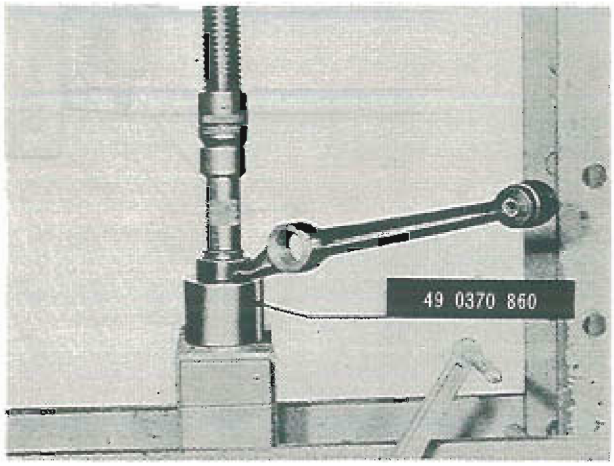


Fig. 13–54 Installing of ball joint

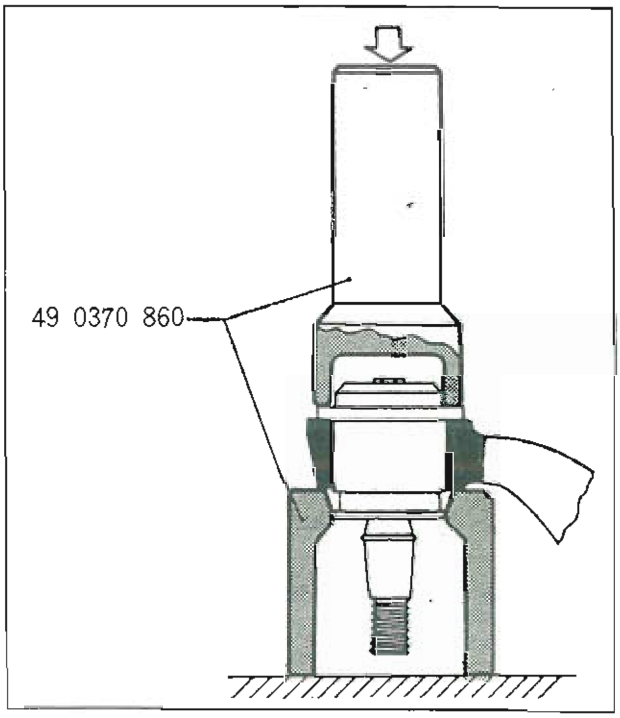


Fig. 13–55 Ball joint installer

6. Install the ball joint and suspension arm assembly to the steering knuckle Tighten the nut to 8.0 m-kg (60 ft-lb) and install the cotter pin.
7. Install the suspension assembly.

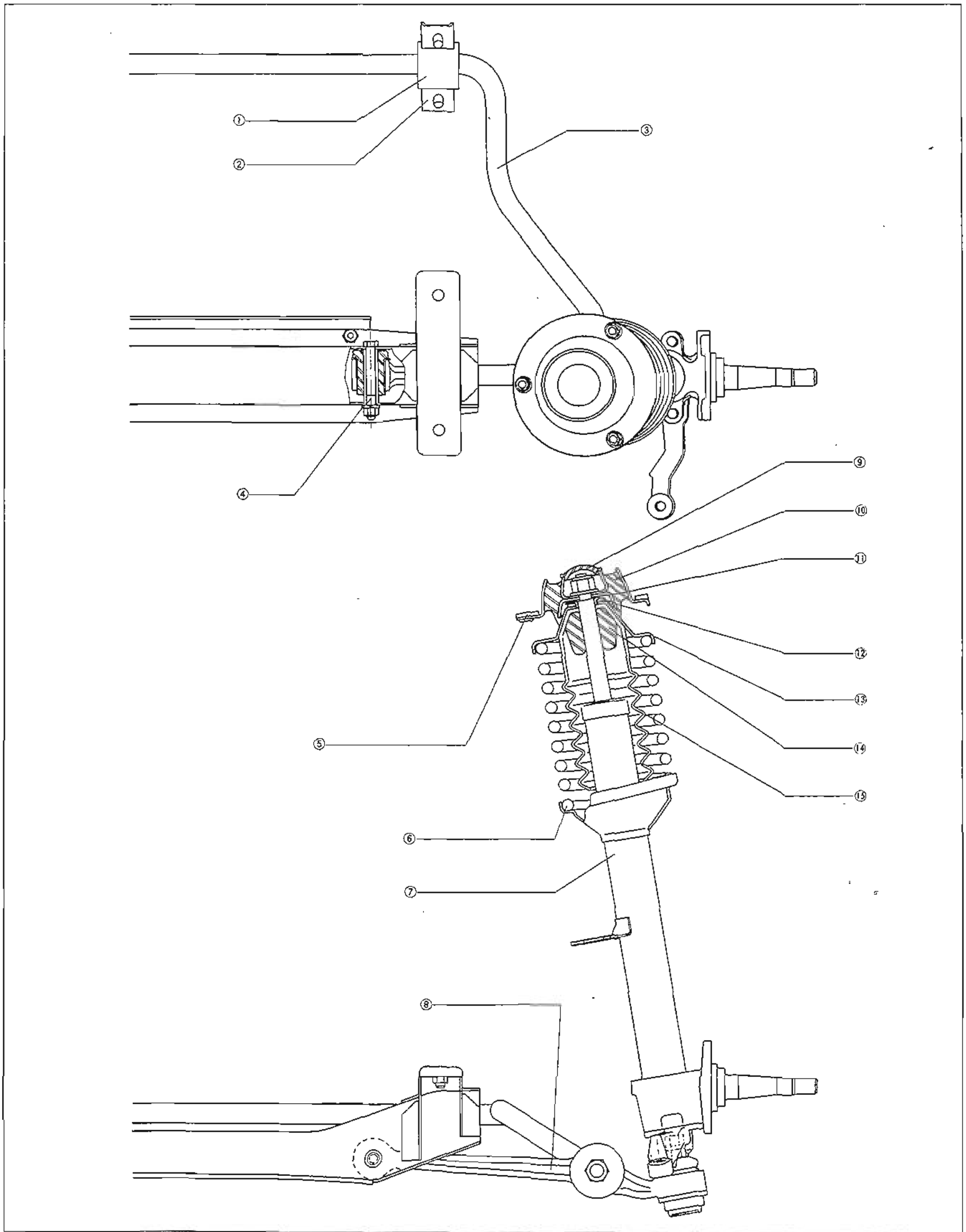


Fig. 13–56 Front suspension

1. Bush
2. Stabirizer bracket
3. Stabirizer
4. Bolt
5. Road clearance adjusting plate
6. Coil spring
7. Front shock absorber
8. Suspension arm
9. Cap
10. Shock absorber support (Mounting rubber)
11. Washer
12. Thrust washer
13. Spring seat
14. Damper stopper
15. Dust seal

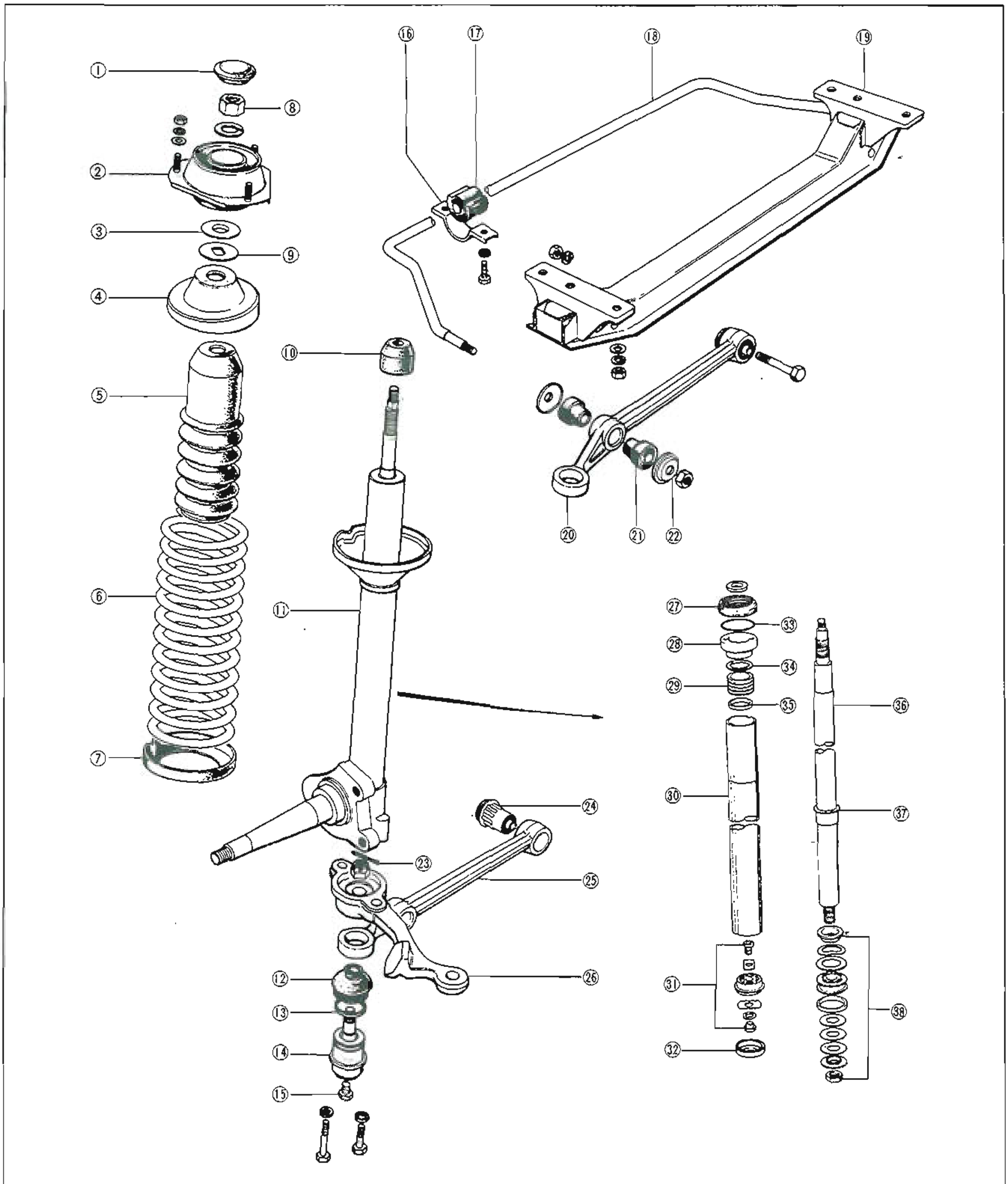


Fig. 13–57 Front suspension components

1. Cap
2. Shock absorber support (Mounting rubber)
3. Thrust washer
4. Spring seat
5. Dust seal
6. Coil spring
7. Spring seat
8. Nut
9. Washer
10. Damper stopper
11. Front shock absorber
12. Dust seal
13. Set ring
14. Ball joint
15. Plug
16. Stabilizer bracket
17. Bush
18. Stabilizer
19. Cross member
20. Suspension arm
21. Bush
22. Washer
23. Castellated nut and cotter pin
24. Bush
25. Suspension arm
26. Knuckle arm
27. Cap nut and seal assembly
28. Piston rod guide
29. Stopper
30. Reservoir tube
31. Base valve assembly
32. Cap
33. "O" ring
34. Stopper guide
35. Back-up ring
36. Piston rod
37. Oil stop ring
38. Piston assembly

13–B. REAR SUSPENSION

13–B–1. Rear Shock Absorber

a. Removing of rear shock absorber

1. Open the luggage compartment door, and remove the package trim.

Fig. 13–58 Removing of package trim

2. Remove the nuts, washers and rubber bushes from upper ends of the shock absorber.

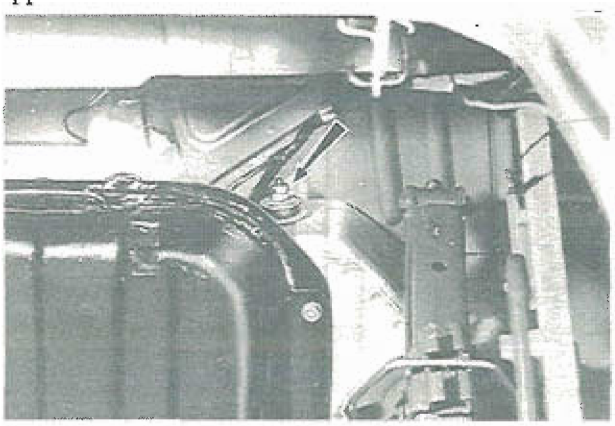


Fig. 13–59 Removing of upper nuts

3. Remove nut and bolt attaching the lower end of the shock absorber to the rear axle housing, and remove the shock absorber.

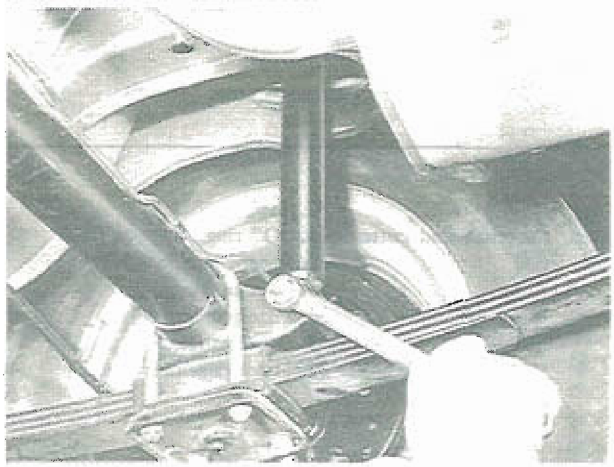


Fig. 13–60 Removing of lower nut

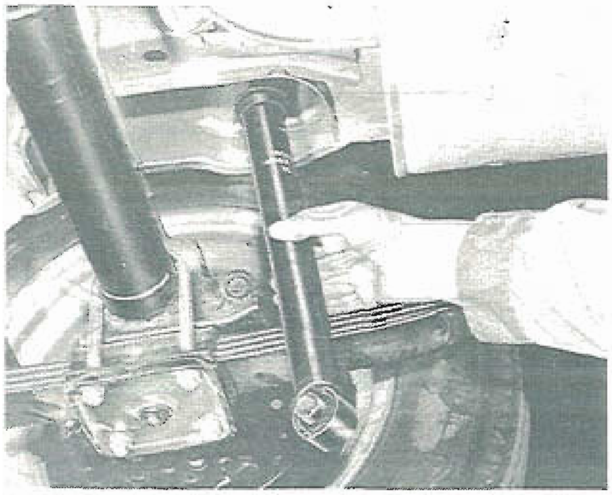


Fig. 13–61 Removing of rear shock absorber

b. Installing of rear shock absorber

Follow the removal procedures in the reverse order.

Note:

Tighten the rear shock absorber upper nuts to the dimension shown in Fig. 13–62.

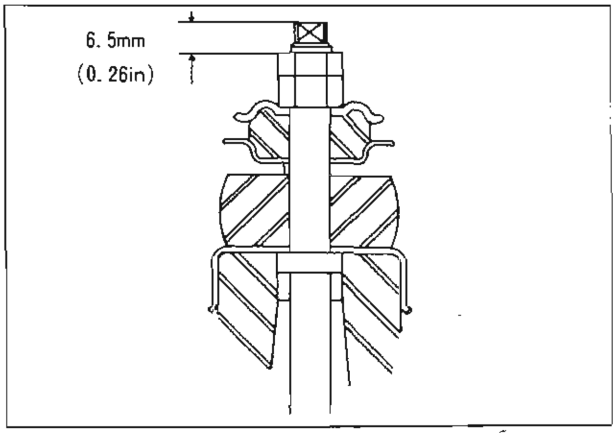


Fig. 13–62 Tightening of upper nut

13–B–2. Rear Spring

a. Removing of rear spring

1. Raise the rear end of the vehicle and support the body (rear side frame).

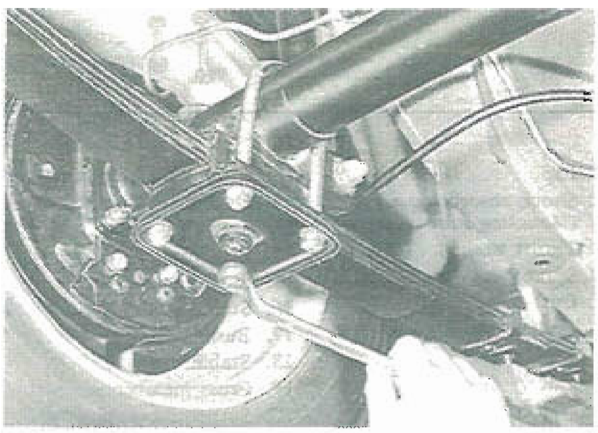


Fig. 13–63 Removing of "U" bolt attaching nut

2. Remove the rear wheel and support the rear axle housing with stands.
3. Remove the "U"-bolt attaching nuts, and then remove the "U"-bolt seat, rubber pad, plate and "U"-bolts.
4. Remove the two bolts and one nut attaching the spring pin located at the front end of the rear spring. Insert a suitable tool as a screwdriver between the spring pin and bracket of the body, and pry them.

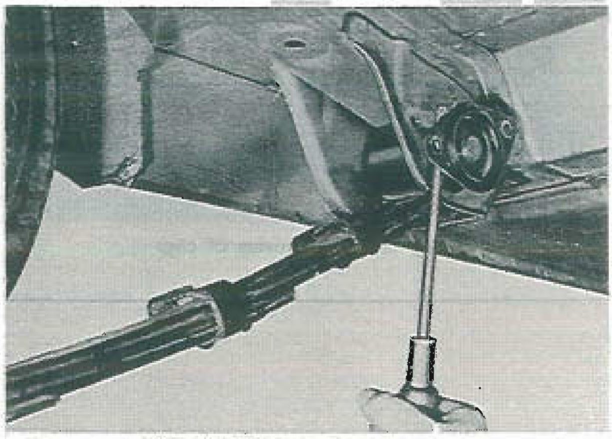


Fig. 13–64 Removing of spring pin

5. Remove the two nuts and one bolt attaching the shackle hanger to the body and remove the rear spring with the shackle hanger.
6. Remove the shackle plate, shackle, shackle hanger and bushes from the rear end of the rear spring.

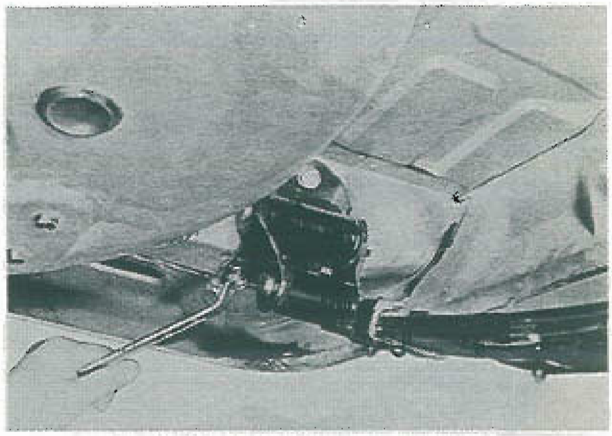


Fig. 13–65 Removing of shackle hanger

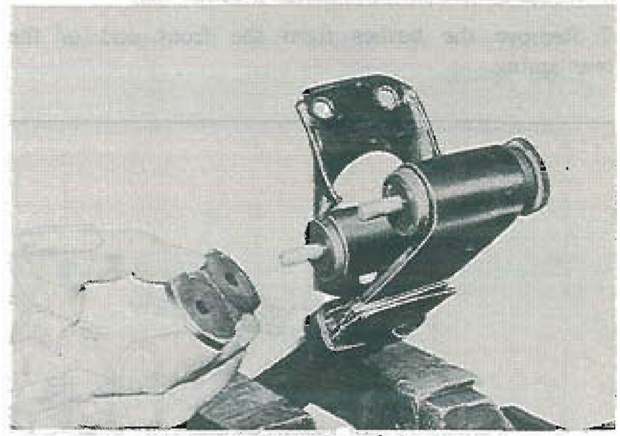


Fig. 13–66 Removing of shackle plate

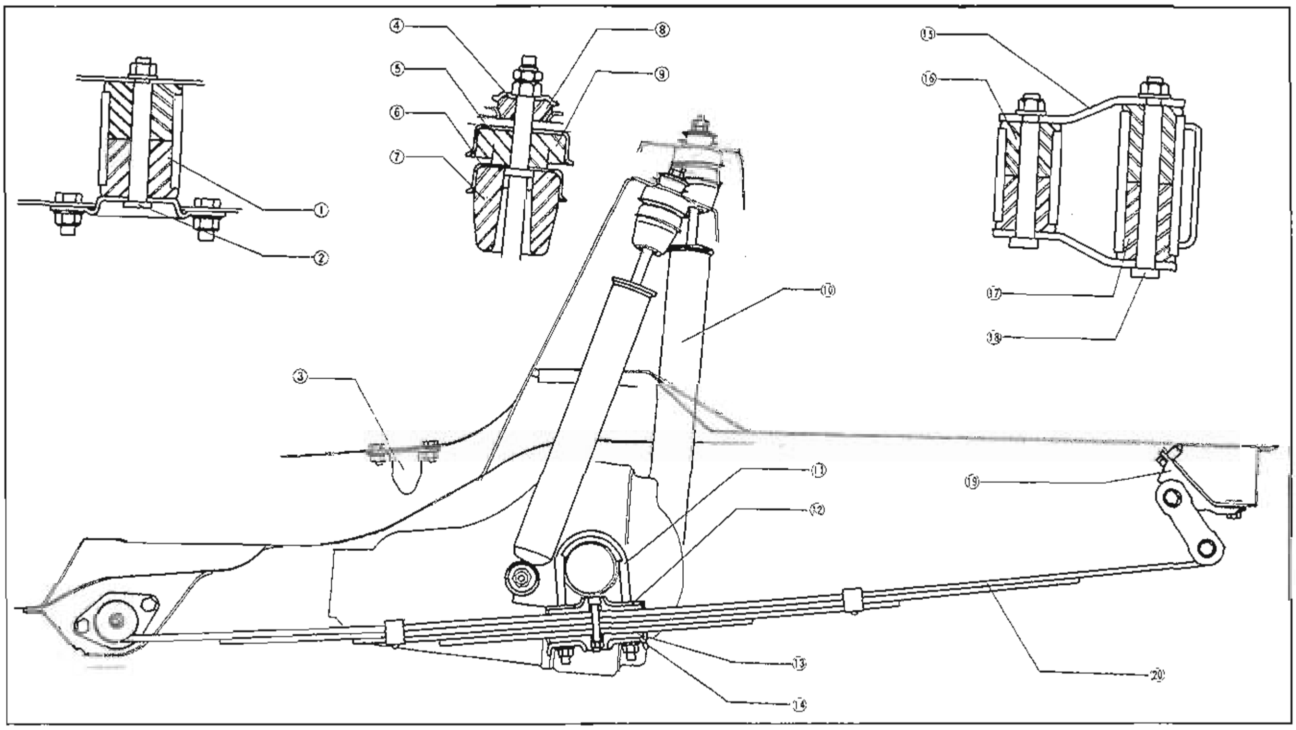


Fig. 13–67 Rear suspension

1. Bush	6. Stopper casing	11. "U"-bolt	16. Bush
2. Spring pin	7. Bound bumper	12. "U"-bolt seat	17. Bush
3. Stopper rubber	8. Bush	13. Rubber pad	18. Shackle pin
4. Retainer	9. Bush	14. Spring clamp	19. Shackle hanger
5. Bush holder	10. Rear shock absorber	15. Shackle plate	20. Leaf spring (Rear spring)

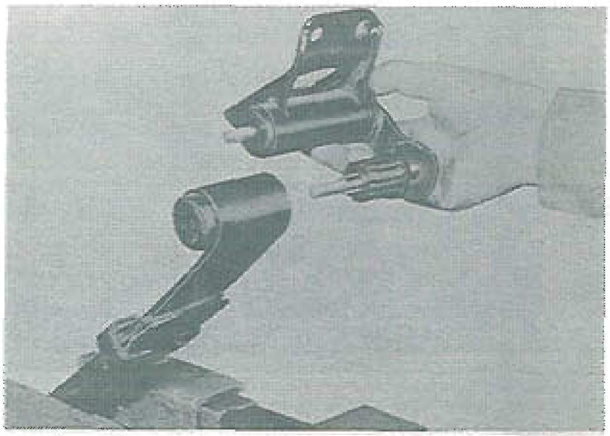


Fig. 13–68 Removing of shackle hanger

7. Remove the bushes from the front end of the rear spring.

b. Disassembling of rear spring

1. Pry the four clips with a suitable tool.

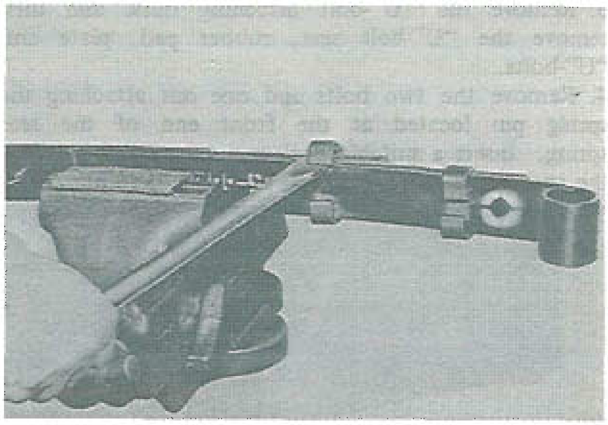


Fig. 13–69 Removing of clips

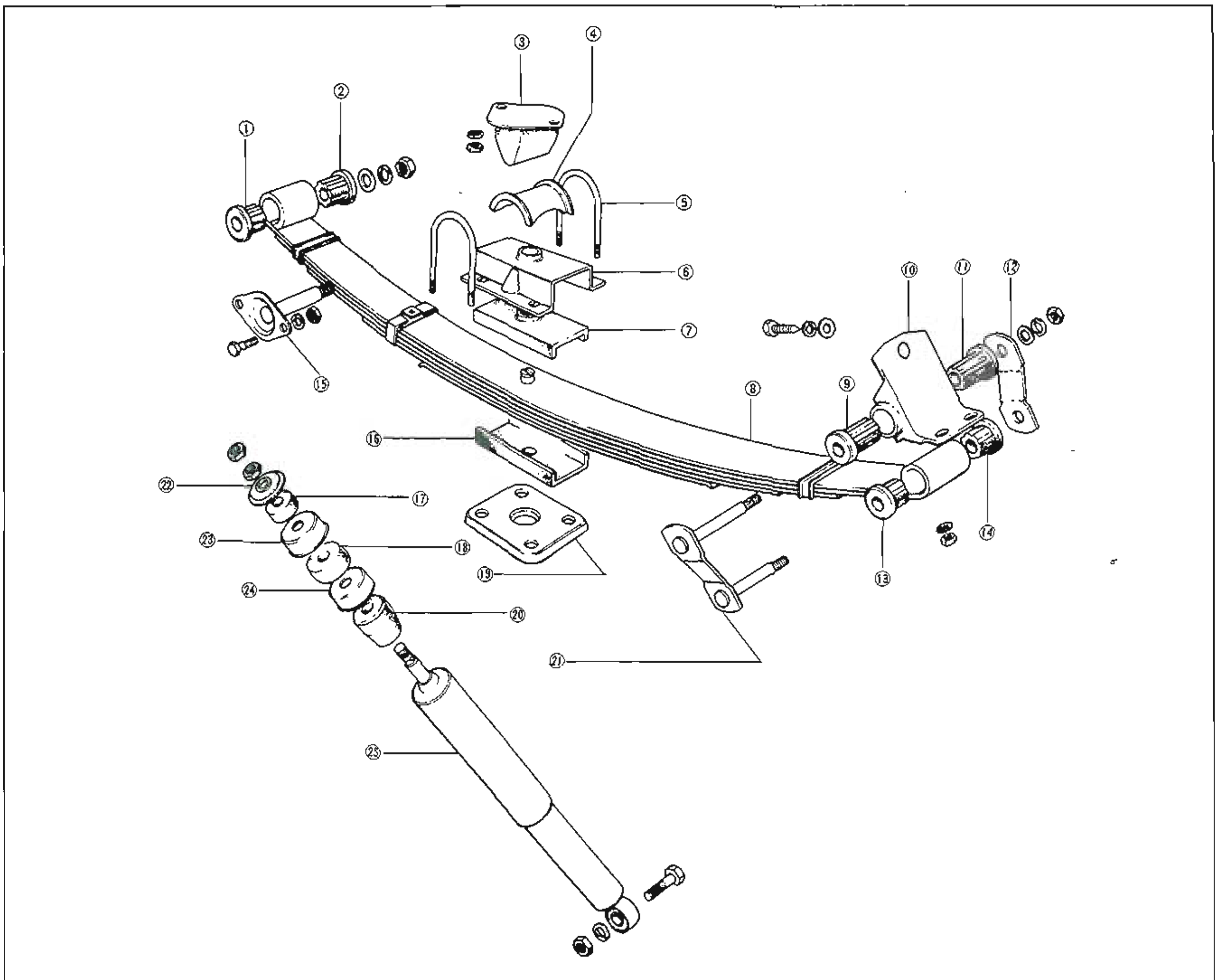


Fig. 13–70 Rear suspension components

1. Bush
2. Bush
3. Bound stopper
4. "U"-bolt seat
5. "U"-bolt
6. Plate
7. Rubber pad
8. Rear spring
9. Bush
10. Shackle hanger
11. Bush
12. Shackle plate
13. Bush
14. Bush
15. Spring pin
16. Rubber pad
17. Bush
18. Bush
19. Spring clamp
20. Damper stopper
21. Shackle
22. Washer
23. Holder
24. Damper stopper casing
25. Rear shock absorber

2. Remove the center bolt and nut, and disassemble the rear spring.

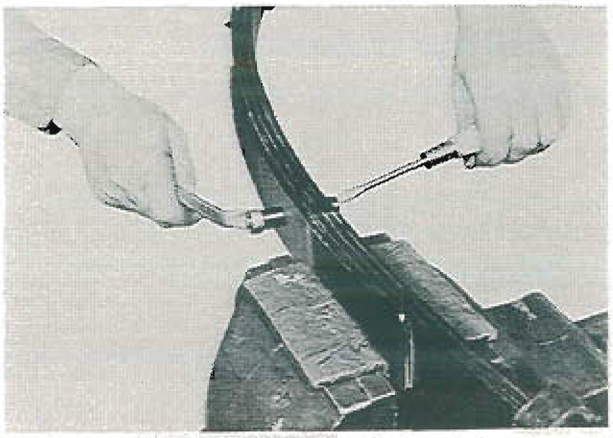


Fig. 13–71 Removing of center bolt

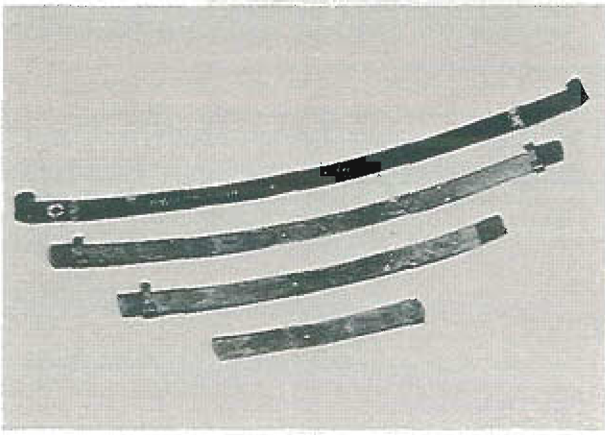


Fig. 13–72 Rear spring

Note:
According to the size of camber, the rear springs are classified into the three categories of –, 0, and +. They are marked on the main leaf. Since difference in camber between the right and left springs results in a difference in road clearance causing inclination of the vehicle, those with the same mark should be installed on both sides.

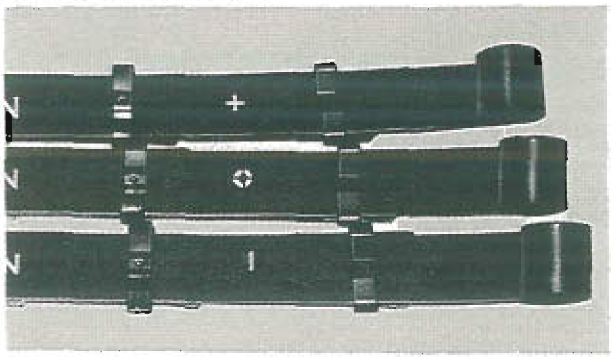


Fig. 13–73 Mark of rear spring

c. Inspecting of rear spring

1. Check the bush and spring rubber pad for wear or weakness.
2. Check the rear springs for breakage, cracks or weak leaves.
3. Check the shackle, and "U"-bolt for wear or any damage.
4. Check the leaves, inter leaves, center bolt and clips for defects.

d. Assembling of rear spring

Follow the disassembly procedures in the reverse order.

Note:
(a) Bend the clips until the leaves and inter leaves are firmly contacted.

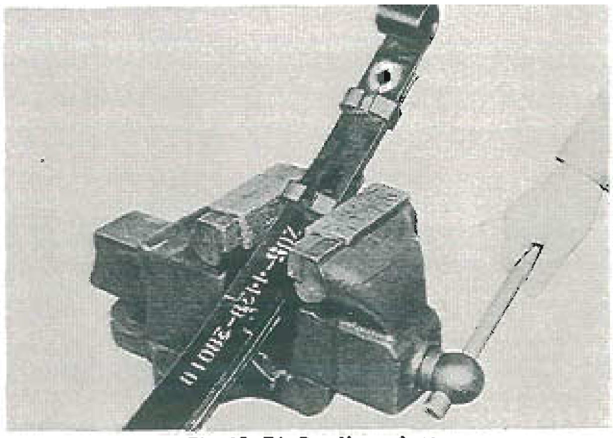


Fig. 13–74 Bending of clips

(b) After tightening the center bolt and nut, punch the nut to prevent loosening of the bolt.

e. Installing of rear spring

Follow the removal procedures in the reverse order.

Note:
Tighten the "U"-bolt attaching nuts to 4.0 m-kg (3.0 ft-lb).

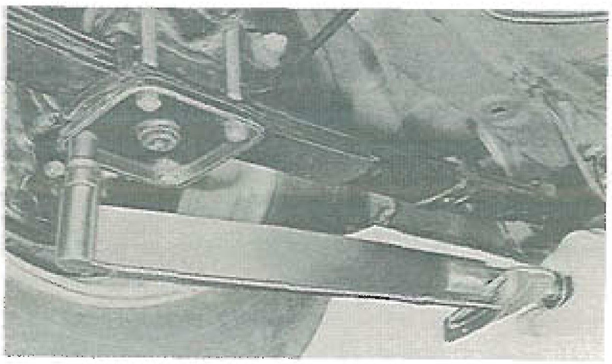


Fig. 13–75 Tightening of "U" bolt attaching nuts

SPECIAL TOOLS

49 0370 860	Ball joint remover and installer	49 0259 702	Cap nut wrench
49 0223 640A	Spring compressor	49 0370 590	Cap nut oil seal guide
49 0223 641	Spring compressor	49 0118 850C	Ball joint puller
49 0259 700A	Cap nut wrench	49 0727 575	Knuckle arm puller

SUSPENSION

RX-3 Rotary Wagon
808 Station Wagon

DESCRIPTION

The rear shock absorbers equipped on 808 Station Wagon and RX-3 Rotary Wagon are of the gas sealed type. The procedures for removing and installing the rear shock absorber are explained in this section. The rear shock absorbers should not be disassembled as it contains a high compressed gas. Servicing the other components is the same as that Sedan, which is explained in section 13.

13A–A. REAR SHOCK ABSORBER

13A–A–1. Removing of Rear Shock Absorber

1. Jack up the rear end of the vehicle and support the body with safety stands.
2. Remove the lock nuts, washers and rubber bush from lower end of the shock absorber.

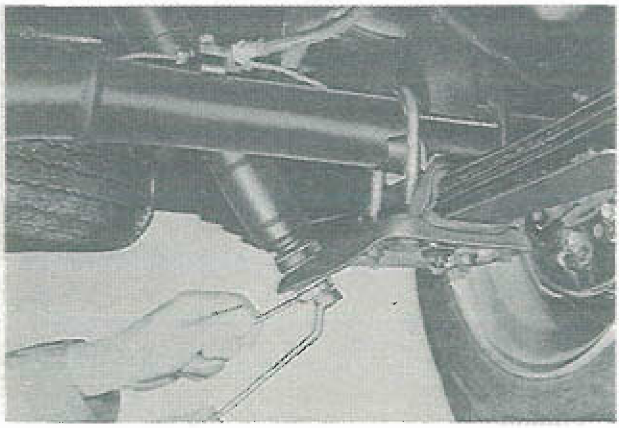


Fig. 13A–1 Removing of lock nuts

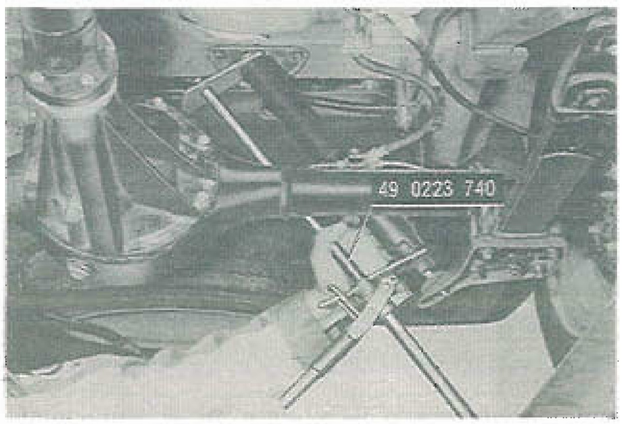


Fig. 13A–2 Compressing of shock absorber

3. Compress the shock absorber with a **shock absorber lifter** (49 0223 740) as shown in Fig. 13A–2.
4. Remove the bolts that attach the shock absorber bracket to the body and remove the shock absorber together with the lifter.

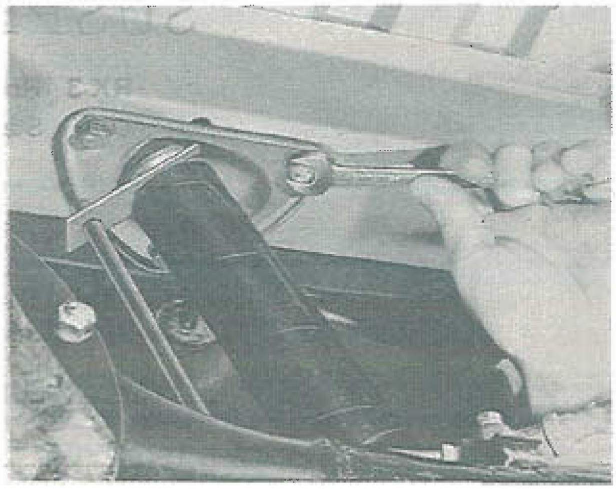


Fig. 13A–3 Removing of shock absorber bracket

5. Remove the lifter from the shock absorber.
6. Remove the nuts, washers, rubber bush, bracket and rubber bush from the shock absorber.
7. If the rubber bushes appear worn, damaged or deteriorated, replace with new ones.

13A–A–2. Installing of Rear Shock Absorber

Install the shock absorber in the reverse order of removing, noting the following points:

1. Position the washer, rubber bush, bracket and rubber bush to the upper end of the shock absorber in this order.
2. Tighten the shock absorber upper nuts to the dimension shown in Fig. 13A–4.

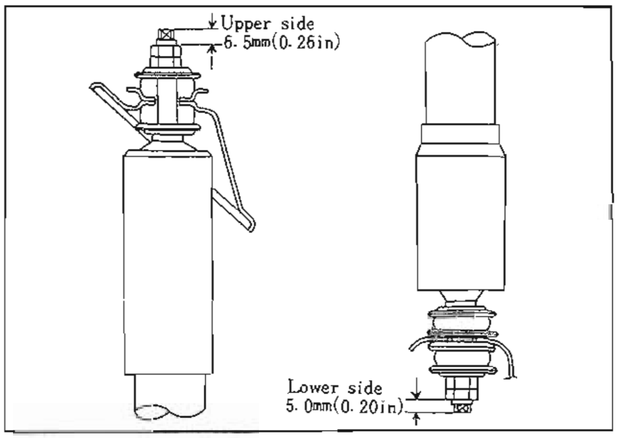


Fig. 13A–4 Tightening of lock nut

SPECIAL TOOL

49 0223 740	Shock absorber lifter

BODY

DESCRIPTION
The body is designed to give an unitary construction with the body and chassis frame unified for light, rigid and durable construction. This section explains service procedures of the hood, luggage compartment, bumper, door, seat, top celing, windshield, and nose panel.

14–A. HOOD

14–A–1. Removing of Hood

1. Open the hood and support the hood in the open position. Mark the hood hinge locations on the hood.
2. Remove the hood support from the hood.

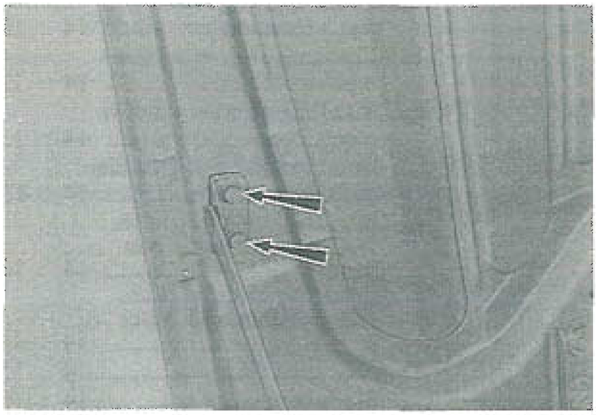


Fig. 14–1 Removing of hood support

3. Remove two bolts attaching each hinge to the hood taking care not to let the hood slip when

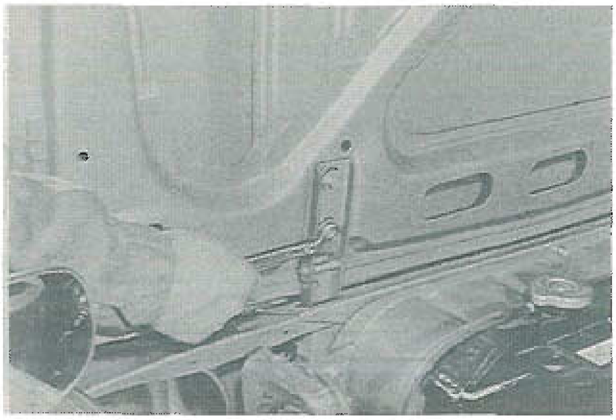


Fig. 14–2 Removing of hinge attaching bolts

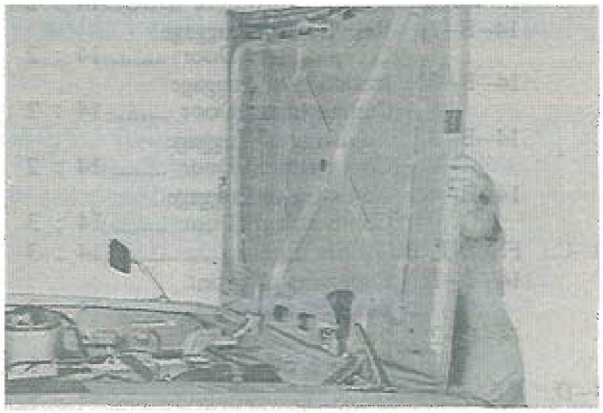


Fig. 14–3 Removing of hood

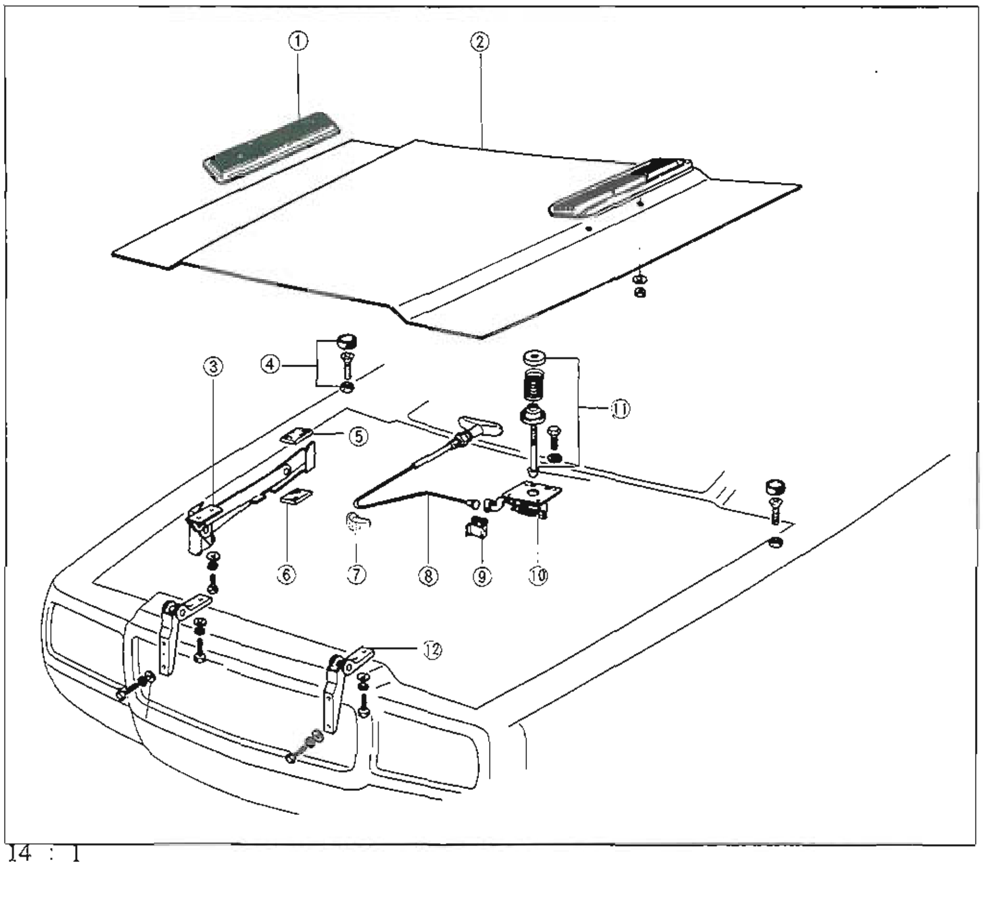


Fig. 14–4 Hood components

1. Air scoop
2. Hood (Bonnet)
3. Hood support
4. Hood stop bolt
5. Pad
6. Pad
7. Release wire grommet
8. Release wire
9. Release wire clamp
10. Hood latch dowel
11. Hood latch (Bonnet lock)
12. Hood hinge

the bolts are removed.
4. Remove the hood from the vehicle.

14–A–2. Installing of Hood

Follow the removal procedures in the reverse order and adjust the hood by applying the procedures explained in the following paragraph.

14–A–3. Adjusting of Hood

The hood is provided with to-and-fro, up-and-down and side-to-side adjustments.

To make the to-and-fro and side-to-side adjustments, loosen the hood attaching bolts and move the hood to the proper position, then tighten the attaching bolts.

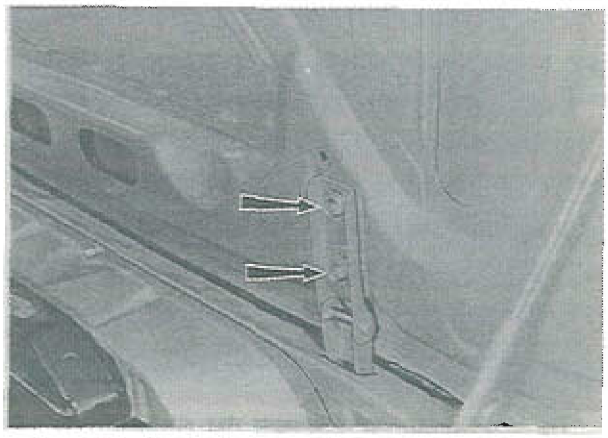


Fig. 14–5 To-and-fro adjustment

To make the up-and-down adjustment at the rear edge of the hood, loosen the hood stop bolts and move the hood to proper position, then tighten the attaching bolts.

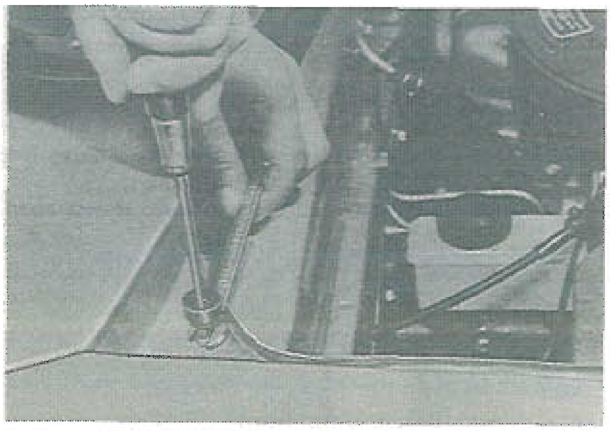


Fig. 14–6 Up-and-down adjustment

14–A–4. Adjusting of Hood Latch

1. Make certain that the properly aligned.
2. Loosen the hood latch attaching bolts. Move them as required to align with the latch dowel. Tighten the attaching bolts.
3. Loosen the lock nut on the hood latch dowel, and turn the dowel clockwise to pull the hood tighter or counterclockwise to loosen it. The proper height is when the top of the hood is flush with the fenders.

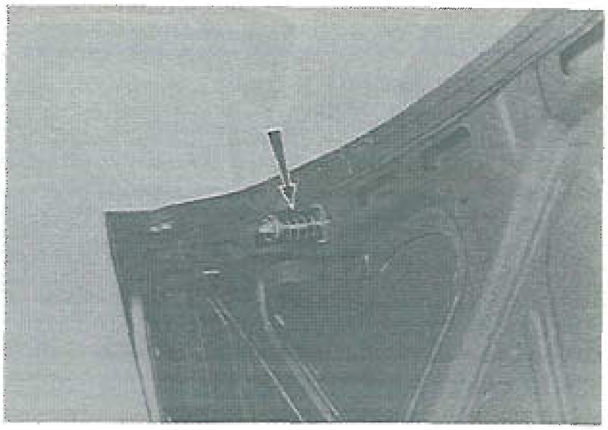


Fig. 14–7 Adjusting of hood latch

4. Tighten the dowel lock nut after the proper adjustment has been obtained.

14–B. LUGGAGE COMPARTMENT DOOR

14–B–1. Removing of Luggage Compartment Door

1. Open the luggage compartment door and support the door in the luggage compartment.
2. Remove the two bolts attaching the hinge to the luggage compartment door.
3. Remove the luggage compartment door from the vehicle.

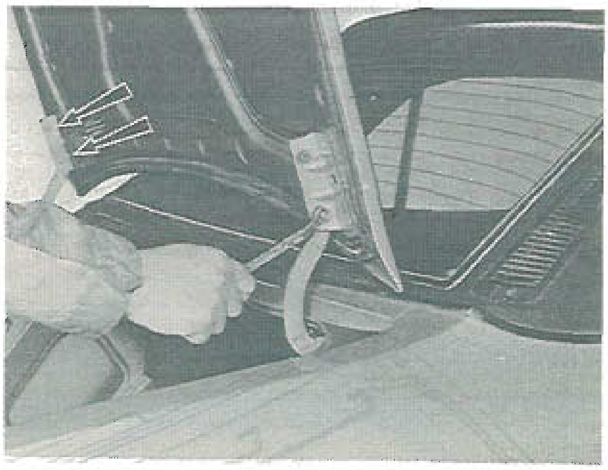


Fig. 14–8 Removing of compartment door

14–B–2. Installing of Luggage Compartment Door

Follow the removal procedures in the reverse order and adjust the luggage compartment door by applying procedures explained in the following paragraph.

14–B–3. Adjusting of Luggage Compartment Door

To make the to-and-fro or side-to-side adjsutment, loosen the luggage compartment door attaching bolts, and move the door as required.
To make the up-and-down adjustment, loosen the hinge-to-hinge support attaching bolts and raise or lower the hinge as required.

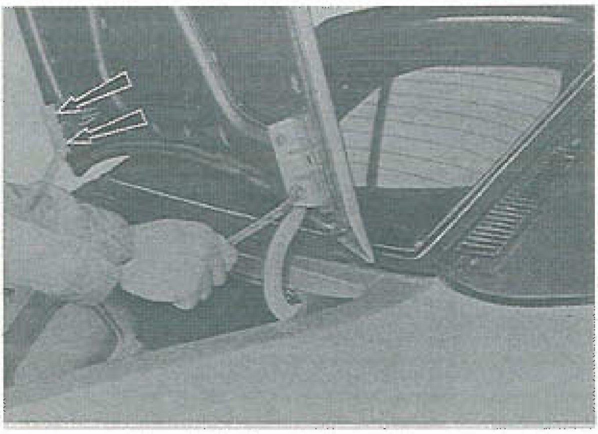


Fig. 14–9 Up-and-down adjustment

14–B–4. Adjusting of Luggage Compartment Door Latch

To adjust the door latch, loosen the door latch

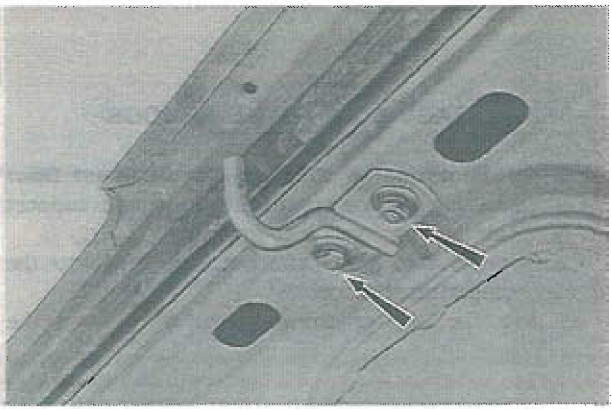


Fig. 14–10 Adjusting of door latch

striker attaching bolts, and move the striker as required, then tighten the attaching bolts.

14–C. FRONT BUMPER

14–C–1. Removing of Front Bumper

1. Raise the front end of the vehicle and support with stands.
2. Remove the two bolts attaching the left and right bumper stays to the outside of the frame.

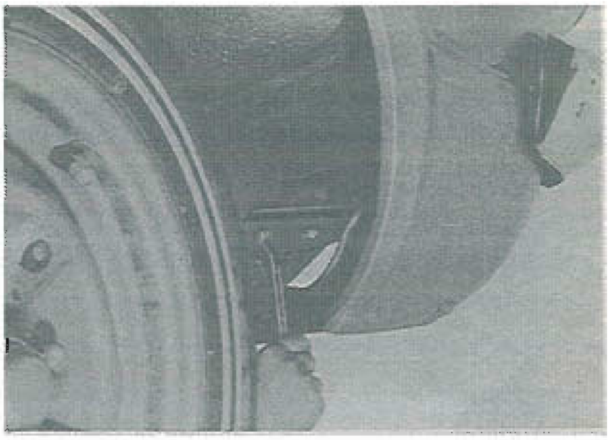


Fig. 14–12 Removing of bumper stay attaching bolts

3. Remove the two bolts attaching the left and right bumper ends to the inside of the frame and remove the bumper.

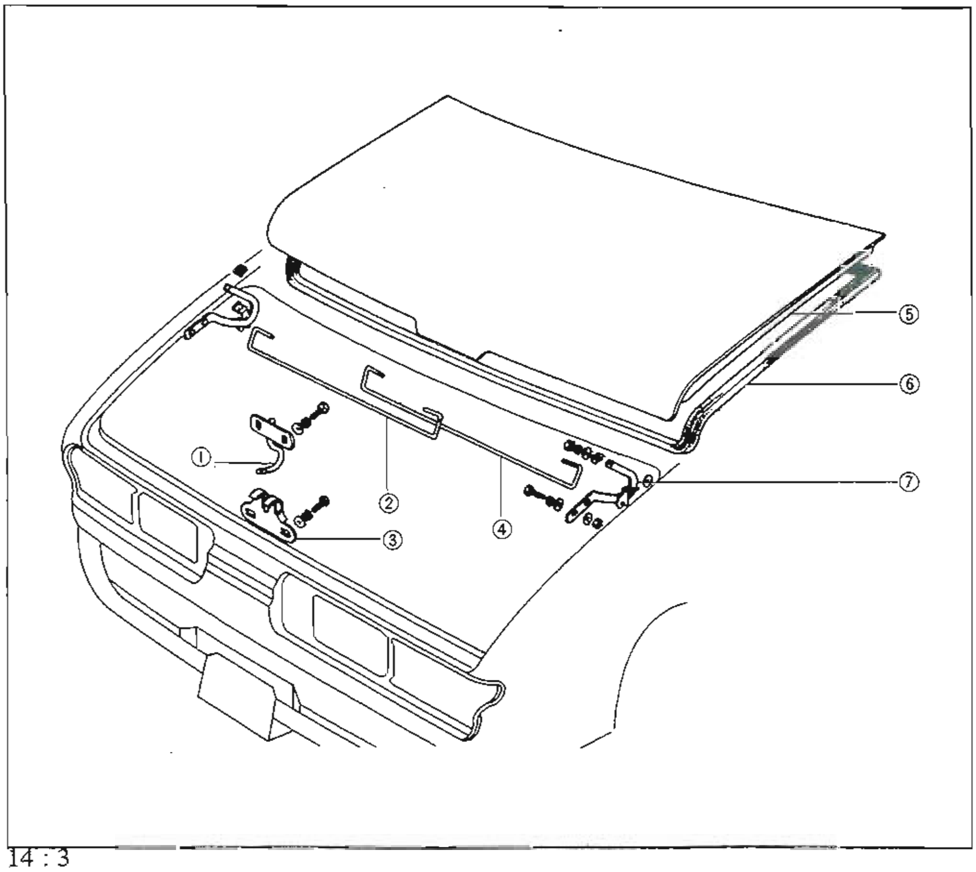


Fig 14–11

Luggage compartment door components

1. Striker
2. Balance spring
3. Door latch (Door lock)
4. Balance spring
5. Luggage compartment door (Trunk lid)
6. Weatherstrip
7. Door hinge

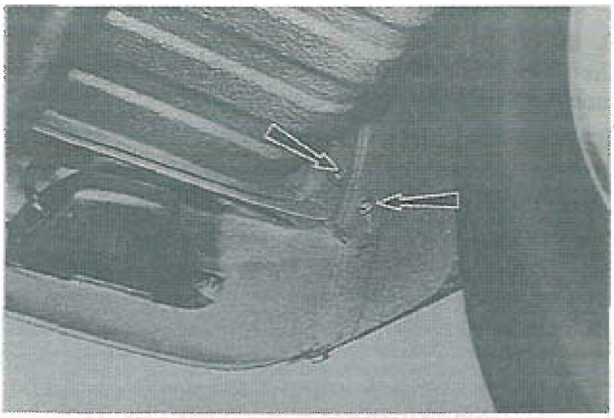


Fig. 14–13 Removing of bumper end attaching bolt

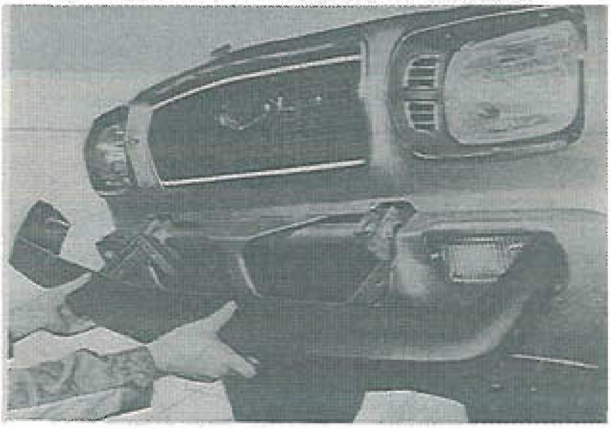


Fig. 14–14 Removing of front bumper

4. Remove the bolts attaching each bumper stay to the bumper and remove the stays.

14–C–2. Installing of Front Bumper

Follow the removal procedures in the reverse order and align the bumper for good fit and appearance.

14–D. REAR BUMPER

14–D–1. Removing of Rear Bumper

1. Open the luggage compartment door.
2. Remove the two bolts attaching the left and right bumper ends.
3. Remove the nuts attaching the left and right bumper stays and remove the rear bumper.

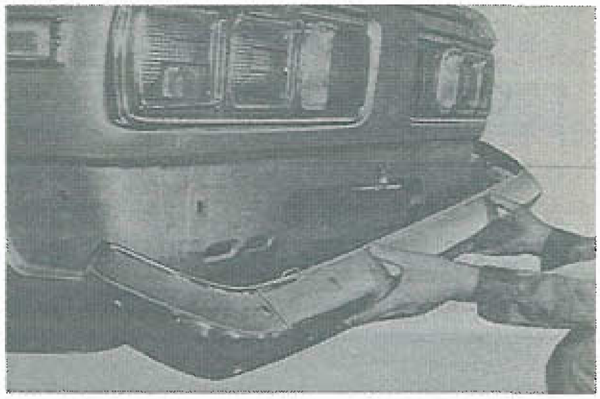


Fig. 14–15 Removing of rear bumper

14–D–2. Installing of Rear Bumper

Follow the removal procedures in the reverse order and align the bumper for good fit and appearance.

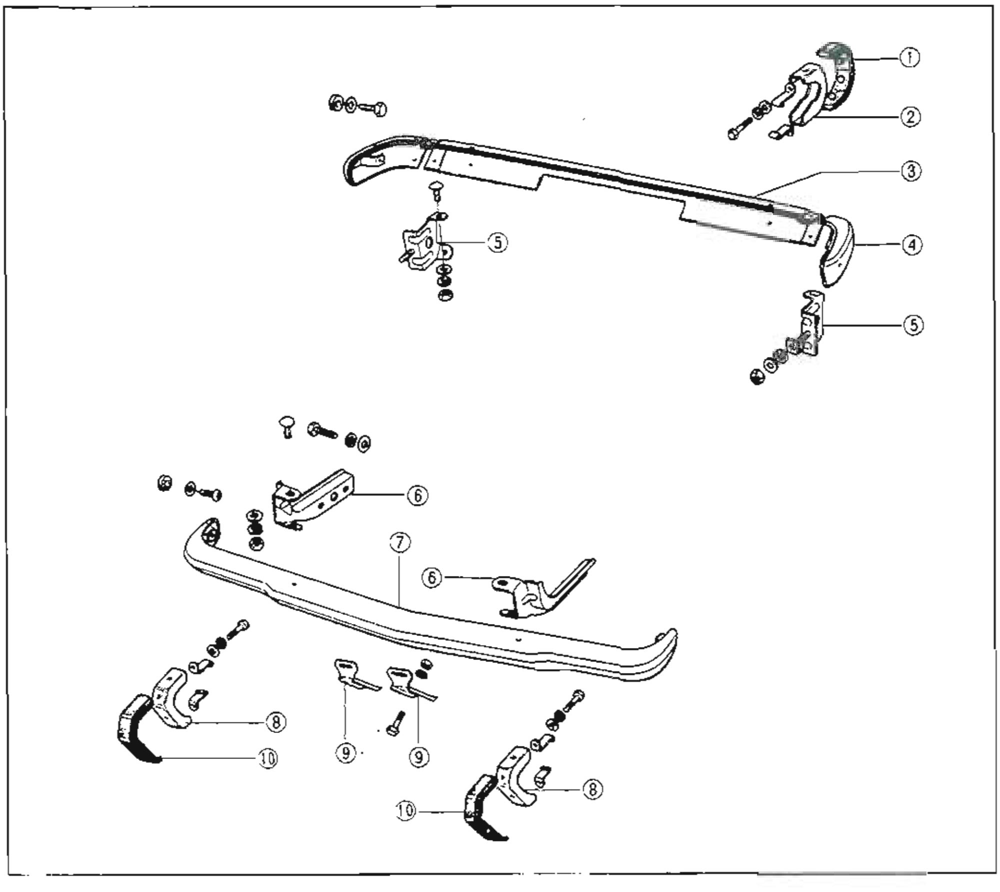


Fig. 14–16 Front bumper and rear bumper

1. Cushion
2. Guard
3. Rear bumper
4. Bumper end
5. Stay
6. Front bumper stay
7. Front bumper
8. Guard
9. Licence plate holder
10. Cushion

14–E. WINDSHIELD GLASS

14–E–1. Removing of Windshield Glass

To replace the windshield glass, use the **window service tool set** (Part No. 49 0305 870) shown in Fig. 14–21.

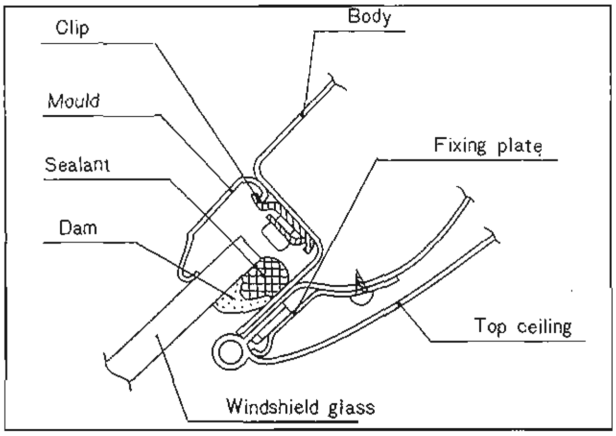


Fig. 14–17 Windshield cross section

1. Remove the interior mirror and also right and left front pillar trims from the interior of the vehicle.
2. Remove the windshield wiper arms and blades.

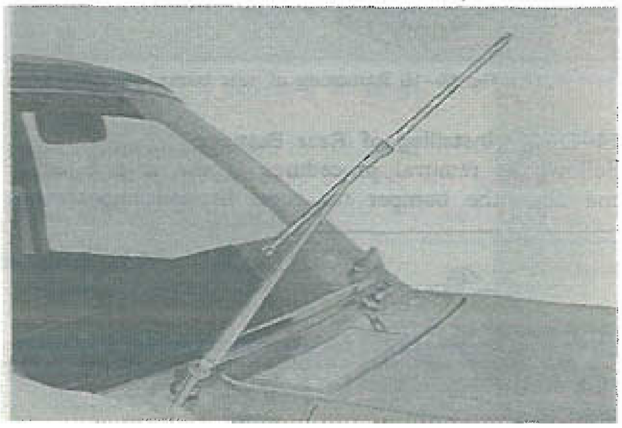


Fig. 14–18 Removing of wiper arm

3. Insert the mould remover between the mould and the glass and pull the retaining clip to remove the mould upward. Remove the mould.

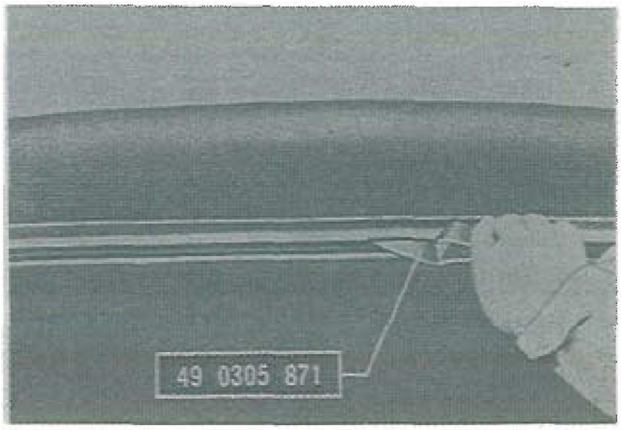


Fig. 14–19 Removing of mould

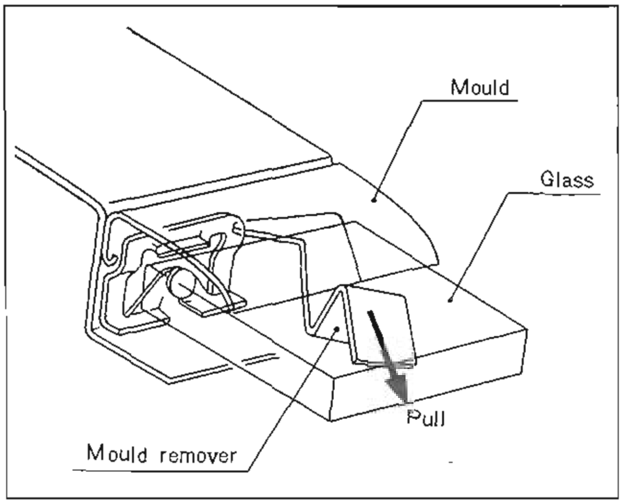


Fig. 14–20 Removing of mould

4. Remove the mould retaining clips.
5. Pierce the needle between the glass and the sealant and insert the 500 mm (20 in) length of piano

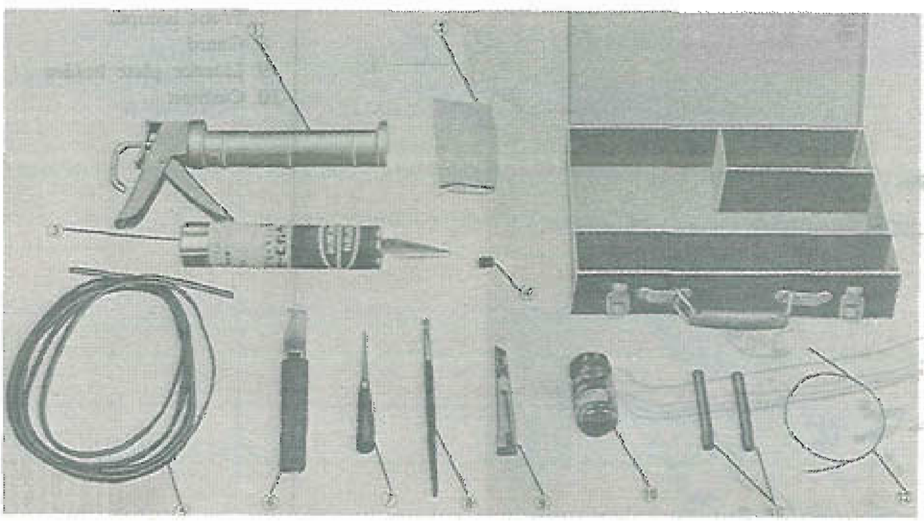


Fig. 14–21 Window service tool set (49 0305 870)

1. Sealant gun
2. Guaze
3. Sealant
4. Spacer
5. Dam
6. Mould remover
7. Needle
8. Brush
9. Cutting knife
10. Primer
11. Bar
12. Piano wire

wire into the pierced hole. Wrap each end of the wire around the bars.

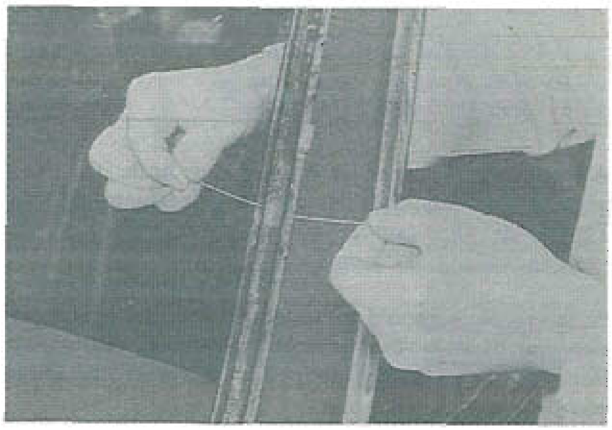


Fig. 14–22 Piercing of piano wire

6. With the aid of an assistant, cut the sealant all the way around the glass with a sawing motion and remove the glass.

Note:

(a) When cutting the sealant with the piano wire, cut it along the border between the window glass and the sealant.

(b) The piano wire is liable to snap if only a certain section is constantly used and becomes hot. Therefore, when cutting the sealant ensure that the piano wire is kept cool (it should be cooled slowly) or the section of the wire being used is constantly rotated.

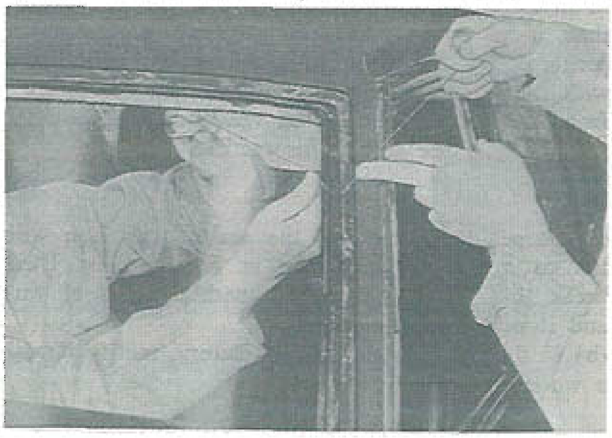


Fig. 14–23 Cutting of sealant

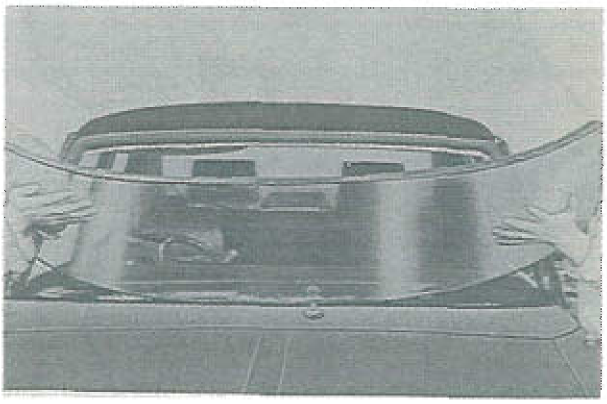


Fig. 14–24 Removing of glass

14–E–2. Installing of Windshield Glass

1. Using the cutting knife, cut the sealant off smoothly so that **1 to 2 mm (0.04 to 0.08 in)** of the sealant remains along the glass opening flange.

Fig. 14–25 Cutting of sealant

If the thickness of the sealant left along the glass opening flange is too small, first, clean with a solvent. Then, apply primer with the brush and leave it to dry for **20 to 30 minutes**. Then, apply sealant until a thickness of **1 to 2 mm (0.04 to 0.08 in)** is obtained.

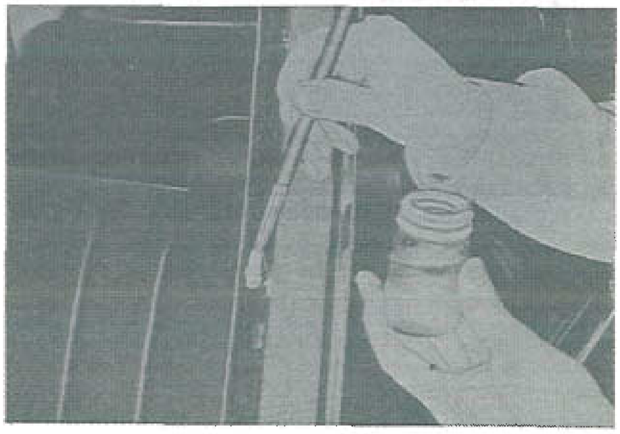


Fig. 14–26 Applying of primer

2. Clean the glass thoroughly and bond the dam with bonding agent parallel to the edge of the glass

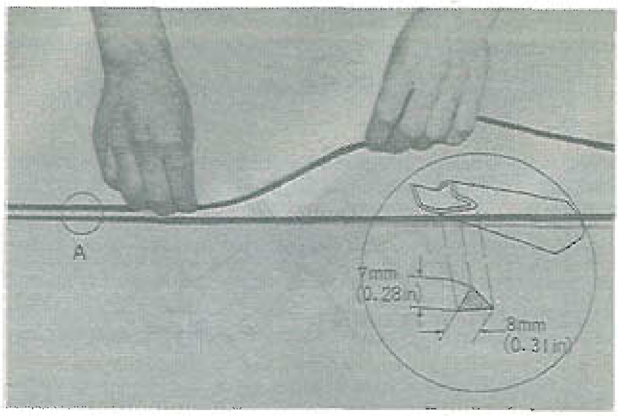


Fig. 14–27 Bonding of dam

at a position **7 mm (0.028 in)** away from it. Bond the dam in the direction shown in Fig. 14–27.

Note:
Securely bond the dam so that it is straight and will not come apart.

3. Apply primer around the entire perimeter of the glass in the area that will contact the sealant. Clean the glass opening flange and apply primer to the entire perimeter of the sealant on the glass opening flange. Allow the primer to dry **30 minutes** before installation of glass.

Note:
(a) Apply as thin the sealant coating as possible to the glass.
(b) **Do not** allow any dust, water, oil, etc. to get on the coating surface and also **do not** touch the coating surface with hand.

Fig. 14–28 Applying of primer

4. Bond each spacer to the glass opening flange with

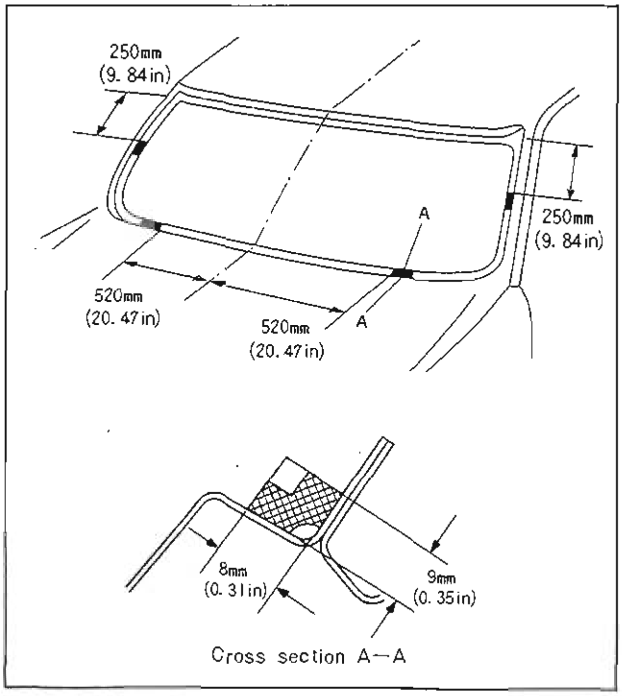


Fig. 14–29 Position of spacers

bonding agent. Fig. 14–29 shows the directions and positions of each spacer. There are two kinds of spacer.

Part Nos.	Name of Part	Color
0305 70 448A	Spacer	Gray
0305 70 447B	Spacer	Black

Although the spacer is bonded on both the right and the left hand sides of the windshield glass in Fig. 14–29, the spacer on only one side of the glass should be sufficient.

5. Insert each mould retaining clip to the clip insertion portion in the manner shown in Fig. 14–30. Repalce the retaining clips as required to insure adequate mould retention.

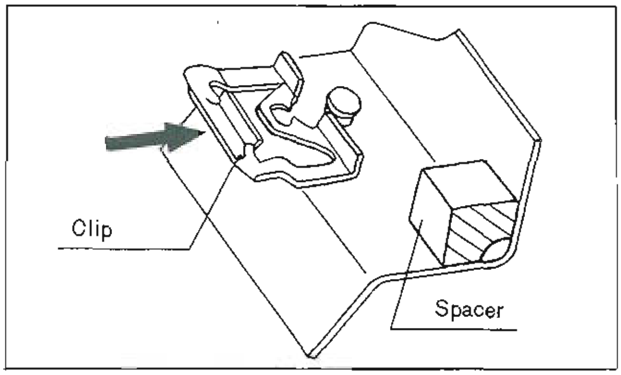


Fig. 14–30 Installing of mould retaining clip

6. After the primer is dry, apply the sealant so that it is **8 mm (0.31 in)** high along the entire perimeter of the glass with the sealant gun fitted with the sealant cartridge. If the sealant comes apart from the painted surface on the body side, use the remainder of the sealant for rectification.

Note:
(a) Shape the nozzle of the sealant cartridge with the cutting knife as shown in Fig. 14–31. Then, break the film of the sealant with a piece of wire and it is ready for application.
(b) If the application is unsatisfactory, rectify it with a wooden spatula.

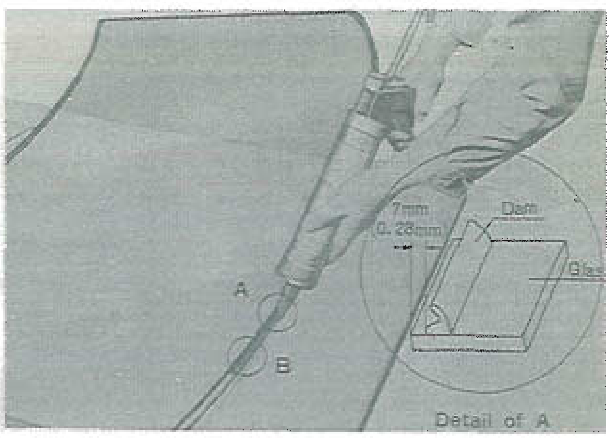


Fig. 14–31 Applying of sealant

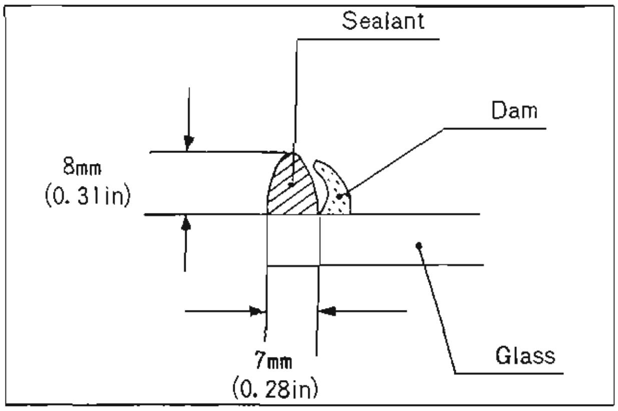


Fig. 14–32 Detail B of Fig. 14–31

(c) If any seal adheres to your hand, it should be removed immediately.

7. Place the glass in the opening flange, locating the best position for equal sealant contact.
8. Firmly press the glass against the sealant with hand pressure. Then, inspect the appearance of the sealant through the glass. A dull sport indicates an area where the sealant does not contact glass surface. Additional hand pressure will seal most areas. When installing the glass, **5.8 mm (0.23 in)** clearance should exist between the body and the glass. Check the clearance at the four positions shown in Fig. 14–32.

Note:
If possible, **do not** apply any force to the glass until the sealant has hardened. Time required for the seal to harden after it is applied.

Summer (20°C or 68°F)	5 hours
Winter (5°C or 41°F)	24 hours

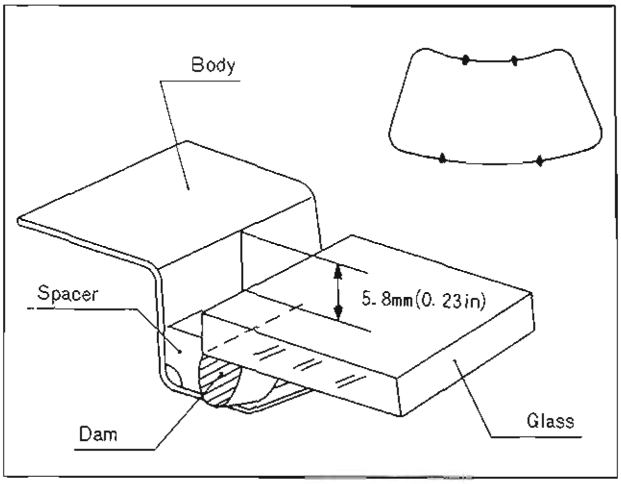


Fig. 14–33 Adjusting of clearance

9. Remove any excess primer from the glass with a wooden spatula and wipe with a clean solvent.
10. Water test the installation around the entire perimeter of the glass. Repair any leaks by applying the sealant around the edge of the glass.
11. Install the moulds, interior mirror, front pillar trims, windshield wiper arms, etc.

Note:
(a) Keep the door windows open until the sealant has hardned to some extent.
(b) If the vehicle is to be repainted, remove all the sealant from the body and then after backing the paint on, apply the sealant so that it is **10 mm (0.4 in)** high. **Never apply** air setting paint to the surface on which the sealant is to be applied.

14–F. REAR WINDOW GLASS

14–F–1. Removing and Installing of Rear Window Glass

The removal and installation of the rear window glass can be made in the same way as those of the windshield glass. But care should be taken to the following points:
1. In the case of a vehicle equipped with a heatable window, perform the works of disconnection and connection of the relevant wiring.
2. When installing the glass, **7.8 mm (0.31 in)** clearance should exist between the body and the glass. Check the clearance at the four portions shown in Fig. 14–34.

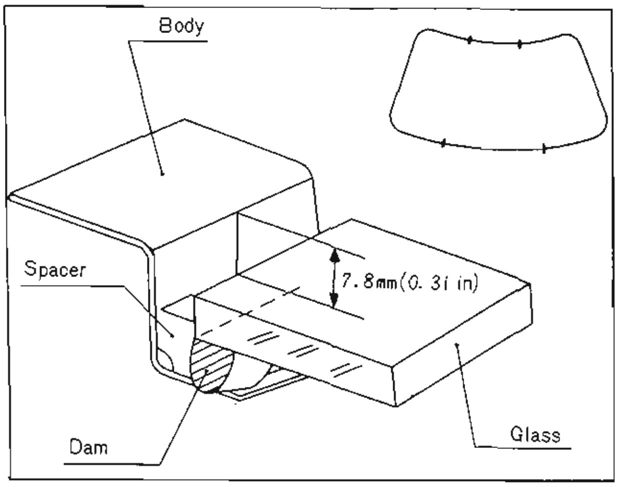


Fig. 14–34 Adjusting of clearance

3. The directions and positions each spacer to be bonded are shown in Fig. 14–35.

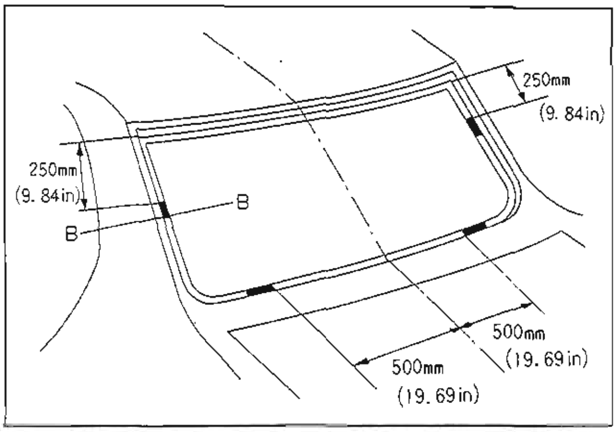


Fig. 14–35 Position of spacers

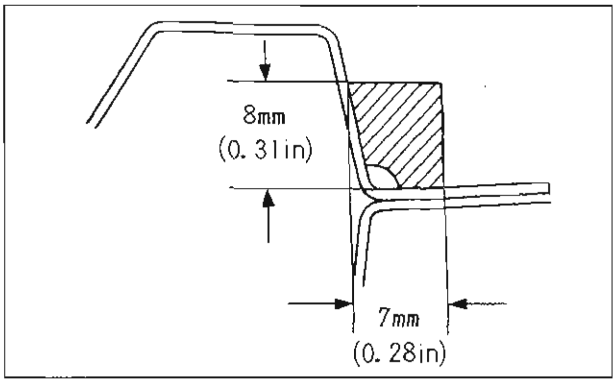


Fig. 14–36 B-B section of Fig. 14-35

14–F–2. Heatable Window Inspection

1. Turned on the heater switch.
2. Ground the negative terminal of the voltmeter on the body and touch the positive terminal on the center of each filament to measure the voltage. Normal filament registers approximately **6 volts** at the center. A high voltage on the order of **12 volts** shows that breakage is on the negative side from the center (grounded side) and a voltage close to **0 volt** shown that breakage is on the positive side.
3. Move the positive terminal to the side where breakage is known to exist, and you will note sudden change in voltage at a portion. That portion is where the filament is broken.

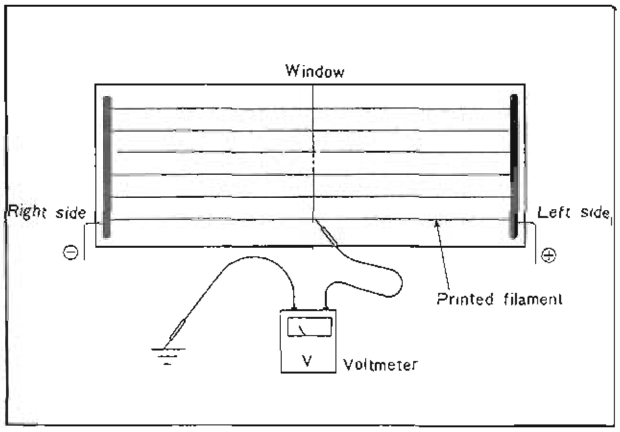


Fig. 14–37 Inspecting of heatable window

14–F–3. Heatable Window Repair

1. Clean the broken portion with solvent.
2. By using a small brush or a drawing pen, apply the **conductive silver paint** (Part No. 2835 77 6000), i.e., Dupont No. 4817 to the broken section.
3. Completely dry the painted section by leaving it intact for 24 hours in the case of 20°C (68°F) (for 30 minutes when the painted section is heated up to 60°C (140°F) with a dryer).

Note:

(a) **Never turn** on the heater before the paint has completely dried.
(b) **Do not** use any alkaline chemical cleanser to clean the section thus repaired.
(c) The life of Dupont No. 4817, conductive silver paint, is one year and must be kept at a dry place having a temperature of less than 20°C (68°F).

14–G. FRONT SEAT

14–G–1. Front Seat Replacement

1. Remove the front seat by removing the two attaching bolts and two attaching nuts.
2. To install, reverse the removal procedures.

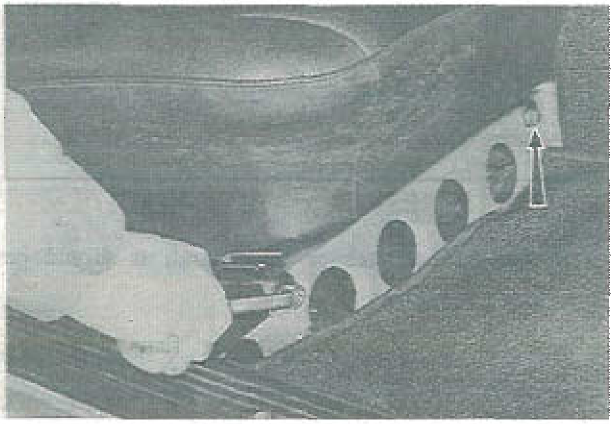


Fig. 14–38 Removing of bolts

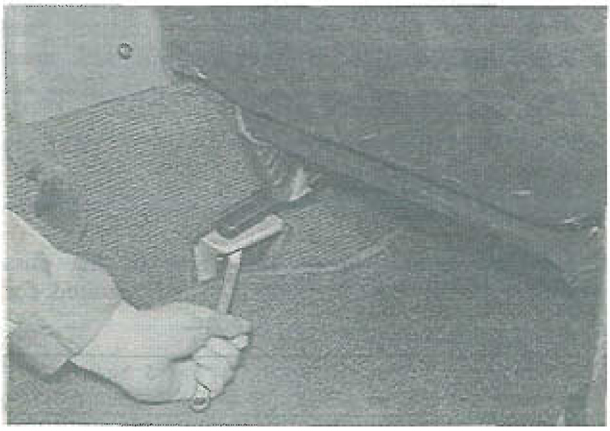


Fig. 14–39 Removing of nuts

14–G–2. Seat Adjuster Inspection

1. Inspect the seat adjuster for smooth operation by moving the seat back and forth. If necessary, apply grease to the seat adjuster.
2. Inspect the seat adjusting lever for wear. If defective, repair or replace it.

14–G–3. Reclining Knuckle Replacement

To replace the reclining knuckle, **use the tool** (Part No. 49 0259 855).

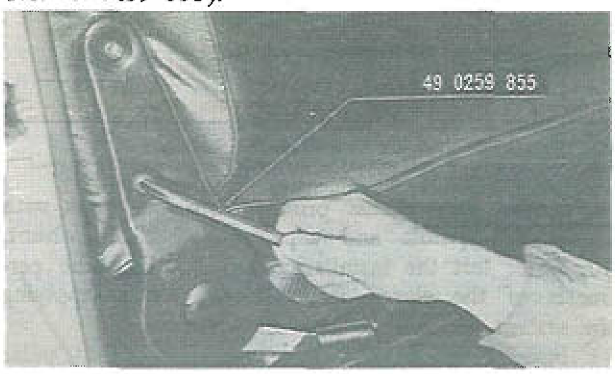


Fig. 14–40 Removing of reclining knuckle

14–H. REAR SEAT

14–H–1. Rear Seat Replacement

1. Remove the two bolts attaching the seat cushion and remove the seat cushion.

Fig. 14–41 Removing of seat cushion

2. Open the luggage compartment door and remove the package trim by removing the two attaching screws.
3. Remove the rear seat back attaching nuts from the inside of the luggage compartment door.

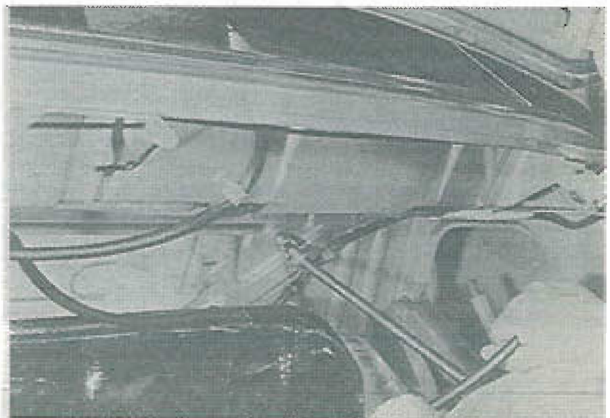


Fig. 14–42 Removing of seat back attaching nut

4. Remove the rear seat back attaching bolts and remove the seat back.

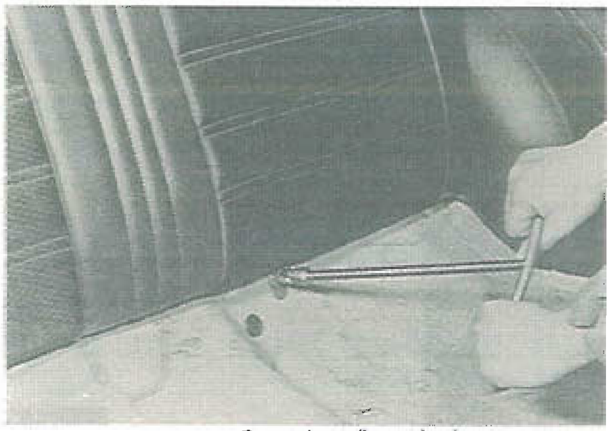


Fig. 14–43 Removing of seat back

5. To install, reverse the removal procedures.

14–I. DOOR

14–I–1. Door Adjustment

a. Adjusting of door latch striker

The striker can be adjusted laterally and vertically as well as fore and aft. The striker should not be adjusted to correct door sag.

1. Loosen the striker attaching screws and move the striker as required.
2. Tighten the attaching screws and check the door fit.

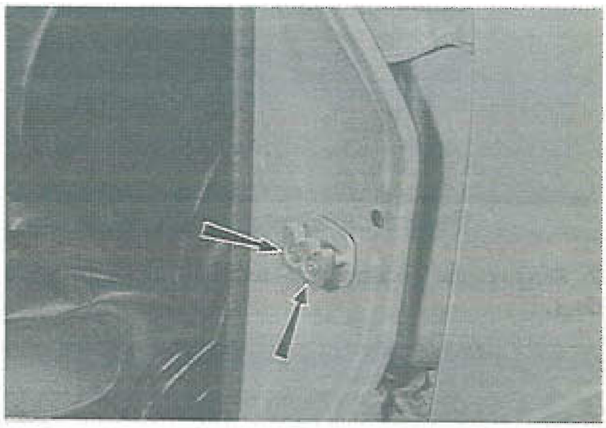


Fig. 14–44 Adjusting of striker

b. Adjusting of door alignment

The door hinges provide sufficient adjustment latitude to correct most door misalignment conditions. **Do not** cover up a poor door alignment with the door latch striker adjustment.

1. Loosen the hinge attaching bolts and move the hinge as required.
2. Tighten the attaching bolts and check the door fit.

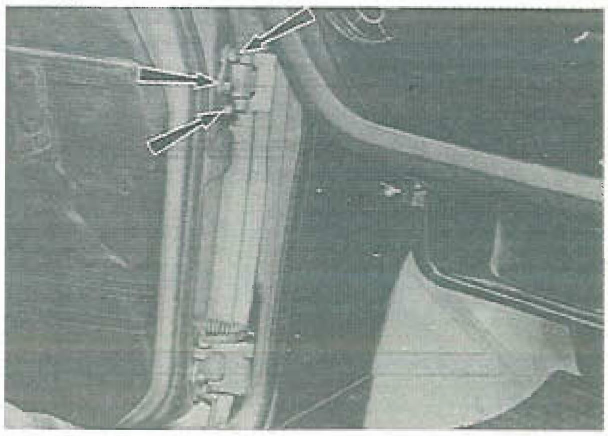


Fig. 14–45 Adjusting of door alignment

14–I–2. Door Hinge Replacement

1. Support the door.
2. Remove the hinge-to-body attaching bolts.
3. Remove the hinge-to-door attaching bolts and remove the hinge.
4. Position the hinge to the door and body, and install the attaching bolts.
5. Adjust the door as described in **Par. 14–I–1** and tighten the attaching bolts.

14–I–3. Door Weatherstrip Replacement

1. Pull the weatherstrip from the retaining clips, and remove the weatherstrip without damaging the rubber if the weatherstrip is to be used again.

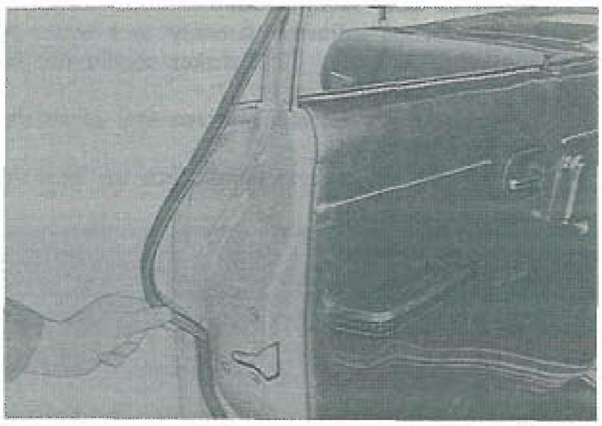


Fig. 14–46 Removing of weatherstrip

2. Remove the weatherstrip retaining clips from the door.

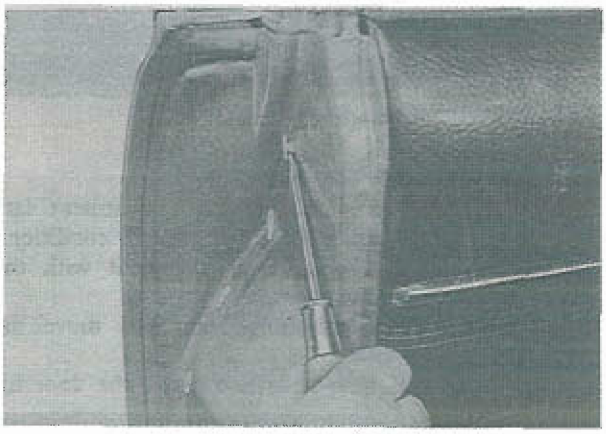


Fig. 14–47 Removing of retaining clip

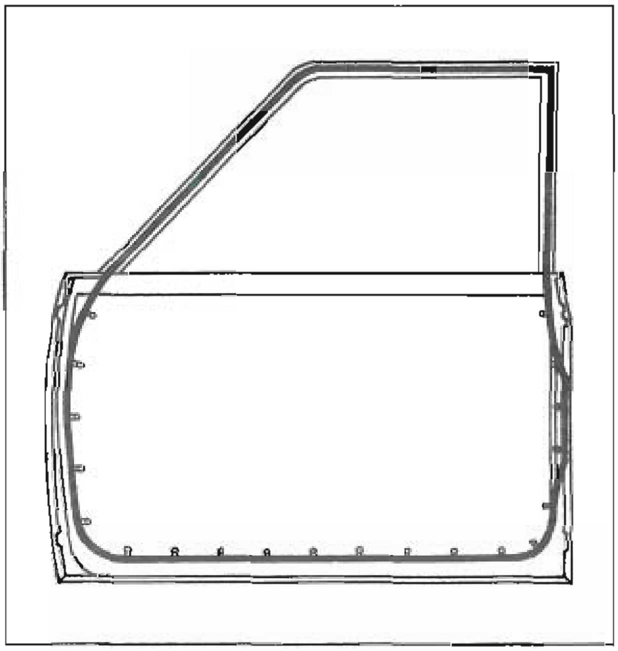


Fig. 14–48 Position of retaining clip

3. Inspect the weatherstrip for crack, deformation and damage. If defective, replace it.
4. Fit the retaining clips to the weatherstrip with a plier.

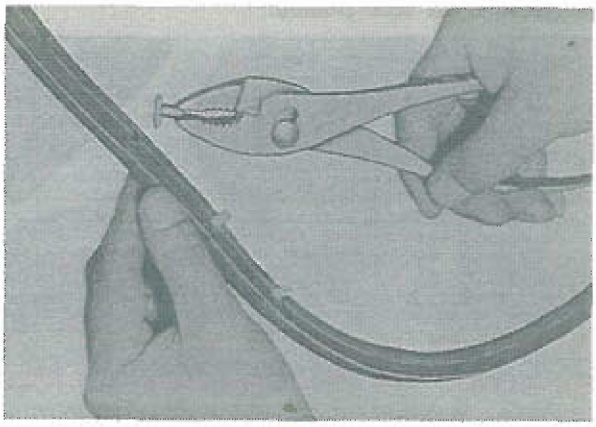


Fig. 14–49 Fitting of retaining clip

5. Position the weatherstrip to the door and fit the retaining clips into place.

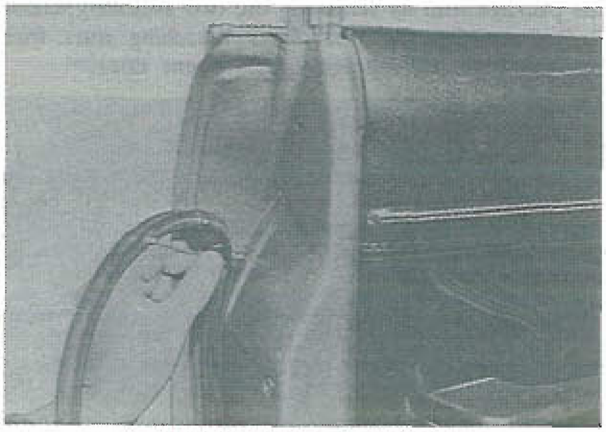


Fig. 14–50 Installing of weatherstrip

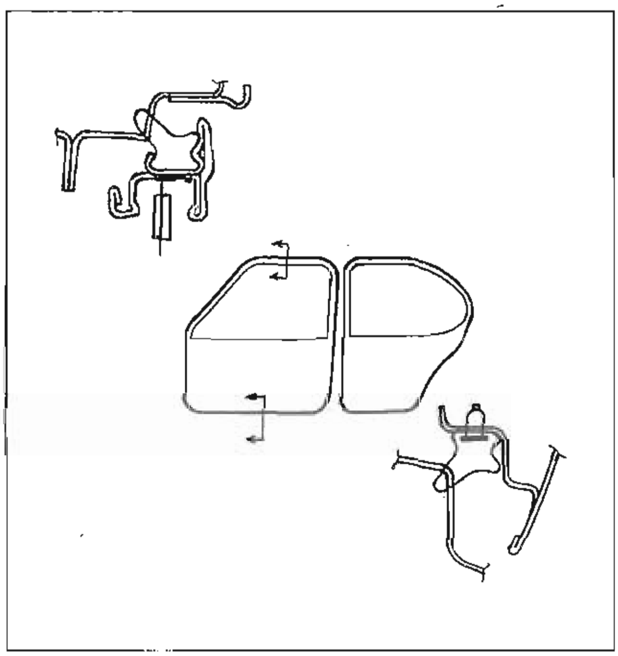


Fig. 14–51 Weatherstrip cross section

14–J. FRONT DOOR

14–J–1. Door Window Regulator and Glass

a. Removing of door window regulator and glass

1. Remove the regulator handle by removing the attaching screw.
2. Remove the door latch knob.
3. Remove the arm rest by removing the attaching screws.
4. Remove the inner handle cover by removing the attaching screw.
5. Remove the trim panel and watershield.
6. Remove the regulator attaching bolts, and lower the regulator to disconnect the regulator roller from the glass channel, then remove the regulator assembly.
7. Remove the glass.

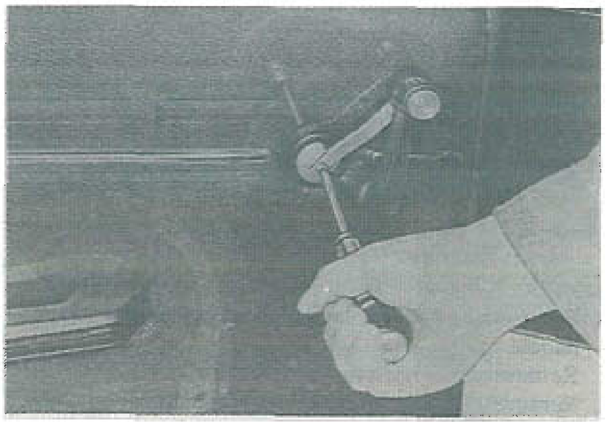


Fig. 14–52 Removing of regulator handle

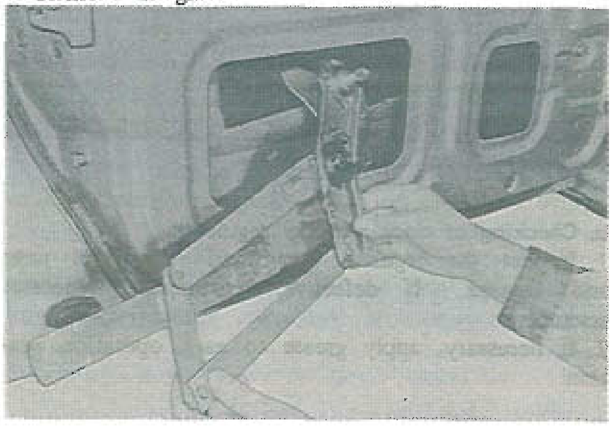


Fig. 14–53 Removing of regulator

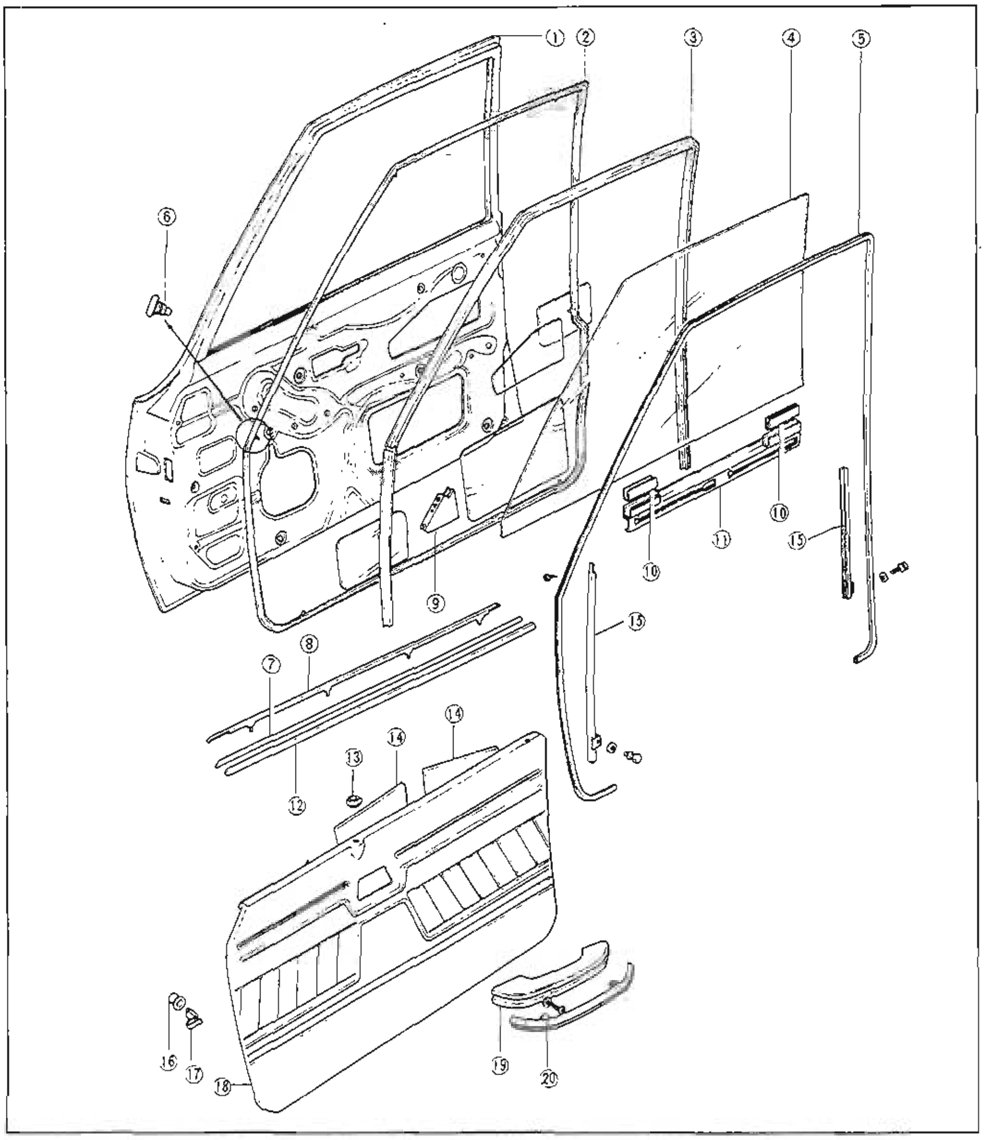


Fig. 14–54 Front door glass

1. Front door
2. Weatherstrip
3. Run channel
4. Glass
5. Seaming welt
6. Weatherstrip retaining clip
7. Weatherstrip
8. Mould
9. Corner bracket
10. Rubber strip
11. Glass channel (Glass holder)
12. Weatherstrip
13. Trim panel grommet
14. Insulation
15. Glass guide
16. Trim panel fastener seal
17. Trim panel fastener
18. Trim panel
19. Arm rest
20. Garnish

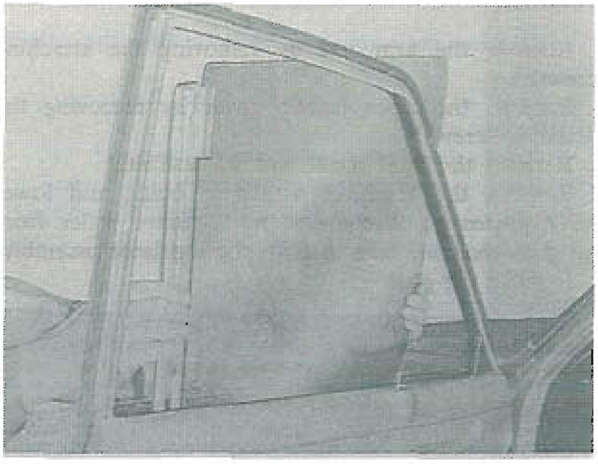


Fig. 14–55 Removing of glass

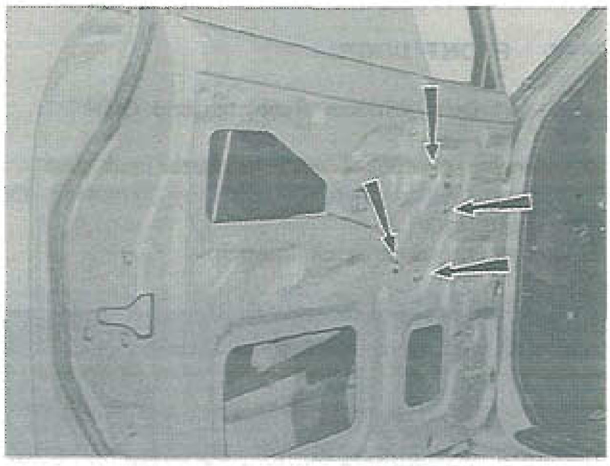


Fig. 14–56 Adjusting of regulator

b. Checking of door window regulator

1. Inspect the regulator gear and spring for wear and damage. If defective, replace the regulator assembly.
2. If necessary, apply grease to each operation portion.

c. Installing of door window regulator and glass

Follow the removal procedures in the reverse order.

Note:
Adjust the regulator and check the operation of the regulator.

14–J–2. Door Latch, Lock Cylinder and Outer Handle

a. Removing of door latch, lock cylinder and outer handle

1. Remove the regulator handle, arm rest, etc.
2. Remove the trim panel and watershield.
3. Remove the bolts attaching the inner handle and remove the inner handle.
4. Raise the glass fully and disconnect the remote control rod from the lock cylinder.
5. Remove the door latch attaching screw and remove the door latch.

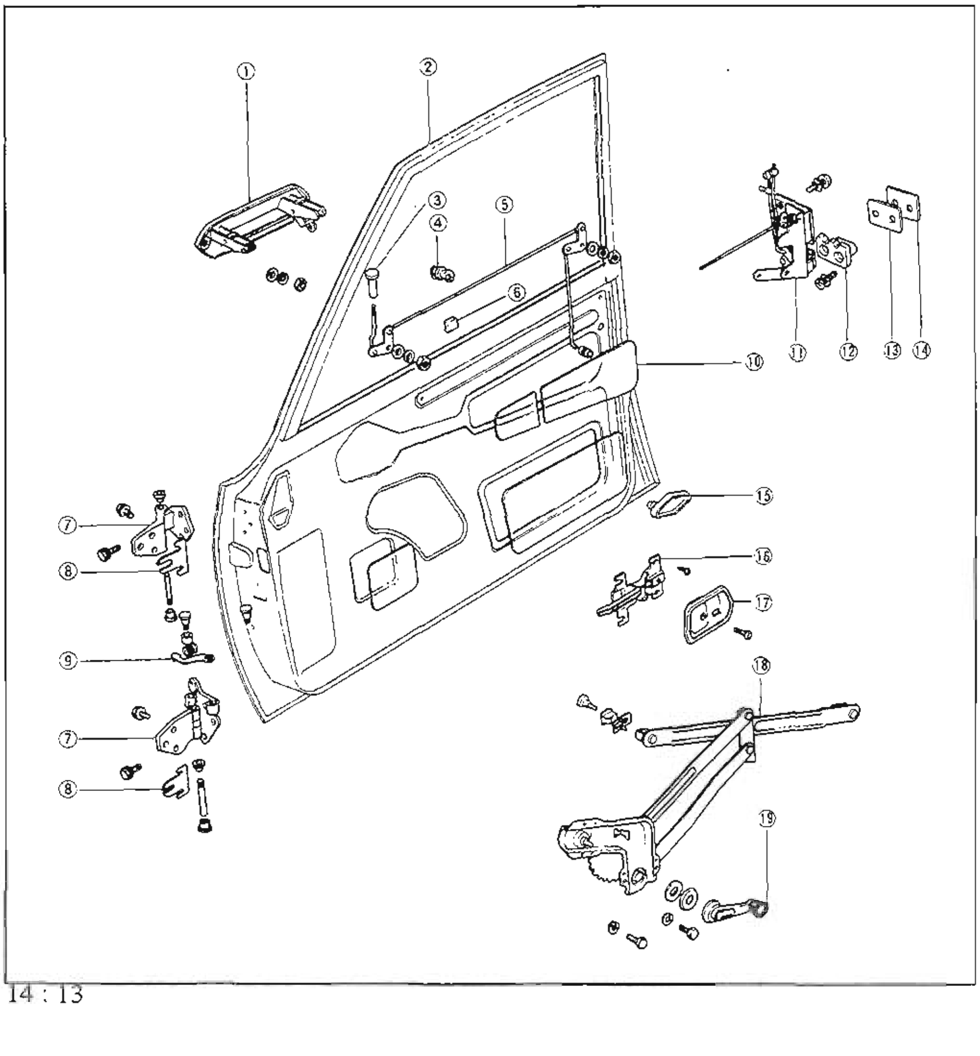


Fig. 14–57 Front door regulator components

1. Outer handle
2. Front door
3. Door latch-knob
4. Remote control rod holder
5. Remote control rod
6. Pad
7. Door hinge
8. Shim
9. Check lever
10. Watershield
11. Door latch (Door lock)
12. Door striker
13. Striker seat
14. Base plate
15. Cushion
16. Inner handle
17. Inner handle cover
18. Regulator
19. Regulator handle

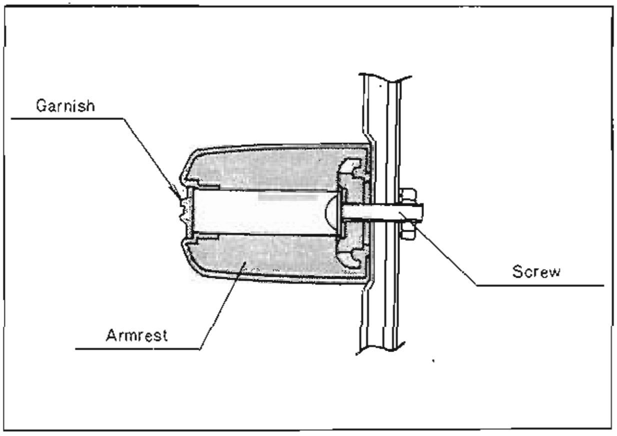


Fig. 14–58 Removing of arm rest

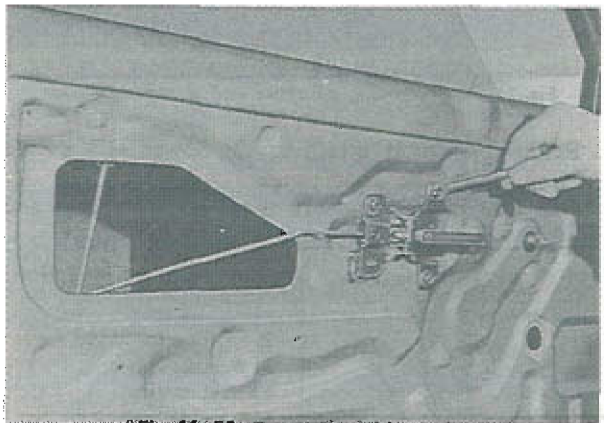


Fig. 14–59 Removing of inner handle

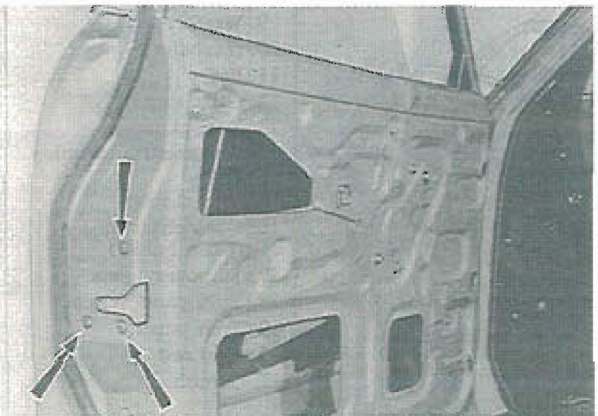


Fig. 14–60 Removing of door latch attaching screws

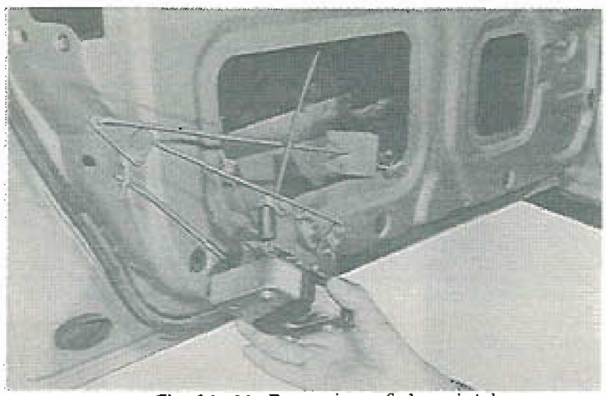


Fig. 14–61 Removing of door latch

6. Remove the retainer that secure the lock cylinder to the door inner panel and remove the lock cylinder.

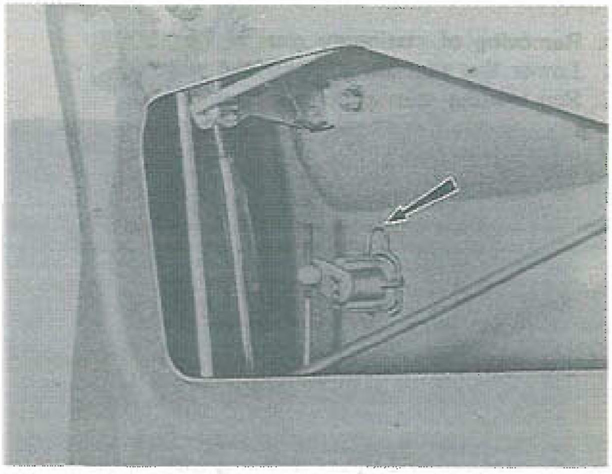


Fig. 14–62 Removing of retainer

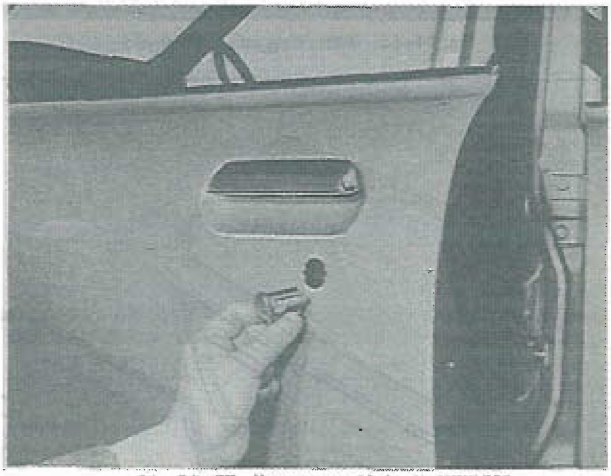


Fig. 14–63 Removing of lock cylinder

7. Remove the outer handle by removing the attaching nuts.

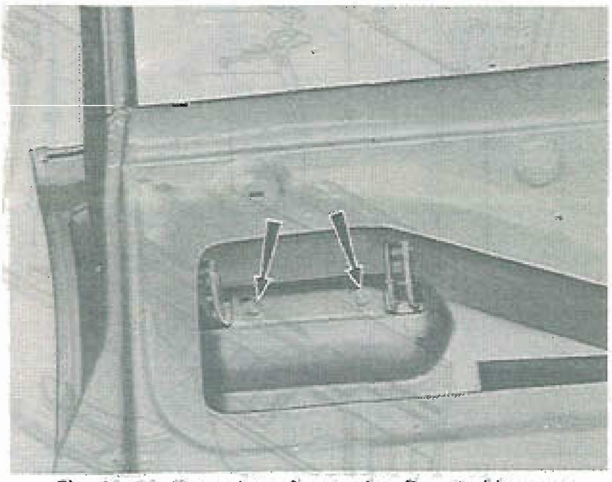


Fig. 14–64 Removing of outer handle attaching nuts

b. Installing of door latch, lock cylinder and outer handle

Follow the removal procedures in the reverse order.

14–K. REAR DOOR

14–K–1. Stationary Glass

a. Removing of stationary glass

1. Lower the window glass all the way.
2. Remove the trim panel and watershield.

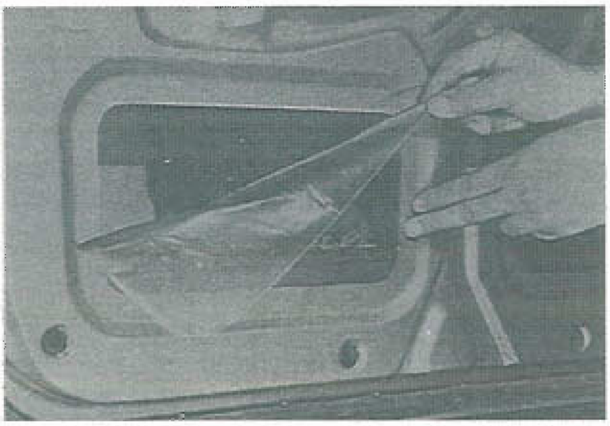


Fig. 14–65 Removing of watershield

3. Remove the screws attaching the upper end of the division bar to the window frame.

Fig. 14–66 Removing of upper end attaching screws

4. Remove the bolt attaching the lower end of the division bar to the door panel.
5. Pull the division bar off the stationary glass and

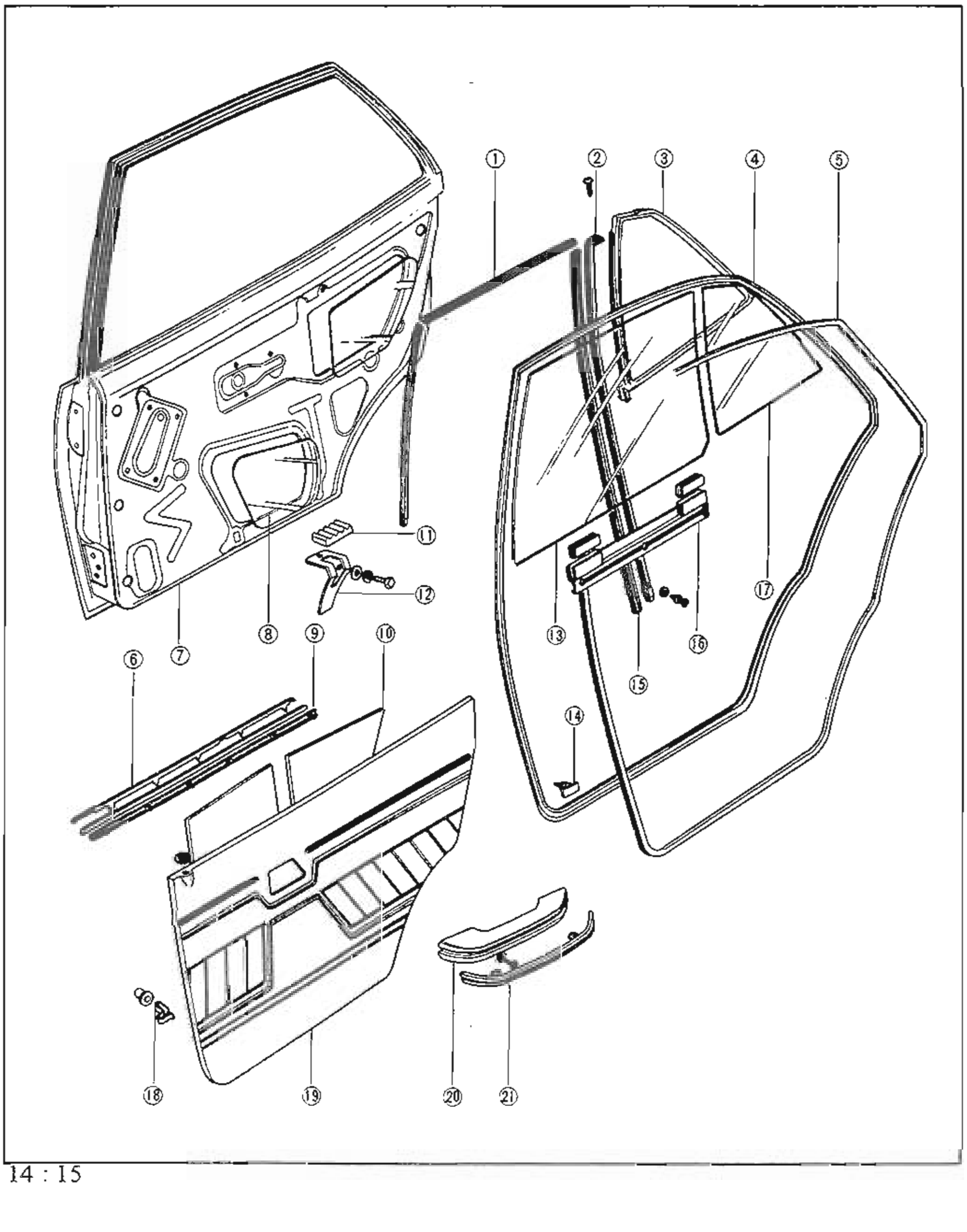


Fig. 14–67 Rear door glass

1. Run channel
2. Division bar (sash)
3. Weatherstrip
4. Weatherstrip
5. Seaming welt
6. Mould
7. Rear door
8. Watershield
9. Weatherstrips
10. Insulation
11. Pad
12. Glass stop
13. Rear glass
14. Weatherstrip retaining clip
15. Run channel
16. Glass channel (Glass holder)
17. Stationary glass
18. Trim panel fastener
19. Trim panel
20. Arm rest
21. Garnish

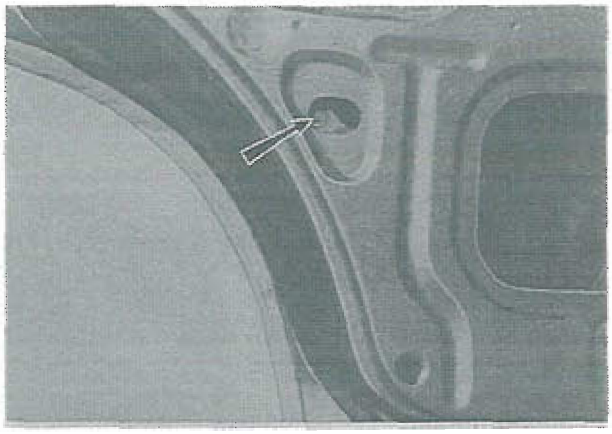


Fig. 14–68 Removing of lower end attaching bolt

Fig. 14–69 Removing of division bar

remove the stationary glass.
6. Remove the weatherstrip from the stationary glass.

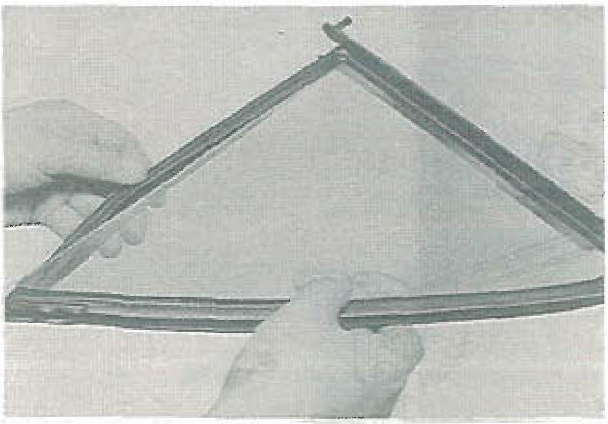


Fig. 14–70 Removing of weatherstrip

b. Installing of stationary glass
Follow the removal procedures in the reverse order.

14–K–2. Rear Door Window Regulator and Glass

a. Removing of rear door window regulator and glass
1. Lower the window glass all the way.
2. Remove the regulator handle, arm rest, door latch knob, etc.
3. Remove the trim panel and watershield.

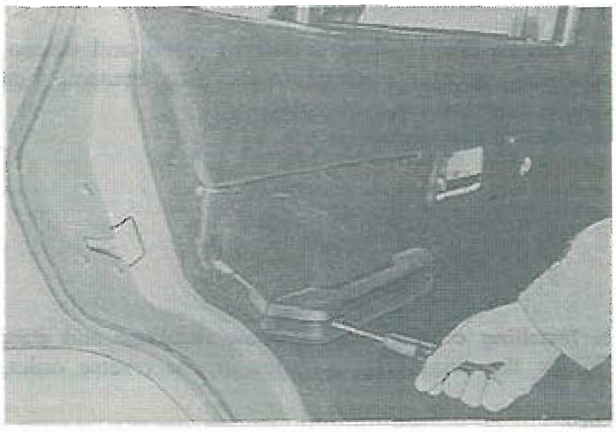


Fig. 14–71 Removing of arm rest

4. Remove the screws attaching the upper end of the division bar to the window frame.
5. Remove the bolt attaching the lower end of the division bar to the door panel.
6. Remove the division bar.

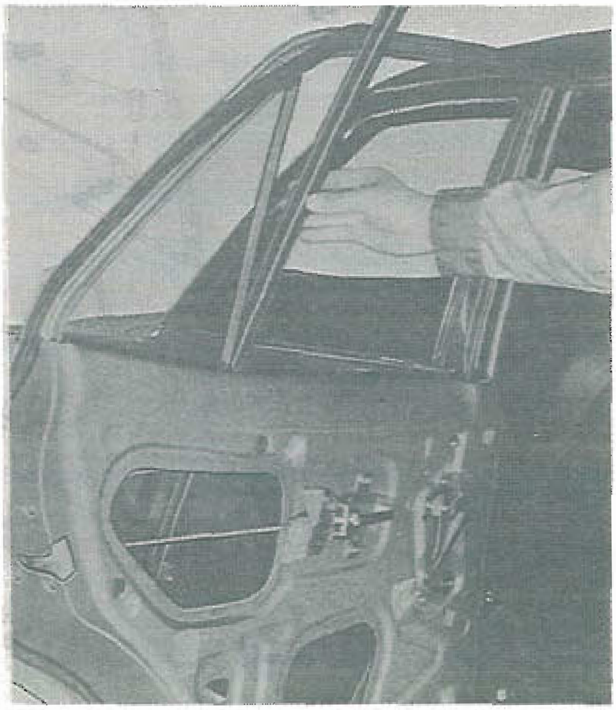


Fig. 14–72 Removing of division bar

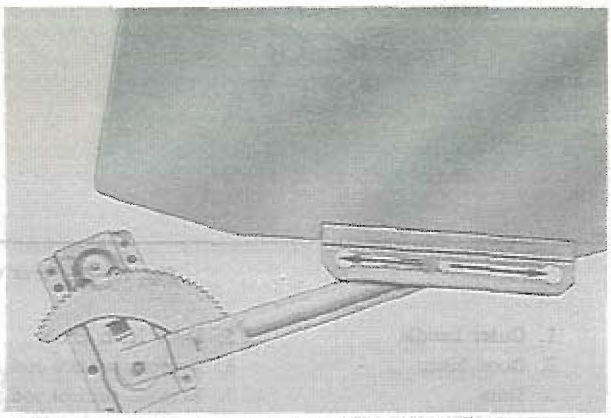


Fig. 14–73 Removing of regulator

7. Remove the regulator attaching bolts and disconnect the regulator roller from the glass channel, then remove the regulator assembly.
8. Remove the glass.

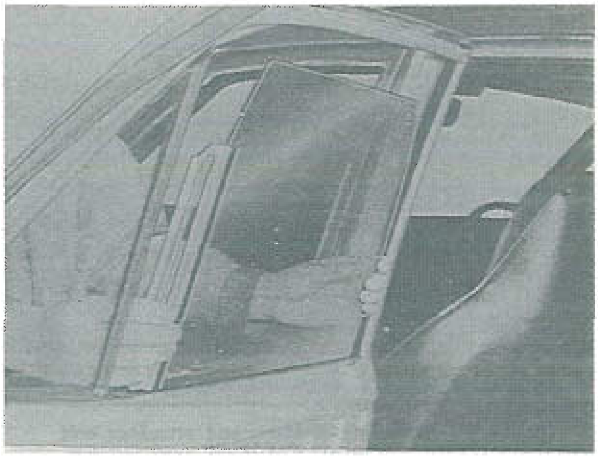


Fig. 14–74 Removing of glass

b. Installing of rear door window regulator and glass
Follow the removal procedures in the reverse order.

Note:
Adjust the regulator and check the operation of the regulator.

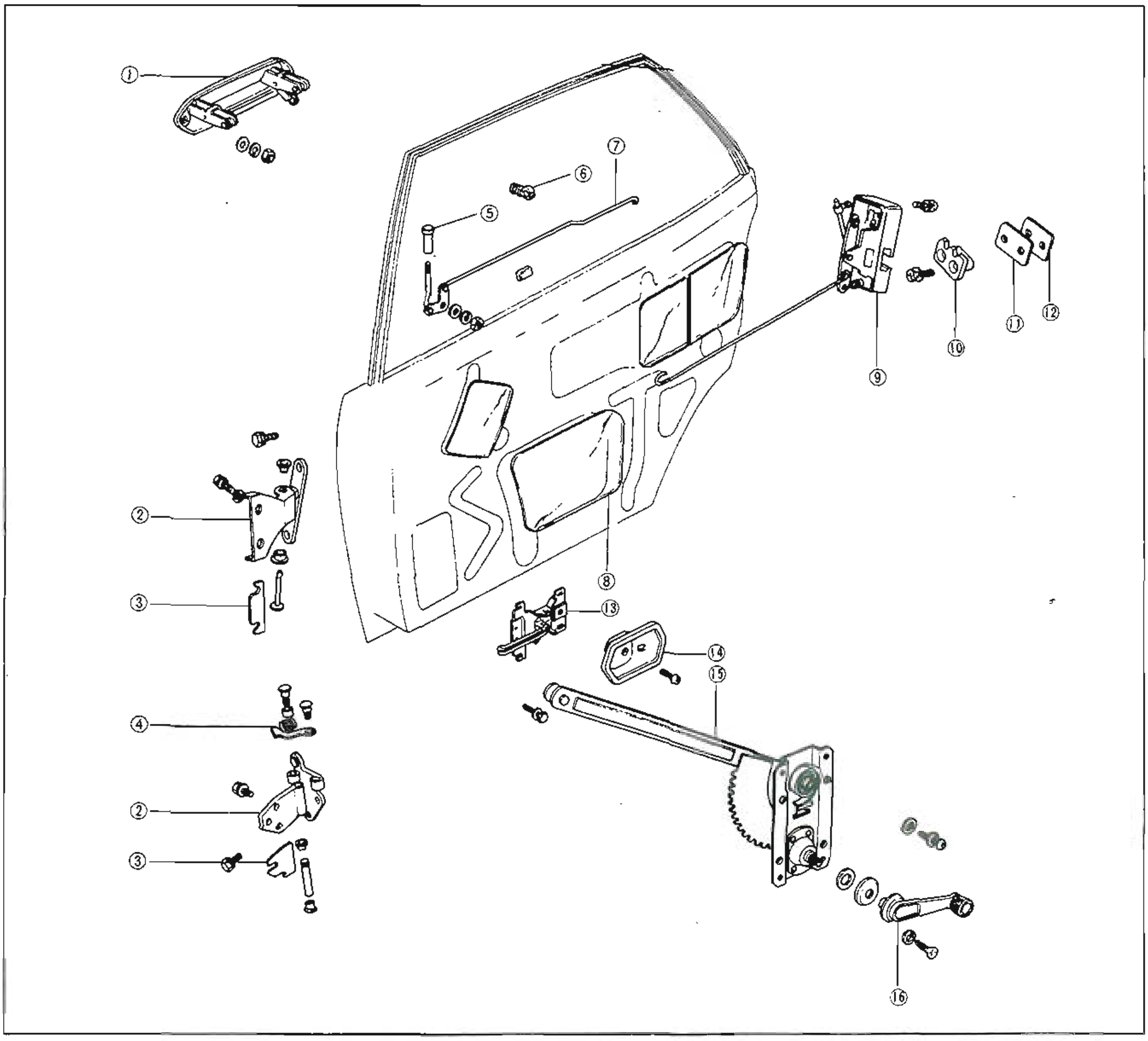


Fig. 14–75 Rear door regulator components

1. Outer handle	5. Door latch knob	9. Door latch (Door lock)	13. Inner handle
2. Door hinge	6. Remote control rod holder	10. Door striker	14. Inner handle cover
3. Shim	7. Remote control rod	11. Striker seat	15. Regulator
4. Check lever	8. Watershield	12. Base plate	16. Regulator handle

14–L. QUARTER WINDOW (COUPÉ)

14–L–1. Quarter Window Regulator and Glass Removal

1. Lower the glass all the way.
2. Remove the rear seat as described in **Par. 14–H–1**.
3. Remove the glass stopper as shown in Fig. 14–76.

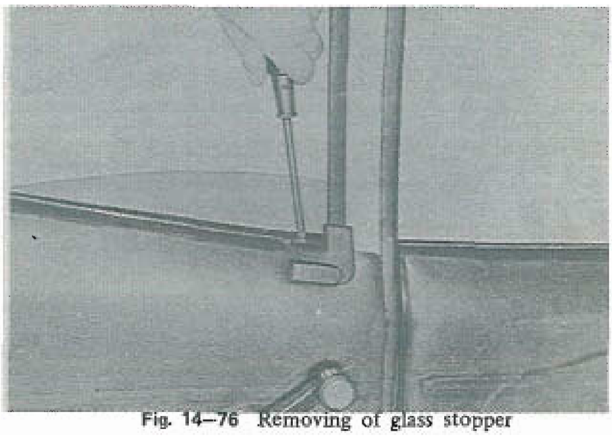


Fig. 14–76 Removing of glass stopper

4. Remove the scarf plate attaching screw as shown in Fig. 14–77.

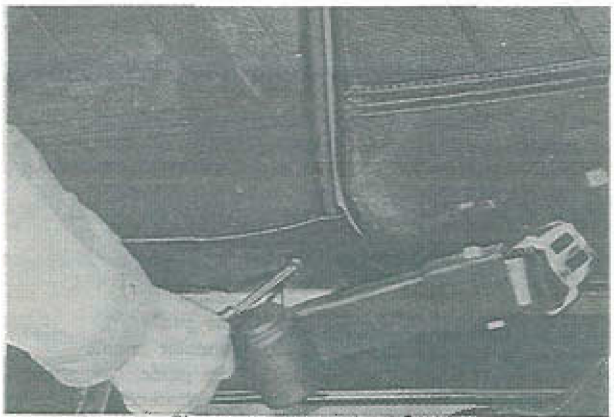


Fig. 14–77 Removing of screw

5. Remove the regulator handle and arm rest.

Fig. 14–78 Removing of arm rest

6. Remove the trim panel and watershield.

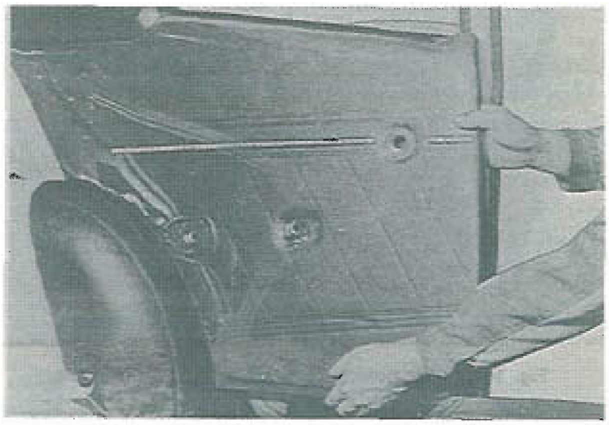


Fig. 14–79 Removing of trim panel

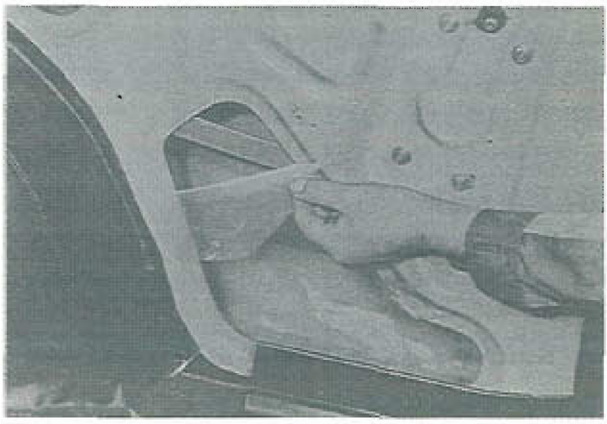


Fig. 14–80 Removing of watershield

7. Remove the regulator attaching screws.
8. Disconnect the glass roller from the glass roller guide.
9. Disconnect the regulator roller from the glass channel.

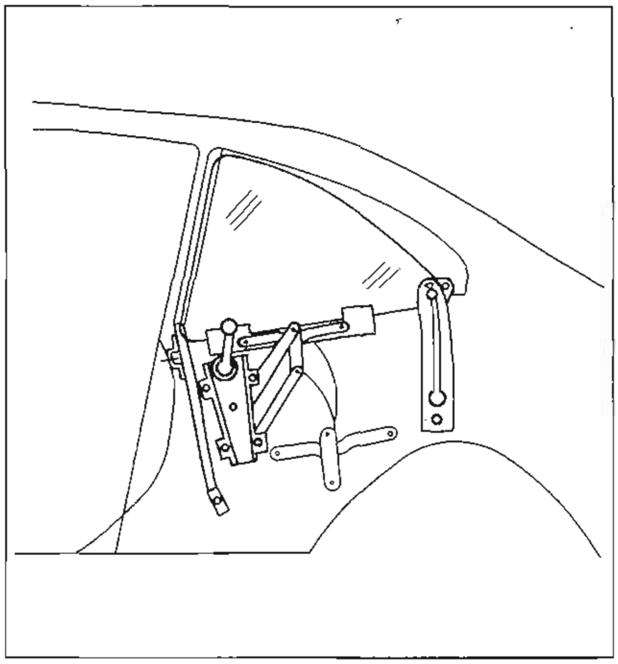


Fig. 14–81 Regulator and glass

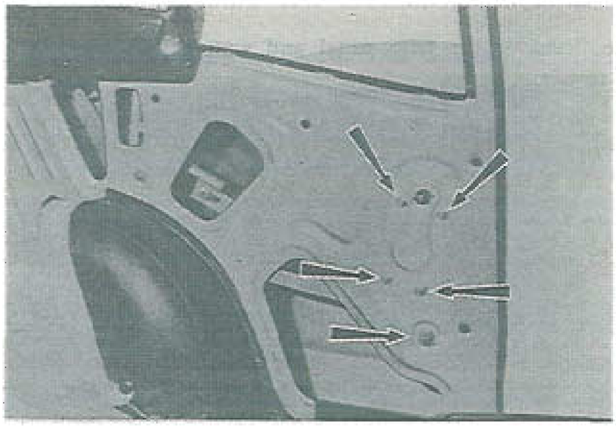


Fig. 14–82 Removing of regulator attaching screw

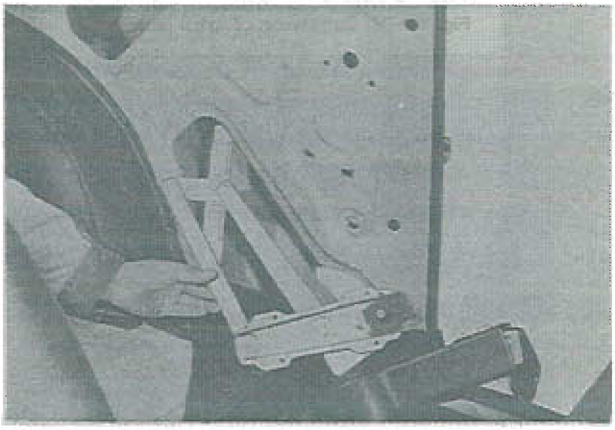


Fig. 14–83 Removing of regulator

10. Remove the regulator.
11. Remove the glass.

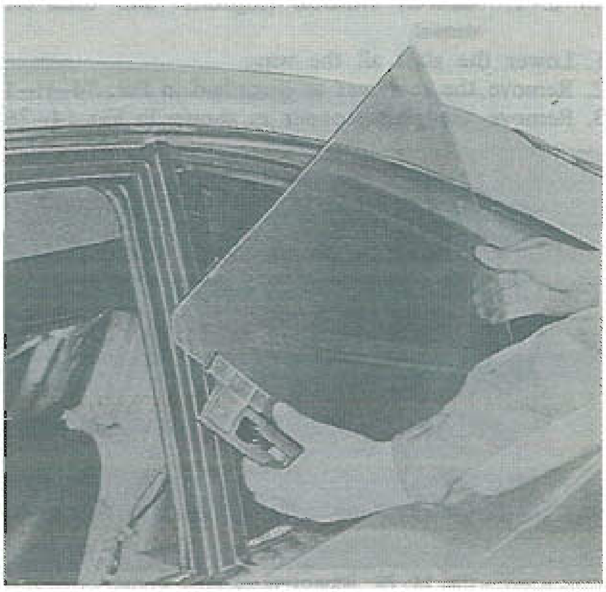


Fig. 14–84 Removing of glass

14–L–2. Quarter Window Regulator and Glass Installation

Follow the removal procedures in the reverse order.

Note:
Adjust the regulator and check the operation of the regulator.

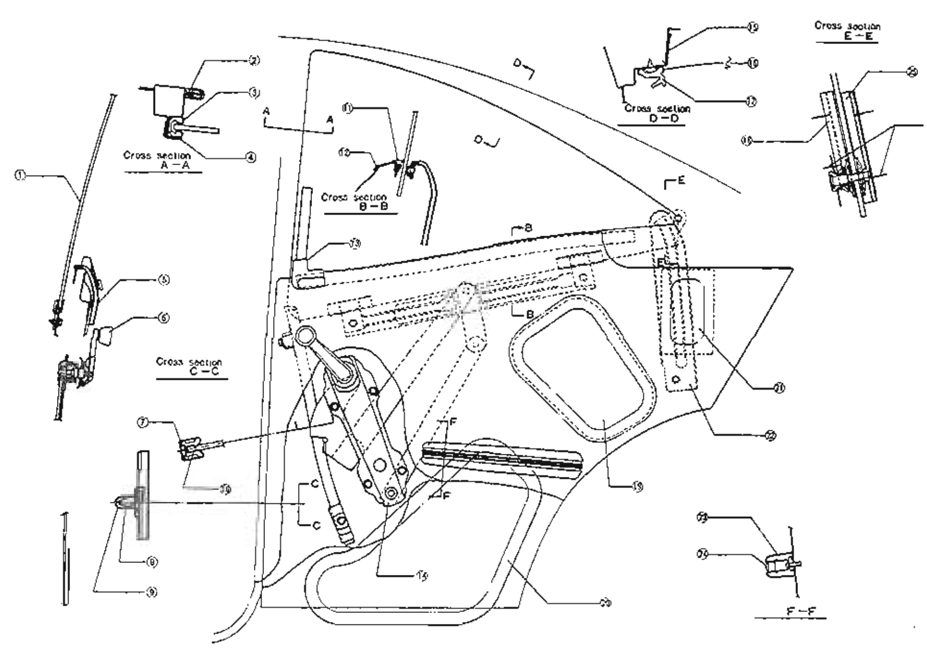


Fig. 14–85 Quarter window

1. Glass
2. Seaming welt
3. Run channel
4. Garnish
5. Trim panel
6. Regulator handle
7. Glass guide
8. Trim fastener
9. Fastener cap
10. Run channel
11. Weatherstrip
12. Mould
13. Glass stopper
14. Regulator
15. Mould
16. Retainer
17. Weatherstrip
18. Weatherstrip
19. Watershield
20. Watershield
21. Watershield
22. Glass roller guide
23. Arm rest
24. Garnish
25. Weatherstrip

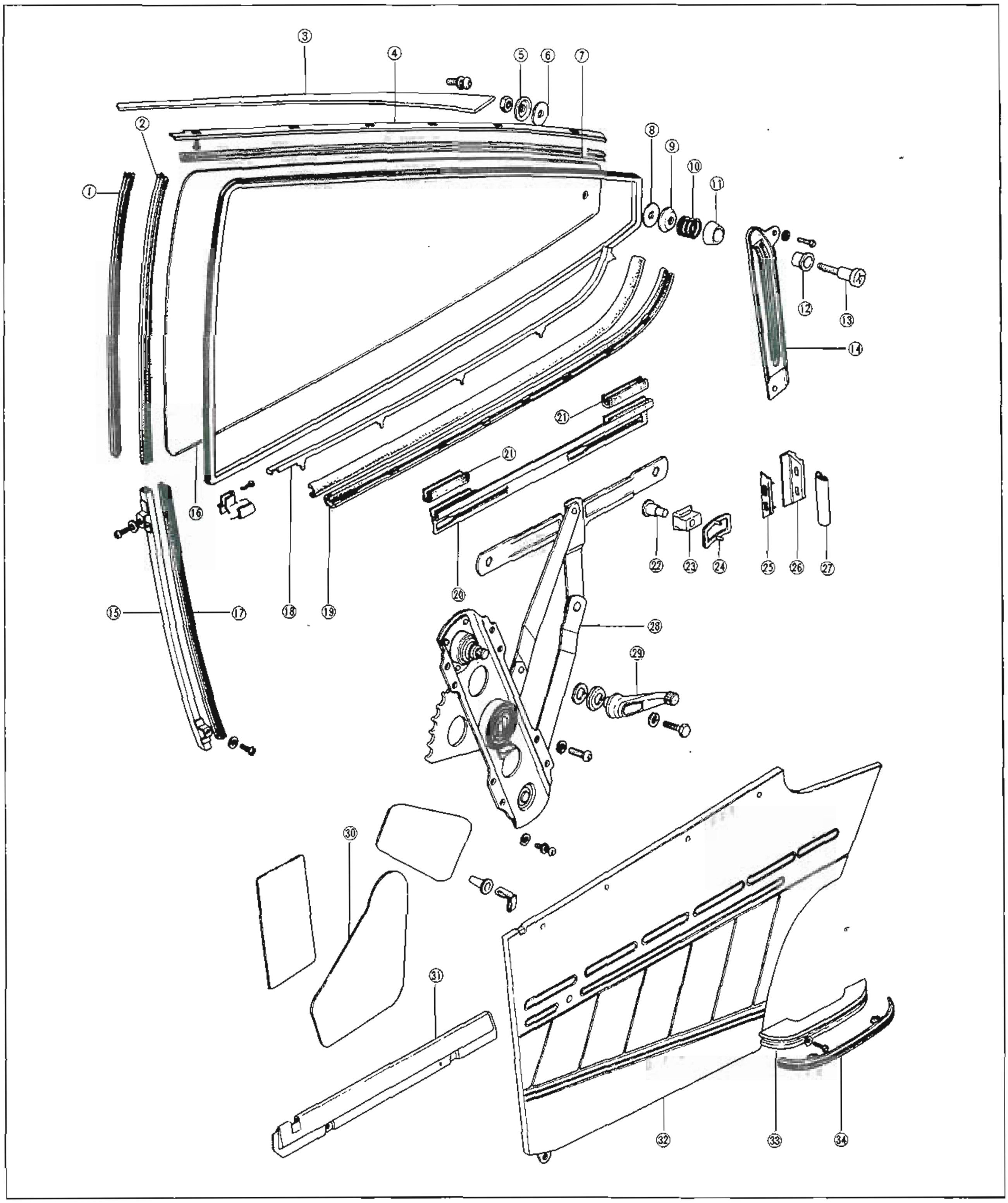


Fig. 14–86 Quarter window components

1. Garnish
2. Run channel
3. Mould
4. Retainer
5. Washer
6. Seat
7. Weatherstrip
8. Seat
9. Washer
10. Spring
11. Spring seat
12. Roller
13. Pin
14. Glass roller guide
15. Glass guide
16. Quarter glass
17. Run channel
18. Mould
19. Weatherstrips
20. Glass channel (Glass holder)
21. Rubber strip
22. Pin
23. Guide
24. Guide spring
25. Weatherstrip
26. Set plate
27. Weatherstrip
28. Regulator
29. Regulator handle
30. Watershield
31. Garnish
32. Trim panel
33. Arm rest
34. Garnish

14–M. TOP CEILING

14–M–1. Top Ceiling Removal

1. Remove the sun visors, interior mirror, interior lamps, assist straps, etc.

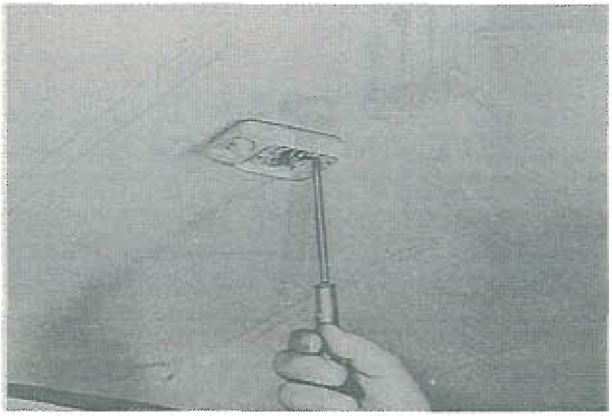


Fig. 14–87 Removing of interior lamp

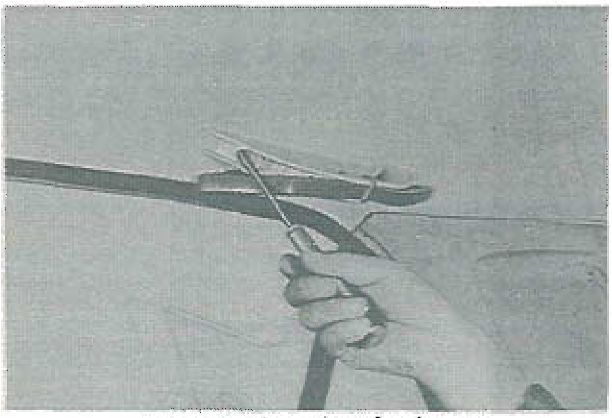


Fig. 14–88 Removing of assist strap

2. Remove the front pillar trims and rear package tray trim panel.

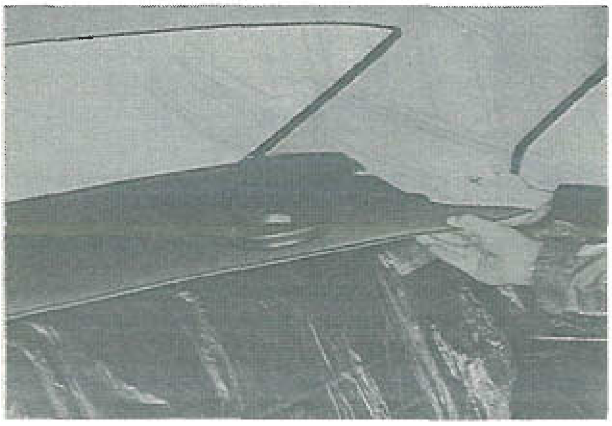


Fig. 14–89 Removing of package trim panel

3. Strip off the seaming welts from the body flange and tear the cemented surface of the top ceiling from the outside of the flange.
4. Remove the polythylene plates of the top ceiling from the inserting points of the body.
5. Remove the listing wires and top ceiling.

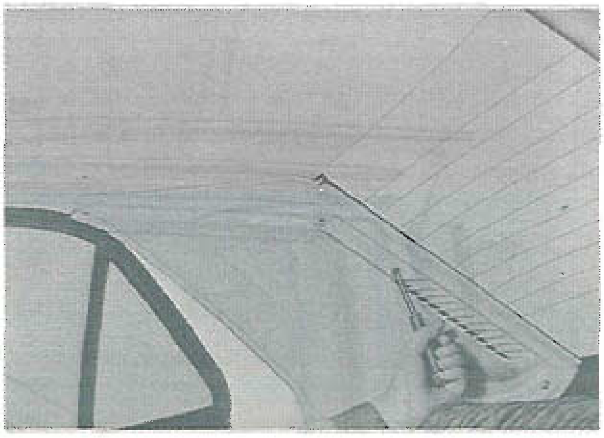


Fig. 14–90 Removing of pillar trim

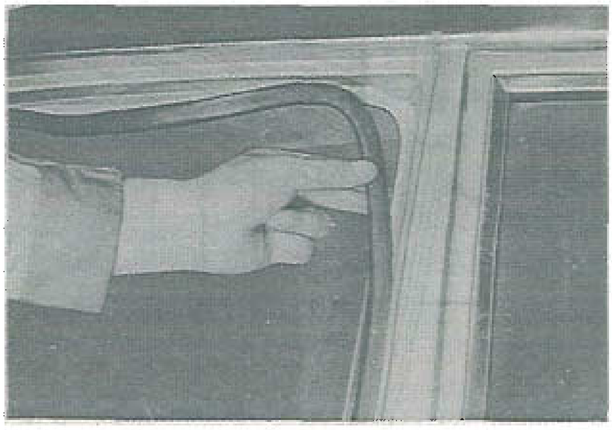


Fig. 14–91 Removing of seaming welt

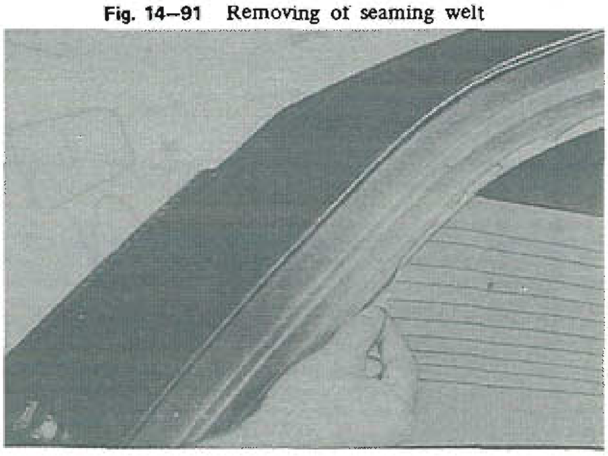


Fig. 14–92 Tearing of ceiling cemented surface

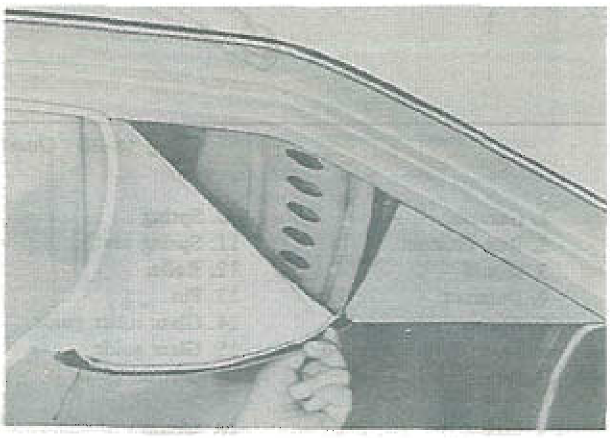


Fig. 14–93 Removing of top ceiling

14–M–2. Top Ceiling Installation

Follow the removal procedures in the reverse order.

Note:

(a) After applying the adhesive cement to the outside of the body flange and allow the adhesive cement to dry.

(b) When inserting the polythylene plates of the top ceiling, if the guide made of plastic plate is used, you can insert it without touching the wearing point.

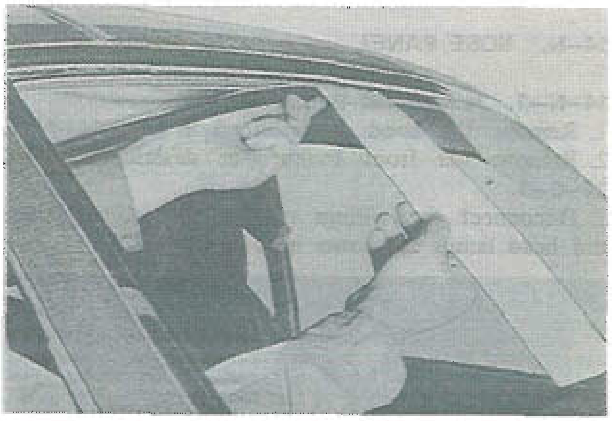


Fig. 14–94 Installing of top ceiling

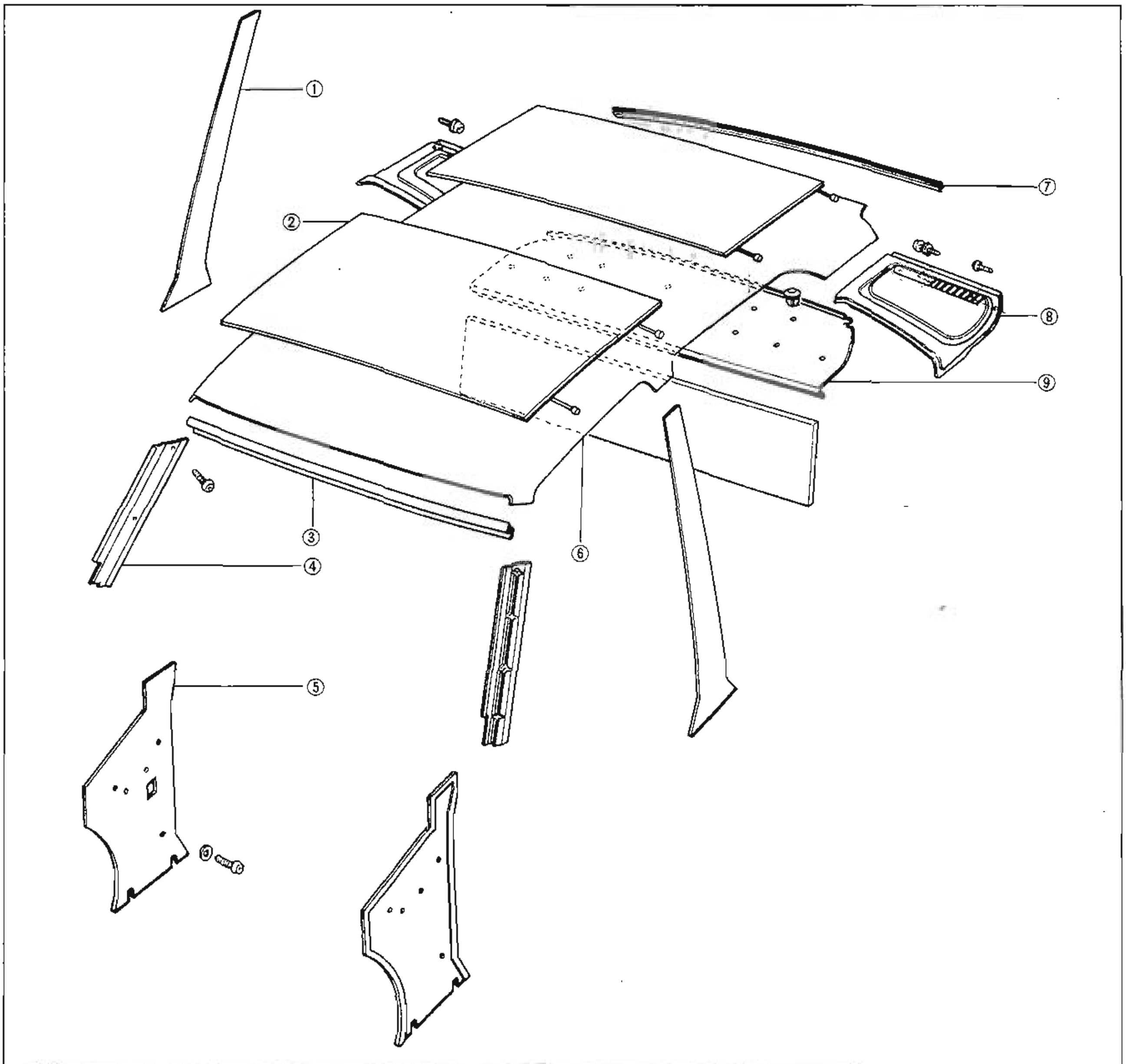


Fig. 14–95 Top ceiling components

1. Center pillar trim
2. Head lining
3. Front polythylene plate
4. Front pillar trim
5. Front side trim
6. Top ceiling
7. Rear polythylene plate
8. Rear pillar trim
9. Rear package tray trim panel

14–N. NOSE PANEL

14–N–1. Nose Panel Removal

1. Remove the hood as described in **Par. 14–A–1.**
2. Remove the front bumper as described in **Par. 14–C–1.**
3. Disconnect the wirings of the turn signal lamps and head lamps as shown in Fig. 14–96.

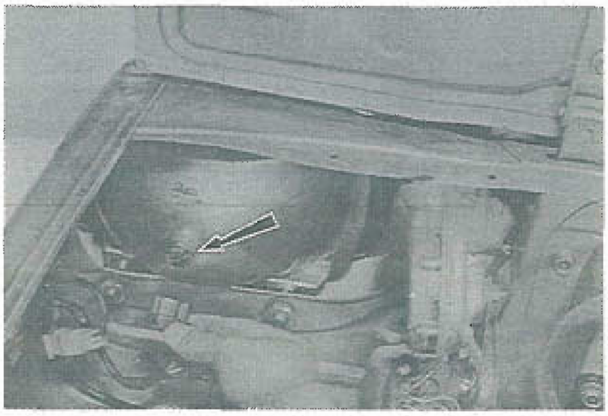


Fig. 14–96 Disconnecting of head lamp wire

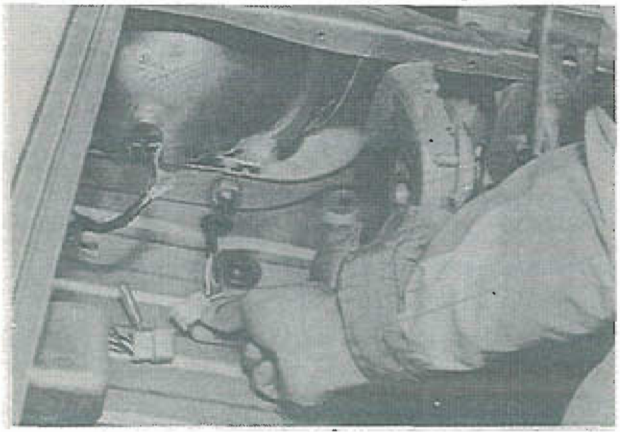


Fig. 14–97 Disconnecting of turn signal lamp wire

4. Remove the nose panel attaching bolts and screws.
5. Remove the nose panel from the vehicle.

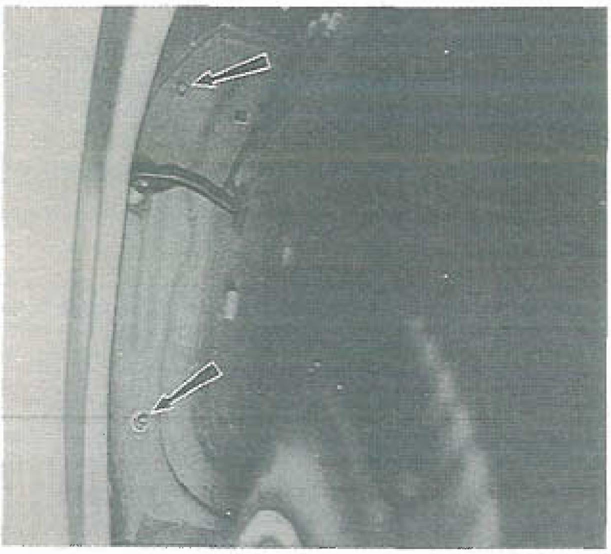


Fig. 14–98 Removing of bolts

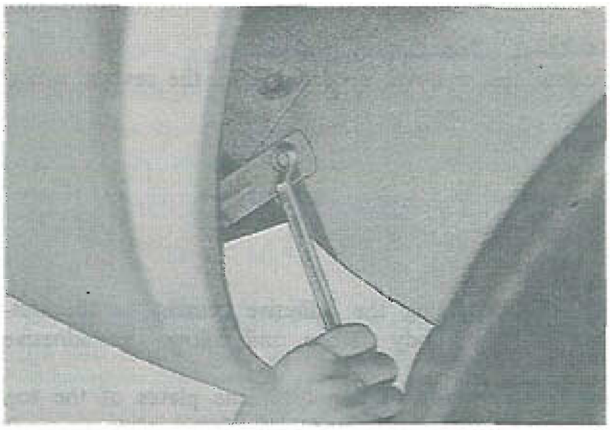


Fig. 14–99 Removing of bolts

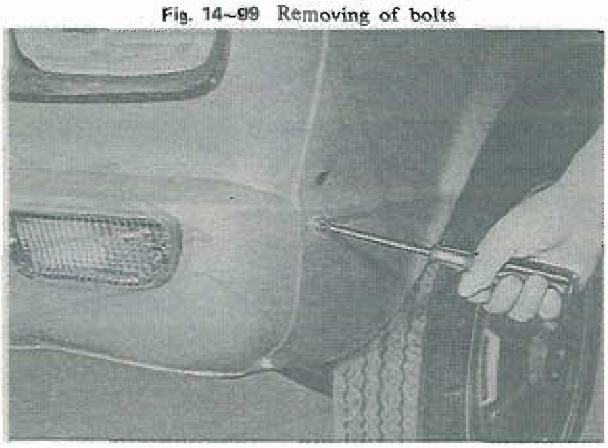


Fig. 14–100 Removing of screws

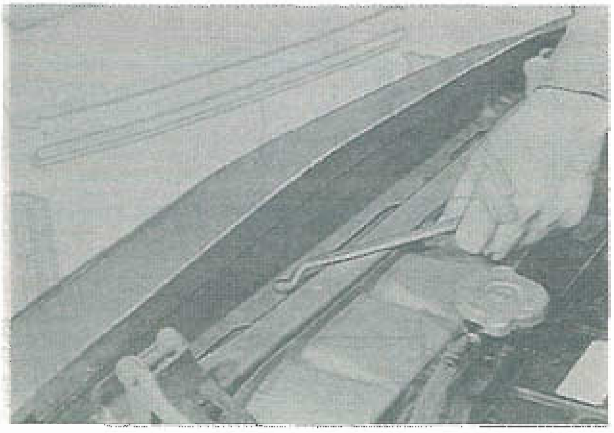


Fig. 14–101 Removing of bolts

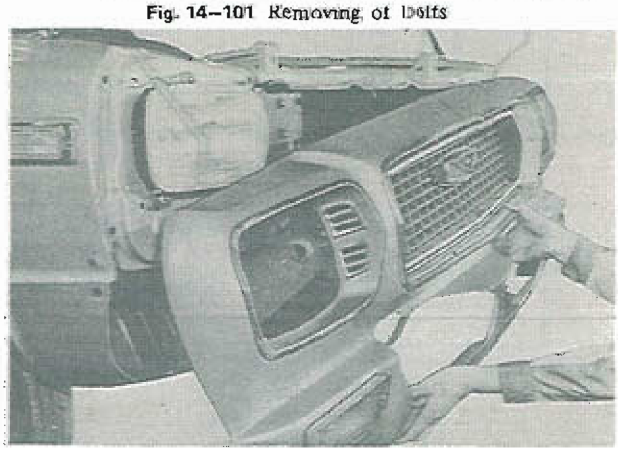


Fig. 14–102 Removing of nose panel

14–N–2. Nose Panel Installation

Follow the removal procedures in the reverse order and align the nose panel for good fit and appearance.

14–O. NOSE PANEL (RX–3)

The RX-3 is fitted with a reinforced plastic nose panel which is strong, light and corrosion-resistant. When this nose panel is damaged, it is repaired in the following manner. In the case of such exterior scratches and dents as do not influence panel strength, fill the affected area with polyester putty, and the subsequent repair is carried out in the same manner as in the case of a steel panel. However, in the case of cracks or tear-offs, it is necessary to reinforce from inside with a nose panel repair kit to maintain the strength of the nose panel. If a damage is serious and requires extensive repairs, the nose panel should be replaced.

14–O–1. Repair Procedure for Nose Panel Exterior Damage

1. Thoroughly remove with a sandpaper the paint film from the affected area.
2. Apply polyester putty on the affected area.
3. After the putty cures, smooth the affected area with a file.
4. Apply paint.

Note:
When using polyester putty, follow directions specified by its manufacturer.

14–O–2. Repair Procedure of Nose Panel Breakage

1. Remove the nose panel from the body.

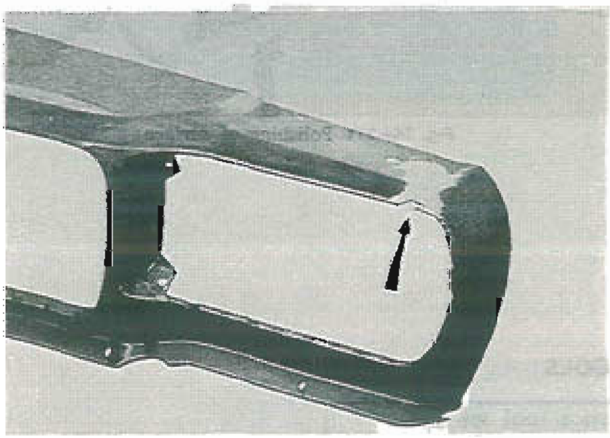


Fig. 14–103 Damaged nose panel

2. Thoroughly remove with a sandpaper the paint from the outside and the inside of the affected area.
3. Apply masking tape on the affected area.
4. Make ready one glass mat and **3 ~ 5 glass cloths** corresponding in size to the polished area on the inside of the affected area.

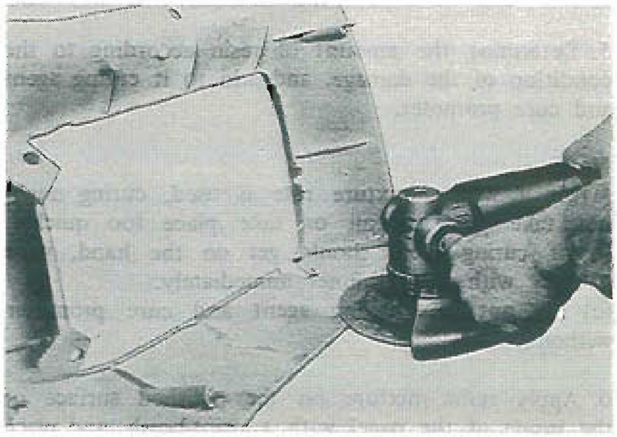


Fig. 14–104 Removing of paint

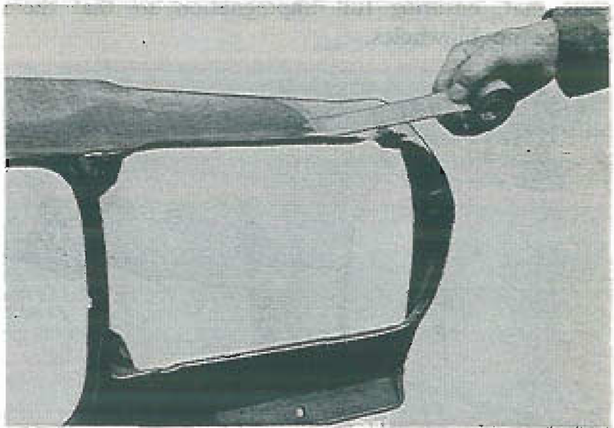


Fig. 14–105 Applying of masking tape

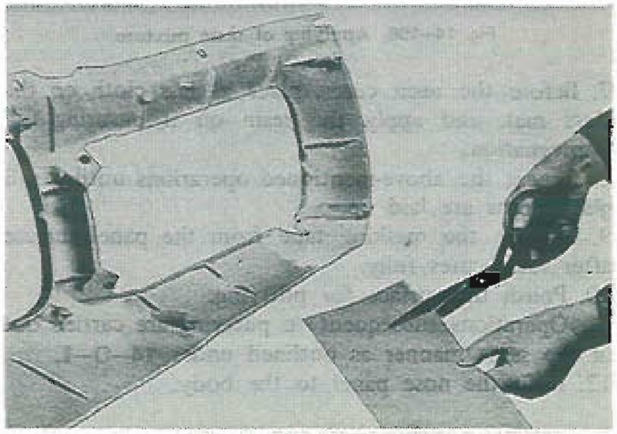


Fig. 14–106 Glass mat

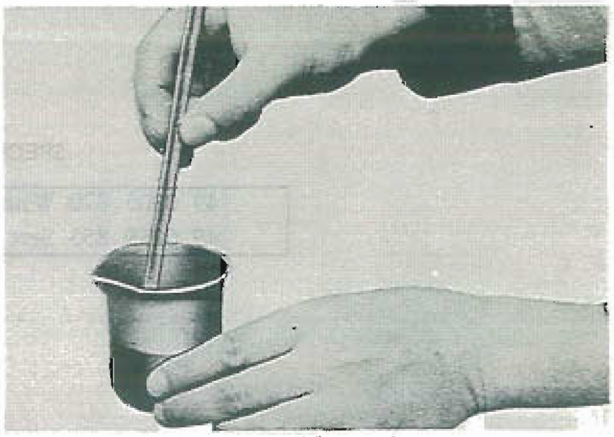


Fig. 14–107 Mixing of resin

5. Determine the amount of resin according to the condition of the damage, and add to it curing agent and cure promoter.

Note:
(a) If a wrong mixture rate is used, curing might not take place at all or take place too quickly.
(b) If curing agent should get on the hand, wipe it away with paint thinner immediately.
(c) **Do not** mix curing agent and cure promoter without resin.

6. Apply resin mixture on the polished surface of the inside of the panel with a paint-brush, and place on it a glass mat. Next, apply the resin on the glass mat, ensuring full impregnation so that there will be no blowholes.

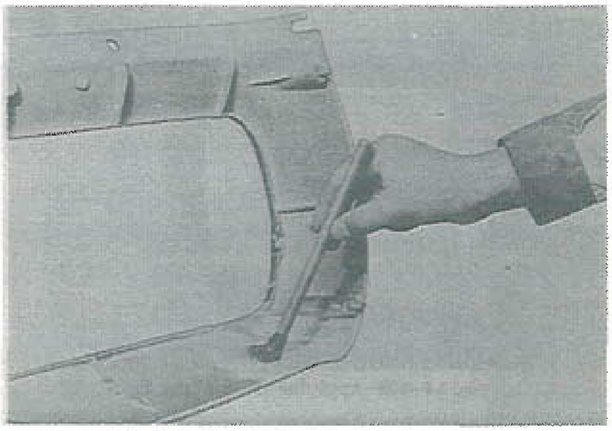


Fig. 14–108 Applying of resin mixture

7. Before the resin cures, place a glass cloth on the glass mat, and apply the resin on it ensuring full impregnation.
8. Repeat the above-mentioned operarions until **3 ~ 5 glass cloths** are laid up.
9. Remove the masking tape from the panel surface after resin cures fully.
10. Polish the surface for puttying.
11. Operations subsequent to puttying are carried out in the same manner as outlined under **14–O–1**.
12. Refit the nose panel to the body.

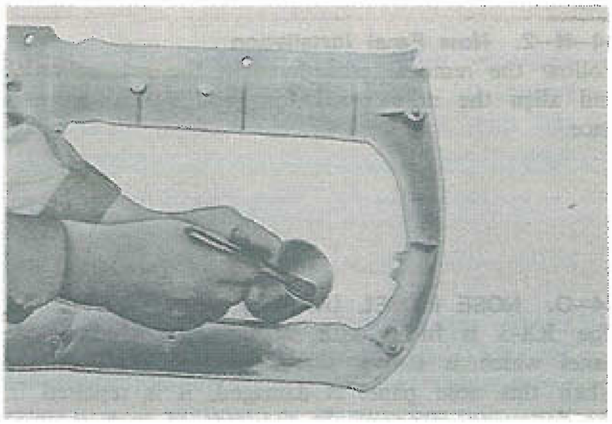


Fig. 14–109 Applying of resin mixture

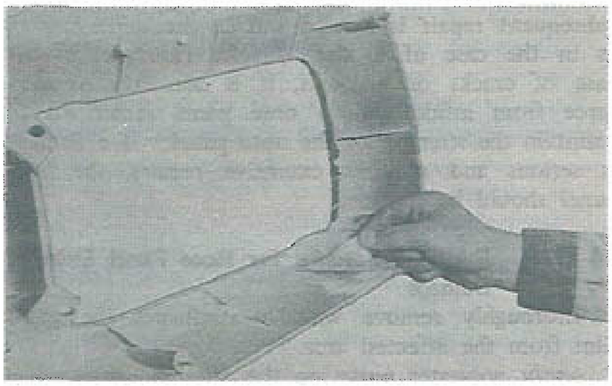


Fig. 14–110 Installing of glass cloth

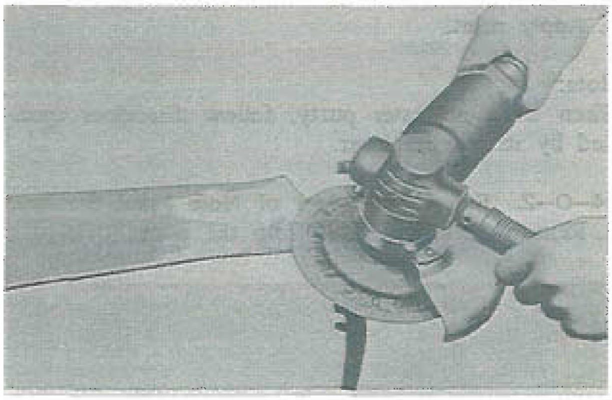


Fig. 14–111 Polishing of surface

SPECIAL TOOLS

49 0305 870	Window service tool set
49 0259 855	Seat reclining knuckle remover

BODY

RX-3 Rotary Wagon
808 Station Wagon

DESCRIPTION

The front body of the RX-3 Rotary Wagon and 808 Station Wagons is the same as that of their sedan versions. When the seat back is folded forward, the seat back rear surface will be at the same level with the luggage space floor surface.

14A–A. BACK DOOR

14A–A–1. Removing of Back Door

1. Open the back door, and remove the back door trim.
2. Disconnect the licence plate light wiring and heatable window wirings (if equipped).

Pull out the wiring harness from the hole (A) of the back door as shown in Fig. 14A–1.

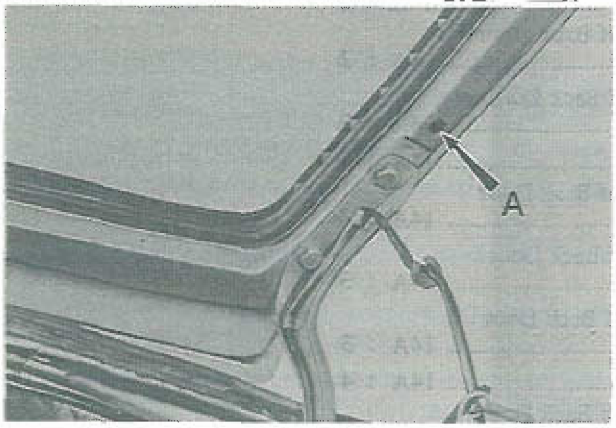


Fig. 14A–1 Disconnecting of wiring harness

3. Remove the back door and hinge arm tightening bolts, and remove the back door.

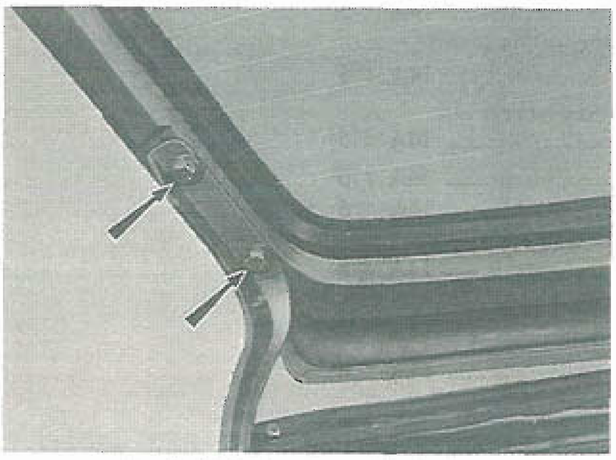


Fig. 14A–2 Removing of back door

14A–A–2. Installing of Back Door

Follow the removal procedures in the reverse order.

14A–A–3. Adjusting of Back Door

1. To adjust the back door for **to-and-fro** position, loosen the back door hinge bracket attaching bolts

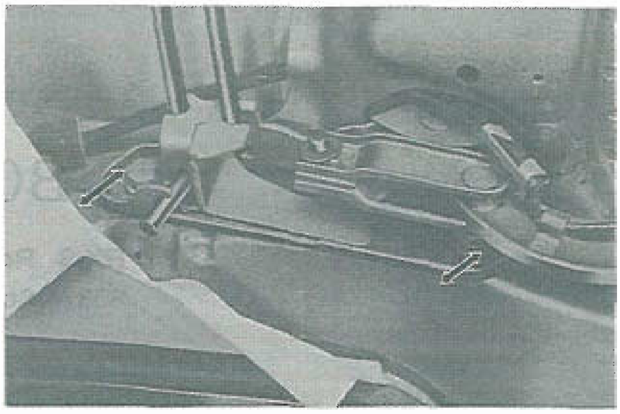


Fig. 14A–3 *Adjusting of to-and-fro*

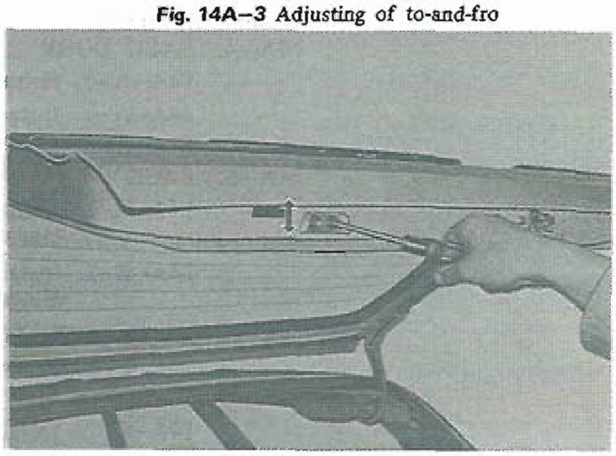


Fig. 14A–4 Adjusting of dovetail

on the body side and the dovetail attaching screws on the door side.

2. To adjust the back door for **up-and-down** position, loosen the back door hinge arm tightening bolts on the back door side.

When the up-and-down adjustment is made, the striker also should be adjusted by using the shims.

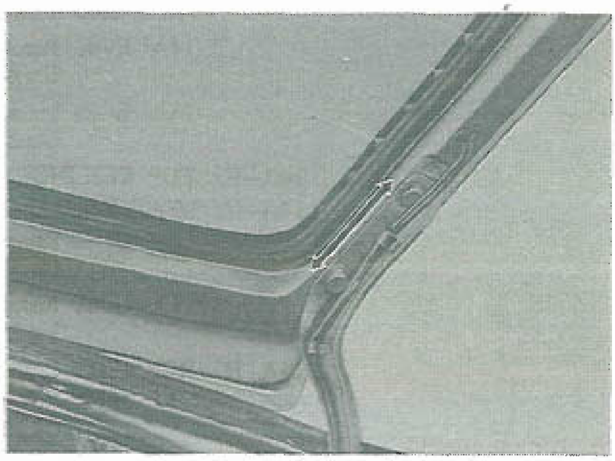


Fig. 14A–5 Adjusting of up-and-down

3. Adjust the back door for closing, by moving the back door lock striker as shown in Fig. 14A–6, or inserting the shims of proper thickness between the striker and the body.

The adjusting shims are of 1.0 mm (0.039 in) and 2.0 mm (0.079 in) in thickness.

Fig. 14A–6 Adjusting of striker

4. The back door can be shifted from **side to side** by moving the upper wedge to fore-and-aft.

Note:
Care should be taken not to distort the back door or mar the surrounding body.

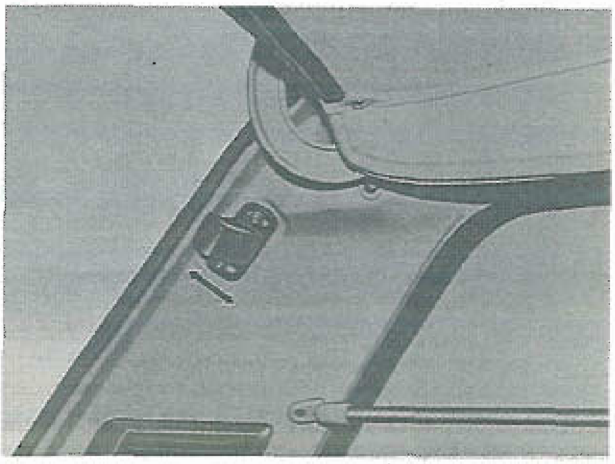


Fig. 14A–7 Adjusting of side-to-side

14A–B. BACK DOOR HINGE

14A–B–1. Removing of Back Door Hinge

1. Remove the back door as described in **Par. 14A–A–1.**
2. Remove the back door hinge cover attaching screws, and remove the hinge cover.

Fig. 14A–8 Removing of hinge cover

3. Remove the screws attaching the top ceiling fixing

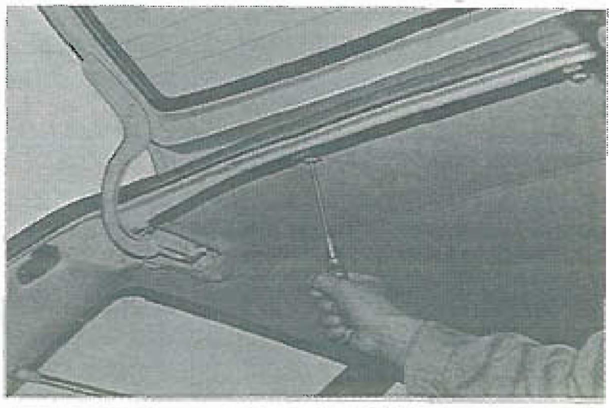


Fig. 14A–9 Removing of fixing plate

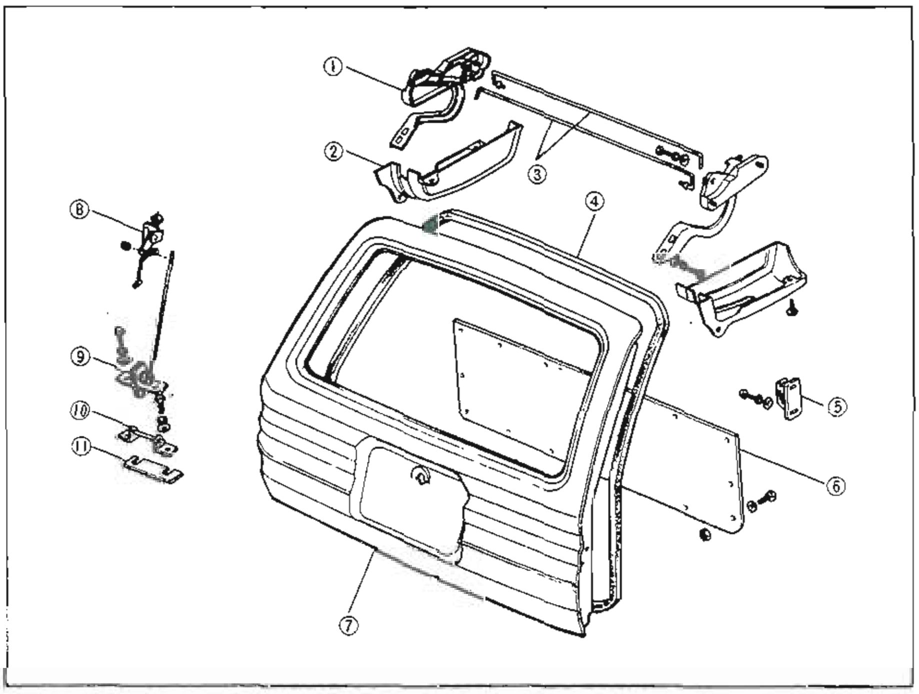


Fig. 14A–10

Back door components

1. Back door hinge
2. Back door hinge cover
3. Torsion springs
4. Weatherstrip
5. Upper wedge
6. Trim board
7. Back door
8. Back door lock control link assembly
9. Back door lock assembly
10. Striker
11. Adjusting shim

plate. Remove the rear end of the top ceiling.
4. Remove the back door hinge bracket attaching bolts, and remove the back door hinge assembly.

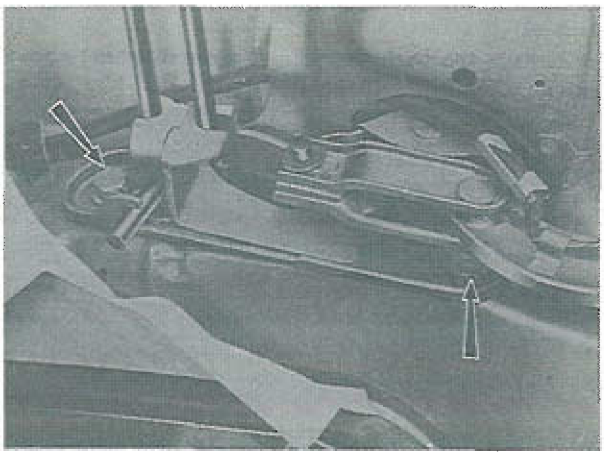


Fig. 14A–11 Removing of hinge assembly

5. Hold the back door hinge assembly in a vice.
6. Remove the torsion springs with a suitable tool as shown in Fig. 14A–12.

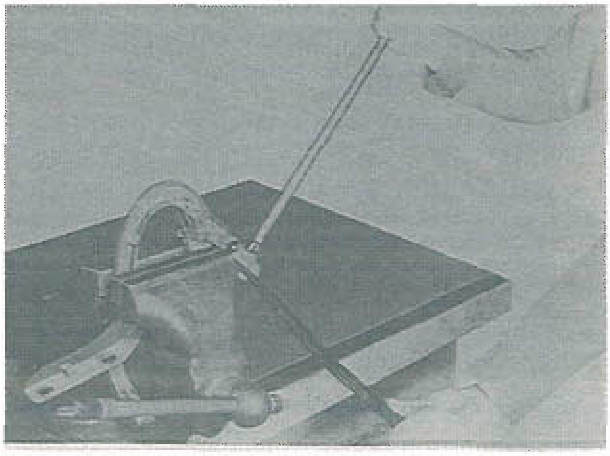


Fig. 14A–12 Removing of torsion springs

Note:
To perform the removal and installation of the torsion spring, it is recommended to use a suitable pipe of 9 mm (0.35 in) in inner diameter and 400 mm (15.7 in) in length.

14A–B–2. Installing of Back Door Hinge
Follow the removal procedures in the reverse order.

14A–C BACK DOOR LOCK

14A–C–1. Removing of Back Door Lock
1. Remove the back door trim board and watershield.
2. Disconnect the back door lock control link at the joint as shown in Fig. 14A–13. Remove the back door lock control assembly.

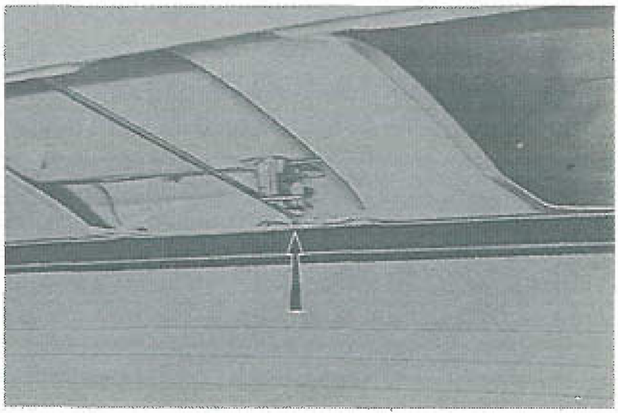


Fig. 14A–13 Disconnecting of door lock control link

3. Remove the two back door lock attaching bolts, and remove the back door lock assembly.

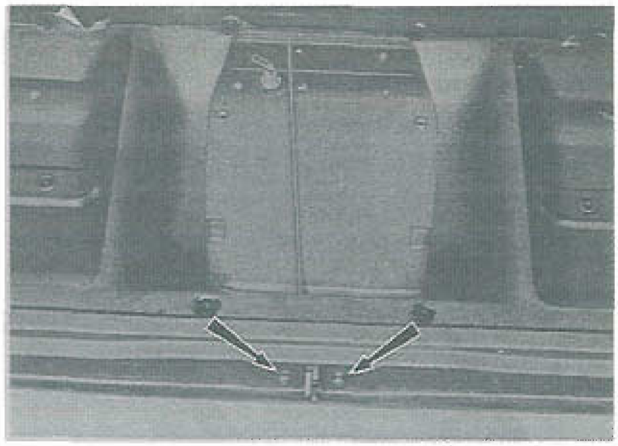


Fig. 14A–14 Removing of door lock assembly

4. Remove the lock cylinder retainer, and remove the lock cylinder assembly.

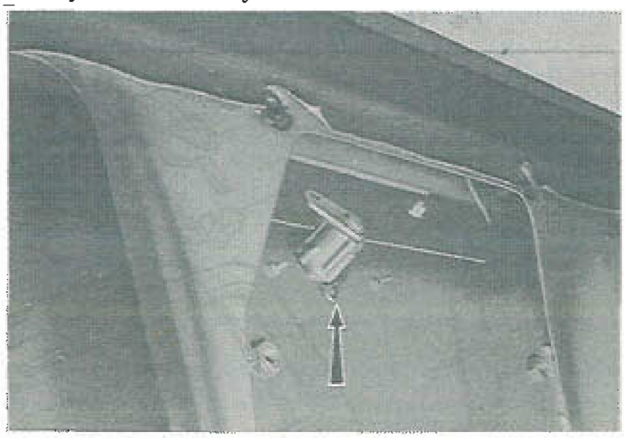


Fig. 14A–15 Removing of lock cylinder retainer

14A–C–2. Installing of Back Door Lock
Follow the removal procedures in the reverse order.

14A–C–3. Adjusting of Back Door Lock
1. To adjust the back door lock, loosen the back door lock control assembly attaching screws and move the lock control assembly so as to give the specified clearance between the outer handle and push lever.

The specified clearance should be **0.5 ~ 1.5 mm (0.02 ~ 0.06 in)**. Tighten the screws attaching the back door lock control assembly and apply lubricant to the assembly.

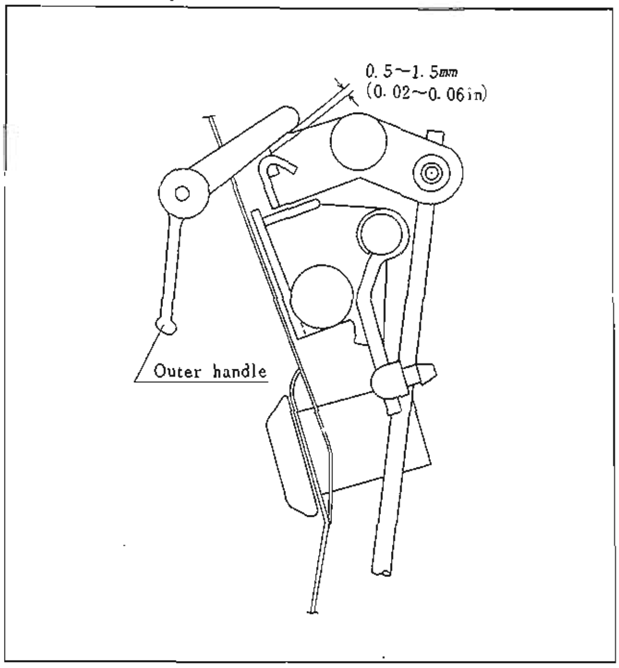


Fig. 1A–16 Adjusting of door lock control assembly

2. To adjust the back door lock striker, refer to **Par. 14A–A–3, 3.**

14A–D. BACK DOOR GLASS

14A–D–1. Removing of Back Door Glass

1. Remove the back door trim board and disconnect the heatable window wirings from the wiring harness.
2. Tear the weatherstrip cemented surface from the body with a wooden spatula.
3. Drive out the inner lip of the weatherstrip with a suitable tool from the inside of the vehicle while pushing the back door glass outwards.

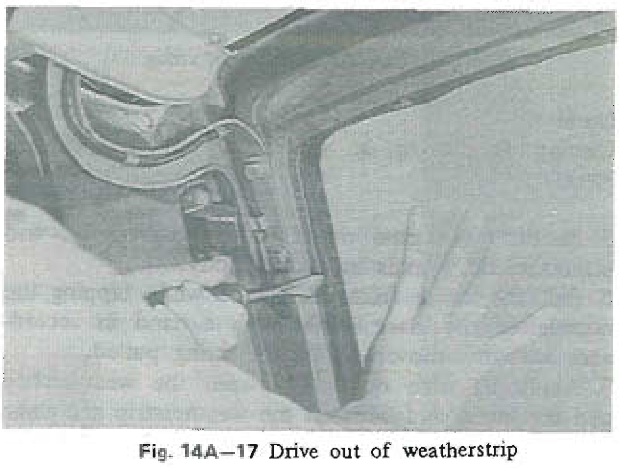


Fig. 14A–17 Drive out of weatherstrip

4. Remove the back door glass together with the weatherstrip.
5. Remove the moulding and glass from the weatherstrip.

Note:
When removing the heatable window, be careful not to damage the filament surface.

14A–D–2. Installing of Back Door Glass

Before installing the back door glass, clean off the old adhesive cement around the glass and body thoroughly.

1. Install the weatherstrip onto the back door glass and align the corners of the weatherstrip and glass.

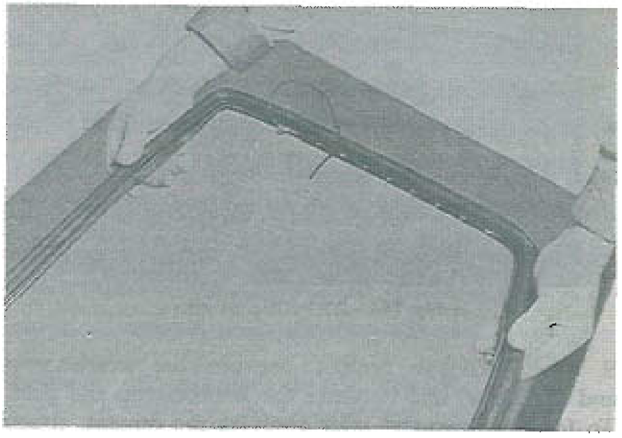


Fig. 14A–18 Installing of weatherstrip

2. Fit a string of 4 mm (0.16 in) in diameter into the mould fitting groove of the weatherstrip with a suitable tool.
3. Apply water and soap lightly onto the weatherstrip groove.
4. Connect the right, left, upper and lower mouldings with four joints. Push the moulding against the groove of the weatherstrip and pull the string to fit the moulding.
5. Apply water and soap lightly onto the weatherstrip groove, which is fitted to the body flange.
6. Insert a string into the weatherstrip groove by using a suitable tool.

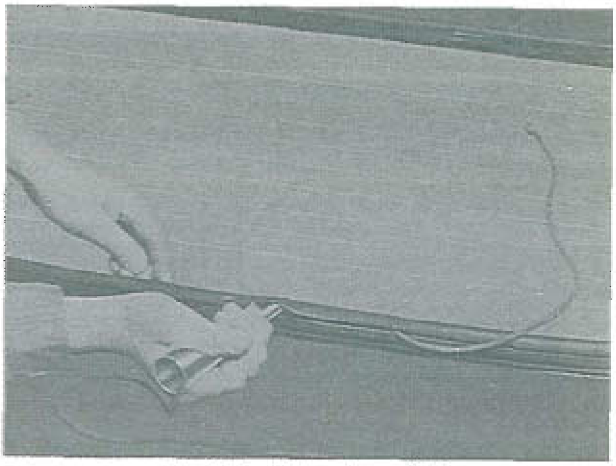


Fig. 14A–19 Inserting of string

Note:
Overlap the string at the center portion of the glass.

7. Position the glass onto the body properly, and place the string ends inside the body. To facilitate the procedure, apply water and soap lightly onto the body flange.
8. Pull the string from the inside while tapping the outside of the glass lightly with a hand in accordance with the movement of the string pulled.

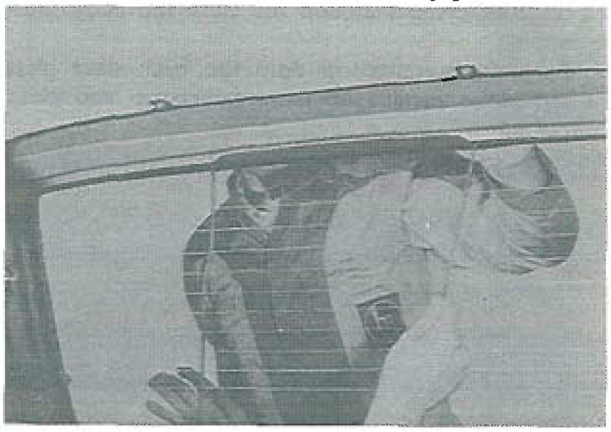


Fig. 14A–20 Pulling of string

9. Apply adhesive cement between the weatherstrip and the body, and between the weatherstrip and glass. To facilitate cleaning after applying the cement, attach a suitable tape onto the glass and body.
10. Clean off the excessive adhesive cement together with the tape.

14A–E. STATIONARY GLASS (Rear Side Glass)

14A–E–1. Removing of Stationary Glass

1. Remove the guard pipe (if equipped).
2. Drive out the inner lip of the weatherstrip with a suitable tool from the inside of the vehicle while pushing the stationary glass.

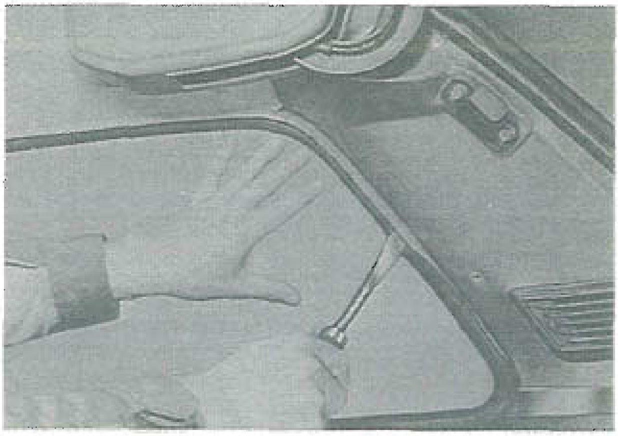


Fig. 14A–21 Drive out of weatherstrip

3. Remove the stationary glass together with the weatherstrip.
4. Remove the mould and glass from the weatherstrip.

14A–E–2. Installing of Stationary Glass

Before installing the stationary glass, clean off the old adhesive cement around the glass and body thoroughly.

1. Install the weatherstrip onto the stationary glass.
2. Install the moulding onto the weatherstrip using a string.

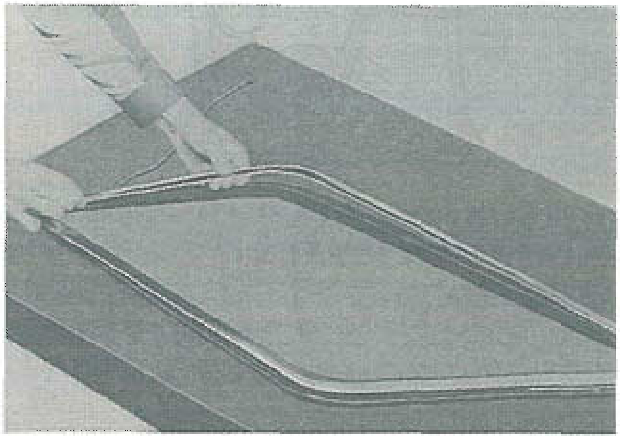


Fig. 14A–22 Installing of moulding

3. Apply water and soap lightly onto the weatherstrip groove, which is fitted to the body flange.
4. Insert a string into the weatherstrip groove by using a suitable tool.

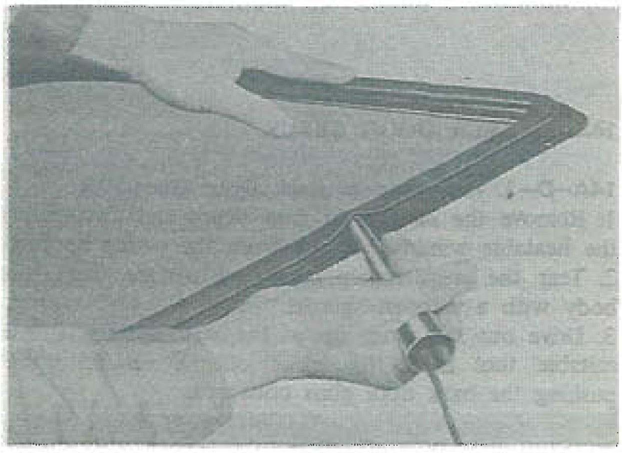


Fig. 14A–23 Inserting of string

Note:
Overlap the string at the center portion of the glass.

5. Position the glass onto the body properly, and place the string ends inside the body.
6. Pull the string from the inside while tapping the outside of the glass lightly with a hand in accordance with the movement of the string pulled.
7. Apply adhesive cement between the weatherstrip and the body, and between the weatherstrip and glass.
8. Clean off the excessive adhesive cement.

14A–F. TOP CEILING

To remove and install the top ceiling, refer to **Par. 14–M (TOP CEILING)** on page 14–21.

14A–G. SEAT BACK LOCK

14A–G–1. Removing of Seat Back Lock

1. Fold the rear seat back frontward.
2. Remove the rear side trim.
3. Drill a hole of 5.0 mm (0.20 in) in diameter into the rivet hole which holds the seat back lock on the body.
4. Remove the seat back lock assembly from the body.

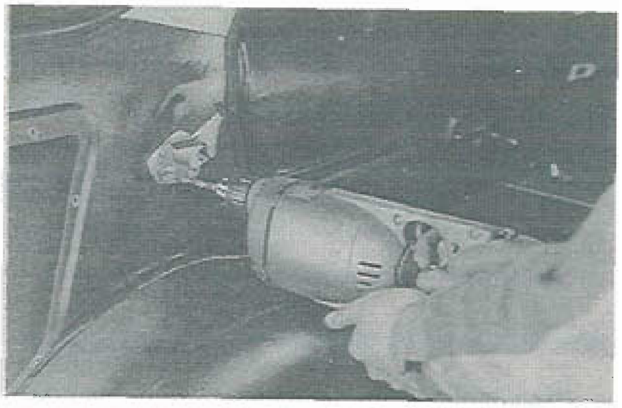


Fig. 14A–24 Drilling of hole

14A–G–2. Installing of Seat Back Lock

Place the seat back stopper, bush, return spring and lock plate on the body, and insert the rivet into the rivet hole of the body through the lock plate hole. Securely fix the seat back lock assembly with a suitable rivet gun as shwon in Fig. 14A–25.

Note:
There are two types of rivets, the long one is for the seat back lock plate and the other short one for the seat back stopper.

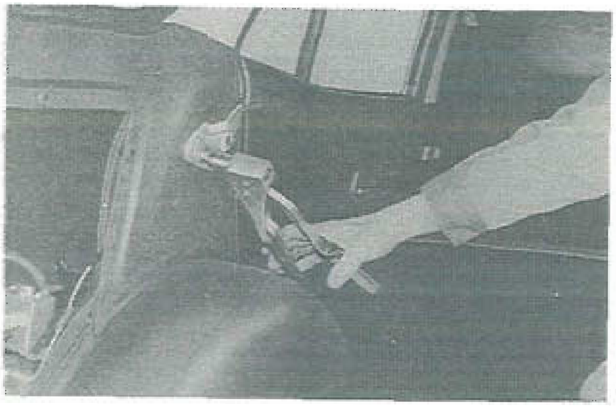


Fig. 14A–25 Securing of seat back lock assembly

14A–H. REAR SEAT

14A–H–1. Removing of Rear Seat Cushion

1. Lift up the rear end of the rear seat cushion.
2. Remove the clips from the hinge pins and pull out the hinge pins.

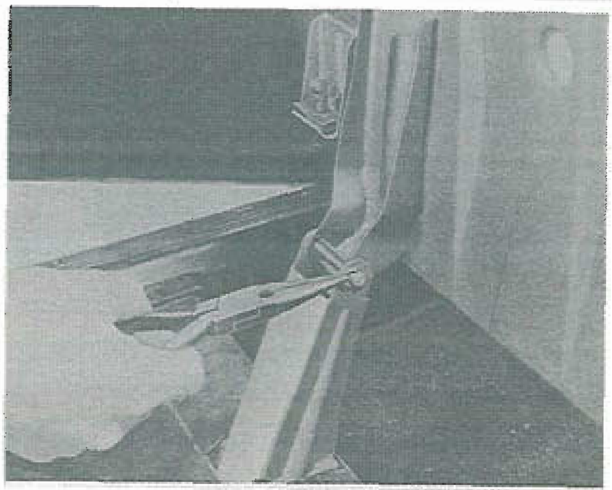


Fig. 14A–26 Removing of clip

3. Remove the rear seat cushion.

14A–H–2. Installing of Rear Seat Cushion

Follow the removal procedures in the reverse order.

14A–H–3. Removing of Rear Seat Back

1. Fold the rear seat back frontward.
2. Remove the screws attaching the floor mat and remove the floor mat.
3. Bend back and straighten the tabs that secure the retainer to the bracket and remove the retainer from the rear seat back bracket.

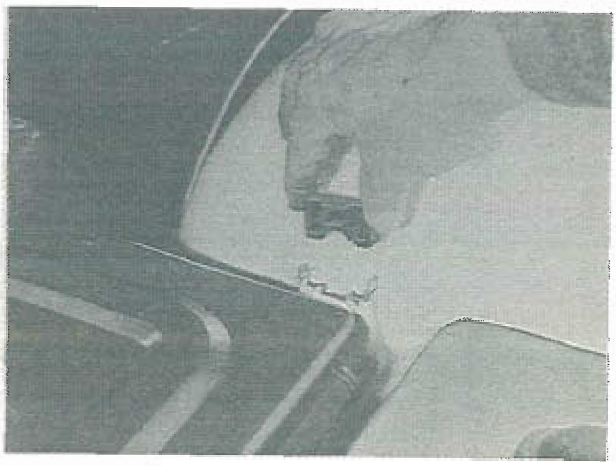


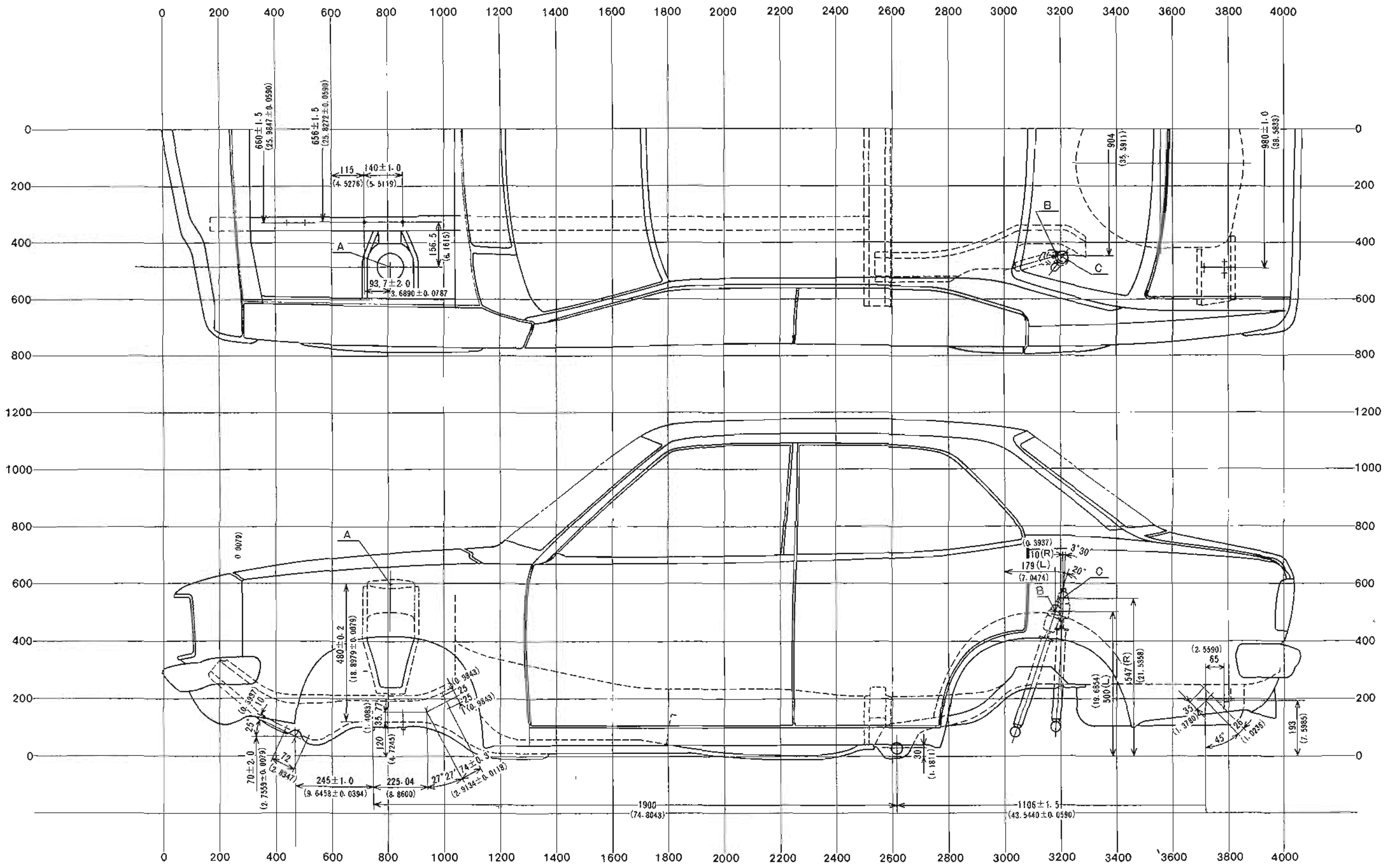
Fig. 14A–27 Removing of retainer

4. Remove the rear seat back.

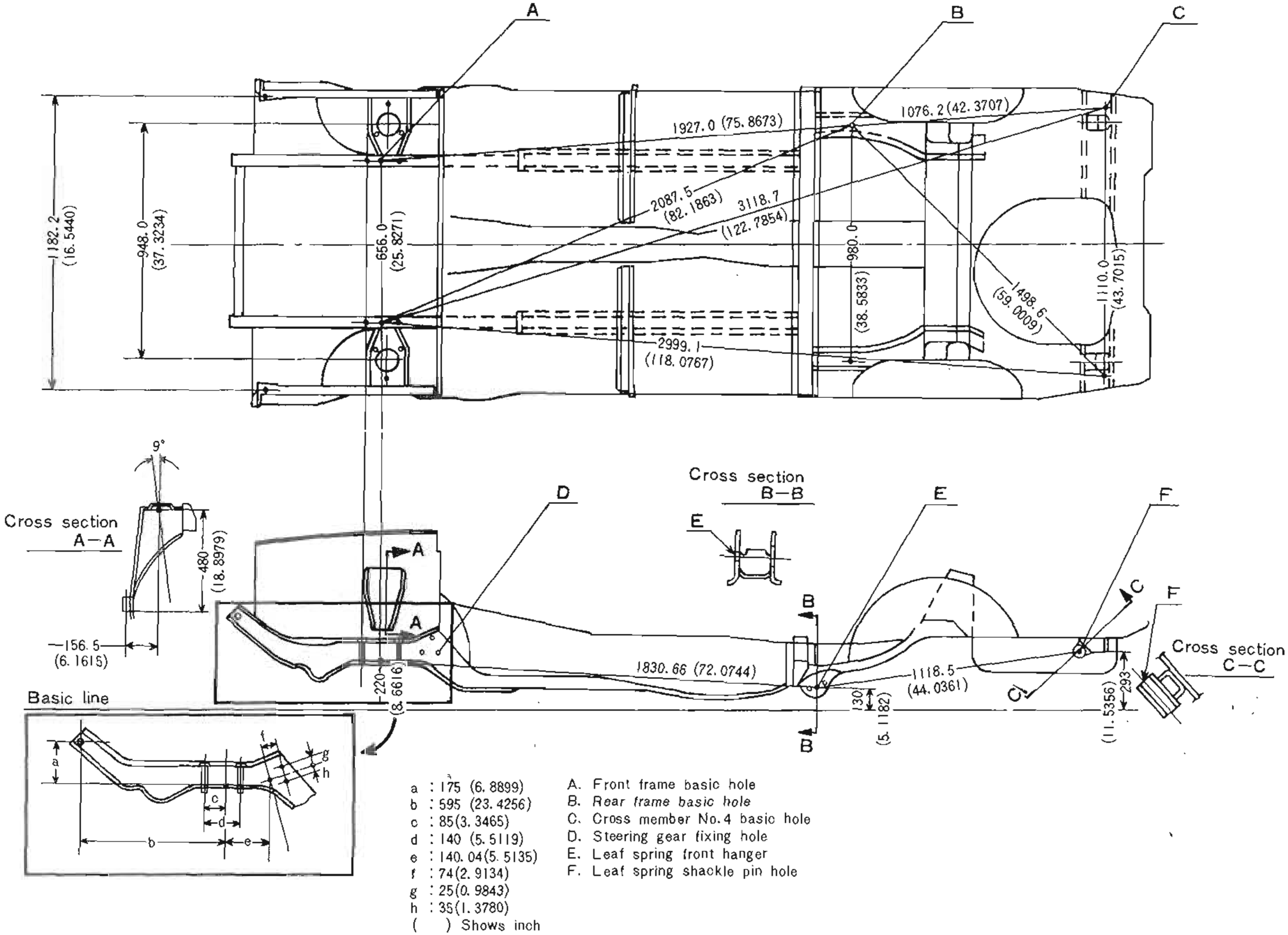
14A–H–4. Installing of Rear Seat Back

Follow the removal procedures in the reverse order.

BODY CHECKING DIMENSION



A
B
C
1900
(74.8043)
1106±1.5
(43.5440±0.0590)
245±1.0
(9.6458±0.0394)
225.04
(8.8600)
480±0.2
(18.8979±0.0079)
660±1.5
(25.9847±0.0590)
656±1.5
(25.8272±0.0590)
980±1.0
(38.5833)


A
B
C
1076.2 (42.3707)
1927.0 (75.8673)
2087.5 (82.1863)
3118.7 (122.7854)
1182.2 (16.5440)
948.0 (37.3234)
656.0 (25.8271)
980.0 (38.5833)
1498.6 (59.0009)
1110.0 (43.7015)
2999.1 (118.0767)
9°
Cross section A—A
480 (18.8979)
156.5 (6.1615)
D
Cross section B—B
E
F
A
A
B
B
C
C
F
Cross section C—C
1830.66 (72.0744)
1118.5 (44.0361)
220 (8.6616)
130 (5.1182)
293 (11.5356)
Basic line
a
b
c
d
e
f
g
h
a : 175 (6.8899)
b : 595 (23.4256)
c : 85 (3.3465)
d : 140 (5.5119)
e : 140.04 (5.5135)
f : 74 (2.9134)
g : 25 (0.9843)
h : 35 (1.3780)
( ) Shows inch
A. Front frame basic hole
B. Rear frame basic hole
C. Cross member No.4 basic hole
D. Steering gear fixing hole
E. Leaf spring front hanger
F. Leaf spring shackle pin hole

T

MAZDA 808
TECHNICAL DATA
(Chassis)

CLUTCH

	808 (1300cc)	808 (1600cc)
Type	Single dry plate, diaphragm spring	Single dry plate, diaphragm spring
Pressure plate:		
Inner diameter	125 mm (4.921 in)	126 mm (4.961 in)
Outer diameter	180 mm (7.087 in)	203 mm (7.992 in)
Permissible lateral run-out	0.05 mm (0.0020 in)	0.05 mm (0.0020 in)
Clutch disc:		
Facing:		
Inner diameter	125 mm (4.921 in)	130 mm (5.118 in)
Outer diameter	180 mm (7.087 in)	200 mm (7.874 in)
Thickness (Single plate)	3.2 mm (0.126 in)	3.5 mm (0.138 in)
Lateral run-out of clutch disc:		
Limit	1.0 mm (0.039 in)	1.0 mm (0.039 in)
Clutch release mechanism	Hydraulic or cable	Hydraulic
Release fork free play	2.5 ~ 3.5 mm (0.10 ~ 0.14 in)–Hydraulic 4.0 ~ 5.5 mm (0.16 ~ 0.22 in)–Cable	2.5 ~ 3.5 mm (0.10 ~ 0.14 in)
Clutch pedal free travel (Before push rod contacts with piston)	0.5 ~ 3.0 mm (0.02 ~ 0.12 in)	0.5 ~ 3.0 mm (0.02 ~ 0.12 in)
Master cylinder bore	15.87 mm (5/8")	15.87 mm (5/8")
Release cylinder bore	17.46 mm (11/16")	17.46 mm (11/16")
Clearance of piston and cylinder bore:		
New	0.032 ~ 0.102 mm (0.0013 ~ 0.0040 in)	0.032 ~ 0.102 mm (0.0013 ~ 0.0040 in)
Wear limit	0.15 mm (0.006 in)	0.15 mm (0.006 in)

TRANSMISSION

	808 (1300cc)	808 (1600cc)
Type	Four speed manual transmission or automatic transmission	Four speed manual transmission or automatic transmission
Gear ratio:		
First	3.337 2.458 (Automatic transmission)	3.403 2.458 (Automatic transmission)
Second	1.995 1.458 (Automatic transmission)	2.005 1.458 (Automatic transmission)
Third	1.301	1.373
Top	1.000 1.000 (Automatic transmission)	1.000 1.000 (Automatic transmission)
Reverse	3.337 2.181 (Automatic transmission)	3.665 2.181 (Automatic transmission)
Main shaft:		
Permissible run-out of main shaft	0.03 mm (0.0012 in)	0.03 mm (0.0012 in)
Clearance between main shaft and gear bush:		
New	0.03 ~ 0.08 mm (0.0012 ~ 0.0031 in)	0.03 ~ 0.08 mm (0.0012 ~ 0.0031 in)
Wear limit	0.15 mm (0.006 in)	0.15mm (0.006 in)
Spline-fit of main shaft and top-and-third clutch hub (Turning direction):		
New	0.007 ~ 0.072 mm (0.0003 ~ 0.0028 in)	0.06 ~ 0.13 mm (0.0024 ~ 0.0051 in)
Wear limit	0.30 mm (0.012 in)	0.30 mm (0.012 in)
Spline-fit of main shaft and first-and-second clutch hub (Turning direction):		
New	0.007 ~ 0.072 mm (0.0003 ~ 0.0028 in)	0.06 ~ 0.13 mm (0.0024 ~ 0.0051 in)
Wear limit	0.30 mm (0.012 in)	0.30 mm (0.012 in)
Counter shaft:		
Spline-fit of counter shaft and reverse gear (Turning direction):		
New	0 ~ 0.15 mm (0 ~ 0.0059 in)	0.05 ~ 0.13 mm (0.0020 ~ 0.0051 in)
Wear limit	0.30 mm (0.012 in)	0.30 mm (0.012 in)

	808 (1300cc)	808 (1600cc)
Reverse idle sliding gear:		
Clearance between reverse idle (sliding) gear bush and shaft:		
New	0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in)	0.04 ~ 0.09 mm (0.0016 ~ 0.0035 in)
Wear limit	0.15mm (0.006 in)	0.15 mm (0.006 in)
Shift fork:		
Clearance between shift fork and elutch sleeve	0.08 ~ 0.23 mm (0.003 ~ 0.009 in)	0.08 ~ 0.23 mm (0.003 ~ 0.009 in)
Clearance between shift fork and reverse idle (sliding) gear	0.07 ~ 0.20 mm (0.003 ~ 0.008 in)	0.07 ~ 0.20 mm (0.003 ~ 0.008 in)
Lubricant:		
Above −18°C (0°F)	EP. SAE 90	EP. SAE 90
Below −18°C (0°F)	EP. SAE 80	EP. SAE 80
Oil capacity	1.3 liters (1.4 U.S. quarts, 1.1 Imp. quarts)	1.5 liters (1.6 U.S. quarts, 1.3 Imp. quarts)

PROPELLER SHAFT

Length	1074 mm (42.28 in) 1045 mm (41.14 in) (Automatic transmission)	923 mm (36.34 in)
Outer diameter	65 mm (2.56 in)	65 mm (2.56 in)
Permissible run-out	0.4 mm (0.016 in)	0.4 mm (0.016 in)
Spline-fit of propeller shaft:		
New	0.06 ~ 0.16 mm (0.0024 ~ 0.0063 in)	0.06 ~ 0.16 mm (0.0024 ~ 0.0063 in)
Wear limit	0.30 mm (0.012 in)	0.30 mm (0.012 in)
Universal joint:		
Spider diameter:		
New	$14.72\,^{-0.010}_{-0.025}$ mm ($0.5795\,^{-0.0004}_{-0.0010}$ in)	$14.72\,^{-0.010}_{-0.025}$ mm ($0.5795\,^{-0.0004}_{-0.0010}$ in)
Wear limit	0.20 mm (0.008 in)	0.20 mm (0.008 in)

REAR AXLE

Type	Semi-floating, hypoid gears	Semi-floating, hypoid gears
Reduction ratio	4.111	3.700 4.111 (Automatic transmission)
Number of gear teeth	37 : 9	37 : 10 37 : 9 (Automatic transmission)
Backlash of ring gear and pinion	0.15 ~ 0.17 mm (0.0059 ~ 0.0067 in)	0.17 ~ 0.19 mm (0.0067 ~ 0.0075 in)
Mounting distance	78 ± 0.025 mm (3.0709 ± 0.0010 in)	90 ± 0.025 mm (3.5434 ± 0.0010 in)
Pinion bearing preload (Without pinion oil seal)	3 ~ 7 cm-kg (2.6 ~ 6.1 in-lb)	9 ~ 14 cm-kg (7.8 ~ 12.2 in-lb)
Backlash of side gear and pinion gear	0 ~ 0.1 mm (0 ~ 0.004 in)	0 ~ 0.1 mm (0 ~ 0.004 in)
Spline-fit of companion flange and pinion (Turning direction):		
New	−0.03 ~ 0.07 mm (−0.0012 ~ 0.0028 in)	−0.03 ~ 0.07 mm (−0.0012 ~ 0.0028 in)
Wear limit	0.30 mm (0.012 in)	0.30 mm (0.012 in)
Spline-fit of side gear and rear axle shaft:		
New	0.05 ~ 0.26 mm (0.0020 ~ 0.0102 in)	0.05 ~ 0.26 mm (0.0020 ~ 0.0102 in)
Wear limit	0.30 mm (0.012 in)	0.30 mm (0.012 in)
Clearance between rear axle shaft and thrust block	0 ~ 0.004 mm (0 ~ 0.1 in)	0 ~ 0.004 mm (0 ~ 0.1 in)
Lubricant:		
Above −18°C (0°F)	HP. SAE 90	HP. SAE 90
Below −18°C (0°F)	HP. SAE 80	HP. SAE 80
Oil capacity	1.0 liters (1.1 U.S. quarts, 0.9 Imp. quarts)	1.4 liters (1.5 U.S. quarts, 1.2 Imp. quarts)

STEERING		
	808 (1300cc)	808 (1600cc)
Type	Recirculating ball nut	Recirculating ball nut
Reduction ratio	17 ~ 19 : 1	17 ~ 19 : 1
Free play of steering wheel (Turning direction):		
New	'72, '73 : 10 ~ 30 mm (0.4 ~ 1.2 in) 10 ~ 20 mm (0.4 ~ 0.8 in) –Coupé '74 : 5 ~ 20 mm (0.2 ~ 0.8 in)	'72, '73 : 10 ~ 30 mm (0.4 ~ 1.2 in) 10 ~ 20 mm (0.4 ~ 0.8 in) – Coupé '74 : 5 ~ 20 mm (0.2 ~ 0.8 in)
Limit	'72, '73 : 50 mm (2.0 in) '74 : 30 mm (1.2 in)	'72, '73 : 50 mm (2.0 in) '74 : 30 mm (1.2 in)
Backlash between rack and sector gear	0.42 ~ 0 mm (0.017 ~ 0 in)	0.42 ~ 0 mm (0.017 ~ 0 in)
Worm bearing preload	1 ~ 4 cm-kg (0.9 ~ 3.5 in-lb)	1 ~ 4 cm-kg (0.9 ~ 3.5 in-lb)
Clearance between sector shaft and gear housing:		
New	0.027 ~ 0.069 mm (0.0011 ~ 0.0027 in)	0.027 ~ 0.069 mm (0.0011 ~ 0.0027 in)
Wear limit	0.20 mm (0.008 in)	0.20 mm (0.008 in)
End clearance of sector fhaft	'72 : 0.02 ~ 0.08 mm (0.001 ~ 0.003 in) '73, '74 : 0 ~ 0.1 mm (0 ~ 0.004 in)	'72 : 0.02 ~ 0.08 mm (0.001 ~ 0.003 in) '73, '74 : 0 ~ 0.1 mm (0 ~ 0.004 in)
Lubricant	EP. SAE 90	EP. SAE 90
End play of center link and tie-rod ball stud:		
New	0 ~ 0.20 mm (0 ~ 0.008 in)	0 ~ 0.20 mm (0 ~ 0.008 in)
Wear limit	0.50 mm (0.020 in)	0.50 mm (0.020 in)
Steering geometry:		
King pin inclination	'72, '73 : 8° 25' – Sedan, Coupé 8° 30' – Wagon '74 : 8° 20'	'72, '73 : 8° 50' – Sedan, Coupé 8° 40' – Wagon '74 : 8° 45' – Sedan, Coupé 8° 20 – Wagon
Camber	'72, '73 : 1° 05' ± 1° – Sedan, Coupé 1° 00' ± 1° – Wagon '74 : 1° 10' ± 1°	'72, '73 : 0° 40' ± 1° – Sedan, Coupé 0° 50' ± 1° – Wagon '74 : 0° 45' ± 1° – Sedan, Coupé 1° 10' ± 1°— Wagon
Maximum permissible difference in camber between sides	30'	30'
Camber offset	42.2 mm (1.66 in)	42.2 mm (1.66 in)
Caster	'72, '73 : 1° 31' ± 45' – Sedan, Coupé 1° 09' ± 45' – Wagon '74 : 2° 05' ± 45' – Sedan, Coupé 1° 45' ± 45' – Wagon	'72, '73 : 1° 15' ± 45' – Sedan, Coupé 1° 00' ± 45' – Wagon '74 : 1° 20' ± 45' – Sedan, Coupé 1° 45' ± 45' – Wagon
Maximum permissible difference in caster between sides	40'	40'
Toe-in	0 ~ 6 mm (0 ~ 0.24 in)	0 ~ 6 mm (0 ~ 0.24 in)
BRAKES		
Brake pedal free travel	0.5 ~ 3.0 mm (0.02 ~ 0.12 in) *(Before push rod contacts with piston)*	7 ~ 9 mm (0.28 ~ 0.35 in) *(Before power brake piston operates)*
Master cylinder:		
Type	Tandem	Tandem
Bore	19.05 mm (3/4")	'72 : 19.05 mm (3/4") '73 : 22.22 mm (7/8") '74 : 20.64 mm (13/16")
Clearance between piston and bore:		
New	0.020 ~ 0.105 mm (0.0008 ~ 0.0041 in)	0.040 ~ 0.125 mm (0.0016 ~ 0.0049 in)
Wear limit	0.15 mm (0.006 in)	0.15 mm (0.006 in)
Front brake:		
Type	Disc	Disc
Rotor (Brake disc) outer diameter	230 mm (9.055 in)	230 mm (9.055 in)

	808 (1300cc)	808 (1600cc)
Thickness of rotor:		
New	11 mm (0.4331 in)	11 mm (0.4331 in)
Limit	10 mm (0.3937 in)	10 mm (0.3937 in)
Lateral run-out of rotor	Less than 0.1 mm (Less than 0.0039 in)	Less than 0.1 mm (Less than 0.0039 in)
Thickness of lining and shoe:		
New	14.2 mm (0.559 in)	14.2 mm (0.559 in)
Limit	6.5 mm (0.256 in)	6.5 mm (0.256 in)
Rear brake:		
Type	Drum, leading and trailing	Drum, leading and trailing
Drum diameter		
New	200 mm (7.8741 in) – General 228.6 mm (9.000 in) – ECE	200 mm (7.8741 in) – General 228.6 mm (9.000 in) – ECE
Regrinding limit	1.0 mm (0.0394 in)	1.0 mm (0.0394 in)
Wheel cylinder bore	17.46 mm (11/16")	17.46 mm (11/16")
Clearance between piston and bore:		
New	0.032 ~ 0.102 mm (0.0013 ~ 0.0040 in)	0.032 ~ 0.102 mm (0.0013 ~ 0.0040 in)
Wear limit	0.15 mm (0.006 in)	0.15 mm (0.006 in)
Parking brake:		
Type	Mechanical	Mechanical
Operates at	Rear wheels	Rear wheels
WHEELS AND TIRES		
Wheel disc:		
Front	4½J x 13 WDC	4½J x 13 WDC
Rear	4½J x 13 WDC	4½J x 13 WDC
Tire:		
Front	*6.15S–13–4PR* 155SR13	*6.15S–13–4PR* 155SR13
Rear	6.15S–13–4PR 155SR13	6.15S–13–4PR 155SR13
Inflation pressure:		West Germany – Sedan, Coupé
Front More than 100 km/h (60 mile/h)	2.0 kg/cm² (28 lb/in²)	Front: 2.0 kg/cm²
Front Less than 100 km/h (60 mile/h)	2.0 kg/cm² (28 lb/in²)	Rear: 2.0 kg/cm²
Rear More than 100 km/h (60 mile/h)	2.0 kg/cm² (28 lb/in²)	
Rear Less than 100 km/h (60 mile/h)	2.0 kg/cm² (28 lb/in²)	

General:

	Light load		Heavy load	
	Front	Rear	Front	Rear
808 (1300cc) 808 (1600cc) Wagon	1.8 kg/cm² (26 lb/in²)	1.8 kg/cm² (26 lb/in²)	1.8 kg/cm² (26 lb/in²)	2.1 kg/cm² (30 lb/in²)

Austria:

	Curb weight		Max. load and Max. speed	
	Front	Rear	Front	Rear
808 (1300) Sedan, Coupé	2.0 kg/cm²	2.0 kg/cm²	2.0 kg/cm²	2.0 kg/cm²
808 Wagon (1300, 1600)	1.8 kg/cm²	1.8 kg/cm²	1.8 kg/cm²	2.2 kg/cm²

	808 (1300cc)	808 (1600cc)

France:

	Fully loaded		High speed running	
	Front	Rear	Front	Rear
808 (1300) Sedan, Coupé	2.0 kg/cm2	2.0 kg/cm2	2.0 kg/cm2	2.0 kg/cm2
808 (1300) Wagon	1.8 kg/cm2	2.1 kg/cm2	1.8 kg/cm2	2.1 kg/cm2

Australia:

	Up to 2 persons		Full load	
	Front	Rear	Front	Rear
808 (1300) Sedan, Coupé, Wagon	1.8 kg/cm2 (26 lb/in2)	1.8 kg/cm2 (26 lb/in2)	1.8 kg/cm2 (26 lb/in2)	2.0 kg/cm2 (28 lb/in2)

FRONT SUSPENSION (SEDAN)

	808 (1300cc)	808 (1600cc)
Type	Strut	Strut
Coil spring:		
Spring constant	1.55 kg/mm (87 lb/in)	1.85 kg/mm (104 lb/in)
Wire diameter	10.8 mm (0.43 in)	11 mm (0.43 in)
Coil diameter	110 mm (4.33 in)	110 mm (4.33 in)
Free length	356 mm (14.02 in)	338.5 mm (13.33 in)
Fitting length	204.5 mm (8.05 in)	204.5 mm (8.05 in)
Stabilizer:		
Diameter	20 ± 0.3 mm (0.787 ± 0.012 in)	20 ± 0.3 mm (0.787 ± 0.012 in)
Shock absorber	Hydraulic double action	Hydraulic double action

FRONT SUSPENSION (COUPÉ, WAGON)

	808 (1300cc)	808 (1600cc)
Type	Strut	Strut
Coil spring:		
Spring constant	1.85 kg/mm (104 lb/in)	1.85 kg/mm (104 lb/in)
Wire diameter	11 mm (0.43 in)	11 mm (0.43 in)
Coil diameter	110 mm (4.33 in)	110 mm (4.33 in)
Free length	338.5 mm (13.33 in)	338.5 mm (13.33 in)
Fitting length	204.5 mm (8.05 in)	204.5 mm (8.05 in)
Stabilizer:		
Diameter	20 ± 0.3 mm (0.787 ± 0.012 in)	20 ± 0.3 mm (0.787 ± 0.012 in)
Shock absorber	Hydraulic double action	Hydraulic double action

REAR SUSPENSION (SEDAN)

	808 (1300cc)	808 (1600cc)
Type	Leaf spring	Leaf spring
Leaf spring:		
Spring constant	1.75 kg/mm (95 lb/in)	2.0 kg/mm (112 lb/in)
Number of leaves	4	4
Length	1150 mm (45.28 in)	1150 mm (45.28 in)
Width	50 mm (1.97 in)	50 mm (1.97 in)

REAR SUSPENSION (COUPÉ, WAGON)

	808 (1300cc)	808 (1600cc)
Type	Leaf spring	Leaf spring
Leaf spring:		
Spring constant	2.0 kg/mm (112 lb/in)	2.0 kg/mm (112 lb/in)
Number of leaves	4	4
Length	1150 mm (45.28 in) 1100 mm (43.31 in) – Wagon	1150 mm (45.28 in) 1100 mm (43.31 in) – Wagon
Width	50 mm (1.97 in)	50 mm (1.97 in)

WEIGHTS AND DIMENSIONS (SEDAN)

	808 (1300cc)	808 (1600cc)
Overall length	3970 mm (156 in) 4075 mm (160 in) – for Sweden	3970 mm (156 in)
Overall width	1595 mm (63 in)	1595 mm (63 in)
Overall height	1380 mm (54 in)	1350 mm (53 in)
Wheel base	2310 mm (91 in)	2310 mm (91 in)
Tread:		
Front	1295 mm (51 in)	1300 mm (51 in)
Rear	1290 mm (51 in)	1290 mm (51 in)
Minimum road clearance	170 mm (7 in)	150 mm (6 in)

WEIGHTS AND DIMENSIONS (COUPÉ)

Overall length	3970 mm (156 in) 4075 mm (160 in) – for Sweden	4065 mm (160 in)
Overall width	1595 mm (63 in)	1595 mm (63 in)
Overall height	1355 mm (53 in)	1350 mm (53 in)
Wheel base	2310 mm (91 in)	2310 mm (91 in)
Tread:		
Front	1295 mm (51 in)	1295 mm (51 in)
Rear	1290 mm (51 in)	1290 mm (51 in)
Minimum road clearance	170 mm (7 in)	165 mm (6 in)

WEIGHTS AND DIMENSIONS (WAGON)

Overall length	3995 mm (157 in) 4095 mm (161 in) – for Sweden	3995 mm (157 in) 4095 mm (161 in) – for Sweden
Overall width	1595 mm (63 in)	1595 mm (63 in)
Overall height	1405 mm (55 in)	1405 mm (55 in)
Wheel base	2310 mm (91 in)	2310 mm (91 in)
Tread:		
Front	1295 mm (51 in)	1295 mm (51 in)
Rear	1290 mm (51 in)	1290 mm (51 in)
Minimum road clearance	165 mm (6 in)	165 mm (6 in)

TIGHTENING TORQUE

	m-kg	ft-lb	m-kg	ft-lb
ENGINE:				
Main bearing cap	6.0 ~ 6.5	43 ~ 47	8.4 ~ 9.0	61 ~ 65
Connecting rod cap	4.0 ~ 4.5	29 ~ 33	5.0 ~ 5.5	36 ~ 40
Oil pump	0.8	6	2.0	15.0
Oil pump sprocket	3.0 ~ 3.5	22 ~ 25	3.0 ~ 3.5	22 ~ 25
Oil pan	0.65 ~ 0.95	5 ~ 7	0.65 ~ 0.95	5 ~ 7
Cylinder head				
Cold engine	6.5 ~ 7.0	47 ~ 51	7.7 ~ 8.3	56 ~ 60
Warm engine	7.0 ~ 7.5	51 ~ 54	9.5 ~ 10.0	69 ~ 72
Camshaft sprocket	—	—	7.0 ~ 8.0	51 ~ 58
Distributor drive gear	7.0 ~ 8.0	51 ~ 58	7.0 ~ 8.0	51 ~ 58
Crankshaft pulley	11.0 ~ 12.0	80 ~ 87	14.0 ~ 15.0	101 ~ 108
Inlet manifold	1.9 ~ 2.6	14 ~ 19	1.9 ~ 2.6	14 ~ 19
Exhaust manifold	1.6 ~ 2.3	12 ~ 17	1.6 ~ 2.3	12 ~ 17
Spark plugs	1.5 ~ 2.1	11 ~ 15	1.5 ~ 2.1	11 ~ 15
Rocker arm cover	0.25 ~ 0.35	1.8 ~ 2.5	0.15 ~ 0.20	1.1 ~ 1.4
Oil pressure switch	1.2 1.8	9 ~ 13	1.2 ~ 1.8	9 ~ 13
CLUTCH:				
Flywheel	8.3 ~ 9.0	60 ~ 65	15.5 ~ 16.3	112 ~ 118
Clutch cover	1.8 ~ 2.7	13 ~ 20	1.8 ~ 2.7	13 ~ 20

	808 (1300cc)		808 (1600cc)	
	m-kg	ft-lb	m-kg	ft-lb
TRANSMISSION				
Main shaft lock nut	16 ~ 24	116 ~ 174	16 ~ 24	116 ~ 174
Shift lock spring caps	1.0 ~ 1.5	7 ~ 11	1.0 ~ 1.5	7 ~ 11
Reverse lock spring cap	4.5 ~ 5.5	33 ~ 40	4.5 ~ 5.5	33 ~ 40
Shift fork set bolts	0.9 ~ 1.3	7 ~ 9	0.9 ~ 1.3	7 ~ 9
PROPELLER SHAFT:				
Yoke to rear axle	3.5 ~ 3.8	25 ~ 27	3.5 ~ 3.8	25 ~ 27
REAR AXLE:				
Ring gear	5.5 ~ 6.5	40 ~ 47	5.5 ~ 6.5	40 ~ 47
Differential side bearing caps	3.2 ~ 4.7	23 ~ 34	3.2 ~ 4.7	23 ~ 34
Companion flange	10 ~20	72 ~ 145	10 ~ 20	72 ~ 145
STEERING:				
Steering gear housing	4.4 ~ 5.5	32 ~ 40	4.4 ~ 5.5	32 ~ 40
Steering wheel	3.0 ~ 4.0	22 ~ 29	3.0 ~ 4.0	22 ~ 29
Pitman arm	14 ~ 17	101 ~ 123	14 ~ 17	101 ~ 123
Idler arm bracket	4.4 ~ 5.5	32 ~ 40	4.4 ~ 5.5	32 ~ 40
Ball studs of tie-rods and center link	2.5 ~ 3.5	18 ~ 25	2.5 ~ 3.5	18 ~ 25
Tie-rod lock nut	7.0 ~ 8.0	51 ~ 58	7.0 ~ 8.0	51 ~ 58
Idler arm to center link	2.5 ~ 3.5	18 ~ 25	2.5 ~ 3.5	18 ~ 25
WHEELS:				
Wheel bolts	9 ~ 10	65 ~ 72	9 ~ 10	65 ~ 72
SUSPENSION:				
Suspension arm to cross member	4.0 ~ 5.5	29 ~ 40	4.0 ~ 5.5	29 ~ 40
Suspension ball joint to knuckle arm	6.0 ~ 7.0	43 ~ 51	6.0 ~ 7.0	43 ~ 51
Front shock absorber				
Piston nut	1.35 ~ 1.65	9.02 ~ 12.9	1.35 ~ 1.65	9.02 ~ 12.9
Base valve	0.15	1.0	0.15	1.0
Cap nut	5.0 ~ 6.0	36.2 ~ 43.4	5.0 ~ 6.0	36.2 ~ 43.4
Absorber support to body	6.5	47	6.5	47
"U" bolts	3.8 ~ 4.6	27 ~ 33	3.8 ~ 4.6	27 ~ 33
Spring pin	1.6 ~ 2.3	12 ~ 17	1.6 ~ 2.3	12 ~ 17
Shackle pin	1.5 ~ 2.3	11 ~ 17	1.5 ~ 2.3	11 ~ 17
UNLESS OTHERWISE SPECIFIED:	(6T)		(8T)	
6 mm bolt/nut	0.7 ~ 1.0	5 ~ 7	0.8 ~ 1.2	6 ~ 9
8 mm bolt/nut	1.6 ~ 2.3	12 ~ 17	1.8 ~ 2.7	13 ~ 20
10 mm bolt/nut	3.2 ~ 4.7	23 ~ 34	3.7 ~ 5.5	27 ~ 40
12 mm bolt/nut	5.6 ~ 8.2	41 ~ 59	6.4 ~ 9.5	46 ~ 69
14 mm bolt/nut	7.7 ~ 10.5	56 ~ 76	10.4 ~ 14.0	75 ~ 101

MAZDA RX-3
TECHNICAL DATA
(Chassis)

CLUTCH

	General spec. models	Models with emission control system
Type	Single dry plate, diaphragm spring	Single dry plate, diaphragm spring
Pressure plate:		
Inner diameter	126 mm (4.961 in)	147 mm (5.787 in)
Outer diameter	202 mm (7.953 in)	217 mm (8.543 in)
Permissible lateral run-out	0.05 mm (0.0020 in)	0.05 mm (0.0020 in)
Clutch disc:		
Facing		
Inner diameter	130 mm (5.118 in)	150 mm (5.906 in)
Outer diameter	200 mm (7.874 in)	215 mm (8.465 in)
Thickness (Single plate)	3.5 mm (0.138 in)	3.5 mm (0.138 in)
Lateral run-out of clutch disc		
Limit	1.0 mm (0.039 in)	1.0 mm (0.039 in)
Clutch release mechanism	Hydraulic	Hydraulic
Release fork free play	3.0 ~ 4.0 mm (0.12 ~ 0.16 in)	3.0 ~ 4.0 mm (0.12 ~ 0.16 in)
Clutch pedal free travel (Before push rod contacts with piston)	0.5 ~ 3.0 mm (0.02 ~ 0.12 in)	0.5 ~ 3.0 mm (0.02 ~ 0.12 in)
Master cylinder bore	15.87 mm (5/8″)	15.87 mm (5/8″)
Release cylinder bore	'72, '73 – 17.46 mm (11/16″) '74 – 19.05 mm (3/4″)	'72, '73 – 17.46 mm (11/16″) '74 – 19.05 mm (3/4″)
Clearance of piston & cylinder bore		
Wear limit	0.15 mm (0.006 in)	0.15 mm (0.006 in)

TRANSMISSION

	General spec. models	Models with emission control system
Type	Four speed manual transmission or automatic transmission	Four speed manual transmission or automatic transmission
Gear ratio:		
First	'72, '73 – 3.737 '74 – 3.683 2.458 (Automatic transmission)	3.683 2.458 (Automatic transmission)
Second	'72, '73 – 2.202 '74 – 2.263 1.458 (Automatic transmission)	2.263 1.458 (Automatic transmission)
Third	'72, '73 – 1.435 '74 – 1.397 ——	1.397 ——
Top	1.000 1.000 (Automatic transmission)	1.000 1.000 (Automatic transmission)
Reverse	'72, '73 – 4.024 '74 – 3.692 2.181 (Automatic transmission)	3.692 2.181 (Automatic transmission)
Main shaft:		
Permissible run-out of main shaft	0.03 mm (0.0012 in)	0.03 mm (0.0012 in)
Clearance between main shaft and gear bush		
Wear limit	0.15 mm (0.006 in)	0.15 mm (0.006 in)
Spline-fit of main shaft and top-and-third clutch hub (Turning direction)		
New	0.05 ~ 0.15 mm (0.0020 ~ 0.0059 in)	0.05 ~ 0.15 mm (0.0020 ~ 0.0059 in)
Wear limit	0.30 mm (0.012 in)	0.30 mm (0.012 in)
Spline-fit of main shaft and first-and-second clutch hub (Turning direction)		
New	0.03 ~ 0.11 mm (0.0012 ~ 0.0043 in)	0.03 ~ 0.11 mm (0.0012 ~ 0.0043 in)
Wear limit	0.30 mm (0.012 in)	0.30 mm (0.012 in)
Counter shaft:		
Spline-fit of counter shaft and reverse gear (Turning direction)		
New	0.01 ~ 0.09 mm (0.0004 ~ 0.0035 in)	0.01 ~ 0.09 mm (0.0004 ~ 0.0035 in)
Wear limit	0.30 mm (0.012 in)	0.30 mm (0.012 in)

	General spec. models	Models with emission control system
Reverse idle gear:		
Clearance between reverse idle gear bush and shaft		
New	0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in)	0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in)
Wear limit	0.15 mm (0.006 in)	0.15 mm (0.006 in)
Shift fork:		
Clearance between shift fork and clutch sleeve	0.08 ~ 0.23 mm (0.003 ~ 0.009 in)	0.08 ~ 0.23 mm (0.003 ~ 0.009 in)
Clearance between shift fork and reverse idle gear	0.07 ~ 0.20 mm (0.003 ~ 0.008 in)	0.07 ~ 0.20 mm (0.003 ~ 0.008 in)
Lubricant:		
Above −18°C (0°F)	EP. SAE 90	EP. SAE 90
Below −18°C (0°F)	EP. SAE 80	EP. SAE 80
Oil capacity	'73 : 1.4 liters (1.5 U.S. quarts / 1.2 Imp. quarts) '74 : 1.7 liters (1.8 U.S. quarts / 1.5 Imp. quarts)	'73 : 1.5 liters (1.6 U.S. quarts / 1.3 Imp. quarts) '74 : 1.7 liters (1.8 U.S. quarts / 1.5 Imp. quarts)
PROPELLER SHAFT		
Length	1026 mm (40.39 in) 1059 mm (41.69 in) (Automatic transmission)	1026 mm (40.39 in) 1059 mm (41.69 in) (Automatic transmission)
Outer diameter	65 mm (2.56 in)	65 mm (2.56 in)
Permissible run-out	0.4 mm (0.016 in)	0.4 mm (0.016 in)
Universal joint:		
Spider diameter		
New	$14.72^{-0.010}_{-0.025}$ mm ($0.5795^{-0.0004}_{-0.0010}$ in)	$14.72^{-0.010}_{-0.025}$ mm ($0.5795^{-0.0004}_{-0.0010}$ in)
Wear limit	0.20 mm (0.008 in)	0.02 mm (0.008 in)
REAR AXLE		
Type	Semi-floating, hypoid gears	Semi-floating hypoid gears
Reduction ratio	3.700	3.700
Number of gear teeth	37 : 10	37 : 10
Backlash of ring gear and pinion	0.17 ~ 0.19 mm (0.0067 ~ 0.0075 in)	0.17 ~ 0.19 mm (0.0067 ~ 0.0075 in)
Mounting distance	90 ± 0.025 mm (3.5435 ± 0.0010 in)	90 ± 0.025 mm (3.5435 ± 0.0010 in)
Pinion bearing preload (Without pinion oil seal)	9 ~ 14 cm-kg (7.8 ~ 12.2 in-lb)	9 ~ 14 cm-kg (7.8 ~ 12.2 in-lb)
Backlash of side gear and pinion gear	0 ~ 0.1 mm (0 ~ 0.004 in)	0 ~ 0.1 mm (0 ~ 0.004 in)
Lubricant:		
Above −18°C (0°F)	HP. SAE 90	HP. SAE 90
Below −18°C (0°F)	HP. SAE 80	HP. SAE 80
Oil capacity	1.4 liters (1.5 U.S. quarts / 1.2 Imp. quarts)	1.4 liters (1.5 U.S. quarts / 1.2 Imp. quarts)
STEERING		
Type	Recirculating ball nut	Recirculating ball nut
Reduction ratio	17 ~ 19 : 1	17 ~ 19 : 1
Maximum wheel angle on full lock:		
Wheel on inside of curve	40° 10′	40° 10′
Wheel on outside of curve	34° 07′	34° 07′
Free play of steering wheel: (Turning direction)		
New	5 ~ 20 mm (0.2 ~ 0.8 in)	5 ~ 20 mm (0.2 ~ 0.8 in)
Wear limit	30 mm (1.2 in)	30 mm (1.2 in)
Backlash between rack and sector gear	0	0
Worm bearing preload	1 ~ 4 cm-kg (0.9 ~ 3.5 in-lb)	1 ~ 4 cm-kg (0.9 ~ 3.5 in-lb)

	General spec. models	Models with emission control system
Clearance between sector shaft and housing:		
New	0.027 ~ 0.069 mm (0.0011 ~ 0.0027 in)	0.027 ~ 0.069 mm (0.0011 ~ 0.0027 in)
Wear limit	0.20 mm (0.008 in)	0.20 mm (0.008 in)
End clearance of sector shaft	0 ~ 0.1 mm (0 ~ 0.004 in)	0 ~ 0.1 mm (0 ~ 0.004 in)
Lubricant	EP. SAE 90	EP. SAE 90
End play of center link and tie-rod ball stud:		
New	0 ~ 0.25 mm (0 ~ 0.010 in)	0 ~ 0.25 mm (0 ~ 0.010 in)
Wear limit	1.0 mm (0.039 in)	1.0 mm (0.039 in)
Steering geometry:		
King pin inclination	'72, '73 : 8° 50′ '74 : 8° 45′	'72, '73 : 8° 35′–Sedan, Coupé 8° 30′ – Wagon '74 : 8° 45′
Camber	'72, '73 : 0° 40′ ± 1° '74 : 0° 45′ ± 1°	'72, '73 : 0° 55′ ± 1° – Sedan, Coupé 1° 00′ ± 1° – Wagon '74 : 0° 45′ ± 1°
Maximum permissible difference in camber between sides	30′	30′
Caster	'72, '73 : 1° 15′ ± 45′ – Sedan, Coupé 0° 55′ ± 45′ – Wagon '74 : 1° 20′ ± 45′ – Sedan, Coupé 1° 25′ ± 45′ – Wagon	'72, '73 : 1° 30′ ± 45′ – Sedan, Coupé 1° 10′ ± 45′ – Wagon '74 : 1° 45′ ± 45′ – Sedan, Coupé 1° 25′ ± 45′ – Wagon
Maximum permissible difference in caster between sides	40′	40′
Caster trail	'72 : 5.1 mm (0.20 in) '73 : 5.0 mm (0.20 in) – Sedan, Coupé 4.0 mm (0.16 in) – Wagon '74 : 6.0 mm (0.24 in)	'72, '73 : 6.0 mm (0.24 in) – Sedan, Coupé 5.0 mm (0.20 in) – Wagon '74 : 8.0 mm (0.31 in) – Sedan, Coupé 6.0 mm (0.24 in) – Wagon
Toe-in	0 ~ 6 mm (0 ~ 0.24 in)	0 ~ 6 mm (0 ~ 0.24 in)
Brake pedal free travel (Before power piston operates)	7 ~ 9 mm (0.28 ~ 0.35 in)	7 ~ 9 mm (0.28 ~ 0.35 in)
Master cylinder:		
Type	Tandem	Tandem
Bore	'73 : 22.22 mm (7/8") '74 : 20.64 mm (13/16")	'73 : 22.22 mm (7/8") '74 : 20.64 mm (13/16")
Clearance between piston and bore		
New	0.040 ~ 0.125 mm (0.0016 ~ 0.0049 in)	0.040 ~ 0.125 mm (0.0016 ~ 0.0049 in)
Wear limit	0.15 mm (0.006 in)	0.15 mm (0.006 in)
Front brake:		
Type	Disc	Disc
Rotor (Brake disc) outer diameter	230 mm (9.055 in)	230 mm (9.055 in)
Thickness of rotor		
New	11 mm (0.4331 in)	11 mm (0.4331 in)
Limit	10 mm (0.3937 in)	10 mm (0.3937 in)
Lateral run-out of rotor	Less than 0.1 mm (Less than 0.0039 in)	Less than 0.1 mm (Less than 0.0039 in)
Thickness of lining and shoe		
New	14.2 mm (0.559 in)	14.2 mm (0.559 in)
Limit	6.5 mm (0.256 in)	6.5 mm (0.256 in)
Rear brake:		
Type	Drum, leading and trailing	Drum, leading and trailing
Drum diameter		
New	200 mm (7.8741 in)	200 mm (7.8741 in) – General 228.6 mm (9.000 in) – ECE
Regrinding limit	1.0 mm (0.0394 in)	1.0 mm (0.0394 in)
Wheel cylinder bore	19.05 mm (3/4")	17.46 or 15.87 mm (11/16" or 5/8")
Clearance between piston and bore		
New	0.040 ~ 0.125 mm (0.0016 ~ 0.0049 in)	0.032 ~ 0.102 mm (0.0013 ~ 0.0040 in)
Wear limit	0.15 mm (0.006 in)	0.15 mm (0.006 in)

	General spec. models	Models with emission control system
Parking brake: Type Operates at	 Mechanical Rear wheels	 Mechanical Rear wheels
WHEELS AND TIRES		
Wheel disc: Front Rear Tire: Front Rear	 4½J x 13 WDC 4½J x 13 WDC 155SR−13 or 155HR−13 155SR−13 or 155HR−13	 4½J x 13 WDC 4½J x 13 WDC 155SR−13 or 155HR−13 155SR−13 or 155HR−13
Inflation pressure:	See tables below	

General:

	Front	Rear
Sedan Coupé Wagon	2.0 kg/cm² (28 lb/in²)	2.0 kg/cm² (28 lb/in²)

West Germany:

	Front	Rear
Coupé	2.0 kg/cm²	2.0 kg/cm²

Austria:

	Curb weight		Max. load and Max. speed	
	Front	Rear	Front	Rear
Sedan Coupé	2.0 kg/cm²	2.0 kg/cm²	2.0 kg/cm²	2.0 kg/cm²

France:

	Fully loaded		High speed running	
	Front	Rear	Front	Rear
Sedan Coupé	2.0 kg/cm²	2.0 kg/cm²	2.0 kg/cm²	2.0 kg/cm²

Australia:

	Front	Rear
Sedan Coupé	26 lb/in²	26 lb/in²

	General spec. models	Models with emission control system
FRONT SUSEPNSION		
Type	Strut	Strut
Coil spring: Spring constant	 1.85 kg/mm (104 lb/in)	 '72 : 1.85 kg/mm (104 lb/in) '73 : 2.0 kg/mm (112 lb/in) '74 : 2.1 kg/mm (118 lb/in)
Wire diameter	11 mm (0.43 in)	'72 : 11.0 mm (0.43 in) '73 : 11.5 mm (0.45 in) '74 : 12.3 mm (0.48 in)
Coil diameter	110 mm (4.33 in)	'72, '73 : 110 mm (4.33 in) '74 : 109 ~ 120 mm (4.29 ~ 4.72 in)
Free length	338.5 mm (13.33 in)	'72 : 338.5 mm (13.33 in) '73 : 354.5 mm (13.96 in) '74 : 355.5 mm (13.98 in)
Fitting length	204.5 mm (8.05 in)	204.5 mm (8.05 in)
Fitting load	235 ~ 256 kg (518 ~ 564 lb)	'72 : 235 ~ 256 kg (518 ~ 564 lb) '73 : 276 ~ 300 kg (608 ~ 661 lb) '74 : 292.5 ~ 317.5 kg (644 ~ 699 lb)
Stabilizer: Diameter	 20 ± 0.3mm (0.787 ± 0.012 in)	 20 ± 0.3 mm (0.787 ± 0.012 in)
Shoek absorber	Hydraulic double action	Hydraulic double action

REAR SUSPENSION

	General spec. models	Models with emission control system
Type	Leaf spring	Leaf spring
Leaf spring:		
Spring constant	2.0 kg/mm (112 lb/in)	2.0 kg/mm (112 lb/in)
Number of leaves	4	4
Length (Sedan, Coupé)	1150 mm (45.28 in)	1150 mm (45.28 in)
(Rotary Wagon)	1100 mm (43.31 in)	1100 mm (43.31 in)
Shock absorber	Gas sealed type	Gas sealed type

WEIGHTS AND DIMENSIONS

	Sedan	Coupé	Rotary Wagon
Overall length	'72, '73 : 4065 mm (160 in) '74 : 4075 mm (160 in)	'72, '73 : 4065 mm (160 in) '74 : 4075 mm (160 in)	'72, '73 : 4085 mm (161 in) '74 : 4095 mm (161 in)
Overall width	1595 mm (63 in)	1595 mm (63 in)	1595 mm (63 in)
Overall height	'72 : 1370 mm (54 in) '73 : 1375 mm (54 in) '74 : 1380 mm (54 in)	'72, '73 : 1350 mm (53 in) '74 : 1355 mm (53 in)	'72 : 1385 mm (55 in) '73 : 1405 mm (55 in) '74 : 1400 mm (55 in)
Wheel base	2310 mm (91 in)	2310 mm (91 in)	2310 mm (91 in)
Tread:			
Front	1300 mm (51 in)	1300 mm (51 in)	1300 mm (51 in)
Rear	1290 mm (51 in)	1290 mm (51 in)	1290 mm (51 in)
Minimum road clearance	'72: 155 mm (6 in) '73 : 165 mm (6 in) '74 : 165 mm (6 in) – Without ECS 160 mm (6 in) – With ECS	'72 : 155 mm (6 in) '73 : 165 mm (6 in) '74 : 165 mm (6 in) – Without ECS 160 mm (6 in) – With ECS	'72 : 155 mm (6 in) '73 : 165 mm (6 in) '74 : 165 mm (6 in) – Without ECS 160 mm (6 in) – With ECS

TIGHTENING TORQUE

	m-kg	ft-lb
CLUTCH:		
Flywheel nut	40 ~ 50	289 ~ 362
Clutch cover	1.8 ~ 2.7	13 ~ 20
TRANSMISSION:		
Shift lock spring caps	4.5 ~ 5.5	33 ~ 40
Reverse lock spring cap	4.5 ~ 5.5	33 ~ 40
Reverse idle shaft set bolt	1.0	7
Control lever end	2.5	20
Shift fork set bolts	0.9 ~ 1.3	7 ~ 9
PROPELLER SHAFT:		
Yoke to rear axle	3.5 ~ 3.8	25 ~ 27
REAR AXLE:		
Ring gear	5.5 ~ 6.5	40 ~ 47
Differential side bearing caps	3.2 ~ 4.7	23 ~ 34
Companion flange	10 ~ 20	72 ~ 145
Rear axle to housing	2.0	14.5
STEERING:		
Steering gear housing	4.4 ~ 5.5	32 ~ 40
Steering wheel	3.0 ~ 4.0	22 ~ 29
Pitman arm	14 ~ 17	101 ~ 123
Idler arm spindle	4.4 ~ 5.5	32 ~ 40
Idler arm bracket	4.4 ~ 5.5	32 ~ 40
Ball studs of tie-rods and center link	2.5 ~ 3.5	18 ~ 25
Tie-rod lock nut	7.0 ~ 8.0	51 ~ 58
Idler arm to center link	2.5 ~ 3.5	18 ~ 25

	m-kg	ft-lb
WHEELS:		
Wheel bolts	9.0 ~ 10.0	65 ~ 72
Brake disc to wheel hub	5.0	36.2
SUSPENSION:		
Suspension arm to cross member	4.0 ~ 5.5	29 ~ 40
Suspension ball joint to knuckle arm	6.0 ~ 7.0	43 ~ 51
Front shock absorber		
Piston nut	1.35 ~ 1.65	9.02 ~ 12.9
Base valve	0.15	1.0
Cap nut	5.0 ~ 6.0	36.0 ~ 43.0
Absorber support to body	2.0	15.0
"U" bolts	3.8 ~ 4.6	27 ~ 33
Spring pin nuts	1.5 ~ 2.3	11 ~ 17
Shackle pin nuts	1.5 ~ 2.3	11 ~ 17
UNLESS OTHERWISE SPECIFIED		
(6T) 6 mm bolt/nut	0.7 ~ 1.0	5 ~ 7
8 mm bolt/nut	1.6 ~ 2.3	12 ~ 17
10 mm bolt/nut	3.2 ~ 4.7	23 ~ 34
12 mm bolt/nut	5.6 ~ 8.2	41 ~ 59
14 mm bolt/nut	7.7 ~ 10.5	56 ~ 76
(8T) 6 mm bolt/nut	0.8 ~ 1.2	6 ~ 9
8 mm bolt/nut	1.8 ~ 2.7	13 ~ 20
10 mm bolt/nut	3.7 ~ 5.5	27 ~ 40
12 mm bolt/nut	6.4 ~ 9.5	46 ~ 69
14 mm bolt/nut	10.4 ~ 14.0	75 ~ 101

1975

Mazda RX-3·808

WORKSHOP MANUAL

CHASSIS

SUPPLEMENT

FOREWORD

This manual is a supplement to the RX-3, 808 (CHASSIS) workshop manual. Service information contained in this manual covers only those features that are new for 1975 RX-3, 808 (CHASSIS).

Refer to the RX-3, 808 (CHASSIS) workshop manual for service procedures common to previous and 1975 models.

The model name, "MAZDA 808", in this material stands for "Automobiles MAZDA 818" in France and her territories, and "MAZDA 818" in other European and all African countries.

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Section 6. CLUTCH

1. Clutch Disk - 808(1300)

The outer diameter of the cluth disk has been changed from 180.0 mm (7.1 in.) to 184.2 mm (7.3 in.) and also the number of torsion springs has been changed from 6 to 4. (Refer to Service Information No. M008/74)

Applied Models, Car Nos. & Production Dates:

Models	Car Nos.	Production Dates
Sedan	No. 284592	July 21, 1974
Coupé	No. 284593	July 21, 1974
Wagon	No. 173538	July 21, 1974

Section 10. STEERING

1. Steering Geometry - 808 (1300, 1600), RX-3

In order to keep the directional stability when braking suddenly, the shape of the stabilizer has been modified, According to this modification, the caster angle has been changed as shown in the following table. (Refer to Service Bulletin No. 359)

Models	Caster Angle
808·1300 Sedan	1°55'
808·1300 Coupé	2°10'
808·1300 Wagon	1°30'
808·1600 Sedan & Coupé RX-3·10A	1°35'
808·1600 Wagon for Canada, Hawaii, Guam, Puerto Rico & Americal	1°10'
808·1600 Wagon for E.C.E. & E.C.E. Cold Proof	1°20'
RX-3·12A Sedan & Coupé	1°50'
RX-3·12A Wagon	1°30'

Applied Models, Car Nos. & Production Dates:

Models	Car Nos.	Production Dates
808·1300 Sedan	No. 243666	Aug. 4, 1973
808·1300 Coupé	No. 243667	Aug. 4, 1973
808·1300 Wagon	No. 151873	Aug. 21, 1973
808·1600 Sedan	No. 122184	Aug. 24, 1973
808·1600 Coupé	No. 122183	Aug. 24, 1973
808·1600 Wagon	No. 106906	Aug. 21, 1973
RX-3·10A Sedan	No. 178809	Aug. 12, 1973
RX-3·10A Coupé	No. 178808	Aug. 20, 1973
RX-3·12A Sedan	No. 152678	Aug. 8, 1973
RX-3·12A Coupé	No. 152677	Aug. 8, 1973
RX-3·12A Wagon	No. 148670	Aug. 7, 1973

Section 11. BRAKE

1. Rear Wheel Cylinder - 808(1600)

The inside diameter of the rear wheel cylinder has been changed from 11/16 in (17.5 mm) to 5/8 in (15.9 mm). (Refer to Service Bulletin No. 414)

Applied Models, Car Nos. & Production Dates:

Models	Car Nos.	Production Dates
Sedan	No. 132188	Feb. 1, 1974
Coupé	No. 132176	Feb. 1, 1974
Wagon	No. 111891	Feb. 1, 1974

SUPPLEMENT TO MAZDA RX-3 AND 808 WORKSHOP MANUAL (VOL. CHASSIS)

This supplement has been prepared mainly to gide the outline of the minor changes in the 1974 year models and the resulting alterations in servicing, and also Body Electrical System (15).

OUTLINE OF 1974 YEAR MODEL

CLUTCH (6)

RX-3

a. The shape of the clutch housing has been altered according to the adoption of a new type engine (573 cc x 2 rotors).

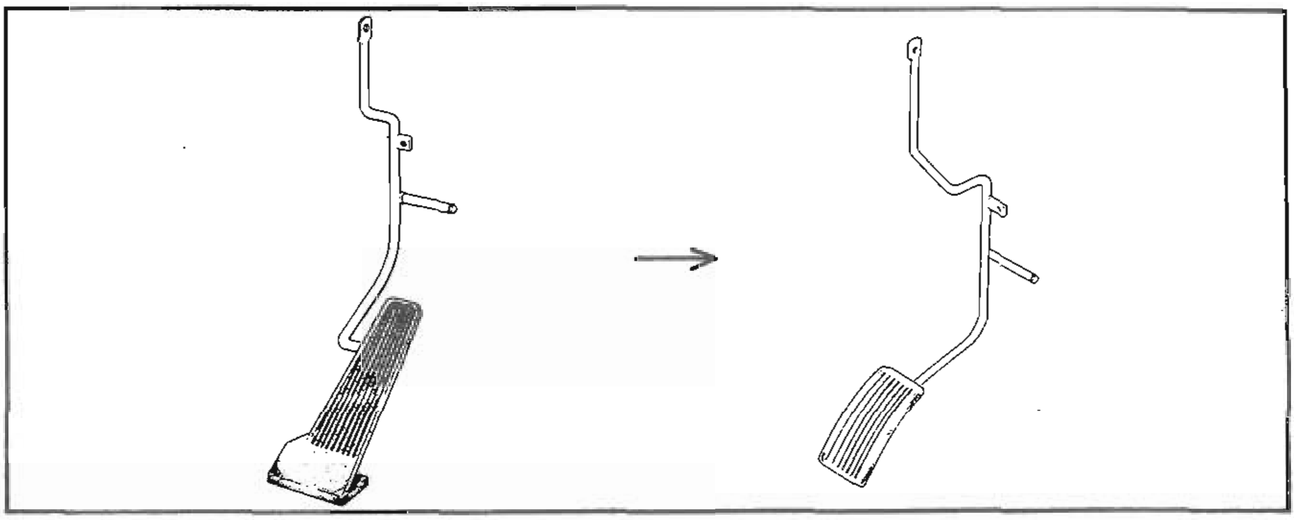
b. The clutch release cylinder has been altered to a play-nonadjustment type.

808

Same as the 1973 year model.

Note:

The accelerator pedal on both the RX-3 and 808 has been altered to the hanging type as shown in the sketch below.



TRANSMISSION (7)

RX-3

a. The 1st gear bearing of the 4-speed transmission has been altered to the bush from the needle bearing in order to standardize the part in the RX-3 and RX-4.
b. The shift lever of the 5-speed transmission has been lengthened by **40 mm (1.57")**.

808

Same as the 1973 year model.

Note:

The automatic transmission in both the RX-3 and 808 is 3N71B as installed in the 1973 year models.

PROPELLER SHAFT (8)

The propeller shaft in both the RX-3 and 808 is the same as the one in the 1973 year models.

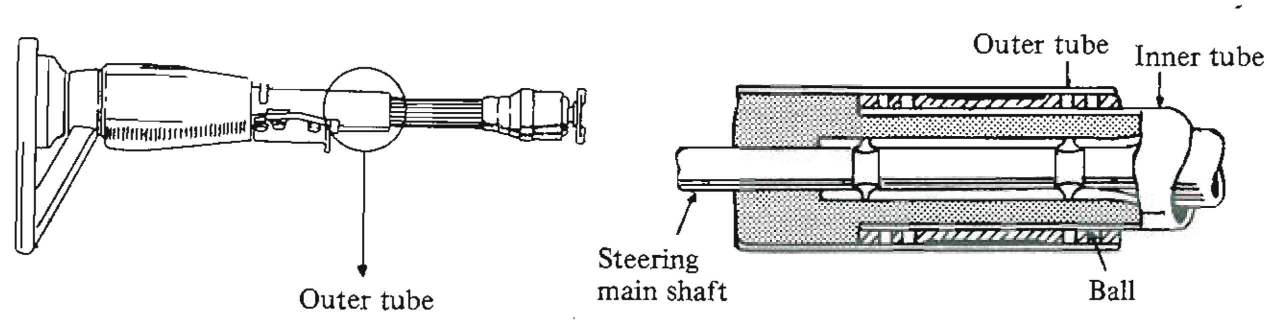
REAR AXLE (9)

The rear axle in both the RX-3 and 808 is the same as the one in the 1973 year models, except those of ECE specifiactions. The rear brake drum in the models of ECE specifications has been increased by **9" (228mm)** in size, and the rear axle shaft has been also altered accordingly.

STEERING (10)

RX-3 and 808

a. The energy absorbing shaft has been altered to a ball type as shown in the sketch below.



b. The insulator (fitted to the idler arm) of the tie rod ball joint has been enlarged.

BRAKES (11)

RX-3

a. The master cylinder diameter has been altered to **13/16"** (conventional) from **7/8"** (portless).
b. The location of the rear brake pipe No. 2 has been altered to the lower side of the rear axle casing, and a protector has been newly provided (on only the cars equipped with the emission device).
c. The diameter of the rear brake drum on only the models of ECE specifications has been altered to **228 mm (9")** from **200 mm (7.874")**.
d. Only the models of Swedish specifications have been equipped with the brake werar indicator.

808

a. The diameter of the master cylinder on only the 1600 cc model has been altered to **13/16"** (conventional) from **7/8"** (portless).
b. The diameter of the rear brake drum on only the models of ECE specifications has been altered to **228 mm (9")** from **200 mm (7.874")**.
c. Only the models of Swedish specifications have been equipped with the brake wear indicator.

WHEELS AND TIRES (12)

The specifications of tire are as follows.

RX-3

Models of U.S.A., Canadian and Australian specifications .... 155SR13 (Tubeless)
Models of ECE specifications .... 155SR13 or 155HR13
Other models .... 155SR13 or 155HR13

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Models of U.S.A. and Canadian specifications .... 155-13 (Tubeless) or 6.15-13-4 (Tubeless)
Models of Australian specifications .... 155S13 (Tubelsss) or 6.15S-13-4 (Tubeless)
Models of ECE specifications .... 155SR13 or 6.15S-13-4 (Tubeless)
Other models .... 6.15S-13-4, 6.15S-13-4 (Tubeless) or 155SR13

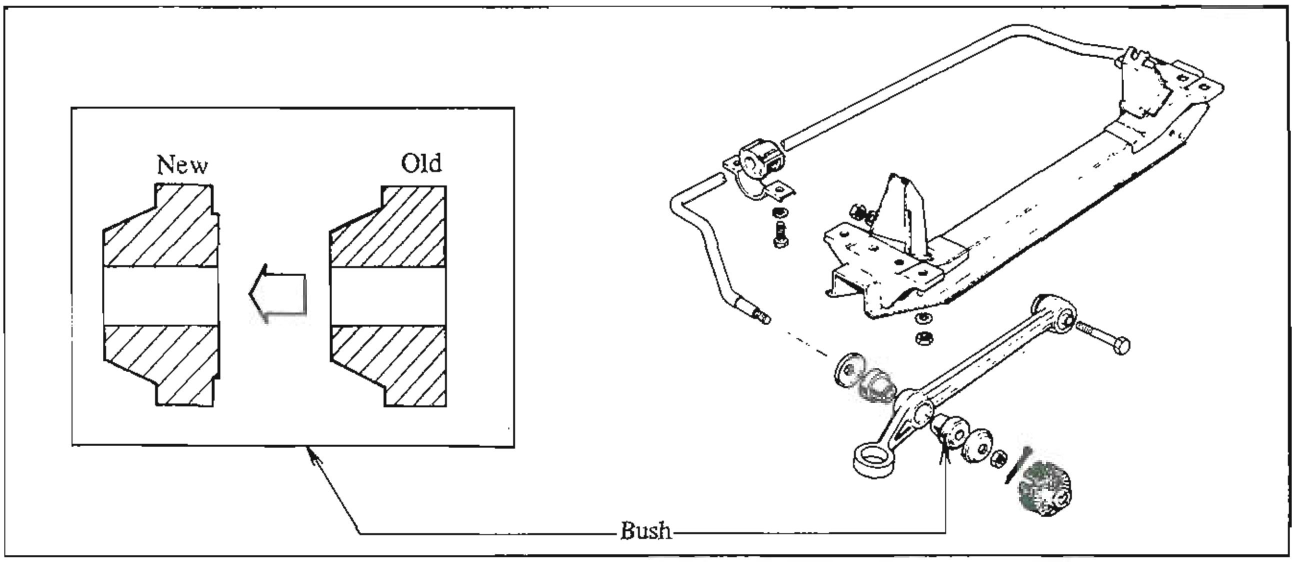
SUSPENSION (13)

Front Suspension

RX-3

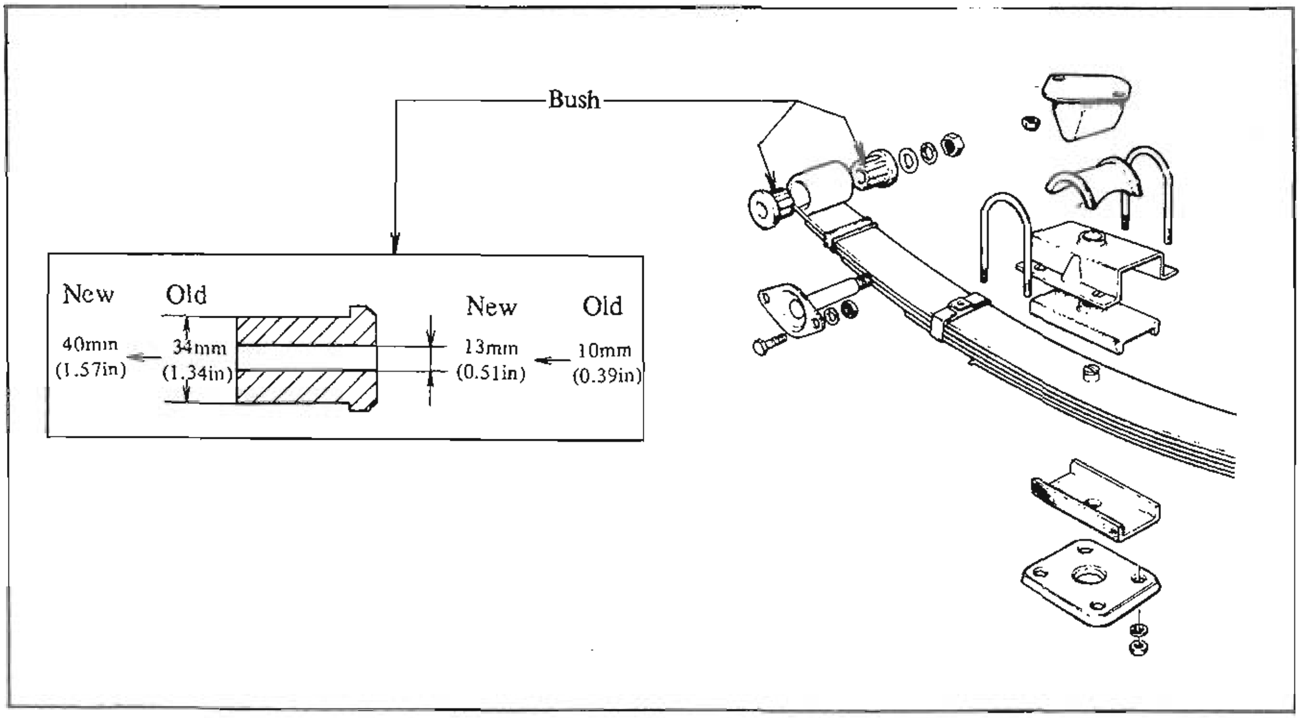
a. The coil spring constant has been altered to **1,87 kg/mm (105 lb/in)** from **1,78 kg/mm (100 lb/in)** (only on the models of U.S.A. and Canadian specifications).
b. A bumper sheet has been newly established, and the bump stroke has been altered to **70 mm (2.76")** from **75 mm (2.95")** (only on the models of U.S.A. and Canadian specifications).

c. The shape of the stabilizer bush has been altered as shown in the sketch below.



808
The coil spring constant has been altered to **1,78 kg/mm (100 lb/in)** from **1,65 kg/mm (93 lb/in)** (only on the models of U.S.A. and Canadian specifications).

Rear Suspension
RX-3 and 808
a. The rear spring camber has been altered (on only the models of U.S.A. and Canadian specifications).
b. The front eye inner diameter of the rear spring has been altered to **40 mm (1.57")** from **34 mm (1.34")** and the front eye bush has been enlarged accordingly as shown sketch below.



BODY (14)
Accordingly to the introduction of a safety bumper and engine interlock system (on only the models of U.S.A. and Canadian specifications), and for the purpose of standardization, the shapes of various areas of the body have been altered.

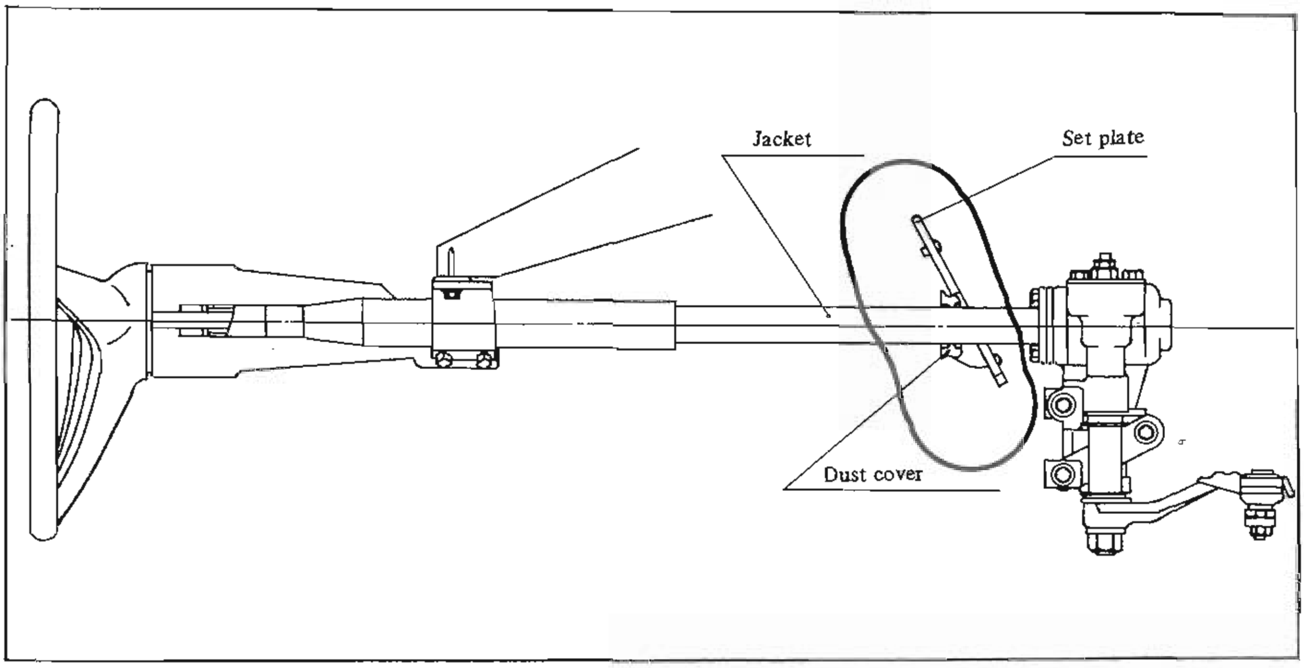
BODY ELECTRICAL (15)
RX-3 and 808

a. The central control unit has been adopted on the left hand drive models excluding those of U.S.A. and Canadian specifications.
b. The head light relay has been established (on only the models of Swedish specifications) to prevent the falling of voltage to the head light cleaner and circuit.
c. The tail light circuit has been altered to a double circuit (only in the models of German specifications).
d. The main fuse and ammeter have been altered to a shunt type.

ALTERATIONS AND SUPPLEMENTS OF THE CONTENTS OF THE WORKSHOP MANUAL

CLUTCH (6)
As adjustment of the clutch release cylinder has become unnecessary, there are description only on disassembly, assembly and inspection.

STEERING (10)
The following item is added as the cautions in fitting the steering gear box. "When fitting the dust cover, adjust it using the set plate fitting area so that a clearance may not be produced between the steering jacket and dust cover".



BODY (14)
The item of "Safety Bumper" is added (on only the models of U.S.A. and Canadian specifications).

BODY ELECTRICAL (15)
As a simple method of inspecting each unit of the body electrical equipment, a circuit tester has been taken up in the Workshop Manual. In this case, however, possible contact resistance is not taken into account.
Accordingly, please note that even when the circuit tester shows that the continuity to a unit is satisfactory, in case constant resistance has increased, there is a possibility of the unit not working properly.
So pay due attention to this point.

CLUTCH RELEASE CYLINDER
(PLAY-NONADJUSTMENT TYPE)

The freeplay adjustment is not necessary on this clutch release cylinder.

6–A. CLUTCH RELEASE CYLINDER

6–A–1. Disassembling Clutch Release Cylinder

1. Clean the outside of the cylinder thoroughly.
2. Remove the dust boot from the cylinder.
3. Remove the release rod.
4. Remove the piston and cup assembly from the cylinder. If necessary, blow out with compressed air from the fluid passage.
5. Remove the spring.
6. Remove the bleeder screw and valve (steel ball).

6–A–2. Checking Clutch Master Cylinder

1. Wash the parts in clean alcohol or brake fluid. **Never use gasoline or kerosene.**
2. Check the piston cups and replace if they are damaged, worn, softened, or swelled.
3. Examine the cylinder bore and piston for wear, roughness or scoring.
4. Check the clearance between the cylinder bore and the piston. If it is **more than 0.15 mm (0.006 in)**, replace the cylinder or piston.
5. Ensure that the compensating port on the cylinder is open.

6–A–3. Assembling Clutch Release Cylinder

1. Install the spring into the cylinder.
2. Fit the piston cup to the piston and install them into the cylinder.
3. Install the release rod into the cylinder.
4. Install the dust boot.
5. Install the valve (steel ball) and bleeder screw into the bleeder hole. Fit the bleeder cap.

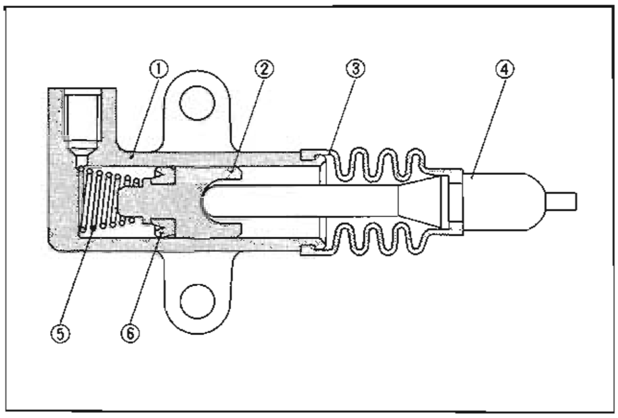


Fig. 6–1 Release cylinder

1. Cylinder
2. Piston
3. Boot
4. Release rod
5. Spring
6. Piston cup

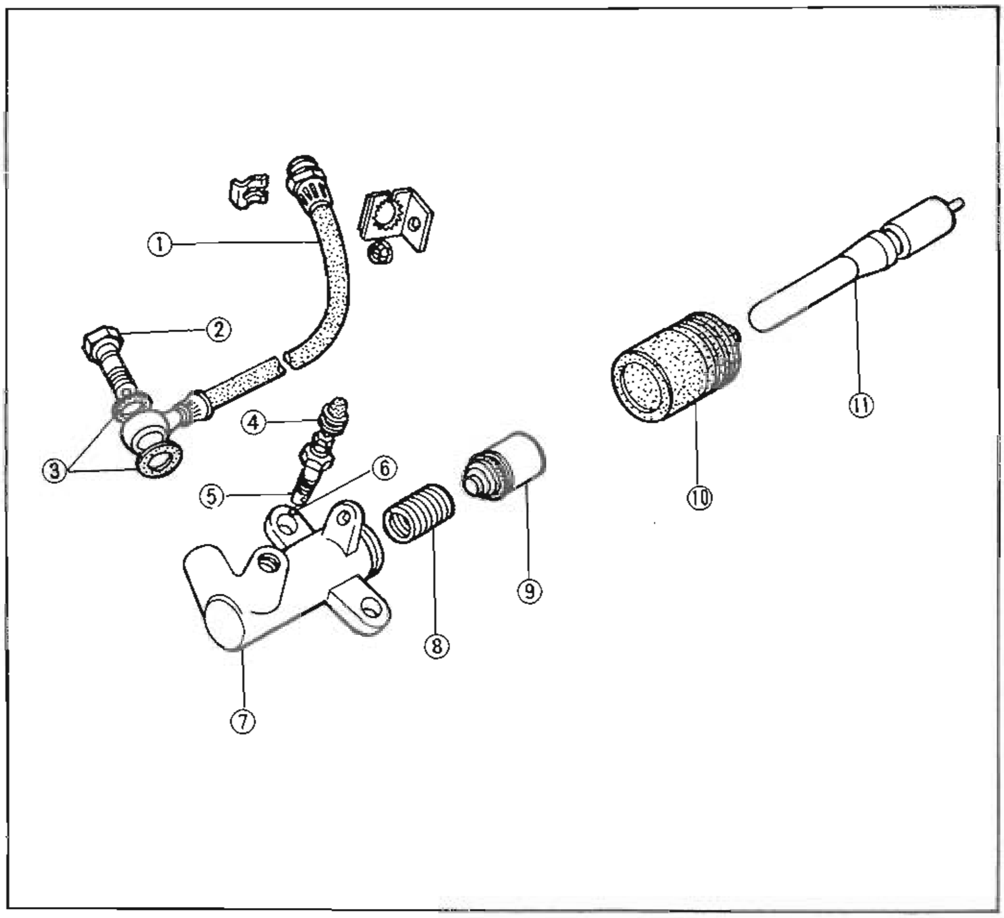
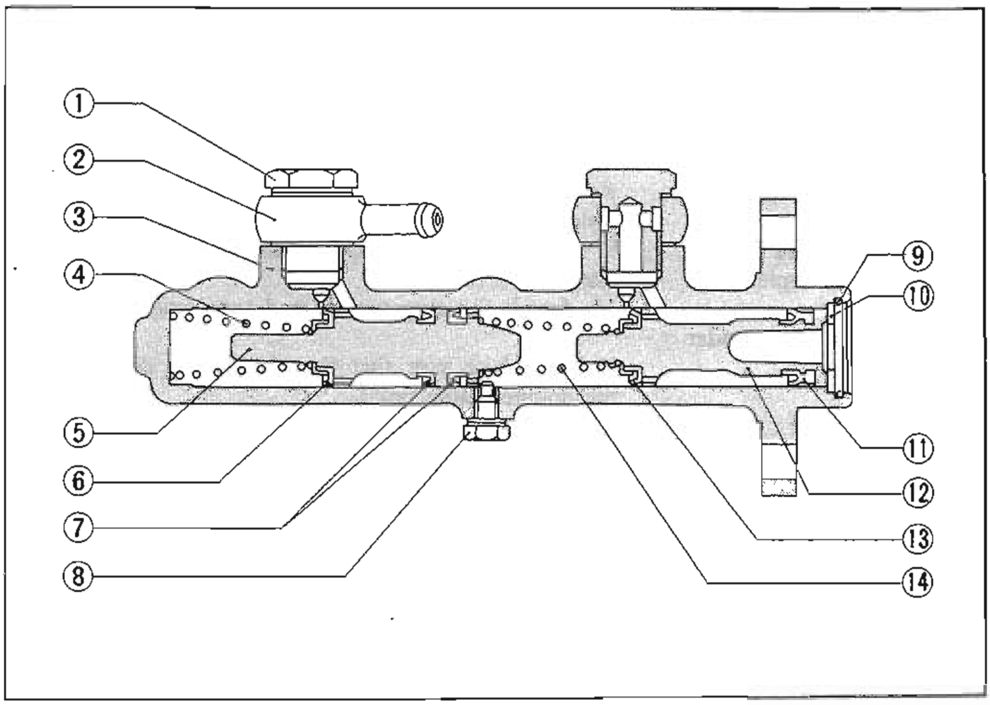


Fig. 6–2 Release cylinder components

1. Flexible hose
2. Connection bolt
3. Gasket
4. Rubber cap
5. Bleeder screw
6. Valve (steel ball)
7. Cylinder
8. Spring
9. Piston assembly
10. Boot
11. Release rod

BRAKE MASTER CYLINDER
(CONVENTIONAL TYPE)



1. Connecting bolt
2. Connector union
3. Cylinder
4. Floating spring
5. Floating piston
6. Primary cup
7. Secondary cup
8. Set bolt
9. Snap ring
10. Washer
11. Secondary cup
12. Primary piston
13. Primary cup
14. Primary spring

Fig. 11–1 Dual master cylinder cross section

11–H. BRAKE MASTER CYLINDER

11–H–1. Removing Brake Master Cylinder

1. Disconnect the fluid pipes (reservoir tank ~ master cylinder) at the brake master cylinder and plug the end of the pipes to prevent fluid leakage. (Left hand drive vehicles only)
2. Disconnect the fluid pipes at the brake master cylinder outlets.
3. Remove the nuts that attach the brake master cylinder to the power brake unit.
4. Remove the brake master cylinder assembly from the power brake unit.

Note: Never allow the brake fluid to drop on any painted surface.

11–H–2. Disassembling Brake Master Cylinder

1. Clean the outside of the master cylinder thoroughly and drain the brake fluid.
2. On the right hand drive vehicles, separate the reservoir from the cylinder by removing the connector bolts and washers.
3. Using snap ring pliers, remove the snap ring and remove the stop washer.
4. Remove the primary piston, cups, spacer and spring seat assembly and return spring from the cylinder.
5. Loosen the secondary piston stop bolt. Do not remove it.
6. Pushing in the secondary piston with a screwdriver, remove the stop bolt and insert the guide pin in its place. Then, gradually take out the screwdriver and remove the secondary piston and cups assembly and spring from the cylinder. (See Fig. 11–2.)

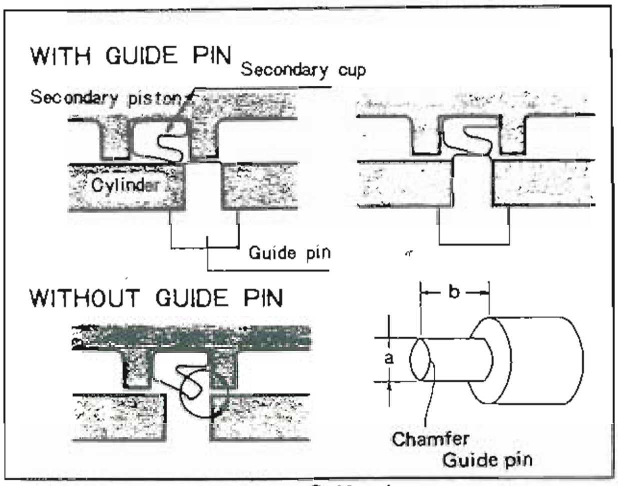


Fig. 11–2 Guide pin

MODEL	a	b
RX-2 & 616 (RH)	4.9mm (0.192 in)	13.2mm (0.519 in)
RX-2 & 616 (LH)	4.9mm (0.192 in)	7.8mm (0.307 in)
808 · 1300 (RH)	4.9mm (0.192 in)	8.4mm (0.330 in)
808 · 1300 (LH) 808 · 1600	4.9mm (0.192 in)	13.3mm (0.523 in)
808 · 1600 (FOR ECE)	4.9mm (0.192 in)	8.6mm (0.338 in)
RX-3 (ALL MODEL)	4.9mm (0.192 in)	8.6mm (0.338 in)

If necessary, blow out with compressed air from the outlet hole.
7. Remove the fluid pipe fittings and gaskets from the cylinder, and then remove the check valves and springs.

11–H–3. Checking Brake Master Cylinder

1. Wash the parts in clean alcohole or brake fluid. **Never use gasoline or kerosene.**
2. Check the piston cups and replace if they are damaged, worn , softened, or swelled.
3. Examine the cylinder bore and pistons for wear, roughness or scoring.
4. Check the clearance of the cylinder bore and pistons. If it is **more than 0.15 mm (0.006 in)**, replace the cylinder or piston.
5. Ensure that the compensating ports on the cylinder are open.

11–H–4. Assembling Brake Master Cylinder

1. Dip the pistons and the cups in clean brake fluid.
2. Fit the check valve springs and check valves into the outlet holes. Install the pipe fittings and gaskets to the outlet holes. Tighten the fittings to **6.0 ~ 7.0 m-kg (43 ~ 51 ft-lb).**

Note: Be sure to fit the valve which has a hole in the center of it to the front side outlet hole (disc brake).

3. Insert the return spring into the cylinder.
4. Fit the secondary cup and primary cup onto the secondary piston so that the flat side of the cup goes toward the piston.
5. Fit the guide pin into the stop bolt hole and insert the secondary piston assembly into the cylinder.
6. Push the secondary piston as far as it will go, remove the guide pin, and install the stop bolt and "O"ring.
7. Fit the primary cup onto the primary piston so that the flat side of the cup goes toward the piston.
8. Fit the secondary cup onto the primary piston, with the edge side of the cup facing the secondary piston.
9. Insert the return spring and the primary piston assembly.
10. Install the stop washer and snap ring.

Note: Make sure that the piston cups do not cover the compensating ports.

11. On the right hand drive vehicles, install the reservoir to the cylinder body. Tighten the connector bolts.

11–H–5. Installing Brake Master Cylinder

To install the master cylinder, carry out the removing operation in the reverse order. After installing, bleed the brake system, and check for proper brake operation.

SAFETY BUMPER

(FOR U.S.A. and Canada vehicles)

14–A. FRONT BUMPER

14–A–1. Removing Front Bumper

1. Remove the screws attaching the left and right turn signal lights to the bumper and remove the turn signal lights form the bumper.
2. Remove the bolts attaching the left and right bumper ends to the fender.
3. Remove the nuts and bolts attaching the bumper to the left and right hinge plate.
Then, remove the bumper.
4. Remove the bolts attaching the left and right splash shields to the skirt panel and remove the splash shields.
5. Remove the bolts attaching the shock absorber bracket to the front frame. Then, remove the shock absorber and bracket assembly.
6. Remove the nuts from the piston rod end, then separates shock absorber form the bracket.

14–A–2. Checking Shock Absorber

To check the shock absorber, measure the dimension (A) shown in Fig. 14–1.
This measurement should be **75±2 mm (2.95±0.08 in).**
If this measurement is not within the specification, replace the shock absorber with a new one.

14–A–3. Installing Front Bumper

Follow the removal procedures in the reverse order and align the bumper for good fit and appearance.

Note:
When installing the bumper care must be taken in the following point:
(a) After installing the shock absorber assembly to the body frame, check the hinge plate height from the level ground surface.
The height should be **457 ± 29 mm (17.99 ± 1.14 in)** as shown in Fig. 14–2.
If necessary, adjust the height by moving the position of hinge plate or shock absorber assembly.
The hinge plate height must be equal on either side.
(b) If the bumper attaching bolts can not fit smoothly into the bumper and hinge plate holes, correct the position of hinge plate or shock absorber assembly so that the bumper hole aligns with the hinge plate hole on either side.
Incorrectly installed bumper may cause its poor recovery.
(c) The bumper attaching bolt has a slight inclination on the under surface of the bolt head.
So, the bumper attaching bolt should be installed in the correct direction so that the under surface nicely fits the bumper surface.
(d) Tighten the bumper attaching bolt to **1.8 ~ 2.7 m-kg (13 ~ 19 ft-lb).**
(e) Tighten the shock absorber bracket attaching bolt to **1.8 ~ 2.7 m-kg (13 ~ 19 ft-lb).**

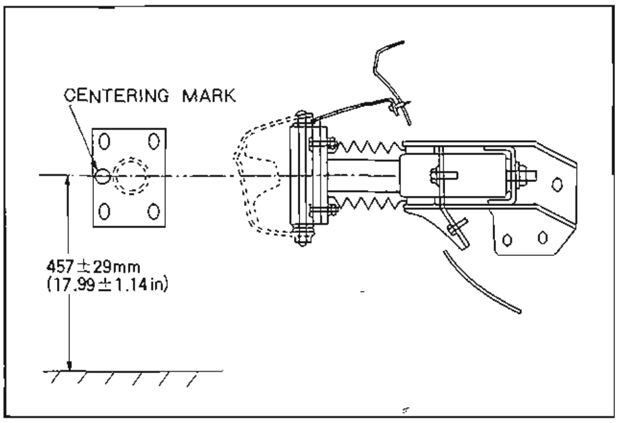


Fig. 14–2 Front hinge plate height

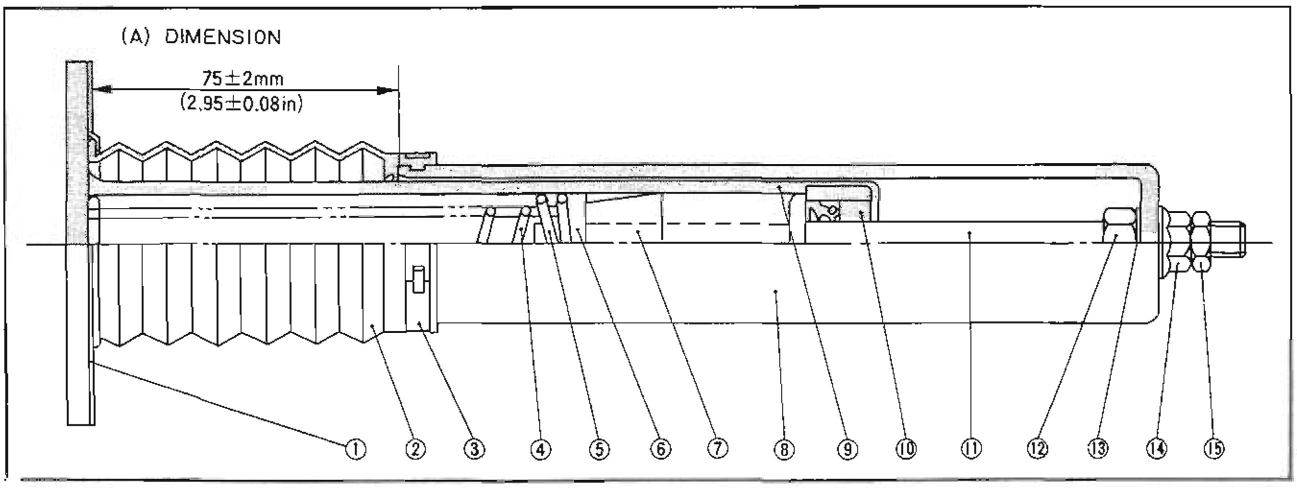


Fig. 14–1 Shock absorber

1. Boot plate
2. Boot
3. Boot clamp
4. Inner coil spring
5. Outer coil spring
6. Guide
7. Rubber bush
8. Outer casing
9. Inner casing
10. Inner casing end
11. Piston rod
12. Nut
13. Seal wsaher
14. Nut
15. Nut

14–B. REAR BUMPER

14–B–1. Removing Rear Bumper

1. Remove the bolts attaching the left and right bumper ends to the fender.
2. Remove the nuts and bolts attaching the bumper to the left and right hinge plates. Then, remove the bumper.
3. Remove the bolts attaching the shock absorber bracket to the rear frame and nuts attaching the piston rod end to the rear frame. Then, remove the shock absorber and bracket assembly.
4. Remove the shock absorber from the bracket.

14–B–2. Checking Shock Absorber

To check the rear shock absorber, make the same inspection as for the front shock absorber described in **Par. 14–A–2.**

14–B–3. Installing Rear Bumper

Follow the removal procedures in the reverse order and align the bumper for good fit and appearance.

Note:
When installing the rear bumper, care should be taken the same as in the case of the front bumper installation described in **Par. 14–A–3.**

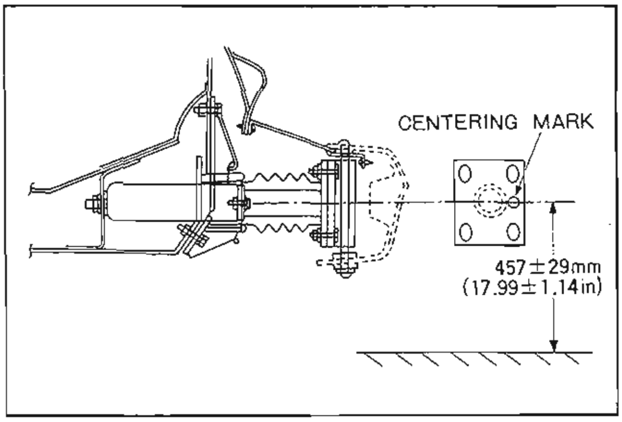


Fig. 14–3 Rear hinge plate height

BODY ELECTRICAL

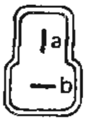
15–A. COMBINATION SWITCH

15–A–1. Checking Combination Switch

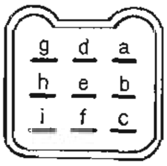
Check the continuity between the coupler terminals using the circuit tester according to the following switch interconnection diagram.

1. Turn Signal and Hazard Swtich

Switch Position \ Terminal	TIG	HBA	TFB	FU	HFB	FR	RR	FL	RL	
Right Turn	0		0	0		0	0			Turn Signal
Neutral	0		0							
Left Turn	0		0	0				0	0	
OFF		0								Hazard
ON		0			0					
				0		0	0	0	0	



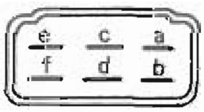
a : RL ...... Rear turn signal, left (LY)
b : RR ...... Rear turn signal, right (LR)



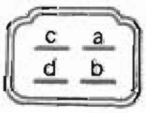
a : FU ...... Flasher unit (GR)
b : HFB ...... Hazard flasher unit power source (WG)
c : FR ...... Front turn signal, right (GW)
d : FL ...... Front turn signal, left (GB)
e : HBA ...... Hazard switch power source (WL)
f : TIG ...... Turn signal switch power source (GY)
g : TFB ...... Turn signal flasher switch power source (GL)
h : HO ...... Horn switch power source (G)
i : Vacant

Fig. 15–1 Turn signal and hazard switch interconnection diagram (RX-3 and 808 R.H.D)

Switch Position \ Terminal	TFU	HFU	TL	TR	TIG	TFB	HBA	HFB	SS	SS	
Right Turn	0			0	0	0					Turn Signal
Neutral					0	0					
Left Turn	0		0		0	0					
OFF							0				Hazard
ON		0	0	0			0	0	0	0	



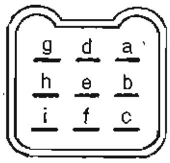
a : TIG ...... Turn signal switch power source (GY)
b : TFB ...... Turn signal flasher switch power source (GL)
c : TL ...... Turn signal left (GB)
d : HFB ...... Hazard flasher power source (WG)
e : HBA ...... Hazard switch power source (WL)
f : TR ...... Turn signal right (G)



a : TFU ...... Turn signal flasher unit (GR)
b : E ...... Earth (B)
d : HFU ...... Hazard flasher unit (WB)
d : HO ...... Horn switch power source (G)
SS ...... Stop switch (Lg)
SS ...... Stop switch (Lg)
Refer to Fig. 15–7

Fig. 15–2 Turn signal and hazard switch interconnection diagram
(RX-3 L.H.D and 808 of Swedish specifications)

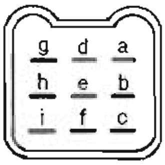
Terminal / Switch Position	TIG	HBA	FB	TFU	HFU	HFB	TL	TR	
Left Turn	0		0	0			0		Turn Signal
Neutral	0		0						
Right Turn	0		0	0				0	
OFF	0		0						Hazard
ON		0	0		0	0	0	0	



a : TFU ...... Turn signal flasher unit (GR)
b : HFU ...... Hazard flasher unit (WG)
c : TR ...... Turn signal right (GW)
d : TL ...... Turn signal left (GB)
e : HBA ...... Hazard switch power source (WL)
f : TIG ...... Turn signal switch power source (GY)
g : FB ...... Turn signal flasher unit power source (GL)
h : HO ...... Horn switch power source (G)
i : HFB ...... Hazard flasher unit power source (WR)

Fig. 15–3 Turn signal and hazard switch interconnection diagram (Models of U.S.A and Canadian specifications)

Terminal / Switch Position	TIG	HBA	FB	FU	TL	TR	HW	
Right Turn	0		0	0		0		Turn Signal
Neutral	0		0					
Left Turn	0		0	0	0			
OFF	0		0					Hazard
ON		0	0	0	0	0	0	

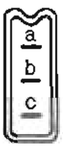


a : FU ...... Flasher unit (GR)
b : Vacant
c : TR ...... Turn signal right (GW)
d : HBA ...... Hazard switch power source (GB)
e : TL ...... Turn signal left (WL)
f : TIG ...... Turn signal switch power source (GY)
g : FB ...... Turn signal flasher unit power source (GL)
h : HO ...... Horn switch power source (G)
i : HW ...... Hazard warning lamp (WG)

Fig. 15–4 Turn signal and hazard switch interconnection diagram (808 L.H.D)

2. Wiper and Washer Switch

Terminal / Switch Position	E	SWL	SWH	SW	
OFF	0				Wiper
LOW	0	0			
HIGH	0		0		
OFF	0				Washer
ON	0			0	

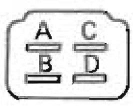


a : SW ... Washer switch (L)
b : SWL ... Wiper LOW (W)
c : SWH ... Wiper HIGH (R)

E ..... Earth (B), Refer to Fig. 15–7

Fig. 15–5 Wiper and washer switch interconnection diagram (RX-3 and 808 R.H.D, RX-3 of U.S.A and Canadian specifications)

Terminal / Swtich Position	E	SWL	SWH	INT	SW	
OFF	0					Wiper
LOW	0	0				
HIGH	0		0			
INT	0			0		
OFF	0					Washer
ON	0				0	



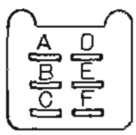
A : SW ... Washer switch (L)
B : SWL ... Wiper LOW (W)
C : SWH ... Wiper HIGH (R)
D : INT ... Wiper INTERMIT (G)

E ..... Earth (B), Refer to Fig. 15–7

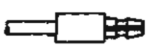
Fig. 15–6 Wiper and washer switch interconnection diagram (RX-3 L.H.D and 808 of Swedish specifications)

3. Light, Dimmer and Passing Switch

Switch Position \ Terminal	BA	PH	TNS	HB	HU	HL	
OFF	0—	—0					Light
Tail, Side, Licence	0—	—0—	—0				
Head Lamp	0—	—	—0—	—0			
Upper				0—	—0		Dimmer
Lower				0—	—	—0	
OFF		0					Passing
ON		0—	—	—	—0		

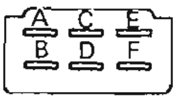


A : HU ...... Head lamp upper (RW)
B : HL ...... Head lamp lower (RB)
C : TNS ...... Tail, license and side lamp (RG)
D : Vacant
E : Vacant
F : E ...... Earth (B)



a : BA ...... Power source (R)

RX-3 and 808 R.H.D, RX-3 of U.S.A and Canadian specifications



A : BA ...... Power source (R)
B : TNS ...... Tail, licence and side lamp (RG)
C : SS ...... Stop switch (Lg)
D : SS ...... Stop switch (Lg)
E : HU ...... Head lmap upper (RW)
F : HL ...... Head lamp lower (RB)

RX-3 L.H.D and 808 of Swedish specifications

Fig. 15–7 Light, dimmer and passing switch interconnection diagram

Note:
The terminals PH and HB are connected inside the switch and are not on the coupler. So, please refer to the diagram below.

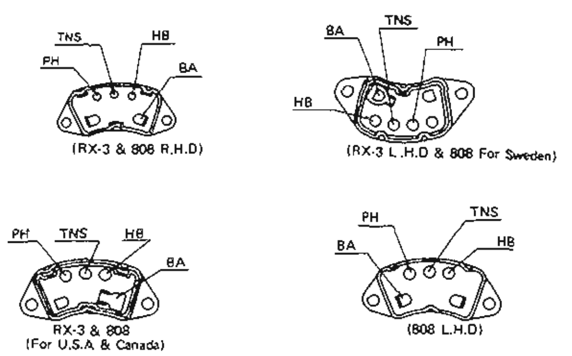


Fig. 15–8 Light switch terminal

15–B. IGNITION SWITCH

15–B–1. Checking Ignition Switch

Check the continuity between the switch terminals using the circuit tester according to Fig. 15–9, interconnection diagram.

Switch Position \ Terminal	B	IG	S	A	R
ACC	0—	—	—	—0	
ON	0—	—0—	—	—0	
START	0—	—0—	—0—	—	—0

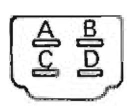
Fig. 15–9 Ignition switch interconnection diagram

15–C. HEATER FAN SWITCH

15–C–1. Checking Heater Fan Switch

Check the continuity between the coupler terminals using the circuit tester according to Fig. 15–10.

Switch Position \ Terminal	BA	L	M	H
OFF	0			
LOW	0—	—0		
MID.	0—	—	—0	
HIGH	0—	—	—	—0



A : L .... Heater low (LW)
B : H .... Heater high (LY)
C : BA.. Power source (LB)
D : M ... Heater medium (LR)

Fig. 15–10 Heater fan switch interconnection diagram

15–D. INHIBITOR SWTICH

15–D–1. Checking Inhibitor Switch

Check the continuity between the coupler terminals using the circuit tester according to Fig. 15–11.

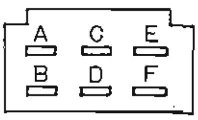
Inhibitor switch interconnection diagram

Terminal / Switch Position	a	b	c	d	A	B	C	D	E	F
P	0··	0	0	—	—	—	—	—	0	
R			0	0						
N	0··	0	0	—	—	—	—	—	—	0
D			0	—	—	—	0			
1			0	—	—	—	—	0		
2			0	—	0					

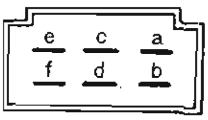
Notes:

a. Solid lines show the connection for indicator light circuit.

b. Dotted lines show the connection for starting circuit.



A : Indicator light P (GL)
B : Vacant
C : Indicator light D (GR)
D : Indicator light N (GB)
E : Indicator light 1 (G)
F : Indicator light 2 (GW)



a : Ignition switch S (BY)
b : Starter S (BY)
c : Power source (GY)
d : Indicator light R (RY)
e : E.I.S unit (for U.S.A.) (LO)
f : Vacant

Fig. 15–11 Inhibitor switch coupler

15–E. WIPER RELAY (Models of U.S.A and Canadian specifications)

15–E–1. Checking Wiper Relay

Check the continuity between the relay terminals using the battery and circuit tester according to Fig. 15–12.

1. LOW

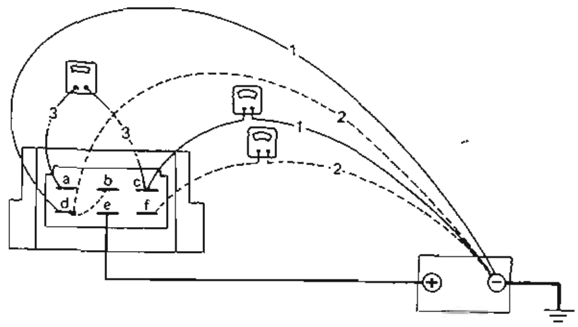
When the battery ⊕ post is connected to the ignition terminal (L) and the battery ⊖ post to the S2 terminal (YG), LOW terminal (LW) and relay body should be in continuity with each other.

2. HIGH

When the battery ⊕ is connected to the ignition terminal (L) and the battery ⊖ to the S3 and S2 terminals (YB and YG), HI terminal (LR) and relay body should be in continuity with each other.

3. OFF

LOW terminal (LW) and AS terminal (LB) should be in continuity with each other.



a : AS Wiper motor auto stop (LB)
b : S3 Wiper switch low (YB)
c : LOW Wiper motor low (LW)
d : S2 Wiper switch high (YG)
e : IG Power source (L)
f : HI Wiper switch high (LR)

Fig. 15–12 Wiper relay interconnection diagram

15–F. TURN SIGNAL RELAY (Models of U.S.A and Canadian specifications)

15–F–1. Checking Turn Signal Relay

Check the continuity between the relay terminals using the battery and circuit tester according to Fig. 15–13.

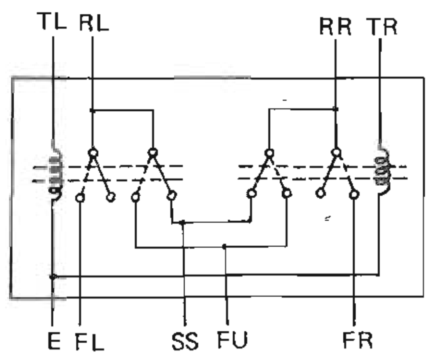


Fig. 15–13 Turn signal relay circuit

1. Right Turn

When the battery ⊕ is connected to the TR terminal and the battery ⊖ to the E terminal, FU, FR and RR terminals should be in continuity with each other.

2. Neutral

RL, RR and SS terminals should be in continuity with each other. (Battery power source is not required)

3. Left Turn

When the battery ⊕ is connected to the TL terminal and the battery ⊖ to the E terminal, FU, LF and RL terminals should be in continuity with each other. RR and SS terminals should also be in continuity with each other.

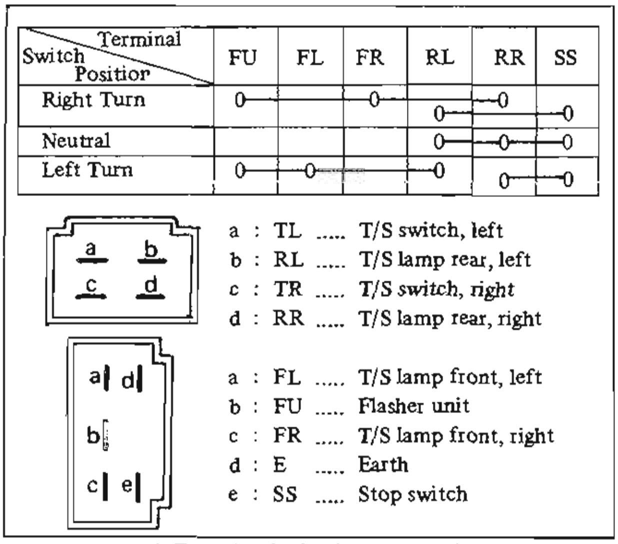


Fig. 15–14 Turn signal relay interconnection diagram

15–G. FLASHER UNIT (Models of U.S.A and (Canadian specifications)

15–G–1. Checking Flasher Unit

Connect a prescribed lamp (**27W x 3 + 3.4W x 1**) between the unit and battery according to Fig. 15–15. When the unit is switched on, the light must turn on and off **85** ± **10** times per minute with interval between flasher under **1.0** second.

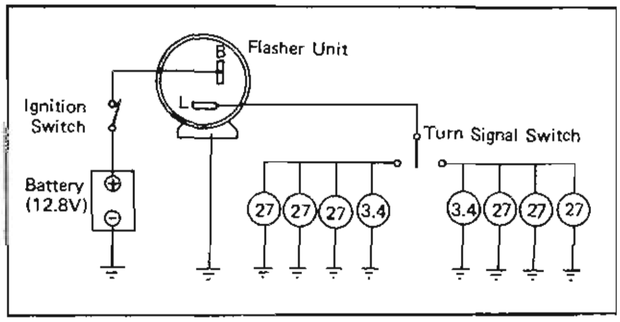


Fig. 15–15 Flasher unit circuit

Note:
The turning on and off of the lamp vary depending upon the lamp capacity and the unit earth condition as follows:

Faulty unit earth	Flash becomes quicker or buzzer is actuated
Lamp capacity decreased	Lamp remains lighted
Lamp capacity increased	Flash becomes quicker

15–H. HAZARD UNIT (Models of U.S.A and Canadian specifications)

15–H–1. Checking Hazard Unit

Connect a prescribed lamp (**27W x 6 + 3.4W x 2**) is connected between the unit and battery according to Fig. 15–16. When the unit is switched on, the light must turn on and off **95** ±**10** times per minute with interval between flasher under **1.5** second.

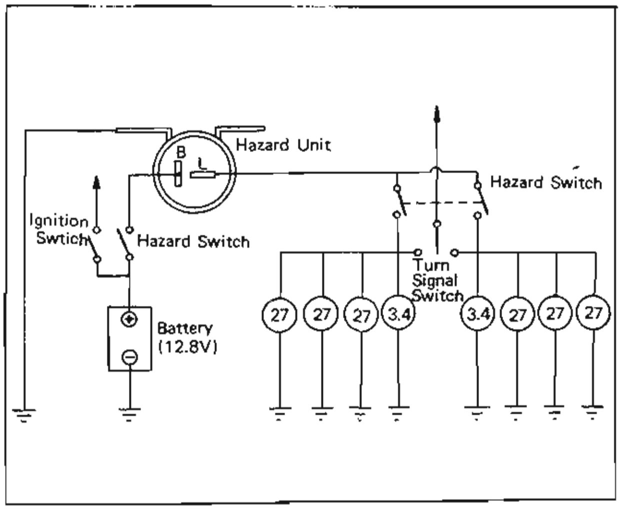


Fig. 15–16 Hazard unit circuit

Note: The turning on and off of the lamp vary depending upon the lamp capacity and the unit earth condition as follows:

Faulty unit earth	Lamp remains lighted
Lamp capacity decreased	Number of flashes remains unchanged
Lamp capacity increased	Number of flashes remains unchanged

15–I. CENTRAL CONTROL UNIT (Except models of U.S.A and Canadian specifications)

The central control unit is composed of wiper relay (R1 and R2), flasher relay (R3), horn relay (R4) and flasher unit (U1), each of which is a plug-socket connection type. Each relay and unit are easy to replace. In replacing the flasher unit, care should be taken that its capacity differs depending upon area. Also, the "multi-grade relay" has been prepared which is applicable as replacement of any of the relays.

15–I–1. Checking Central Control Unit

Check the central control unit using the battery and circuit tester as follows:

1. Wiper Relay (R1)
When the battery ⊕ is connected to the WIG terminal and the battery ⊖ to the S2 terminal, LOW terminal and unit body should be in continuity with each other.

2. Wiper Relay (R2)
(2–A) When the battery ⊕ is connected to the WIG terminal and the battery ⊖ to the S2 and S3 terminals, H1 terminal and unit body should be in continuity with each other.
(2–B) AS terminal and LOW terminal should be in continuity with each other without connecting the battery to them.

3. Horn Relay (R4)
When the battery ⊕ is connected to the HZB terminal and the battery ⊖ to the HNS terminal, HZB terminal and HON terminal should be in continuity with each other.

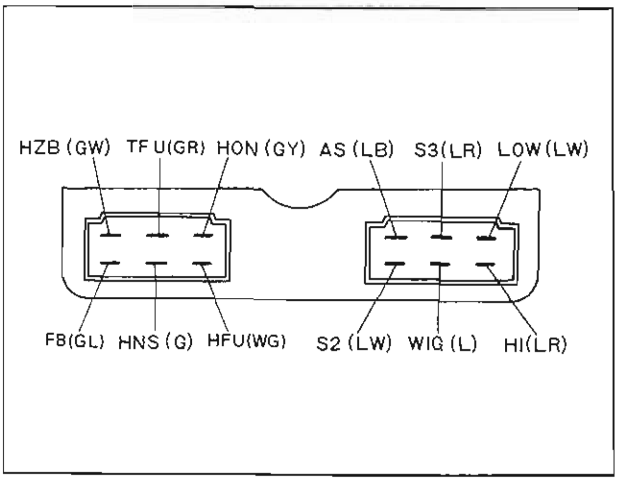


Fig. 15–17 Central control unit coupler

4. Flasher Unit (U1)

In checking the flasher unit, connect a prescribed lamp as indicated on the central control unit cover between the unit (with the flasher relay R3) and battery as shown in Fig. 15–18.

4–A. Turn signal

When the battery ⊕ is connected to the FB terminal and a prescribed lamp between the battery ⊖ and TFU terminal, the lamp must turn on and off **90±10** times per minute with interval between flasher under **1.5** second.

4–B. Hazard

When the battery ⊕ is connected to the HFU terminal and a prescribed lamp between the battery ⊖ and TFU terminal, the lamp must turn on and off **90±10** times per minute with the interval between flasher under **1.5** second.

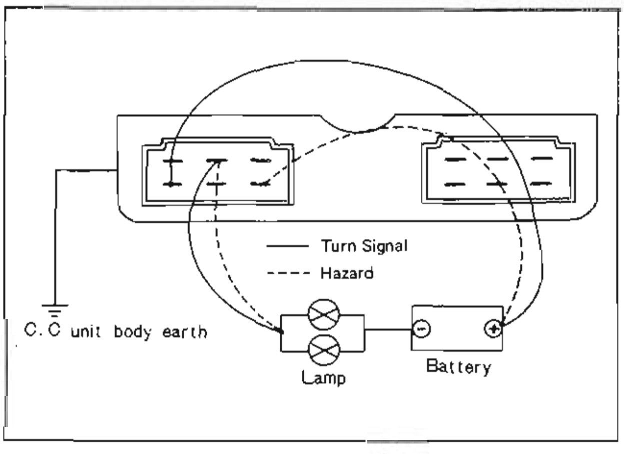


Fig. 15–18 Hazard and flasher unit interconnection diagram

Note:

The flashing on and off of the lamp varies depending upon the lamp capacity and the central control unit earth condition as follows:

Flasher

Faulty unit earth	Lamp remains lighted
Lamp capacity decreased	Flash becomes slower or lamp remains lighted
Lamp capacity increased	Number of flashes remains unchanged

Hazard

Faulty unit earth	Lamp remains lighted
Lamp capacity decreased	Number of flashes remains unchanged
Lamp capacity increased	Number of flashes remains unchanged

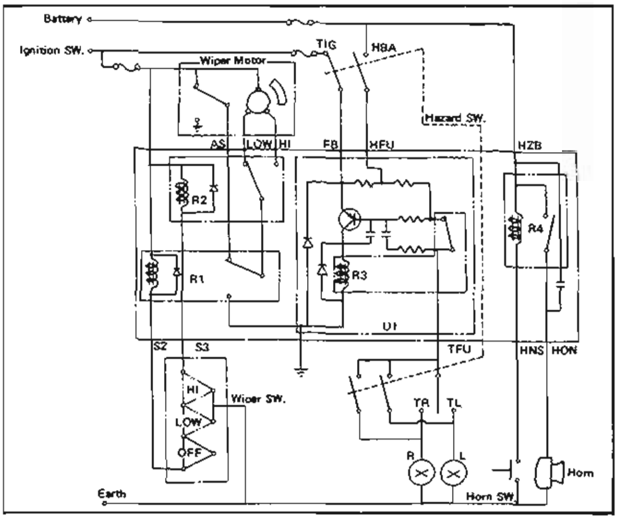


Fig. 15–19 Central control unit circuit

15–J. WIPER MOTOR

15–J–1. Checking Wiper Motor

Connect the wiper motor, ammeter and battery according to the following diagram, and check the number of wiping revolutions and amperage.

	Wiping RPM	Amperage
LOW	42–55	Less than 2.5A
HIGH	62–85	Less than 2.5A

Note:

a. The difference in number of revolutions between LOW and HIGH should be more than **15 RPM.**

b. The Auto Stop does not work in the case of faulty wiper motor earth.

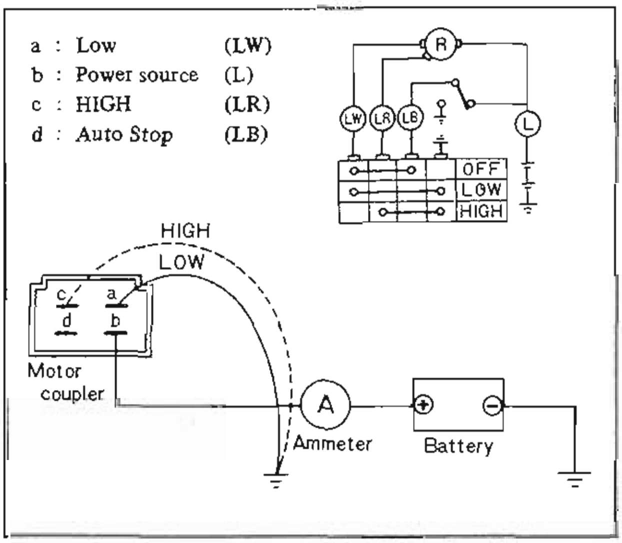


Fig. 15–20 Wiper motor interconnection diagram

15–K. METER

15–K–1. Checking Meter Set Print Panel

Check the continuity between connector pin and lamp, and that between connector pin and meter using the circuit tester according to the interconnection diagram below.

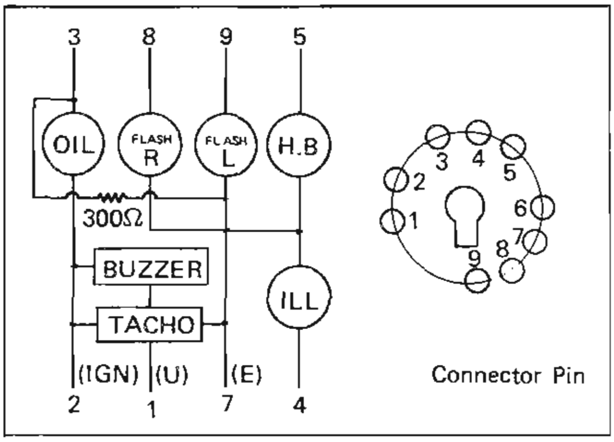


Fig. 15–21 Print panel interconnection diagram (RX-3 R.H.D)

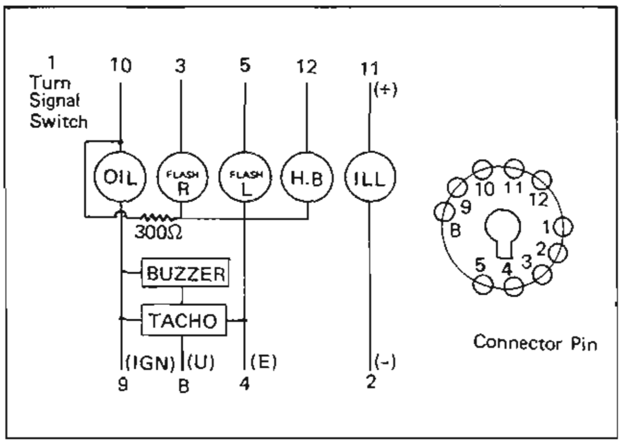


Fig. 15–22. Print panel interconnection diagram (RX-3 L.H.D)

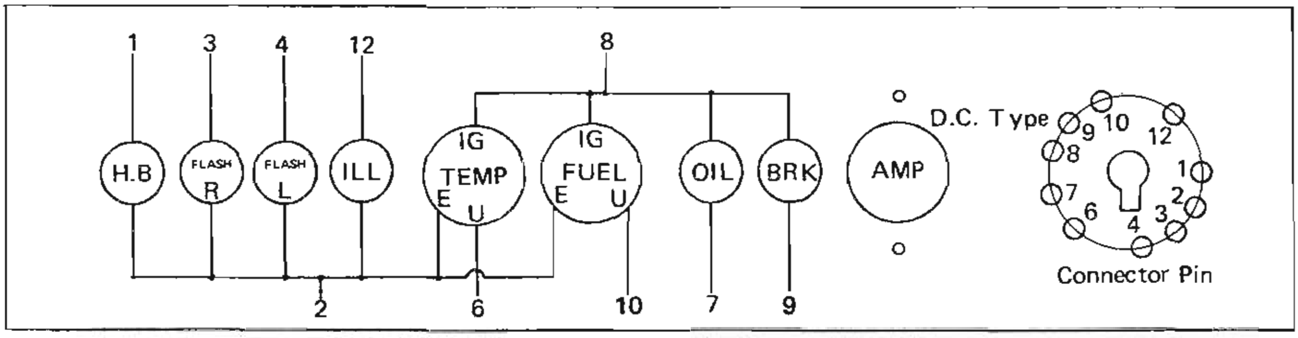


Fig. 15–23 Print panel interconnection diagram (808 L.H.D)

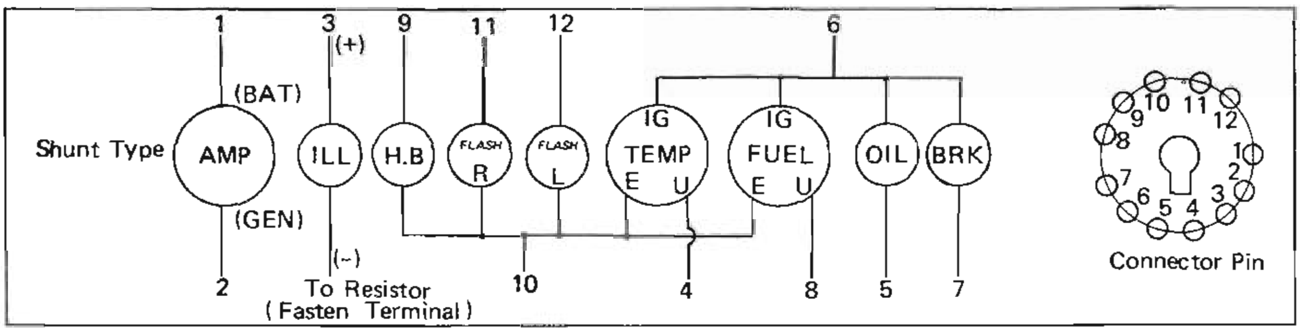


Fig. 15–24 Printepanel interconnection diagram (808 of U.S.A. Canadian and Australian specifications)

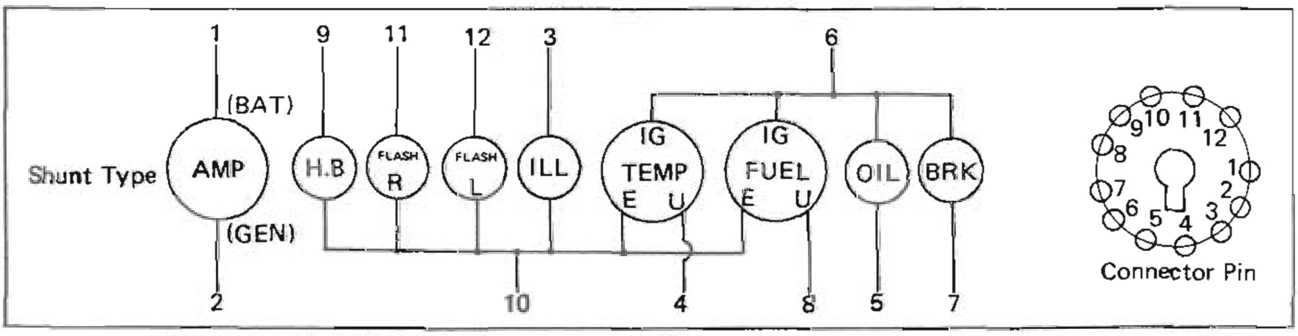


Fig. 15–25 Print panel interconnection diagram (808 R.H.D of Swedish specifications)

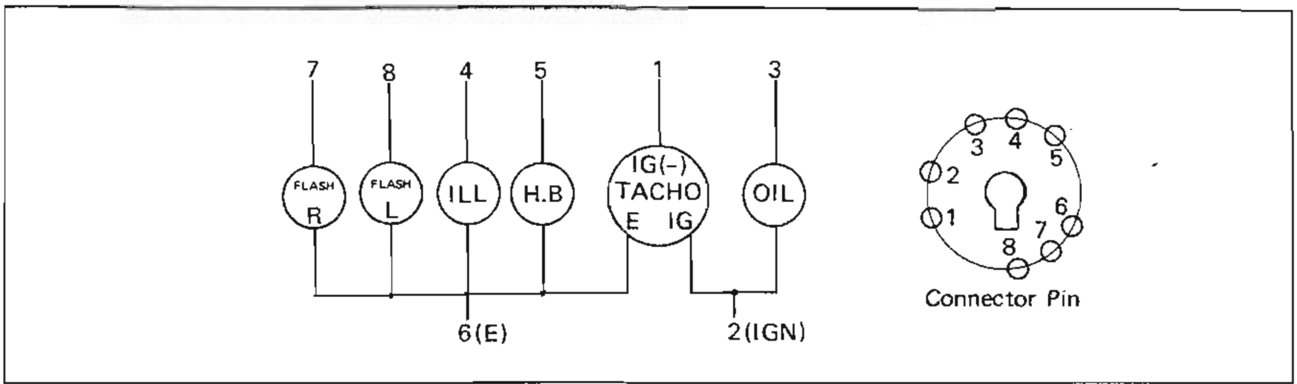


Fig. 15–26 Print panel interconnection diagram (808 L.H.D)

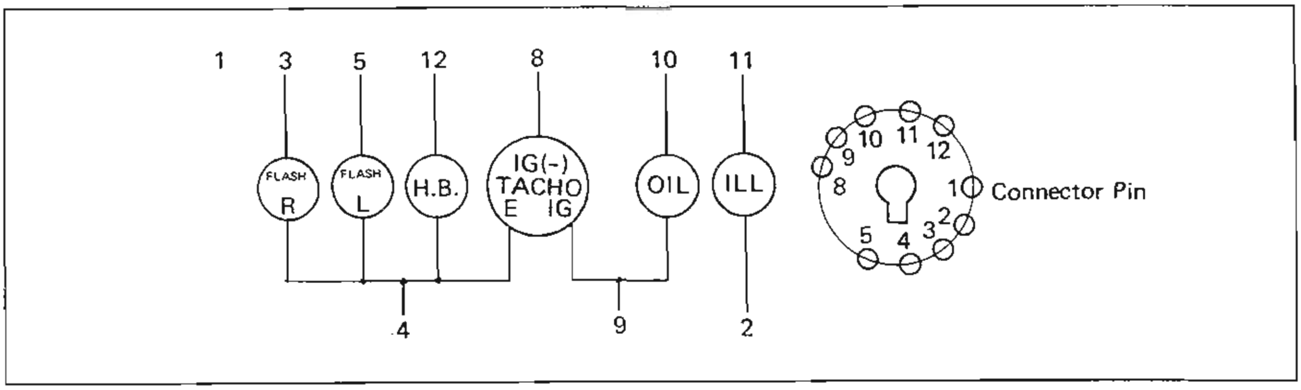


Fig. 15–27 Print panel interconnection diagram (808 of U.S.A and Canadian specifications)

15–K–2. Checking Combination Meter Print Panel

Check the continuity between connector pin and lamp, and that between connector pin and meter using the circuit tester according to the interconnection diagram below.

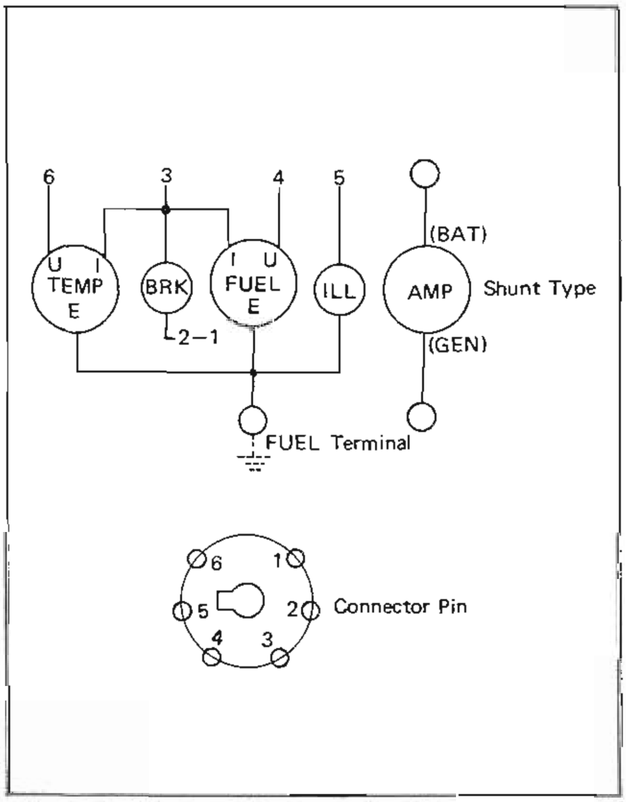


Fig. 15–28 Print panel interconnection diagram (RX-3 R.H.D)

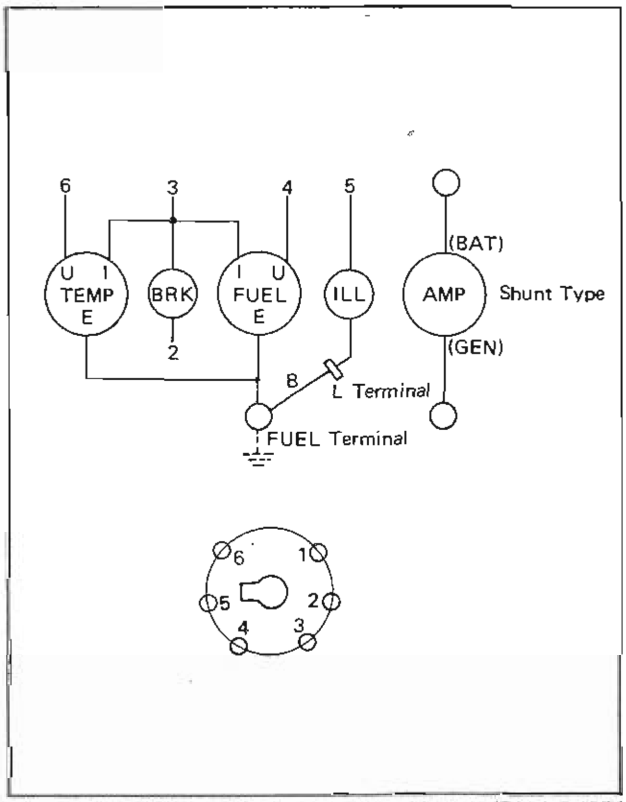


Fig. 15–29 Print panel interconnection diagram (RX-3 L.H.D)

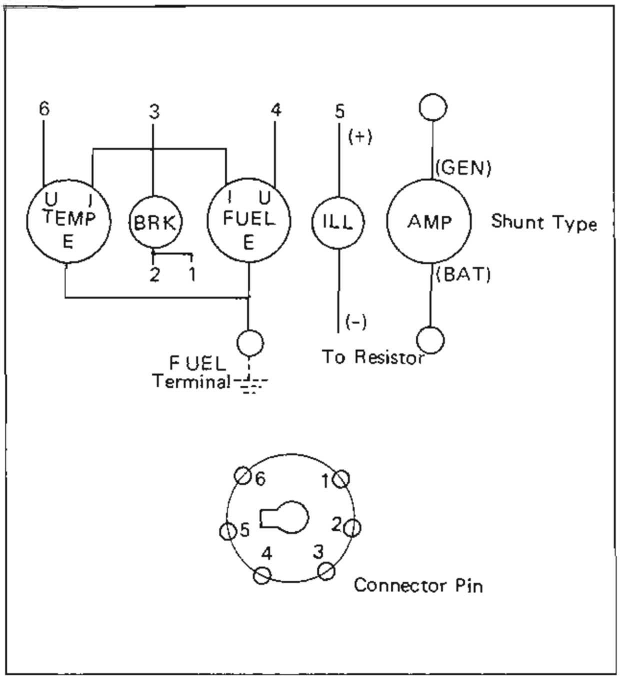


Fig. 15–30 Print panel interconnection diagram (808 R.H.D)

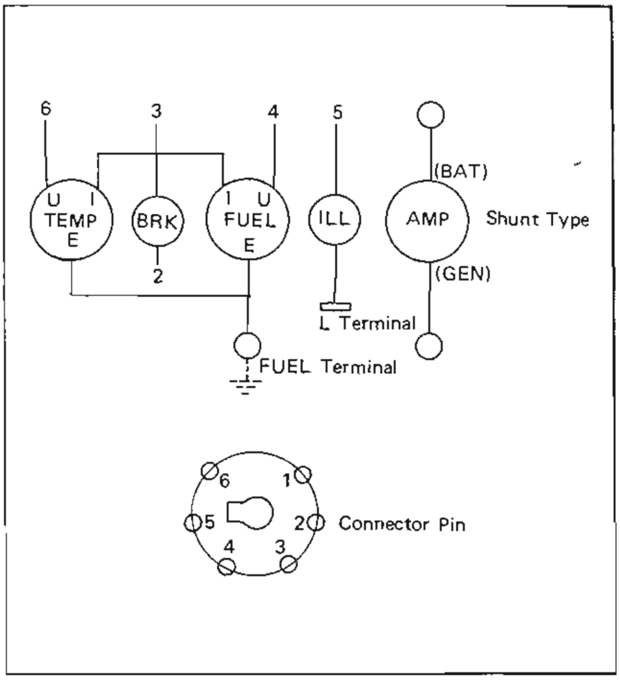
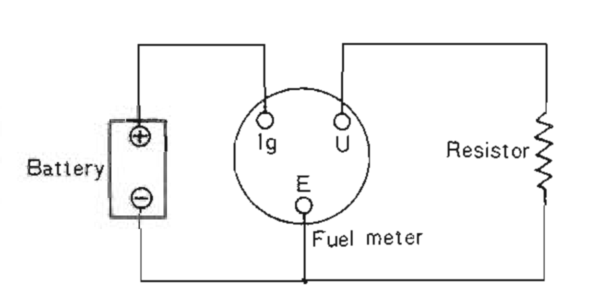


Fig. 15–31 Print panel interconnection diagram (808 L.H.D)

15–K–3. Checking Fuel Meter
Connect the battery, meter and resistor according to the following diagram, and check the meter indicator in the order of F, 1/2 and E.



Fuel meter graduation	E	1/2	F
Unit resistance (Ω)	82.5	43	12

Fig. 15–32 Fuel meter interconnection diagram

Note:
The permissible error of the fuel meter indication is a width of the indicator needle to either upper or lower side as shown in Fig. 15–33.

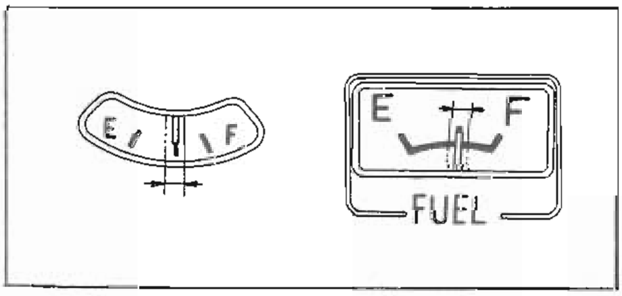
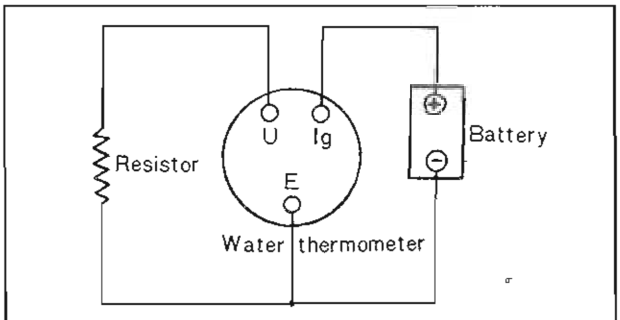


Fig. 15–33 Fuel meter

15–K–4. Checking Water Thermometer
Connect the battery, meter and resistor according to the following diagram, and check the meter indicator in the order of 35°, 110° and 120°C.



Water thermometer graduation	C (35°C)	60°C	110°C	H (120°C)
Unit resistance (Ω)	670	240	47.5	36.2

Fig. 15–34 Water thermometer interconnection diagram

Note:
The permissible error of the water thermometer indication is a width of the indicator needle to either upper or lower side as shown in Fig. 15–35.

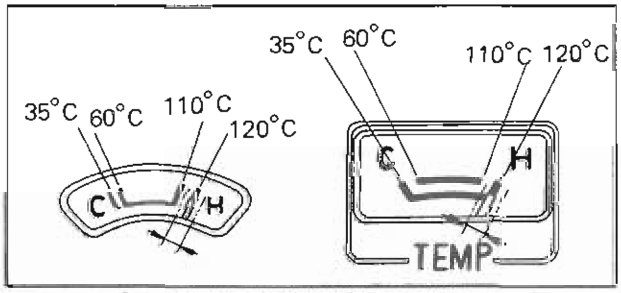


Fig. 15–35 Water thermometer

1976
Mazda RX-3·808
WORKSHOP MANUAL
CHASSIS
SUPPLEMENT

FOREWORD

This manual is a supplement to the RX-3, 808 (CHASSIS) workshop manual. Service information contained in this manual covers only those features that are new for 1976 RX-3, 808 (CHASSIS).

Refer to the RX-3, 808 (CHASSIS) workshop manual for service procedures common to previous and 1976 models.

The model name, "MAZDA 808", in this material stands for "Automobiles MAZDA 818" in France and her territories, and "MAZDA 818" in other European and all African countries.

1906211

Section 9. Rear Axle

1. Final Gear Ratio

The final gear ratio has been changed as follows.

808 (1600) 3.700 → 3.727

808 (1300) 4.111 → 4.100

This modification will be applied from our September production in 1975.

2. Ring Gear Tightening Torque

In order to further improve the mechanical characteristic of the ring gear tightening bolts, the material of the bolts has been changed. According to this modification the tightening torque of the ring gear has been also changed from 5.5 ~ 6.5 m-kg (40 ~ 47 ft-lb) to 6.5 ~ 7.5 m-kg (47 ~ 54 ft-lb).

(Refer to Service Information M024/75)

Applied Models, Car Nos. & Production Dates:

Models	Car Nos.	Production Dates.
808 (1600) Sedan	No. 146495	December 13, 1974
808 (1600) Coupe	No. 146496	December 13, 1974
808 (1600) Wagon	No. 119689	December 24, 1974

Section 10. Steering

1. Steering Ball Joint

New ball joint manufactured by T.R.W. Co., Ltd., is put in use for all 808 models. The configuration of the knuckle arm, pitman arm and center link have been altered accordingly.

The tightening torque of the ball joint nuts has been changed to 3.0 ~ 4.5 m-kg (22 ~ 23 ft-lb) from 2.5 ~ 3.5 m-kg (18 ~ 25 ft-lb).

This modification will be applied from our September production in 1975.

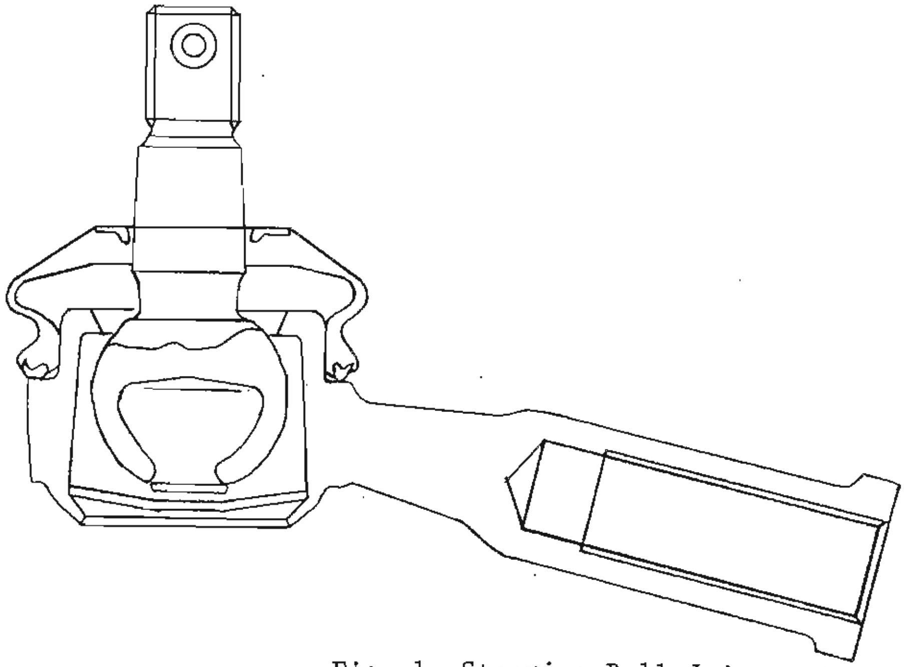


Fig. 1 Steering Ball Joint

Section 11. Brakes

1. Differential Proportioning Valve (E.C.E., E.C.E. Arctic, West Germany Spec.)

The differential proportioning valve has been newly equipped, and the fail indicator is included in this valve.

The differential proportioning valve is serviced as an assembly and never adjusted or overhauld.

This modification has been applied from our July production in 1975.

1-A Removing of Differential Proportioning Valve.

1. Pull off the wire from the differential proportioning valve.
2. Disconnect the fluid pipes at the differential proportioning valve inlets and outlets.
3. Remove the bolts that attach the differential proportioning valve.
4. Remove the differential proportioning valve.

1-B Installing of Differential Proportioning Valve.

Follow the removal procedures in the reverse order.

Note: After installing the differential proportioning valve, bleed the hydraulic system.

1-C Centralizing Brake Fail Indicator.

After any repair or bleeding of the front or rear brake system, the brake warning light will usually continue to be illuminated due to the brake fail indicator remaining in the off center position. To centralize the brake fail indicator, turn off the warning light after a repair operation.

1. Turn the ignition switch to the ON position
2. Check the fluid level in the master cylinder reservoir and fill them to 3/4 full of the brake fluid.
3. Depress the brake pedal and piston will center itself causing the brake warning light to go out.
4. Turn the ignition switch to the OFF position.
5. Before driving the vehicle, check operation of the brakes and be sure that a firm pedal is obtained.

2. Rear Wheel Cylinder (E.C.E. E.C.E. Arctic, West Germany Spec.)

The inside diameter of the rear wheel cylinder has been changed from 5/8 in (15.87 mm) to 3/4 in (19.05 mm).

This modification has been applied from our July production in 1975.

3. Power Brake Unit (E.C.E., E.C.E. Arctic, West Germany Spec.)

808 (1300) ... 6" power brake unit has been newly equipped.

808 (1600) ... The power piston diameter has been changed from 5" to 6".

Since its construction and function are same as before, service should be performed based on the Workshop Manual.

This modification has been applied from our July production in 1975.

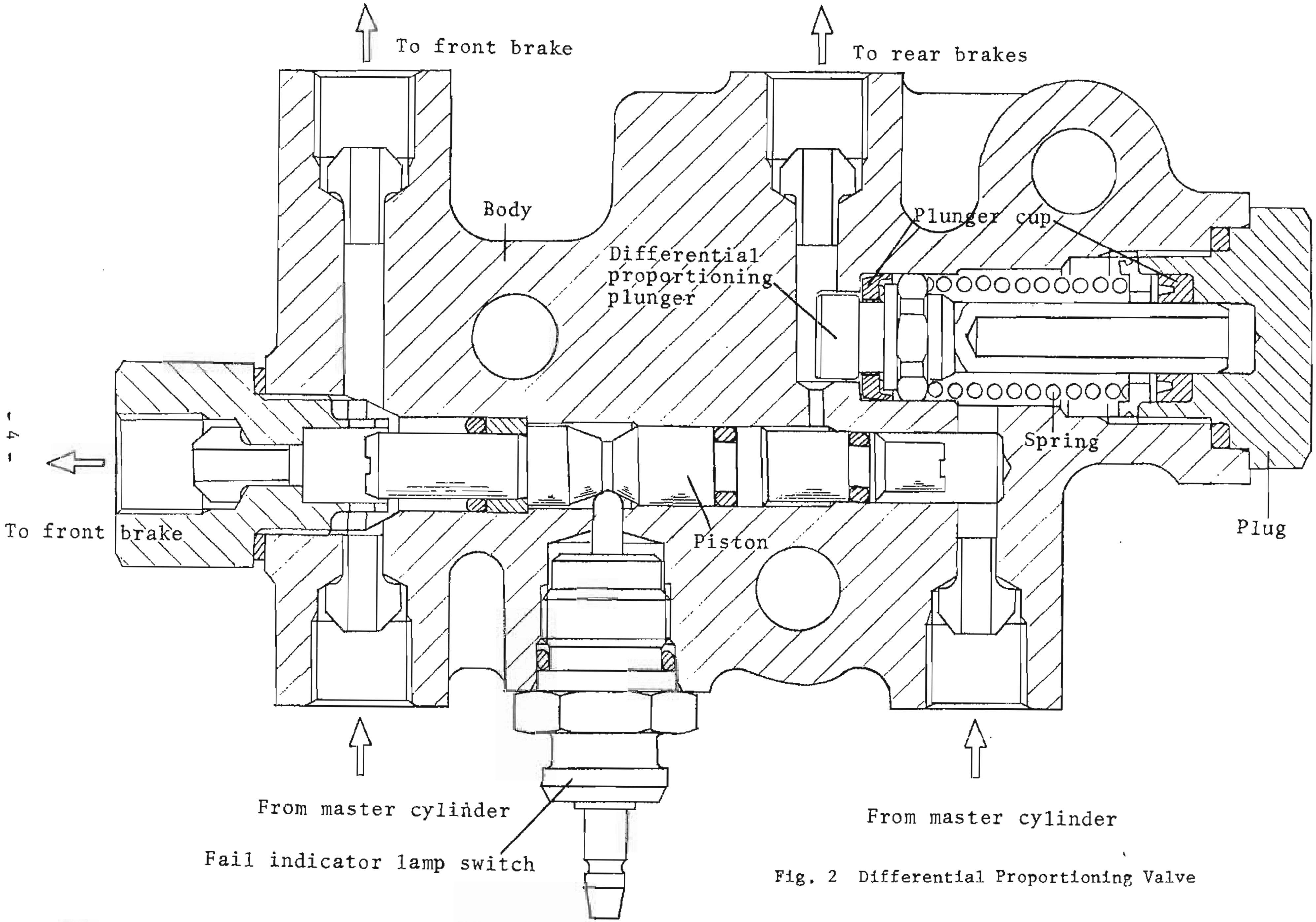


Fig. 2 Differential Proportioning Valve