DATSUN 510

RANGE: 1969-1973

WORKSHOP
MAINTENANCE & REPAIR
MANUAL

DRAKE PUBLISHERS, INC.

auto Datsun

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RANGE: 1969-1973

WORKSHOP MAINTENANCE & REPAIR MANUAL

BY DRAKE AUTOMOTIVE EDITORS

Quick Reference Index

The purpose of this manual is to provide the automobile owner and mechanic with a reference source with which he can perform normal service operations.

We endeavor to incorporate the latest manufacturing design changes and up-to-date specifications at the time of publication. While every effort is made to attain accuracy, the Publisher cannot be held responsible for manufacturing changes, typographical errors or omissions.

Upon compiling the information contained herein, we have tried to be brief and simple, relying on the combination of photographs, illustrations and text to make this manual a useful tool.

DRAKE

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VALVE CLEARANCE

Valve clearance adjustment is performed with the engine not running. The initial adjustment is made while the engine is cold.

Remove the air cleaner. Unbolt and remove the camshaft cover. Each valve must be adjusted with the valve completely closed; that is, the rocker arm should be at the base (lowest point) of the cam lobe. Loosen the locking nut and turn the adjusting screw until the specified clearance is obtained as checked with a fuel gauge between the rocker arm and camshaft. Straighten the locking nut. Repeat this procedure on each valve, turning the engine over by hand to position each valve as necessary. Temporarily replace the camshaft cover with two or three bolts and warm up the engine. Remove the cover and recheck the valve clearance according to the warranty certificates. Readjust as necessary. Replace the camshaft cover using a new gasket if the old gasket appears flattened or broken. Run engine and check for leaks from the gasket.

Valve clearance

Unit: mm (in)

Cold	Intake	0.20 (0.008)
	Exhaust	0.25 (0.010)
Warm	Intake	0.25 (0.010)
	Exhaust	0.30 (0.012)

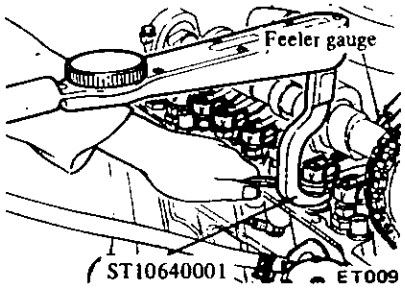

Fig. 1 Adjusting valve clearance

FAN BELT

Check for cracks or damage. Replace if necessary.

Adjust belt tension. It is correct if deflection is 0.315 to 0.472 in. when thumb pressure (22.0 lb) is applied midway between fan and alternator pulleys.

ENGINE OIL

Check if oil is diluted with water or gasoline. Drain and refill oil if necessary.

Notes:

a. A milky oil indicates the presence of cooling water. Isolate the cause and take corrective measure.

b. An oil with extremely low viscosity indicates dilution with gasoline.

Check oil level. If below the specified level, raise it up to the H level.

Engine oil capacity

(including oil filter)

Maximum (H level)

4½ U.S. qts.

Minimum (L level)
3½ U.S. qts.

OIL FILTER

The oil filter is of a cartridge type.

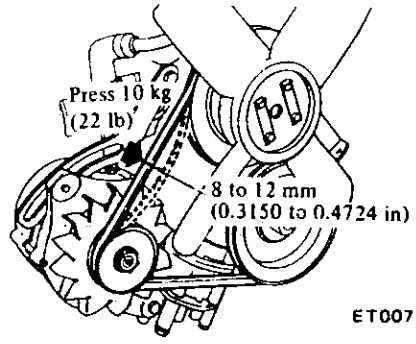

Fig. 2 Drive belt tension

Percent concentration	Boiling point		Freeze protection
	Sea level	0.9 kg/cm^2 cooling system pressure	
30%	106°C (221°F)	124°C (255°F)	−15°C (5°F)
50%	109°C (228°F)	127°C (261°F)	−35°C (−31°F)

Water capacity

	610	620	510
Without heater	6.0 ℓ (1 ¾ U.S. gal., 1 ¾ Imper. gal.)	5.4 ℓ (1 ¾ U.S. gal., 1 ½ Imper. gal.)	6.4 ℓ (1 ¾ U.S. gal., 1 ¾ Imper. gal.)
With heater	6.5 ℓ (1 ¾ U.S. gal., 1 ¾ Imper. gal.)	6.0 ℓ (1 ¾ U.S. gal., 1 ¾ Imper. gal.)	6.8 ℓ (1 ¾ U.S. gal., 1 ½ Imper. gal.)

Check for oil leaks past gasketed flange. If any leakage is found, retighten just enough to stop leakage. If retightening is no longer effective, replace filter as an assembly.

When installing oil filter, tighten by hand.

Note: Do not overtighten oil filter, lest leakage should occur.

COOLANT

Nissan Long Life Coolant

L.L.C. is an ethylene glycol base product containing chemical inhibitors to protect the cooling system from rusting and corrosion. The L.L.C. does not contain any glycerine, ethyl or alcohol. It will not evaporate or boil away and can be used with either high or low temperature thermostats. It flows freely, transfers heat efficiently, and will not clog the passages in the cooling system. The L.L.C. must not be mixed with other product. This coolant can be used throughout the seasons of the year.

Whenever any coolant is changed, the cooling system must be flushed and refilled with a new coolant. Check the level.

COMPRESSION

When it becomes necessary to check cylinder compression, it is essential to remove all spark plugs. The purpose of this test is to determine whether there is excessive leakage past the piston rings, head gasket, etc. To test, the engine should be heated to the operating temperature and throttle and choke valves opened.

Cylinder compression in cylinders should not be less than 80% of the highest reading. Dif-

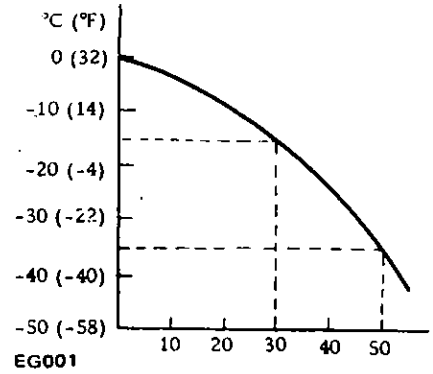

Fig. 3 Protection concentration

ferent compression in two or more cylinder usually indicates an improperly seated valve or broken piston ring.

Low compression in cylinders can result from worn piston rings. This trouble may usually be accompanied by excessive fuel consumption.

Test Result

If cylinder compression in one or more cylinders is low, pour a small quantity of engine oil into cylinders through the spark plug holes and retest compression.

If adding oil helps the compression pressure, the chances are that rings are defective.

If pressure stays low, the likelihood is that valve is sticking or seating improperly.

If cylinder compression in any two adjacent cylinders is low, and if adding oil does not help the compression, this could be leakage past the gasketed surface.

Oil and water in combustion in any two adjacent cylinders is low, and if adding oil does not help the compression, this could be leakage past the gasketed surface.

Oil and water in combustion chambers can result from this trouble.

Compression pressure

psi/at rpm

Standard 171/350
Minimum 128/350

BATTERY

Check electrolyte level in each battery cell.

Unscrew each filler cap and inspect fluid level. If the fluid is low, add distilled water to bring the level up approximately 0.394 to 0.787 in. above the plates. Do not overfill.

Measure the specific gravity of battery electrolyte.

Clean top of battery and terminals with a solution of baking soda and water. Rinse off and dry with compressed air. Top of battery must be clean to prevent current leakage between terminals and from positive terminal to hold-down clamp.

In addition to current leakage, prolonged accumulation of acid and dirt on top of battery may cause blistering of the material covering connector straps and corrosion of straps. After tightening terminals, coat them with petroleum (vaseline) to protect them from corrosion.

	Permissible value	Full charge value (at 20°C (68°F))
Frigid climates	Over 1.22	1.28
Tropical climates	Over 1.18	1.23
Other climates	Over 1.20	1.26

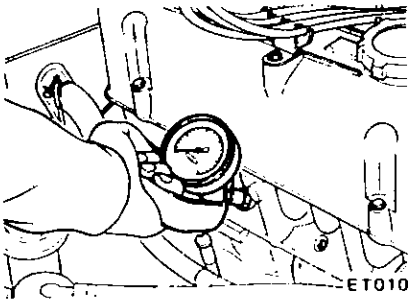

Fig. 4 Testing compression pressure

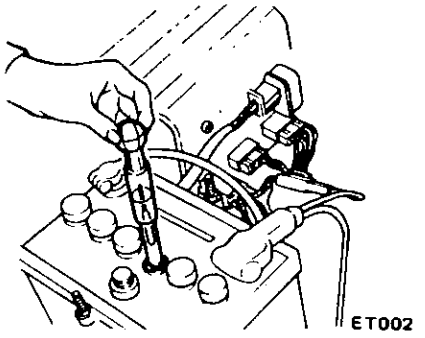

Fig. 5 Checking specific gravity of battery electrolyte

IGNITION TIMING

Check spark plugs and distributor breaker points for condition.

Thoroughly wipe off dirt and dust from timing mark on crank pulley and timing indicator on and front cover.

Warm up engine sufficiently.

Install a timing light on No. 1 cylinder spark plug wire, and install a tachometer.

Set idling speed to approximately 800 rpm.

Check ignition timing if it is 5° B.T.D.C. (Before Top of Dead Center) by the use of timing light.

If necessary, adjust it as follows;

Loosen set screw to such an extent that distributor can be moved by hand.

Adjust ignition timing to 5° B.T.D.C.

Lock distributor set screw, and make sure that timing is correct.

Ignition timing:

5° (Retard side)
12° (Advance side)

POINTS

Check the distributor breaker points for abnormal pitting and wear. Replace if necessary. Make sure they are in correct alignment for full contact and that point dwell and gap are correct. Clean and apply distributor grease to the cam and wick.

Note: Do not apply grease excessively.

Point gap

0.0177 to 0.0217 in.

Dwell angle
49 to 55 degrees

CONDENSER

Clean outlet of condenser lead wire, and check for loose set screw. Retighten if necessary.

Check condenser capacity with a capacity meter. Condenser insulation resistance may be also checked using a tester by adjusting its range to measure large resistance value. When condenser is normal, the tester pointer swings largely and rapidly, and moves gradually back to the infinite side. When the pointer does not stay still or it points zero in resistance, replacement is necessary.

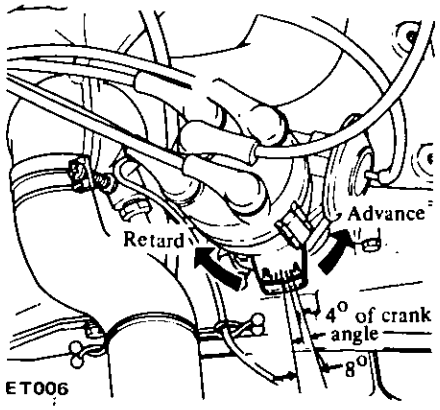

Fig. 6 Adjusting ignition timing

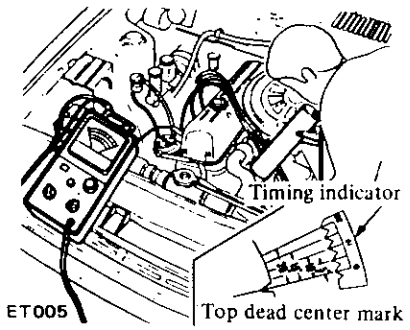

Fig. 7 Checking ignition timing

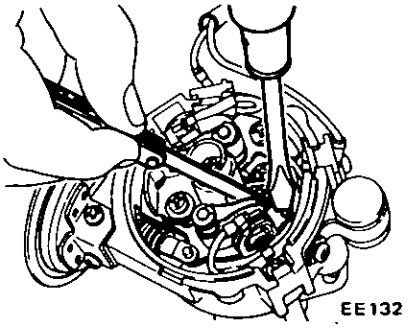

Fig. 8 Checking distributor point gap

Condenser capacity

Retard side 0.05 μ F

(Micro Farad)

Advance side 0.22 μ F

(Micro Farad)

Condenser insulation resistance
5MΩ (Mega ohms)

SPARK PLUGS

Remove and clean plugs in a sand blast cleaner. Inspect each spark plug. Make sure that they are of the specified heat range. Inspect insulator for cracks and chips. Check both center and ground electrodes. If they are excessively worn, replace with new spark plugs. File center electrode flat. Set the gap to 0.028 to 0.031 in. using proper adjusting tool. Tighten plugs to 11.0 to 15.0 ft-lb torque.

CARBURETOR

Idle mixture adjustment requires the use of a "CO" meter. When preparing to adjust idle mixture, it is essential to have the meter thoroughly warmed and calibrated.

Warm up engine sufficiently.

Continue engine operation for one minute at idling speed.

Adjust throttle adjusting screw so that engine speed is 800 rpm (in "N" range for automatic transmission).

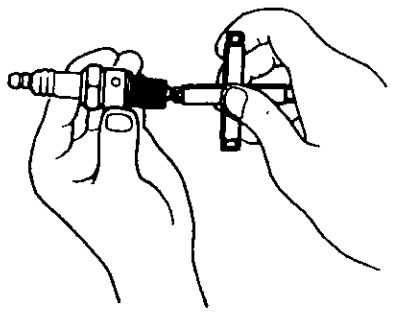

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Fig. 9 Checking spark plug point gap

Check ignition timing, if necessary adjust it to the specifications. (5°/800 rpm, retard side)

Adjust idle adjusting screw so that "CO" percentage is 1.5±0.5%.

Repeat the procedures as described in items 3 and 5 above so that "CO" percentage is 1.5±0.5% at 800 rpm.

Caution:

a. On automatic transmission equipped model, check should be done in the "D" range.

Be sure to apply parking brake and to lock both front and rear wheels with wheel chocks.

b. Hold brake pedal while stepping down on accelerator pedal. Otherwise car will rush out dangerously.

On automatic transmission equipped model, make sure that the adjustment has been made with the selector lever in "N" position.

And then check the specifications with the lever in "D" position. Insure that "CO" percent and idle speed are as follows.

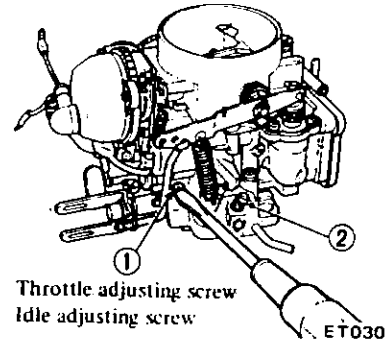
Idling rpm 650

"CO" percentage 1.5±0.5%.

Readjust by turning in or out throttle adjusting screw or idle adjusting screw if still out.

Notes:

a. Do not attempt to screw down idle ad-



1 Throttle adjusting screw
2 Idle adjusting screw

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Fig. 10 Throttle and idle adjusting screws

justing screw completely to avoid damage to tip, which will tend to cause malfunctions.

b. After idle adjustment has been made, shift the lever to "N" or "P" range for automatic transmission.
c. Remove wheel chocks when running.

Idle Limiter Cap

Do not remove this idle limiter cap unless necessary. If this unit is removed, it is necessary to re-adjust it at the time of installation. To adjust proceed as follows.

After adjusting throttle or idle speed adjusting screws, check to be sure that the amount of "CO" contained in exhaust gases meets the established standard.

Install idle limiter cap in position, making sure that the adjusting screw further turn 1/8 rotation in the "CO-RICH" direction.

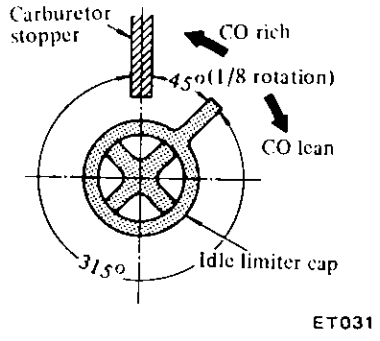


Fig. 11 Setting idle limiter cap

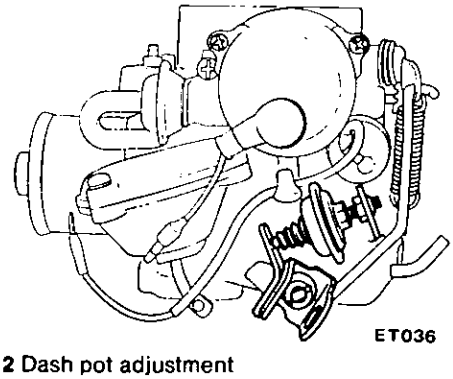


Fig. 12 Dash pot adjustment

CHECKING AND ADJUSTING DASH POT (Automatic Transmission only)

Proper contact between throttle lever and dash pot stem provides normal dash pot performance. Adjustment of the proper contact can be made by dash pot set screw.

If normal set can not be obtained between dash pot stem and throttle arm, rotate dash pot to the proper position.

Installed On Engine

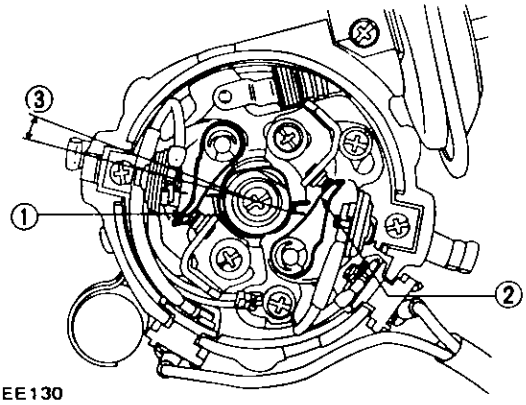
It is necessary that the idling speed of engine and mixture have been well turned up and engine is sufficiently warm.

Turn throttle valve by hand, and read engine speed when dash pot just touches the stopper lever.

Adjust the position of dash pot by turning nut until engine speed is in the range of 1,600 to 1,800 rpm.

Then fasten loosened lock nut.

Make sure that the engine speed is smoothly reduced from 2,000 to 1,000 rpm in about three seconds.



1 Advanced breaker point
2 Retarded breaker point
3 Phase difference

Fig. 13 Dual point distributor

DUAL POINT DISTRIBUTOR

Distributor has two breaker points, located opposite each other with a phase difference as shown in Figure 13.

The difference in phase can be adjusted by the adjusting screw. A phase difference of 7 crank angles is adopted.

Those two breaker points are placed parallel in the primary ignition circuit. The retarded breaker point works when the relay is turned "ON" and the advanced breaker point works when the relay is turned "OFF."

Cap and Rotor Head

Cap and rotor head must be inspected at regular intervals. In addition, remove cap and clean all dust and carbon deposits from cap and rotor from time to time. If cap is cracked or is leaking, replace with a new one.

Point

Standard gaps of both points are 0.0177 to 0.0217 in. If the gap is off the standard, adjustment must be made by loosening point screws. Gap gauge is required for adjustment.

Both gaps must be checked from time to time.

When point surface is rough, take off any irregularities with fine sand paper of No. 500 or 600 or with oil stone.

At this time, grease must be supplied to cam-shaft and cam heel. (Do not apply excessively.) When wear on each breaker point is noticeable, replace points together with contact arm.

Point gap:

0.018 to 0.022 in

Dwell angle:

49° to 55°

If point gap is adjusted by examining dwell angle, install distributor on engine and proceed as follows:

Disconnect wiring harness of distributor from engine harness.

Using a lead wire, connect B (black) of engine harness and B (black) of distributor harness (advance side).

Adjust dwell angle of advance side by loosening point screw.

Disconnect lead wire from B (black) of distributor harness and then connect it to Y (yellow) of distributor (Retard side).

Adjust dwell angle of retard side by loosening point screw.

After adjustment, disconnect lead wire then connect engine harness and distributor harness securely.

Phase Difference

To check phase difference, install distributor on engine and proceed as follows:

Disconnect wiring harness of distributor from engine harness.

Using a lead wire, connect B (black) of engine harness and B (black) of distributor harness. (Advance side). See Figure 15.

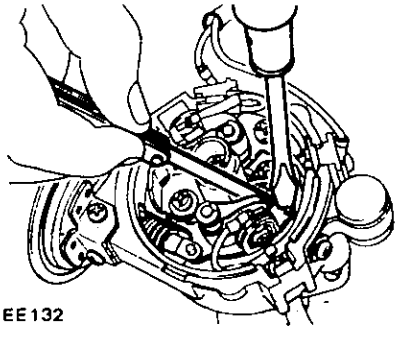


Fig. 14 Checking of distributor breaker point gap

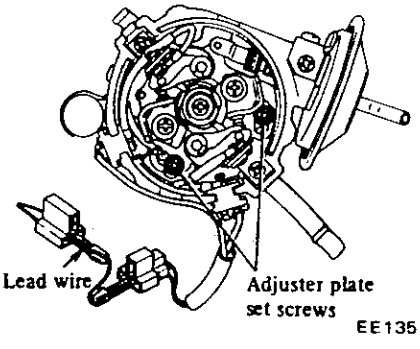


Fig. 15 Connect lead wire

Spark timing control system for Automatic Transmission

	Throttle SW.	Spark timing	
		"Advance"	"Retard"
Engine start	ON	–	O
Idling	ON	–	O
Partial throttle opening	ON	–	O
Wide throttle opening (and high speed crousing)	OFF	O	–

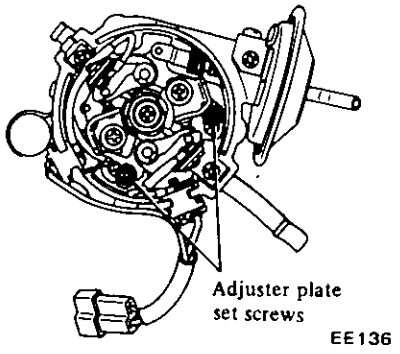


Fig. 16 Adjuster plate set screws

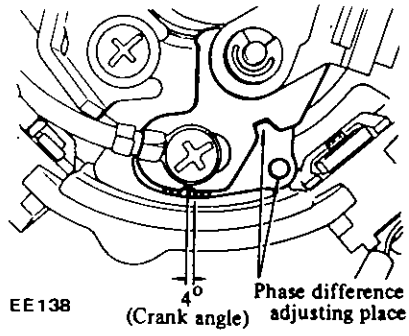


Fig. 18 Phase difference adjusting scale

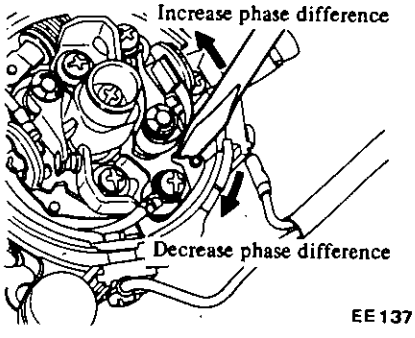


Fig. 17

With engine idling, adjust ignition timing by rotating distributor to specifications. (12°/800 rpm, advance side)

Disconnect lead wire from B (black) of distributor harness and then connect it to Y (yellow) of distributor harness. (Retard side)

With engine still idling, check to determine that phase delay is 7 degrees in terms of crank shaft angular displacement.

To correct, further proceed as follows:

Referring to Figure 16, turn out adjuster plate set screw 1/2 to 2 turns. The screw is located at contact set on retard side.

Using a notch in adjuster place as a hold, turn adjuster plate as required until correct delay is obtained. Ignition is retarded when plate is turned counterclockwise.

Note: Refer to graduations on breaker plate to make adjustment easier. One graduation corresponds to crankshaft angular displacement of 4 degrees.

Tighten adjuster plate set screws to secure the adjustment.

Make sure that the ignition timing of advance side is the specifications.

After adjustment, remove lead wire and connect wiring harness of distributor to engine harness securely.

TUNE-UP GUIDE

Ignition and fuel system		
Ignition timing	degree	5° (B.T.D.C.)
Distributor		
Point gap	mm (in)	0.45 to 0.55 (0.0177 to 0.0217)
Dwell angle	degrees	49 to 55
Condenser capacity	μF	retard side 0.05 advance side 0.22
Condenser insulation resistance	MΩ	5
Idling adjustment		
Manual Transmission	degree/rpm	5°/800 (retard side)
	CO %	1.5 ± 0.5
Automatic Transmission	degree/rpm	5°/650 (retard side, "D" range)
	CO %	1.5 ± 0.5
Dash pot adjustment	rpm	1,600 to 1,800
Anti-dieseling solenoid tightening torque	kg-cm (in-lb)	35 to 55 (30 to 48)
Spark timing control system		
Throttle switch operating angle		
L18 A/T L16 (510) M/T	degree	35° 40°
L16 (620) A/T & M/T	degree	45°
Thermo-switch operating temperature	°C (°F)	5 to 13 (41 to 55)
Adjustment of operating pressure of B.C.D.D.		
B.C.D.D. set pressure		
A/T	mmHg (inHg)	−480 ± 20 (−18.9 ± 0.787)
M/T	mmHg (inHg)	−500 ± 20 (−19.7 ± 0.787)
A.T.C. Air cleaner		
A.T.C. Valve opening temperature	°C (°F)	37.5 to 48 (100 to 118)

TROUBLE SHOOTING

Condition	Probable cause	Corrective action
CANNOT CRANK ENGINE OR SLOW CRANKING	Improper grade oil.	Replace with proper grade oil.
	Discharged battery.	Charge battery.
	Defective battery.	Replace.
	Loose fan belt.	Adjust.
	Trouble in charge system.	Inspect.
	Wiring connection trouble in starting circuit.	Correct.
	Defective ignition switch.	Repair or replace.
	Defective starter motor.	Repair or replace.

(Trouble-shooting procedure on starting circuit)
Switch on the starting motor with light "ON."

When light goes off or dims considerably.

a. Check battery.
b. Check connection and cable.
c. Check starter motor.

When light stays bright.

a. Check wiring connection between battery and starter motor.
b. Check starter switch.
c. Check starter motor.

Condition	Probable cause	Corrective action
	Low or no current.	Check for loose terminal or disconnection in primary circuit. Check for burned points.
Ignition system in trouble	Burned distributor point.	Repair or replace.
	Improper point gap.	Adjust.
	Defective condenser.	Replace.
	Leak at rotor cap and rotor.	Clean or replace.
	Defective spark plug.	Clean, adjust plug gap or replace.
	Improper ignition timing.	Adjust.
	Defective ignition coil.	Replace.
	Disconnection of high tension cable.	Replace.
	Loose connection or disconnection in primary circuit.	Repair or replace.
Fuel system in trouble	Lack of fuel.	Supply.
	Dirty fuel strainer.	Replace.
	Dirty or clogged fuel pipe.	Clean.
	Fuel pump will not work properly.	Repair or replace.
	Carburetor choke will not work properly.	Check and adjust.
	Improper adjustment of float level.	Correct.
	Improper idling.	Adjust.
	Dirty or clogged carburetor.	Disassemble and clean.
	Clogged breather pipe of fuel tank.	Repair and clean.
	Damaged anti-dieseling solenoid.	Replace.
Low compression	Incorrect spark plug tightening or defective gasket.	Tighten to normal torque or replace gasket.
	Improper grade engine oil or low viscosity.	Replace with proper grade oil.
	Incorrect valve clearance.	Adjust.
	Compression leak from valve seat.	Remove cylinder head and lap valves.
	Sticky valve stem.	Correct or replace valve and valve guide.
	Weak or defective valve springs.	Replace valve springs.
	Compression leak at cylinder head gasket.	Replace gasket.
	Sticking or defective piston ring.	Replace piston rings.
	Worn piston ring or cylinder.	Overhaul engine.
(Trouble shooting procedure) Pour the engine oil from plug hole, and then measure cylinder compression.		
	Compression increases.	Trouble in cylinder or piston ring.
	Compression does not change.	Compression leaks from valve, cylinder head or head gasket.

Condition	Probable cause	Corrective action
IMPROPER ENGINE IDLING		
Fuel system in trouble	Clogged or damaged carburetor jets.	Clean or replace.
	Incorrect idle adjustment.	Adjust.
	Clogged air cleaner.	Replace element.
	Defective manifold gaskets or carbureto/ insulator.	Replace gasket or insulator.
	Improper float level adjustment.	Adjust.
Low compression		Previously mentioned.
Others	Incorrect valve clearance.	Adjust.
	Extremely low revolution.	Adjust.
	Poor acceleration above 1,000 rpm (Twin carb.)	Loosen idling adjusting nuts about a half turn.
	Defect or malfunction of the ignition system (spark plug, high tension cable, breaker point, ignition coil, etc.).	Replace
	Incorrect basic ignition timing.	Adjust
	Incorrect valve clearance.	Adjust
	B.C.D.D. adjustment incorrect.	Adjust.
	Damaged vacuum control solenoid.	Replace.
	Sticked anti-stall dash pot.	Replace.
ENGINE POWER NOT UP TO NORMAL		
Low compression		Previously mentioned.
Ignition system in trouble	Incorrect ignition timing.	Adjust.
	Defective spark plugs.	Clean, adjust or replace plugs.
	Defective distributor points.	Dress, or replace points. Also check condenser.
Fuel system in trouble	Malfunction of choke system.	Adjust.
	Clogged fuel pipe or floating valve.	Clean.
	Dirty or clogged fuel strainer.	Replace.
	Fuel pump will not work properly.	Repair or replace.
	Clogged carburetor jets.	Disassemble and clean.
Air intake system in trouble	Clogged air cleaner.	Replace element.
	Air inhaling from manifold gasket or carburetor gasket.	Replace gasket.

Condition	Probable cause	Corrective action
Overheating	Insufficient coolant.	Replenish.
	Loose fan belt.	Adjust fan belt.
	Worn or defective fan belt.	Replace.
	Defective thermostat.	Replace.
	Defective water pump.	Replace.
	Clogged or leaky radiator.	Flush, repair or replace.
	Defective radiator filler cap.	Replace.
	Air in cooling system.	Retighten each part of cooling system.
	Improper engine oil grade.	Replace with proper grade oil.
	Incorrect ignition timing.	Adjust.
	Defective carburetor (lean mixture).	Overhaul carburetor.
Overcooling	Defective thermostat.	Replace.
Others	Improper octane fuel.	Replace with specified octane fuel.
	Improper tire pressure.	Inflate to specified pressure.
	Dragging brake.	Adjust.
	Clutch slipping.	Adjust.
NOISY ENGINE		
Car knocking	Overloaded engine.	Use right gear in driving.
	Carbon knocking.	Disassemble cylinder head and remove carbon.
	Timing knocking.	Adjust ignition timing.
	Fuel knocking.	Use specified octane fuel.
	Preignition (misusing of spark plug).	Use specified spark plug.
Mechanical knocking		
Crankshaft bearing knocking.	This strong dull noise increases when engine is accelerated. To locate the place, cause a misfire on each cylinder. If the noise stops by the misfire, this cylinder generates the noise.	This is caused by worn or damaged bearings, or unevenly worn crankshaft. Renew bearings and adjust or change crankshaft. Check lubrication system.
Connecting rod bearing knocking.	This is a little higher-pitched noise than the crankshaft knocking, and also increases when engine is accelerated. Cause a misfire on each cylinder and if the noise deminishes almost completely, this crankshaft bearing generates the noise.	Same as the case of crankshaft bearings.
Piston and cylinder noise.	When you hear an overlapping metalic noise which increases its magnitude with the revolution of engine and which decreases as engine is warmed up, this noise is caused by piston and cylinder. To locate the place, cause a misfire on each cylinder.	This may cause an abnormal wearing of cylinder and lower compression which in turn will cause a lower out-put power and excessive consumption of oil. Overhaul engine.

Condition	Probable cause	Corrective action
Piston pin noise.	This noise is heared at each highest and lowest dead end of piston. To locate the place, cause a misfire on each cylinder.	This may cause a wear on piston pin, or piston pin hole. Renew piston and piston pin assembly.
Water pump noise.	This noise may be caused by worn or damaged bearings, or by the uneven surface of sliding parts.	Replace water pump with a new one.
Others.	An improper adjustment of valve clearance.	Adjust.
	Noise of timing chain.	Adjust the tension of chain.
	An excessive end-play on crankshaft.	Disassemble engine and renew main bearing.
	Note: This noise will be heared when clutch is disengaged.	
	Wear on clutch pilot bushing.	Renew bush and adjust drive shaft.
	Note: This noise will be heared when clutch is disengaged.	
ABNORMAL COMBUSTION (back fire, after fire run-on etc.)		
Improper ignition timing	Improper ignition timing.	Adjust ignition timing.
	Improper heat range of spark plugs.	Use specified spark plugs.
Fuel system in trouble	Damaged carburetor or manifold gasket. (back fire, after fire)	Replace them with new parts.
	Defective carburetor jet.	Disassemble carburetor and check it.
	Improper function of the float.	Adjust the level, and check needle valve.
	Uneven idling. (Run on)	Adjust.
Defective cylinder head, etc.	Improperly adjusted valve clearance.	Adjust.
	Excess carbon in combustion chamber.	Remove head and get rid of carbon.
	Damaged valve spring (back fire, after fire).	Replace it with a new one.
EXCESSIVE OIL CONSUMPTION		
Oil leakage	Loose oil drain plug.	Tighten it.
	Loose or damaged oil pan gasket.	Renew gasket or tighten it.
	Loose or damaged chain cover gasket.	Renew gasket or tighten it.
	Defective oil seal in front and rear of crankshaft.	Renew oil seal.
	Loose or damaged locker cover gasket.	Renew gasket or tighten it (but not too much).
	Improper tightening of oil filter.	Renew gasket and tighten it with the proper torque.
	Loose or damaged oil pressure switch.	Renew oil pressure switch or tighten it.

Condition	Probable cause	Corrective action
Excessive oil consumption	Cylinder and piston wear.	Overhaul cylinder and renew piston.
	Improper location of piston ring gap or reversely assembled piston ring.	Remount piston rings.
	Damage piston rings.	Renew rings.
		Repair or renew piston and cylinder.
	Worn piston ring groove and ring.	Renew piston and piston ring.
	Fatigue of valve oil seal lip.	Replace seal lip with a new one.
	Worn valve stem.	Renew valve or guide.
Others	Inadequate quality of engine oil.	Use the designated oil.
	Engine overheat.	Previously mentioned.
POOR FUEL ECONOMY **See the explanation of the power decrease**		
Others	Exceeding idling revolution.	Adjust it to the designated rpm.
	Defective acceleration recovery.	Adjust it.
	Fuel leakage.	Repair or tighten the connection of fuel pipes.
TROUBLE IN OTHER FUNCTIONS		
Decreased oil pressure	Inadequate oil quality.	Use the designated oil.
	Overheat.	Previously mentioned.
	Defective function of oil pump regulator valve.	Disassemble oil pump and repair or renew it.
	Functional deterioration of oil pump.	Repair or replace it with a new one.
	Blocked oil filter.	Renew it.
	Increased clearance in various sliding parts.	Disassemble and replace the worn parts with new ones.
	Blocked oil strainer.	Clean it.
	Troubles in oil gauge pressure switch.	Replace it with a new one.
Excessive wear on the sliding parts	Oil pressure decreases.	Previously mentioned.
	Defective quality or contamination of oil.	Exchange the oil with proper one and change element.
	Defective air cleaner.	Change element.
	Overheat or overcool.	Previously mentioned.
	Improper fuel mixture.	Check the fuel system.
Scuffing of sliding parts	Decrease of oil pressure.	Previously mentioned.
	Insufficient clearances.	Readjust to the designated clearances.
	Overheat.	Previously mentioned.
	Improper fuel mixture.	Check the fuel system.

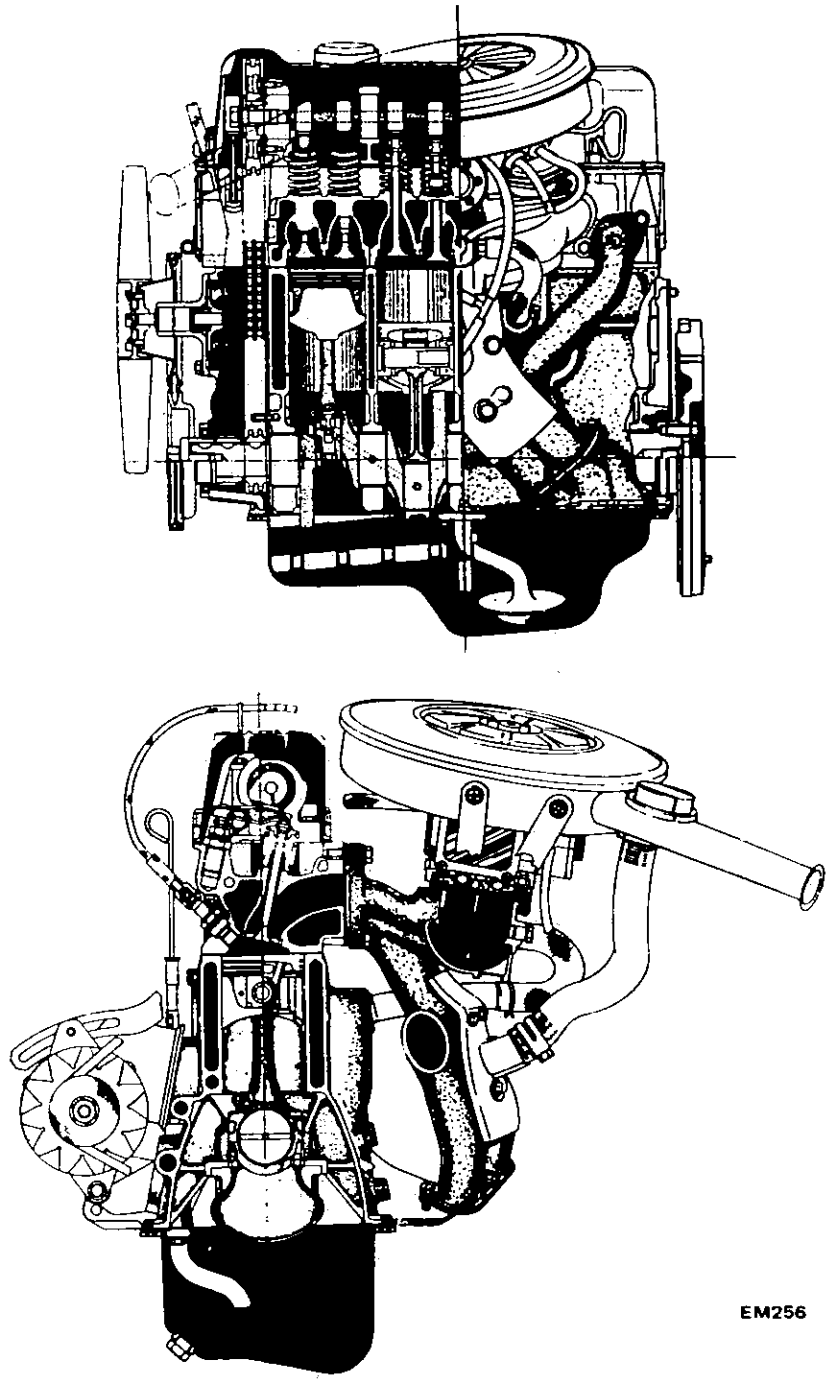
Engine

Engine

DESCRIPTION

The L16 and L18 engines feature O.H.C. valves, wedge-shaped combustion chamber, alminum heads and fully balanced 5-bearing crankshaft to turn out smooth, dependable power. The cylinder block is cast in a single unit, featuring deep skirting.

These engines are equipped with a single,



EM256

Fig. 19 Cross section view

2-barrel, downdraft carburetor that incorporates a special device to control emissions.

Experience has shown that it is much easier to remove the engine with transmission as a single unit than to remove the engine only.

The engine can then be separated from the transmission assembly.

REMOVAL

Scribe alignment marks on hood around hood hinges and remove hood from hinges.

Completely drain the cooling system, engine and transmission lubricant.

Remove blow-by hose from rocker cover and remove air cleaner.

Remove the radiator grille.

Disconnect the battery cable and remove the battery off the car.

Take off both upper and lower radiator hoses by removing the hose clamps. Then loosen the fixing bolts of the radiator, and take it out in sequence.

Note: If equipped with automatic transmission, remove the torque convertor cooling pipes from the radiator.

Remove engine fan and pulley.

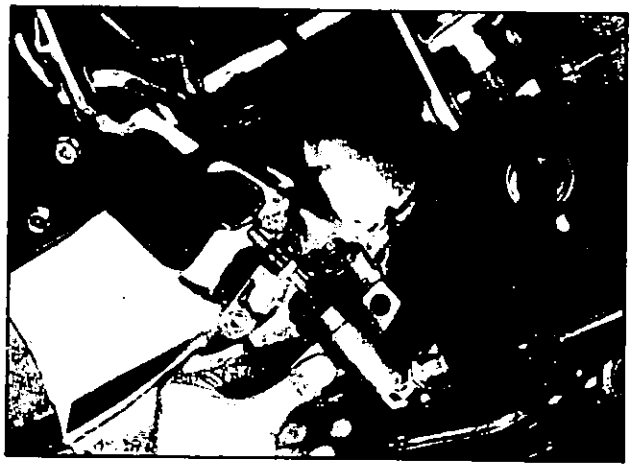


Fig. 20 Removing clutch operating cylinder

Disconnect the fuel tube from the fuel pump.

If equipped with heater, remove its hoses at engine attachment.

Disconnect accelerator control linkage and choke wire at the carburetor side.

Disconnect the wirings for the starter, alternator, ignition coil, oil pressure switch and thermal transmitter.

Remove the clutch operating cylinder and its return spring.

Disconnect the speedometer cable. Disconnect flat-attaching plug connector from the reverse lamp switch.

Disconnect the shift rods and select rods, and then remove the cross shaft assembly by removing the cross shaft bracket from the side member.

Disconnect the front exhaust tube from the exhaust manifold.

Disconnect the center tube from the rear tube and remove the front tube, pre-muffler and center tube assembly.

Disconnect the propeller shaft by disconnecting it from the companion flange of the gear carrier.

Jack up the transmission a little and then remove the rear engine mounting cross member by removing the fixing bolts of the engine mounting insulator, mounting cross member and hand brake cable clamp.

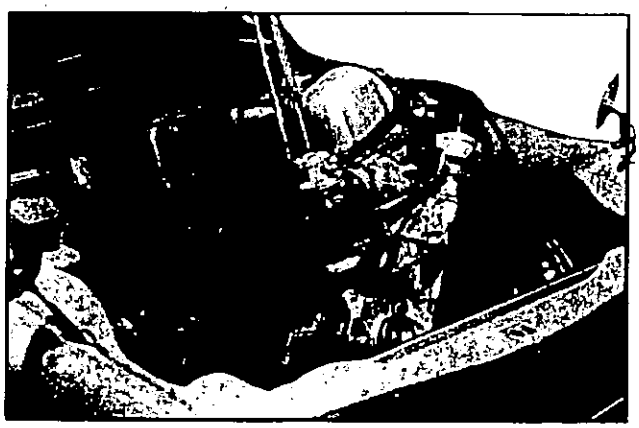


Fig. 21 Lifting engine

Remove the fixing bolts securing the front engine mounting insulators to cross member.

Hook with cable or chain to the stringers (hooks) which are installed on the engine cylinder head one at the front and the other at the rear.

At this lifting, lower the jack placed under the transmission gradually (draw off the jack at adequate stage), hoist up engine observing the tension of wire and adjusting the position of chain block so that the engine tilts in order to make it cleared off the body. At this lifting, take care that accessories installed on the body side do not touch the engine and transmission.

INSTALLATION

Reverse the removal procedure but do not connect any parts to the engine steadily until the engine mounting insulators have been replaced and power unit weight is taken by them.

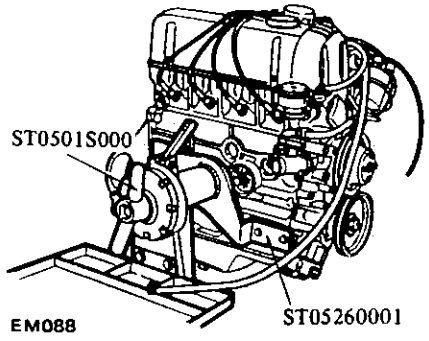


Fig. 22 Engine on engine stand

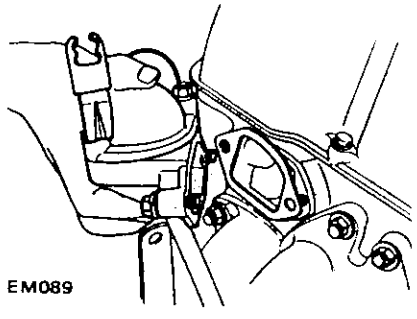


Fig. 23 Removing thermostat housing

DISASSEMBLY

Remove transmission from engine.

Thoroughly drain engine oil and coolant by removing drain plugs.

Place engine assembly on the engine stand.

Remove fan and fan pulley.

Remove engine mounting R.H.

Remove oil filter.

Remove oil pressure switch.

Install engine attachment to cylinder block using bolt holes securing alternator bracket and water drain plug.

Set engine on the stand.

Remove oil level gauge.

Remove clutch assembly.

Remove high tension cable.

Remove spark plugs.

Remove thermostat housing.

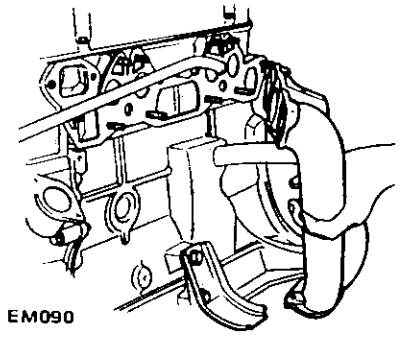


Fig. 24 Removing manifolds

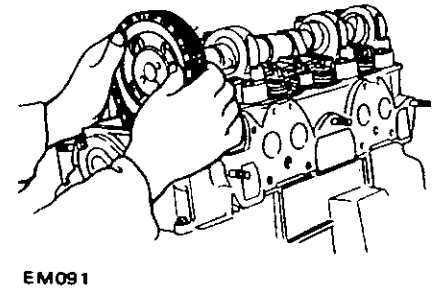


Fig. 25 Removing camshaft sprocket

Remove rocker cover.

Remove carburetor.

Remove intake and exhaust manifolds.

Remove engine mounting L.H.

Remove crank pulley.

Remove water pump.

Remove fuel pump.

Remove fuel pump drive cam.

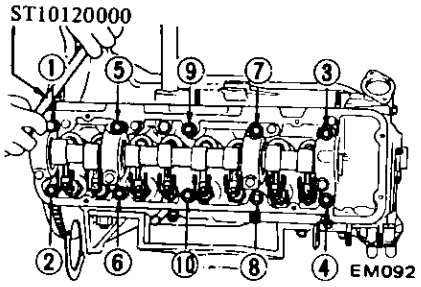


Fig. 26 Cylinder head bolt loosening sequence

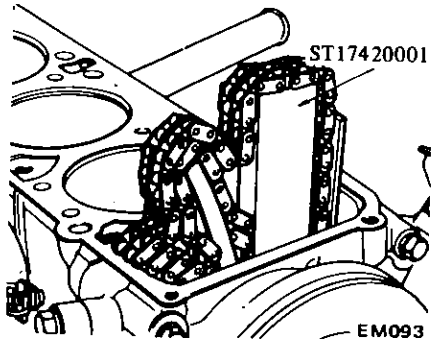


Fig. 27 Supporting timing chain

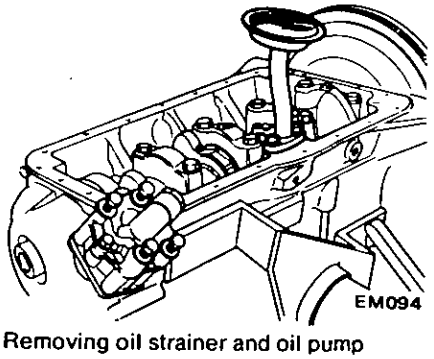


Fig. 28 Removing oil strainer and oil pump

Remove camshaft sprocket.

Remove cylinder head assembly. Loosen bolts from 1 to 10 as shown in Figure 26.

Note: For the convenience of cylinder head replacement, special tool "Chain Stopper ST17420001" is prepared to support timing chain during the service operation. By using this tool, timing marks on crankshaft sprocket and timing

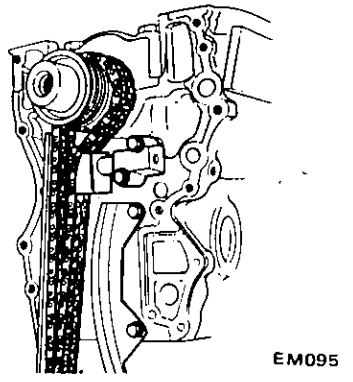


Fig. 29 Removing chain tensioner and timing chain

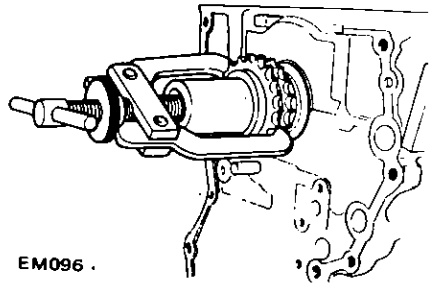


Fig. 30 Removing chain drive sprocket

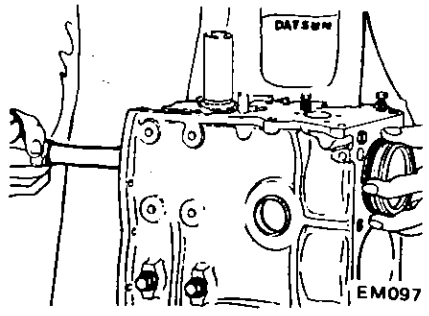


Fig. 31 Removing piston and connecting rod assembly

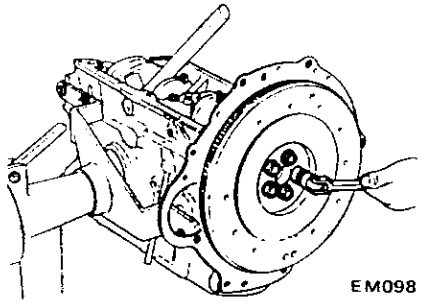


Fig. 32 Removing flywheel

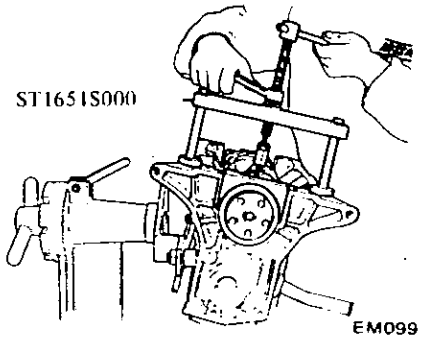


Fig. 33 Removing rear main bearing cap

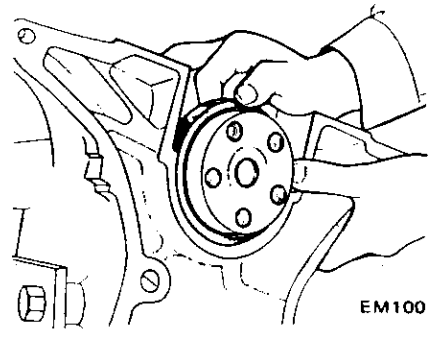


Fig. 34 Removing rear oil seal

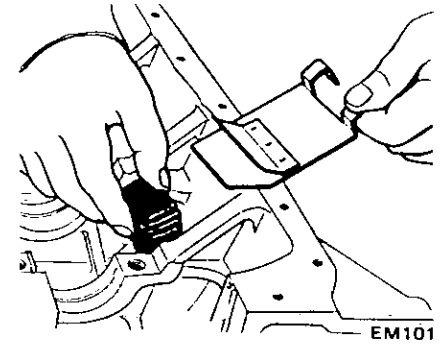


Fig. 35 Removing buffle plate and net

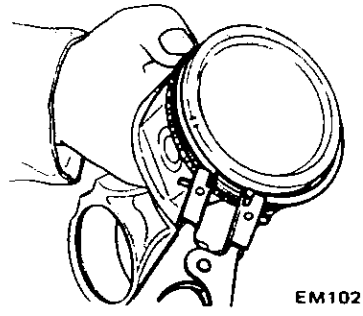


Fig. 36 Removing piston ring

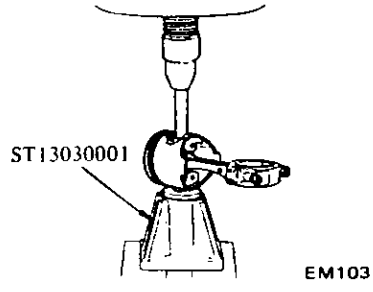


Fig. 37 Removing piston pin

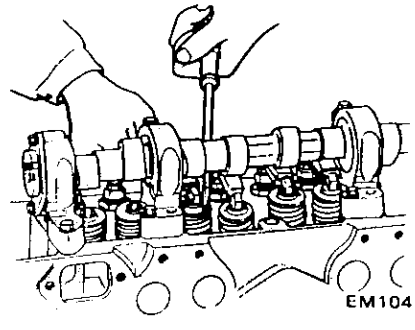


Fig. 38 Removing rocker arm

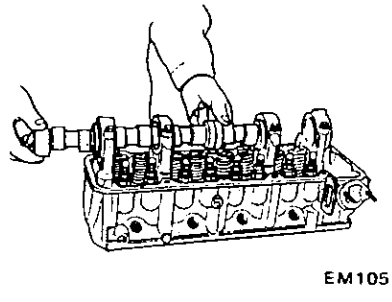


Fig. 39 Removing camshaft

chain will be unchanged. So the work for aligning timing marks will be saved so much.

Invert engine

Remove oil pan and oil strainer.

Remove oil pump and its drive spindle.

Remove front cover.

Remove chain tensioner.

Remove timing chain.

Remove oil thrower, crankshaft worm gear and chain drive sprocket.

Remove piston and connecting rod assembly. Take off connecting rod bearings and keep them in order.

Remove flywheel. Be careful not to drop it.

Remove main bearing caps.

Use special tool "Crankshaft Main Bearing Cap Puller ST1651S0000" to remove center and rear main bearing caps. Keep them in order.

Remove rear oil seal.

Remove crankshaft.
Remove baffle plate and cylinder block net.

Pistons and Connecting Rods
Remove piston rings with a ring remover.

Press out piston pin.
Keep the disassembled parts in order.

Cylinder Head
Loosen valve rocker pivot lock nut and remove rocker arm by pressing down valve spring.

Note: Take care not to lose valve rocker guide.

Remove camshaft.

Note: At this time, take care not to damage camshaft bearings and cam lobes.

Remove valves.

Take care not to lose valve spring seat, oil seal, valve collet, and valve rocker guide.

Note: Be sure to leave camshaft bearing intact. Because the bearing center is liable to be out of alignment.

ASSEMBLY

Precautions
Use thoroughly cleaned parts. Particularly, make sure that oil holes are clear of foreign matter.

When installing sliding parts such as bearings, be sure to apply engine oil to them.

Use new packings and oil seals.

Do not reuse lock washers that have been removed.

Keep tools and work benches clean.

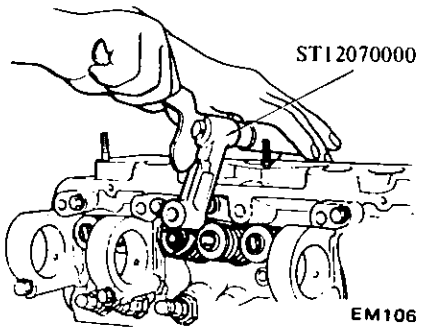


Fig. 40 Removing valve

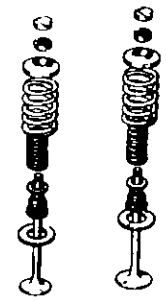


Fig. 41 Valve components

Keep the necessary parts and tools ready near at hand.

Be sure to follow specified tightening torque and order.

Applying sealant

Use sealant to eliminate water and oil leaks. Parts requiring sealant are:

Front cover gasket: Front side of cylinder block and cover gasket. See Figure 42.

Front cover: Top of front cover, see Figure 42.

Main bearing cap and cylinder block: Each side of rear main bearing cap and each corner of cylinder block. See Figure 43.

Cylinder block: Set portions at four mating surfaces (cylinder block to front chain cover and cylinder block to rear main bearing cap). See Figure 44.

Note: Do not apply sealant too much.

Cylinder Head

Valve assembly and valve spring

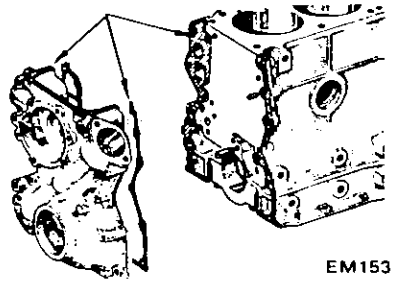


Fig. 42 Applying sealant (Front cover and gasket)

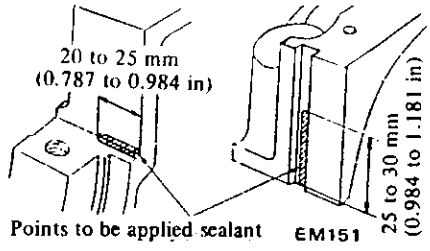


Fig. 43 Applying sealant (Main bearing cap and cylinder block)

Using special tool "Valve Lifter ST12070000," set valve spring seat in position, and fit valve guide with oil seal.

Assemble valve in the order shown below: valve, inner and outer valve springs, spring retainer, valve collet and valve rocker guide.

Notes:

a. Check whether the valve face is free from foreign matter.

b. The L16 and L18 engines use double type valve springs.

Valve rocker pivot assembly

Screw valve rocker pivots joined with lock nuts into pivot bushing.

Camshaft assembly

Set locating plate and install camshaft in cylinder head carefully. Do not damage the bearing inside. The oblong groove of locating

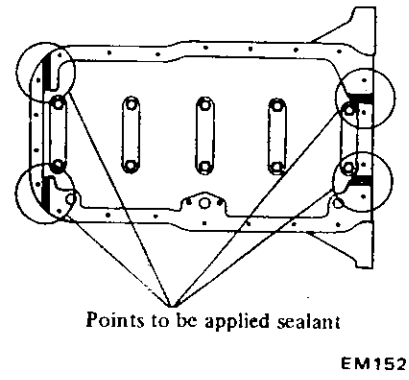


Fig. 44 Applying sealant (Cylinder block)

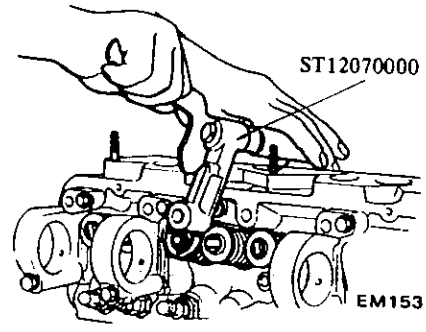


Fig. 45 Installing valve

plate must be directed toward the front side of engine.

Install camshaft sprocket on camshaft and tighten it together with fuel pump cam to the specified torque.

Tightening torque:

86 to 116 ft-lb

At this time, check camshaft end play.

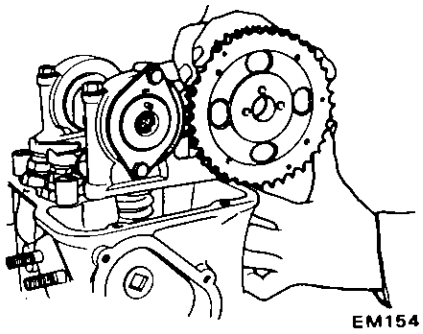


Fig. 46 Installing camshaft sprocket

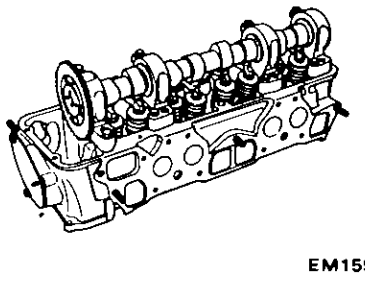


Fig. 47 Assembling cylinder head

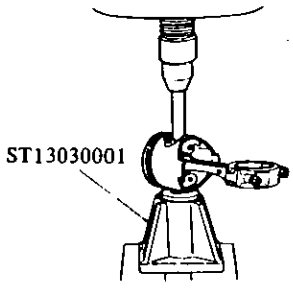


Fig. 48 Installing piston pin

Install rocker arms by pressing down valve springs with a screwdriver.

Install valve rocker springs.

After assembling cylinder head, turn camshaft until No. 1 piston is at T.D.C. on its compression stroke.

Piston and Connecting Rod

Assemble pistons, piston pins and connecting rods to the designated cylinder.

Notes:

a. Piston is pressed into connecting rod, and fitting force is 0.5 to 1.5 tons and the aid of special tool "Piston Pin Press Stand ST13030001" is necessary.

When pressing piston pin in connecting rod, apply engine oil to pin and small end of connecting rod.

b. Arrange so that oil jet of connecting lod big end is directed toward the right side of cylinder block.

c. Be sure to install piston in cylinders with notch mark of piston head toward the front of engine.

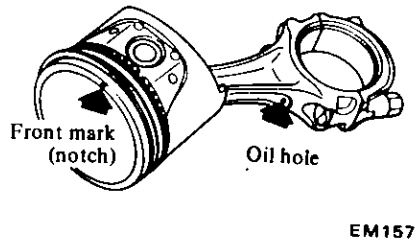


Fig. 49 Assembling piston and connecting rod

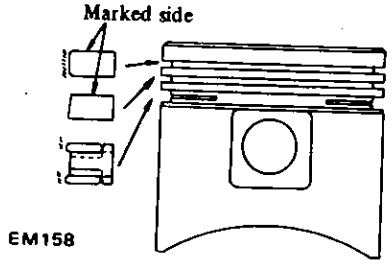


Fig. 50 Installing piston ring

Install piston rings

Install top and second rings in right position, with the marked side up.

Top ring is chromium-plated on liner contacting face.

Second ring has larger taper surface than top ring.

In the combined oil ring, upper rail is the same as lower one.

Fix bearings on connecting rod and connecting rod cap.
Note: Clean the back side of bearing carefully.

Engine
The first step in engine assembly is to bolt special tool "Engine Attachment ST05260001" to right hand side of cylinder block. In succession, install block in another special tool "Engine Stand ST0501S000" with engine bottom up.

Set main bearings at the proper portion of cylinder block.

Install baffle plate including cylinder block net.

Notes:

Only center bearing (No. 3) is a flanged type.

All inter-bearings (No. 2 and No. 4) are the same type.

Front bearing (No. 1) is also the same type as rear bearing (No. 5). The difference is that an oil hole is provided in the front bearing.

All bearings except No. 1 bearing have an interchangeability between upper and lower bearings.

Apply engine oil to main bearing surfaces on both sides of cylinder block and cap.

Install crankshaft.

Install main bearing cap and tighten bolts to specified torque.

Tightening torque:

32.5 to 39.8 ft-lb

Notes:

Apply sealant to each side of rear main bearing cap and each corner of cylinder block as shown in Figure 43.

Arrange the parts so that the arrow mark on bearing cap faces toward the front of engine.

Prior to tightening bearing cap bolts, place bearing cap in proper position by shifting crankshaft in the axial direction.

Tighten bearing cap bolts gradually in separating two to three stages and outwardly from center bearing in the sequence as shown in Figure 52.

After securing bearing cap bolts, ascertain that crankshaft turn smoothly.

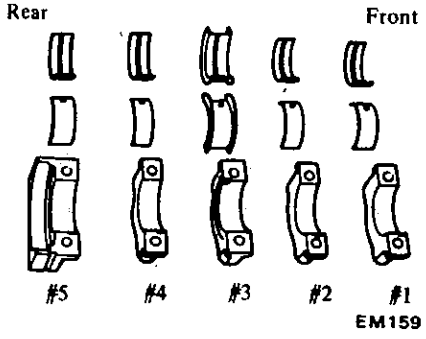


Fig. 51 Main bearings

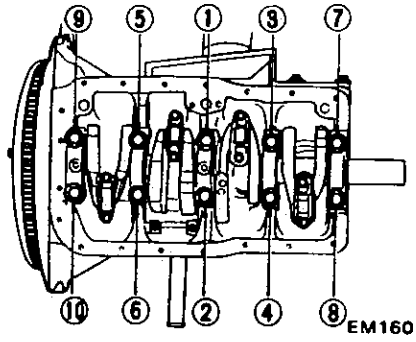


Fig. 52 Torque sequence of cap bolts

Make sure that there exists proper end play at cranksahft.

Crankshaft end play:

0.0020 to 0.0071 in

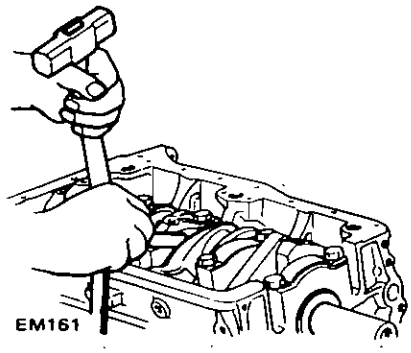


Fig. 53 Checking crankshaft end play

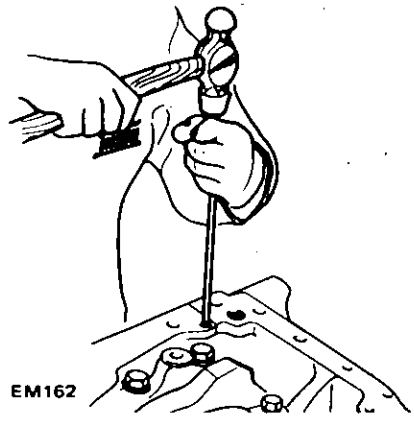


Fig. 54 Driving side oil seal

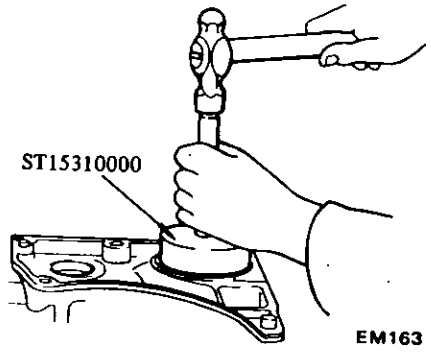


Fig. 55 Installing rear oil seal

Install side oil seals into rear main bearing cap. Prior to installing, apply sealant to these seals.

Install rear oil seal using special tool "Crankshaft Rear Oil Seal Drift ST15310000." Apply a lithium grease to sealing lip of oil seal.

Install rear end plate.

Install flywheel securely, and tighten bolts to specified torque.

Tightening torque:

101 to 116 ft-lb

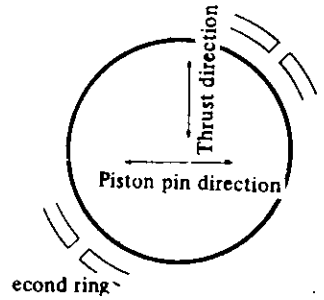


Fig. 56 Installing piston-rod assembly

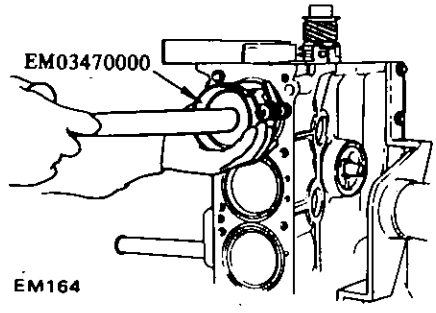


Fig. 57 Piston ring direction

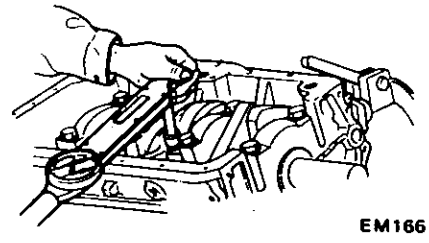


Fig. 58 Installing connecting rod cap

Insert pistons in corresponding cylinder using special tool "Piston Ring Compressor EM03470000."

Notes:

Apply engine oil to sliding parts.

Arrange so that the notch mark on piston head faces to the front of engine.

Install piston rings at 180° to each other, avoiding their fit in the thrust and piston pin directions.

Install connecting rod caps.

Tightening torque:

for L16

23 to 28 ft-lb

for L18

33 to 40 ft-lb

Note: Arrange connecting rods and connecting rod caps so that the cylinder numbers face in the same direction.

Make sure that there exists proper end play at connecting rod big end.

Big end play:

0.0079 to 0.0118 in

Install cylinder head assembly.

Thoroughly clean cylinder block and head surface.

Do not apply sealant to any other part of cylinder block and head surface.

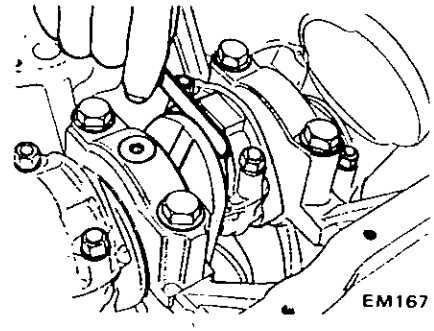


Fig. 59 Checking big end play

Turn crankshaft until No. 1 piston is at T.D.C. on its compression stroke.

Make sure that camshaft sprocket location notch and plate oblong groove are aligned at their correct positions.

When installing cylinder head, make sure that all valves are apart from heads of pistons.

Do not rotate crankshaft and camshaft separately, because valves will hit heads of pistons.

Temporarily tighten two bolts 1, 2 shown in Figure 60.

Tightening torque:

14.5 ft-lb

Install cranksahft sprocket and distributor drive gear and fit oil thrower.

Note: Make sure that the mating marks of crankshaft sprocket faces to the front.

Install timing chain.

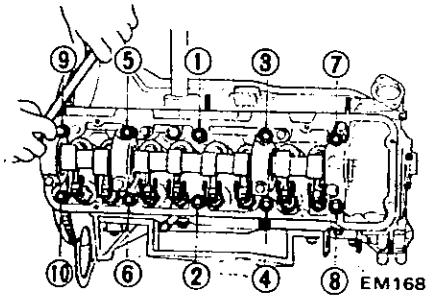
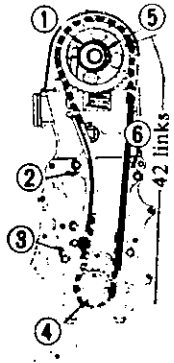


Fig. 60 Tightening sequence



1 Fuel pump drive cam
2 Chain guide
3 Chain tensioner
4 Crank sprocket
5 Cam sprocket
6 Chain guide

Fig. 61 Installing timing chain

Notes:

Make sure that crankshaft and camshaft keys point upwards.

Set timing chain by making its mating marks align with those of crankshaft sprocket and camshaft sprocket at the right hand side. There are forty-two chain links between two mating marks of timing chain.

No. 2 hole is factory adjusted. When chain stretches excessively, adjust camshaft sprocket at No. 3 hole.

Use a set of timing marks and location hole numbers.

Install chain guide to cylinder block.

Install chain tensioner.

Note: Adjust the protrusion of chain tensioner spindle to 0 in.

Press new oil seal in front cover. (front cover oil seal should be replaced when front cover is disassembled.)

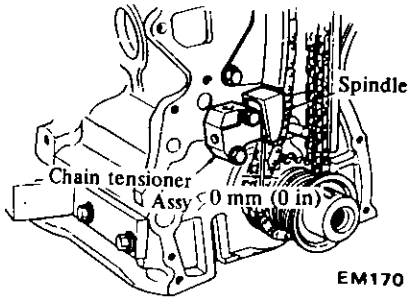


Fig. 62 Installing chain tensioner

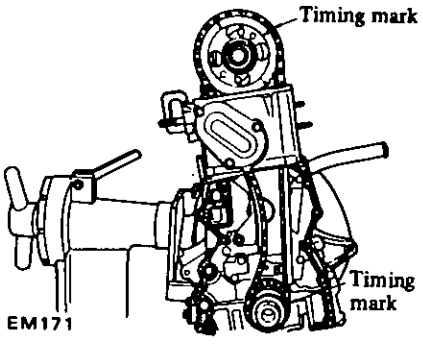


Fig. 63 Installing front cover

Install front cover with gasket in place.

Notes:

Apply sealant to front side of cylinder block and front cover gasket as shown in Figure 42.

Apply sealant only to the top of front cover as shown in Figure 42.

Install front cover with head gasket in place.

Check the height difference between cylinder block upper face and front cover upper face. Its difference must be less than 0.0059 in.

Note that different types of bolts are used.

Apply a lithium grease to sealing lip of oil seal.

Tightening torque:

Size M8

(0.315)

7.2 to 11.6 ft-lb

Size M6

(0.236 in)

2.9 to 5.8 ft-lb

Install crankshaft pulley and water pump, then set No. 1 piston at T.D.C. on its compression stroke.

Crankshaft pulley nut

tightening torque:

86.8 to 115.7 ft-lb

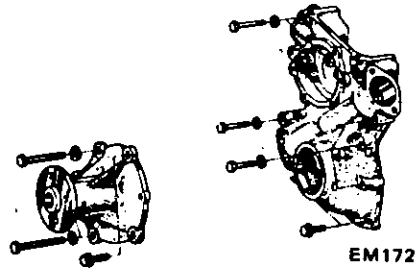


Fig. 64 Front cover bolts

Finally tighten head bolts to the specified torque in three steps according to the tightening sequence as shown in Figure 60.

Note that two types of bolts are used.

Tightening torque:

1st turn

(28.9 ft-lb

2nd turn

(43.4 ft-lb

3rd turn

47.0 to 61.5 ft-lb

Notes:

Be sure to tighten two small bolts

After engine has been operated for several minutes; if necessary, retighten.

Install oil pump and distributor driving spindle into front cover.

Tightening torque:

8.0 to 10.8 ft-lb

Notes:

Assemble oil pump and drive spindle, making driving spindle mark face to oil pump hole.

Install oil pump together with drive spindle so that the projection on its top is

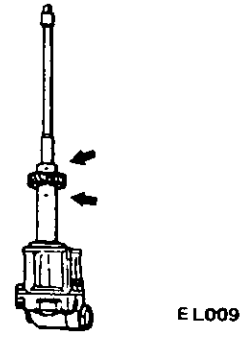


Fig. 67 Setting distributor driving spindle

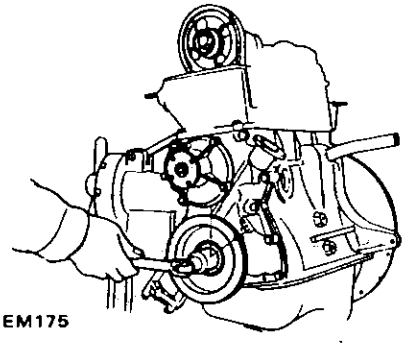


Fig. 65 Installing crankshaft pulley and water pump

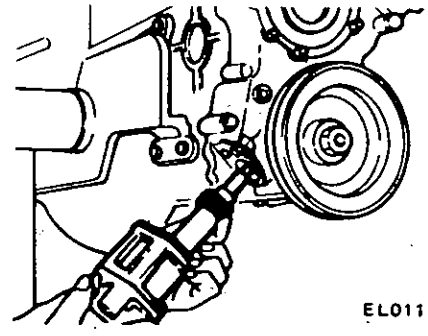


Fig. 68 Installing oil pump

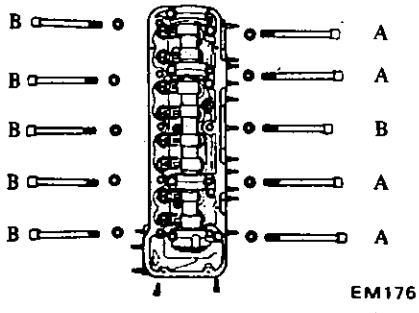


Fig. 66 Cylinder head bolts

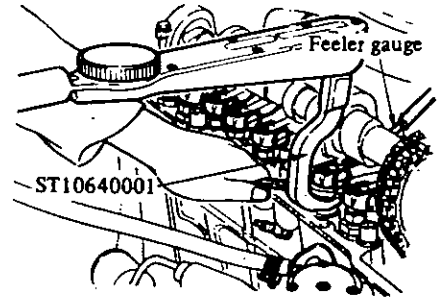


Fig. 69 Adjusting valve clearance

located in 11:25 a.m. position. At this time, the smaller bow-shape will be placed toward the front.

Do not forget to install gasket.

Install fuel pump, water inlet elbow and front engine slinger in their positions.

Fuel pump tightening torque:

Note: Do not forget to install fuel pump spacer and packings inserted between spacer and block, spacer and fuel pump.

Install oil strainer, oil pan gasket and oil pan.

Notes:

Apply sealant to the step portions at four mating surfaces as shown in Figure 44.

Tightening oil pan should be performed in criss-cross pattern and finally to 4.3 to 6.5 ft-lb torque.

Adjust valve clearance to the specified dimensions.

Tightening torque:

36.2 to 43.4 ft-lb

Notes:

First set clearance to the cold specifications.

After engine has been assembled, run it for at least several minutes, finally adjust the clearance to the warm specifications.

Install rear engine slinger, exhaust manifold and intake manifold.

Tightening torque:

8.7 to 11.6 ft-lb

Install distributor assembly.

Install carburetor assembly and carburetor insulator with stamp facing upward. Tightening torque 3.6 to 7.2 ft-lb.

Install fuel pipes and vacuum hose.

All pipes and hoses should be clamped securely, being careful not to allow them to interfere with adjacent or surrounding parts.

Install thermostat housing, thermostat and water outlet in their positions. Do not forget to install gasket.

Install rocker cover.

Note: Bond gasket to rocker cover using sealant. Then, install rocker cover to cylinder head.

Install spark plugs.

Connect distributor to plug high tension lead wire.

Install engine mount bracket on left hand side.

Install clutch assembly.

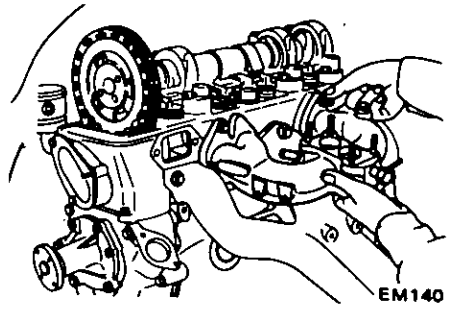


Fig. 70 Installing manifolds

			L16 and L18
Valve clearance mm (in)	Cold	Intake	0.2 (0.0079)
		Exhaust	0.25 (0.0098)
	Warm	Intake	0.25 (0.0098)
		Exhaust	0.30 (0.0118)

Tightening torque:

8.7 to 15.9 ft-lb.

Using an overhead hoist and lifting cable, hoist engine up away from engine stand and then down onto engine carrier. Install alternator bracket, adjusting bar, alternator, fan pulley, fan and fan belt in this order. Then, check to be sure that deflection of fan belt is held within 0.315 to 0.472 in when thumb pressure is applied midway between pulleys (A pressed force is about 22.0 lb).

Install engine mount bracket (right hand), oil filter, oil pressure switch, oil level gauge and water drain plug. When installing an oil filter, fasten it on cylinder block by hand.

Note: Do not overtighten filter, or oil leakage may occur.
Pour engine oil up to specified level.

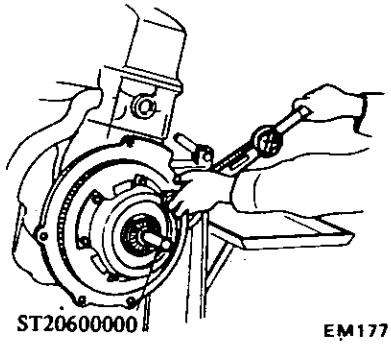


Fig. 71 Installing clutch assembly

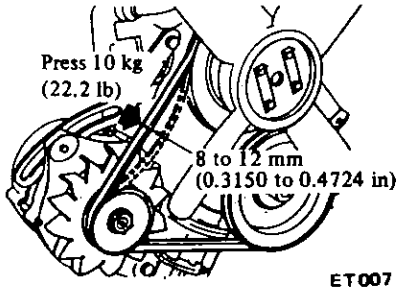


Fig. 72 Fan belt tension

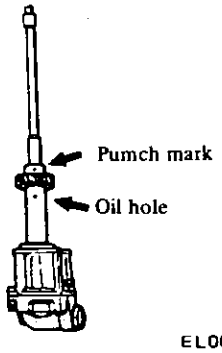


Fig. 73 Aligning punch mark and oil hole

OIL PUMP

Removal

Remove distributor.

Drain engine oil.

Remove front stabilizer.

Remove splash shield board.
Remove oil pump body with drive spindle assembly.

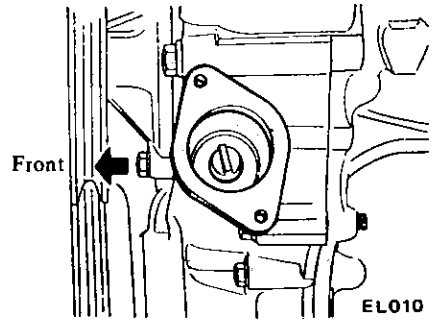


Fig. 74 Setting drive spindle

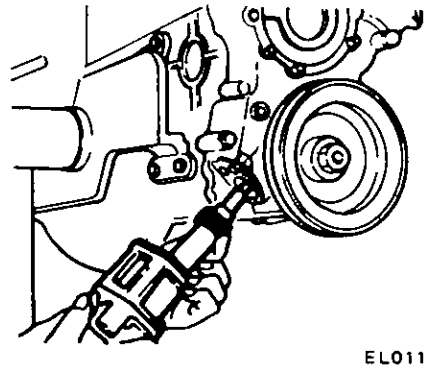


Fig. 75 Installing oil pump

Installation

Before installing oil pump in engine, turn crankshaft so that No. 1 piston is at T.D.C.

Fill pump housing with engine oil, then align punch mark of spindle with hole in oil pump as shown in Figure 73.

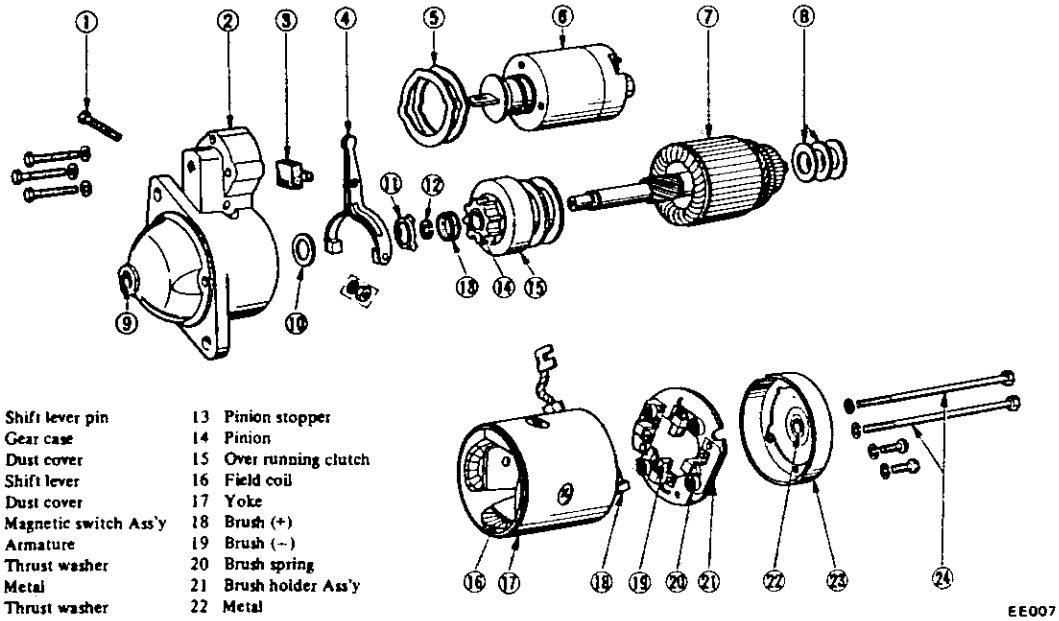
Using a new gasket, install oil pump and drive spindle assembly so that the projection on its top is located in 11:25 a.m. position, at this time, the smaller bow-shape will be placed toward the front as shown in Figure 74.

Ascertain whether the engagement is order or not by checking the top of spindle through distributor fitting hole.

Tighten bolts securing oil pump to front cover.

Electrical System

STARTER



1	Shift lever pin	13	Pinion stopper
2	Gear case	14	Pinion
3	Dust cover	15	Over running clutch
4	Shift lever	16	Field coil
5	Dust cover	17	Yoke
6	Magnetic switch Ass'y	18	Brush (+)
7	Armature	19	Brush (–)
8	Thrust washer	20	Brush spring
9	Metal	21	Brush holder Ass'y
10	Thrust washer	22	Metal
11	Stopper washer	23	Rear cover
12	Stopper clipe	24	Through bolt

Fig. 76 Exploded view of starting motor

Removal

Disconnect battery ground cable.

Disconnect black wire with yellow tracer from magnetic switch terminal, and black battery cable from battery terminal of magnetic switch.

Remove two bolts securing starting motor to gear case. Pull starter assembly forward and remove starting motor.

Installation

Installation is the reversal of removal.

CHARGING CIRCUIT DESCRIPTION

The charging circuit consists of the battery, alternator, regulator and necessary wiring to connect these parts. The purpose of this system is to convert mechanical energy from the engine into electrical energy which is used to operate all electrically operated units and to keep the battery fully charged.

When the ignition switch is set to "ON," current flows from the battery to ground through the ignition switch, voltage regulator IG terminal, primary side contact point "PI," movable contact point "P2," voltage regulator "F" terminal, alternator "F" terminal, field coil and alternator "E" terminal. as shown in Figure 77 by full line arrow marks. Then the rotor in the alternator is excited. On the other hand, current flows from the battery to ground through the ignition switch, warning lamp, voltage regulator "L" terminal, lamp side contact point "P4," movable contact point "P5," and voltage regulator "E" terminal, as shown by dotted line arrow marks. Then, the warning lamp lights.

When the alternator begins to operate, three-phase alternating current is induced in the stator coil. This alternating current is rectified by the positive and negative silicon

diodes. The rectified direct current output reaches the alternator "A" and "E" terminals.

On the other hand, the neutral point voltage reaches "N" and "E" terminals (nearly a half of the output voltage), and current flows from voltage regulator "N" terminal to "E" terminal or ground through the coil "VC1" as shown in Figure 78 by the dotted line arrow marks. Then the coil "VC1" is excited, and the movable contact point "P5" comes into contact with voltage winding side contact point "P6." This action causes to turn off the warning lamp and complete the voltage winding circuit as shown by the full line arrow marks.

When the alternator speed is increased or the voltage starts to rise excessively, the movable contact point "P2" is separated from the primary side contact "P1" by the magnetic force of coil "VC2." Therefore, register "R1" is applied into the rotor circuit and output voltage is decreased. As the output voltage is decreased, the movable contact point "P2" and primary side contact "P1" comes into contact once again, and the alternator voltage increases. Thus, the rapid vibration of the movable contact point voltage constant.

When the alternator speed is further increased or the voltage starts to rise excessively, the movable contact point "P2" comes into contact with secondary side contact point "P3." Then, the rotor current is shut off and alternator output voltage is decreased immediately. This action causes to separate movable contact "P2" from secondary contact "P3." Thus, the rapid vibration of the movable contact point "P2" or breaking and completing the rotor circuit maintains an alternator output voltage constant.

ALTERNATOR

Description

Alternator	Vehicle
LT150-05B	510 and 610 models except for Canada
LT160-19	510 and 610 models for Canada
LT135-13B	620 model

Removal

Disconnect negative battery terminal.

Disconnect two lead wires and connector from alternator.

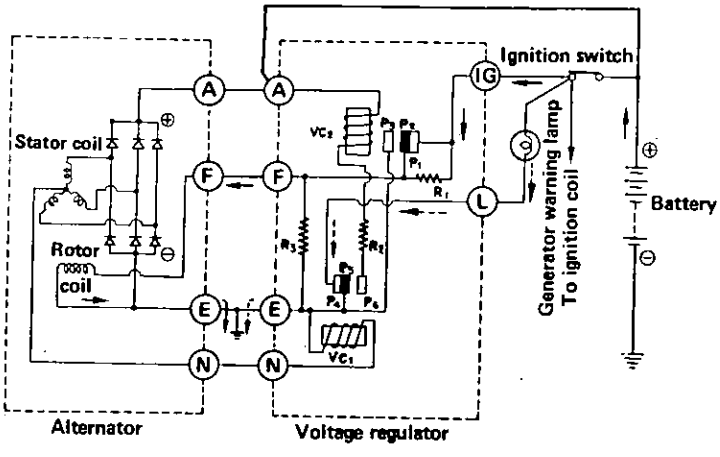


Fig. 77 Charging Circuit 1

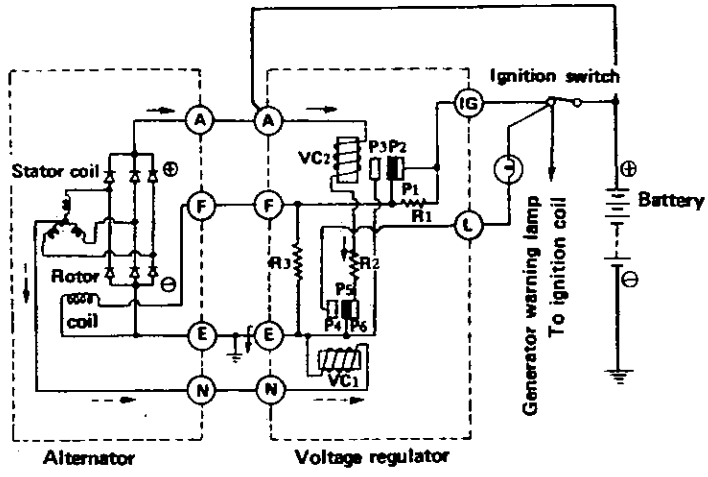
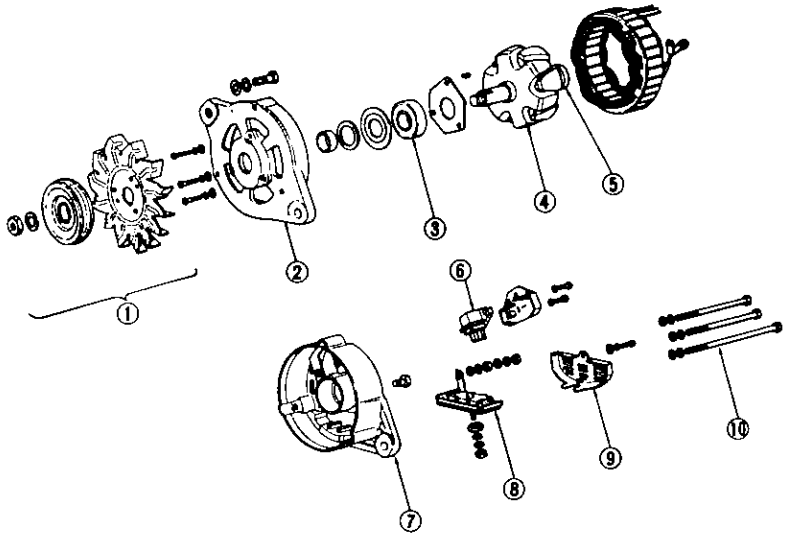


Fig. 78 Charging Circuit 2

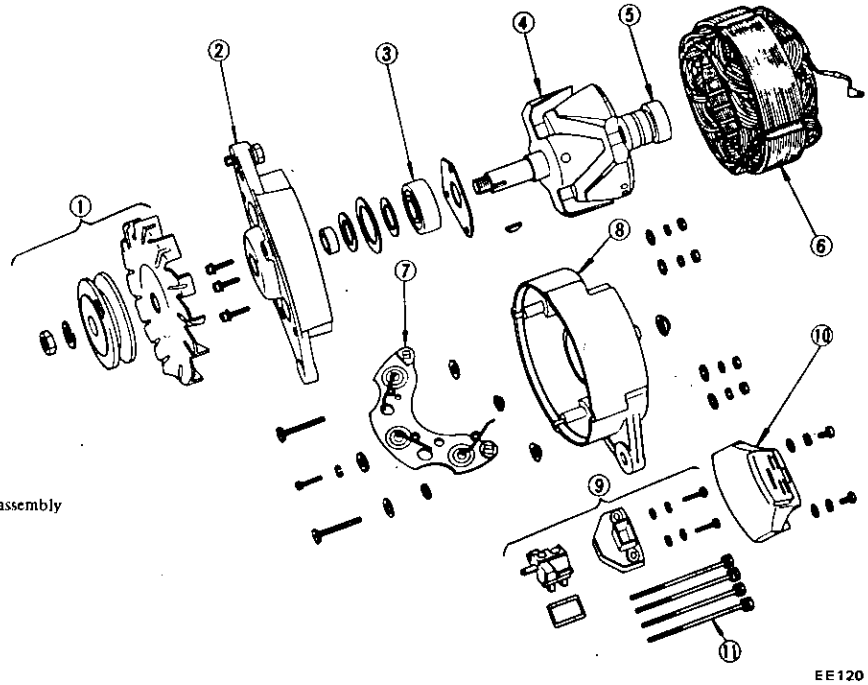
TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Starting motor will not operate.	Discharged battery.	Charge or replace battery.
	Defective solenoid switch.	Repair or replace solenoid switch.
	Loose connections of terminal.	Clean and tighten terminal.
	Defective brushes.	Replace brushes.
	Defective starting motor.	Remove starting motor and make test.
Noisy starting motor.	Loose securing bolt.	Tighten bolt.
	Worn pinion gear.	Replace pinion gear.
	Poor lubrication.	Fill in oil.
	Worn commutator.	Disassemble motor.
	Worn brushes.	Replace brushes.
Starting motor cranks slowly.	Discharged battery.	Charge or replace battery.
	Loose connection of terminal.	Clean and tighten terminal.
	Worn brushes.	Replace brushes.
	Locked brushes.	Inspect brush spring tension or repair brush holder.
Starting motor cranks slowly	Dirty or worn commutator.	Clean and repair.
	Armature rubs field coil.	Replace assembly.
	Defective solenoid switch.	Repair or replace switch.
Starting motor operates but does not crank engine.	Worn pinion.	Replace pinion.
	Locked pinion guide.	Repair pinion guide.
	Worn ring gear.	Replace ring gear.
Starting motor will not disengage even ignition switch is turned off.	Defective solenoid switch.	Repair or replace solenoid switch.
	Defective gear teeth.	Replace defective gear.



1 Pulley assembly
2 Front cover
3 Front bearing
4 Rotor
5 Rear bearing
6 Brush assembly
7 Rear cover
8 Diode (set plate) assembly
9 Diode cover
10 Through bolts

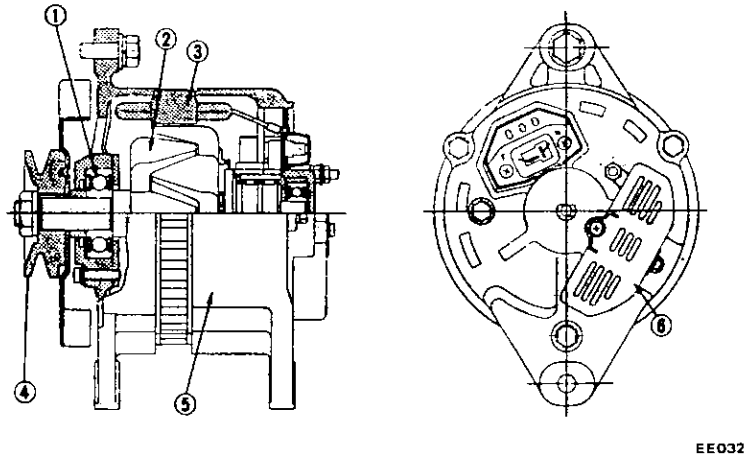
Fig. 79 Exploded View of LT 150-05B (LT 135-13B)



1 Pulley assembly
2 Front cover
3 Front bearing
4 Rotor
5 Rear bearing
6 Stator
7 Diode set plate assembly
8 Rear cover
9 Brush assembly
10 Diode cover
11 Through bolts

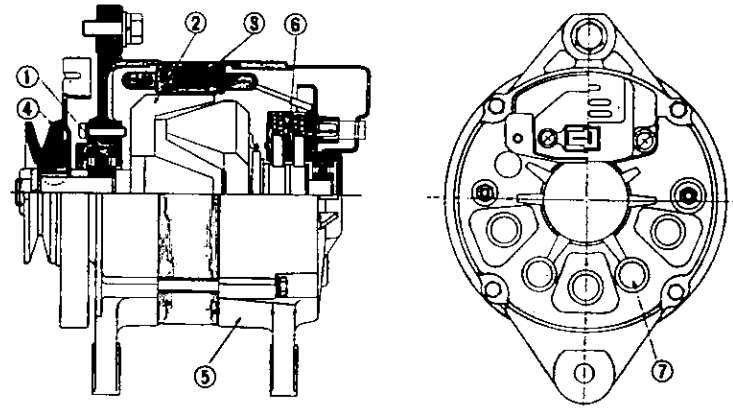
EE120

Fig. 80 Exploded View of LT 160-19



1 Front bearing
2 Rotor
3 Stator
4 Pulley
5 Rear cover
6 Encased diode

Fig. 81 Sectional View of LT 150-05B (LT 135-13B)



1 Front bearing
2 Rotor
3 Startor
4 Pulley
5 Rear cover
6 Brush holder assembly
7 Diode

Fig. 82 Sectional View of LT 160-19

Loosen adjusting bolt.

Remove alternator drive belt.

Remove parts associated with alternator from engine.

Remove alternator from vehicle.

Installation

Installation is the reversal of removal

VOLTAGE REGULATOR

Description

The regulator consists basically of a voltage regulator and a charge relay. The voltage

regulator has two sets of contact points, a lower set and upper set, to control alternator voltage. An armature plate placed between the two sets of contacts, moves upward or downward or vibrates. The lower contacts, when closed, complete the field circuit direct to ground; and the upper contacts, when closed, complete the field circuit to ground through a resistance (field coil), and produces alternator output.

The charge relay is similar in construction to the voltage regulator.

When the upper contacts are closed, ignition warning lamp goes on.

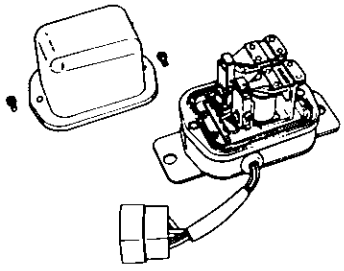


Fig. 83 View of Removing Cover.

VOLTAGE REGULATOR

Measurement of Voltage

Regulator voltage is measured with regulator assembled with alternator. When measuring voltage with regulator mounted on vehicle, it is necessary to rotate engine at high speed.

Connect DC voltmeter (15-30V), DC ammeter (15-30A), battery and resistor (0.25 ohms) with cables as shown.

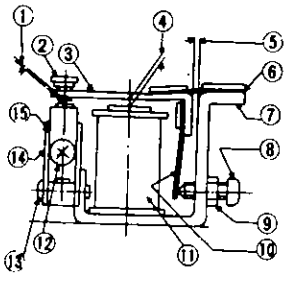
Check to be sure that all electrical loads such as lamps, air conditioner, radio etc. are disconnected.

Before starting engine, be sure to make short circuit with a cable between fuse side terminal of resistor (0.25Ω) and negative side terminal of ammeter. Failure to follow this caution causes needle of ammeter to swing violently and reversely, resulting in a damaged ammeter.

Refer to the following chart to determine if regulator and relative parts are in good condition:

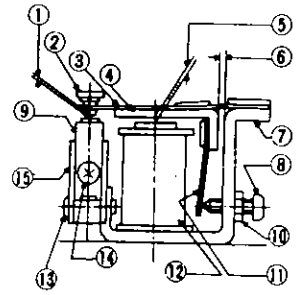
Notes: a. Do not measure voltage immediately after driving. Do this while regulator is cold.

b. To measure voltage, raise engine speed gradually from idling to rated speed.



1 Point gap
2 Lower contact
3 Armature
4 Core gap
5 Yoke gap
6 Connecting spring
7 Yoke
8 Adjusting screw
9 Lock nut
10 Adjust spring
11 Coil
12 3 mm (0.1181 in) dia. screw
13 4 mm (0.1575 in) dia. screw
14 Contact set
15 Upper contact

(a) Construction of voltage regulator



EE054

1 Point gap
2 Charge relay contact
3 Connecting spring
4 Armature
5 Core gap
6 Yoke gap
7 Yoke
8 Adjusting screw
9 Voltage regulator contact
10 Lock nut
11 Adjust spring
12 Coil
13 3 mm (0.1181 in) dia. screw
14 4 mm (0.1575 in) dia. screw
15 Contact set

(b) Construction of charge relay

Fig. 84 Structural View

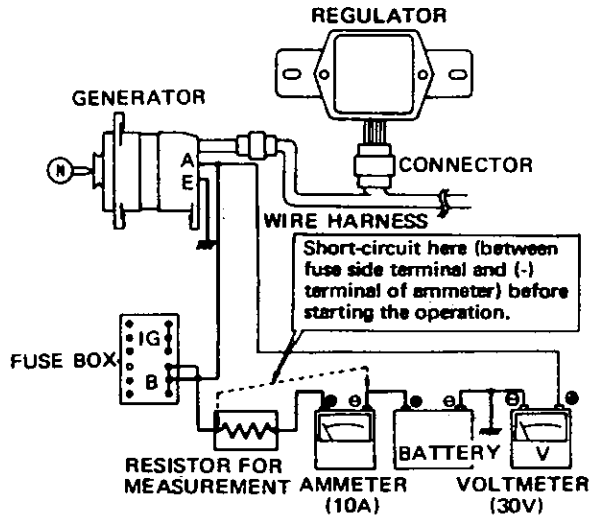
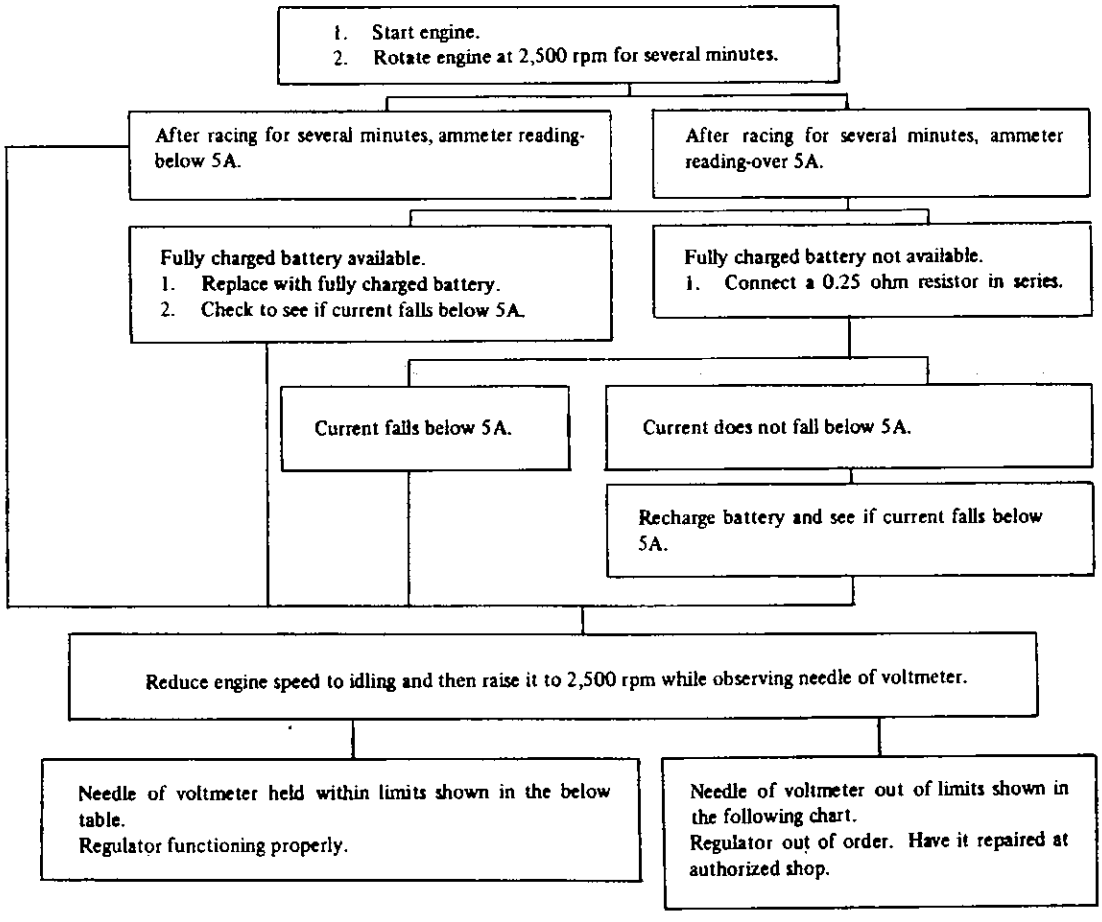


Fig. 85 Measuring Regulator Voltage with Regulator on Vehicle



Regulator model TL1Z-57 and TL1Z-58 (HITACHI)

Temperature °C (°F)	Voltage V
−10 (14)	14.75 to 15.75
0 (32)	14.60 to 15.60
10 (50)	14.45 to 15.45
20 (68)	14.30 to 15.30
30 (86)	14.15 to 15.15
40 (104)	14.00 to 15.00

c. Voltage may be approx. 0.3 V higher than the rated for two to three minutes after engine is started, or more specifically, when regulator becomes self-heated. Measurements should then be made within one minute after starting engine, or when regulator is cold.

d. The regulator is of a temperature-compensating type. Before measuring voltage, be sure to measure surrounding temperature and correct measurements according to the table in the left hand side.

Adjustment

As the result of above measurement, when regulating voltage is deviated from rated value, adjust regulator in accordance with the following instructions.

1. Inspect contact surface, and if rough, lightly polish surface with fine emery paper (#500 or 600).

2. Measure each gap, and adjust if necessary. Adjust core gap and point gap in that order. No adjustment is required for yoke gap.

3. Adjusting core gap

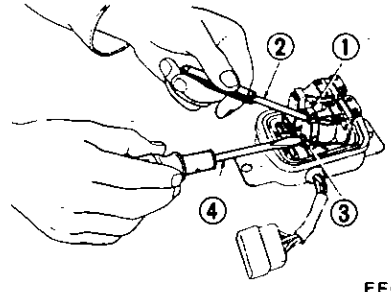
Loosen screw [4 mm (0.1575 in) diameter] which is used to secure contact set on yoke, and move contact upward or downward properly. (See Figure 86).

4. Adjusting point gap

Loosen screw [3 mm (0.1181 m) diameter] used to secure upper contact, and move upper contact upward or downward adequately. (See Figure 87).

5. Adjusting voltage

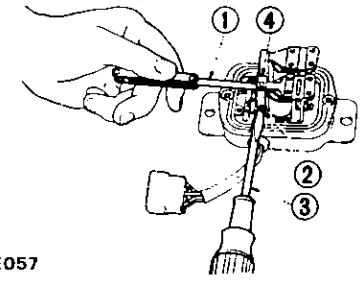
Adjust regulating voltage as follows:



EE056

1 Contact set
2 Thickness gauge
3 4 mm (0.1575 in) dia. screw
4 Crosshead screwdriver

Fig. 86 Adjusting Core Gap

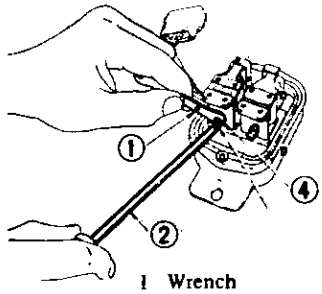


EE057

1 Thickness gauge
2 3 mm (0.1181 in) dia. screw
3 Crosshead screwdriver
4 Upper contact

Fig. 87 Adjusting Point Gap

Loosen lock nut securing adjusting screw. Turn this screw clockwise to increase, or counterclockwise to decrease, regulating voltage. (See Figure 88).



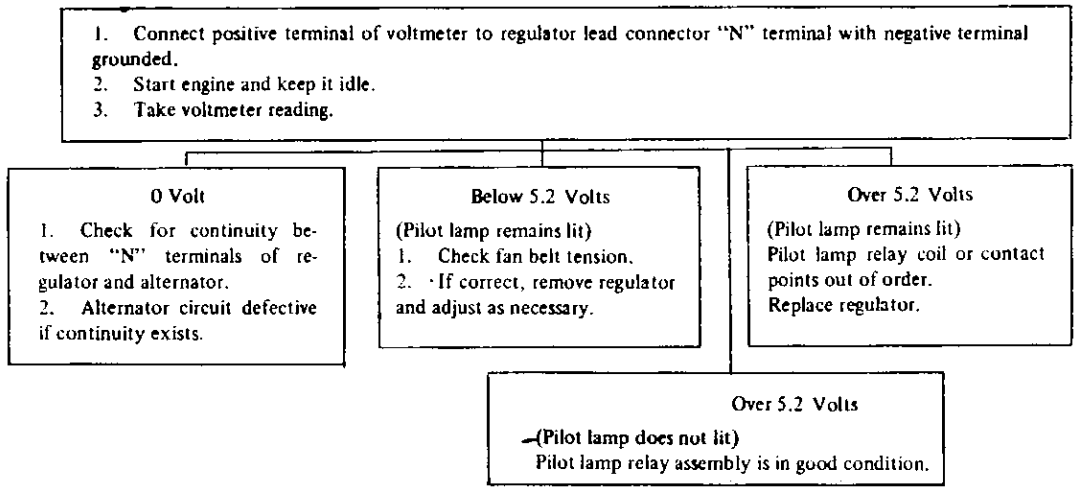
1 Wrench
2 Crosshead screwdriver
3 Adjusting screw
4 Lock nut

Fig. 88 Adjusting Regulating Voltage

Charging relay

Normal relay operating voltage is 8 to 10V as measured at alternator "A" terminal. Relay itself, however, operates at 4 to 5V.

Use a DC voltmeter, and set up a circuit as shown in Figure 89.



TROUBLE DIAGNOSES AND CORRECTIONS (Including alternator)

Condition	Probable cause	Corrective action
No output	Sticking brushes.	Correct or replace brushes and brush springs.
	Dirty brushes and slip rings.	Clean.
	Loose connections or broken leads.	Retighten or solder connections. Replace leads if necessary.
	Open stator winding.	Repair or replace stator.
	Open rotor winding.	Replace rotor.
	Open diodes.	Replace diodes.
	Shorted rotor.	Replace rotor.
	Shorted stator.	Repair or replace stator.
	Grounded "BAT" terminal.	Replace insulator.
	Broken fan belt.	Replace belt.

Excessive output	Broken neutral wire (color of wire is white.)	Replace wire.
	Defective voltage regulator.	Check regulator operation and repair or replace as required.
	Poor grounding of alternator and voltage regulator "E" terminal.	Retighten terminal connection.
	Broken ground wire (color of wire is black.)	Replace wire.
Low output	Loose or worn fan belt.	Retighten or replace belt.
	Sticking brushes.	Correct or replace brushes and springs if necessary.
	Low brush spring tension.	Replace brush springs.
	Defective voltage regulator.	Check regulator operation and repair or replace as required.
	Dirty slip rings.	Clean.
	Partial short, ground, or open in stator winding.	Replace stator.
	Partially shorted or grounded rotor winding.	Replace rotor.
	Open or defective diode.	Replace diode.
Noisy alternator	Loose mounting.	Retighten mounting bolts.
	Loose drive pulley.	Retighten pulley correctly.
	Defective ball bearing.	Replace bearing.
	Improperly seated brushes.	Seat brushes correctly.

Alternator

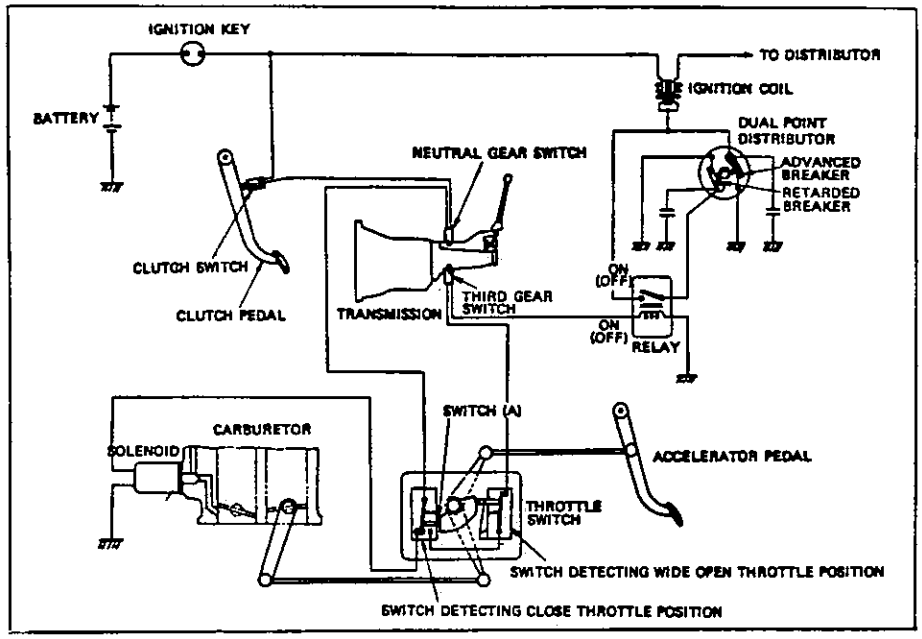
Engine Model	Alternator		
	Part Number	Output @ Generator rpm	
		rpm	Amps (14v.)
J	Mitsubishi AS203A1	2,500	24.5
R	Mitsubishi AC[illegible]/12X2R	2,500	24.5, 21.5 @ high temp.
U20	Mitsubishi AS2030A2	2,500	23
L16	Hitachi LT130-41	2,500	22
L24	Hitachi LT145-35	2,500 5,000	>34 >45
A12	Hitachi LT135-05	2,500 5,000	>24 >33

>More than

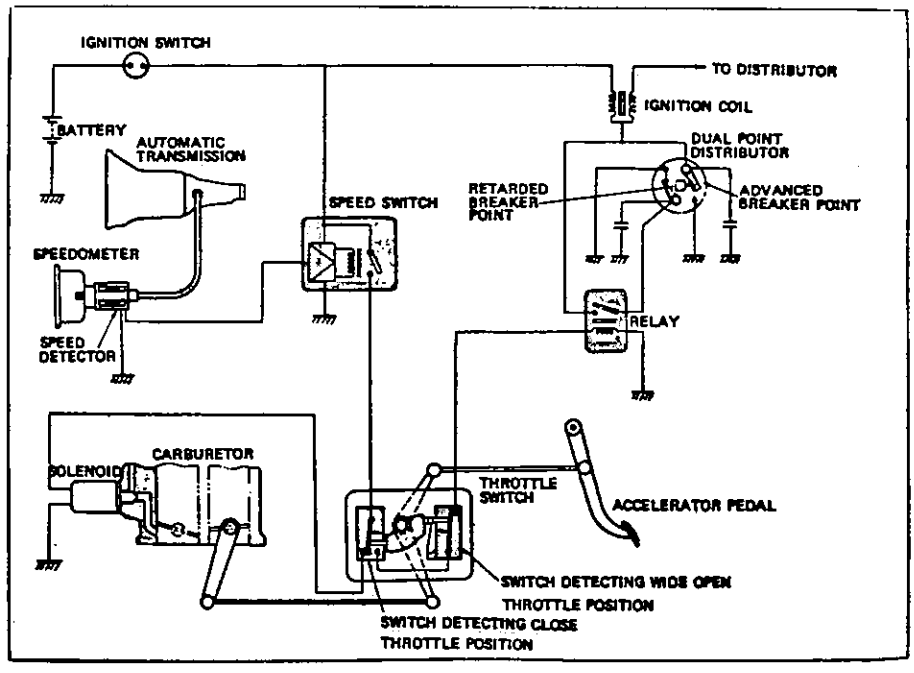
Fuses and Fusible Links

Model	Fuse Box Location	Fusible Link Location
L320, L520, L521 PL521, PL510, WPL510	Engine compartment, right rear	
L60	Engine compartment, right fender well	
SPL311, SRL311	Inside glove compartment	
LB110 KLB110	Under instrument panel, right of steering column	Between battery and alternator
HLS30	Under ash tray in console	At alternator, at starter

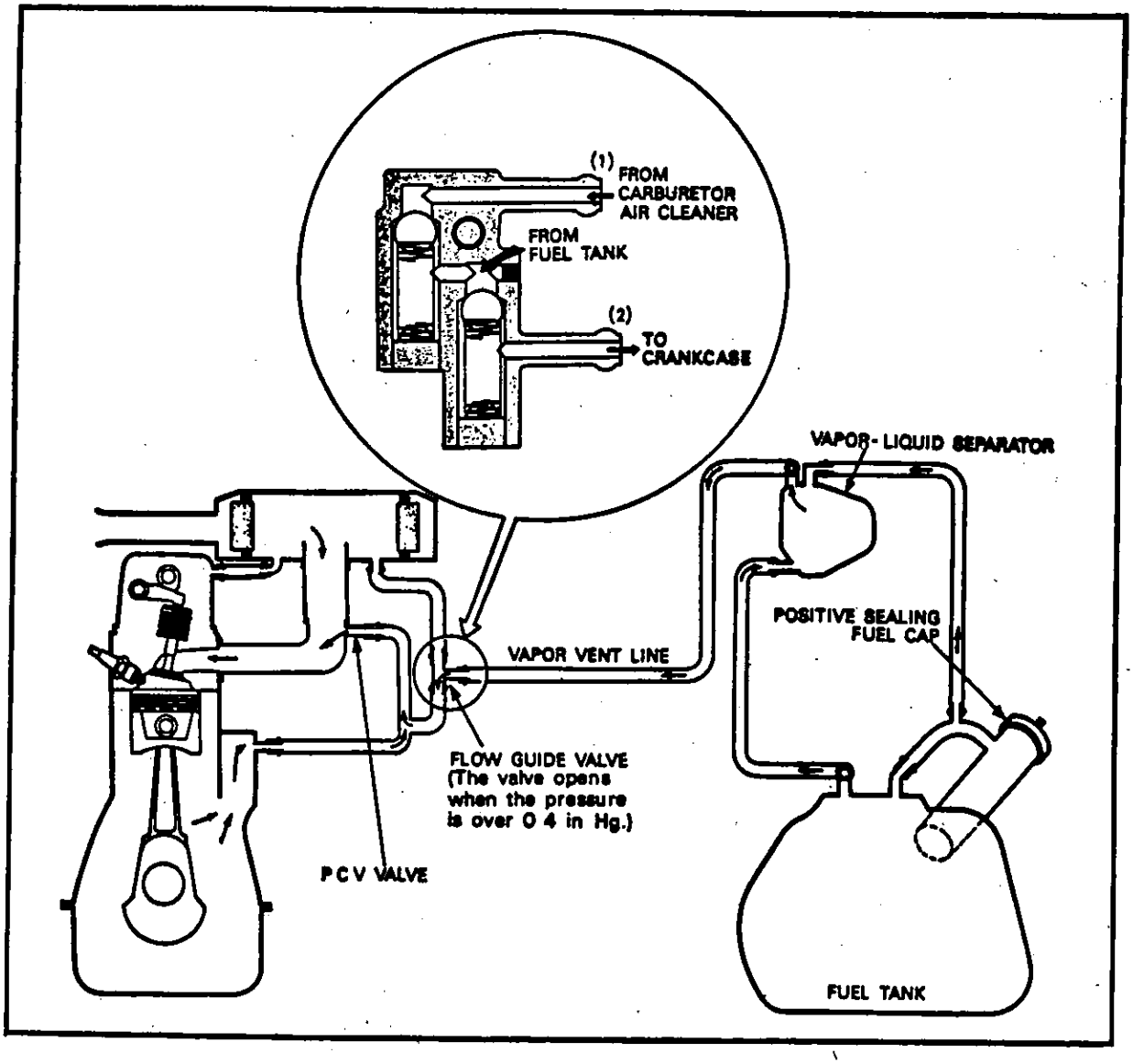
EMISSION CONTROL DIAGRAMS



Datsun emission control system, manual transmission



Datsun emission control system, with automatic transmission



Datsun evaporative emission control system

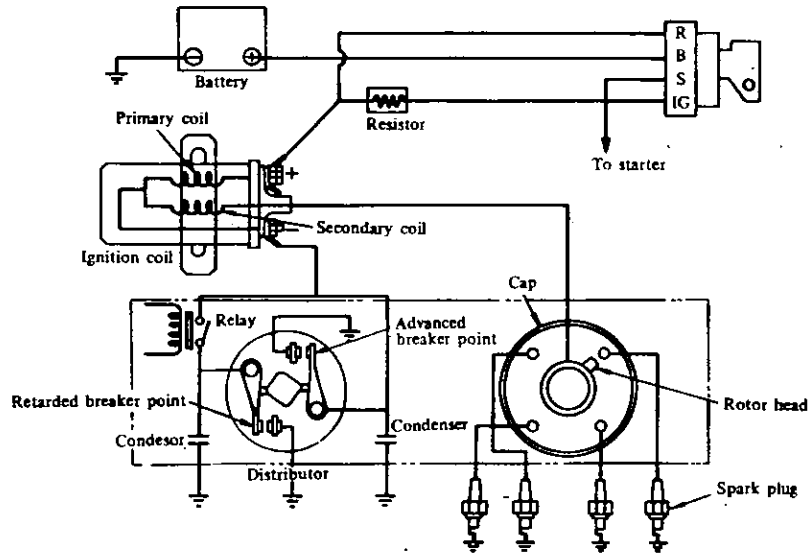
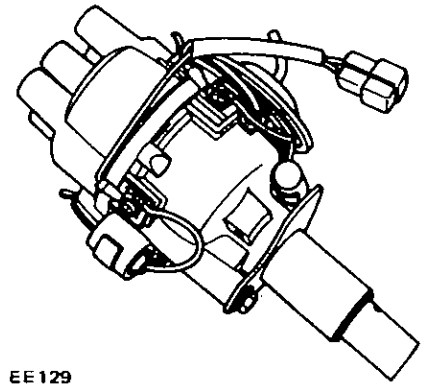


Fig. 89 Ignition Systems Circuit Diagram

DISTRIBUTOR

CONSTRUCTION

Distributor model	Applied engine
D410-66A	L18
D410-67	L16



EE129

Fig. 90 External View of Distributor

The distributor for L16 and L18 engines has two breaker points, located opposite to each other with a phase difference as shown in Figure 90.

The difference in phase can be adjusted by turning the adjusting screw.

A phase difference of 7° crank angles is adopted. Two breaker points, which consists of advance and retard breakers, are placed in parallel with each other in the primary ignition circuit.

The retard breaker point works when the relay is switched "ON" and the advance breaker point works when the relay is switched "OFF." (See Fig. 91).

The distributor follows the conventional design except for the dual points; i.e., breaker plate with contact points, centrifugal advance mechanism, vacuum unit, drive shaft and rotor. Figures 92 and 93 show an exploded view of the unit.

Disassembly

To disassemble, follow the below procedure.

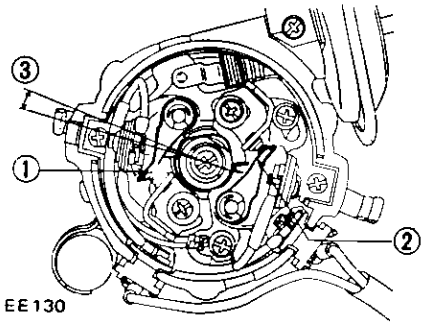
Take off cap and disconnect rotor head.

Remove vacuum controller.

Remove contact set

Unscrew two contact breaker set screws and remove contact breaker assembly.

Pull knock pin out and disconnect collar to remove the entire rotating parts.



1 Advanced breaker point
2 Retarded breaker point
3 Phase difference

Fig. 91 External View of Dual Points

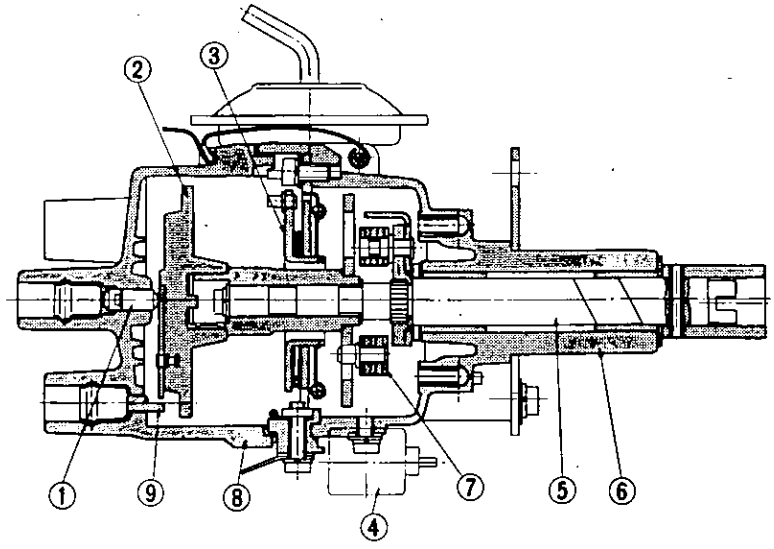
When cam is to be removed, first remove set screw since shaft head is fastened by the screw to hold cam down. Put match mark across cam and shaft so that original combination can be restored at assembly.

When governor weight and spring are disconnected, be careful not to stretch or deform governor spring.
After disassembling, apply grease to governor weights.

Assembly
Assembly can be made in reverse sequence of disassembly. Refer to Figure 101 for replacement and reassembly of governor spring and cam.

In assembling distributor, use caution so that rotor head positioning tip at cam is set on governor spring circular hook side.

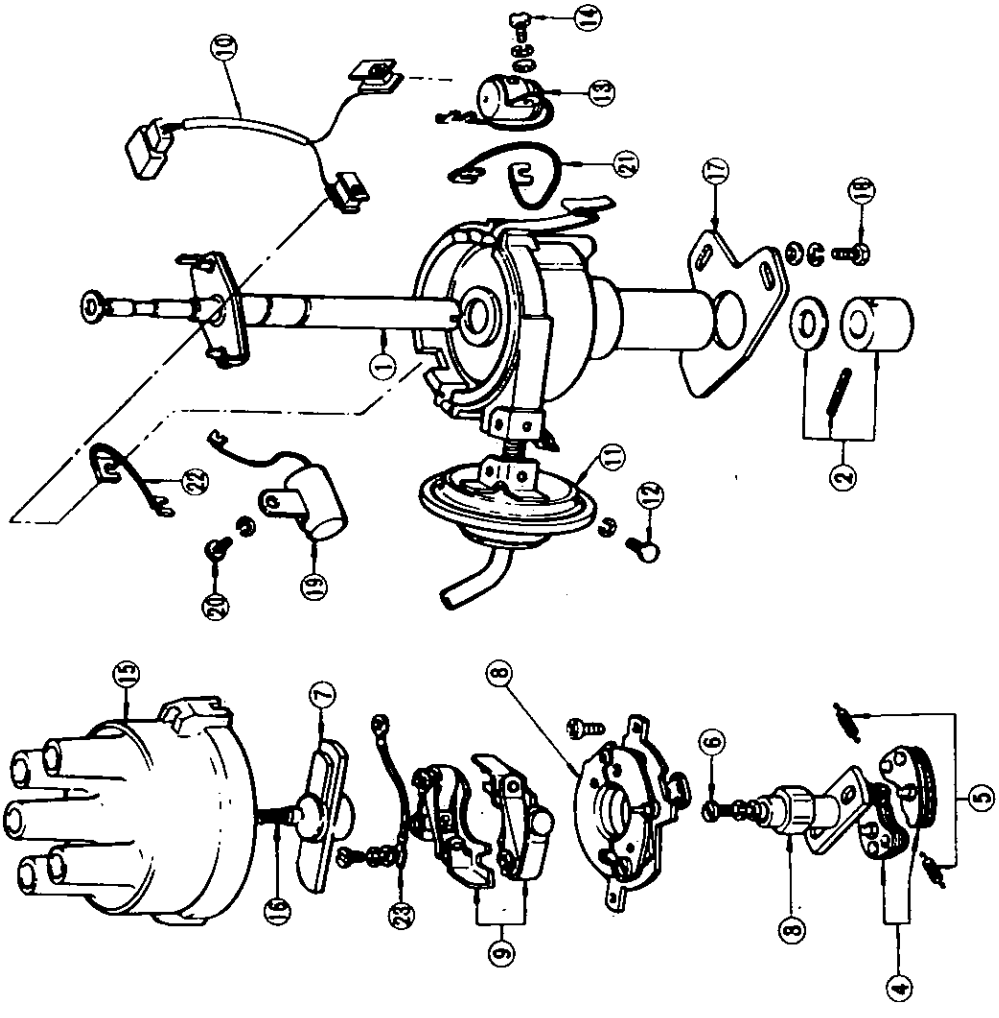
Then weight pin for governor spring A with circular hook comes in long rectangular hole.



1 Center carbon
2 Rotor head
3 Breaker plate (Contact)
4 Condenser
5 Shaft
6 Housing
7 Governor weight
8 Cap
9 Side plug

Fig. 92 Construction

Electrical System



1 Shaft assembly
2 Collar set assembly
3 Cam assembly
4 Governor weight assembly
5 Governor spring set
6 Screw
7 Rotor head assembly
8 Breaker assembly
9 Contact set
10 Connector assembly
11 Vacuum control assembly
12 Screw
13 Condensor assembly (for Advanced point)
14 Screw
15 Distributor cap assembly
16 Carbon point assembly
17 Fixing plate
18 Bolt
19 Condensor assembly (for Retarded point)
20 Screw
21 Lead wire assembly (for Advanced point)
22 Lead wire assembly (for Retarded point)
23 Earth wire assembly

Fig. 93 Components of Distributor

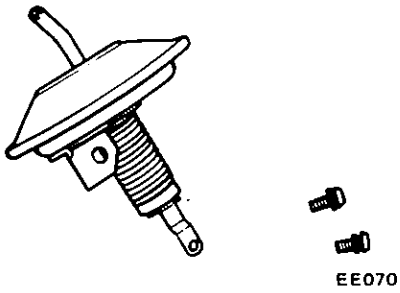


Fig. 94 Disassembling Vacuum Controller

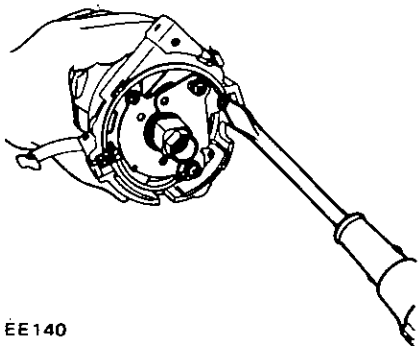


Fig. 95 Unscrewing Breaker Sets Screws

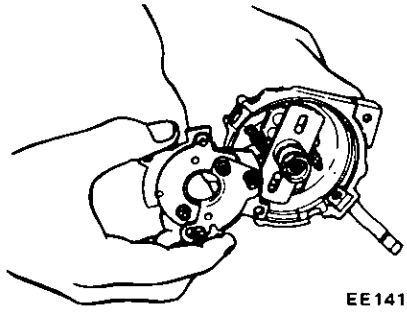


Fig. 96 Removing Contact Breaker

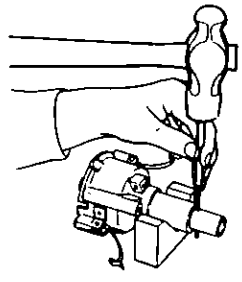


Fig. 97 Removing Knock Pin

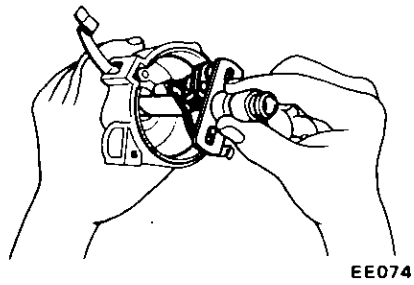


Fig. 98 Removing Rotation Parts

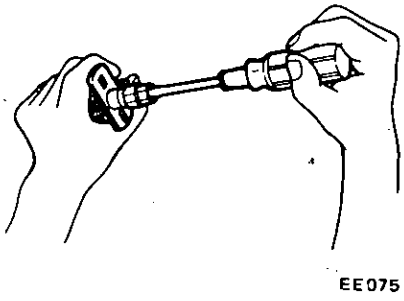


Fig. 99 Removing Cam

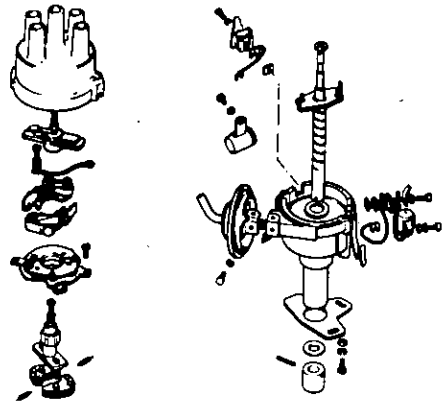
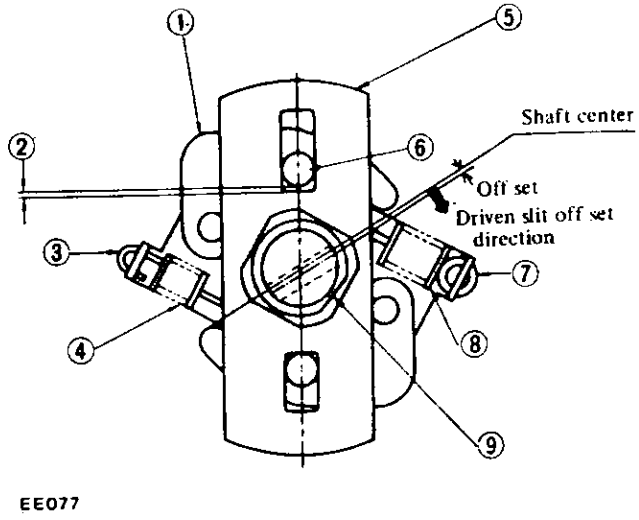


Fig. 100 Exploded View

Also check to be sure that weight pin on spring A is in slit in cam plate with a clearance between the two at beginning and end of governor operation.

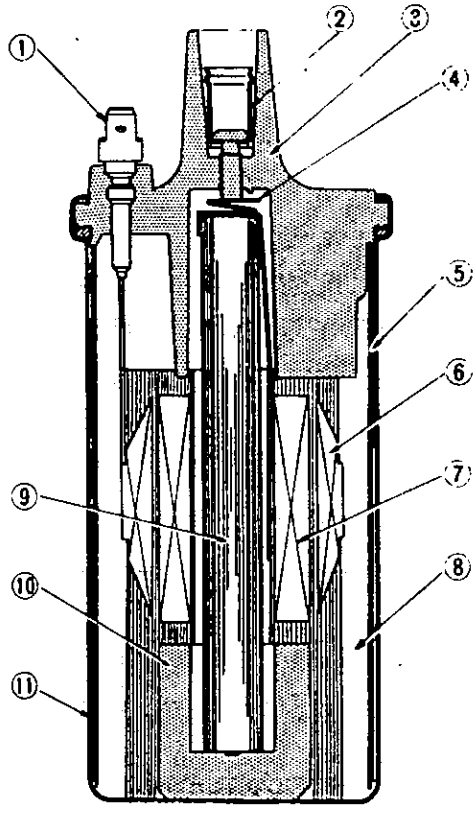
Meanwhile, weight pin on opposite side comes in short rectangular hole.



1 Governor weight
2 Clearance for start and end of advancing angle
3 Rectangular hook
4 Governor spring (B)
5 Cam plate
6 Weight pin
7 Circular hook
8 Governor spring (A)
9 Rotor positioning tip

Fig. 101 Setting Governor's Spring and Cam

IGNITION COIL



1 Primary terminal
2 Secondary terminal
3 Cap
4 Spring
5 Side core
6 Primary coil
7 Secondary coil
8 Insulator oil
9 Center core
10 Segment
11 Case

Fig. 102 Construction

It does not leave clearance either at the start and end of advancing.

With unit assembled, check to be sure that driven slit and rotor position tip (9) are set in the same direction. See Figure 101.

After assembly check operation of governor before installing it on engine.

Ignition timing should be tested with unit mounted on engine.

IGNITION COIL

Description

The ignition coil is of an oil-filled type. The ignition coil case is filled with oil which has good insulating and heat-radiating characteristics.

The ignition coil has a greater ratio between the primary and secondary windings to step up the battery voltage to the high voltage to cause stronger sparks to jump the spark plug gap.

The cap is made of alkyd resin which offers high resistance to electric arc and increased insulation.

The resistor in the ignition coil circuit helps produce strong sparks from starting to high-speed full-power operation.

The internal resistor limits to a maximum safe flow of the primary current through the coil and distributor contact points. Thus, it protects the contact points during slow speed operation when they are closed for long intervals.

The ignition coil and resistor should be handled as a matched set.

SPARK PLUGS

Description

The spark plugs are of the resistor type, having 0.551 in threads and 0.0276 to 0.0315 in gap. The inspection and cleaning should be made every suitable maintenance period. If necessary, replace.

Note: All spark plugs installed on an engine, must be of the same brand and number of heat range.

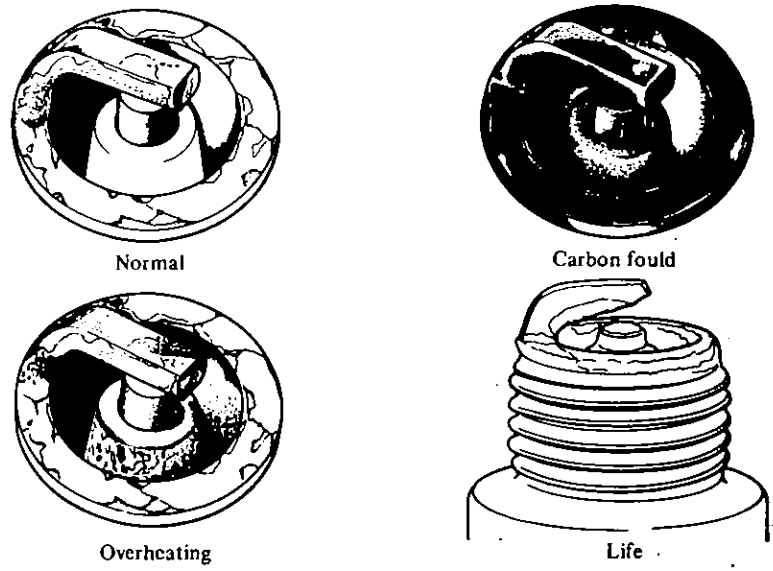


Fig. 103 Spark Plugs

Inspection

Remove spark plug wire by pulling on boot, not on wire itself.

Remove spark plugs.

Check electrodes and inner and outer porcelains of plugs, noting the type of deposits and the degree of electrode erosion.

Normal: Brown to grayish-tan deposits and slight electrode wear indicate correct spark plug heat range.

Carbon fouled: Dry fluffy carbon deposits on the insulator and electrode were mostly caused by slow speed driving in city, weak ignition, too rich fuel mixture, dirty air cleaner, etc.

It is advisable to replace with plugs having hotter heat range.

Oil fouled: Wet black deposits show excessive oil entrance into combustion chamber through worn rings and pistons or excessive clearance between valve guides and stems. If the same condition remains after repair, use a hotter plug.

Overheating: White or light gray insulator with black or gray brown spots and bluish burnt electrodes indicate engine overheating. Moreover, the appearance results from incorrect ignition timing, loose spark plugs, low fuel pump pressure, wrong selection of fuel, a hotter plug, etc.

It is advisable to replace with plugs having colder heat range.

After cleaning, dress electrodes with a small fine file to flatten the surfaces of both center and side electrodes in parallel. Set spark plug gap to specification.

Install spark plugs and torque each plug to 11 to 15 ft-lb.
Connect spark plug wires.

Cleaning and Regap

Clean spark plugs in a sand blast type cleaner. Avoid excessive blasting. Clean and remove carbon or oxide deposits, but do not wear away porcelain. If deposits are too stubborn, discard plugs.

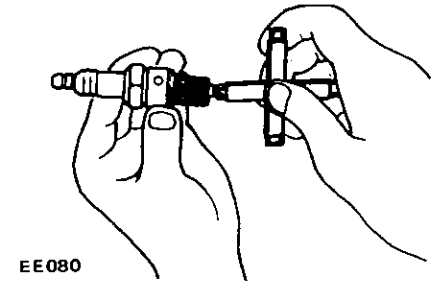


Fig. 104 Setting Spark Plug Gap

TROUBLE SHOOTING IGNITION

Spark length	Trouble location	Causes	Remedies
No sparks at all	Distributor	Defective insulation of condenser.	Replace.
		Breakage of lead-wire on low tension side.	Repair.
		Defective insulation of cap and rotor head.	Replace.
		Point does not open or close.	Repair.
	Ignition coil	Wire breakage or short circuit of coil.	Replace with new one.
	High tension cable	Wire coming off.	Repair.
		Defective insulation.	Replace.
1 to 2 mm (0.0394 to 0.0787 in) or irregular.	Distributor	Point gap too wide.	Correct.
		Oil sticking on point.	Clean.
		Point burnt too much.	Replace.

Troubles	Trouble location	Causes	Remedies
Less than 6 mm (0.2362 in)	Spark plugs	Electrode gap too wide.	Correct or replace.
		Too much carbon.	Clean or replace.
		Broken neck of insulator.	Replace.
		Expiry of plug life.	Replace.
Engine misses	Distributor	Dirty point.	Clean.
		Improper point gap.	Correct.
		Leak of electricity of cap and rotor head.	Repair or replace.
		Defective insulation of condenser.	Replace.
		Defective arm.	Oil shaft.
		Defective spring of arm.	Replace assembly.
		Breakage of lead wire.	Replace.
		Worn out or shaky breaker plate.	Replace assembly.
		Worn out or shaky distributor shaft.	Replace assembly.
	Ignition coil	Layer short circuit or use of inferior quality.	Replace with good one.
	High tension code	Deterioration of insulation and leak of electricity.	Replace.
	Spark plugs	Dirty.	Clean.
		Leak of electricity at upper porcelain insulater.	Repair or replace.
Engine causes knocking very often	Distributor	Improper and advance timing.	Correct the fitting.
		Coming off or breakage of governor spring.	Correct or replace.
		A pin or a hole of governor portion worn out.	Replace.
	Spark plugs	Burnt too much.	Replace.
Engine does not give enough power	Distributor	Improper and retarded timing.	Correct the fitting.
		Defective function of governor.	Replace assembly.
		Dirty point.	Clean.
		Point gap too narrow.	Correct.
	Spark plugs	Dirty.	Clean.

After cleaning spark plugs, renew firing surface of electrodes with file mentioned above. Then gap spark plugs to 0.0276 to 0.0315 in using a round wire feeler gauge. All spark plugs new or used should have the gap checked and reset by bending ground electrode.

HEATER UNIT REMOVAL

Drain out coolant.

Disconnect connector of heater to engine well hot water pipe.

Remove defroster hose.

Disconnect connector motor.

Remove the two heater control wires at heater unit.

Remove the four bolts and take out ventilator.

Remove the four heater unit fixing bolts and detach heater unit.

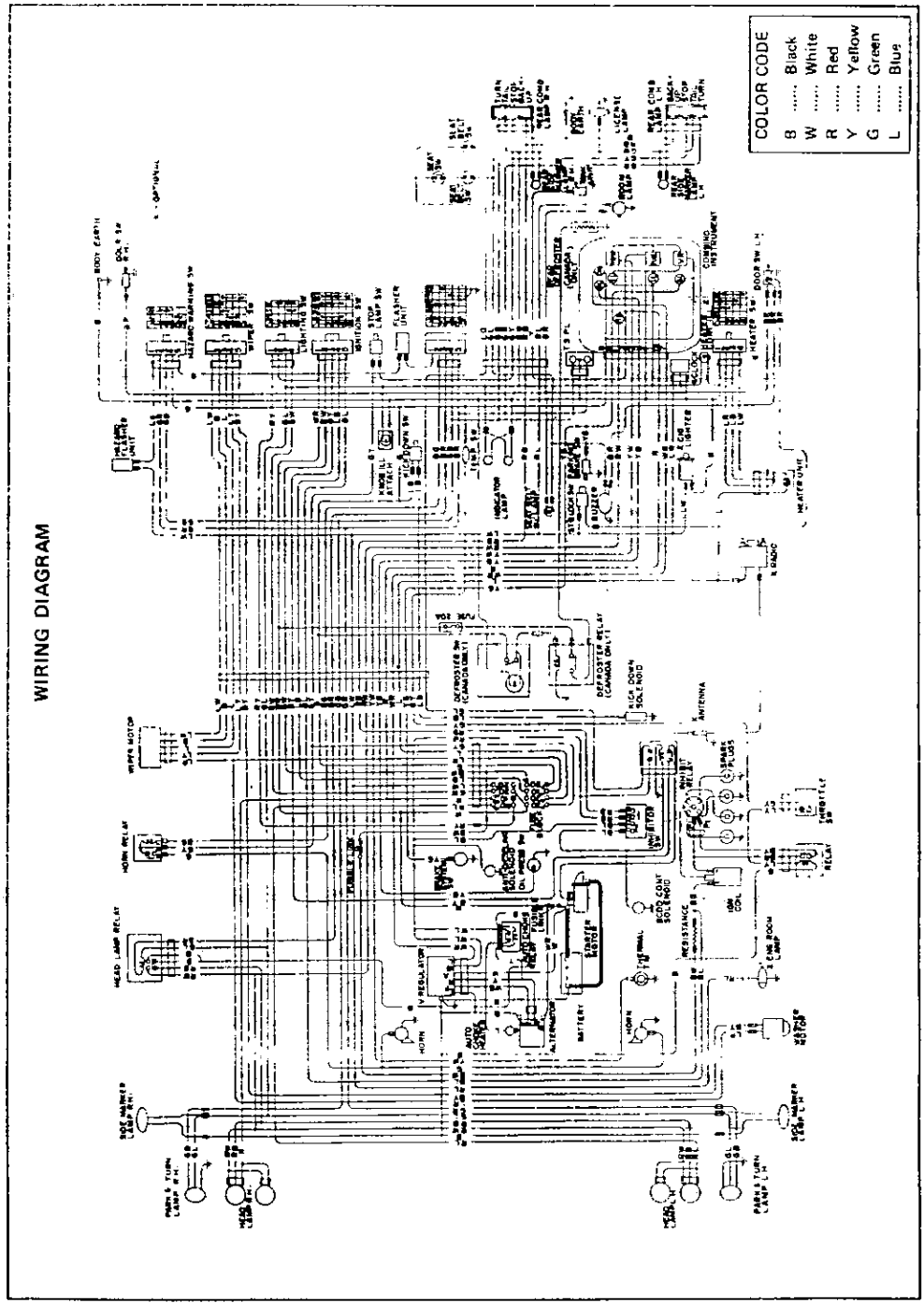


Fig. 105 Wiring Diagram (Sedan with Manual Transmission For USA & Canada)

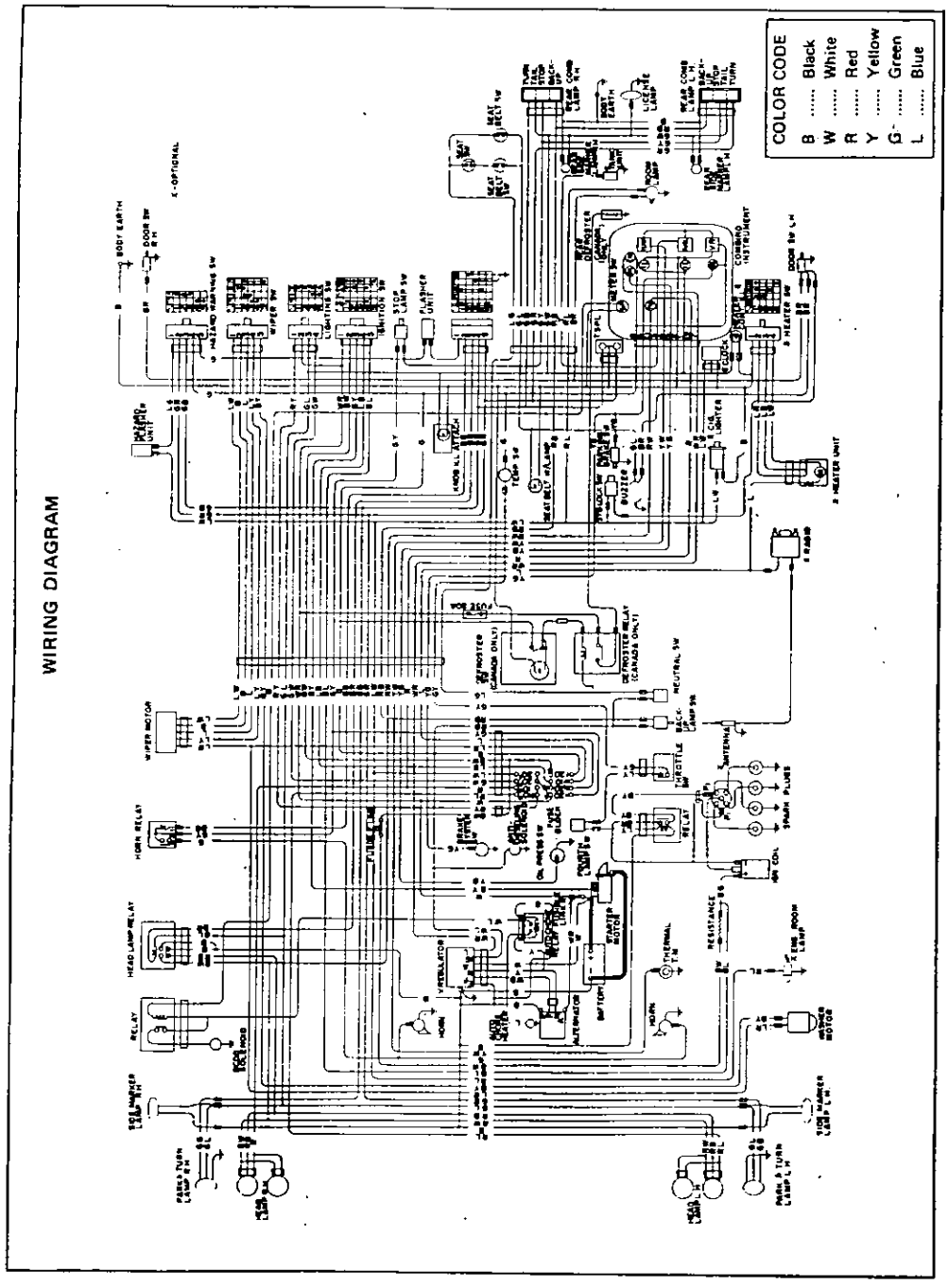


Fig. 106 Wiring Diagram (Sedan with Automatic Transmission for USA & Canada)

TROUBLE SHOOTING HEADLIGHT

Condition	Probable cause	Corrective action
Head lamps dim (engine idling or shut off)	Partly discharged battery.	Charge battery.
	Defective cells in battery.	Replace battery.
	High resistance in light circuit.	Check head lamp circuit including ground connection. Make necessary repairs.
	Faulty sealed beam units.	Replace sealed beam units.
Head lamps dim (engine running above idle)	High resistance in light circuit.	Check lighting circuit including ground connection. Make necessary repairs.
	Faulty sealed beam units.	Replace sealed beam units.
	Faulty voltage control unit.	Test voltage control and generator. Make necessary repairs.
Lights flicker	Loose connections or damaged wires in lighting circuit.	Tighten connections and check for damaged wiring.
	Light wiring insulation damaged producing momentary short.	Check light wiring and replace or tape damaged wires.
Lights burn out frequently	High voltage regulator setting.	Adjust voltage regulator.
	Loose connections in lighting circuit.	Check circuit for loose connections.
Light will not light	Discharged battery.	Recharge battery and correct cause.
	Loose connections in lighting circuit.	Tighten connections.
	Burned out bulbs.	Replace bulbs or sealed beam unit.
	Open or corroded contacts in lighting switch.	Replace lighting switch.
	Open or corroded contacts in turn signal and lighting switches.	Replace turn signal and lighting switches.
Stop lamps will not light	Switch faulty.	Replace switch.
	Wires broken, disconnected or loose.	Make necessary repairs.
	Bulb burned out.	Replace bulb.
	Loose connection or poorly grounded lamp body.	Tighten loose connection or properly ground lamp body.
	Burned out fuse.	Check for shorts and replace fuse.
Turning signal lamps light without blinking	Faulty flasher unit.	Replace flasher unit.
	Burned out parking or tail lamp on that side.	Replace bulb.

Blinking on one side too fast	Loose contact of bulb.	Make necessary repair.
	Improper capacity of bulb.	Replace bulb.
Turn indicator lever does not return automatically	Faulty mechanism of turn signal switch.	Replace with new parts.

TROUBLE SHOOTING HORN

Condition	Probable cause	Corrective action
Horn does not operate	Fuse is burned out.	Replace fuse.
	Improper contact of horn button.	Check and repair horn button.
	Open circuit of harness.	Repair or replace harness.
	Improper contact of each terminal.	Correct each terminal.
	Dead battery.	Charge battery.
	Improper contact of horn relay point.	Correct.
	Open circuit or wrong ground connection of horn interior.	Replace or repair horn.
	Wear of horn point.	Adjust adjusting screw.
Low volume, improper tone	Improper contact of fuse or connector.	Correct contact.
	Open circuit of harness.	Repair.
	Improper contact of horn point.	Correct horn point.
	Wear of horn point.	Adjust adjusting screw.
	Crack in diaphragm.	Replace horn.

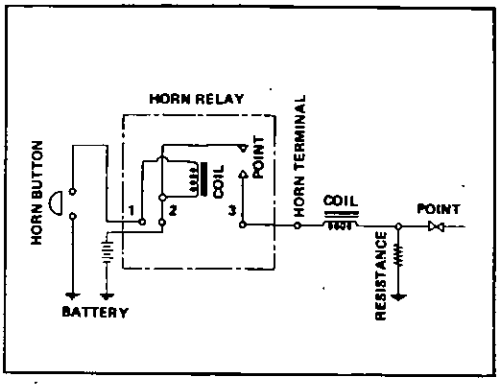


Fig. 107 Horn Relay Wiring

RADIO

Removal

Disconnect all connections.

Remove tuning knob and volume control knob.

Remove ashtray.

Remove cluster lid by unscrewing four cluster lid fixing screws.

Separate cluster lid, finisher board and radio by unscrewing lock nuts.

TROUBLE SHOOTING SPEEDOMETER

Condition	Probable cause	Corrective action
Speedometer does not operate	Improper setting of speedometer cable union nut.	Correct setting.
	Broken speedometer cable.	Replace cable.
	Broken speedometer drive gears.	Replace meter.
	Defective speedometer.	Replace meter.
Swing of pointer	Excessive bend in speedometer.	Correct cable installation or replace cable.
	Broken speedometer drive gear.	Replace speedometer.
	Defective speedometer.	Replace speedometer.
Unsteady pointer	Improper setting of speedometer cable union nut.	Correct setting.
	Defective speedometer cable.	Replace cable.
	Defective speedometer	Replace speedometer.
Strange sound synchronized with running speed	Excessive bend, lack of lubricant and twist of meter cable inner wire.	Replace or lubricate cable.
	Defective speedometer.	Replace speedometer.
Inaccurate indication of pointer.		Replace speedometer.
Defective odometer	Improper gearing of second and third gears in speedometer.	Replace speedometer.
	Improper feed caused by deformation of pinion carrier.	Replace speedometer.

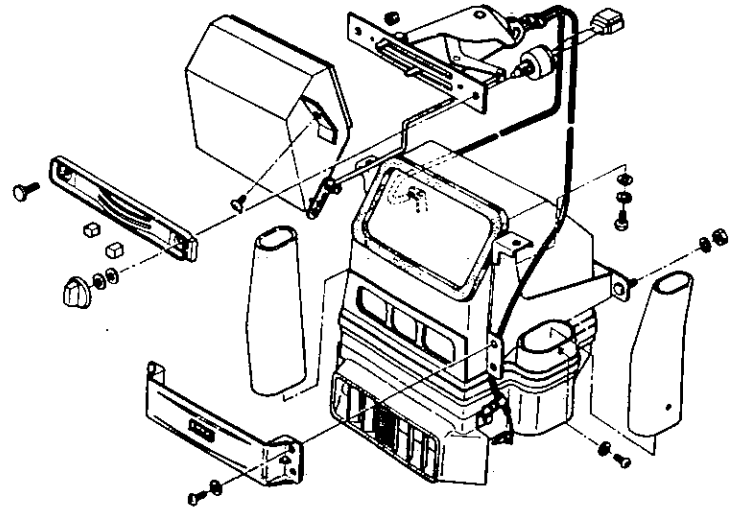


Fig. 108 Heater System

TROUBLE SHOOTING HEATER

Condition	Probable cause	Corrective action
Hot air does not come out. Motor does not operate.	Open or short circuit of feed harness.	Check and repair wiring harness.
	Defective switch.	Replace switch.
Fan cannot be rotated smoothly by hand.	Defective motor.	Replace motor.
	Fin is clogged.	Clean fin.
Hot air does not come out although less fan is rotating.	Slow rotation of fan.	Replace motor
	Looseness of fan installation.	Repair.
Air temperature is low. Hot water does not circulate.	Defective water pump.	Repair water pump.
	Bending or clogging of connecting hose.	Check or clean piping.
	Defective hot water cock.	Repair.
	Air is left in the hose.	Purge air out of hose.
Water temperature is low	Defective thermostat.	Replace thermostat.
Water leakage from heater	Defective water hose.	Replace water hose.
	Loose clipping of water hose.	Retighten clip.
	Defective cylinder head gasket.	Replace gasket.
	Improper soldering of heater core.	Solder leaking position.
Defective defroster	Defroster hose is removed.	Correct connection.
	Bend or break of defroster hose.	Correct or replace.
Vibrating noise	Looseness of heater support.	Tighten completely.
	Looseness of each fixing screw.	Retighten each screw.

TROUBLE SHOOTING RADIO

Condition	Probable cause	Corrective action
Pilot lamp does not light when switch is on.	Melt away fuse.	Replace.
	Improper connection of cable or connector.	Inspect and tighten.
	Broken pilot lamp.	Replace.
	Improper switch operation.	Repair or replace.
Pilot lamp lights but sound does not come out.	Improper connection of antenna.	Tighten.
	Improper connection of speaker.	Tighten.
	Improper circuit of radio itself.	Consult Service Shop of radio manufacturer.

Electrical System

NOISE PREVENTION CHART

Condition	Apparent cause	Repair
Ignition system Noise present synchronized with engine revolution.	High tension cord.	Do not worry about high tension cord, because anti-noise cable is used.
	Ignition coil.	Keep choke wire away from ignition coil as far as possible. Set 0.5 μF condenser at primary side B terminal of ignition coil. Note: If the condenser is set at secondary or primary breaker side, engine will not work properly. Connect with bond wire between engine and ignition coil locating area of body. Secure ground of ignition coil.
	Distributor.	Secure contact of carbon electric pole and rotor. Eliminate excessive tips at rotor pole or cap pole scrubbing by driver. Check stagger between rotor and starter.
Charging system Sound of alternating current present.	Alternator.	Set 0.5 μF condenser at charging terminal A. Note: Do not add more condenser. If more condenser is added, alternator coil will be broken.
When pressing down or releasing accelerator pedal, noise present.	Regulator.	Set 0.5 μF condenser at "B" or "Bat" terminal of voltage regulator.

Fuel System

AIR CLEANER ELEMENT

The air cleaner element is of a viscous paper type and does not require any cleaning until replacement.

Note: Do not brush or blast element before replacement.

AUTOMATIC TEMPERATURE CONTROL AIR CLEANER

The automatic temperature control air cleaner is provided with a temperature sensor and a vacuum operated valve. The vacuum acted upon the air control valve is controlled by the sensor. See Figure 109.

If the temperature of suction air is low when the engine is running, the air control valve closes the underhood-air inlet, and introduces hot air through the cover which is installed on the exhaust manifold (See Figure 110).

When the temperature of suction air around the sensor reaches 37.5°C (100°F) or above, the sensor actuates to open the air control valve. When the temperature of suction air around the sensor further rises and reaches above 48°C (118°F) the air control valve completely opens to prevent the entrance of hot air, and allows under-hood-air alone to be introduced into the carburetor. (See Figure 111).

AIR CONTROL VALVE

The air control valve acts in the manner described previously, and the temperature of suction air around the sensor is always kept at about 43°C (110°F).

When the engine is operating under heavy load, the air control valve fully opens the un-

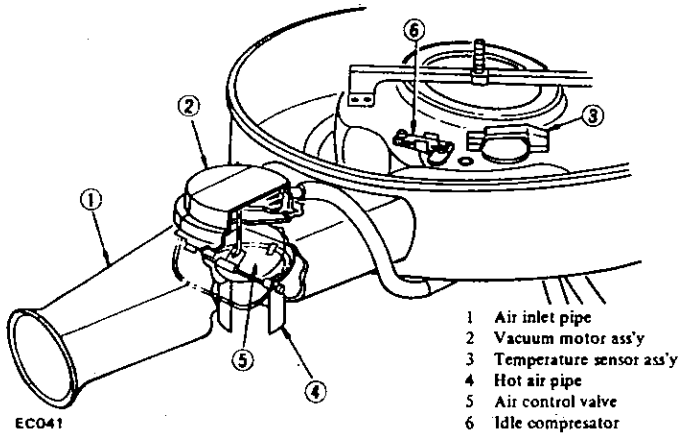


Fig. 109 Automatic Temperature Control Air Cleaner

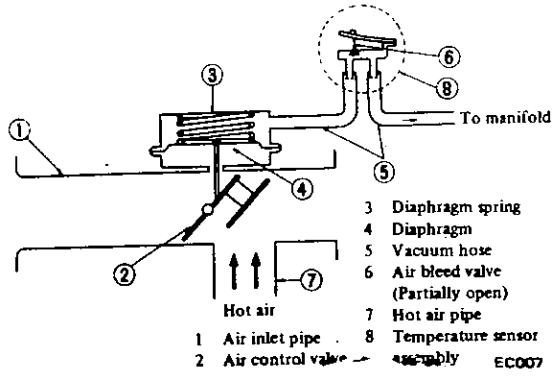


Fig. 110 Hot Air Delivery Mold (During Cold Engine Operation)

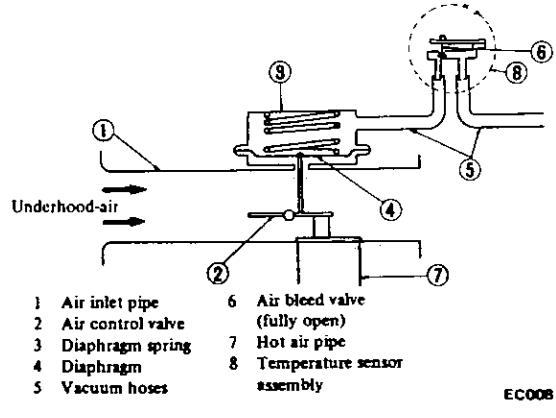


Fig. 111 Underhood-Air Delivery Mold (During Hot Engine Operation)

derhood-air inlet to obtain full power regardless of the temperature around sensor.

This control of carburetor air temperatures allows leaner carburetor calibration with accompanying reduced emissions than conventional controls and also eliminates carburetor icing.

Idle Compensator
The idle compensator is essentially a thermostatic valve to compensate for excessive enriching of the mixture as a result of high idle temperatures. When the under-the-hood temperatures are high, the bimetal located in the air cleaner is heated by intake hot air and lifts the valve to open. This permits additional fresh air that is properly calibrated by the 1.4 mm (0.055 in) dia. orifice compensates for the increased richness of into the intake manifold and the air-fuel mixture in order to maintain smooth idle engine operation.

The idle compensator thermostatic valve partially opens at 65°C (149°F) and fully opens at 75°C (167°F).

Never attempt to disassemble this unit since it is sealed for tightness and properly adjusted for valve timing.

TEMPERATURE SENSOR

Removal
Flatten tabs of clip with pliers.

Pull off hoses.

Note: Note the respective positions of hoses from which they were removed.
Take off sensor and clip.

Installation
Install sensor and gasket assembly in the proper positions. See Figure 113.

Insert clip. Be sure to hold sensor at its correct position in Fig. 113 to avoid damage. See Fig. 114.

Press fit clips into pipe while straightening tabs.

Note: Use care not to damage sensor.

Connect hoses to their proper positions. See Figure 115.

FUEL PUMP

Removal and Disassembly
Remove fuel pump assembly by unscrewing two mounting nuts and disassemble in the following order.

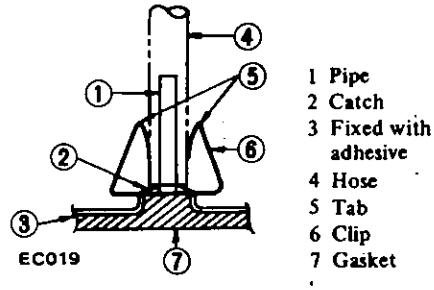


Fig. 112 Removal of Sensor

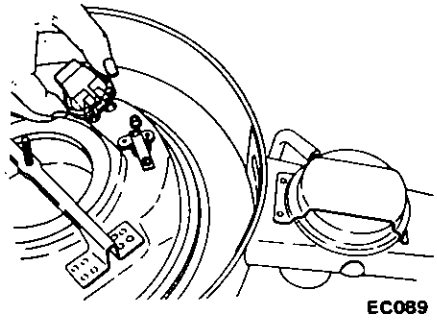


Fig. 113 Installing Sensor

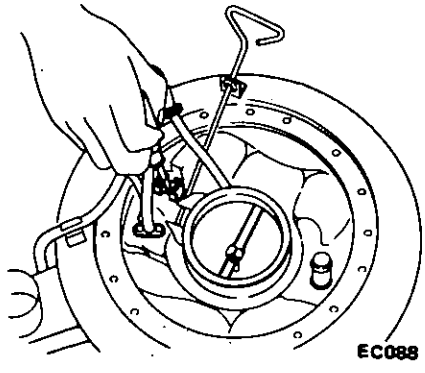


Fig. 114 Inserting Clip

Separate upper body and lower body by unscrewing body set screws.

Take off cap and cap gasket by removing cap screws.

Unscrew elbow and connector.

Take off valve retainer by unscrewing two valve retainer screws and two valves are easily removed.

To remove diaphragm, press down its center against spring force. With diaphragm pressed down, tilt it until the end of pull rod touches the inner wall of body. Then, release the diaphragm to unhook push rod. Use care during this operation not to damage diaphragm or oil seal.

Drive out rocker arm pin by using a press or hammer.

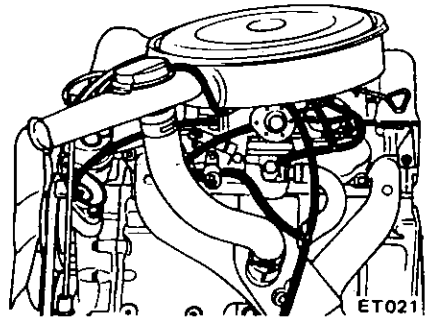


Fig. 115 Connecting Hoses

Inspection

Check upper body and lower body for cracks.

Check valve assembly for wear on valve and valve spring. Blow valve assembly with breath to examine its function.

Check diaphragm for small holes, cracks or wear.

Check rocker arm for wear at the portion in contact with camshaft.

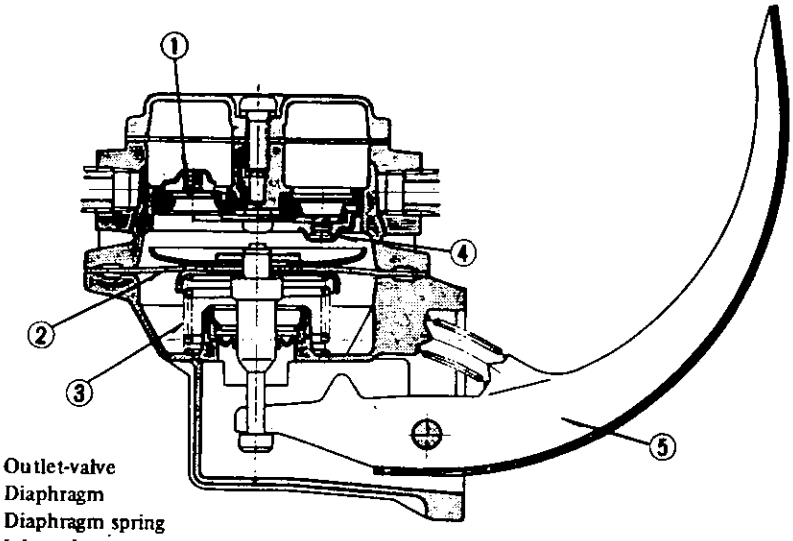
Check rocker arm pin for wear. A worn pin may cause oil leakage.

Check all other components for any abnormalities and replace with new parts if necessary.

Assembly

Reverse the order of disassembly. Closely observe the following instructions.

Use new gaskets.



1 Outlet-valve
2 Diaphragm
3 Diaphragm spring
4 Inlet-valve
5 Rocker arm

Fig. 116 Schematic View of Fuel Pump

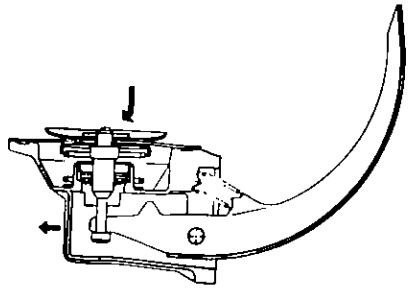


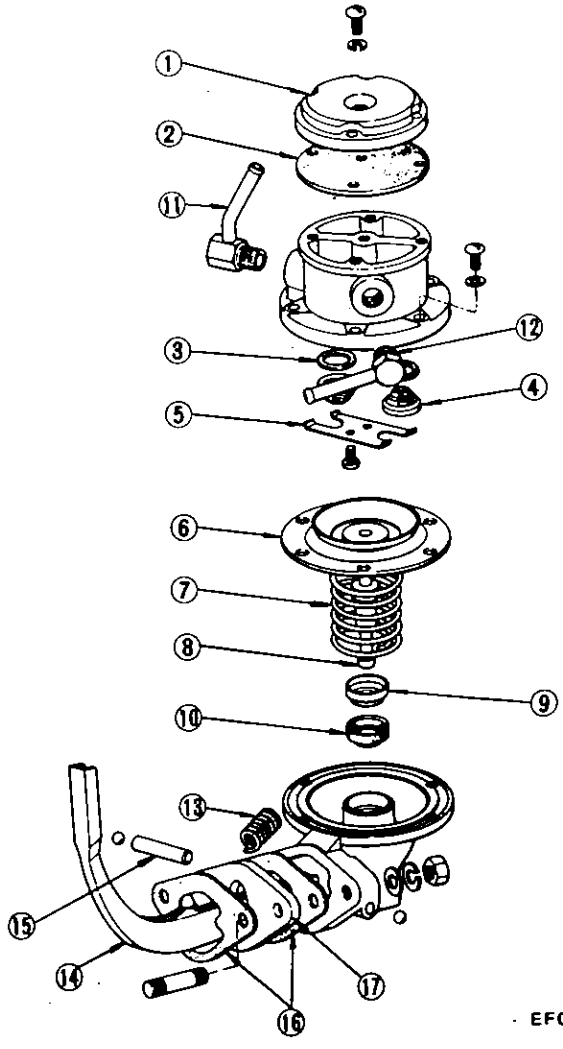
Fig. 117 Removing Pole Rod

Lubricate rocker arm, rocker arm link and rocker arm pin before installation.

To test the function, proceed as follows:

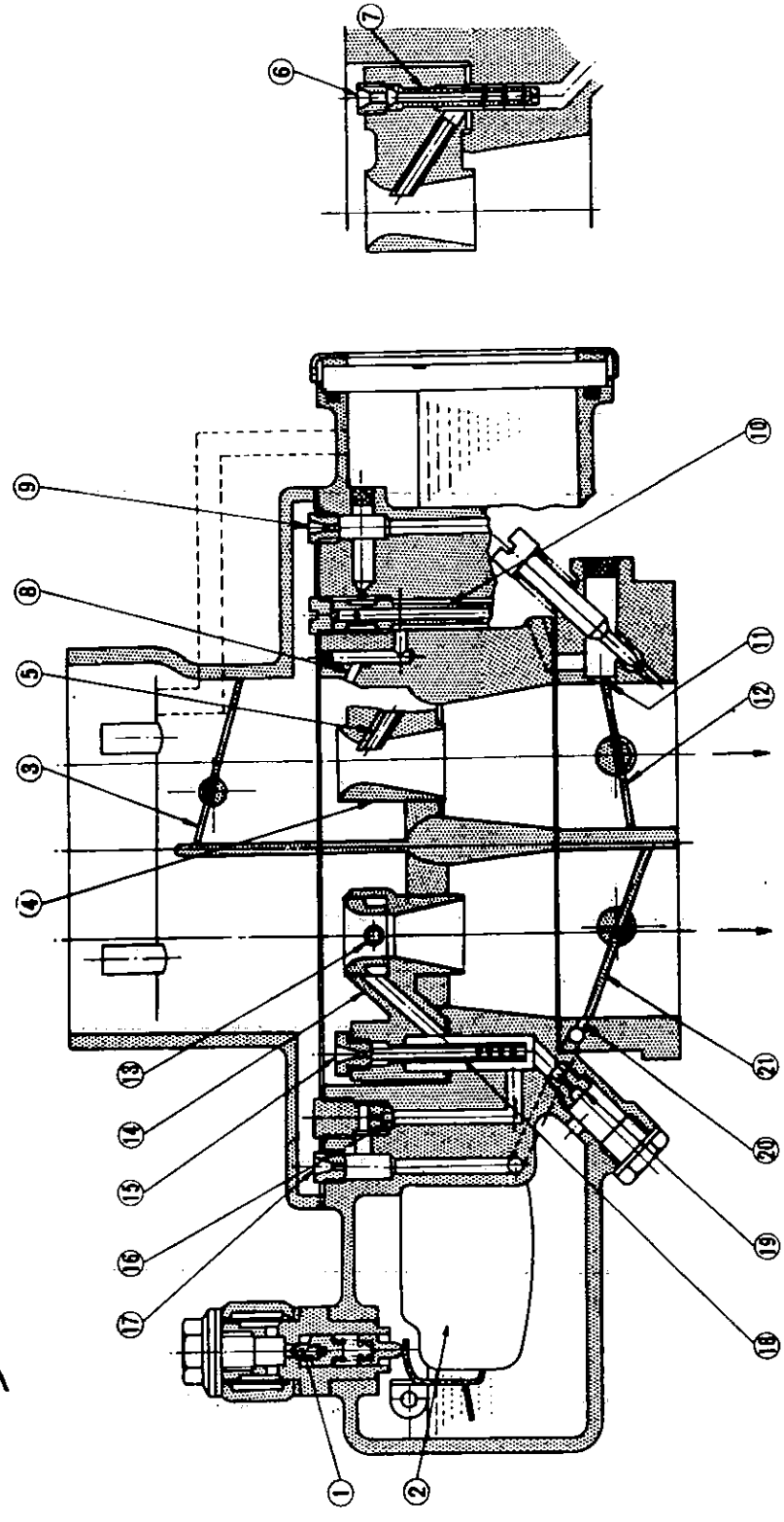
Position fuel pump assembly about 3.3 ft above fuel level of fuel strainer and connect a pipe from strainer to fuel pump.

Operate rocker arm by hand. If fuel is drawn up soon after rocker arm is released, fuel pump is functioning properly.



1 Fuel pump cap
2 Cap gasket
3 Valve packing Ass'y
4 Fuel pump valve Ass'y
5 Valve retainer
6 Diaphragm Ass'y
7 Diaphragm spring
8 Pull rod
9 Lower body seal washer
10 Lower body seal
11 Inlet connector
12 Outlet connector
13 Rocker arm spring
14 Rocker arm
15 Rocker arm side pin
16 Fuel pump packing
17 Spacer-fuel pump to cylinder block

Fig. 118 Structure of Fuel Pump



1 Float valve
2 Float
3 Choke valve
4 Primary small venturi
5 Primary main nozzle
6 Main air bleed
7 Primary emulsion tube
8 P. 1st slow air bleed
9 P. 2nd slow air bleed
10 P. slow jet
11 P. bypass hole
12 P. throttle valve
13. S. main nozzle
14 S. small venturi
15 S. main air bleed
16 S. slow jet
17 S. slow air bleed
18 S. emulsion tube
19 S. main jet
20 S. bypass hole
21 S. throttle valve

Fig. 119 Sectional View of Carburetor

CARB KIT
16009-N0919

CARBURETOR

Removal

Remove air cleaner.

Disconnect fuel and vacuum lines from carburetor.

Remove throttle lever.

Remove four nuts and washers retaining carburetor to manifold.

Life carburetor off manifold.

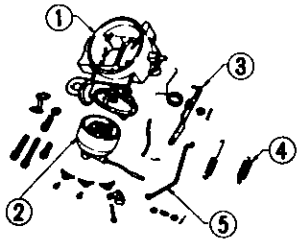
Remove and discard the gasket used between carburetor and manifold. Replace it, if necessary.

Disassembly

Do not remove throttle plates.

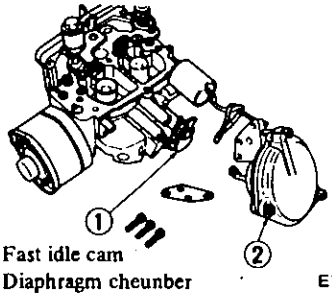
Carburetor assembly

Remove throttle return spring from primary side.



1 Ventui
2 Main air bleed
3 Emuleion take
4 Secondary
5 Primary

Fig. 120 Removing Thermostat



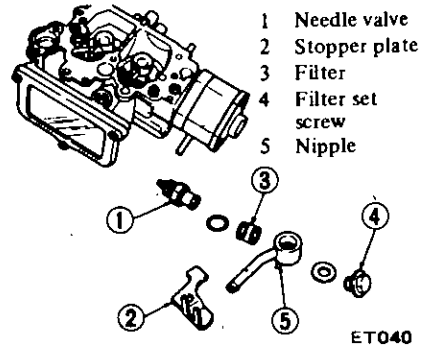
1 Fast idle cam
2 Diaphragm cheunber

Fig. 121 Removing Diaphragm Chamber

Remove pump lever and pump rod.

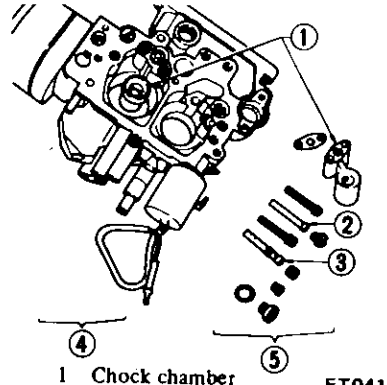
Remove cam connecting rod.

Remove thermostat cover by unscrewing three set screws.



1 Needle valve
2 Stopper plate
3 Filter
4 Filter set screw
5 Nipple

Fig. 122 Removing Filter



1 Chock chamber
2 Thermostat cover
3 Pump lever
4 Throttle return spring
5 Pump rod

Fig. 123 Removing Venturies

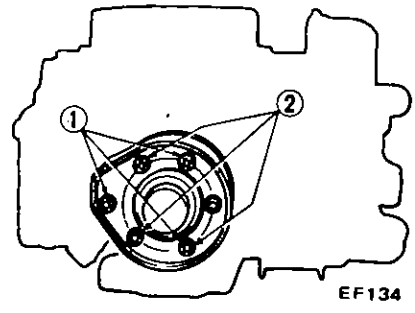


Fig. 124 B.C.D.D. Securing Screws

Remove choke chamber by unscrewing four set screw and remove throttle return spring from secondary side.

Separate float chamber and throttle chamber by unscrewing four set screws.

Float Chamber

Remove diaphragm chamber assembly and diaphragm chamber gasket.

Remove fast idle cam, cam spring and counter lever.

Remove filter set screw, nipple, filter, needle valve and stopper plate.

Remove cylinder plate, pump cover, piston, piston return spring and inlet valve by unscrewing two set screws.

Remove injector spring and outlet valve.

Remove small venturies, main air bleeds and emulsion tubes from primary and secondary sides.

Remove slow jet and slow air bleed.

Remove primary and secondary main jets.

Remove level gauge cover, float chamber, level gauge, rubber seal, float shaft colour and float.

Remove power valve.

Remove return plate, sleeve, fast idle lever, spring hanger and throttle lever.

ANTI-DIESELING SOLENOID

Removal

Solenoid is cemented at factory.
Use a pair of pliers to loosen body out of position.

Installation

Before installing a solenoid, it is essential to clean all threaded parts of carburetor and solenoid. Supply screws in holes and turn them in two or three pitches.

First, without disturbing the above setting, coat all exposed threads with adhesive the "Stud Lock" of LOCTITE or equivalent.

Then, torque screws to 30 to 48 in-lb.

After installing anti-dieseling solenoid, leave carburetor more than 12 hours without operation.

After replacement is over, start engine and check to be sure that fuel is not leaking, and that anti-dieseling solenoid is in good condition.

Notes:a. Do not allow adhesive getting on valve. Failure to follow this caution would result in improper valve performance or clogged fuel passage.

b. In installing valve, use caution not to hold body directly. Instead, use special tool, tightening nuts as required.

c. After installing a new solenoid, check to be certain that there is no leakage, cracks or otherwide deformation.

BOOST CONTROLLED DECELERATION DEVICE

Remove B.C.D.D. by unscrewing three securing screws 1. Do not unscrew three B.C.D.D. assembly screw 2.

When installing, after screwing three securing screws 1, rescrew three B.C.D.D. assembly screws 2 in order to prevent the warp of B.C.D.D. body.

Tighten torque:
17 to 35 in-lb.

Assembly and Installation

Follow disassembly and removal procedures in reverse.

Replace gaskets, if necessary.

In disassembling interlock link and related components, be careful not to bend or deform any of components.

Careful reassembly will restore smooth operation of all interlock parts.

Cleaning and Inspection

Dirt, gum, water or carbon contamination in or on exterior moving parts of a carburetor are often responsible for unsatisfactory performance. For this reason, efficient carburetion depends upon careful cleaning and inspection while servicing.

Blow all passages and castings with compressed air and blow off all parts until dry.

Note: Do not pass drills or wires through calibrated jets or passages as this may enlarge orifice and seriously affect carburetor calibration.

Check all parts for wear. If wear is noted, defective parts must be replaced. Note especially the following:

Push connecting rod of diaphragm chamber and block passage of vacuum by finger. And when connecting rod becomes free, check for leakage of air and damage of diaphragm.

Check float needle and seat for wear. If wear is noted, assembly must be replaced.

Check throttle and choke shaft bores in throttle chamber and choke chamber for wear or out-of-roundness.

Inspect idle adjusting needle for burrs or ridges. Such a condition requires replacement.

Inspect gaskets to see if they appear hard or brittle or if edges are torn or distorted. If any such condition is noted, they must be replaced.

Check filter screen for dirt or lint.

Clean, and if it is distorted or remains plugged, replace.

Check linkage for operating condition.

Inspect operation of accelerating pump. Pour fuel into float chamber and make throttle lever operate. And check condition of fuel injection from the accelerating nozzle.

JETS

The carburetor performance depends on jets and air bleeds. That is why these components must be fabricated with utmost care. To clean them, use cleaning solvent and blow air on them. Larger inner numbers stamped on the jets indicate larger diameters. Accordingly, main and slow jets with larger numbers provice richer mixture, and the smaller numbers the leaner mixture. Inversely, the main and slow air bleeds which are for air to pass through, make the fuel leaner if they bear larger numbers, and the smaller numbers the richer fuel.

Cooling System

Cooling System

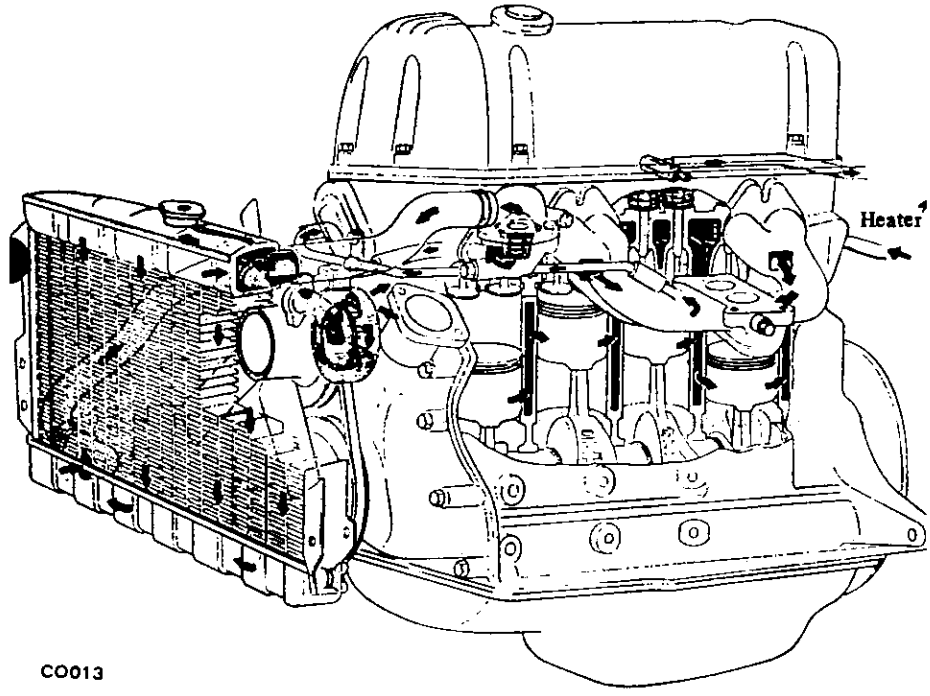


Fig. 125 Cooling System

DRAINING AND FLUSHING

To drain the cooling system remove the radiator cap, release the drain cock at the bottom of the radiator and drain plug on the right side of the cylinder block. If the heater system is installed, set the heater temperature control valve at open position.

After the coolant is drained completely, close the drain cock and plug and refill the system with clean water.

WATER PUMP

The water pump is of a centrifugal type, which is mounted on the engine front cover. The fan and pulley are bolted at the pulley hub.

The pump shaft is supported by a double row ball bearing press fit in an aluminum die cast pump body. The bearings are permanently lubricated and sealed to prevent loss of lubricant and entry of dirt.

The pump contains an impeller that turns on a steel shaft which rotates in the ball bearings, and the volute chamber is built in the front cover assembly. The inlet of the pump is connected to the radiator lower tank by a hose.

Removal

Drain coolant into a clean container.

Loosen four bolts retaining fan shroud to radiator and remove shroud.

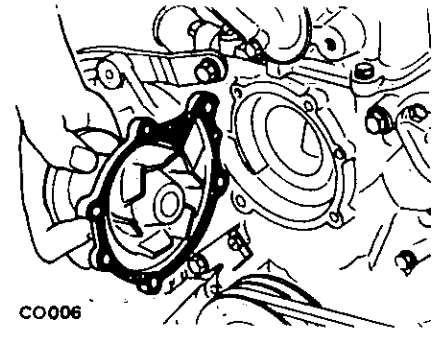


Fig. 126 Removing Water Pump

Loosen belt, then remove fan blade and pulley from hub.

Remove five bolts, pump assembly, and gasket from front cover.

Disassembly
The water pump body is made of aluminum, and its bearing outer race is press fit. For this reason, the body, shaft bearing should not be disassembled.

Inspection
Inspect pump assembly for the following conditions, and replace it if necessary.

Badly rusted or corroded body assembly and vane.

Excessive end play or roughness of bearings in operation.

Installation
Make sure to clean the gasket surfaces on pump and front cover. Always use new gasket when installing pump assembly. Be sure to tighten bolts uniformly.

Fill cooling system and check for leaks at pump.

Install fan pulley and fan blade, and tighten fixing bolts securely. Install belt and adjust for proper tension.

THERMOSTAT

A wax pellet type thermostat is mounted in the thermostat housing at the cylinder head water outlet adjacent to the inlet manifold. The function of thermostat is to control the flow of coolant, facilitating fast engine warm up and regulating coolant temperature. The thermostats are designed to open and close at predetermined temperatures and if not operating properly should be removed and tested as listed below:

Removal and Installation
Drain coolant partially.

Disconnect upper radiator hose at water outlet.

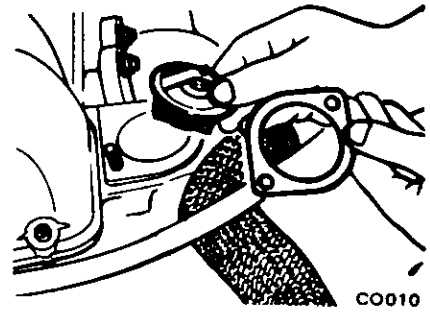


Fig. 127 Removing Thermostat

Loosen two securing nuts and remove water outlet, gasket, and thermostat from thermostat housing.

After checking thermostat satisfactorily, install, replacing with a new housing gasket.

Reinstall water outlet and tighten securing nuts.
Replenish coolant and check for leaks.

RADIATOR

The radiator is a conventional down flow type having the top and bottom tanks to distribute the coolant flow uniformly through the vertical tube of the radiator core.

The radiator filler cap is designed to maintain a pre-set pressure (0.9 kg/em2 13 lb/sq in) above atmospheric pressure. The relief valve consists of a blow-off valve and a vacuum valve. It helps to prevent coolant loss from boiling for by raising the pressure on the coolant. On the contrary, as the pressure is reduced below atmospheric pressure the vacuum valve allows air to re-enter the radiator, preventing the formation of vacuum in the cooling system.

The bottom tank on cars equipped with the automatic transmission incorporates an oil cooler for the transmission fluid.

Removal and Installation
Drain coolant into a clean container.

Remove front grille.

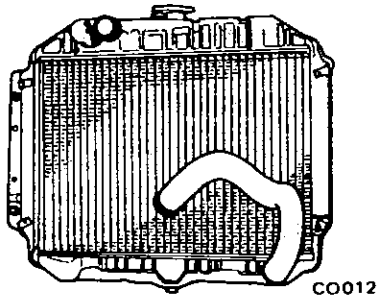


Fig. 128 Radiator for Manual Transmission

Disconnect radiator upper and lower hoses. On a vehicle with automatic transmission, disconnect cooler inlet and outlet lines from radiator.

Remove bolts retaining radiator from radiator side supports and remove radiator upwards. Install radiator in reverse sequense of removal.

Inspection

Radiator cap should be checked for pressure at regular tune up intervals. First, check rubber seal on cap for tears, cracks or deterioration after cleaning it. Then, install radiator cap on a tester. If cap does not hold pressure or will not release at the proper pressure, replace cap.

Also, inspect radiator for water leakage using a cap tester under applying a pressure of 17 lb/sq in. If such the defect is detected, repair or replace radiator.

Brakes

MASTER CYLINDER

Removal

Remove the clevis pin connecting the push rod with the brake pedal and disengage the master cylinder from the pedal.

Disconnect the brake tube from the master cylinder.

Screw out master cylinder fixing nuts and remove the master cylinder from the dash board.

Installation

Installation is a reversal of the removal procedure, but the following operation should be added.

Adjust the pedal height by changing the push rod length of the master cylinder.
Bleed air out of the master cylinder.

FRONT DISC BRAKE

Description

Figure 130 shows the relation of forces working. As brake pedal is depressed, hydraulic pressure from the master cylinder forces the piston of wheel cylinder out of the caliper bore and thrusts inner pad forward until it contacts disc, and simultaneously pushes outer pad by reaction force F_2. These forces cause rotating moment, which increases reaction force F_2. This is called self energizing action. In this SC brake, it is around 5%.

As pad wears, movement of piston is increased, and when seal is deflected more than its elastic deformation, piston will slide outward causing slip between seal and piston, thus assuring constant clearance between pad and disc.

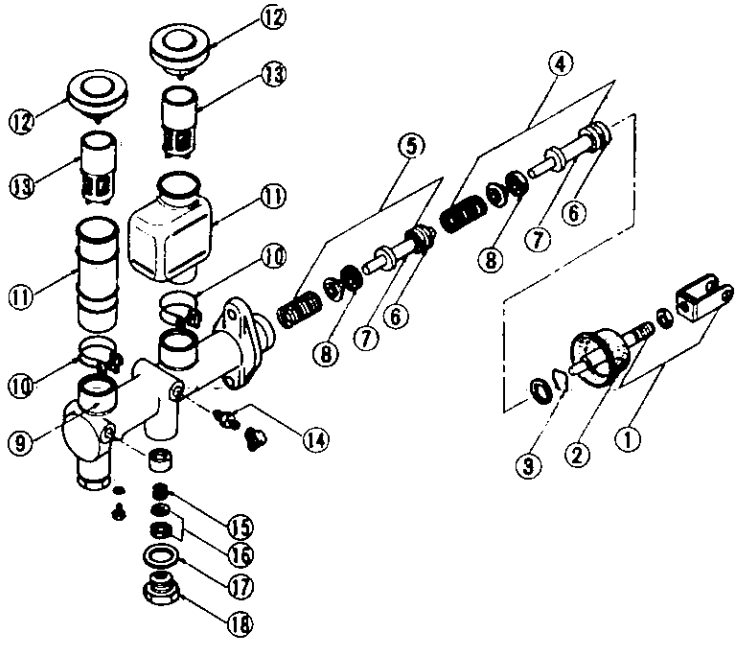
Removal

Jack up the vehicle and support it on stands and remove the wheel.

Disconnect the front brake hose from the brake tube.

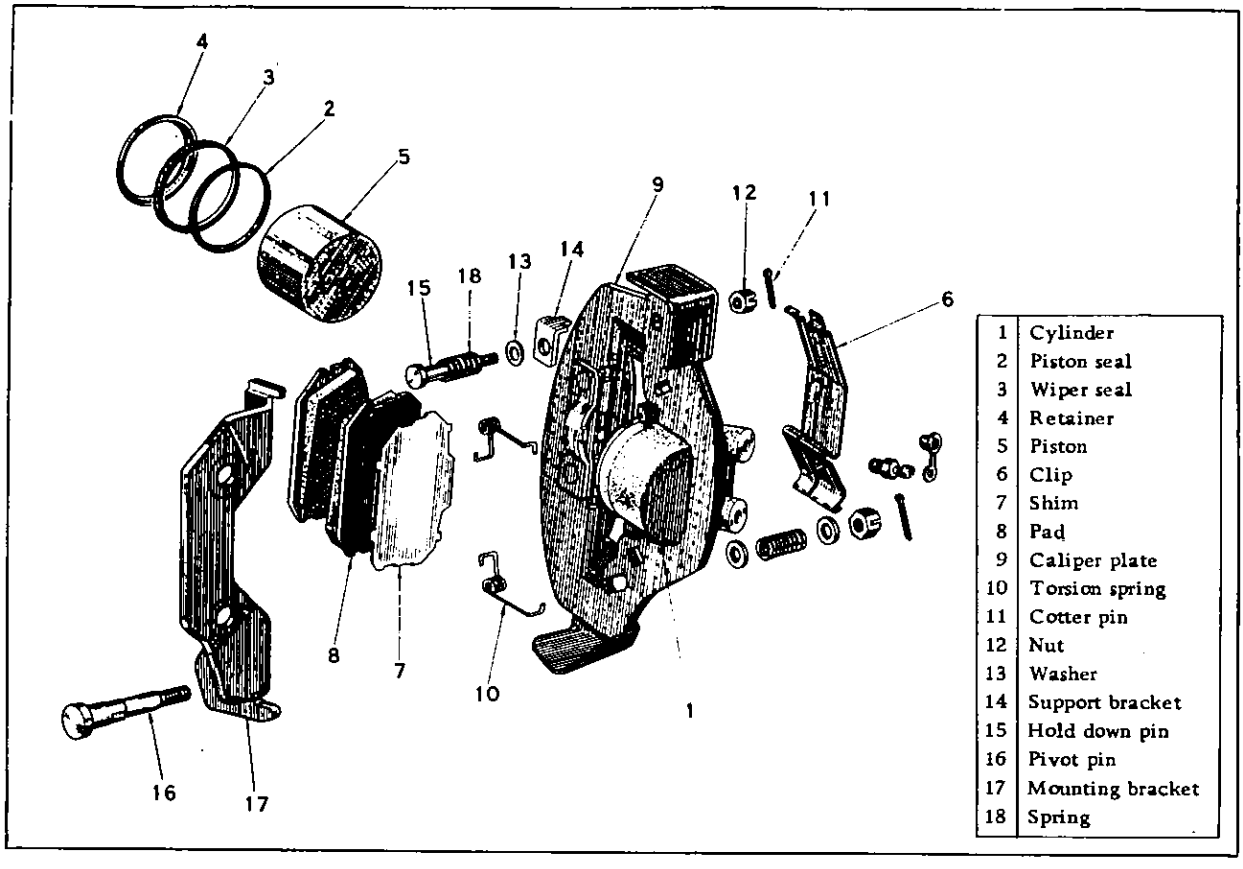
Note: Plug up the brake tube with a wooden peg to avoid spilling fluid during work on caliper.

Screw out the bolts fixing the caliper to the knuckle flange and remove the caliper assembly.



1	Push rod ass'y
2	Dust cover
3	Stopper ring
4	Piston ass'y (A)
5	Piston ass'y (B)
6	Secondary piston cap
7	Piston
8	Primary piston cap
9	Master cylinder body
10	Reservoir band ass'y
11	Reservoir
12	Reservoir cap ass'y
13	Filter
14	Bleeder screw
15	Check valve spring
16	Check valve ass'y
17	Valve cap gasket
18	Valve cap

Fig. 129 Tandem Master Cylinder



1	Cylinder
2	Piston seal
3	Wiper seal
4	Retainer
5	Piston
6	Clip
7	Shim
8	Pad
9	Caliper plate
10	Torsion spring
11	Cotter pin
12	Nut
13	Washer
14	Support bracket
15	Hold down pin
16	Pivot pin
17	Mounting bracket
18	Spring

Fig. 130 Front Disc Brake

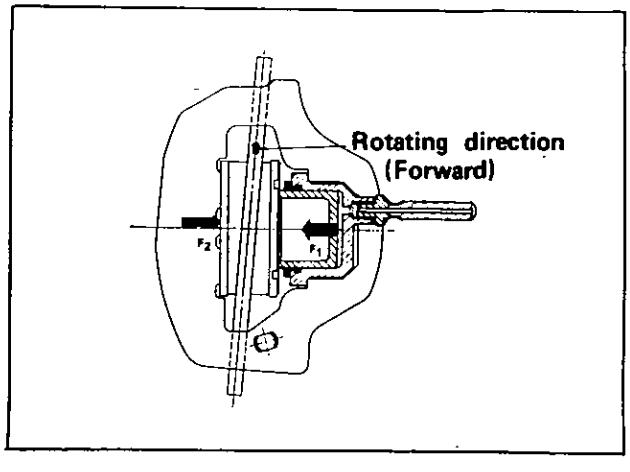


Fig. 131 Sectional View of Front Disc Brake

Fig. 132 Removing Front Brake Hose

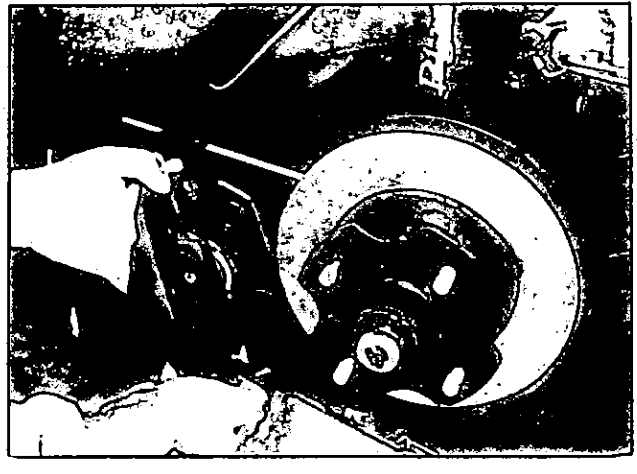


Fig. 133 Removing Caliper Assembly

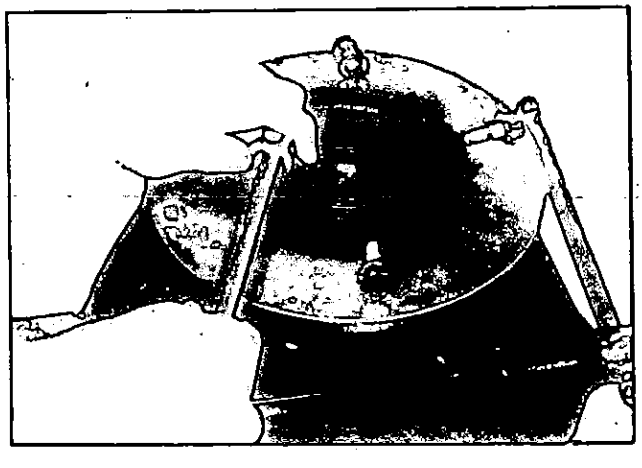


Fig. 134 Removing Brake Disc

Remove the spindle nut and the disc hub, and separate the rotor from the hub assembly.

Disassembly

Remove the anti-rattle clip from the caliper plate and then pick up the pad.

Remove the tension springs and pull the cylinder out of the caliper plate.

To take out piston, apply air or hydraulic pressure from inlet hole. Remove the rubber seal from the groove on the cylinder. Remove the retainer and wiper seal, and then it can be easily taken out.

Inspection and Repair

Check the cylinder assembly for oil leakage and any damage, and replace the cylinder assembly if any abnormal condition is detected on it.

Note: Unlike the wheel cylinder cup of drum brakes, the piston seal of SC type disc brake has three important functions: sealing, retracting piston and automatic adjusting. If pistonseal is damaged, replace whole cylinder assembly as a unit. However if it is necessary to replace piston seal, replace wiper seal, at the same time. When pads are replaced two or three times, cylinder assembly (or seal) should be replaced though they still seem to be in good condition.

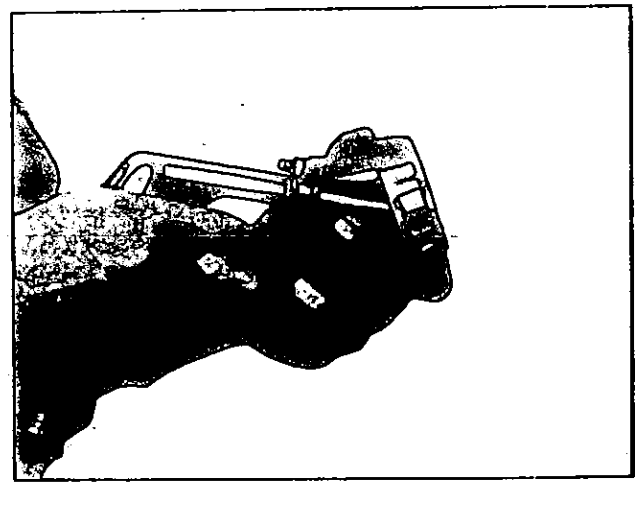


Fig. 135 Removing Piston

Check the pad for wear and crack, replace if it is damaged or become worn to less than 0.04 in. in thickness (not including the metal backing plate).

Check the caliper for damages, and replace it if any damage is detected.

Check the rotor and if it shows score, excessive out of roundness and so forth, reconditioning by machining is required.

Limit of reconditioning in thickness is 0.331 in.

Standard rotor thickness; 0.0394 in.

Runout of the rotor should be less than 0.0048 in. total indicator reading.

If any abnormal condition such as crack, distortion or excessive run out is detected, replace the rotor.

Piston Seal Replacement

If oil leakage is found on the piston seal, it should be replaced, paying attention to the following points.

After disassembly, rinse the cylinder bore with brake fluid. Insert new seal into the groove taking great care not to damage the seal. Attach the wiper seal. Apply a thin coating of specified grease to the cylinder bore.

Clean the piston. Check that no damage exists on piston surface. Insert the piston. Take care that the relieved position of the piston faces pivot pin. Insert first two inches gently, avoiding tilting.

Assembly and Installation

Clean the mounting surface and disc surface. Attach the disc to the hub.

Install the hub to the knuckle spindle.

Insert the piston into the cylinder till the face of piston head becomes almost flush with the face of the retainer of the wiper seal.

Install the cylinder into the caliper plate and secure in place by two torsion springs.

Assemble the hold down pin, spring washer and nut in this order to support bracket.

Insert a cotter pin to the nut.

Secure the mounting bracket and caliper plate with the pivot pin, washer, spring, washer and nut in that order. Tighten nut completely and set a cotter pin.

Pry up and hold down bracket by a screw driver and hook up to the upper end of the mounting bracket. Turn the caliper plate to make sure that it can slide smoothly.

Install the caliper assembly to the knuckle flange.

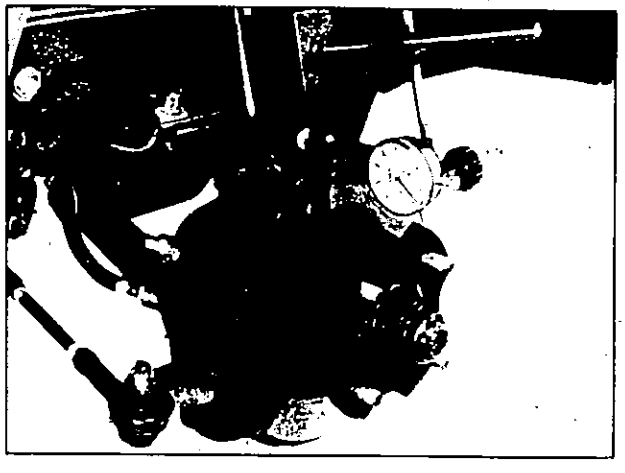


Fig. 136 Measuring Runout of Disc

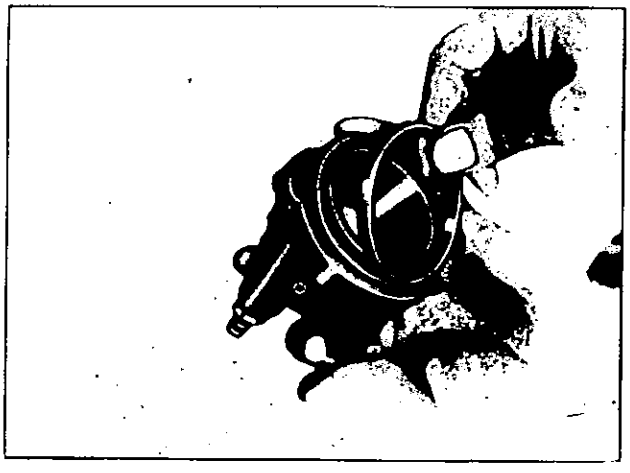


Fig. 137 Assembling Piston Seals and Retainer

Attach a shim to inner pad for noise proof and heat insulation.

Be sure to set the inner pad first. Draw the caliper plate enough toward inside (toward center of chassis). Insert lower cuts on both ends of the pad into the mounting bracket, and then push the pad until the pad contacts the piston.

Draw the caliper plate toward outside. Insert upper cuts and center indentation of outer pad into the caliper plate.

Attach the anti-rattle clip. Be sure the direction coincides as indicated by the sticker on the clip.

Pad Replacement

The clearance between the pad and rotor is adjusted automatically.

Check the pad for wear after the first 6,000 miles and every 3,000 miles and thereafter.

Pad thickness is easily checked by removing the anti-rattle clip. When linings become worn to less than 0.04 in. in thickness (not including the metal backing plate, replace all pads.

Note: Always replace the pads in full sets of four, using genuine parts.

Remove the road wheel. Remove the anti-rattle clip from the caliper plate.

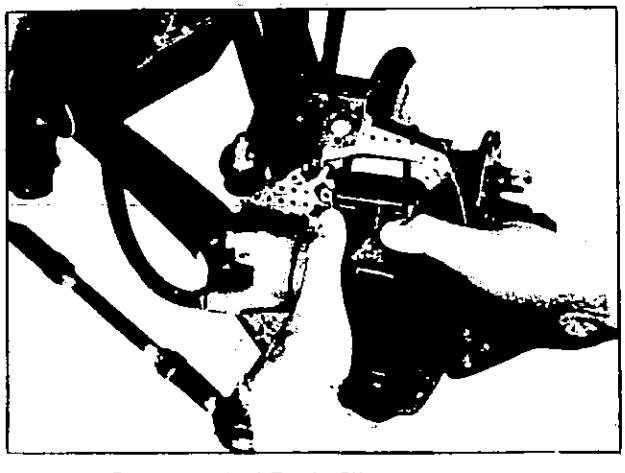


Fig. 138 Removing Anti-Rattle Clip

Loosen the bleed screw. Pull the caliper plate outwards (outward of chassis). Push the piston in by 0.118 to 0.157 in.

Outer pad is loosened and can be easily pulled out.

Draw the caliper plate inwards and remove inner pad. Wipe exposed surface of the piston thoroughly. Push the piston enough into the cylinder bore. Insert new pad into the caliper plate.

REAR BRAKE

Removal and Disassembly

Jack up the vehicle and support it on stands and remove the wheels.

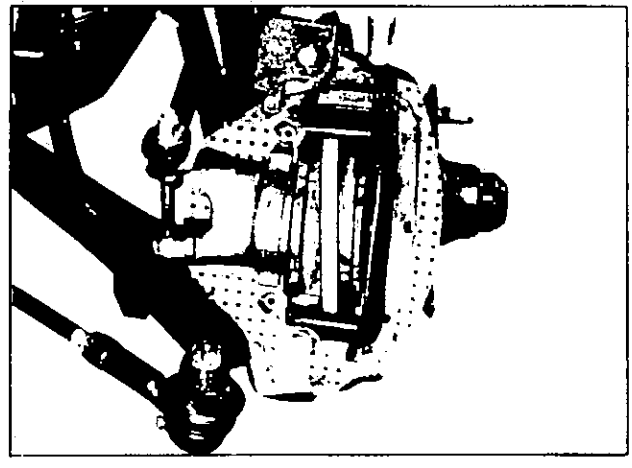


Fig. 139 Pushing Pin

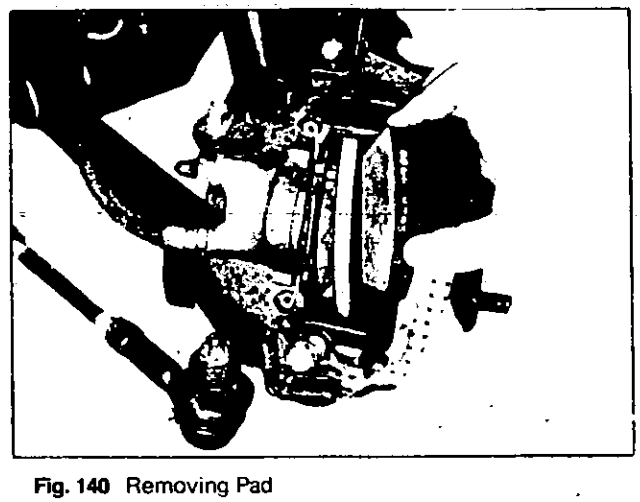


Fig. 140 Removing Pad

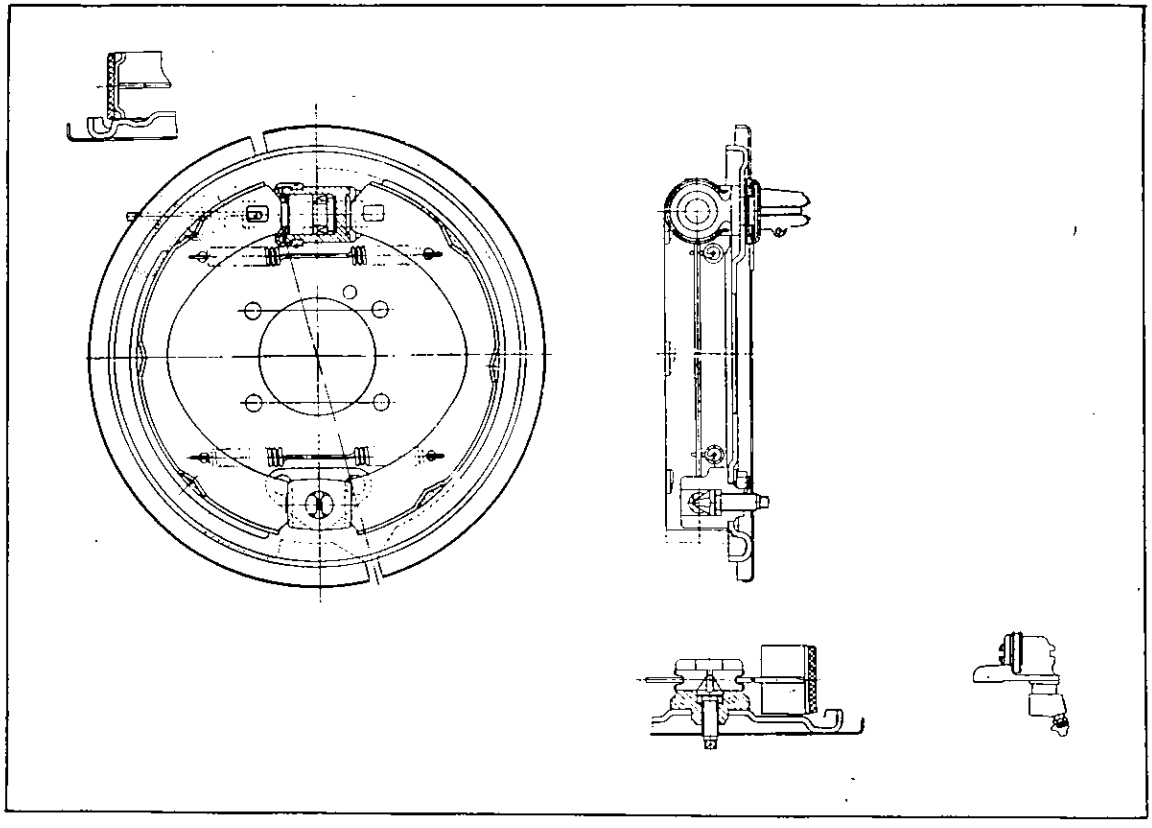


Fig. 141 Sectional View of Rear Brake

Release the parking brake and disconnect the cross rod from the lever of the rear wheel cylinder.

Remove the brake drum.

Remove the return springs and then take out the brake shoe assemblies.

Disconnect the brake tube from the wheel cylinder.

Remove the wheel cylinder by removing components as in the order of dust cover, plates and adjust shims, then it is ready to be removed from the brake disc.

The wheel cylinder is easily disassembled by removing the snap ring and dust cover.

Remove the adjuster assembly.

Remove the brake disc.

Inspection

Drums: If they show score, excessive out of roundness and so forth, reconditioning by machining is required.

Drum inside out of

roundness below 0.0020 in.

Nominal inner diameter

of the drum is 8.999 in.

Limit of reconditioning

in diameter is 9.040 in.

Linings: If shoe linings are incompletely seated, soiled or greasy or deteriorated due to excess heating, repair or replace them. If the thickness of the lining is found less than 0.0591 in., replace it.

Notes: a. If oil or grease is found in

Fig. 142 Sectional View of Rear Brake

linings, clean thoroughly with carbon tetrachloride or gasoline.

b. After lining installation and bonding, grind the lining face to a diameter equal to that of the brake drum.

Check and adjust cams for their smooth operation.

Springs: If they are considerably weak, replace them.

Check the brake disc for distortion.

Check the bore of the wheel cylinder for wear, sign of rust and damage.

If the clearance between the cylinder and the piston exceeds 0.0059 in., replace them.

When the wheel cylinder is overhauled, it is recommendable to replace cups even if apparently they are in satisfactory conditions, and they must be replaced if deformed due to damage, crack, corrosion and ageing.

Assembly

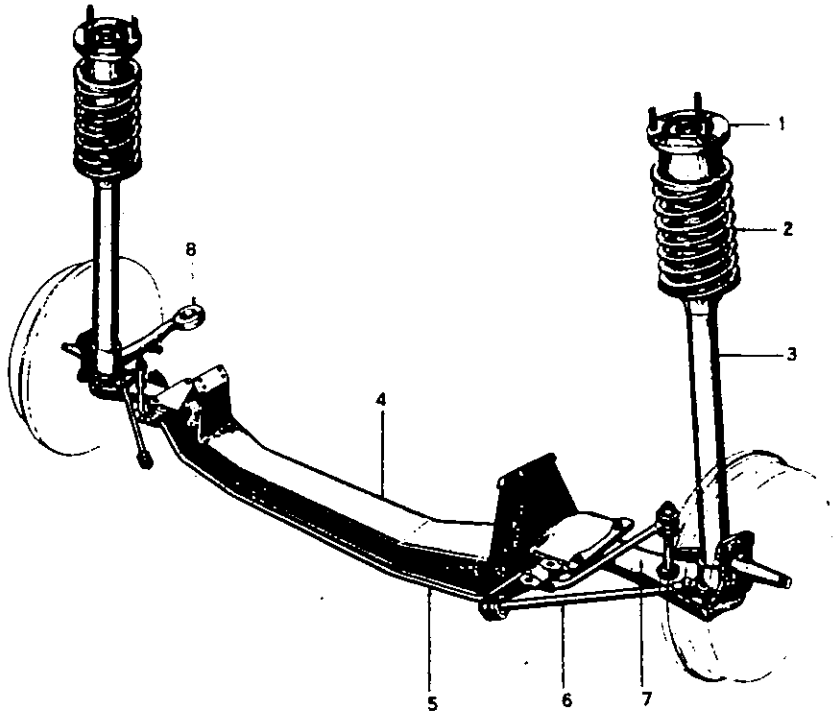
Assemble in the reverse order of disassembly.

Be careful not to smear the brake linings with oil or grease.

Apply grease thinly to the sliding areas such as shoes and discs, cam adjuster stud and spacer.

Adjust the shoe clearance and bleed the hydraulic system.

Front Suspension



1.	Strut mounting insulator
2.	Coil spring
3.	Strut assembly
4.	Suspension cross member
5.	Stabilizer
6.	Tension rod
7.	Transverse link
8.	Steering knuckle arm

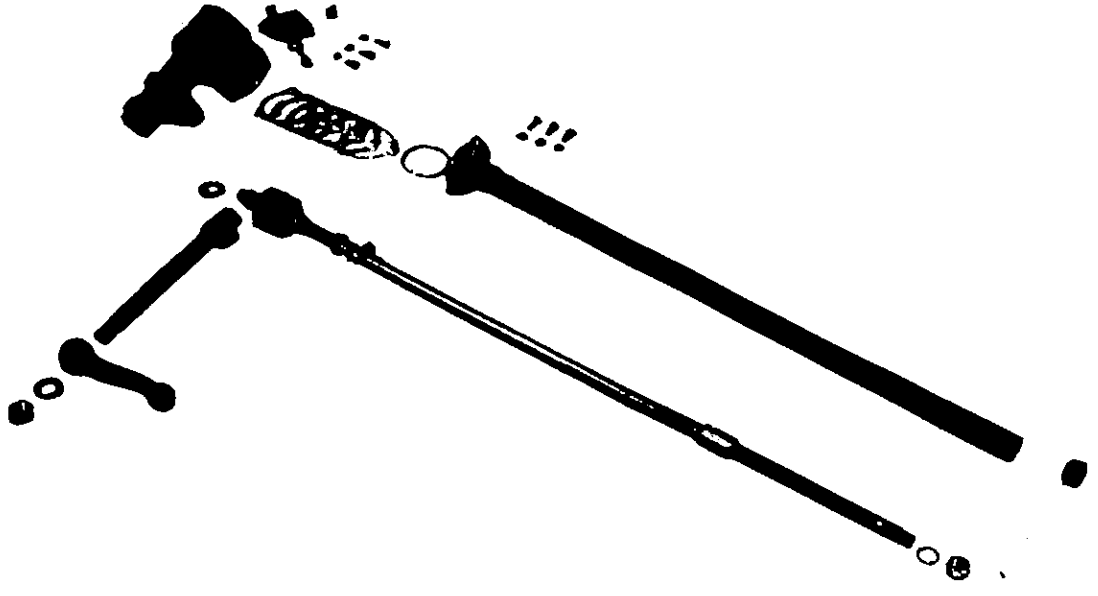
Fig. 143 Front Suspension Assembly

RECOMMENDATIONS

Due to the need for a large number of special tools and alignment equipment, it is recommended that repairs to the front end be left to a completely equipped shop.

Steering

STEERING GEAR COMPONENTS



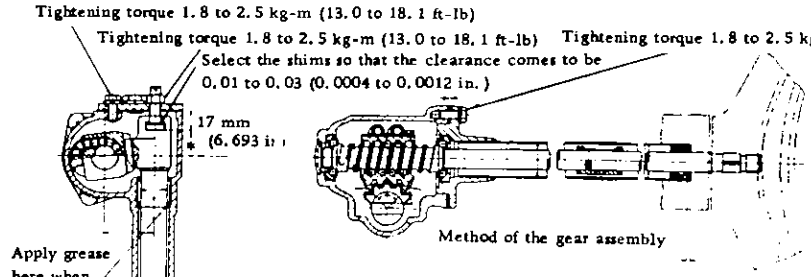
1	Steering gear housing	5	Shim-worm bearing	9	Ass'y-bearing, steering worm
2	Shaft-steering sector	6	"O" ring-housing cover	10	Ass'y-nut, ball
3	Cover-sector shaft	7	Comp-jacket, column	11	Ass'y-column, steering
4	Screw-adjusting, roller shaft	8	Ass'y-bearing, column		

Fig. 144 Steering Gear Components

RECOMMENDATIONS

Due to the need for a large number of special tools and alignment equipment, it is recommended that repairs to the steering components be left to a completely equipped shop.

ASSEMBLY



* The standard distance between the bottom of the T groove and the surface of the housing at the neutral position.

I) BEARING, PRE-LOAD ADJUSTMENT

Adjust the thickness of the worm adjust shim so that the rev. torque of the steering wheel comes to be 4.0 to 6.0 kg-cm (55 to 83 in-oz) before the sector shaft is fitted.

II)
1) Place the sector shaft on the neutral point.
2) Adjust the location of the sector shaft by turning the adjust screw os that the sector shaft and the ball nut hit each other.
3) Lock the adjust screw with the lock nut temporarily.
4) Move the gear for several times from the side of the gear arm E and make sure it turns smoothly.
5) After this, the backlash on the top of the gear arm should be between 0 to 0.1 mm (0 to 0.0039 in.) at the neutral point.
6) If the backlash is more than 0.1 mm (0.0039 in.), screw in the adjust screw further and repeat the the processes of 2) to 5) until it comes within the standard figure.
7) Finally screw in the adjust screw by 1/8 to 1/6 turn and lock it firmly with the lock nut.

III) OILING

Apply gear oil MP90. about 0.33 liters (3/4 U.S. pts., 5/8 Imper. pts.)

IV) STANDARD BACKLASH

The backlash should be 0 on the radius 22.75 mm (0.896 in.) of the sector pitch when the backlash on the neutral point is 0 and the turning angle of the sector shaft is 0.

Fig. 145 Sectional View of Steering Gear

STEERING LINKAGE

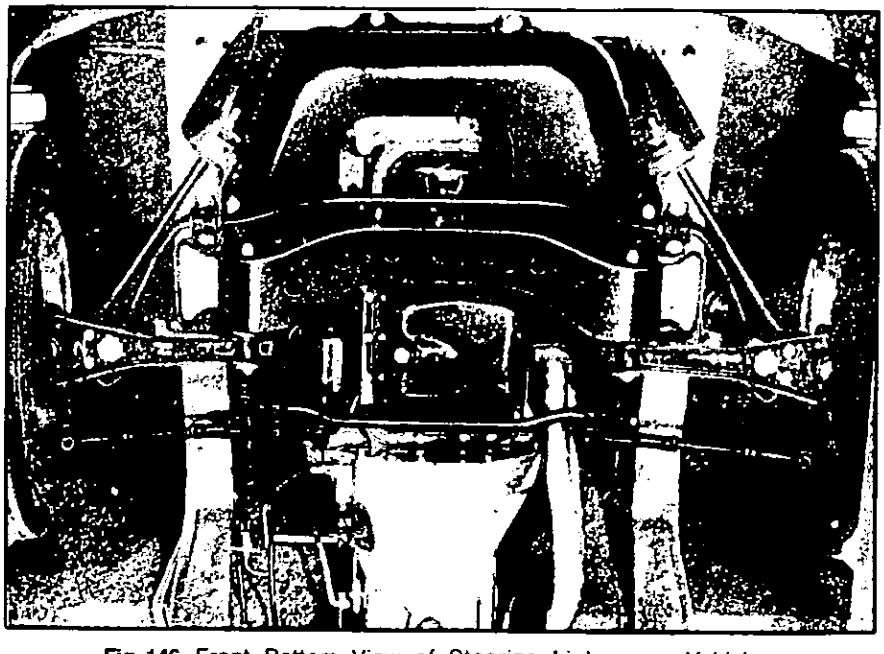
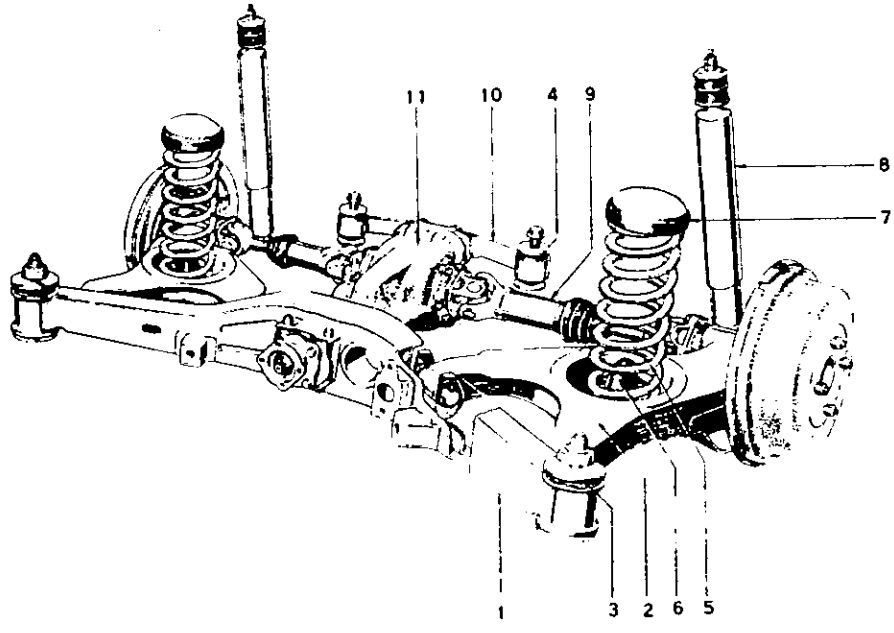


Fig. 146 Front Bottom View of Steering Linkage on Vehicle

Rear Drive & Suspension



1	Suspension member	7	Spring seat
2	Suspension arm	8	Shock absorber
3	Member mounting insulator	9	Drive shaft
4	Differential mounting insulator	10	Differential mounting member
5	Coil spring	11	Differential carrier
6	Bumper rubber		

Fig. 147 Rear Axle on Suspension

SHOCK ABSORBER

Removal

Open the trunk and remove the trunk finisher assembly.

Remove the double nuts which fasten the upper end of the rear shock absorber to the body.

Remove the shock absorber from its lower mounting bracket on the axle housing.

Inspection

Test the shock absorber and replace if necessary.

Check for oil leakage and cracks. Also check the shaft for straightness.

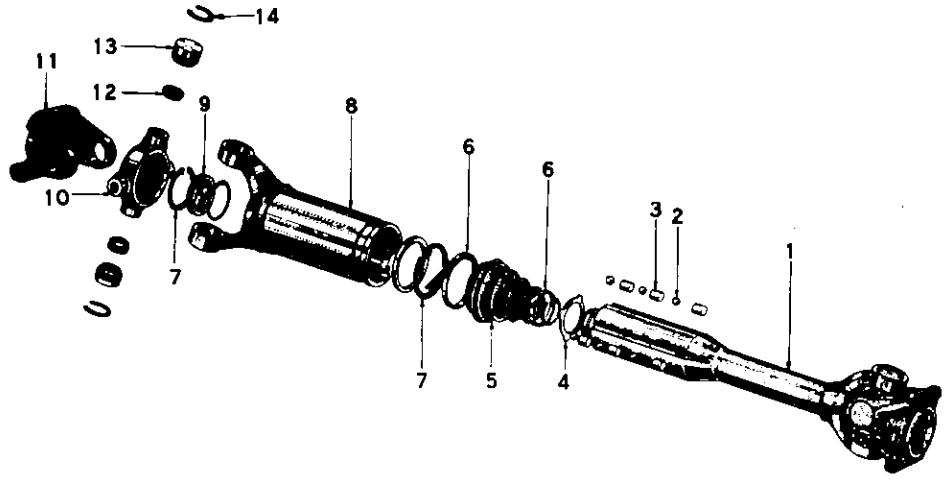
Inspect the rubber bushings for damage, cracks and deformation. Replace the parts, if necessary.

Installation

Installation of the shock absorber is the reversal of the procedure given for removal.

Fig. 148 Installation of Rear Shock Absorber Upper End

DRIVE SHAFT



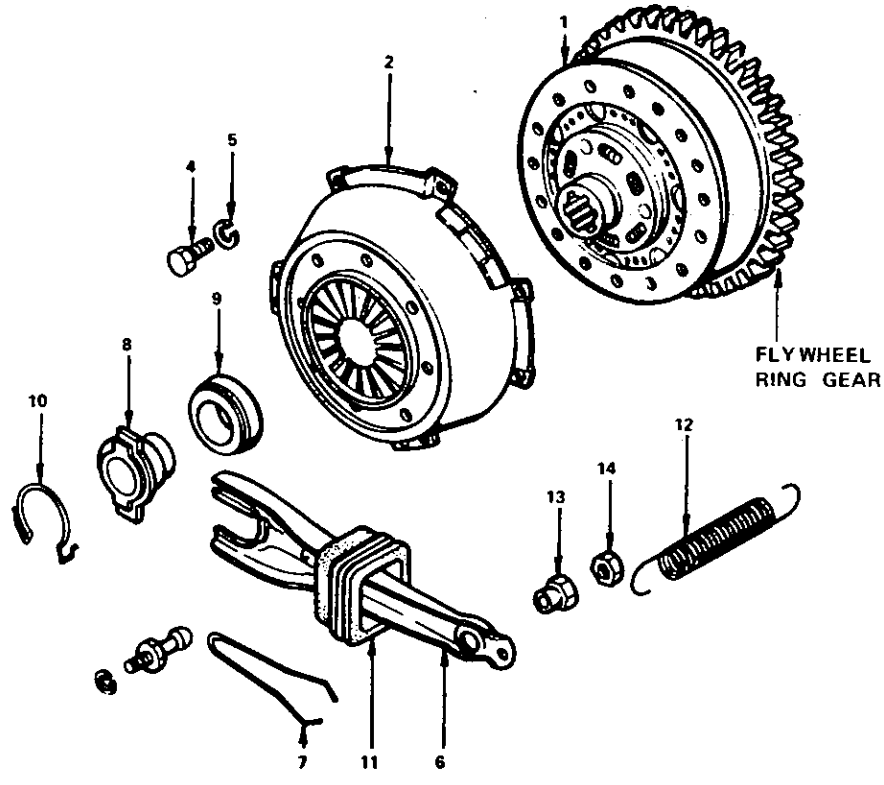
1	Drive shaft	6	Boot band	11	Flange yoke
2	Drive shaft ball	7	Snap ring	12	Oil seal
3	Ball spacer	8	Sleeve yoke	13	Needle bearing
4	Drive shaft stopper	9	Sleeve yoke plug	14	Snap ring
5	Rubber boot	10	Spider journal		

Fig. 149 Drive Shaft

RECOMMENDATIONS

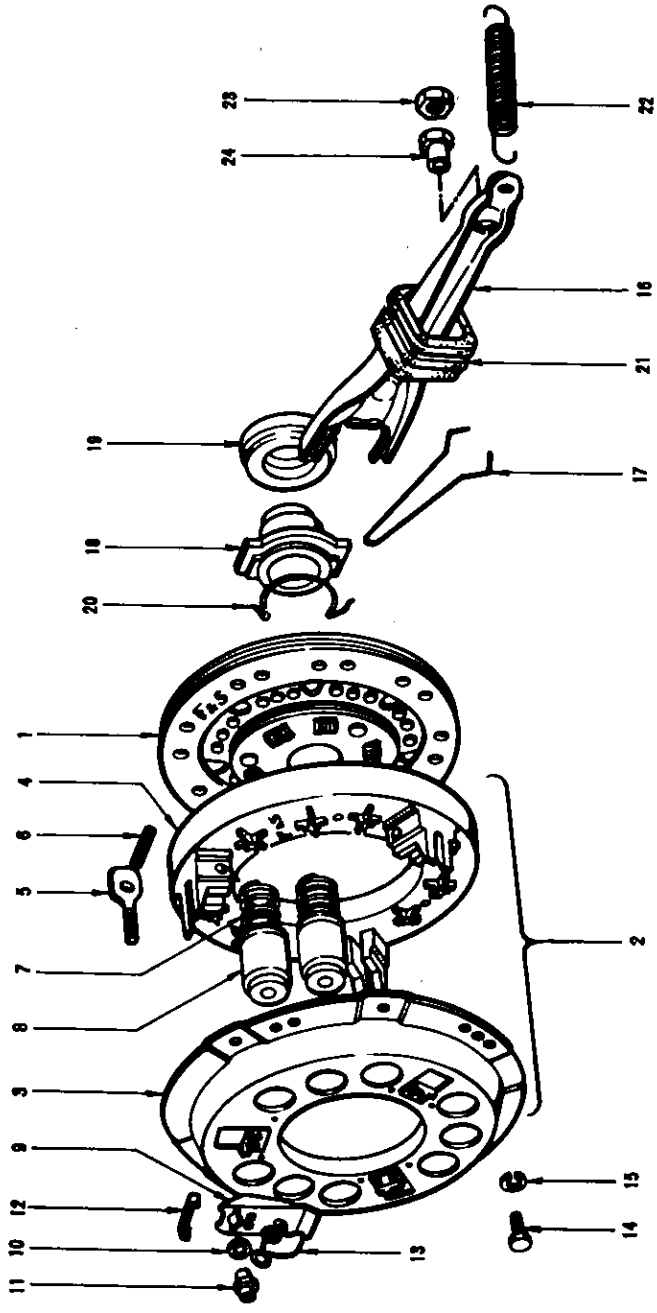
Due to the large number of special tools required and the advanced knowledge necessary, it is recommended that the overhaul of the differential be left to a properly equipped shop.

Clutch



1	Clutch disc	8	Bearing sleeve
2	} Clutch cover assembly with plate	9	Clutch release bearing
3		10	Bearing sleeve holder spring
4	Bolt	11	Dust cover
5	Lock washer	12	Return spring
6	Clutch withdrawal lever	13	Withdrawal lever push
7	Retainer spring	14	Lock nut

Fig. 150 Clutch Diaphragm Spring-Type)



1	Clutch disc	9	Release lever	17	Retainer spring
2	Clutch assembly	10	Release lever seat	18	Bearing sleeve
3	Clutch cover	11	Lock nut	19	Clutch release bearing
4	Pressure plate	12	Release lever support	20	Bearing sleeve holder spring
5	Pressure plate bolt	13	Retaining spring	21	Dust cover
6	Eye-bolt pin	14	Bolt	22	Return spring
7	Pressure spring	15	Lock washer	23	Lock nut
8	Pressure spring retainer	16	Clutch withdrawal lever	24	Withdrawal lever push nut

Fig. 151 Clutch (Coil Spring-Type)

REMOVAL

Remove the transmission assembly from the engine.

(a) Diaphragm spring type

Fully insert a special tool Clutch aligning Bar (ST20600000) on the clutch disc hub spring to support the clutch.

(b) Coil spring type

Temporarily lock the release lever with the release lever stopper.

Note: If the release lever stopper is not placed under each levers, the release lever will be over-loaded with excessive force when the clutch assembly is removed.

Loosen the six bolts which are holding the cover assembly to the flywheel, a turn at a time by diagonal selection until the spring pressure is relieved.

Remove the screws completely and lift the clutch assembly away from the flywheel.

Note: Be sure not to soil with grease or oil the surface of the disc.

RELEASE BEARING

Replace if there is rough spot or wear on the release lever control surface or if the inside wear causes too much play.

If it is judged that the remaining grease is not enough because of the leakage, replace the bearing.

If the clearance between the transmission front cover and the inside diameter of the sleeve is more than 0.5 mm (0.0197 in.) or there is step wear at the contacting surface with the withdrawal lever, replace or repair.

Replace if there is excessive wear or deformation.

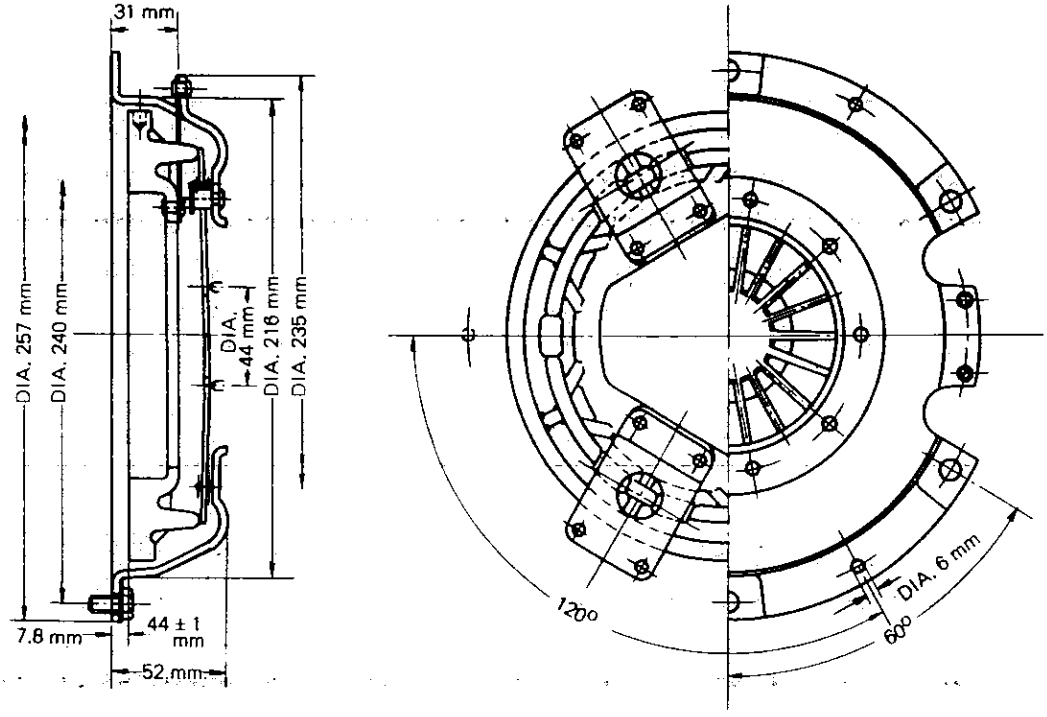


Fig. 152 Clutch Cover Assembly (Diaphragm Spring-Type)

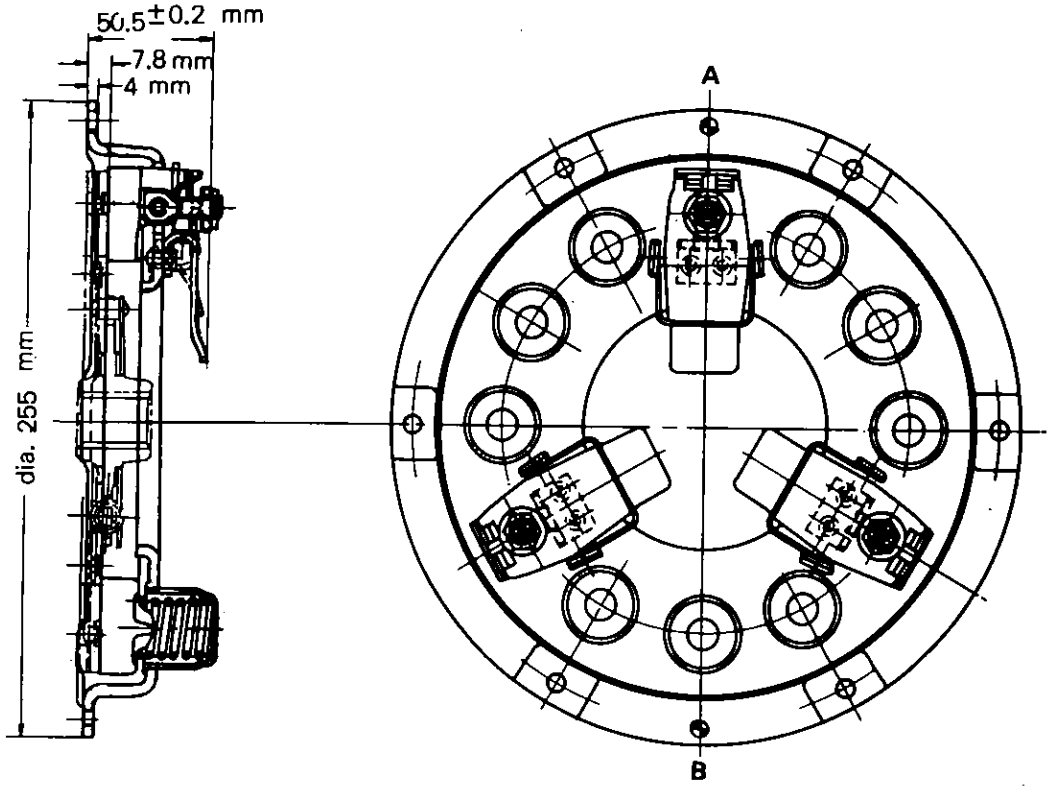


Fig. 153 Clutch Cover Assembly (Coil Spring-Type)

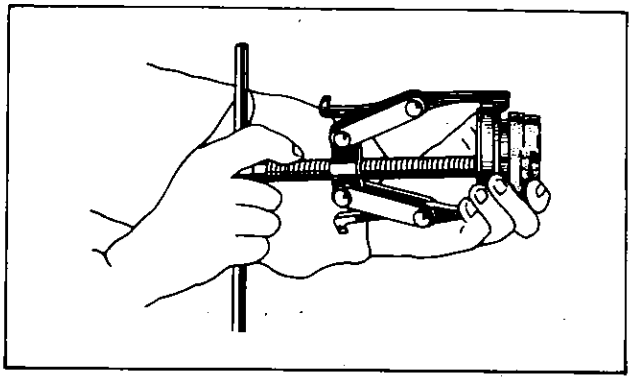


Fig. 154 Removing Release Bearing

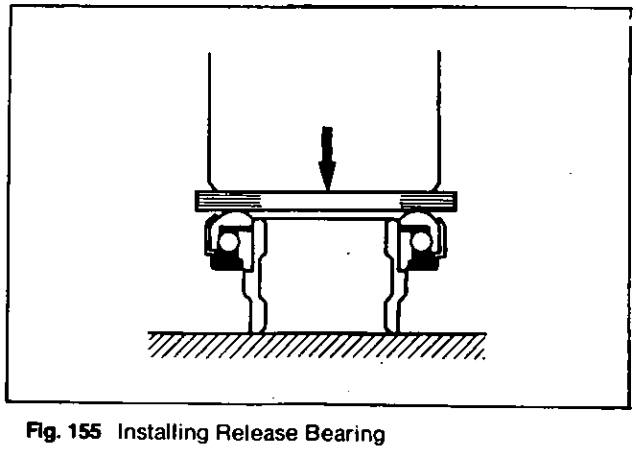


Fig. 155 Installing Release Bearing

REPAIR

Refacing Pressure Plate

The pressure plate can be refaced if the surface is rough or has uneven wear. In this case, the tension of clutch springs working on the pressure plate will be weakened.

The refacing limit is 1.0 mm (0.0394 in.) from specified standard dimension.

If it needs to be cut more than 1.0 mm (0.0394 in.) the unit must be replaced. After refacing the out of flatness should be less than 0.1 mm (0.0039 in.).

Note: In case of the diaphragm spring type, the pressure plate should not be refaced at any times.

Replacing Release Bearing
Removing the bearing

Remove the bearing by using universal puller.

Pressing the bearing in

There are two types of the release bearing. Specification of both bearings is quite the same, but particular attention is required because of different construction when installing the bearing into the bearing sleeve as follows.

(a) Diaphragm spring type. Release Bearing Fitting press-fit the bearing in place on the bearing sleeve, with the force of 400 kg (880 lbs) applied at the outer race as shown in Fig. 155.

ADJUSTMENT

Screw the center pillar into the base plate and slip the high finger over the pillar.

Adjust the height of the release levers by screwing or unscrewing the eye-bolt nuts until the height, when rotated, just contact the highest point on the tip of the release levers

Replace the height finger and pillar by the clutch actuating mechanism and actuate the clutch several times by operating the handle.

Note: This will enable the parts to settle down on their knife edges.

Replace the height finger and recheck the height of the release levers, checked for "run out" as near the edge as possible; if the error is more than 0.020 in. adjust until it is true within spec. limit.

INSTALLATION

It is important to keep friction facings free from oil or grease.

Place the disc assembly on the flywheel with the longer chamfered splined end of the disc assembly towards the transmission.

Set the position of the disc assembly by a dummy drive shaft which fit the splined bore of the disc assembly hub and the pilot bearing of the flywheel.

Tighten six bolts which are holding the clutch cover assembly to the flywheel a turn at a time by diagonal selection.

Note: There are two dowels on the flywheel to locate the clutch cover.

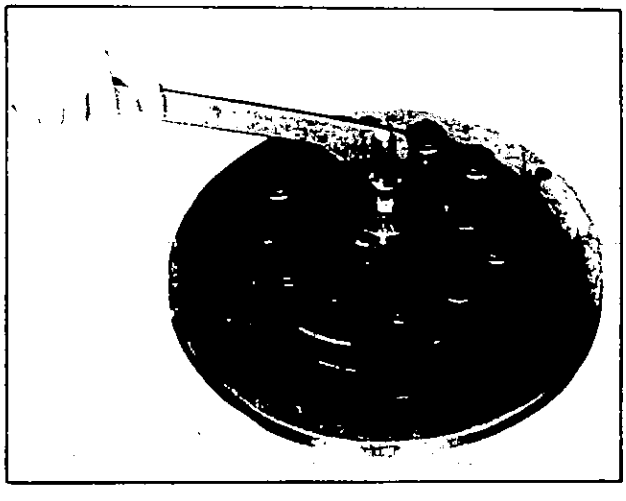


Fig. 156 Adjusting Release Lever Height

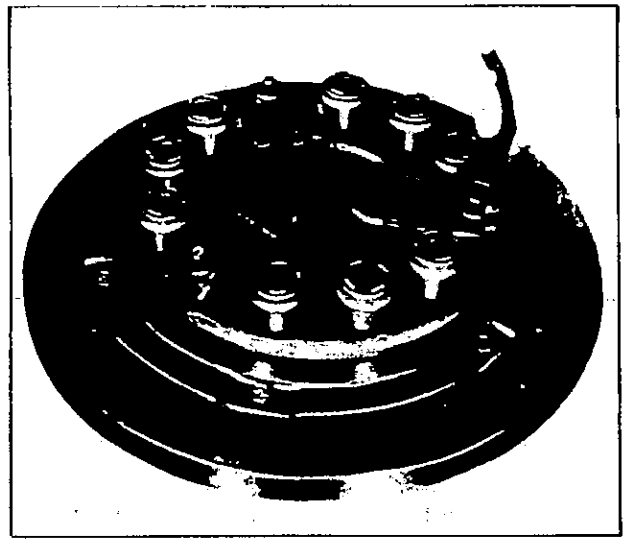
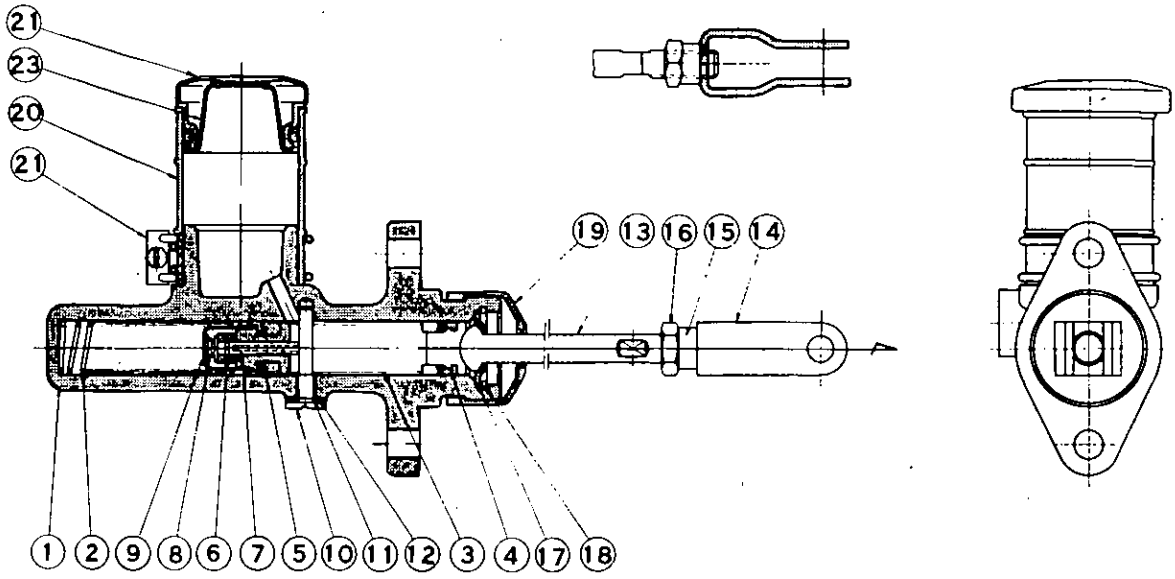


Fig. 157 Actuating Clutch



1	Cylinder	9	Spring seat	17	Piston stopper
2	Return spring	10	Valve stem stop	18	Stopper ring
3	Piston	11	Stopper gasket	19	Boots
4	Secondary cup	12	Gasket ring	20	Oil reservoir
5	Piston cup	13	Push rod	21	Reservoir band
6	Supply valve seat	14	Push rod head	22	Reservoir cap
7	Supply valve stem	15	Weld nut	23	Cap seal
8	Supply valve spring	16	Lock nut	24	Pipe seat

Fig. 158 Clutch Master Cylinder

Remove the dummy shaft after these bolts are fully tightened.

Tightening torque should be 11 to 16 lb/ft.

Remove the clutch aligning bar (release lever stopper).

Refit the release bearing and transmission case.

Note: In assembling a clutch disc, be sure to apply small amount of Multipurpose grease (MILG-2108 or 10924) to the disc splines. Neglecting this caution will result in clutch slippage.

MASTER CYLINDER

Removal

Remove the clevis pin installed at the push rod.

Disconnect the clutch hose from the master cylinder and drain out the fluid.

Remove the securing bolts and take off the master cylinder assembly from the car.

Disassembly

Remove the filler cap and drain out the fluid.

Pull back the rubber boot and remove the snap ring, and then the push rod and ring can be removed.

Unscrew the piston stopper screw and remove the piston assembly completely.

The piston assembly can be separated by lifting the spring seat edge over the shouldered end of the piston.

Inspection
Prior to inspection all parts should be cleaned or washed.

Note: To clean or wash all parts of master cylinder, operating cylinder and pipings, clean brake fluid must be used. Never use mineral oils such as gasoline and kerosene, etc. as to do so will ruin the rubber parts of the hydraulic system. To do so will ruin the the hydraulic parts of the hydraulic system.

Check cylinder and piston for abnormal one sided wear and damage and replace if found.

If the clearance between cylinder and piston is more than 0.005 in., replace cylinder.

Renew piston cup, in principle, when disassembled. It must also be replaced when swell, wear, deformation due to fatigue and damage, etc. are found.

Damaged dust cover, oil reservoir and cap, etc. should be replaced.

Piston spring and inlet valve spring must also be replaced when they are broken or weak.

Replace clutch hose and tube if any abnormal signs of damage or deformation are found.

Assembly
This is accomplished by reversing the disassembling procedure, but the following points should be observed.

Prior to assembly piston cup should be soaked in brake fluid. Install piston cup taking care it is correctly faced.

Coat well brake fluid to cylinder and piston and assemble them.

Installation
Installation is a reversal of the removal procedure, but the following operation should be added.

Adjust the pedal height by changing the push rod length.

Bleed air out of the hydraulic system.

BLEEDING CLUTCH SYSTEM

Remove the bleed screw dust cap of the operating cylinder, open the bleed screw approximately three-quarters of a turn and attach a tube immersing the open end into a clean receptacle containing a small amount of brake fluid.

Fill the master cylinder reservoir with the recommended fluid and by using slow, full strokes, pump the clutch pedal until the fluid entering the container is free from air bubbles.

Screw up the bleed screw on a down stroke of the pedal, remove the bleed tube and replace the dust cap.

Transmission

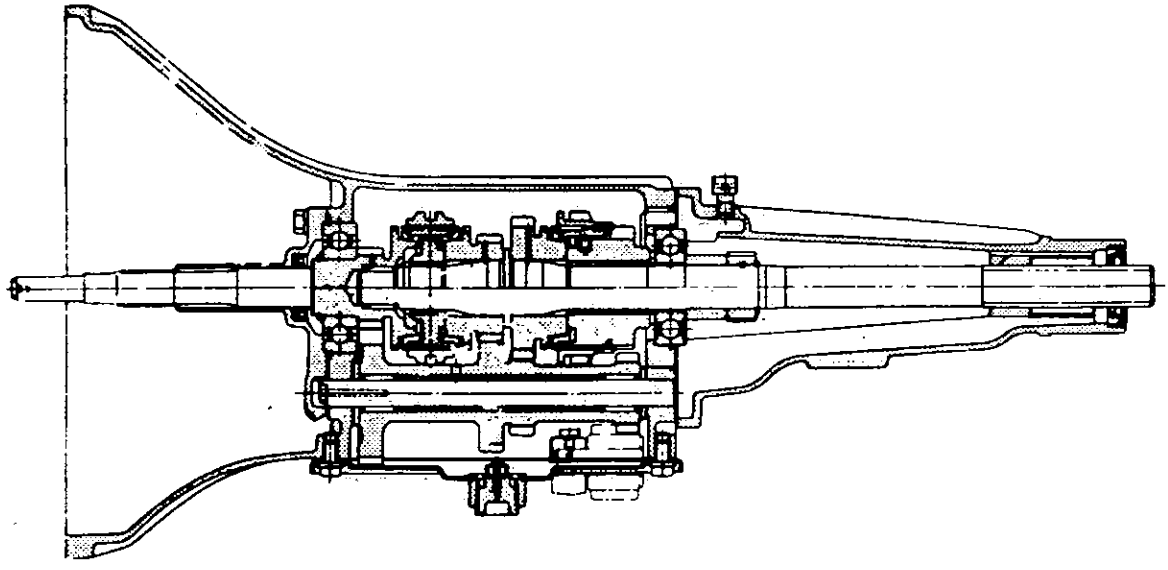


Fig. 159 3-Forward Speed Transmission

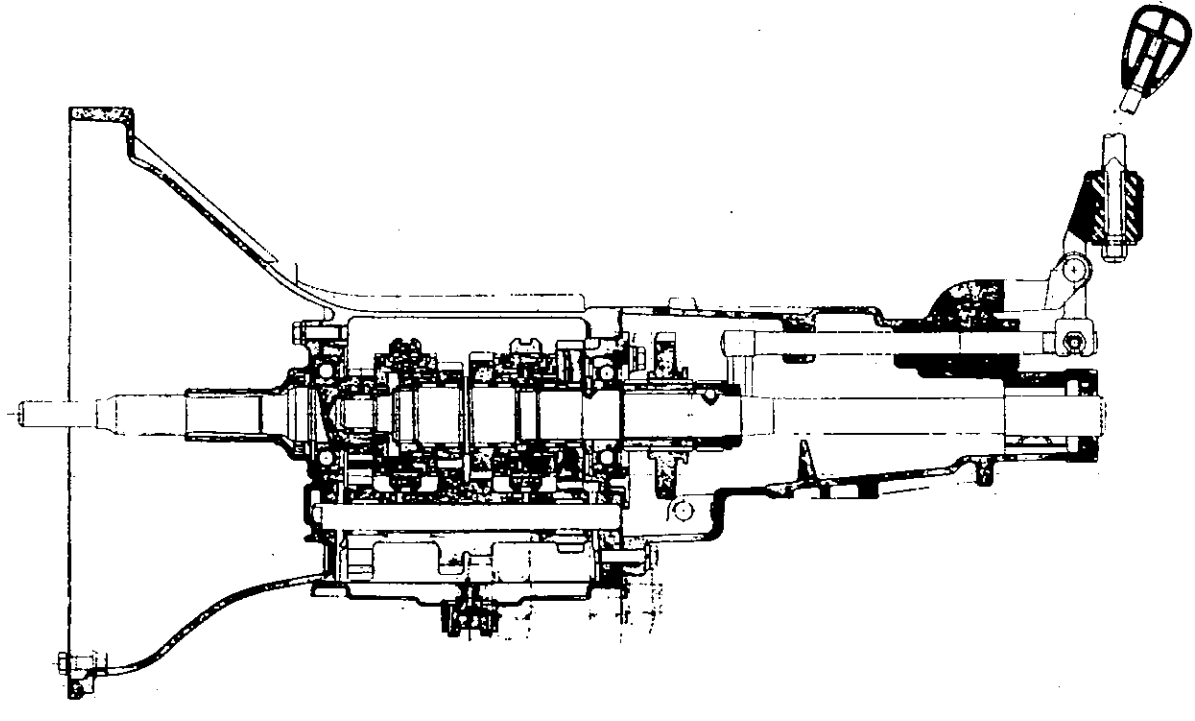


Fig. 160 4-Forward Speed Transmission

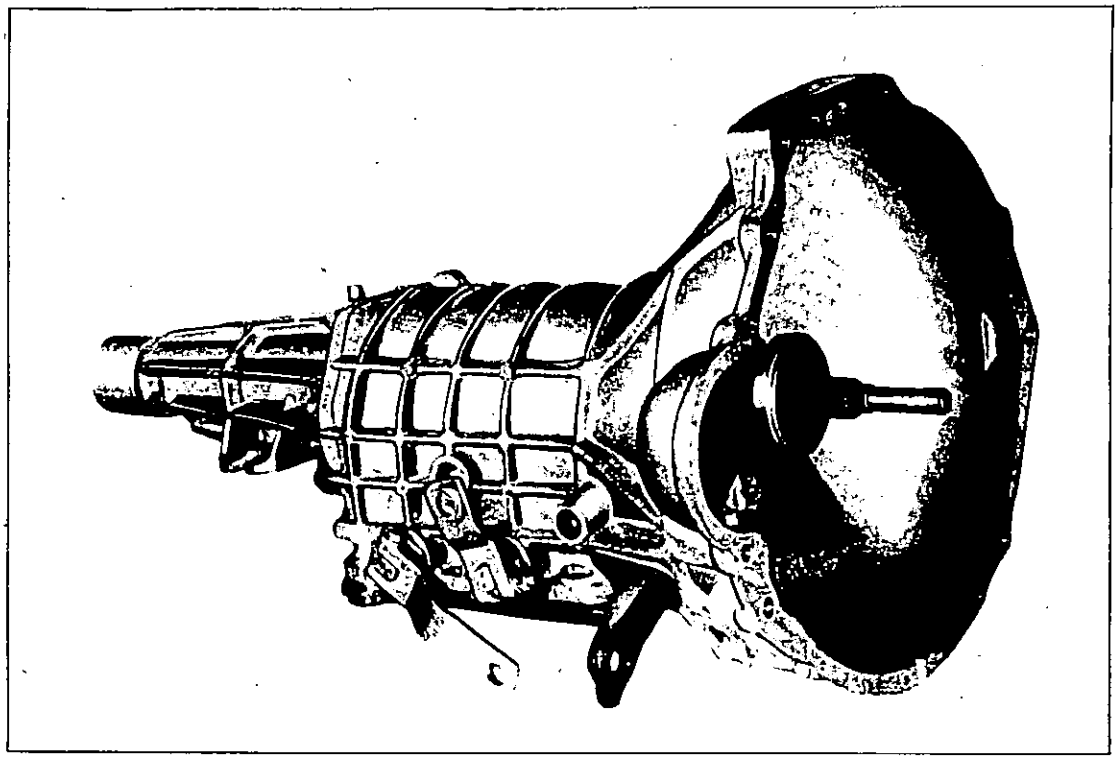


Fig. 161 3-Forward Speed Transmission

REMOVAL

When removing the transmission from the vehicle it is necessary to follow the undermentioned procedure.

Jack up the vehicle and support it with four stands. If available a hydraulic hoist or open pit can be utilized.

Disconnect the hand brake wire at the equalizer pivot as shown in Figure 163.

Loosen the two exhaust center pipe clamps and turn the premuffler complete with center pipe to the left as shown in Figure 164. This will allow sufficient room for the propeller shaft to be removed.

Remove the propeller shaft by disconnecting the four securing bolts at the companion flange of the gear carrier. Seal the end of the rear extension housing to prevent oil leakage.

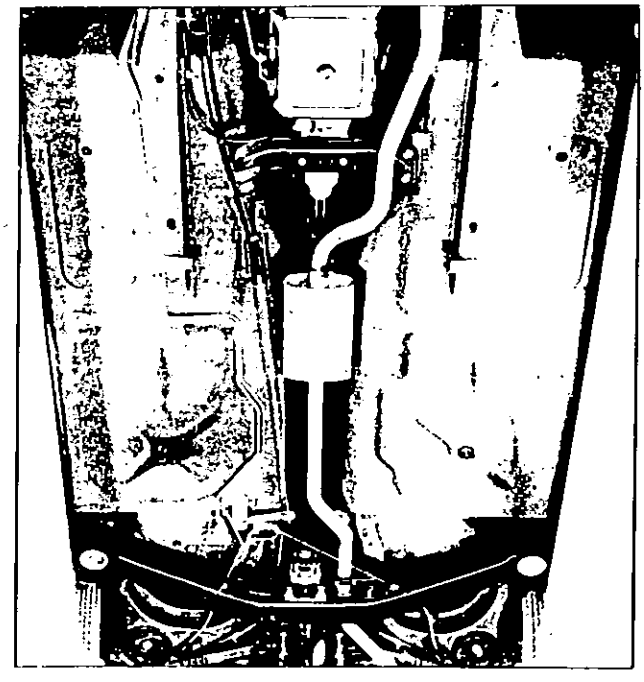


Fig. 162 Underside of Vehicle

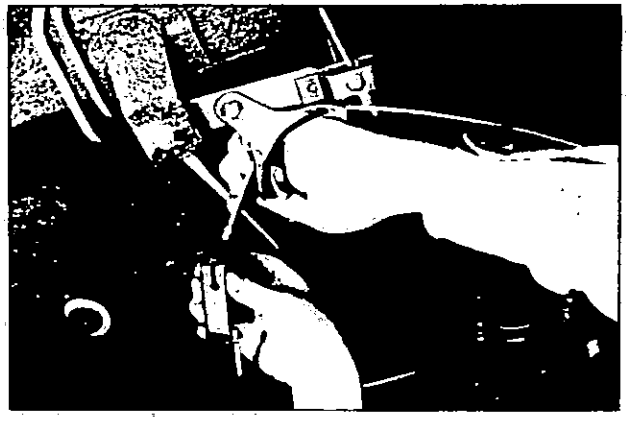


Fig. 163 Disconnecting Hand Brake Wire

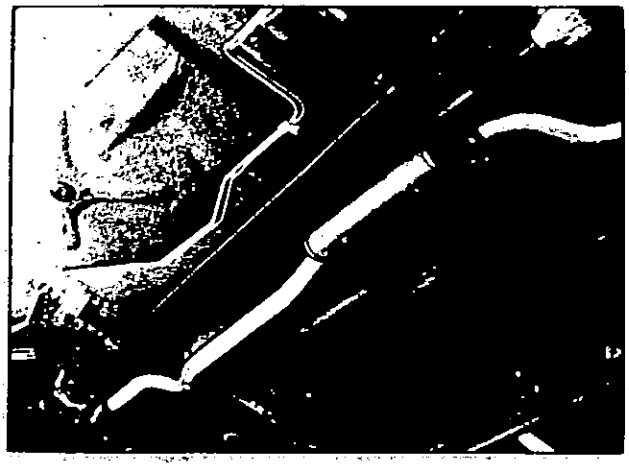


Fig. 164 Removing Propeller Shaft

Fig. 165 Disconnecting Speedometer Cable

Disconnect the speedometer drive cable from the adapter in the transmission extension housing (See Fig. 165).

Disconnect the lower shift rods from the shift levers and remove the cross shaft assembly from the transmission case (See Fig. 166).

Remove the clutch operating cylinder from the clutch housing.

Support the engine with a jack placed under the oil pan. Do not locate the jack under the

Fig. 166 Disconnecting Remote Control Linkage

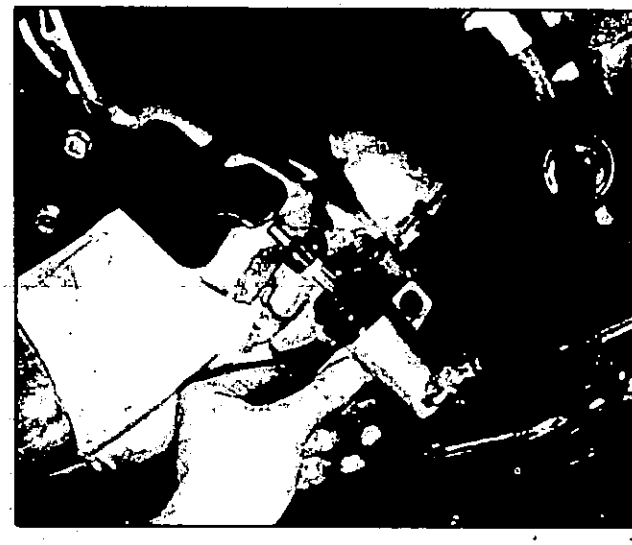


Fig. 167 Detaching Clutch Operating Cylinder

oil pan drain plug. To prevent damage to the oil pan insert a wooden block between the pan and jack.

Remove the two bolts attaching the transmission to the rear engine mount. Place a jack under the transmission and remove the four bolts fixing the rear engine mounting cross member to the body.

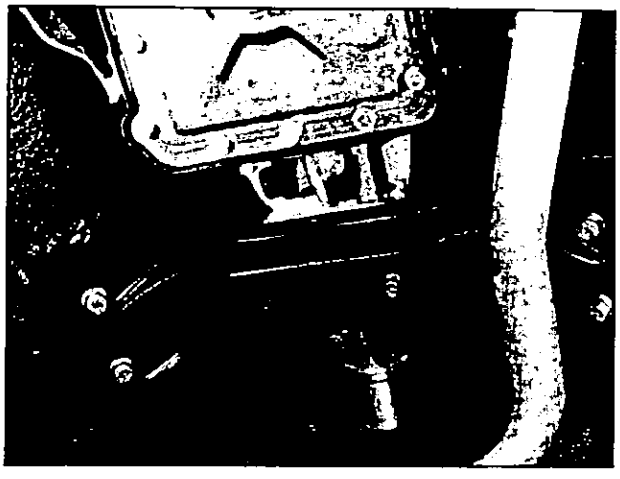


Fig. 168 Cross-Member Removal

Lower the jack supporting the engine to incline the engine in a rearward direction. This will allow sufficient room for the transmission to be removed.

Remove the starting motor and the bolts attaching the clutch housing to the engine.
Lower the jack gradually and withdraw the transmission.

INSTALLATION

Installation of the transmission is the reversal of the procedure given for removal. However, attention should be given to the following points.

Notes: a. Fill the transmission with the recommended gear oil MP 90.

Oil capacity 0.45 U.S.gal.

b. Adjust the clutch operating cylinder at the push rod so that the play at the withdrawal lever will be 0.087 in.

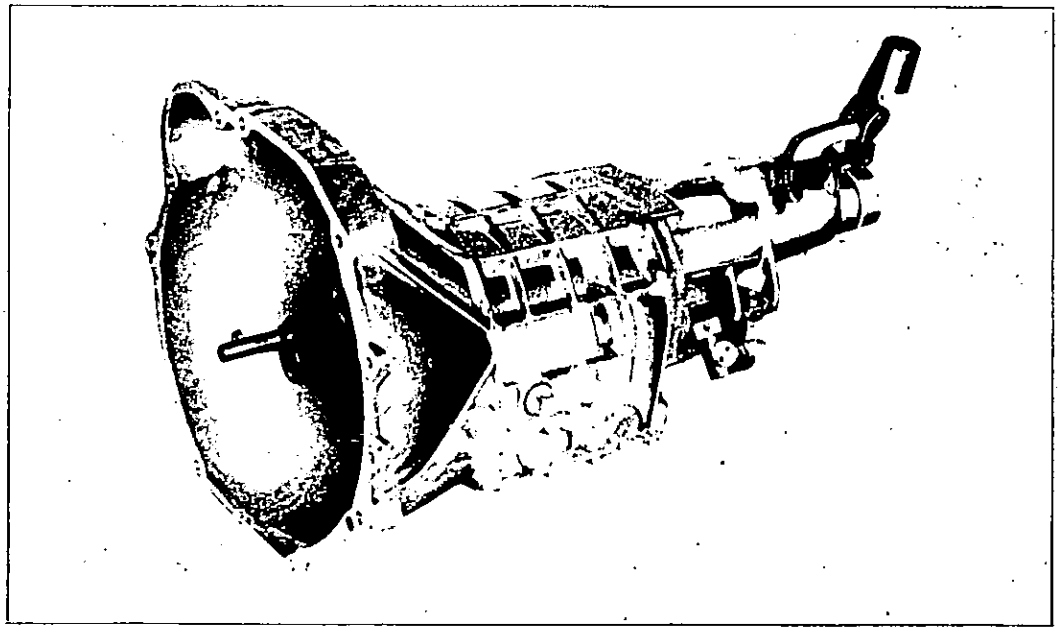
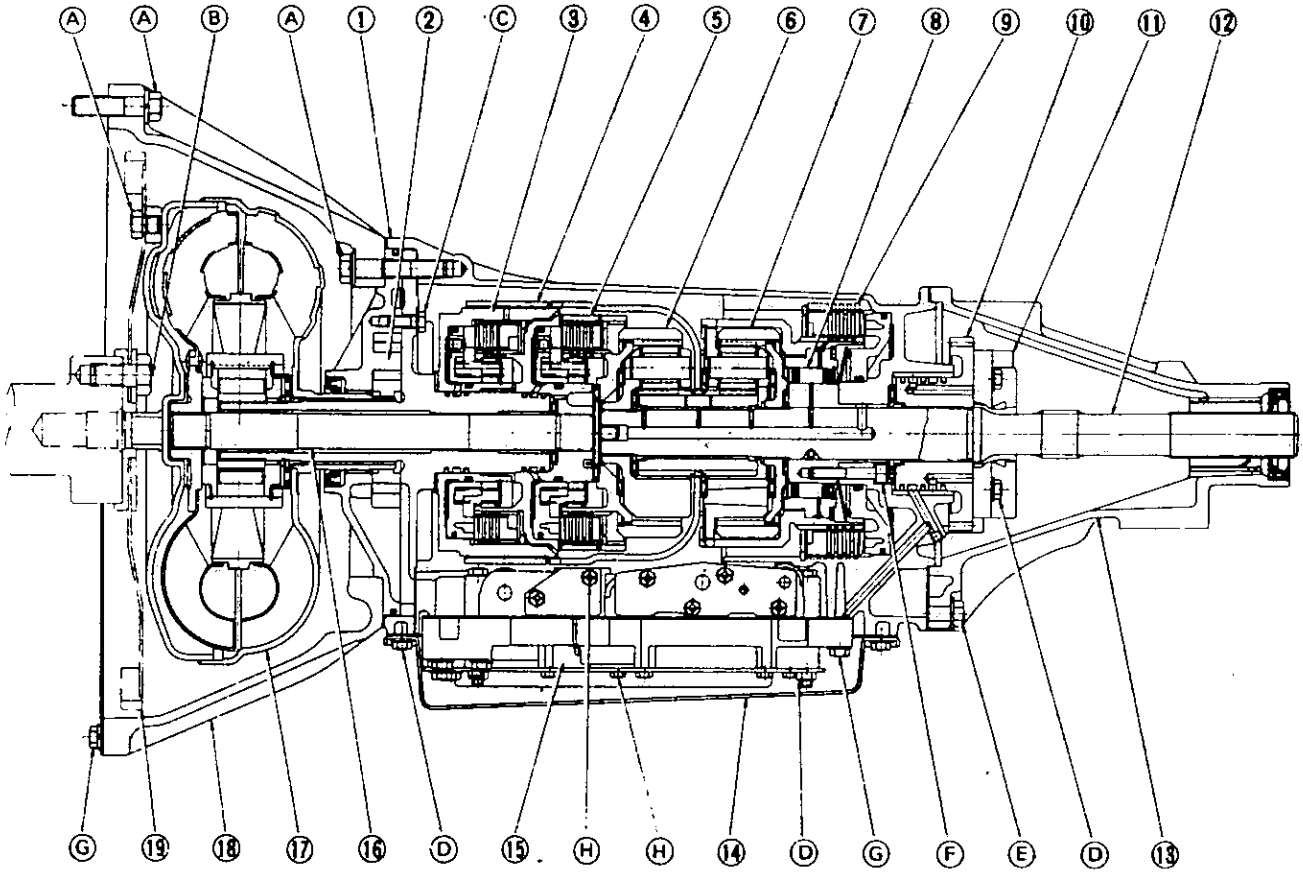


Fig. 169 4-Forward Speed Transmission

AUTOMATIC TRANSMISSION



AT260

1 Transmission case
2 Oil pump
3 Front clutch
4 Band brake
5 Rear clutch
6 Front planetary gear
7 Rear planetary gear
8 One way clutch
9 Low & Reverse brake
10 Oil distributor
11 Governor
12 Output shaft
13 Rear extension
14 Oil pan
15 Control valve
16 Input shaft
17 Torque converter
18 Converter housing
19 Drive plate

Tightening torque (T) of bolts and nuts

Ⓐ T = 4 to 5 kg-m (29 to 36 ft-lb)
Ⓑ T = 14 to 16 kg-m (101 to 116 ft-lb)
Ⓒ T = 0.6 to 0.8 kg-m (4.3 to 5.8 ft-lb)
Ⓓ T = 0.5 to 0.7 kg-m (3.6 to 5.1 ft-lb)
Ⓔ T = 2.0 to 2.5 kg-m (14 to 18 ft-lb)
Ⓕ T = 1.3 to 1.8 kg-m (9.4 to 13 ft-lb)
Ⓖ T = 0.55 to 0.75 kg-m (4.0 to 5.4 ft-lb)
Ⓗ T = 0.25 to 0.35 kg-m (1.9 to 2.5 ft-lb)

Fig. 170 Cross-Sectional View of 3N71B Automatic Transmission

4-SPEED TRANSMISSION

Removal and Installation

Removal and installation of the 4-forward speed transmission are similar to the procedure given for the 3-speed transmission. However, the 4-speed transmission is of the floor shift type, therefore, in addition to completing the operations described in the section covering the 3-forward speed transmission it will be necessary to remove the shift lever from the control lever bracket. On the 4-speed transmission, the rear engine mounting support is securely placed between the upper support plate and rubber insulator on one hand, and the lower support plate and rubber insulator on the other.

RECOMMENDATIONS

Due to the complexity of setting up a disassembled transmission as well as the special tools necessary, it is recommended that internal repairs be left to a fully equipped shop.

Body Work

Body Work

FRONT FENDER

Removal and Installation

Remove the radiator grill, head light and head light finisher.

Remove all bolts securing the fender and then remove the fender.

Installation of the fender is the reversal of the procedure given for removal

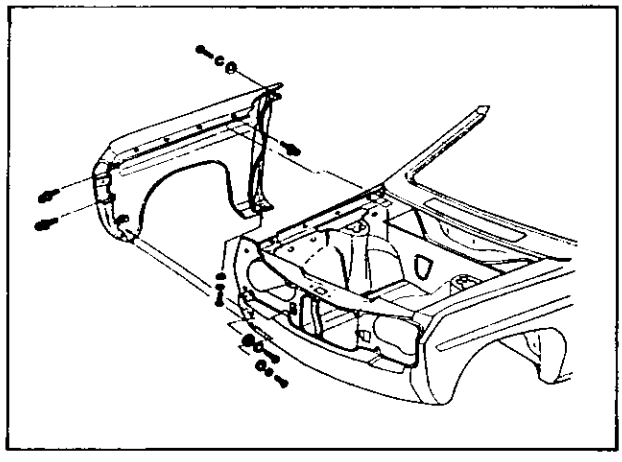


Fig. 171 Removing the Fender

HOOD

Removal and Installation

Open hood and place a protective cover over the front fenders to prevent damage to painted areas.

Scribe (pencil) the location of the hinge straps on under surface of hood.

Replace the bolts attaching the hinge to the hood. With the aid of a helper remove the hood.

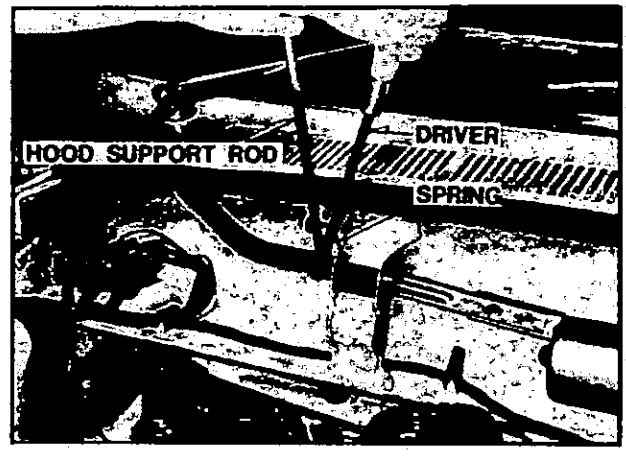


Fig. 173 Removing the Hood Support Rod

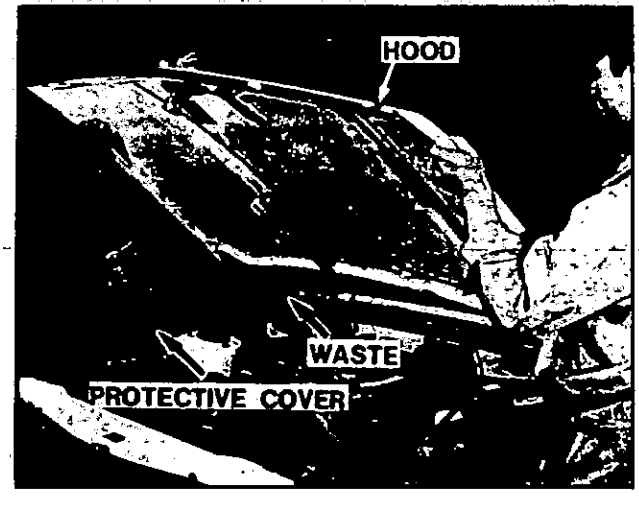


Fig. 172 Removing the Hood

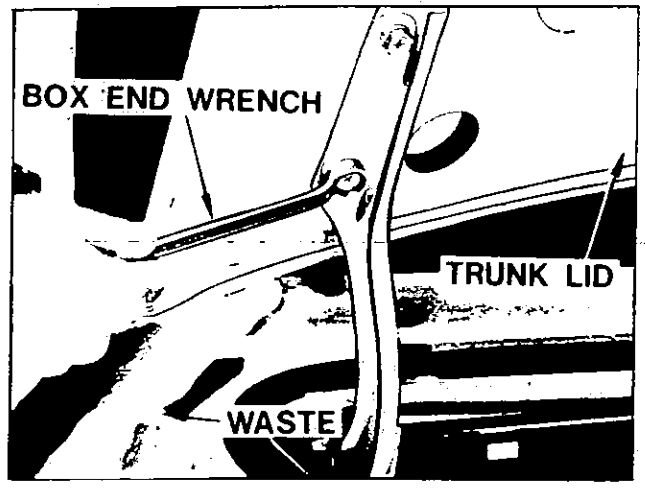


Fig. 174 Removing Trunk Lid

Using screw driver as shown in Figure 173, remove the hood support rod from the support bracket.

Installation of the hood is the reversal of the procedure given for removal. However, align the hinges within the scribe marks.

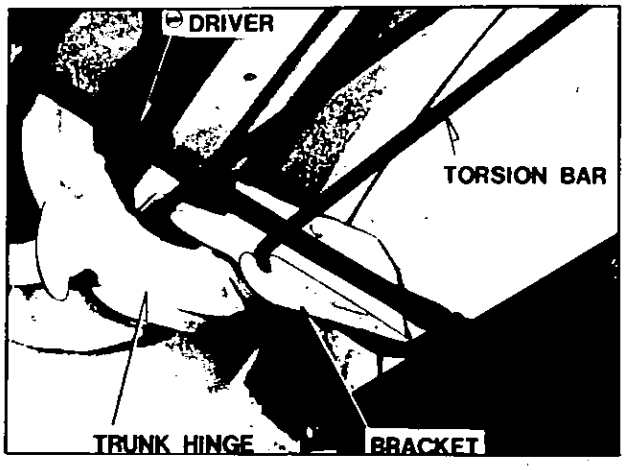


Fig. 175 Removing the Torsion Bar

Adjustment
To adjust the hood release the hinge attaching bolts and move the hood to the desired position. After the adjustment has been made tighten the hinge bolts.

TRUNK LID

Removal and Installation
Open trunk lid and place a cover over the rear fenders and rear panel to protect them from damage to painted area.

With the aid of a helper, remove the trunk lid attaching bolts and remove trunk lid (See Fig. 174).

Torsion Bar Removal and Adjustment
Remove torsion bar fixing wire, then using a screw driver as shown in Fig. 175, remove the torsion bar.

The tension of the torsion bar can be adjusted by changing the location of the bar with the use of a screw driver.

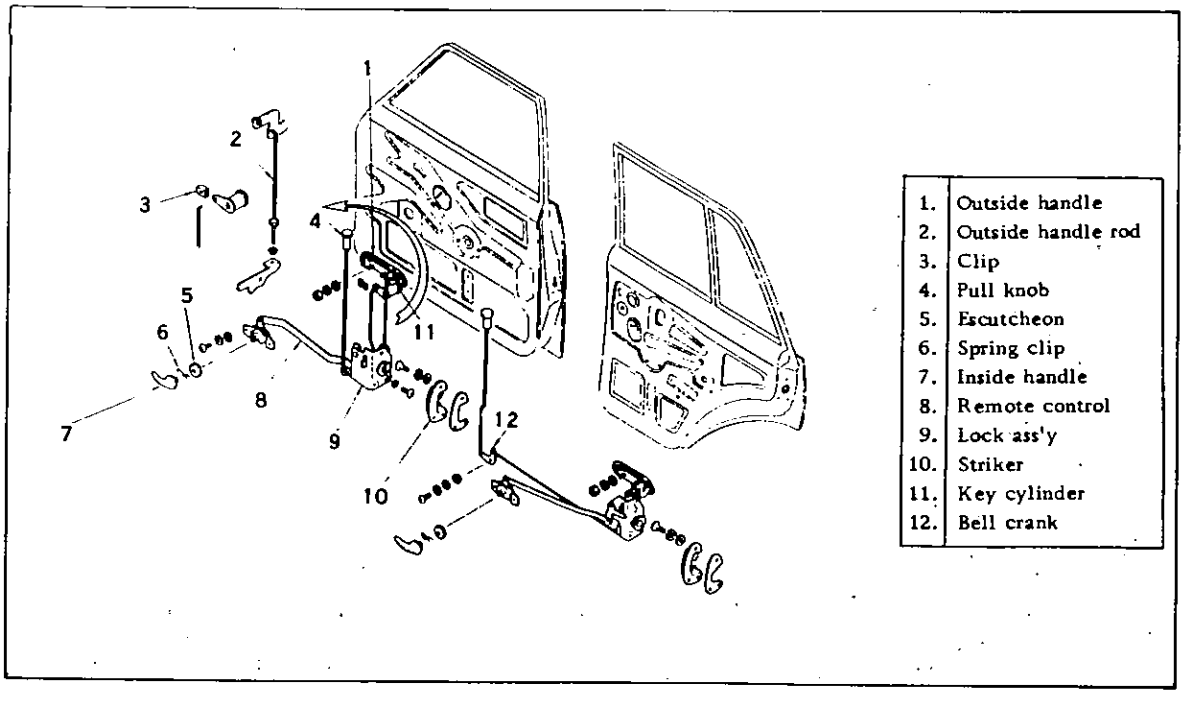
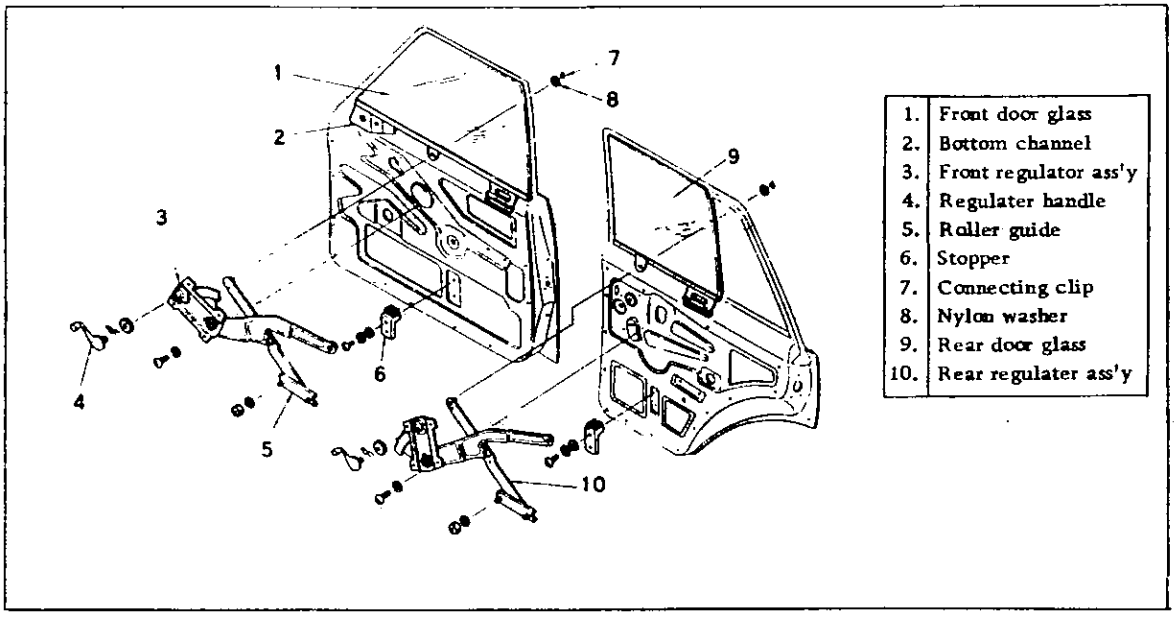


Fig. 176 Door Lock Mechanism



1.	Front door glass
2.	Bottom channel
3.	Front regulator ass'y
4.	Regulater handle
5.	Roller guide
6.	Stopper
7.	Connecting clip
8.	Nylon washer
9.	Rear door glass
10.	Rear regulater ass'y

Fig. 177 Window Regulator

Specifications

Specifications

STARTER

Model		L16 and L18 engines	
Type		HITACHI S114-103P (For manual transmission)	HITACHI S114-126M (For automatic transmission)
Voltage		12 Volts	←
Output		1.0 KW	1.2 KW
Starting current (Voltage)		Less than 430 amps. (6 Volts)	Less than 540 amps. (5 Volts)
No load current (Voltage)		Less than 60 amps. (12 Volts)	←
No load starter revolution	rpm	More than 7,000	More than 6,000
Shift type of pinion gear		Magnetic shift	←
Number of teeth on pinion gear		9	←
Number of teeth on ring gear		120	←
Weight	kg (lb)	5.1 (10.42)	5.8 (12.8)

SPECIFICATIONS AND SERVICE DATA

Specifications

Item \ Model	LT150-05B	LT160-19	LT135-13B
Applicable to	510 and 610 models except for Canada	510 and 610 models for Canada	620 model
Maker	HITACHI	←	←
Nominal rating	12V-50A	12V-60A	12V-35A
Ground polarity	Negative	←	←

DISTRIBUTOR

SPECIFICATIONS AND SERVICE DATA

Distributor type	D410-66A	D410-67
Make	HITACHI	←
Applied engine (vehicle)	L18 (610)	L16 (510 and 620)
Firing order	1-3-4-2	←
Rotating direction	Counterclockwise	←
Ignition timing (degree)	5° (B.T.D.C.)	←
Idling adjustment		
M/T	5°/800 rpm	←
A/T	5°/650 rpm in "D" range	←
Dwel angle (degree)	49° to 55°	←
Condenser capacity (μF)		
Advanced isde	0.2 to 0.24	←
Retarded side	0.05 ± 15%	←
Phase difference (degree)	7° at crank angle	←

< All distributors >

Point gap	mm (in)	0.45 to 0.55 (0.0177 to 0.0217) (Advanced and Retarded side equally)
Point pressure	kg (lb)	0.50 to 0.65 (1.10 to 1.43)
Shaft diameter (lower part)	mm (in)	12.430 to 12.440 (0.4894 to 0.4898)
Housing inner diameter	mm (in)	12.450 to 12.468 (0.4902 to 0.4909)
Clearance between shaft and housing	mm (in)	0.010 to 0.038 (0.0004 to 0.0015)
Repair limit of clearance	mm (in)	0.08 (0.0031)
Shaft diameter (upper part)	mm (in)	$8\ ^{-0.005}_{-0.014}\ (0.3150\ ^{-0.0002}_{-0.0006})$
Cam inner diameter	mm (in)	8.000 to 8.015 (0.3150 to 0.3156)
Clearance between shaft and cam	mm (in)	0.005 to 0.029 (0.0002 to 0.0011)
Weight pivot diameter	mm (in)	4.972 to 4.990 (0.1959 to 0.1965)
Weight hole diameter	mm (in)	5.000 to 5.018 (0.1969 to 0.1976)
Clearance between pivot and hole	mm (in)	0.01 to 0.046 (0.0004 to 0.0018)

Specifications

SPARK PLUGS

SERVICE DATA AND SPECIFICATIONS

Item \ Make	NGK
Item \ Model	B6ES
Applied engine	L16 and L18
Size (screw dia. x reach) mm (in)	14 x 19 (0.55 x 0.75)
Plug gap mm (in)	0.7 to 0.8 (0.028 to 0.031)
Tightening torque kg-m (ft-lb)	1.5 to 2.5 (11.0 to 15.0)

VALVES

H	Valve head diameter mm (in)	L16	In.	42.0 to 42.2 (1.654 to 1.661)
			Ex.	33.0 to 33.2 (1.299 to 1.307)
		L18	In.	42.0 to 42.2 (1.654 to 1.661)
			Ex.	35.0 to 35.2 (1.378 to 1.386)
L	Valve length mm (in)	L16 L18	In.	114.9 to 115.2 (4.524 to 4.535)
			Ex.	115.7 to 116.0 (4.555 to 4.567)
D	Valve stem diameter mm (in)	L16 L18	In.	7.965 to 7.980 (0.3136 to 0.3142)
			Ex.	7.945 to 7.960 (0.3128 to 0.3134)
α	Valve seat angle In. & Ex.			45°30′

OIL PUMP

Tightening torque

Oil pump mounting bolts	kg-m (ft-lb)	1.1 to 1.5 (8.0 to 11)
Oil pump cover bolts	kg-m (ft-lb)	0.7 to 1.0 (5.1 to 7.2)
Cap nut-regulator valve	kg-m (ft-lb)	4 to 5 (29 to 26)

Specifications

Oil pressure at idling	kg/cm^2 (lb/sq in)	0.8 to 2.8 (11 to 40)
Regulator valve spring		
Free length	mm (in)	52.5 (2.067)
Pressured length	mm (in)	34.8 (1.370)
Regulator valve opening pressure	kg/cm^2 (lb/sq in)	3.5 to 5.0 (50 to 71)

Specifications

GENERAL SPECIFICATIONS

Model		L16	L18
Cylinder arrangement		4, in line	
Displacement	cc (cu in)	1,595 (62.80)	1,770 (108.01)
Bore and stroke	mm (in)	83 x 73.7 (3.2677 x 2.9016)	85 x 78 (3.3465 x 3.0709)
Valve arrangement		O.H.C.	O.H.C.
Firing order		1-3-4-2	1-3-4-2
Engine idle	rpm		
M/T		800	
A/T		650 in "D" range	
Compression ratio		8.5	
Engine idle manifold mmHg (inHg) at idle rpm			
M/T		430 (16.9)	
A/T		390 (15.4) in "N" range	
Oil pressure (Warm at 2,000 rpm)	kg/cm^2 (psi)	3.5 to 4.0 (49.8 to 56.9)	

M/T: Manual Transmission A/T: Automatic Transmission

STARTING MOTOR SPECIFICATIONS

Year	Starter Number	Brush Spring Tension Lbs.	Current Draw, Amps.	No Load Current, Amps.
1967-68	Mitsubishi ME-Y2R	1.1-2.1	500	60
1966-68	Hitachi S-114-92	1.5-1.8	500	60
1966-67	Hitachi S-114-91A	1.5-1.8	500	60
1968-72	Hitachi S114-103	1.5-1.8	480	60
1969-72	Hitachi S-114-122	1.5-1.8	460	60
1971-72	Hitachi S-114-87L	1.5-1.8	420	60

Distributor Specifications

Engine Model	Distributor	Centrifugal Advance Start (rpm)	Centrifugal Advance End (deg. @ rpm)	Vacuum Advance Start (in. Hg.)	Vacuum Advance End (deg. @ in. Hg.)
J	Hitachi D411-53	450	11-15 @ 2,400	3.9-4.7	6-9 @ 13.4
L16	Hitachi D410-58	450	10 @ 1,500	5.9	9 @ 12.4
L24	Hitachi D606-52	450	6 @ 1,000	3.9	5.5 @ 9.6
A12	Hitachi D412-63	550	12.5 @ 2,100	9.8	6.5 @ 13.8

DISTRIBUTOR SPECIFICATIONS

Year	Model or Engine	Distributor Part No.	Point Gap, Inch	Dwell Angle, Degrees	Spring Tension Ounces	Centrifugal Advance① Start @ rpm	Centrifugal Advance① Int. @ rpm	Centrifugal Advance① Full @ rpm	Vacuum Advance Inches of Vacuum to Start Plunger	Vacuum Advance Int.	Vacuum Advance Full Adv. Dist. Degree @ Vacuum
1966-67	R	D407-51	.018-.022	Hitachi 50-54 Mitsubishi 56-61	1.1-1.43	0 @ 400-550	—	14-16 @ 1800	4.7-5.5	—	9-12 @ 12.6
1966-68	J	D411-53	.018-.022	50-55	1.1-1.43	0 @ 450	—	11-15 @ 2400	4.7-5.5	—	6-9 @ 13
	U20	D407-52	.016-.020	49-55	1.1-1.43	0 @ 400-500	—	7.5 @ 1900	6.0①	5 @ 10	10 @ 13
1968-72	L-16	D410-58	.017-.022	49-55	1.1-1.43	0 @ 450	5 @ 1000	10 @ 1500	6.0	5 @ 8	9 @ 12
1971-72	L-24	D612-52	.016-.020	35-41	1.1-1.43	0 @ 500	5 @ 1000	12 @ 1400	9.84	5 @ 14	9 @ 17.7
	1200	D412-63	.017-.022	49-55	1.1-1.43	0 @ 550	5 @ 1200	12.5 @ 2100	6.0	5 @ 9	9.5 @ 12

①—Vacuum advance deactivated with Solex carb.

Specifications

Electrical Specifications —Battery and Starter

Engine Model	Battery			Starter						
				Lock Test			No Load Test			
	Capacity (Amp. Hrs.)	Volts	Grounded Terminal	Amps	Volts	Torque (ft. lbs.)	Amps	Volts	rpm	Brush Minimum Length (in.)
P	60	12	Neg.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
E1	50	12	Pos.	<500	8.0	>7.7	60	11	<7,000	N.A.
G	N.A.	12	Pos.	<500	9.5	>7.0	60	11	<7,000	N.A.
J	40,50	12	Neg.	N.A.	N.A.	N.A	60	12	>7,000	.37
R	40,50	12	Neg.	<500	9.5	>6.5	N.A.	N.A.	N.A.	N.A.
U20	50	12	Neg.	<500	6.0	>7.2	60	11	<6,000	.30
L16	50,60 PL510, WPL510; 40,50 L520; 40,50,60 PL521, L521	12	Neg.	<480	6.0	>7.9	60	12	>7,000	.28
L24	N.A.	12	Neg.	<460	6.0	10.1	60	12	>5,000	.49
A12	N.A.	12	Neg.	<420	6.3	>6.5	60	12	>7,000	.37

<—Less than >—More than

Electrical Specifications — AC Regulator

Engine Model	Part Number	Charge Indicator Relay				Voltage Regulator				
		Core Gap (in.)	Back Gap (in.)	Air Gap (in.)	Point Gap (in.)	Core Gap (in.)	Back Gap (in.)	Air Gap (in.)	Point Gap (in.)	Regulated Voltage
G	Mitsubishi RLA-1		.032-.044	.032-.048	.032-.044		.028-.036	.032-.040	.012-.016	N.A.
J	Mitsubishi RL2220B5		.032-.043	.032-.047	.032-.043		.028-.035	.032-.039	.012-.016	14-15
R	Mitsubishi RL-2B		.032-.043	.032-.047	.032-.043		.028-.035	.032-.035	.012-.016	14-15
U20	Mitsubishi RL2220B5		.035-.047	.030-.043	.030-.043		.032-.047	.032-.043	.012-.016	13.5-14.5
L16	Hitachi TL1Z-17		.007	.020-.024	.016-.020		.035-.039	.032-.047	.012-.016	14-15
L24	Hitachi TL1Z-37	.032-.039			.016-.024	.024-.039			.012-.016	14.3-15.3 @ 50F
A12	Hitachi TL1Z-37	.032-.039			.016-.024	.024-.039			.012-.016	14.3-15.3 @ 50F

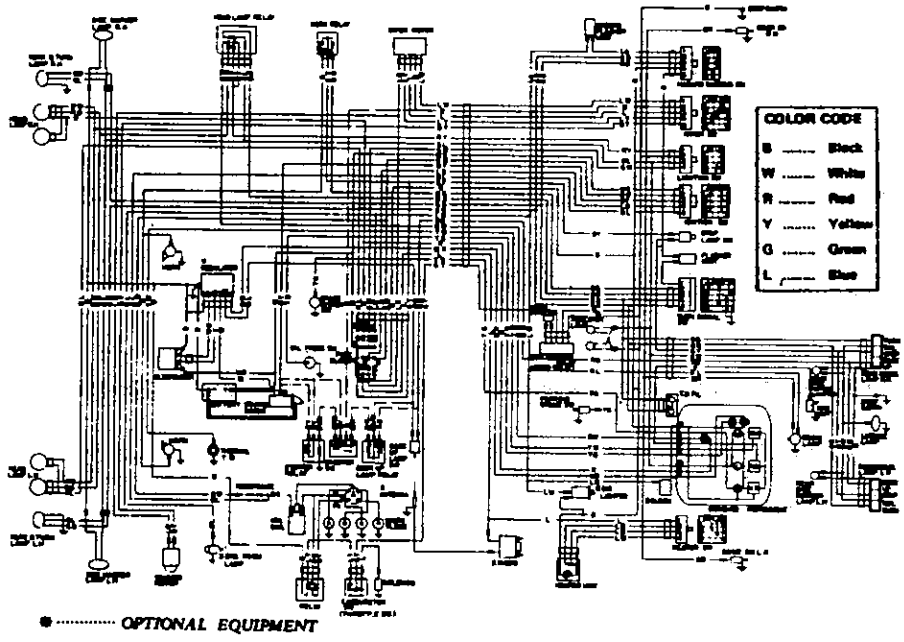
①—Right unit in regulator case (left unit in TL1Z-17)
②—Left unit in regulator case (right unit in TL1Z-17)
NOTE: Right and left are determined with the regulator terminals or harness plug downward.

Item \ Vehicle model (Applied engine)		610 (L18)	510 (L16)	620 (L16)
Make and type		HANSHIN H5-15-1	HANSHIN H5-15-2	HITACHI C6R-601
Applied resister		RC-15	←	5660R-1510
Primary voltage	V	12	←	←
Spark gap	mm (in)	more than 7 (0.2756)	←	←
Primary resistance at 20°C (68°F)	Ω	1.17 to 1.43	←	←
Secondary resistance at 20°C (68°F)	KΩ	11.2 to 16.8	←	←
External resistor at 20°C (68°F)	Ω	1.3 to 1.7	←	←

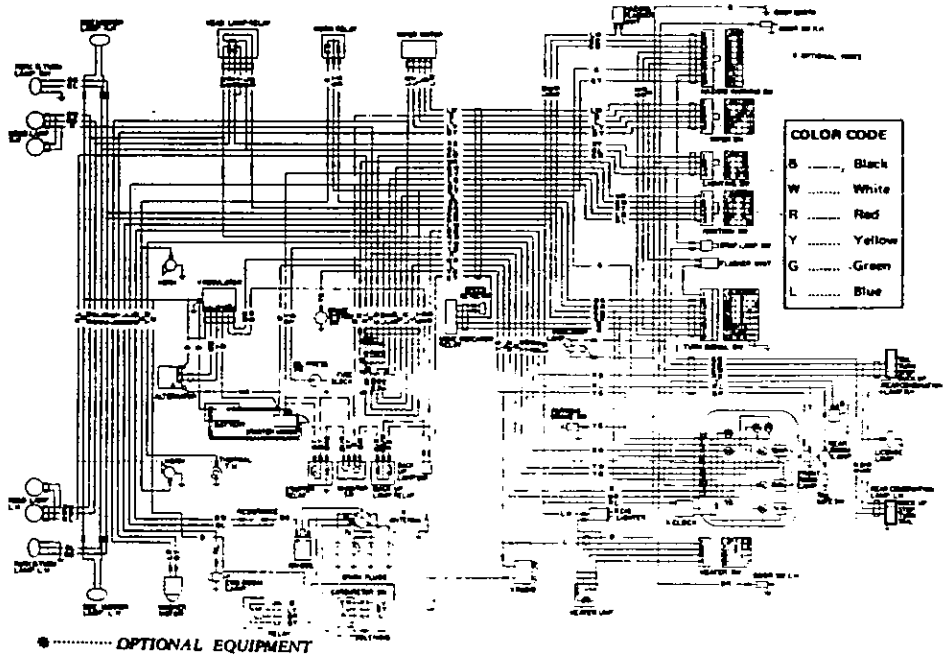
Light Bulb Specifications

Model	Usage	Wattage
L60	Headlights	50/42
	Front parking, turn	21/6
	Stop, tail, turn	21/6
	License plate	10
	Instrument panel	8
	Flasher warning light	1.5
PL410	Headlights	37.5/50
		37.5
	Parking	8
	Turn	25
	License plate	8
	Interior light	5
	Backup	25
	Warning lights	1.5
	Instrument	5
SPL310	Headlights	50/40
	Front parking, turn	25/5
	Tail, stop	21/6
	License plate	8
	Interior	6
	Instruments, warning	1.5
	Inspection lamp	8
	Radio	1.2
PL411, RL411	Headlights	37.5/50
		37.5
	Side markers	8
	Tail	8
	License plate	8
	Stop	25
	Backup	25
	Interior	5
	Fog	35
	Inspection	8
	Parking	8
	Turn	25
	Instrument	3
	Warning	1.5
SPL311, SRL311	Headlight	50/40
	Front turn, parking	25/8
	Stop, tail, turn	25/8
	Backup	15
	License plate	8
	Map	5
	Side marker	8
L520	Headlights	37.5/50
		50
	Front parking, turn	25/8
	Tail, stop	25/8
	Rear turn, backup	25
	License plate	8
	Interior	6
L521, PL521	Headlights	37.5/50
		37.5
	Front turn, parking	25/8
	Tail, stop	25/8
	Rear turn	25
	Backup	25
	Interior	6
	License plate	8
PL510, WPL510	Headlights	37.5/50
		37.5
	Front parking, turn	25/8
	Tail, turn	25/8
	Stop	25
	Backup	25
	License plate	8
	Interior	10
HLS30	Headlights	50/40
	Side marker, turn	23/7
	Side marker, license plate	7.5
	Tail	7
	Stop	23
	Rear turn	23
	Backup	23
	Instrument, warning, glove compartment, clock	3
	Four-way flasher	23
	Inspection	8

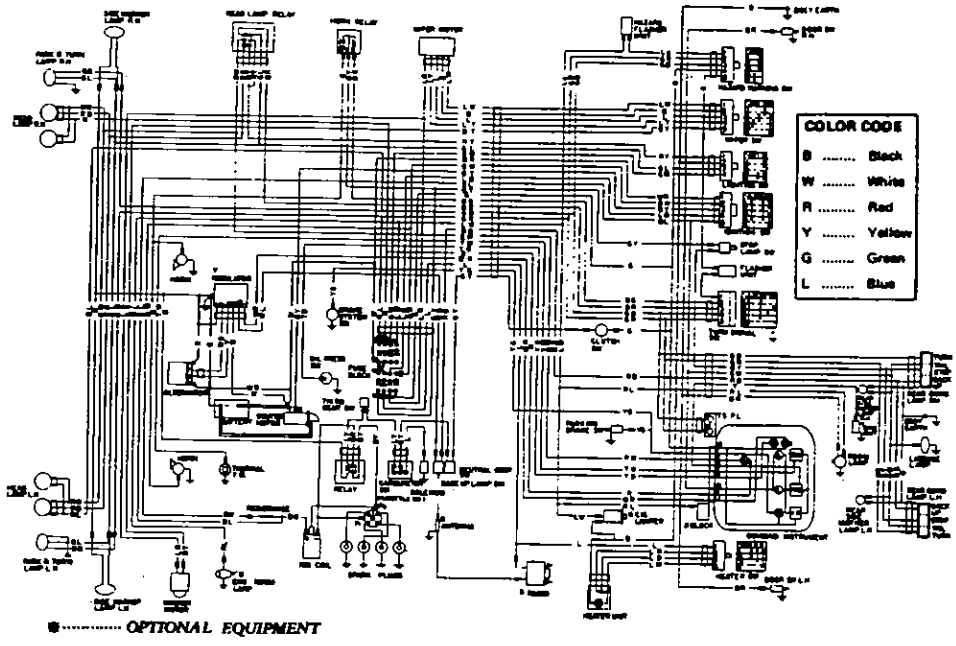
WIRING DIAGRAMS



PL510, automatic transmission



WPL510, automatic transmission



PL510, standard transmission

MANUAL TRANSMISSION

APPLICATION OF TRANSMISSION MODELS

Type of Transmission	Applied Model		Speedometer gear	Final gear ratio
3-Forward speed Column shift Warner type synchromesh	N510(S)U, NL510(S)U, JN510SU, JNL510S	(R3W65L) 1st 3.263 2nd 1.645 3rd 1.000 Rev. 3.355	19/5	4.375
	P510(S)U, PL510(S)		17/5	3.900
	WP510U, WPL510		17/5	3.899
4-Forward speed Floor shift Warner type synchromesh	NL510(S)T, JN510TU P510(S)TU, JNL510(S)T PL510(S)T N510TU P510TKU, PL510TK RPL510SWTU, PL510TU	(F4W63L) 1st 3.382 2nd 2.013 3rd 1.312 4th 1.000 Rev. 3.364	16/5	3.700
	WP510TU WPL510T	(F4W63L) 1st 3.657 2nd 2.177 3rd 1.419 4th 1.000 Rev. 3.638	16/5	3.700

Specifications

Manual Transmission Ratios

Vehicle	First	Second	Third	Fourth	Fifth	Reverse
L60①	2.900	1.562	1.000	None	None	3.015
L320	4.94	3.01	1.73	1.00	None	6.46
L520	3.657	2.177	1.419	1.000	None	3.638
	4.941	3.009	1.726	1.000	None	6.462
PL521	3.657	2.177	1.419	1.000	None	3.638
PL410	3.518	1.725	1.00	None	None	4.125
	3.197	1.725	1.00	None	None	4.125
	3.945	2.94	1.490	1.000	None	5.159
	3.945	2.403	1.490	1.000	None	5.159
PL411	3.197	1.725	1.000	None	None	4.125
	3.94	2.40	1.49	1.00	None	5.159
	3.657	2.177	1.419	1.000	None	3.638
RL411, SPL311, PL510	3.382	2.013	1.312	1.000	None	3.365
SPL310	3.515	2.140	1.328	1.000	None	4.597
SRL311	2.957	1.858	1.311	1.000	.852	2.922
WPL510	3.657	2.177	1.419	1.000	None	3.638
	3.382	2.013	1.312	1.000	None	3.634
	3.382	2.013	1.312	1.000	None	3.634
HLS30	3.549	2.197	1.420	1.000	None	3.164
	2.957	1.857	1.311	1.000	.852	2.922
LB110, KLB110	3.757	2.169	1.404	1.000	None	3.640

① L60 transfer case ratios are 2.264:1 and 1:1.

Condition	Probable cause	Corrective action
	Loosened bolts such as side flange, side retainer or gear carrier.	Tighten the bolts to specified torque.
	Defective gasket or O-ring.	Replace defective parts with new ones.
	Loose filler or drain plug.	Tighten the plug.
	Clogged or damaged breather.	Repair or replace.

SERVICE DATA AND SPECIFICATIONS

Nominal diameter of ring gear mm (in)	160 (6.30)
Gear carrier material	Malleable cast-iron
Gear ratio (number of teeth)	3.700 (37/10) [with A/T model for U.S. and Canada: 4.111 (37/9)]
Drive pinion preload adjusted by	Shim
Drive Pinion	
Preload kg-cm (in-lb)	
(without oil seal)	7 to 10 (6.1 to 8.7)
(with oil seal)	8 to 11 (7.0 to 9.6)
At companion flange bolt hole kg (lb)	
(without oil seal)	2.0 to 2.9 (4.4 to 6.4)
(with oil seal)	2.3 to 3.2 (5.1 to 7.1)
Thickness of pinion height adjusting washer mm (in)	3.09 (0.1217)
	3.12 (0.1228)
	3.15 (0.1240)
	3.18 (0.1252)
	3.21 (0.1264)
	3.24 (0.1276)
	3.27 (0.1287)
	3.30 (0.1299)
	3.33 (0.1311)
	3.36 (0.1323)
	3.39 (0.1335)
	3.42 (0.1346)
	3.45 (0.1358)
	3.48 (0.1370)
	3.51 (0.1382)
	3.54 (0.1394)
	3.57 (0.1406)
	3.60 (0.1417)
	3.63 (0.1429)
	3.66 (0.1441)

Specifications

Thickness of pinion bearing adjusting spacer and washer	mm (in)	
[Spacer]		56.2 (2.2126)
		56.4 (2.2205)
		56.6 (2.2283)
		56.8 (2.2362)
		57.0 (2.2441)
		57.2 (2.2520)
[Washer]		2.59 (0.1020)
		2.57 (0.1012)
		2.55 (0.1004)
		2.53 (0.0996)
		2.51 (0.0988)
		2.49 (0.0980)
		2.47 (0.0972)
		2.45 (0.0965)
		2.43 (0.0957)
		2.41 (0.0949)
		2.39 (0.0941)
		2.37 (0.0933)
		2.35 (0.0925)
		2.33 (0.0917)
		2.31 (0.0909)
Side gear and pinion mate		
Thickness of side gear thrust washer	mm (in)	0.75 to 0.80 (0.0295 to 0.0315)
		0.80 to 0.85 (0.0315 to 0.0335)
		0.85 to 0.90 (0.0335 to 0.0354)
Backlash in pinion mate and side gear (or clearance between side gear and thrust washer	mm (in)	0.1 to 0.2 (0.0039 to 0.0079)
Ring gear		
Backlash between ring gear and drive pinion	mm (in)	0.1 to 0.2 (0.0039 to 0.0079)
Runout of rear side of ring gear gear	mm (in)	Less than 0.05 (0.0020)
Thickness of side retainer adjusting shim	mm (in)	0.20 (0.0079)
		0.25 (0.0098)
		0.30 (0.0118)
		0.40 (0.0158)
		0.50 (0.0197)
Side bearing standard with	mm (in)	20.0 (0.7874)

Carburetor Specifications

Engine Model —Variable	Suction Spring (Number)	Metering Needle	Float Chamber Inclination (deg.)	Economizer (in.)	Fuel Level (in.)	Vacuum Jet (Number)
P—L60					.80-.88①	
P with emission control —L60						
E1—PL410				.079	.75①	
E1—L320				#145	.75①	
J—L520					.85①	
J—PL411					.85①	
J with emission control —L520, L521					N.A.	
R					.87-.95①	
R with emission control	23	M-39 with 38W-5, M-70 with 38W-6	0		.87-.95①	
U20 (SU type)					.87-.95①	
U20 (Mikuni/Solex)					See text	
U20 with emission control	32	N-17 with 46W-5, N-25 with 46W-7	8		.87-.95①	
L16—PL510				.071	.87-.95①	
L16 with emission control				.071	.87-.95①	150, 130 sec.
L24 with emission control —HLS30	23	N-27 .079"			.87-.95①	
A12 with emission control —LB110, KLB110					.71-.78①	

①—From float chamber top to fuel level

Carburetor Specifications

Engine Model—Vehicle	Carburetor	Bore Size (in.)	Large Venturi (in.)	Small Venturi (in.)	Main Jet (Number)	Main Air Bleed (Number)	Main Nozzle (in.)	Idle (Slow) Jet (Number)	Idle (Slow) Air Bleed	Bypass Air Bleed (Number)	Power Jet	Accelerator Pump Injector	Fast Idle (deg. of throttle opening at fast idle cam)	Suction Piston Lift (in.)
P—L60	Hitachi VC42-4A	1.42			135	70		25	210					
P with emission control—L60	Rochester 7015013 single throat downdraft													
E1—PL410	Nihonki-kaki 2D30CE dual throat downdraft	1.102, 1.81 sec.	.827, 1.024 sec.		96, 115 sec.	80, 60 sec.		48, 48 sec.	100, 220 2nd, 120 sec.		#55		14	
E1—L320	Nihonki-kaki 2D30C dual throat downdraft	1.102, 1.81 sec.	.827, 1.024 sec.		96, 115 sec.	80, 60 sec.		48, 48 sec.	100, 220 2nd, 120 sec.		55		14	
J—L520	Nihonki-kaki D2630A-5A dual throat downdraft	1.022, 1.180 sec.	.788, 1.06 sec.		90, 145 sec.			48, 48 sec.			#40	#45	14	
J—PL411	Nihonki-kaki D2630A-5A dual throat downdraft	1.022, 1.180 sec.	.788, 1.06 sec.		92, 140 sec.	60, 60 sec.		48, 48 sec.	100, 240 2nd, 120 sec.		#40	.024"	14	

J with emission control—L520, L521	Hitachi DCA306-4 dual throat downdraft	1.022, 1.180 sec.	.827, 1.01 sec.	.315-.512 prim., .315-.433 sec., .551-.710 2nd	98, 130 sec.	100, 140 sec.	.106/.138 .118/.157 sec.	47, 100 sec.	200, 100 sec.	170	#60		13	
R	Hitachi HJB38W SU type sidedraft	1.495												
R with emission control	Hitachi HJB38W-5 or HJB38W-6 SU type sidedraft	1.495									.092"		6	1.400
U20	Hitachi HJ46W SU type sidedraft	1.81												
U20	Mikuni/ Solex 44PHH twin-choke sidedraft	1.74	.394, 1.456 sec.		180			60				.012"		1.337
U20 with emission control	Hitachi HJG46W-5 or HJG46W-7 SU type sidedraft	1.805									.100"		4.5	
L16—PL510	Hitachi DAF328 dual throat downdraft	1.102, 1.260 sec.	.945, 1.102 sec.	.354	115, 155 sec.	240, 120 sec.		48, 180 sec.	180, 100 sec.				16	
L16 with emission control	Hitachi DAF328-8 (auto.), DAF328-8 (std.) DAF328-10 (PL521)	1.101, 1.260 sec.	.906, 1.101 sec.	.355	117 (1969), 115 (1970)	240, 120 sec.	.255/.071 .118 sec.	48, 180 sec.	150, 100 sec.			.020"	16	
L24 with emission control—HLS30	Hitachi HJG46W-3A SU type sidedraft	1.811			A									
A12 with emission control—LB110, KLB110	Hitachi DCG306 dual throat downdraft	1.024, 1.181 sec.	.787, 1.024 sec.	.315 prim., .276 sec., .512 2nd	98, 135 sec.	80, 80 sec.	.083, .110 sec.	43, 50 sec.	220, 100 sec.		#60	.020"	17.5	

Clutch Specifications

Vehicle model	Clutch type	Spring tension, free length (lbs. @ in., in.)	Release lever or diaphragm distance from flywheel (in.)	Facing O.D. X I.D. X thickness (in.)	New disc thickness (in.)	No. disc springs	Minimum allowable depth of rivet head below facing (in.)	Maximum allowable disc runout (in.)	Pedal height above floor (in.)	Pedal free play (in.)
L60	coil spring	180-190 @ 1.56, N.A.	2.5	10.8 X 6.9 X .14	.47	N.A.	.012	.020	8.1-8.5	1.0-1.5
Early L320	coil spring	132-176 @ 1.41, 1.95	2.26-2.32	7.25 X 5.00 X .14	.346	6	.012	.020	N.A.	.98-1.18
Late L320, PL410, PL411, RL411	coil spring	78-87 @ 1.15, 1.87-1.99	1.98-2.00	7.87 X 5.12 X .14	.338-.358	6	.012	.020	N.A.	1.0-1.5, 1.8-2.0 for PL411 & RL411
SPL310	coil spring	169-178 @ 1.56, 2.17	2.04-2.06	7.87 X 5.76 X .13	.333	6	.012	.020	6.10-6.60	.60-.80
SPL311, SRL311	diaphragm spring	—	N.A.	7.87 X 5.12 X .14	N.A.	N.A.	.012	.020	N.A.	1.9-2.1
PL510 WPL510	coil spring	92.6-101.4 @ 1.15, 2.06	1.97-2.01	7.87 X 5.12 X .14	.339-.354	6	.012	.020	8.15	.98
L510, WPL510	diaphragm spring	—	1.69-1.77	7.87 X 5.12 X .14	.339-.354	6	.012	.020	8.15	.98
L520, L521, PL521	coil spring	161-179 @ 1.15, 1.87-1.99	1.98-2.01	7.87 X 5.12 X .14	.339-.354	9	.012	.020	5.34, 5.46 without pedal stop	.98
HLS30	diaphragm spring	—	1.69-1.77	8.86 X 5.90 X N.A.	.327-.350	6	.012	.020	8.00	.39-.59
LB110, KLB110	diaphragm spring	—	1.14-1.22	7.09 X 4.92 X N.A.	.299-.315	6	.012	.020	5.57	1.18

SERVICE DATA AND SPECIFICATIONS

Pressure spring	
Free length	52.3 mm (2.059 in.)
Fitted length & load	29.2 mm/44 ± 2 kg (1.149 in./97 ± 4.4 lb)
Out-of-right angle	5/100 mm (0.1968/3.937 in.)
Allowable min. spring force	15%
Clutch release lever	
Release bearing-to-diaphragm spring (release lever) clearance	1.2 ~ 1.4 mm (0.0472 ~ 0.0551 in.)
Diaphragm spring-to-flywheel height	44.0 ± 1.0 mm (1.732 ± 0.0394 in.)
Release lever-to-flywheel height	50.5 ± 0.05 mm (1.988 ± 0.0197 in.)
Clutch disc	
Facing size Outer dia. × inside dia. × thickness	200 × 130 × 3.5 mm (7.87 × 5.120 × 0.140 in.)
Total friction area	362 cm^2 (56.11 in^2)
Thickness of disc assembly Free	8.6 ~ 9.0 mm (0.3386 ~ 0.3543 in.)
Compressed	7.65 ~ 7.95 mm (0.3012 ~ 0.3130 in.)
Material	HITACHI HT50S-17, AKEBONO A50
Number of torsion spring	6
Allowable min. depth of rivet head from facing surface	0.3 mm (0.0118 in.)
Allowable facing run-out	0.5 mm (0.0197 in.)
Allowable free play of spline	0.4 mm (0.0157 in.)
Pressure plate	
Allowable refacing limit	1.0 mm (0.0394 in.)
Clutch pedal	
Pedal height when not depressed	182 mm (7.17 in.) (R.H.), 207 mm (8.150 in.) (L.H.)
Free stroke of pedal head	25 mm (0.984 in.)
Pressing strength at full stroke	15 kg (33 lb)
Master cylinder - clutch	
Dia. master cylinder	15.87 mm (5/8 in.)
Allowable max. clearance between cylinder and piston	0.13 mm (0.0051 in.)
Tightening torque	
Clutch assembly securing bolt	2.4 ~ 2.6 kg-m (17.4 ~ 18.8 ft-lb)

Specifications

ENGINE TORQUE

Operation	FT. LBS.		
	1200	240-Z	510
Cylinder head bolts	32.5 to 39.8	1st turn: 32.5 2nd turn: 47.0	1st turn: 32.5 2nd turn: 39.8
Connecting rod nuts	23.1 to 27.5	19.5 to 23.9	19.5 to 23.9
Flywheel bolts	47.0 to 54.2	101.2	68.7 to 75.9
Main bearing cap bolts	36.2 to 43.4	32.5 to 39.8	32.5 to 39.8
Camshaft gear bolts	28.9 to 34.7	36.2 to 43.4	36.2 to 43.4
Oil pan bolts	2.9 to 4.3	2.9 to 5.8	2.9 to 5.1
Oil pump bolts	8.0 to 12.3	10.8 to 15.2	10.8 to 15.2
Oil strainer bolts	6.5 to 10.1	5.78 to 8.7	5.8 to 8.7
Crank pulley bolts	108 to 116	115.7 to 130.1	115.7 to 130.1

PISTONS, PINS, RINGS, CRANKSHAFT & BEARINGS

Year	Model or Engine	Piston Clearance, Inch	Ring End Gap, Inch		Piston Pin Diameter, Inch	Rod Bearings, Inch		Main Bearings			
			Comp.	Oil		Shaft Diameter	Bearing Clearance	Shaft Diameter, Inch	Bearing Clearance, Inch	Thrust on Bearing No.	Shaft End Play, Inch
1966–68	J	.0016	.008–.013	.008–.013	.679	1.860	.001–.002	1.982	.0005–.002	2	.002–.006
	R	.001–.0016	Top .010–.016 2nd .006–.012	.006–.012	.866	2.046	.001–.002	2.360	.001–.0027	2	.002–.006
	U-20	.0012–.002	Top .010–.016 2nd .006–.012	.006–.012	.866	2.045	.0013–.0034	2.478	.0008–.0028	2	.002–.012
1968–72	L-16	.0016	Top .009–.015 2nd .006–.012	.006–.012	.826	1.967	.0006–.0026–	2.163	.0008–.0028	3	.002–.012
	L-24	.0016	Top .009–.015 2nd .006–.012	.006–.012	.826	1.967	.0006–.0026	2.163	.0008–.0028	4	.002–.012
1970–72	1200	.0009–.0017	.008–.014	.012–.035	.687	1.770	.0008–.002	1.967	.0008–.0024	3	.002–.012

Specifications

VALVE ADJUSTMENT

Year	Model or Engine	Valve Lash, Inch		Valve Angles, Degrees		Valve Spring Pressure Lbs. @ In.	Stem Clearance Inch		Stem Diameter Inch	
		Intake	Exhaust	Seat	Face		Intake	Exhaust	Intake	Exhaust
1966–68	J	.014	.014	45	44½	Inner: 28 @ 1 15/32 Outer: 64 @ 1 7/16	.001–.004	.001–.004	0.34	0.34
	R	.017①	.017①	45	44½	Outer: 134 @ 1 3/16 Inner: 47 @ 1 ½	.001–.004	.001–.004	0.34	0.34
	U-20	.008①	.012①	45	44½	Outer: 160–172 @ 1 ½ Inner: 62–70 @ 1 ½	.0006–.006	.002–.006	0.34	0.34
1968–72	L-16	.010①	.012①	45	44½	Outer: 105 @ 1 3/16 Inner: 56 @ 1 ½	.001–.004	.001–.004	0.312	0.312
1970–72	L-24	.010①	.012①	45	44½	Outer: 90–100 @ 1 3/16 Inner: 40–45 @ 1	.001–.004	.001–.004	0.312	0.312
	1200	.014	.014	45	44½	129 @ 1 13/64	.001–.004	.001–.004	0.312	0.312

① Engine hot.

ENGINE

GENERAL SPECIFICATIONS

Year	Model or Engine	Bore & Stroke, Inches (mm)	Piston Displacement Cubic Inches (cc)	Compression Ratio	Maximum Brake H.P. @ rpm	Maximum Torque Ft. Lbs. @ rpm	Normal Oil Pressure Pounds
1966–68	J	2.874 x 3.035 (73 x 77.5)	79.27 (1299.2)	8.2	67 @ 5200	77 @ 2800	30–40
1966–67	R	3.433 x 2.630 (87.3 x 66.9)	97.32 (1595)	9.0	96 @ 6000	103 @ 4000	54–60
	U-20	3.433 x 3.267 (87.3 x 83)	120.92 (1981.9)	9.5	SU carbs 135 @ 6000	132 @ 4400	30–40
					Solex carbs 150 @ 6000	138 @ 4800	
1968–71	L-16	3.268 x 2.902 (83.2 x 73.76)	97.3 (1595)	8.5	96 @ 5600	100 @ 3600	54–60
	L-24	3.268 x 2.902 (83.2 x 73.76)	146 (2393)	9.0	151 @ 5600	146 @ 4400	54–60
	1200	2.874 x 2.756 (73 x 69.97)	71.5 (1171)	9.0	69 @ 6000	70 @ 4000	43–50
1972	L-16	3.268 x 2.962 (83.2 x 73.76)	97.3 (1595)	8.5	96 @ 5600	100 @ 3600	54–60
	L-24	3.268 x 2.902 (83.2 x 73.76)	146 (2393)	8.8	151 @ 5600	146 @ 4400	54–60
	1200	2.874 x 2.756 (73 x 69.97)	71.5 (1171)	9.0	69 @ 6000	70 @ 4000	43–50

Specifications

TUNEUP SPECIFICATIONS

Year	Car Model or Engine	Spark Plugs		Distributor		Firing Order	Ignition Timing		Hot Idle Speed rpm
		Type	Gap, Inch	Point Gap, Inch	Dwell Angle, Degrees		Degrees BTDC	Mark Location	
1966–68	J	—	.027–.031	.018–.022	50–55	1-3-4-2	8	pulley	600
1966–67	R	—	.027–.031	.018–.022	50–54 Hitachi 56–61 Mitsubishi	1-3-4-2	16	Pulley	600
	U-20	—	.027–.031	.016–.020	49–55	1-3-4-2	16①	Pulley	600
1968–72	L-16	—	.031–.035	.017–.022	49–55	1-3-4-2	10	Pulley	600
1970–72	1200	—	.028–.032	.017–.022	49–55	1-3-4-2	7	Pulley	600
	L-24	—	.031–.035	.016–.020	35–41	1-5-3-6-2-4	5	Pulley	750

①—20° with Solex carbs.

ADJUSTMENT OF IDLING

Adjust the engine at normal idling setting

	Engine idling (rpm)	Idling timing (degree, retard side)	CO (%)
M/T vehicle	800	5° BTDC	1.5 ± 0.5
A/T vehicle	650 (in D range)	5° BTDC	1.5 + 0.5

Recommended Lubricants (SAE)

Temperature (°F)	*Under 10*	*10–32*	*32–90*	*Over 90*
Engine Oil API designation: MS, SD, SE	10W-30, 10W, or 5W-20	10W-30, 10W-40, or 10W	10W-30, 10W-40, or 20W	10W-30, 10W-40, 20W-40, or 30W*
Gear Oil API designation: MP, EP, MPS	80	90	90	140

* 40W may be used for high speeds in temperatures over 90.

Capacities and Pressures

Model	Engine Crankcase Refill after Draining (qts.)		Transmission Refill after Draining (pts.)				Differential (pts.)	Fuel Tank (gals.)	Cooling System (qts.)	Normal Fuel Pressure (psi)	Maximum coolant pressure (psi)
	With Filter	Without Filter	Manual 3-Speed	Manual 4-Speed	Manual 5-Speed	Auto. (total capacity)					
L60	3.6	N.A.	4.2①				2.6 front and rear	19.0	5.2	N.A.	N.A.
PL410	3.3	3.0	3.8				2.0	10.8	5.4	N.A.	6
SPL310	N.A.	4.2		4.6			1.8	11.3	6.9	N.A.	4-6
PL411	N.A.	3.1	3.8	4.7			2.2	11.0	5.7	N.A.	6
RL411	N.A.	3.5		4.3			1.9	11.0	7.1	N.A.	4-6
SPL311	N.A.	4.3		4.6			2.0	11.4	8.4	3.4-4.3	4-6
SRL311	N.A.	4.3			5.4		2.0	11.4	9.0	3.4-4.3	13
SRL311 with two twin-choke carburetors	N.A.	7.5			5.4		2.0	11.4	9.0	3.4-4.3	13
L320	3.8	3.2		4.3			1.8	9.3	5.7	N.A.	N.A.
L520, L521	3.8	3.2		4.2			1.7	10.8	5.9	2.1-2.5	6
PL510	5.2	4.4		6.4		11.4②	1.7	11.9	6.8, 7.2 with heater	2.6-3.4	13
WPL510	5.2	4.4		6.4		11.4②	2.1	11.9	6.8, 7.2 with heater	2.6-3.4	13
PL521	4.4	3.6		4.2			1.7	10.8	6.8, 7.4 with heater	2.6-3.4	13
HLS30	4.7	4.3		3.2	3.2	12.8	2.1	15.9	8.5	3.4-4.3	13
LB110	N.A.	2.9		4.3			1.8	9.3	5.7	N.A.	13

①—4.8 pts.—without power takeoff, 7.8 pts.—transfer case
②—1.5 pts.—oil cooler

Specifications

AUTOMATIC TRANSMISSION

Valve spring chart

Valve spring	Wire dia. mm (in)	Mean coil dia. mm (in)	No. of active coil	Free length mm (in)	Installed	
					Length mm (in)	Load kg (lb)
Manual detent	1.3 (0.0512)	6.0 (0.2362)	15.0	32.4 (1.276)	26.5 (1.043)	5.5 (12)
Pressure regulator	1.2 (0.0472)	10.5 (0.4134)	13.0	43.0 (1.693)	23.5 (0.925)	2.8 (6.2)
Pressure modifier	0.4 (0.0157)	8.0 (0.3150)	5.0	18.5 (0.728)	9.0 (0.3543)	0.1 (0.2)
1st - 2nd shift	0.6 (0.0236)	6.0 (0.2362)	16.0	32.0 (1.260)	16.0 (0.630)	0.625 (1.4)
2nd - 3rd shift	0.7 (0.0276)	6.2 (0.2441)	18.0	41.0 (1.614)	17.0 (0.669)	1.40 (3.1)
2nd - 3rd timing	0.7 (0.0276)	5.5 (0.2165)	15.0	32.5 (1.280)	27.0 (1.063)	0.55 (1.2)
Throttle back-up	0.8 (0.0315)	6.5 (0.2559)	14.0	36.0 (1.417)	18.8 (0.740)	1.92 (4.2)
Solenoid downshift	0.55 (0.0217)	5.0 (0.1969)	12.0	22.0 (0.866)	12.5 (0.492)	0.60 (1.3)
Second lock	0.55 (0.0217)	5.0 (0.1969)	16.0	33.5 (1.319)	21.0 (0.827)	0.60 (1.3)
Throttle relief	0.9 (0.0354)	5.6 (0.2205)	14.0	26.8 (1.055)	19.0 (0.748)	2.19 (4.8)
Orifice check	0.2 (0.0078)	4.8 (0.1890)	15.0	21.5 (0.846)	11.5 (0.453)	0.01 (0.02)
Primary governor	0.45 (0.0177)	8.3 (0.3268)	5.0	21.8 (0.858)	7.5 (0.2953)	0.215 (0.5)
Secondary governor	0.7 (0.0276)	8.5 (0.3346)	5.5	25.1 (0.988)	10.5 (0.413)	1.10 (2.4)

SERVICE DATA AND SPECIFICATIONS

General specifications

Torque converter

Type		Symmetrical 3-element 1-stage 2-phase torque converter coupling
Stall torque ratio		2.0 : 1

Transmission

Type		3-speed forward and one-speed reverse with planetary gear train
Control elements:	Multiple-disc clutch	2
	Band brake	1
	Multiple-disc brake	1
	One-way clutch	1
Gear ratio	1st	2.458
	2nd	1.458
	3rd	1.000
	Reverse	2.182
Selector positions	P (Park)	The transmission is placed in neutral. The output shaft is fixed. The engine can be started.
	R (Reverse)	Backward running
	N (Neutral)	The transmission is in neutral. The engine can be started.
	D (Drive)	Up- or downshifts automatically to and from 1st, 2nd, and top
	2 (2nd lock)	Fixed at 2nd
	1 (Lock up)	Fixed at low or downshifts from 2nd

Oil pump

Type	Internally intermeshing involute gear pump
Number of pump	1
Oil	Automatic transmission fluid "Dexron" type
Capacity	5.5 liters (5 7/8 U.S.qts., 4 7/8 Imp.qts.) Approximately 2.7 liters (2 7/8 U.S.qts., 2 3/8 Imp.qts.) in torque converter
Hydraulic control system	Controlled by detecting the negative pressure of intake manifold and the revolution speed of output shaft.
Lubrication system	Forced lubrication by an oil pump
Cooling system	Water-cooled by a circulation-type auxiliary cooler (located at the radiator).

Specifications

Specifications and adjustment

Automatic transmission assembly		
Model code number		X0400
Torque converter assembly		
Stamped mark on the T/C		16-B
Front clutch		
Number of drive plates		3
Number of driven plates		3
Clearance	mm (in)	1.6 to 1.8 (0.0630 to 0.0709)
Thickness of retaining plate	mm (in)	10.6 (0.417) 10.8 (0.425) 11.0 (0.433) 11.2 (0.441) 11.4 (0.449) 11.6 (0.457)
Rear clutch		
Number of drive plates		4
Number of driven plates		4
Clearance	mm (in)	1.0 to 1.5 (0.039 to 0.059)
Thickness of retaining plate	mm (in)	4.8 (0.189)
Low & reverse brake		
Number of drive plates		4
Number of driven plates		4
Clearance	mm (in)	0.80 to 1.05 (0.031 to 0.041)
Thickness of retaining plate	mm (in)	11.8 (0.465) 12.0 (0.472) 12.2 (0.480) 12.4 (0.488) 12.6 (0.496) 12.8 (0.504)
Brake band		
Piston size	mm (in)	
Big dia.		64 (2.520)
Small dia.		40 (1.575)
Control valve assembly		
Stamped mark on strainer		E
Governor assembly		
Stamped mark on governor body		35

Engine idling and stall revolution

(Engine with emission control device)

Idling revolution	rpm	650 at "D" position (800 at "N" position)
Stall revolution	rpm	1,800 to 2,000

Tightening torque

	kg-m	(ft-lb)
Drive plate to crankshaft	14.0 to 16.0	(101 to 116)
Drive plate to torque converter	4.0 to 5.0	(30 to 36)
Converter housing to engine	4.0 to 5.0	(30 to 36)
Transmission case to converter housing	4.0 to 5.0	(30 to 36)
Transmission case to rear extension	2.0 to 2.5	(15 to 18)
Oil pan to transmission case	0.5 to 0.7	(3.6 to 5.1)
Servo piston retainer to transmission case	0.5 to 0.7	(3.6 to 5.1)
Piston stem (when adjuting band brake)	*1.2 to 1.5	(8.7 to 10.8)
Piston stem lock nut	1.5 to 4.0	(11 to 29)
One way clutch inner race to transmission case	1.3 to 1.8	(9.4 to 13)
Control valve body to transmission case	0.55 to 0.75	(4.0 to 5.4)
Lower valve body to upper valve body	0.25 to 0.35	(1.9 to 2.5)
Side plate to control valve body	0.25 to 0.35	(1.9 to 2.5)
Nut for control valve reamer bolt	0.5 to 0.7	(3.6 to 5.1)
Oil strainer to lower valve body	0.25 to 0.35	(1.9 to 2.5)
Governor valve body to oil distributor	0.5 to 0.7	(3.6 to 5.1)
Oil pump housing to oil pump cover	0.6 to 0.8	(4.4 to 5.8)
Inhibitor switch to transmission case	0.5 to 0.7	(3.6 to 5.1)
Manual shaft lock nut	3.0 to 4.0	(22 to 29)
Lock nut for oil cooler pipe connector to transmission case	3.0 to 5.0	(22 to 36)
Oil cooler pipe connecting nut	0.7 to 1.1	(5.0 to 7.9)
Test plug (oil pressure inspection hole)	1.4 to 2.1	(10 to 15)
Support actuator (parking rod inserting position) to rear extension	0.8 to 1.1	(5.8 to 7.9)
Oil charging pipe to case	0.55 to 0.75	(4.0 to 5.4)
Dust cover to converter housing	0.55 to 0.75	(4.0 to 5.4)
Selector range lever to manual shaft	3.0 to 4.0	(22 to 29)
Selector rod lock nut	0.8 to 1.0	(5.8 to 7.2)
Control lever bolt	1.6 to 2.2	(12 to 16)
Control lever bracket to floor	0.35 to 0.45	(2.6 to 3.3)
Control lever knob to lever	0.20 to 0.25	(1.4 to 1.8)

* Turn back two turns after tightening.

Specifications

PROPELLER SHAFT

SERVICE DATA AND SPECIFICATIONS

Propeller shaft		Length x out. dia. x in. dia. mm (in.)
For Sedan		1,080 x 63.5 x 60.3 (42.5 x 2.5 x 2.4)
For Wagon		1,242 x 75.0 x 71.8 (48.9 x 3.0 x 2.8)
Axial play of the spider journal		0.08 mm (0.0315 in.)
Sleeve yoke spline-to-mainshaft		0 ~ 0.08 mm (0 ~ 0.0031 in.)
Spline lash wear limit		0.5 mm (0.0197 in.)
Maximum run-out of propeller shaft		0.6 mm (0.0236 in.)
Spider journal diameter wear limit		0.15 mm (0.0059 in.)
Permissible unbalance		
Dynamic		35 gr-cm (0.486 in-oz) at 5,800 r.p.m.
Thickness of available snap rings		
Standard	(white)	2.00 mm (0.0787 in.)
Oversize	(yellow)	2.02 mm (0.0795 in.)
	(red)	2.04 mm (0.0803 in.)
	(green)	2.06 mm (0.0811 in.)
	(blue)	2.08 mm (0.0819 in.)
	(brown)	2.10 mm (0.0827 in.)
	(colorless)	2.12 mm (0.0835 in.)
	(pink)	2.14 mm (0.0843 in.)
Tightening torque		
Fixing nuts of flange yoke to companion flange		2.0 ~ 2.7 kg-m (14 ~ 20 ft-lb)

Tightening torque	**kg-m (ft-lb)**	
Drive pinion nut		17 to 20 (122.9 to 144.6)
Ring gear bolt		7 to 8 (50.6 to 57.8)
Side retainer bolt		0.9 to 1.2 (6.5 to 8.7)
Side flange fix bolt		1.9 to 2.6 (13.7 to 18.8)
Rear cover fix bolt		1.9 to 2.6 (13.7 to 18.8)
Rear cover to mounting member lock nut		6 to 8 (43.4 to 57.8)
Differential carrier to suspension member fix bolt		5 to 7 (36.2 to 50.6)
Differential to drive shaft fix bolt		5 to 6 (36.2 to 43.4)
Differential mounting member self lock nut		7 to 10 (50.6 to 72.3)
Companion flange to propeller shaft fix bolt		2.0 to 2.7 (14.5 to 19.5)
Oil drain and filler plug		4 to 6 (28.9 to 43.4)
Oil capacity (about)	**liter (U.S.qt., Imper.qt.)**	0.8 (7/8, 3/4)
Adjusting methods		
Variation numbers expressed by		mm (× 0.01)
Dummy shaft		Use
Drive pinion adjusting formula		$T = W + N - [(H - D' - S) \times 0.01] - 0.2$
Side bearing adjusting formula		$T1 = (A + C + G1 - D) \times 0.01 + 0.76 - E$
		$T2 = (B + D + G2) \times 0.01 + 0.76 - F$

Specifications

Brake Specifications

Model	Type		Brake Cylinder Bore (in.)			Brake Drum or Disc Diameter (in.)	
	Front	Rear	Master Cylinder	Wheel Cylinder Front	Wheel Cylinder Rear	Front	Rear
L60	Drum	Drum	1.000	1.000	1.150	11.5	11.5
PL410	Drum	Drum	.875	1.000	.938	N.A.	N.A.
SPL310	Drum	Drum	.875	1.000	.938	N.A.	N.A.
PL411	Drum	Drum	.875	1.000	.938	9.0	9.0
RL411	Disc	Drum	.875	2.000	.938	N.A.	N.A.
SPL311	Disc	Drum	.750	2.125	.813	11.2	9.0
SRL311	Disc	Drum	.750	2.125	.75	11.2	9.0
L320	Drum	Drum	.77	.77	.77	10.0	10.0
L520, L521	Drum	Drum	.750	.750	.750	10.0	10.0
PL510	Disc	Drum	.750	2.000	.813	9.1	9.0
WPL510	Disc	Drum	.750	2.000	.813	9.1	9.0
PL521	Drum	Drum	N.A.	N.A.	N.A.	10.0	10.0
HLS30	Disc	Drum	.875	2.125	.875	10.7	9.0
LB110, KLB110	Disc	Drum	.688	1.894	.688	8.4	8.0

Chassis and Wheel Alignment Specifications

Model	Chassis			Wheel Alignment				Toe-In (in.)	Kingpin Inclination (deg.)	Wheel Pivot Ratio (deg.)	
	Wheelbase (in.)	Track (in.)		Caster (deg.)		Camber (deg.)					
		Front	Rear	Range	Preferred Setting	Range	Preferred Setting			Inner Wheel	Outer Wheel
L60	86.6	54.6	55.3		1°30′		1°30′	.12-.16	6°45′-7°15′	28	25°32′
WL60	98.4	54.6	55.3		1°30′		1°30′	.12-.16	6°45′-7°15′	28	25°32′
PL410	93.8	47.5	47.0		1°30′		1°30′	.06-.13	6°30′	36	28°36′
SPL310	89.8	47.8	47.1		1°30′		1°26′	.06-.13	6°34′	36	28°36′
PL411	93.7	47.5	47.2		0		1°45′	.06-.13	6°15′	36	28°36′
RL411	93.7	47.5	47.2		0		1°45′	.13	6°15′	36	28°36′
SPL311	89.8	50.2	47.2		1°30′		1°25′	.08-.12	6°35′	36°16′	29°20′
SRL311	89.8	50.2	47.2		1°30′		1°25′	.08-.12	6°35′	36°16′	29°20′
L320	97.2	46.1	46.7		3°30′		1°30′	.08-.12	6	34	29°30′
L520	99.6	49.2	49.9		1°50′	50′-1°50′	1°20′	.08-.12	6	34	29°30′
PL510	95.3	50.4	50.4		1°40′		1	.35-.47	8	38-39	22°30′-33°30′
WPL510	95.3	50.2	49.6		2		1°10′	.12-.24	7°50′	38-39	22°30′-33°30′
L521, PL521	99.6	49.2	49.9		3°50′	50′-1°50′	1°20′	.08-.12	6	34	29°30′
HLS30①	90.7	53.3	53.0	2°25′-3°25′	2°55′	20′-1°20′	50′	08-.20	11°40′-12°40′	32-33	31°24′-32°24′
LB110, KLB110	90.6	48.8	49.0	40′-1°40′	1°10′	35′-1°35′	1°05′	.16-.24	7°55′	42-44	35-37

①—Unloaded

notes

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