1974 DATSUN PICK-UP

SERVICE MANUAL

P/N 20042

NISSAN

NISSAN MOTOR CO., LTD. Tokyo, Japan

DATSUN PICK-UP

SERVICE MANUAL

MODEL 620 SERIES

NISSAN

WWW.THE620.COM

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

QUICK REFERENCE INDEX

FOREWORD

This service manual has been prepared for the purpose of assisting service personnel of authorized NISSAN/DATSUN dealers in providing effective service and maintenance of the 1974 Datsun Pick-up.

Since proper maintenance and service are absolutely essential in satisfying the Datsun owners, this manual should be kept in a handy place for ready reference and should be carefully studied.

This manual includes procedures for maintenance adjustments, minor service operations, removal and installation, and for disassembly and assembly of components.

Some of these service operations require the use of Special Tools especially designed for effective performance of service operations.
The special tools are presented in the "SE" section.

As you read through the maintenance procedures in this service manual, you will occasionally come across paragraphs headed NOTE or CAUTION. A NOTE is supplemental information that is important to a particular procedure. CAUTION warns of steps that must be followed to prevent personal injury and/or damage to some part of your DATSUN.

The Quick Reference Index on the first page enables the user to quickly locate the desired section. At the beginning of each individual section is a table of contents, which gives the page number on which each major subject begins. An index is placed at the beginning of each major subject within the section.

All information, illustrations and specifications contained in this manual are based on the latest product information available at the time of publication approval.

Rights for alteration at any time of specifications and methods are reserved.

Liability for any personal injury or property damage occasioned by the use of this service manual in effecting maintenance or repair of your Datsun is in no way assumed by Nissan Motor Co., Ltd.
Accordingly, anyone using a service procedure or tool which is not specifically recommended by Nissan must first completely satisfy himself that neither his safety nor the vehicle's safety will be jeopardized by the service method selected.

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SERVICE MANUAL

DATSUN PICK-UP
MODEL 620 SERIES

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION GI

GI

GENERAL INFORMATION

GENERAL INFORMATION

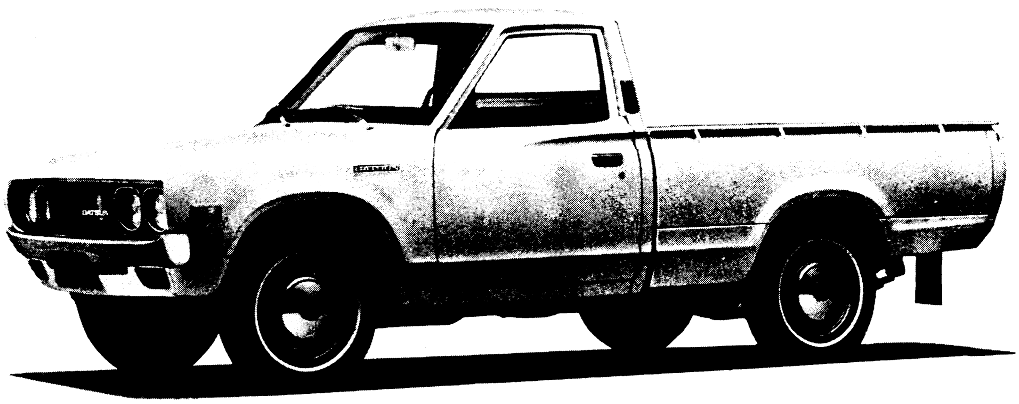


Fig. GI-1 Front view of Datsun Pick-up

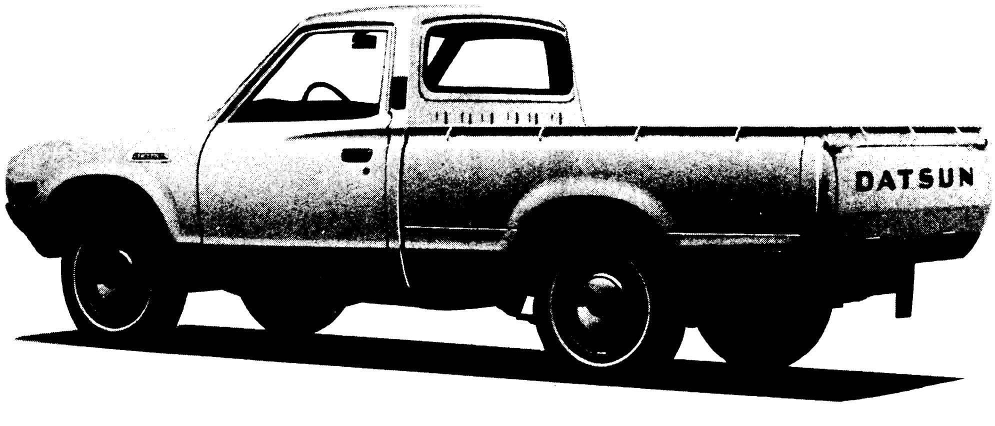


Fig. GI-2 Rear view of Datsun Pick-up

GENERAL INFORMATION

CONTENTS

MODEL VARIATION

Model	Engine	Payload kg (lb)	Transmission type and model	Differential carrier		Remarks
				Model	Gear ratio	
PL620TU	L18	500 (1,100)	Manual F4W71B	H190	4.375	for U.S.A. & Canada
PL620TUH						for Puerto Rico, Guam and U.N.T.T.
PL620KTU			Automatic 3N71B		4.625	for U.S.A. & Canada
PL620KTUH						for Puerto Rico, Guam and U.N.T.T.

The meaning of prefix and suffix

P L 620 K T U H

- H : Without heater
- L-U : Destined for U.S.A. and Canada
- T : Floor shift vehicle
- K : Automatic transmission
- □ : Manual transmission
- P : Equipped with L18 engine

Note: □ means no indication.

Model number plate

The model number plate is located at the hood ledge in the engine room. The plate gives the vehicle type, engine capacity, maximum engine horsepower, wheelbase, engine number and car serial numbers.

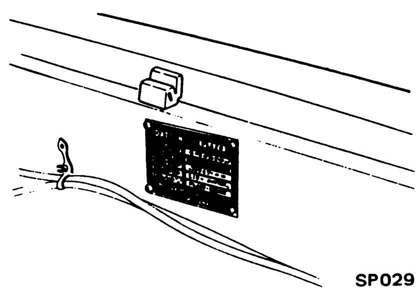

SP029

Fig. GI-3 Model number plate location

IDENTIFICATION NUMBERS

The unit and car numbers are stamped at the factory and are registered by the company. The engine and vehicle identification numbers are entered in legal documents. These numbers are used as the basis for preparing the technical report, warranty claim sheet and other similar service and technical information.

Color number plate

The color number plate is stamped on the top face of radiator core support.

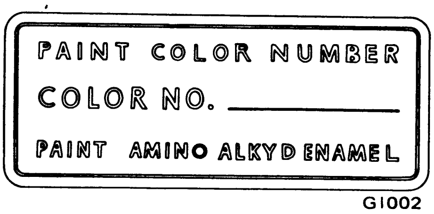


Fig. GI-4 Color number plate

M.V.S.S. certification plate

The certification plate is located at the driver side lock pillar.

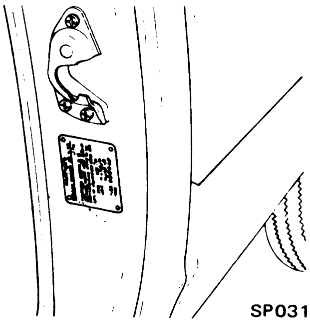


Fig. GI-5 M.V.S.S. certification plate location

Chassis number

The chassis number is located on the upper face of the right side member. The number is identified by the following figures as a serial number.

PL620 - XXXXXX
- XXXXXX — Serial number
- PL620 — Vehicle model

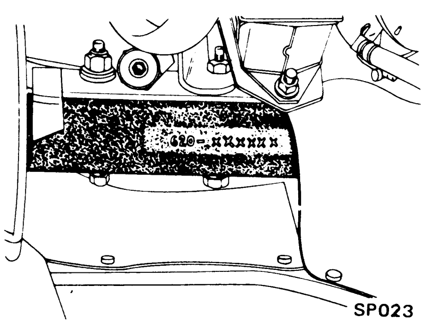


Fig. GI-6 Chassis number location

Engine number

The engine serial number is stamped on the right-hand side of the cylinder block.

L18 - XXXXXX
- XXXXXX — Serial number
- L18 — Engine model

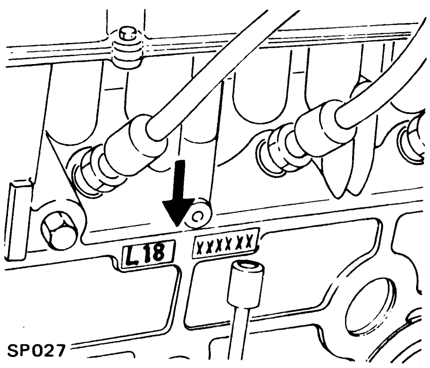


Fig. GI-7 Engine serial number location

Manual transmission number

The transmission serial number is stamped on the front upper face of transmission case.

(Number system)

X X XXXXX
- XXXXX — Serial number (monthly)
- 2nd X — Month of manufacture (1, 2, ... 9, X, Y, Z)
- 1st X — Line code of manufacture

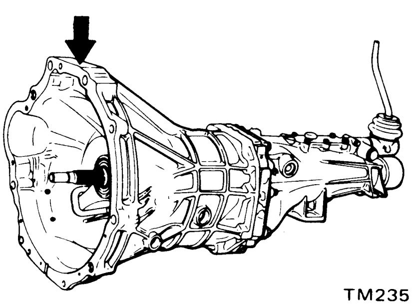


Fig. GI-8 Manual transmission number location

Automatic transmission number

The transmission serial number is stamped on the right-hand side of transmission case.

(Numbering system)

X X XXXXX
- XXXXX — Serial number (monthly)
- 2nd X — Month of manufacture (1, 2, ...9, X, Y, Z)
- 1st X — Last figure of year of manufacture

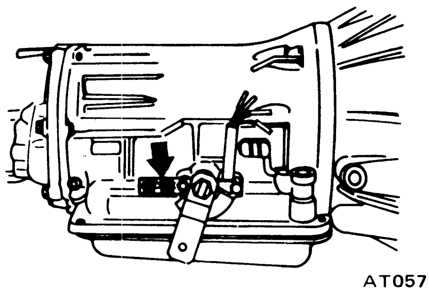


Fig. GI-9 Automatic transmission number location

Steering gear, Front axle and Rear axle number

The steering gear, front axle and rear axle numbers are stamped on each unit of the vehicle.

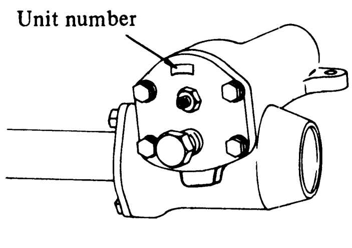
These unit numbers are stamped as a lot number of production.

(Location)

Steering gear:	On top of gear box
Front axle:	On front face of right and left lower arm
Rear axle:	On rear cover of rear axle case

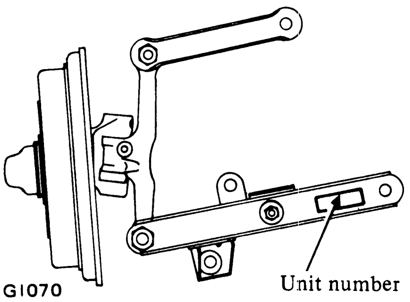
(Numbering system)

X X XXXXX
- XXXXX — Serial number (monthly)
- 2nd X — Month of manufacture (1, 2, ... 9, X, Y, Z)
- 1st X — Line code of manufacture



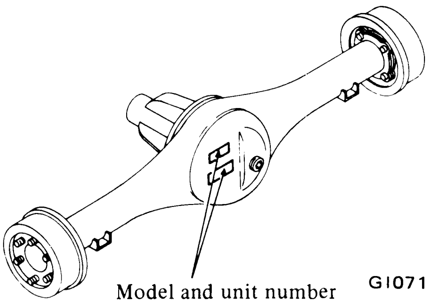
GI069

Fig. GI-10 Steering gear box number location



GI070

Fig. GI-11 Front axle number location



GI071

Fig. GI-12 Rear axle number location

LIFTING POINTS AND TOWING

Lifting points

Screw jack

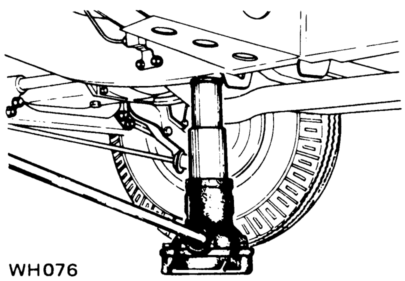
Before using the jack, proceed as follows:

Apply parking brake firmly and block rear wheels if the front of the vehicle is to be raised.

Notes:

a. Never get under the vehicle while it is supported only by the jack. Always use safety stands to support frame or rear axle case when you have to get beneath the vehicle.
b. In no event should the jack be applied to any points except the following specified portions.

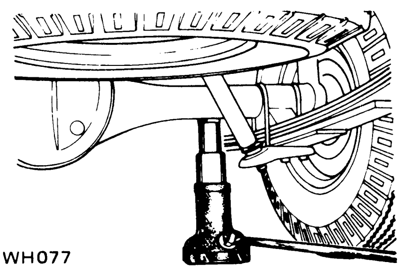
When jacking up the front side, place a screw jack under side frame [about 520 mm (20.5 in) at rear of front axle center].



WH076

Fig. GI-13 Front lifting point

When jacking up the rear side, place a screw jack under rear axle case close to the side of rear spring.

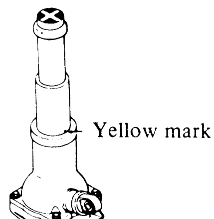


WH077

Fig. GI-14 Rear lifting point

Notes:

a. **When the yellow mark appears on the screw jack, it indicates the maximum permissible height. Do not jack up further.**
b. **When the jack is at lower limit, do not add large force downward.**



WH080

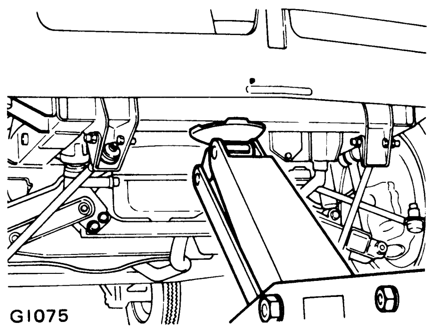
Fig. GI-15 Warning against over-stroke

Garage jack

Note: **When carrying out operations with a garage jack, be sure to support the vehicle with stands in a safe manner.**

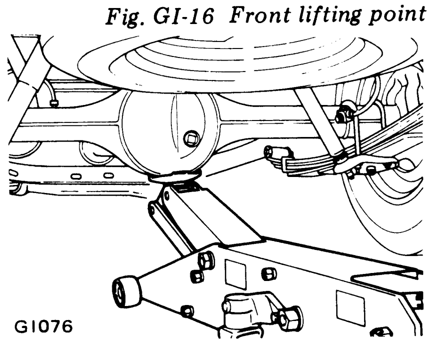
When jacking up the front end, apply garage jack to front cross-member or center portion of suspension member.

When jacking up the rear end, apply the jack to rear axle case.



GI075

Fig. GI-16 Front lifting point



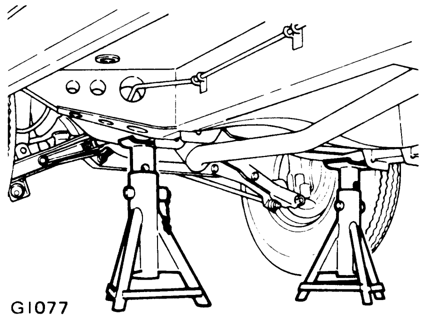
GI076

Fig. GI-17 Rear lifting point

Supportable points

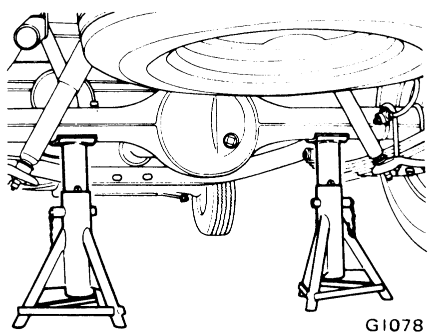
The front supportable points are under frame side member.

The rear supportable points are under rear axle case.



GI077

Fig. GI-18 Front supportable points



GI078

Fig. GI-19 Rear supportable points

Towing

When the vehicle is to be towed forward, connect a rope securely to the hook under the 1st crossmember. Before towing, make sure the parking brake is released.

To tow another car, connect the rope to rear leaf spring shackle.

Notes:

a. **A towing rope should not be connected to any position other than as described above.**

b. **Avoid applying load suddenly to a towing rope, as it may cause damage.**

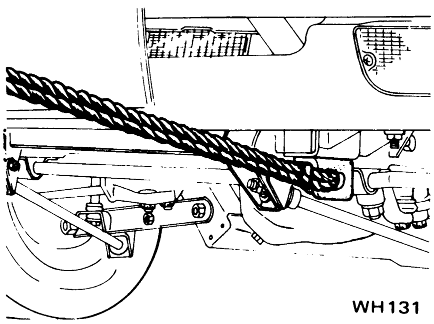


Fig. GI-20 Front towing point

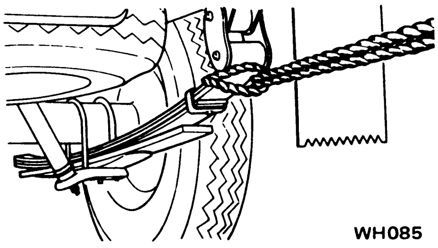


Fig. GI-21 Rear towing point

Manual transmission

Before towing, make sure the transmission is in neutral gear.

If the rear axle or transmission is inoperative, the vehicle should be towed with its rear wheels off the ground, or the propeller shaft must be removed.

Automatic transmission

When the vehicle is towed on its rear wheels, make sure the transmission is in "N" (Neutral) position. Don't exceed 30 km/h (20 MPH) and a distance of 10 km (6 miles). If the rear axle or transmission is inoperative, or if the speed exceeds the above conditions, the vehicle must be towed with its rear wheels off the ground, or the propeller shaft must be removed.

Note: When the vehicle is towed with its front wheels on the ground, the steering wheel should be secured to maintain a straight ahead position.

Tie-down

The front two tie-down hooks are located under the 1st crossmember.

The hook is available as a towing hook. For rear tie-down, the rear leaf spring shackle be used. This point is also used as a towing point.

APPROXIMATE REFILL CAPACITY

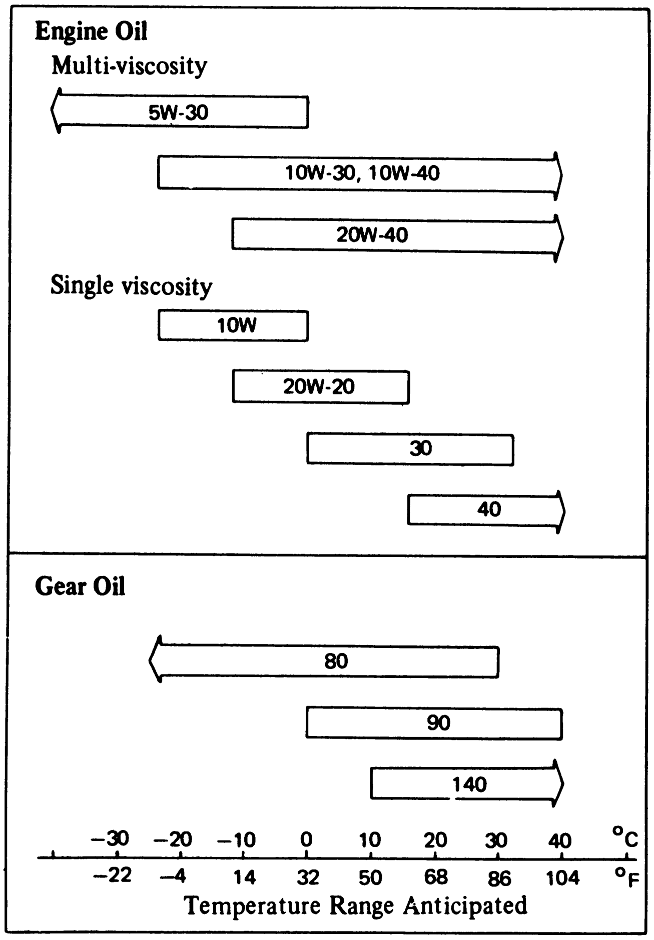
		Liter	U.S. measure	Imper. measure
Fuel tank		45 ℓ	11 7/8 gal.	9 7/8 gal.
Cooling system	With heater	6.0 ℓ	6 3/8 qt.	5 1/4 qt.
	Without heater	5.4 ℓ	5 3/4 qt.	4 3/4 qt.
Engine lubrication system		4.8 ℓ	5 1/8 qt.	4 1/4 qt.
Oil pan		4.1 ℓ	4 3/8 qt.	3 5/8 qt.
Manual transmission		1.6 ℓ	1 3/4 qt.	1 3/8 qt.
Automatic transmission		5.5 ℓ	5 7/8 qt.	4 7/8 qt.
Steering gear box		0.33 ℓ	3/4 pt.	5/8 pt.
Differential carrier		1.0 ℓ	2 1/8 pt.	1 3/4 pt.

RECOMMENDED FUEL

Use a no-lead or low-lead gasoline with a minimum octane rating of 87 the average of the Research and Motor Octane Numbers in the U.S. When the figure is based on the Research Octane Number, use a gasoline with a minimum octane rating of 91 (RON) in Canada.

RECOMMENDED LUBRICANTS

Recommended SAE viscosity number



Lubricant specifications

Item		Specifications	Remarks
Gasoline engine oil		SAE Classification SD or SE	Furthermore refer to SAE recommended viscosity table. See Page GI-7.
Gear oil	Transmission and steering	API GL-4	
	Differential	API GL-5	
Automatic T/M fluid		Type DEXRON	
Multipurpose grease		NLGI 2	Lithium soap base
Brake and clutch fluid		DOT 3	
Antifreeze			Permanent anti-freeze (Etylene glycol base)

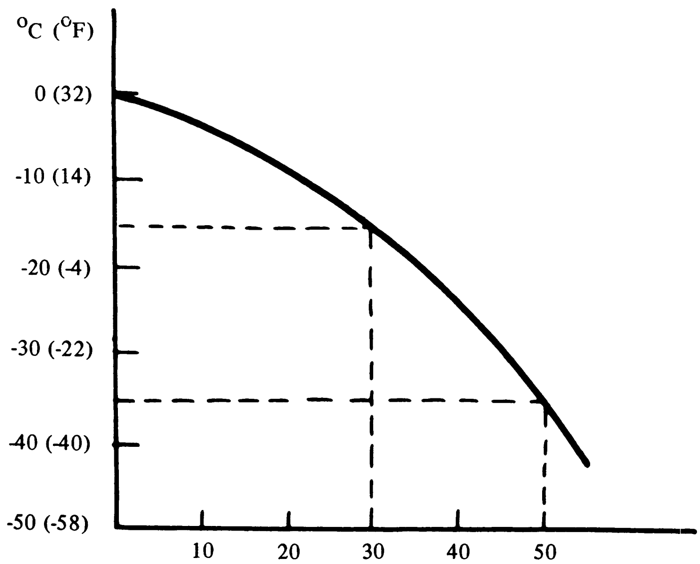
NISSAN LONG LIFE COOLANT (L.L.C.)

The cooling system has been filled at factory with Long Life Coolant (L.L.C.) and water for all season protection. This coolant provides freezing protection to −15°C (−5°F) in a 30% Long Life Coolant ratio and also protects the engine against corrosion. If outside temperature falls down to −35°C (−31°F), fill a 50/50 mixture of the Long Life Coolant and water. The Long Life Coolant is an ethylene glycol base product containing no glycerine, ethyl or methyl alcohol.

The Long Life Coolant must not be mixed with any other product. Scale or sediment accumulated in the water jacket or radiator may adversely affect heat radiation efficiency.

When the coolant is changed, the system should be thoroughly flushed out by opening the two drain plugs, one at the bottom of the radiator and the other at the right side of the cylinder block until clean water comes out. Always use clean, soft water for filling the radiator.

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)



EG001

Fig. GI-22 Protection concentration

SERVICE MANUAL

DATSUN PICK-UP
MODEL 620 SERIES

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION ET

ET

ENGINE TUNE-UP

BASIC MECHANICAL SYSTEM

CONTENTS

ADJUSTING INTAKE AND EXHAUST VALVE CLEARANCE

Valve clearance adjustment is impossible when the engine is in operation:

1. Loosen pivot locking nut and turn pivot screw until the specified clearance is obtained while cold.

Using service tool, tighten pivot locking nut securely after adjustment, and recheck the clearance.

2. Warm up engine for at least several minutes and stop it. Measure valve clearance while hot. If out of specifications, adjust.

Valve clearance

Unit: mm (in)

Cold	Intake	0.20 (0.0079)
	Exhaust	0.25 (0.0098)
Warm	Intake	0.25 (0.0098)
	Exhaust	0.30 (0.0118)

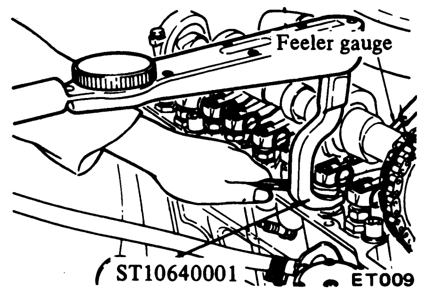


Fig. ET-1 Adjusting valve clearance

CHECKING AND ADJUSTING DRIVE BELT

1. Check for cracks or damage. Replace if necessary.
2. Adjust belt tension. It is correct if deflection is 8 to 12 mm (0.315 to 0.472 in) when thumb pressure [10 kg (22.0 lb)] is applied midway between fan and alternator pulleys.

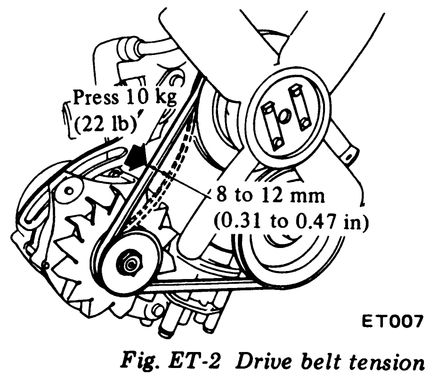


Fig. ET-2 Drive belt tension

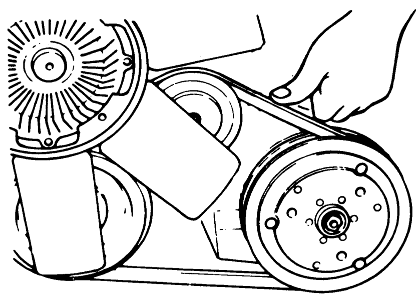


Fig. FT-3 Cooler compressor belt tension (for 710 model only)

RETIGHTENING CYLINDER HEAD BOLTS, MANIFOLD NUTS AND CARBURETOR SECURING NUTS

Tightening torque:
- Cylinder head bolts
  - 1st turn
    4.0 kg-m (29 ft-lb)
  - 2nd turn
    6.0 kg-m (43 ft-lb)
  - 3rd turn
    6.5 to 8.5 kg-m
    (47 to 61 ft-lb)
- Manifold nuts
  1.2 to 1.6 kg-m
  (8.7 to 11.6 ft-lb)
- Carburetor nuts
  0.5 to 1.0 kg-m
  (3.6 to 7.2 ft-lb)

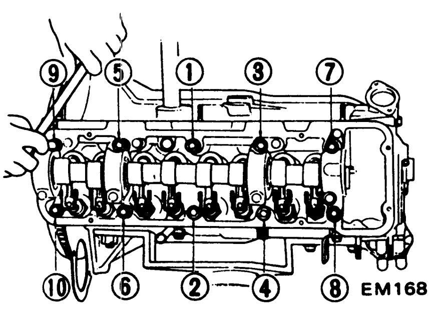


Fig. ET-4 Tightening sequence

CHECKING ENGINE OIL

1. 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.

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

Engine oil capacity
(including oil filter)
Maximum (H level)
4.8 liters
(5⅛ U.S. qt., 4¼ Imp. qt.)
Minimum (L level)
3.8 liters
(4 U.S. qt., 3⅜ Imp. qt.)

REPLACING OIL FILTER

The oil filter is a cartridge type and can be removed using Oil Filter Wrench ST19320000.

1. Check for oil leaks past gasketed flange. If leakage is found, retighten just enough to stop leakage. If retightening is no longer effective, replace filter as an assembly.
2. When installing oil filter, tighten by hand.

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

CHANGING ENGINE COOLANT (L.L.C.)

Nissan long life coolant

L.L.C. is an ethylene glycol base procuct 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.

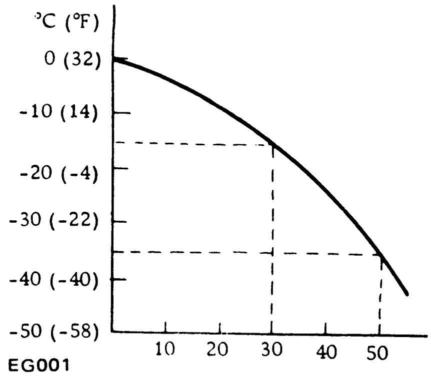


Fig. ET-5 Protection concentration

Percent concentration	Boiling point		Freeze protection
	Sea level	0.9 kg/cm² (13 psi) 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)

CHECKING COOLING SYSTEM HOSES AND CONNECTIONS

Check hoses and fittings for loose connections or deterioration. Retighten or replace if necessary.

Inspection of radiator cap

Apply reference pressure [0.9 kg/cm² (13 psi)] to radiator cap by means of a cap tester to see if it is satisfactory. Replace cap assembly if necessary.

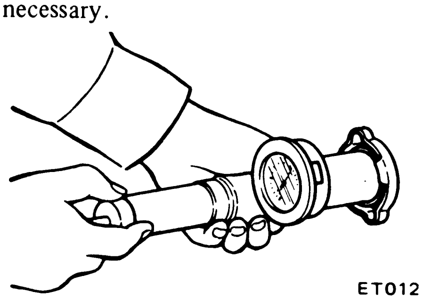


Fig. ET-6 Testing radiator cap

Cooling system pressure test

With radiator cap removed, apply reference pressure [1.6 kg/cm² (23 psi)] to the cooling system by means of a tester to detecte any leakage.

Water capacity

Liters (U.S. qt., Imp. qt.)	710	620
Without heater	6.4 (6¾, 5⅝)	5.4 (5¾, 4¾)
With heater	6.9 (7¼, 6⅛)	6.0 (6⅜, ¼)

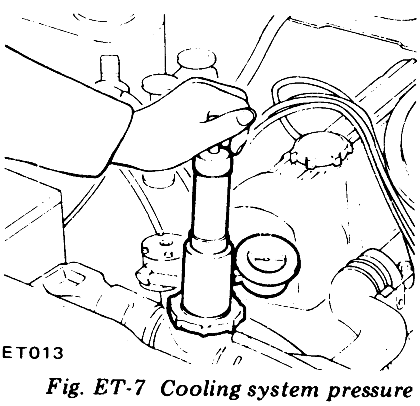


Fig. ET-7 Cooling system pressure test

CHECKING VACUUM FITTINGS, HOSES AND CONNECTIONS

Check fittings and hoses for loose connections or any other faulty fittings and hoses for loose connections. Retighten as necessary; replace any faulty parts.

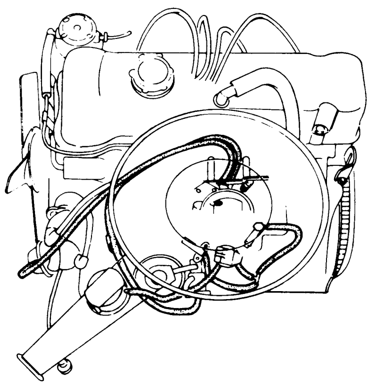


Fig. ET-8 Connecting hoses of vacuum passage

CHECKING ENGINE 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. Different 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 condition may usually be accompanied by excessive fuel consumption.

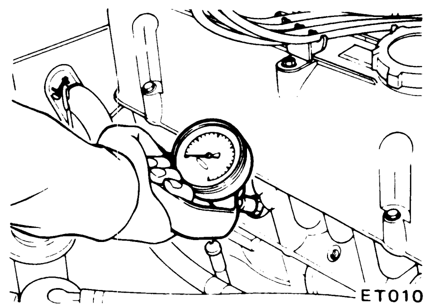


Fig. ET-9 Testing compression pressure

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.

1. If adding oil helps the compression pressure, the chances are that rings are faulty.
2. If pressure stays low, the likelihood is that valve is sticking or seating improperly.
3. 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 chambers can result from leakage.

Compression pressure	kg/cm^2 (psi)/at rpm
Standard	12.0 (171)/350
Minimum	9.0 (128)/350

IGNITION AND FUEL SYSTEM

CONTENTS

CHECKING BATTERY

Check electrolyte level in each battery cell.

1. Unscrew each filler cap and inspect fluid level. If the fluid is low, add distilled water to bring the level up approximately 10 to 20 mm (0.39 to 0.79 in) above the plates. Do not overfill.
2. Measure the specific gravity of battery electrolyte.

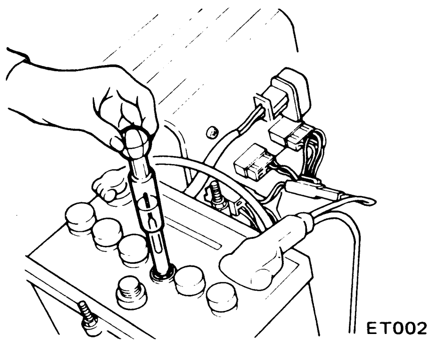


Fig. ET-10 Checking specific gravity of battery electrolyte

	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

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 petrolatum (vaseline) to protect them from corrosion.

CHECKING AND ADJUSTING IGNITION TIMING

Adjusting ignition timing

1. Check spark plugs and distributor breaker points for condition.
2. Thoroughly wipe off dirt and dust from timing mark on crank pulley and timing indicator on and front cover.
3. Warm up engine sufficiently.
4. Install a timing light on No. 1 cylinder spark plug wire, and install a tachometer.
5. Set idling speed to approximately 750 rpm.
6. Check ignition timing if it is 12° B.T.D.C. (Before Top of Dead Center) by the use of timing light.

If necessary, adjust it as follows;

1. Loosen set screw to such an extent that distributor can be moved by hand.
2. Adjust ignition timing to 12° B.T.D.C.
3. Lock distributor set screw, and make sure that timing is correct.

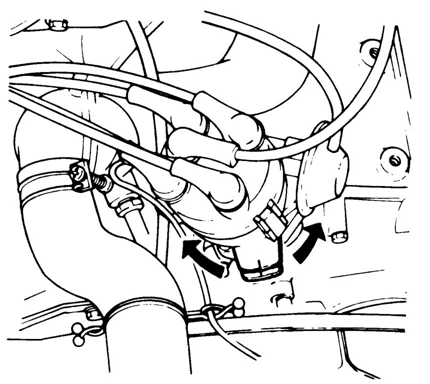


Fig. ET-11 Adjusting ignition timing

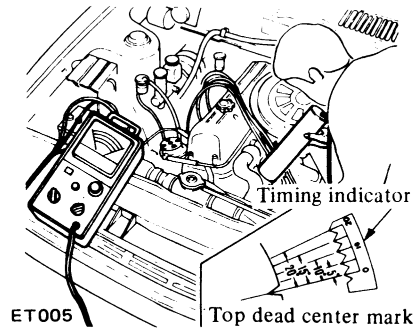


Fig. ET-12 Checking ignition timing

Ignition timing:
- Manual transmission
  - 12°/800 rpm
- Automatic transmission
  - 12°/650 rpm (in "D" range)

CHECKING OR REPLACING DISTRIBUTOR BREAKER 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 excessibly.

Point gap
- 0.45 to 0.55 mm
- (0.0177 to 0.0217 in)

Dwell angle
- 49 to 55 degrees

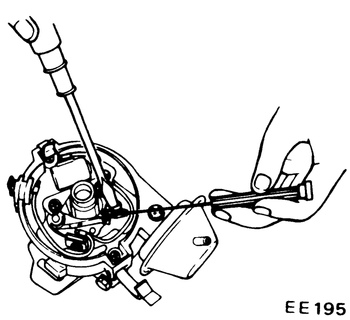
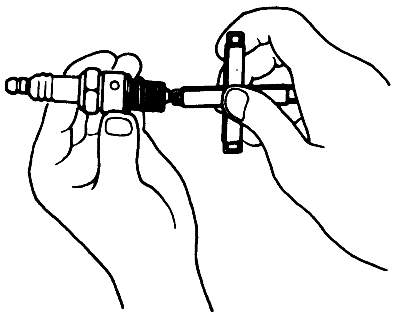


Fig. ET-13 Checking distributor point gap

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 0.7 to 0.8 mm (0.028 to 0.031 in) using the proper adjusting tool. Tighten plugs to 1.5 to 2.0 kg-m (11 to 14 ft-lb) torque.



EE080

Fig. ET-14 Checking spark plug point gap

CHECKING DISTRIBUTOR, IGNITION WIRING AND IGNITION COIL

Distributor

Check the centrifugal mechanical parts for loose connection, sticking of spring, or excessive or local wear.

If found to be in good condition, then check advance characteristics using a distributor tester. For test procedure and reference data, refer to item Distributor in Section EE.

If vacuum advance unit fails to operate properly, check the following items and correct as necessary:

1. Check vacuum inlet for signs of leakage at connection. If necessary, retighten or replace with a new one.
2. Check vacuum diaphragm for air leak.

If leak is found, replace diaphragm with a new one.

3. Inspect breaker plate for smooth operation.

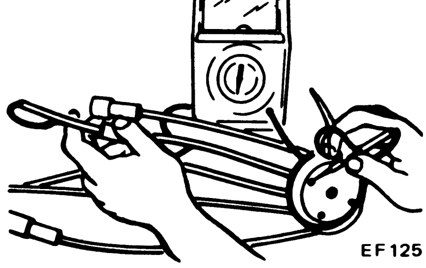
If plate does not move smoothly, this could be due to sticky steel balls or pivot. Apply grease to steel balls or, if necessary, replace breaker plate as an assembly. Refer to section EE-28. Distributor as to vacuum advance charactristics.

Ignition wiring

Use an ohmmeter to check resistance of secondary cables. Disconnect cables from spark plugs and install the proper adaptor between cable and spark plug. Remove distributor cap from distributor with secondary cables attached. Do not remove cables from cap.

Check resistance of one cable at a time.

Connect ohmmeter between spark plug adaptor and corresponding electrode inside cap. If resistance is more than 30,000 ohms remove cable from cap and check cable resistance only. If resistance is still more than 30,000 ohms, replace cable assembly.



EF125

Fig. ET-15 Checking high tension cable

Ignition coil

Check ignition coil for appearance, oil leak or sparking performance. Refer to Section EE for Ignition Coil.

CHECKING DISTRIBUTOR, ROTOR AND CONDENSOR

Note: This operation is to be performed while checking distributor points. Inspect distributor cap for cracks and flash over.

External surfaces of all parts of secondary system must be cleaned to reduce possibility of voltage loss. All wires should be removed from distributor cap and coil so that terminals can be inspected and cleaned. Burned or corroded terminals indicate that wires are not fully seated, which causes arcing between end of wire and terminal. When replacing wires in terminal, be sure they are fully seated before pushing rubber nipple down over tower. Check distributor rotor for damage, and distributor cap for cracks.

Condenser

1. Clean outlet of condenser lead wire, and check for loose set screw. Retighten if necessary.
2. 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.

Condenser capacity
0.20 to 0.24 μF
(Micro Farad)
Condenser insulation resistance
5MΩ (Mega ohms)

ADJUSTING ARBURETOR IDLE-RPM AND MIXTURE RATIO

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.

1. Warm up engine sufficiently.
2. Continue engine operation for one minute at idling speed.
3. Adjust throttle adjusting screw so that engine speed is 800 rpm (in "N" range for automatic transmission).
4. Check ignition timing, if necessary adjust it to the specifications.

Manual transmission
12°/800 rpm
Automatic transmission
12°/650 rpm (in "D" range)

5. Adjust idle adjusting screw so that "CO" percentage is 1.5%.
6. Repeat the procedures as de-ibed in items 3 and 5 above so that "CO" percentage is 1.5% at 800 rpm.

Cautions:

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.**

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

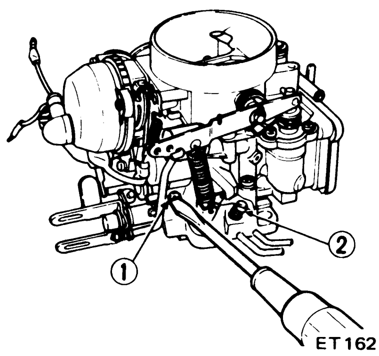
And then check the specifications with the lever in "D" position. Insure that "CO" percent and idle speed are as follows.

Idling rpm	650 rpm
"CO" percentage	1.5%

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 adjusting 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.**



1 Throttle adjusting screw
2 Idle adjusting screw

Fig. ET-16 Throttle and idle adjusting screws

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.

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

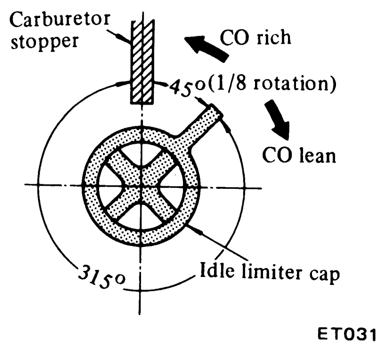


Fig. ET-17 Setting idle limiter cap

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.

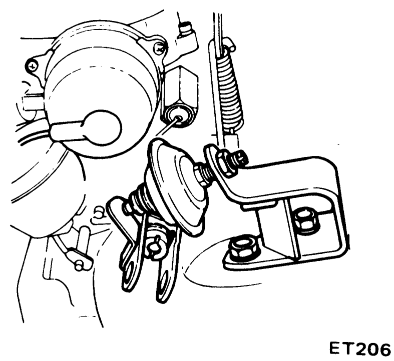


Fig. ET-18 Dash pot adjustment

Installed on engine

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

2. Turn throttle valve by hand, and read engine speed when dash pot just touches the stopper lever.
3. Adjust the position of dash pot by turning nut until engine speed is in the range of 1,600 to 1,800 rpm.
4. Then fasten loosened lock nut.
5. Make sure that the engine speed is smoothly reduced from 2,000 to 1,000 rpm in about three seconds.

CHECKING CARBURETOR RETURN SPRING

Check throttle return spring for cracks, squareness or deformation, if necessary, replace with a new one.

CHECKING CHOKE MECHANISM (Choke plate and linkage)

1. Check choke valve and mechanism for free operation, and clean or replace if necessary. A binding can result from petroleum gum formation on choke shaft or from damage.
2. Check bimetal cover setting. Index mark on bimetal cover is usually set at center of scale.

Note: When some-what over-choked, turn bi-metal cover clockwise slightly.

3. Every day, before starting engine, depress the accelerator pedal to see if choke valve is closed automatically.

If it fails to be closed, the chances are that link movement is unsmooth, or that bimetal is out of order. Refer to Carburetor in Section EF (Page EF-7).

CHECKING ANTI-DIESELING SOLENOID

If engine will crank but will not start, check the operation of anti-dieseling solenoid. Check to see if the solenoid issues click sounds with the ignition key turning on. Disconnect and connect the solenoid wiring repeatedly. If the click sound can not be heard and the harness is in good condition, replace the solenoid with a new one.

If engine will not stop when ignition switch is turned off, this indicates a striking (closed) solenoid valve, shutting off supply of fuel to engine. If harness is in good condition, replace solenoid as a unit.

To replace, proceed as follows:

Removal and installation of anti-dieseling solenoid

Removal

The anti-dieseling solenoid valve can be easily removed by a conventional wrench.

Installation

(1) 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.

Then, torque screws to 180 to 350 kg-cm (156 to 304 in-lb).

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

(2) 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.

REPLACING FUEL FILTER

Check for a contaminated element, and water deposit.

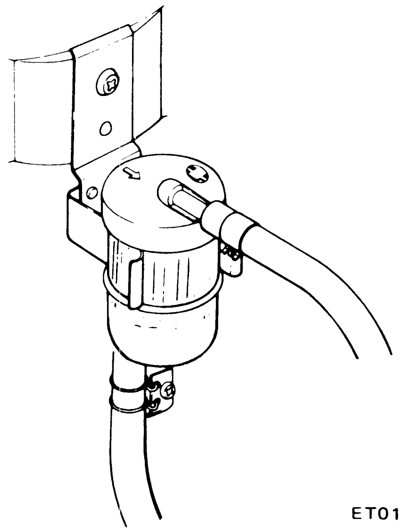


Fig. ET-19 Fuel strainer

All engines use a replaceable cartridge type fuel strainer as an assembly.

CHECKING FUEL LINES (Hoses, pipings, connections, etc.)

Check fuel lines for loose connections, cracks and deterioration. Retighten loose connections and replace any damaged or deformed parts.

ADJUSTMENT OF OPERATING PRESSURE OF B.C.D.D. (BOOST CONTROLLED DECELERATION DEVICE)

CONTENTS

Principally, it is unnecessary to adjust the B.C.D.D., however if there is any requirement the adjustment procedure is as follows.

Prepare the following tools:

1. A tachometer to measure the engine speed while idling, and a screw-driver.
2. A vacuum gauge and connecting pipe.

Notes:

a. A quick-response type boost gauge such as Bourdon's tube type is recommended; mercury-type manometer should not be used.

b. Special tools are not required.

WARMING-UP OPERATION

Warm up engine until it is heated to operating temperature.

CONNECTING VACUUM GAUGE

Connect rubber hose between vacuum gauge and intake manifold as shown:

Disconnect solenoid valve and let racing solenoid valve free.

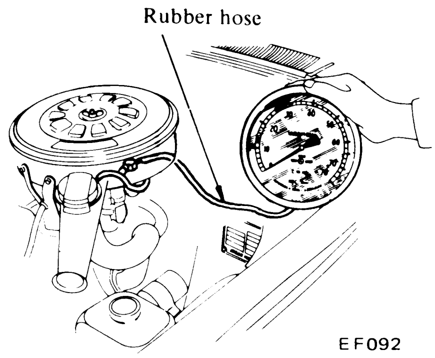


Fig. ET-20 Connecting vacuum gauge

ADJUSTMENT OF IDLING

Adjust the engine at normal idling setting

	Engine idling (rpm)	Idling timing (degree)	CO (%)
Manual trans-mission car	800	12° B.T.D.C.	1.5
Automatic transmission car	650	12° B.T.D.C.	1.5

RACING

Place shift lever in neutral for manual transmission, or "N" or "P" for automatic transmission. Raise engine speed up to 3,000 to 3,500 rpm under no-load, and close throttle valve by releasing it from hand.

Examine engine rpm whether it falls to idling.

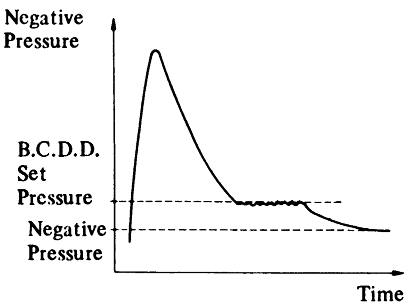
B.C.D.D. SET PRESSURE AND VACUUM PRESSURE

Before checking the B.C.D.D. operating pressure, keep in mind the relationship between the B.C.D.D. set pressure and the idling vacuum pressure.

When the operating pressure equals the set pressure

As shown in Figure ET-21, the B.C.D.D. set pressure is preset at a level somewhat higher than the vacuum pressure at idling. However, the actual B.C.D.D. operating pressure should be set at the set pressure.

B.C.D.D. set pressure:
 −500 mmHg (−19.69 inHg)
 Manual transmission model
 −480 mmHg (−18.90 inHg)
 Automatic transmission model



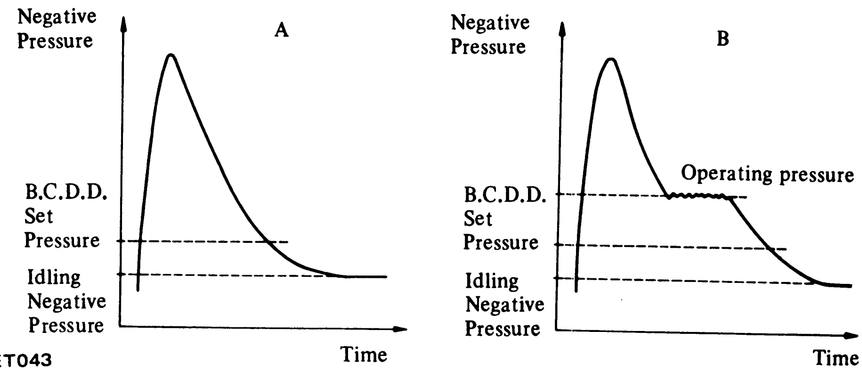
ET045

Fig. ET-21 Characteristic curve — proper negative pressure —

When the operating pressure is too high

When the operating pressure is not properly set to the set pressure, the following conditions will be encountered.

1. If the operating pressure is set at a level higher than the maximum vacuum pressure (Fig. ET-22 A) during periods of deceleration, the B.C.D.D. will not be activated at all. This results in an unsatisfactory emission of exhaust gases.
2. If the operating pressure is lower than the maximum vacuum pressure, or higher than the set pressure (Fig. ET-22 B) during periods of deceleration, the B.C.D.D. will not be properly activated. This results in an unsatisfactory emission of exhaust gases.

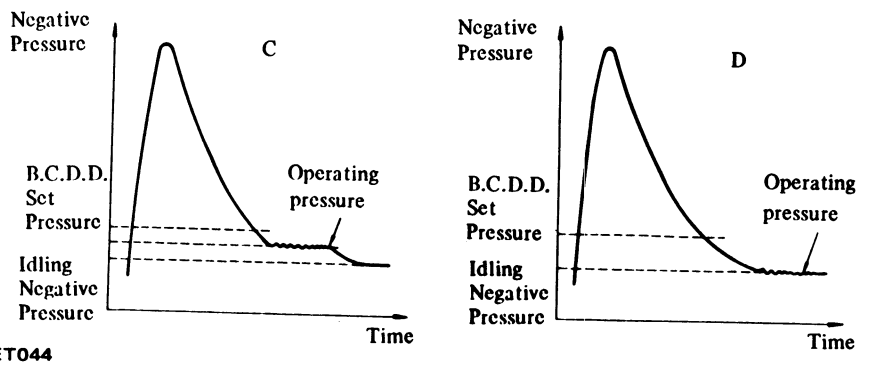


ET043

Fig. ET-22 Characteristic curve — high negative pressure —

When the operating pressure is too low

1. If the B.C.D.D. operating pressure is lower than the set pressure, or higher than the idling vacuum pressure (Fig. ET-23 C), the B.C.D.D. will not activated properly. This results in an unsatisfactory emission of exhaust gases.
2. When the operating pressure equals the idling vacuum pressure (Fig. ET-23 D), the idle rpm will be unusually increased or instable engine operation will be encountered.

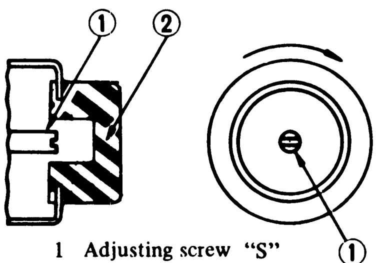


ET044

Fig. ET-23 Characteristic curve — low negative pressure —

ADJUSTMENT OF B.C.D.D. OPERATING PRESSURE

To properly set the B.C.D.D. operating pressure, proceed as follows:
1. Run the engine under no load. Increase engine rpm to 3,000 to 3,500 rpm, then quickly close throttle valve. At this time, the manifold vacuum pressure increases abruptly to −600 mmHg (−23.62 inHg) or above and then gradually decreases to the level set at idling.
2. Check that the B.C.D.D. operating pressure is within the specified range.



1 Adjusting screw "S"
2 Cover "C"

ET037

Fig. ET-24 Adjusting operation pressure

3. If it is higher than the set level, turn the adjusting screw counterclockwise until correct adjustment is made.
4. Race the engine and check for adjustment.
5. If it is lower than the set level,

turn the adjusting screw clockwise until correct adjustment is made.

6. Race the engine and check for adjustment.

B.C.D.D. set pressure:
–500 mmHg (–19.69 inHg)
Automatic transmission model
–480 mmHg (–18.90 inHg)
Manual transmission model

WHEN THE ENGINE REVOLUTION DOES NOT FALL TO THE IDLING SPEED

(See Figure ET-25.)

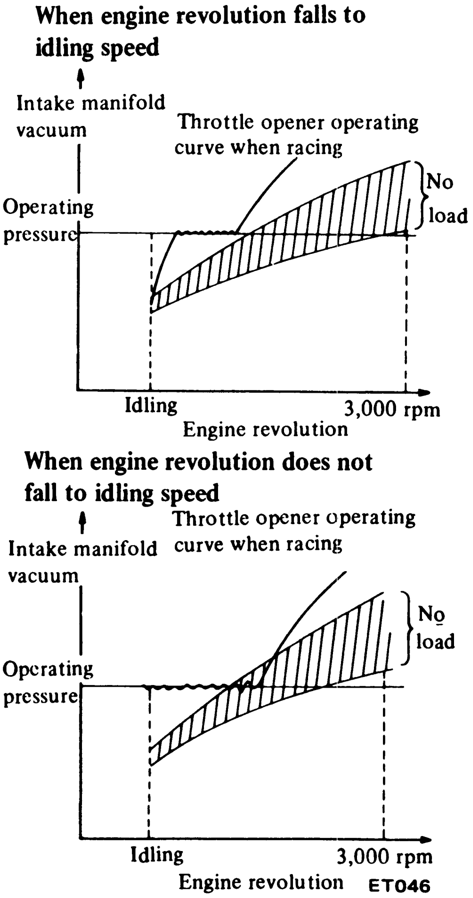


Fig. ET-25 Characteristic curve of B.C.D.D.

When the engine rpm does not fall to idling, it is necessary to reduce the idling negative pressure of manifold to lower than the set pressure of B.C.D.D. (The engine revolution does not fall to the idling speed when the idling negative pressure is higher than the set pressure of B.C.D.D.).

In this case, it is necessary to labour the engine by (1) road test or (2) chassis dynamometer or (3) raise up rear suspension member by stand. And accelerate the car 40 to 50 mph with top gear for manual transmission, then release the accelerator pedal and let the car deceleration.

Then check the B.C.D.D. set pressure whether it is in the predetermined valve or not.

The process of this pressure fall takes one of the three forms as illustrated in Figures ET-21, 22 and 23 according to the difference of the operating pressure of B.C.D.D.

When the operating pressure is too high

When the operating pressure is higher than the set pressure. The negative pressure which has once risen is kept constant at a certain value (operating pressure) for about one second, and then gradually falls to the idling negative pressure. See diagram (B).

Adjustment of this condition is exactly same as that of when the engine revolution falls to the idling speed. (Mentioned above.)

When the operating pressure is too low

1. When the operating pressure is somewhat low, the negative pressure becomes constant for some while at a value below set pressure, and then falls to idling negative pressure. See diagram (C).
2. When the operating pressure is exceedingly low, the negative pressure will not fall to idling pressure and the speed of engine is not restored to the idling speed.

In extreme case, the engine speed fails to attain idling speed although to that of idling. See diagram (D).

Turn adjusting screw "S" until correct pressure is obtained. Slightly turn this adjusting screw counterclockwise and then race the engine. Do not fit tip of screwdriver tightly in screw slot.

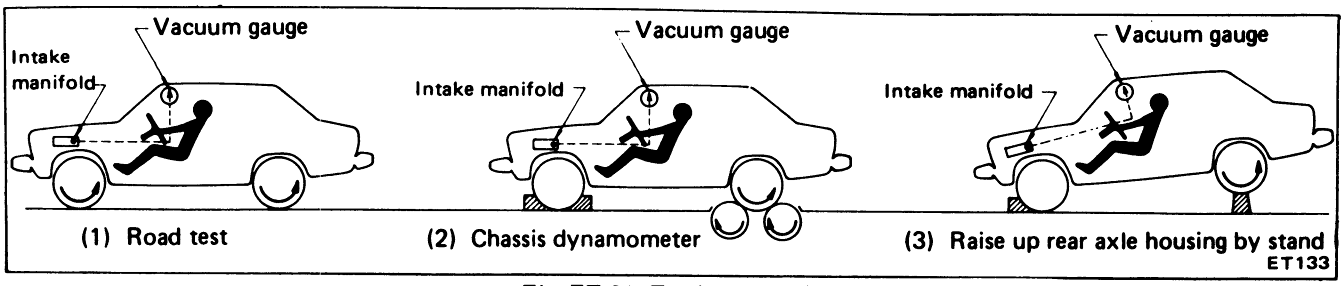
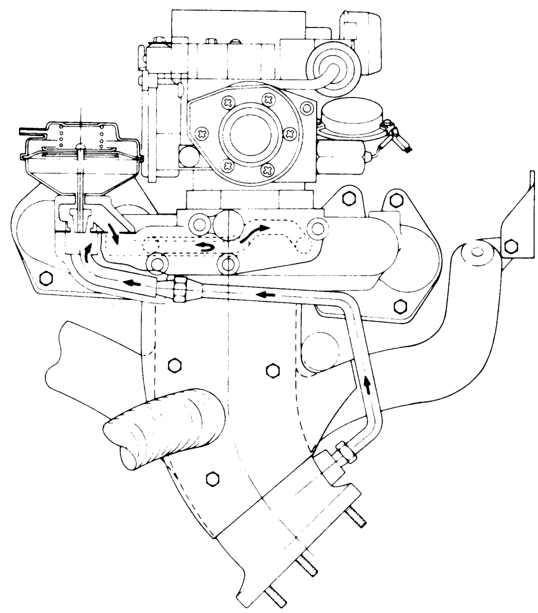


Fig. ET-26 Testing operating pressure of the B.C.D.D. [when the engine revolution does not fall to the idling speed (II)]

EXHAUST GAS RECIRCULATION CONTROL SYSTEM (E.G.R.)

CONTENTS



ET202

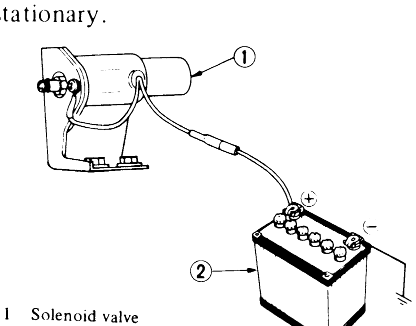
Fig. ET-27 Exhaust gas recirculation control system (E.G.R.)

CHECKING E.G.R. CONTROL SYSTEM

WITH E.G.R. CONTROL SYSTEM EQUIPPED ON ENGINE

1. Visually inspect entire E.G.R. control system. Clean it for ease of inspection if it is contaminated with oil. Replace rubber hoses if found cracked or broken.
2. When it becomes necessary to inspect E.G.R. control valve, check to be sure that E.G.R. solenoid valve is properly wired.
3. Increase engine speed from idling to 3,000 to 3,500 rpm, noting if plate of E.G.R. control valve diaphragm and valve shaft move upwards as speed is increased.
4. Disconnect E.G.R. solenoid valve harness, and connect it directly to battery to apply battery voltage (12V) to E.G.R. solenoid valve. Race engine again without disturbing above setup.

E.G.R. control valve should be kept stationary.



1 Solenoid valve
2 Battery

EC213

Fig. ET-28 Inspecting E.G.R. solenoid valve

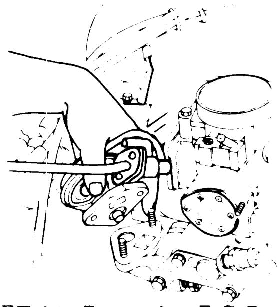
5. With engine running at idling speed, push up E.G.R. control valve diaphragm by manually pressing bottom dish.

It is normal if engine loses stability.

CHECKING E.G.R. CONTROL VALVE

To inspect parts, it is necessary first to remove E.G.R. control valve from engine.

1. Remove E.G.R. vacuum hose and check to be certain that vacuum hose is not deformed excessively. If it is, the probability is that E.G.R. control valve is not operating properly due to leakage of vacuum signals. To remedy this condition, replace vacuum hose.
2. Remove E.G.R. control valve from intake manifold.



EM519

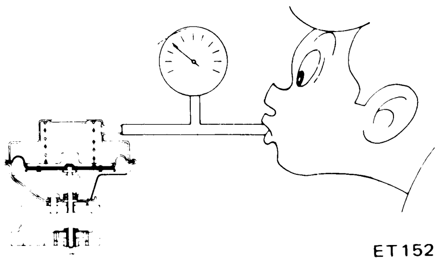
Fig. ET-29 Removing E.G.R. control valve

3. Apply a vacuum of −120 to −130 mm Hg (−4.72 to −5.12 in Hg)

to E.G.R. control valve. Vacuum application can easily be made by the method illustrated in Figure EC-30.

It is correct if valve moves into full-up position.

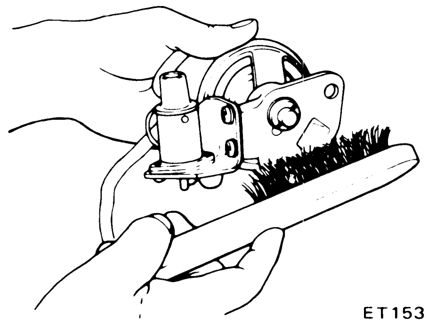
E.G.R. control valve should stay uplifted for more than 30 seconds after vacuum is stopped.



ET152

Fig. ET-30 Checking E.G.R. control valve

4. Visually inspect E.G.R. control valve for sign of damage, wrinkle or otherwise deformation.
5. Clean the E.G.R. control valve seat with brush and compressed air as shown in Figure EC-31 to eliminate clogging of E.G.R. control valve.



ET153

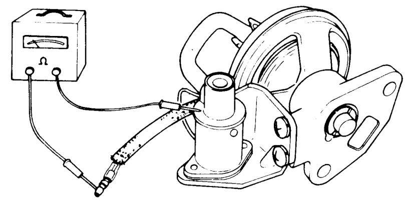
Fig. ET-31 Cleaning E.G.R. control valve seat

CHECKING E.G.R. SOLENOID VALVE

Check E.G.R. solenoid valve as instructed below. An ohmmeter and battery are required in this checking.

1. Check E.G.R. solenoid valve for proper conduction as shown in Figure EC-32.

If ohmmeter pointer does not deflect, it is considered as broken and needs to be replaced.

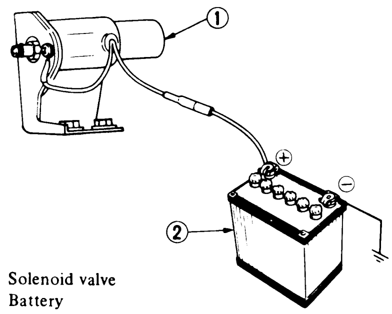


ET154

Fig. ET-32 Checking E.G.R. solenoid valve

2. If ohmmeter pointer deflects in step (1) above. Check E.G.R. solenoid valve to ensure that it clicks when intermittently electrified as shown in Figure EC-33.

If a click is heard, E.G.R. solenoid valve is normal.



1 Solenoid valve
2 Battery

EC213

Fig. ET-33 Inspecting E.G.R. solenoid valve

3. E.G.R. solenoid valve is considered as sticking and must be replaced when it does not click in item 2 above.

Checking water temperature switch

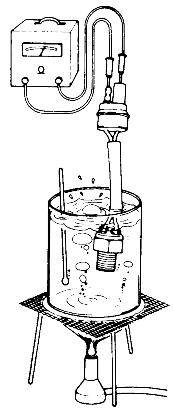
1. A thermometer and ohmmeter are needed for checking water temperature switch.
2. Checking "OFF" of water temperature switch

Starting from water temperature at 25°C (77°F) and below, check continuity of water temperature switch and ensure that a reading is infinite, that is, switch is open.

3. Checking "ON" of water temperature switch

Increasing water temperature from about 25°C (77°F), make continuity check of water temperature switch. Operation is normal if an ohmmeter reading drops to zero, at water temperature somewhere between 31 to 41°C (88 to 106°F) and remains zero at above 41°C (106°F).

4. If it is satisfied both in steps (2) and (3) above, switch is good.



ET155

Fig. ET-34 Checking water temperature operation switch

AUTOMATIC TEMPERATURE CONTROL AIR CLEANER (A.T.C. AIR CLEANER)

CONTENTS

REPLACING CARBURETOR AIR CLEANER FILTER

The paper element (viscous type) has been specially treated, and therefore, there is no need to clean it. But it should be replaced with a new one periodically.

CHECKING HOT AIR CONTROL VALVE

Inspection

Among the possible faults of this device, the most liable is the permanent opening of valve.

This condition is not noticeable in warm weather, but in cold weather appears as poor performance of engine, such as tardy acceleration, hesitation or engine stall. When such a claim has been raised by the user, first inspect this device before checking the carburetor.

Another sympton which might be expected is that the underhood-air is kept closed by the valve regardless of the temperature of suction air around the sensor while the engine is running. This condition appears in the form of extremely excessive fuel consumption or decrease in power.

The inspection of the device should be proceeded as follows:

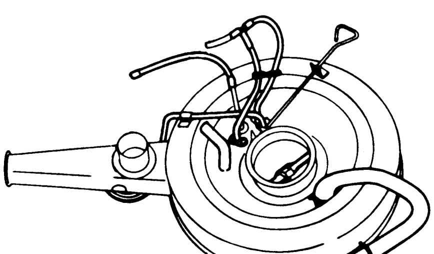


Fig. ET-35 Correct position of hoses

Appearance

1. First inspect whether the vacuum hoses are connected to the correct positions.
2. Inspect the hoses for cracks, distortion, plugging.

Checking vacuum motor

1. With the engine shut down, inspect the position of valve (placing a mirror at the end of inlet pipe for inspection. The correct condition of valve is that it keeps the inlet of underhood-air open and that of hot air closed. Otherwise, inspect the linkage of valve.

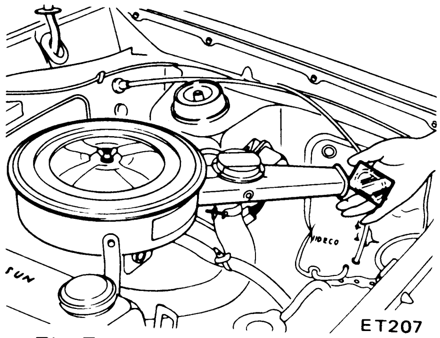


Fig. ET-36 Inspecting valve position

2. Disconnect the hose at the vacuum motor inlet, and directly apply vacuum of manifold to vacuum motor by connecting another hose; sucking by the mouth may be substituted for this process. If underhood-air inlet is closed by the valve, valve is in good condition. Inspect linkage if found otherwise. And then no problem is found even in the linkage, it signifies the malfunction of the vacuum motor.

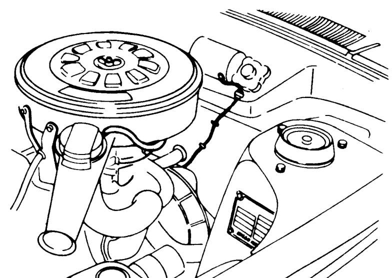


Fig. ET-37 Checking vacuum motor

3. The valve shows correct condition if it keeps underhood-air inlet closed when the passage in the hose is stopped by twisting or clamping it while applying vacuum. If otherwise, it is an indication of leakage taking place in the vacuum motor.
4. When malfunction is found through this check, replace the air cleaner assembly.

Checking sensor

1. Perform the engine test b keeping the temperature around the sensor below 30°C (86°F). Make sure that the engine is cooled down before the test is conducted.
2. Before running the engine, make certain that the valve on underhood-air side fully open.
3. Start the engine and operate it at an idling speed. The valve is in good condition if underhood-air side fully closes immediately after starting.
4. Carefully watch the valve to ascertain that it gradually begins open as the engine warms up. But, when the ambient temperature is low, it takes considerable length of time for the valve to begin to open, or in some case it hardly opens. This should not, however, be regarded as malfunction.

If the valve does not operate satisfactorily or if the condition of the valve is questionable, further conduct the following test:

5. Remove the air cleaner cover, and put a thermister or a small thermom eter as close to the sensor as possible with adhesive tape. Install the air cleaner cover again.

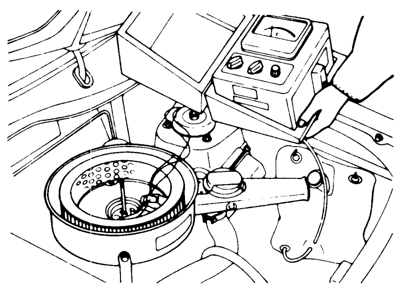


Fig. ET-38 Checking sensor

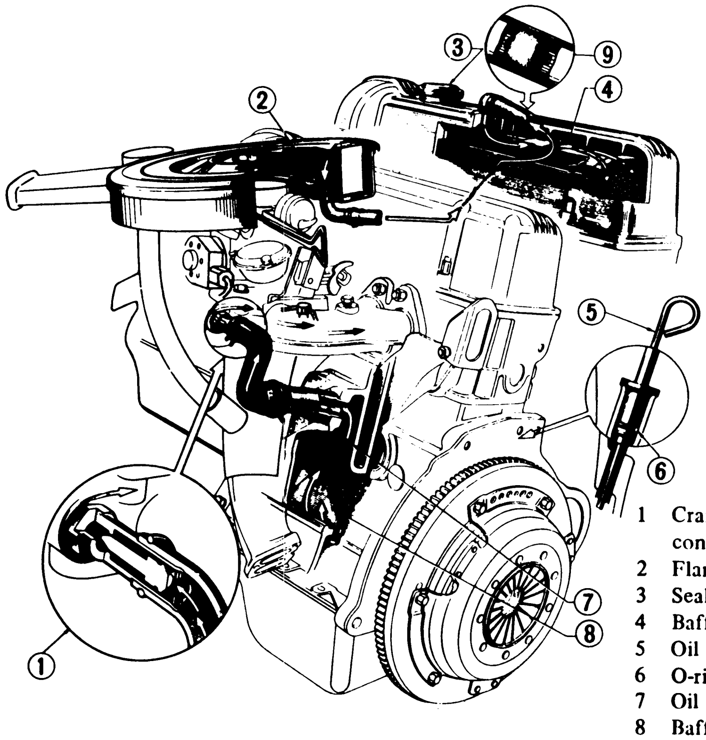
6. Start the engine and continue idling as described under paragraphs (1), (2), and (3) above. When several minutes have passed and valve is partially opened, read the thermister indication. It is correct if the reading falls between 38°C (68°F) and 55°C (130°F). If the reading is abnormal, replace sensor.
7. On the engine equipped with an idle compensator as service option, do as follows before replacing sensor:

CRANKCASE EMISSION CONTROL SYSTEM

This system returns blow-by gas to both the intake manifold and carburetor air cleaner.

The positive crankcase ventilation (P.C.V.) valve is provided to conduct crankcase blow-by gas to the intake manifold. During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the valve. Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air. The ventilating air is then drawn from the clean side of the carburetor air cleaner, through the tube connecting carburetor air cleaner to rocker cover into the crankcase.

Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve, and its flow goes through the tube connection in the reverse direction. In cars with an excessively high blow-by some of the flow will go through the tube connection to the carburetor air cleaner under all conditions.



1 Crank case ventilation control valve
2 Flame arrester
3 Sealed filler cap
4 Baffle plate
5 Oil level gauge
6 O-ring
7 Oil separator
8 Baffle plate
9 Flame arrester

ET203

Fig. ET-39 Crankcase emission control system (closed type)

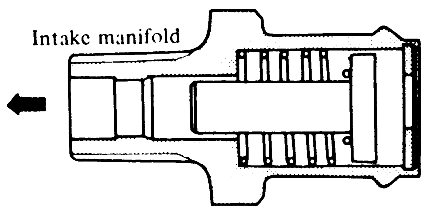
CHECKING AND REPLACING P.C.V. VALVE

Test P.C.V. valve in accordance with the following method.

With engine running at idle, remove the ventilator hose from P.C.V. valve, if the valve is working, a hissing noise will be heard as air passes through the valve and a strong vacuum should be felt immediately when a finger is placed over valve inlet. If the valve is plugged, replace with a new valve.

Check for deposit plugging in the hose.

Clean if necessary.



EC014

Fig. ET-40 Cross-sectional view of P.C.V. valve

CHECKING VENTILATION HOSES

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and blow them out with compressed air.

If any hose can not be free of obstructions, replace with a new one.

Insure that the flame arrester is surely inserted in the hose, between air cleaner and locker cover.

EVAPORATIVE EMISSION CONTROL SYSTEM

CHECKING ENGINE COMPARTMENT HOSE CONNECTIONS AND FUEL VAPOR CONTROL VALVES

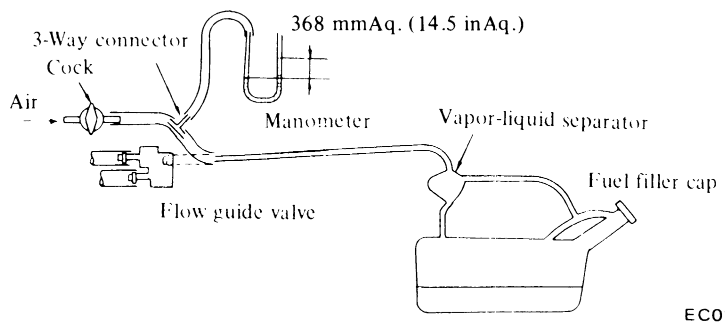


Fig. ET-41 Checking evaporative emission control system

Checking fuel tank, vapor-liquid separator and vapor vent line

1. Check all hoses and fuel tank filler cap.
2. Disconnect the vapor vent line connecting flow guide valve to vapor-liquid separator.
3. Connect a 3-way connector, a manometer and a cock (or an equivalent 3-way change cock) to the end of the vent line.
4. Supply fresh air into the vapor vent line through the cock little by little until the pressure becomes 368 mmAq. (14.5 inAq.).
5. Shut the cock completely and leave it that way.
6. After 2.5 minutes, measure the height of the liquid in the manometer.
7. Variation of height should remain within 25 mmAq. (1.0 inAq.).
8. When the filler cap does not close completely the height should drop to zero in a short time.
9. If the height does not drop to zero in a short time when the filler cap is removed, it is the cause of the stuffy hose.

Note: In case the vent line is stuffy, the breathing in fuel tank si not thoroughly made, thus causing in sufficient delivery of fuel to engine or vapor lock. It must therefore be repaired or replaced.

Checking flow guide valve

1. Disconnect all hoses connected to the flow guide valve.
2. While lower pressure air is pressed into the flow guide valve from the ends of vent line of fuel tank side, the air should go through the valve and flow to crankcase side. If the air does not flow the valve should be replaced. But when the air is blown from crankcase side, it should never flow to the other two vent lines.
3. While the air is pressed into the flow guide valve from the carburetor air cleaner side, it flows to the fuel tank side and/or crankcase side.
4. This valve opens when the inner pressure 10 mm Hg (0.4 in Hg). In case of improper operations or breakage, replace it.

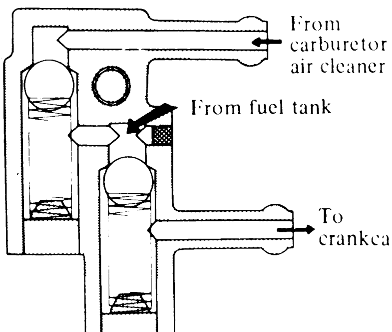


Fig. ET-42 Flow guide valve

CHECKING FUEL TANK VACUUM RELIEF VALVE OPERATION

Remove fuel filler cap and see i' functions properly as follows;

1. Wipe clean valve housing and have it in your mouth.
2. Inhale air. A slight resistance accompanied by valve indicates that valve is in good mechanical condition. Note also that, by furhter inhaling air the resistance should be disappeared with valve clicks.
3. If valve seems to be clogged, or if no resistance is felt, replace cap as an assembled unit.

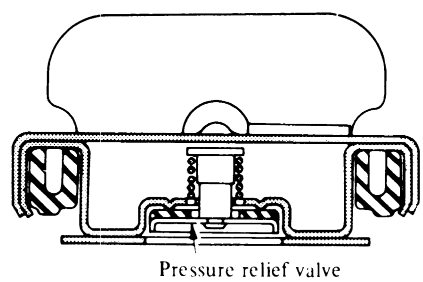


Fig. ET-43 Fuel filler cap

SERVICE DATA AND SPECIFICATIONS

Valve clearance			
Hot	Intake	mm (in)	0.20 (0.0079)
	Exhaust	mm (in)	0.25 (0.0098)
Cold	Intake	mm (in)	0.25 (0.0098)
	Exhaust	mm (in)	0.30 (0.0118)
Drive belt tension			
Fan belt		mm (in)	8 to 12 (0.315 to 0.472)
When thumb pressure		kg (lb)	10 (22) is applied
Tightening torque			
Cylinder head bolts			
	1st turn	kg-m (ft-lb)	4.0 (29)
	2nd turn	kg-m (ft-lb)	6.0 (43)
	3rd turn	kg-m (ft-lb)	6.5 to 8.5 (47 to 61)
Manifold nuts		kg-m (ft-lb)	1.2 to 1.6 (8.7 to 11.6)
Carburetor nuts		kg-m (ft-lb)	0.5 to 1.0 (3.6 to 7.2)
Spark plugs		kg-m (ft-lb)	1.5 to 2.0 (11 to 14)
Engine oil capacity (including oil filter)			
Maximum		liters (US qt, Imp qt)	4.8 (5⅛, 4¼)
Minimum		liters (US qt, Imp qt)	3.8 (4, 3⅜)
Cooling water capacity (with heater)		liters (US qt, Imp qt)	710..... 6.9 (7¼, 6⅛), 620..... 6.0 (6⅜, 5¼)
Radiator cap pressure test		kg/cm^2 (psi)	0.9 (13)
Cooling system pressure test		kg/cm^2 (psi)	1.6 (23)
Compression pressure at rpm		kg/cm^2 (psi)	12.0 (171)/350
Ignition and idling adjustment			
Manual transmission		degree/rpm	12° B.T.D.C./800
Automatic transmission (in "D" range)		degree/rpm	12° B.T.D.C./650
Distributor			
Point gap		mm (in)	0.45 to 0.55 (0.0177 to 0.0217)
Dwell angle		degree	49° to 55°
Condenser capacity		μF	0.20 to 0.24
Condenser insulation resistance		MΩ	5

ENGINE TUNE-UP

Spark plug gap		mm (in)	0.7 to 0.8 (0.028 to 0.031)
Checking "CO" percent at idle speed			
Manual transmission model		%/rpm	1.5/800
Automatic transmission model		%/rpm	1.5/650
Adjustment of operating pressure of B.C.D.D.			
B.C.D.D. set pressure	M/T car	mmHg (in Hg)	–500 ± 20 (–19.69 ± 0.79)
	A/T car	mmHg (inHg)	–480 ± 20 (–18.90 ± 0.79)
A.T.C. air cleaner			
Operating temperature		°C (°F)	38 to 55 (68 to 131)
Flow guide valve			
Operating pressure		mmHg (in Hg)	10 (0.4)

TROUBLE DIAGNOSES AND CORRECTIONS

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

ENGINE WILL CRANK NORMALLY BUT WILL NOT START

In this case, the following trouble causes may exist, but in many cases ignition system or fuel system is in trouble.

Ignition system in trouble
Fuel system in trouble
Valve mechanism does not work properly
Low compression

(Trouble-shooting procedure)
Check spark plug firstly by following procedure.
Disconnect high tension cable from one spark plug and hold it about 10 mm (0.39 in) from the engine metal part and crank the engine.

Good spark occurs.

a. Check spark plug.
b. Check ignition timing.
c. Check fuel system.
d. Check cylinder compression.

No spark occurs.		Check the current flow in primary circuit.
	Very high current.	Inspect primary circuit for short. Check breaker point operation.

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.
	Faulty condenser.	Replace.
	Leak at rotor cap and rotor.	Clean or replace.
	Faulty spark plug.	Clean, adjust plug gap or replace.
	Improper ignition timing.	Adjust.
	Faulty 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.
Low compression	Incorrect spark plug tightening or faulty. 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 damaged valve springs.	Replace valve springs.
	Compression leak at cylinder head gasket.	Replace gasket.
	Sticking or damaged 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.	Malfunctiong 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 filter.	Replace element.
	Damaged manifold gaskets or carburetor insulator.	Replace gasket or insulator.
	Improper float level adjustment.	Adjust.
	Loose air hoses or air-fuel mixture hoses of carburetor.	Check for loose connections.
Low compression		Previously mentioned.
Others	Incorrect valve clearance.	Adjust.
	Extremely low revolution.	Adjust.
	Faulty malfunction of the ignition system (spark plug, high tension cable, breaker point, ignition coil, etc.).	Replace.
	Incorrect basic ignition timing.	Adjust.
	Malfunction of choke valve or linkage.	Adjust.
	Malfunction of vacuum motor, sensor or hoses of air cleaner.	Check for loose hoses. Replace system components if necessary.
	Incorrect idle adjustment.	Adjust idle speed.
	Clogged air cleaner filter.	Replace air cleaner filter.
	Malfunction of idle compensator of air cleaner.	Replace.
	Malfunction of E.G.R. control valve.	Clean or replace.
	Loose manifold and cylinder head bolts.	Retighten bolts.
High engine idle speed.	Dragged accelerator linkage.	Check and correct accelerator linkage.
	Incorrect idle adjustment.	Adjust idle speed.
	Malfunction of B.C.D.D. system.	Check for loose vacuum hose and harness connections. Adjust or replace if necessary.
	Malfunction of speed switch, inhibitor switch, and harness.	Check for loose connections. Repair or replace if necessary.

ENGINE TUNE-UP

Condition	Probable cause	Corrective action
ENGINE POWER NOT UP TO NORMAL		
Low compression		Previously mentioned.
Ignition system in trouble	Incorrect ignition timing.	Adjust.
	Damaged spark plugs.	Clean, adjust or replace plugs.
	Worn 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.
Overheating	Insufficient coolant.	Replenish.
	Loose fan belt.	Adjust fan belt.
	Worn or oiled fan belt.	Replace.
	Inoperative thermostat.	Replace.
	Worn water pump.	Replace.
	Clogged or leaky radiator.	Flush, repair or replace.
	Worn 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.
	Clogged carburetor (lean mixture).	Overhaul carburetor.
Overcooling	Inoperative 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.

Condition	Probable cause	Corrective action
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.
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. **Note: This noise will be heared when clutch is disengaged.**	Disassemble engine and renew main bearing.
	Wear on clutch pilot bushing. **Note: This noise will be heared when clutch is disengaged.**	Renew bush and adjust drive shaft.
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.

Condition	Probable cause	Corrective action
Fuel system in trouble	Damaged carburetor or manifold gasket. (back fire, after fire)	Replace them with new parts.
	Clogged carburetor jet.	Disassemble carburetor and check it.
	Improper function of the float.	Adjust the level, and check needle valve.
	Uneven idling. (Run on)	Adjust.
Cylinder head in trouble, etc.	Improperly adjusted valve clearance.	Adjust.
	Excess carbon in combustion chamber.	Remove head and get rid of carbon.
	Damaged valve spring (backfire, afterfire).	Replace it with a new one.
Others	Malfunction of A.T.C. air cleaner.	Check for loose vacuum hoses. Replace if necessary.
	Faulty carburetor water control valve.	Replace.
	Inoperative E.G.R. control valve.	Replace.
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.
	Worn 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.
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.

Condition	Probable cause	Corrective action
POOR FUEL ECONOMY		
See the explanation of the power decrease		
Others	Exceeding idling revolution.	Adjust it to the designated rpm.
	Inoperative acceleration recovery.	Adjust it.
	Fuel leakage.	Repair or tighten the connection of fuel pipes.
PROBLEM IN OTHER FUNCTIONS		
Decreased oil pressure	Inadequate oil quality.	Use the designated oil.
	Overheat.	Previously mentioned.
	Worn 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.
	Inoperative oil gauge pressure switch.	Replace it with a new one.
Excessive wear on the sliding parts	Oil pressure decreases.	Previously mentioned.
	Faulty quality or contamination of oil.	Exchange the oil with proper one and change element.
	Faulty 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.

SERVICE MANUAL

DATSUN PICK-UP
MODEL 620 SERIES

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION EM

EM

ENGINE MECHANICAL

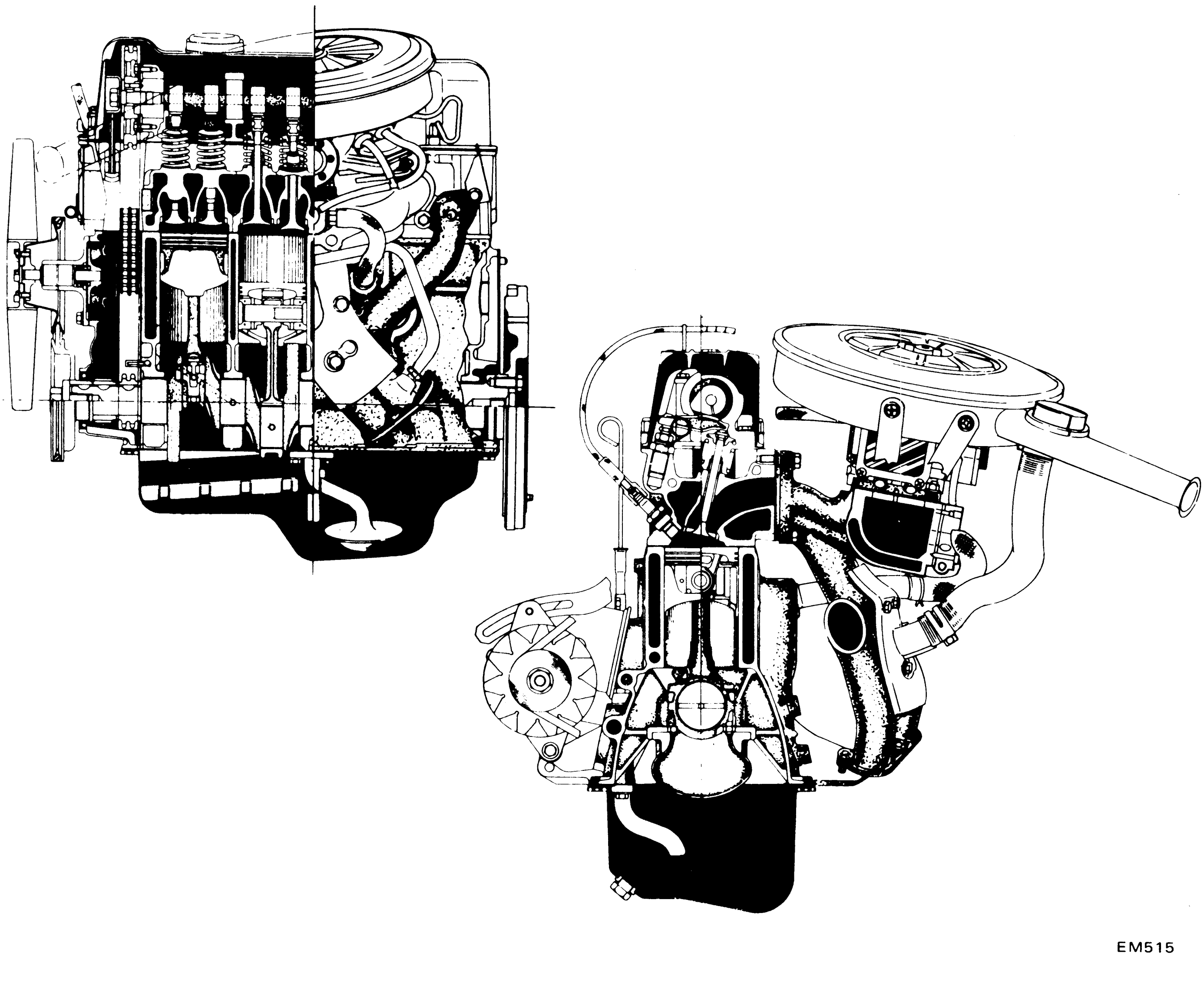
GENERAL DESCRIPTION

CONTENTS

L18 ENGINE

The L18 engine features O.H.C. valves, wedge-shaped combustion chamber, aluminum head and a fully balanced 5-bearing crankshaft to turn out smooth, dependable power.

The cylinder block is cast as a single unit, and features deep skirting. This engine is equipped with a single, 2-barrel downdraft carburetor that incorporates a special device to control emissions.



EM515

Fig. EM-1 Cross section view

Main specifications

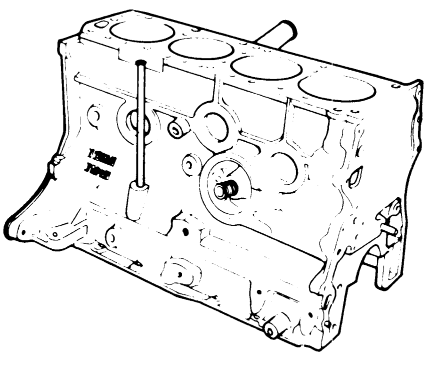
		L18
Displacement	cc (cu in)	1,770 (108.0)
Bore x stroke	mm (in)	85 x 78 (3.35 x 3.07)
Compression ratio		8.5
Ignition timing for M/T B.T.D.C. (for A/T)		12°/800 rpm (12°/650 rpm in "D" range)

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

CYLINDER BLOCK

The cylinder block, a monoblock special casting structure, employs a five-bearing-support system for quietness and higher durability.

The cylinder bores are surrounded by cooling jackets and machined directly in the block. The oil ways in the block are arranged so that the full-flow oil filter is directly attached to the right hand side of the block.



EM406

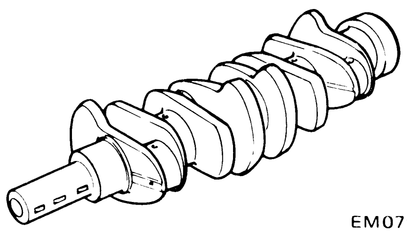
Fig. EM-2 Cylinder block

CRANKSHAFT

The crankshaft is a special steel forging. Fully balanced, it turns out smooth, dependable power at high speed.

The L18 engine uses eight balance weights.

Main bearings are lubricated by oil pumped through the main oil gallery and the oil holes which run in parallel with cylinder bores. There are oilways drilled in the crankshaft for the lubricating oil. The center main bearing is equipped with thrust washers to take up end thrust of the crankshaft.



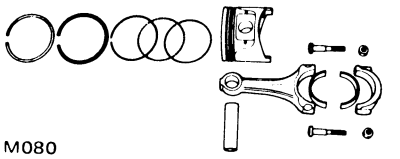
EM079

Fig. EM-3 Crankshaft (L18)

PISTON AND CONNECTING ROD

The pistons are of a special aluminum casting and have struts to control thermal expansion, two compression rings and one combined oil ring. The piston heads are slightly dished. The piston pin is a special hollow steel shaft. It is full-floating fit to the piston and press fit to the connecting rods.

The connecting rods are made of a special forged steel. Oil is sprayed to the connecting rod small ends through drilled passages in the large ends of rod. Oil holes in the connecting rods are located so as to insure optimum lubrication under heavy load.

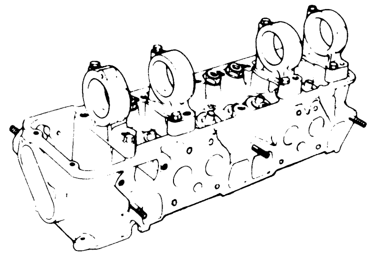


EM080

Fig. EM-4 Piston and connecting rod

CYLINDER HEAD

The cylinder head is made of a light, strong aluminum alloy with good cooling efficiency; it contains wedge type combustion chambers. A special aluminum bronze valve seat is used on the intake valve, while a heat resistant steel valve seat is installed on the exhaust valve. These parts are all hot press-fitted.



EM407

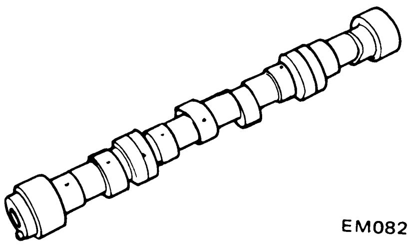
Fig. EM-5 Cylinder head

CAMSHAFT

The camshaft is made of a special cast iron and is located inside the rocker cover. Four aluminum alloy brackets support it. Camshaft bearings are lubricated from oil holes which lead to the main oil gallery of the cylinder head.

Concentric passages are drilled in the front and rear part of the camshaft.

Oil to each cam lobe is supplied through an oil hole drilled in the base circle of each lobe. Lubricant is supplied to the front oil gallery from the 2nd camshaft bearing and to the rear oil gallery from the 3rd camshaft bearing. These holes on the base circle of the lobe supply lubricant to the cam pad surface of the rocker arm and to the valve tip end. The cams feature a long-overlap profile to reduce NOx emission.



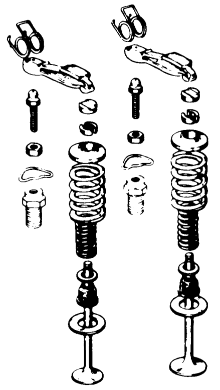
EM082

Fig. EM-6 Camshaft

VALVE MECHANISM

The valve system has a pivot type rocker arm that is activated directly by the cam mechanism; this has made its moving parts considerably lighter and provides ideal high speed performance.

Dual type valve springs are installed.

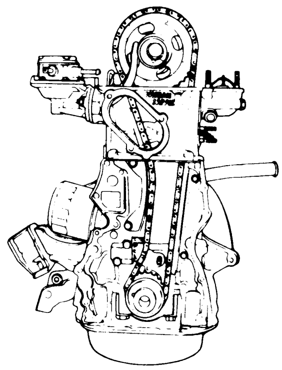


Exhaust Intake EM084

Fig. EM-7 Valve mechanism

CAMSHAFT DRIVE

The camshaft is driven by a double row roller chain driven by the crankshaft. The tension of the chain is controlled by a chain tensioner which is operated by spring and oil pressure. The rubber shoe type tensioner damps vibration of the chain and controls its tension.



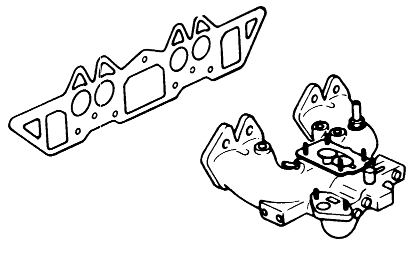
EM085

Fig. EM-8 Chain driving system

MANIFOLDS

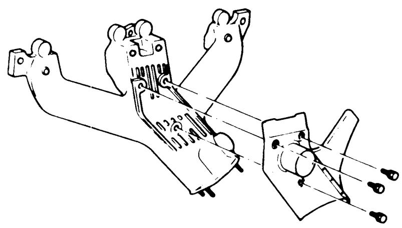
The intake manifold is made of a cast aluminum alloy.

The exhaust manifold, identical in design on both engine types, is a dual exhaust system designed to prevent a decrease in output caused by exhaust interference and to increase output through inertia scavenging action. It is connected to exhaust pipes by flanges, which completely eliminate possibility of exhaust leaks.



EM516

Fig. EM-9 Intake manifold



EM517

Fig. EM-10 Exhaust manifold

ENGINE DISASSEMBLY

CONTENTS

PRELIMINARY CLEANING AND INSPECTION

Before disassembling engine, note the following:

1. Fuel, oil or water may leak past cylinder head and block. Prior to disassembling, check cylinder head, front chain cover, oil pan and oil filter gaskets and crankshaft and water pump seals for signs of leakage past their gasketed surfaces.
2. Check carburetor and fuel pump for condition; fuel hoses for deterioration, cracks or leakage of fuel past their jointed or connected surfaces.
3. Remove air cleaner, alternator, distributor and starter, and plug up carburetor air-horn and distributor hole to prevent entry of foreign matter.
4. Wipe dust and mud off engine.
5. Inspect block, rocker cover, front chain cover, oil pan and all other outer

-arts for visual damage and broken or issing parts such as bolts and nuts.
6. Test all pipings and electrical circuits for discontinuity or broken or damaged insulation.

DISASSEMBLY

To remove engine from car, refer to related topic under "Engine Removal and Installation" in Chassis and Body Service Manual, Section ER.

1. Remove transmission from engine.
2. Thoroughly drain engine oil and coolant by removing drain plugs.
3. Place engine assembly on engine stand.
(1) Remove fan.
(2) Remove engine mounting R.H.
) Remove oil filter using Oil Filter Wrench ST19320000.
(4) Remove oil pressure switch.
(5) Install engine attachment to cylinder block using bolt holes securing alternator bracket and water drain plug.
(6) Set engine on stand.

"Engine Attachment
ST05260001"
"Engine Stand
ST0501S000"

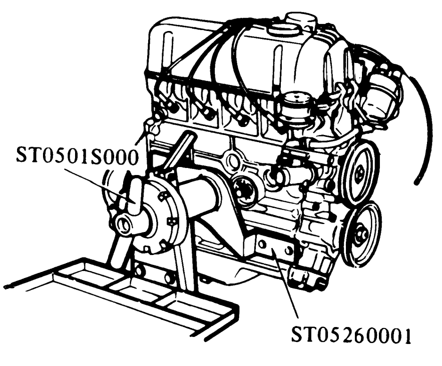
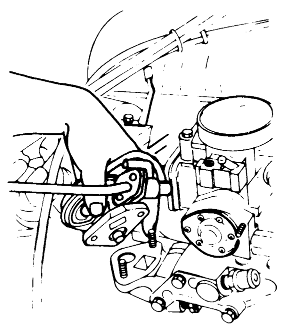


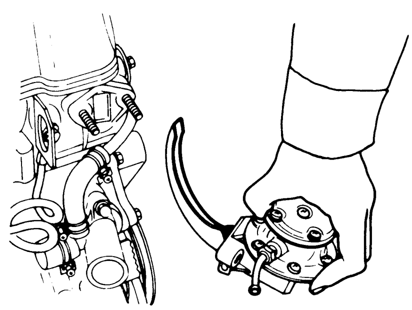
Fig. EM-11 Engine on engine stand

4. Remove oil level gauge.
5. Mesh ratchet with ring gear to prevent flywheel rotation.
Remove crankshaft pulley installing bolt, then remove crank pulley.
6. Remove clutch assembly.
7. Remove high tension cable.
8. Remove spark plugs.
9. Loosen clamps and disconnect hoses.
1) Crank Case to P.C.V. Valve
2) Fuel Hoses
3) Rocker Cover to Air Cleaner
4) Intake Manifold to Thermostat Housing
5) Intake Manifold to Water Outlet

10. Loosen fuel pipe securing bolt and disconnect fuel pipe assembly.
11. Remove E.G.R. valve.


EM519
Fig. EM-12 Removing EGR valve

12. Remove fuel pump assembly.


EM412
Fig. EM-13 Removing fuel pump

13. Remove carburetor.
14. Remove thermostat housing.

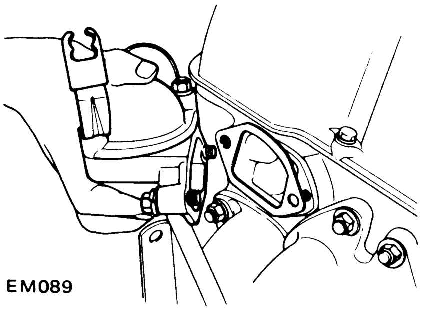


Fig. EM-14 Removing thermostat housing

15. Remove intake manifold.
16. Remove exhaust manifold.

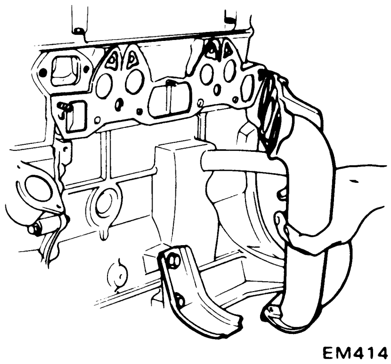


Fig. EM-15 Removing intake manifold

17. Remove engine mounting L.H.
18. Remove water pump assembly.
19. Remove distributor.
20. Remove rocker cover.
21. Remove fuel pump drive cam.
22. Remove camshaft sprocket.

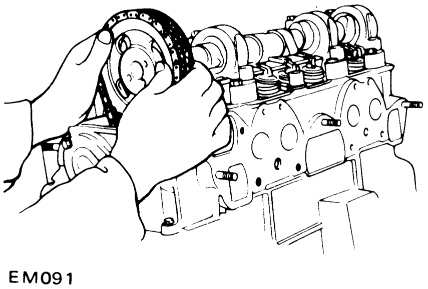


Fig. EM-16 Removing camshaft sprocket

23. Remove cylinder head assembly. Use Cylinder Head Bolt Wrench ST10120000 to remove cylinder head bolts. Loosen bolts from ① to ⑩ as shown in Figure EM-18.

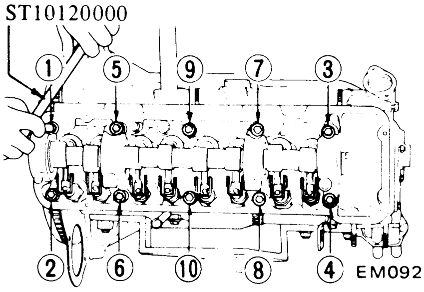


Fig. EM-17 Cylinder head bolt loosening sequence

Note: For convenience in replacing cylinder head, Chain Stopper ST17420001 is provided to support timing chain during the service operation. If this tool is used, timing marks on crankshaft sprocket and timing chain will remain aligned, thus eliminating the problem of re-aligning timing marks.

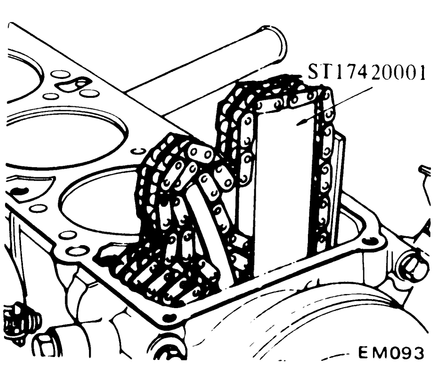


Fig. EM-18 Supporting timing chain

24. Invert engine.
25. Remove oil pan and oil strainer.

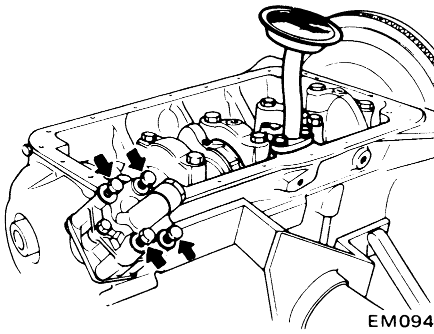


Fig. EM-19 Removing oil strainer and oil pump

26. Remove oil pump and its drive spindle.
See Figure EM-19.
27. Remove front cover.
28. Remove chain tensioner and chain slack side guide.

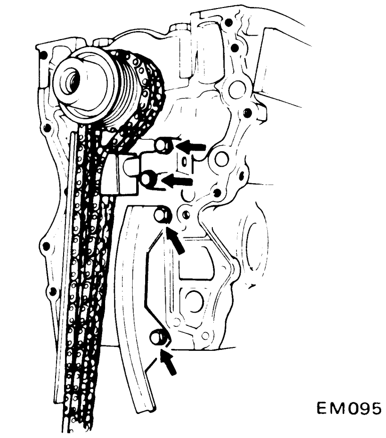


Fig. EM-20 Removing chain tensioner and timing chain

29. Remove timing chain. See Figure EM-20.
30. Remove oil thrower, crankshaft worm gear and chain drive sprocket.

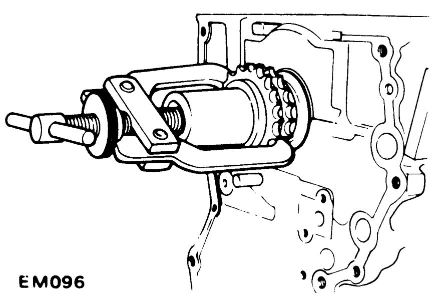


Fig. EM-21 Removing chain drive sprocket

31. Remove piston and connecting rod assembly. Extract connecting rod bearings, keeping them in order.

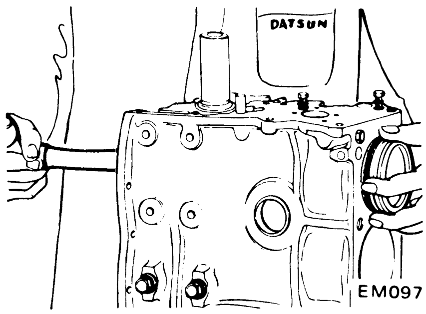


Fig. EM-22 Removing piston and connecting rod assembly

32. Remove flywheel. Be careful not to drop it.

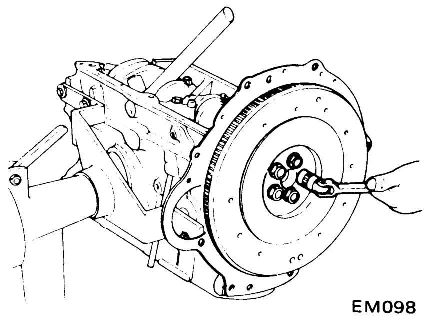


Fig. EM-23 Removing flywheel

33. Remove main bearing caps.
Use Crankshaft Main Bearing Cap Puller ST1651S000 to remove center and rear main bearing caps. Keep them in order.

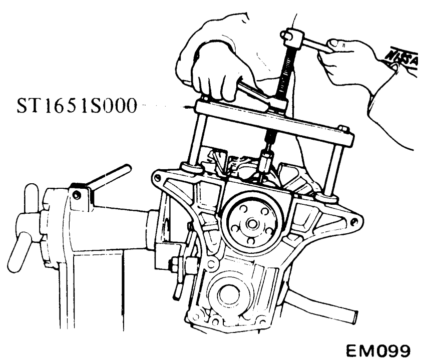


Fig. EM-24 Removing rear main bearing cap

34. Remove two side seals.
35. Remove rear oil seal.

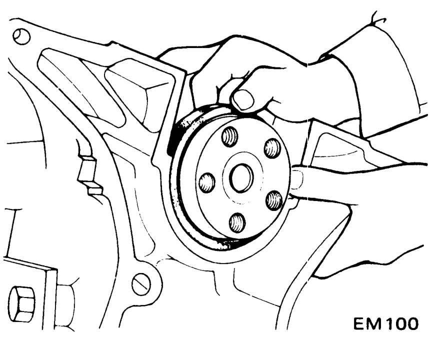


Fig. EM-25 Removing rear oil seal

36. Remove crankshaft.
37. Remove baffle plate and cylinder block net.

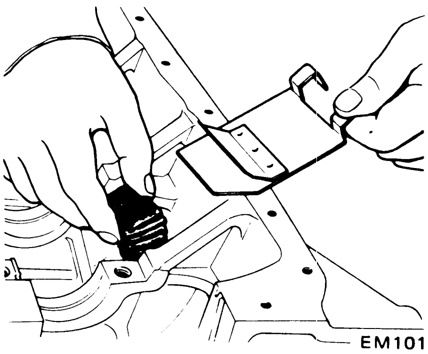


Fig. EM-26 Removing baffle plate and net

PISTONS AND CONNECTING RODS

1. Remove piston rings with a ring remover.

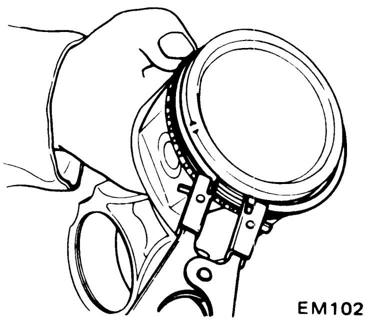


Fig. EM-27 Removing piston ring

2. Press piston pin out with Piston Pin Press Stand ST13030001.

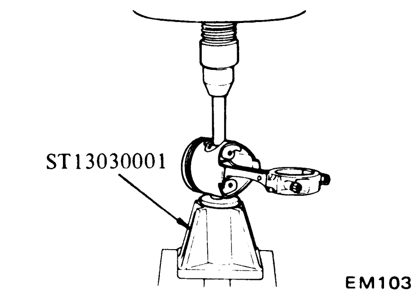


Fig. EM-28 Removing piston pin

3. Keep disassembled parts in order.

CYLINDER HEAD

1. Remove valve rocker springs. Loosen valve rocker pivot lock nut and remove rocker arm by pressing valve spring down.

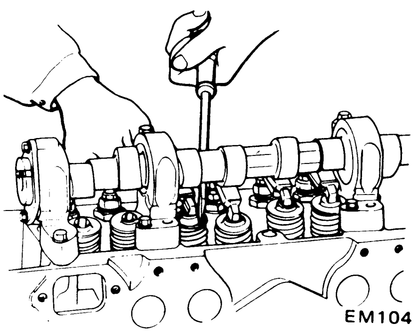


Fig. EM-29 Removing rocker arm

Note: Be careful not to lose valve rocker guide.

2. Remove locate plate, and remove camshaft.

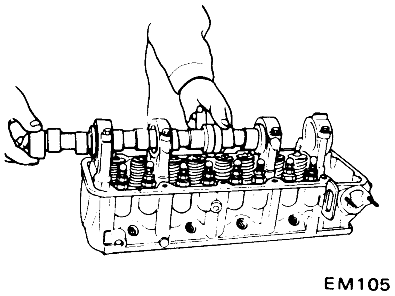


Fig. EM-30 Removing camshaft

Note: Be careful not to damage camshaft bearings and cam lobes.

3. Remove valves using Valve Lifter ST12070000.

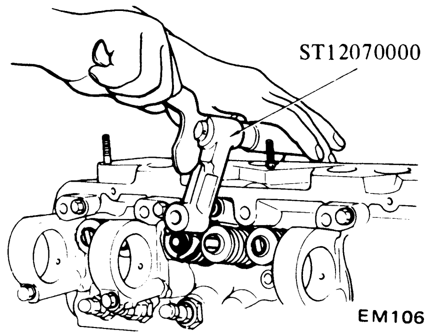


Fig. EM-31 Removing valve

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

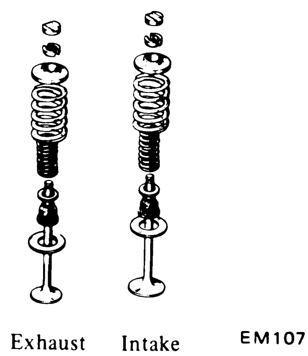


Fig. EM-32 Valve components

Note: Be sure to leave camshaft bearing intact, or the bearing center is liable to come out of alignment.

INSPECTION AND REPAIR

CONTENTS

PREPARATION FOR INSPECTION

1. Before cleaning, check for signs of water and oil leaks in cylinder block and head.
2. Clean oil, carbon deposits and sealant from all parts. Remove gasket.
3. Clean all oil holes with solvent and dry with compressed air. Make sure that they are not restricted.

CYLINDER HEAD AND VALVE

Checking cylinder head mating face

Note: Never remove camshaft bearings unless you have a suitable machine for boring camshaft bearing in line. If you once remove camshaft bearings, bearing centers will come out of alignment; reconditioning is very difficult without center borings.

1. Make a visual check for cracks and flaws.
2. Measure the surface of cylinder head (on cylinder block side) for warpage. If it is found to be beyond the limit designated below, regrind the affected surface with a surface grinder.

Head surface flatness

Standard	Maximum
less than 0.05 mm (0.0020 in)	0.1 mm (0.0039 in)

Valve assembly

1. Check each intake and exhaust valve for worn, damaged or deformed valve caps or stems. Correct or replace any valve that is faulty.
2. Valve face or valve stem end surface should be refaced with a valve grinder.

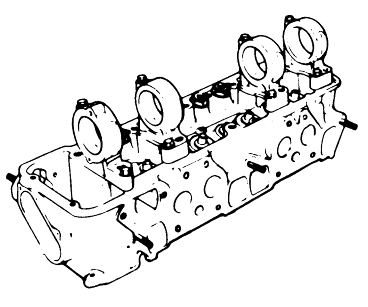

EM407

Fig. EM-33 Cylinder head

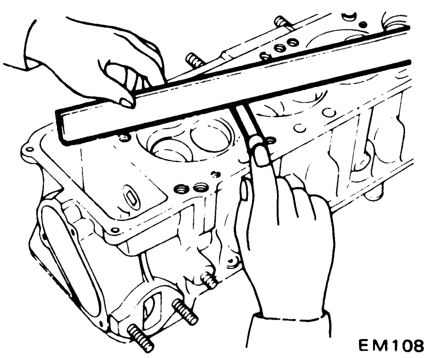
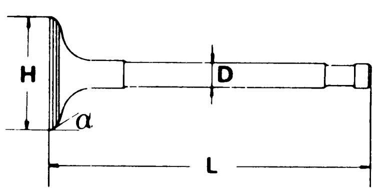

EM108

Fig. EM-34 Checking cylinder head surface



EM109

Fig. EM-35 Intake and exhaust valve dimensions

H	Valve head diameter mm (in)	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)	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)	In.	7.965 to 7.980 (0.3136 to 0.3142)
		Ex.	7.945 to 7.960 (0.3128 to 0.3134)
a	Valve seat angle Intake and Exhaust	In.	45°30′
		Ex.	45°30′

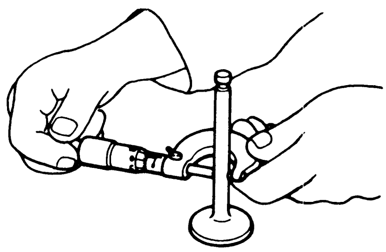

EM110

Fig. EM-36 Checking valve stem diameter

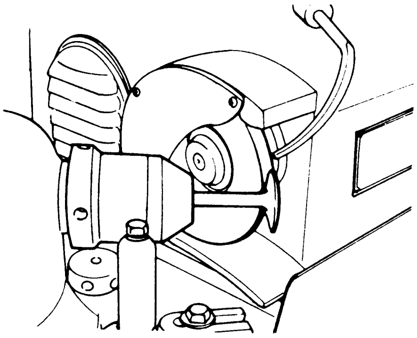

EM111

Fig. EM-37 Regrinding valve face

Note: When valve head has been worn down to 0.5 mm (0.0197 in) in thickness, replace the valve. Grinding allowance for valve stem end surface is 0.5 mm (0.0197 in) or less.

Valve spring

1. Check valve spring for squareness using a steel square and surface plate. If spring is out of square more than 1.6 mm (0.063 in), replace.
2. Measure the free length and tension of each spring. If the measured value exceeds specified limit, replace spring.

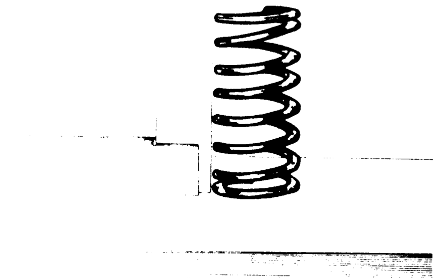

EM112

Fig. EM-38 Measuring spring squareness

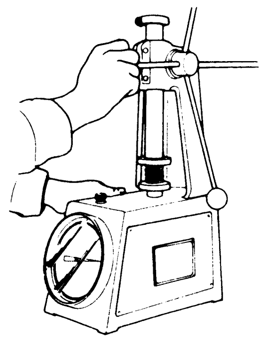

EM113

Fig. EM-39 Measuring spring tension

Spring specifications

Valve spring free length mm (in)

Intake	Outer	49.98 (1.9677)
	Inner	44.85 (1.7657)
Exhaust	Outer	49.98 (1.9677)
	Inner	44.85 (1.7657)

Valve spring pressured length (valve open) mm/kg (in/lb)

Intake	Outer	29.5/49.0 (1.161/108)
	Inner	24.5/25.5 (0.965/56.2)
Exhaust	Outer	29.5/49.0 (1.161/108)
	Inner	24.5/25.5 (0.965/56.2)

Valve spring assembled height (valve close) mm/kg (in/lb)

Intake	Outer	40.0/21.3 (1.575/47.0)
	Inner	35.0/12.3 (1.378/27.1)
Exhaust	Outer	40.0/21.3 (1.575/47.0)
	Inner	35.0/12.3 (1.378/27.1)

Rocker arm and valve rocker pivot

Check pivot head and cam contact and pivot contact surfaces of rocker arm for damage or wear. If damage is found, replace them. A faulty pivot must be replaced together with its corresponding rocker arm.

Valve guide

Measure clearance between valve guide and valve stem. If clearance exceeds designated limit, replace worn parts or both valve and valve guide. In this case, it is essential to determine if such a clearance has been caused by a worn or bent valve stem or by a worn valve guide.

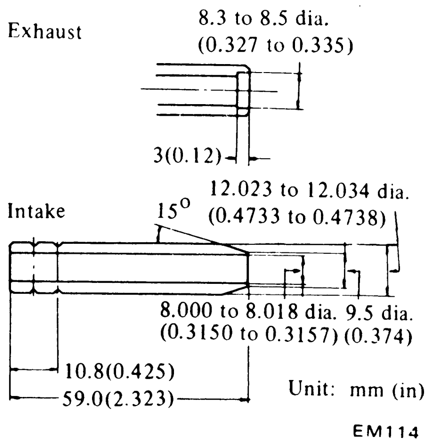


Fig. EM-40 Standard valve guide

	Intake valve	Exhaust valve
Stem to guide clearance mm (in)	0.020 to 0.053 (0.0008 to 0.0021)	0.040 to 0.073 (0.0016 to 0.0029)
Max. tolerance of above clearance mm (in)	0.1 (0.0039)	

As an emergency expedient, a valve can be pushed into valve guide and moved to the left and right. If its tip deflects about 0.2 mm (0.0079 in) or more, it indicates that the clearance between stem and guide exceeds the maximum limit of 0.1 mm (0.0039 in).

Note: Valve should be moved in parallel with rocker arm. (Generally, a large amount of wear occurs in this direction.

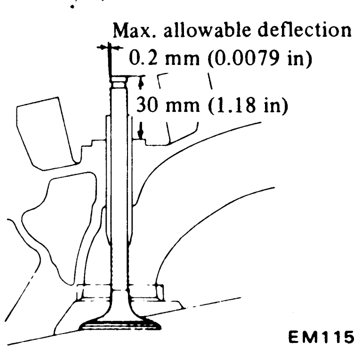


Fig. EM-41 Measuring clearance between valve stem and valve guide

Replacement of valve guide

1. To remove old guides, use a drift and a press (under a 2-ton pressure) or a hammer.

   Drive them out from combustion chamber side toward rocker cover. Heated cylinder head will facilitate the operation.

2. Ream cylinder head side guide hole at room temperature.

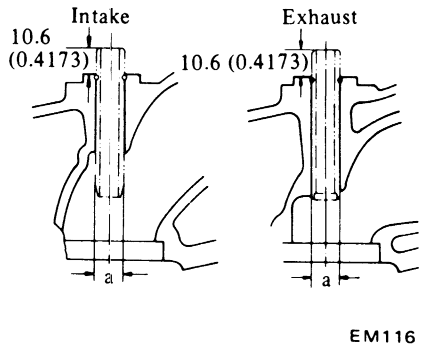


Fig. EM-42 Valve guide hole

Guide hole inner diameter "a" mm (in)		
	For standard valve guide	11.985 to 11.996 (0.4718 to 0.4723)
	For service valve guide	12.185 to 12.196 (0.4797 to 0.4802)

3. Carefully press new valve guide into valve so that it will fit smoothly after heating cylinder head to 150 to 200°C (302 to 392°F).

   Valve guide of 0.2 mm (0.0079 in) oversize diameter is available for service.

   Interference fit of valve guide to guide hole:
   0.027 to 0.049 mm
   (0.0011 to 0.0019 in)

4. Ream bore with valve guide pressed in, using Valve Guide Reamer Set ST1103S000.

Reaming bore:
8.000 to 8.018 mm
(0.3150 to 0.3157 in)

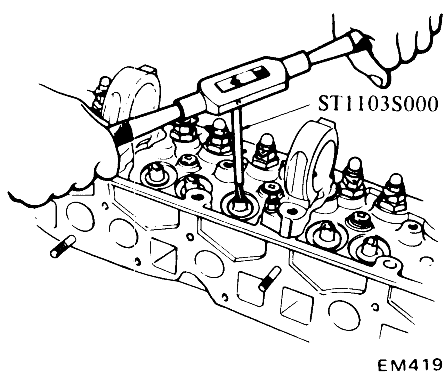


Fig. EM-43 Removing valve guide

5. Correct valve seat surface with new valve guide as the axis.

Valve seat inserts

Check valve seat inserts for any evidence of pitting at valve contact surface, and reseat or replace if worn excessively.

Valve seat insert of 0.5 mm (0.0197 in) oversize is available for service in this L series engine.

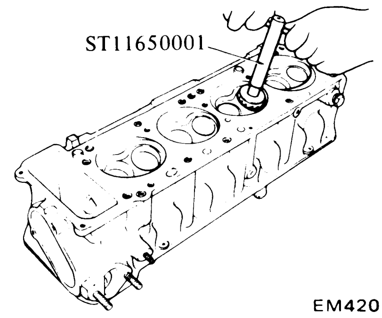


Fig. EM-44 Correcting valve seat

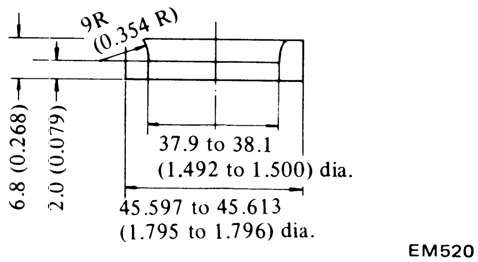
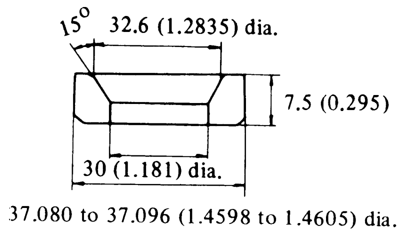
Intake Unit: mm (in)	
Exhaust Unit: mm (in)	

Fig. EM-45 Standard valve seat dimensions

Cylinder head recess diameter

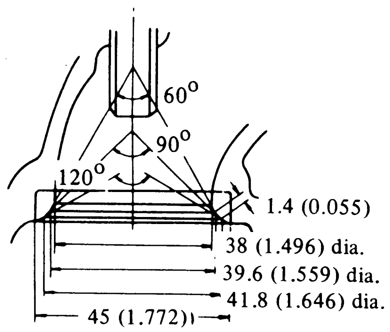
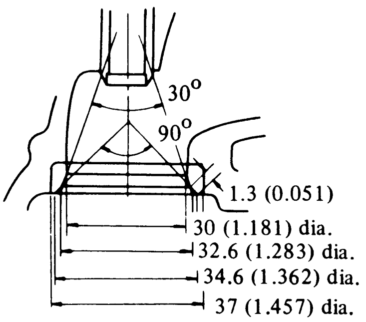
Unit: mm (in)

Intake	For factory standard insert	45.000 to 45.016 (1.7717 to 1.7723)
	For service insert	45.500 to 45.516 (1.7913 to 1.7920)
Exhaust	For factory standard insert	37.000 to 37.016 (1.4567 to 1.4573)
	For service insert	37.500 to 37.516 (1.4764 to 1.4770)

Interference fit mm (in)	Intake	0.081 to 0.113 (0.0032 to 0.0044)
	Exhaust	0.064 to 0.096 (0.0025 to 0.0038)

Replacing valve seat insert

1. Old insert can be removed by boring it out until it collapses. The machine depth stop should be set so that boring cannot continue beyond the bottom face of the insert recess in cylinder head.
2. Select a suitable valve seat insert and check its outside diameter.
3. Machine cylinder head recess to the concentric circles in valve guide center so that insert will have the correct fit.
4. Heat cylinder head to a temperature of 150 to 200°C (302 to 392°F).
5. Fit insert ensuring that it beds on the bottom face of its recess, and caulk more than 4 points.
6. Newly fitted valve seats should be cut or ground at the specified dimensions as shown in Figure EM-46.
7. Apply small amount of fine grinding compound to valve contacting face and put valve into guide. Lap valve against its seat until proper valve seating is obtained. Remove valve and then clean valve and valve seat.

Intake Unit: mm (in)	
Exhaust Unit: mm (in)	

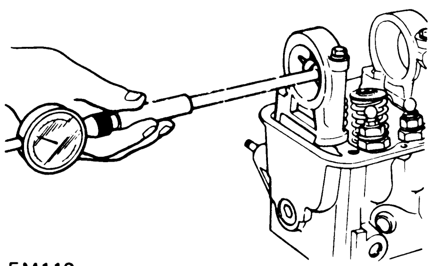
EM121

Fig. EM-46 Valve seat dimensions

CAMSHAFT AND CAMSHAFT BEARING

Camshaft bearing clearance

Measure inside diameter of camshaft bearing with an inside dial gauge and outside diameter of camshaft journal with a micrometer. If wear is found inside of bracket, replace cylinder head assembly.



EM119

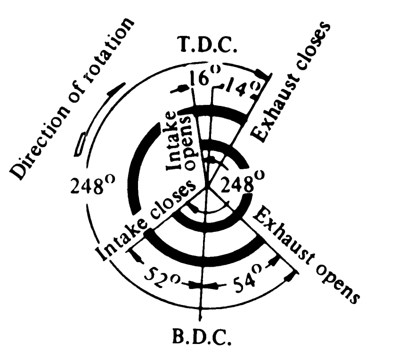
Fig. EM-47 Checking camshaft bearing

Camshaft journal to bearing clearance

	Standard	Wear limit
Oil clearance mm (in)	0.038 to 0.067 (0.0015 to 0.0026)	0.1 (0.0039)
Inner diameter of cam shaft bearing mm (in)	48.000 to 48.016 (1.8898 to 1.8904)	——

Valve timing

This diagram applies to all cylinders. If any valve is found out of specifications, one possibility is that cam lobe is worn or damaged. This calls for replacement of camshaft.



EM421

Fig. EM-48 Valve timing diagram

	Standard	Bend limit
Camshaft bend mm (in)	0.02 (0.0008)	0.05 (0.0020)

Camshaft alignment

1. Check camshaft, camshaft journal and cam surface for bend, wear or damage. If damage is beyond limits, replace affected parts.
2. A bend value is one-half of the reading obtained when camshaft is turned one full revolution with a dial gauge applied to 2nd and 3rd journals.

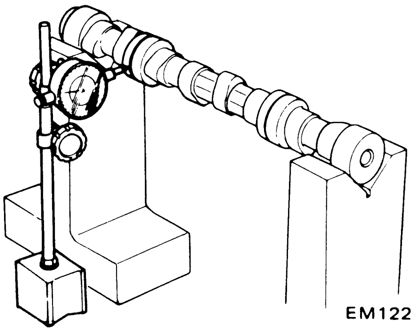


Fig. EM-49 Checking camshaft bend

Standard height of cam mm (in) — Intake		40.30 to 40.35 (1.5866 to 1.5886)
Standard height of cam mm (in) — Exhaust		40.30 to 40.35 (1.5866 to 1.5886)
Wear limit of cam height	mm (in)	0.25 (0.0098)
Allowable difference in diameter between max. worn and min. worn parts of camshaft journal	mm (in)	0.05 (0.0020)
Maximum tolerance in journal diameter	mm (in)	0.1 (0.0039)
Camshaft end play	mm (in)	0.08 to 0.38 (0.0031 to 0.0150)

	Standard	Maximum tolerance
Surface flatness mm (in)	less than 0.05 (0.0020)	0.10 (0.0039)

CYLINDER BLOCK

1. Visually check cylinder block for cracks or flaws.
2. Measure top of cylinder block (cylinder head mating face) for warpage. If warpage exceeds limits, correct it.

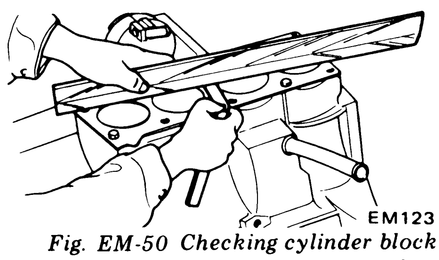


Fig. EM-50 Checking cylinder block surface

3. Using a bore gauge, measure cylinder bore for out-of-round or taper. If out-of-round or taper is excessive, rebore cylinder walls with a boring machine. Measurement should be taken along bores for taper and around bores for out-of-round. See Figure EM-51.

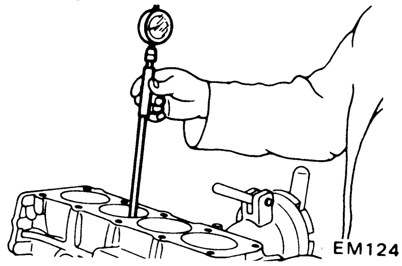


Fig. EM-51 Measuring cylinder bore diameter

4. When wear, taper or out-of-round is minor and within limits, remove step at topmost portion of cylinder using a ridge reamer or other similar tool.

How to measure cylinder bore

A bore gauge is used. Measure cylinder bore at top, middle and bottom positions toward A and B directions as shown in Figure EM-52. and record the measured values.

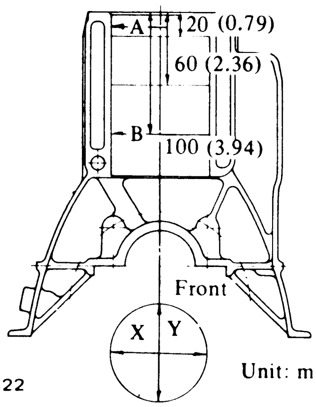


Fig. EM-52 Cylinder bore measuring positions

		Standard	Wear limit
Cylinder bore mm (in)	Inner diameter	85.000 to 85.050 (3.3465 to 3.3484)	0.2 (0.0079)
	Out-of-round	0.015 (0.0006)	
	Taper	0.015 (0.0006)	
Difference in cylinder bore mm (in)		0.05 (0.0020)	0.2 (0.0079)

Cylinder boring

1 When any cylinder needs boring, all other cylinders must also be bored at the same time.

2. Determine piston oversize according to amount of wear of cylinder.

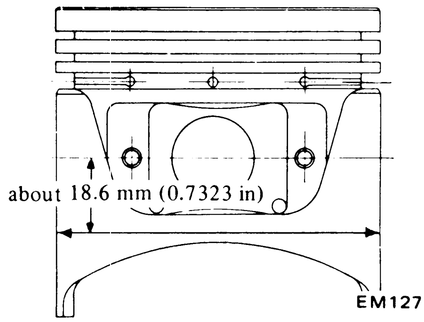


Fig. EM-54 Measuring piston skirt diameter

Oversize pistons specifications

Piston diameter mm (in)	
Standard	84.965 to 85.015 (3.3451 to 3.3470)
0.50 (0.0197) Oversize	85.465 to 85.515 (3.3648 to 3.3667)
1.00 (0.0394) oversize	86.965 to 86.015 (3.4238 to 3.3864)

Rebored size calculation

D = A + B − C = A + [0.005 to 0.025 mm (0.0002 to 0.0010 in)]

where,

D: Honed diameter
A: Skirt diameter as measured
B: Piston-to-wall clearance
C: Machining allowance (0.02 mm) (0.0008 in)

3 The size to which cylinders must be honed is determined by adding piston-to-cylinder clearance to the largest piston diameter (at piston skirt in thrust direction).

Standard clearance	mm (in)	0.025 to 0.045 (0.0010 to 0.0018)
Feeler gauge	mm (in)	0.04 (0.0016)
Extracting force	kg (lb)	0.2 to 1.5 (0.44 to 3.31)

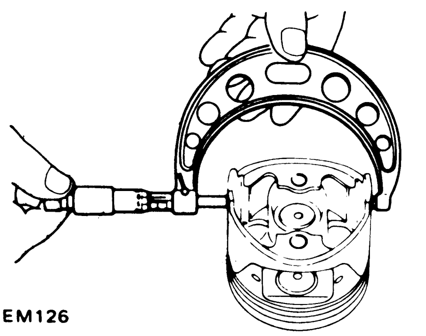


Fig. EM-53 Measuring piston diameter

Note: **To prevent strain due to cutting heat, bore the cylinders in the order of 2-4-1-3.**

4. Do not cut too much out of cylinder bore at a time. Cut only 0.05 mm (0.0020 in) or so at a time.
5. Measurement of a just machined cylinder bore requires utmost care since it is expanded by cutting heat.
6. As a final step, cylinders should be honed to size.
7. Measure the finished cylinder bore for out-of-round or tapered part.
8. Measure piston-to-cylinder clearance.

This clearance can be checked easily by using a feeler gauge and a spring balance hooked on feeler gauge, measuring the amount of force required to pull gauge out from between piston and cylinder.

Notes:

a. When measuring clearance, slowly pull feeler gauge straight upward.

b. It is recommended that piston and cylinder be heated to 20°C (68°F).

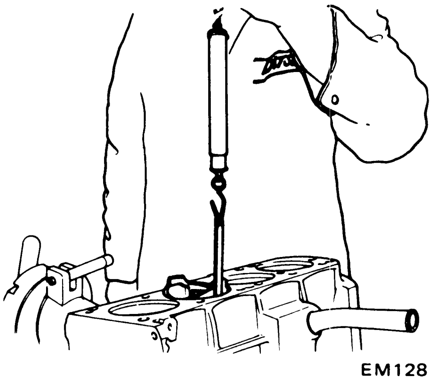


Fig. EM-55 Measuring piston fit in cylinder

PISTONS, PISTON PINS AND PISTON RINGS

1. Remove carbon from piston and ring grooves with a carbon scraper and a curved steel wire. Clean out oil slots in bottom land of oil ring groove.
2. Check for damage, scratches and wear. Replace if necessary.
3. Measure side clearance of rings in ring grooves as each ring is installed. Clearance with new and rings should be as follows.

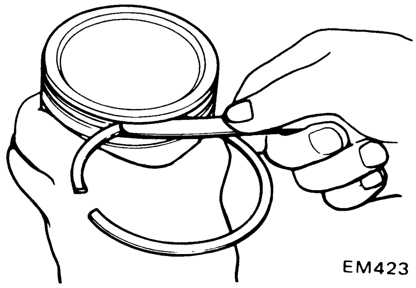


Fig. EM-56 Measuring piston ring side clearance

Side clearance

Unit: mm (in)

	Standard	Wear limit
Top ring	0.040 to 0.073 (0.0016 to 0.0029)	0.1 (0.0039)
Second ring	0.030 to 0.070 (0.0012 to 0.0028)	
Oil ring	–	–

4. Push ring into cylinder with piston so as to place it squarely in cylinder; measure ring gap with a feeler gauge.

Ring should be placed to diameter at upper or lower limit of ring travel.

Ring gap

Unit: mm (in)

	Standard	Wear limit
Top ring	0.25 to 0.40 (0.0098 to 0.0157)	1.0 (0.0394)
Second ring	0.30 to 0.50 (0.0118 to 0.0197)	
Oil ring	0.30 to 0.90 (0.0118 to 0.0354)	

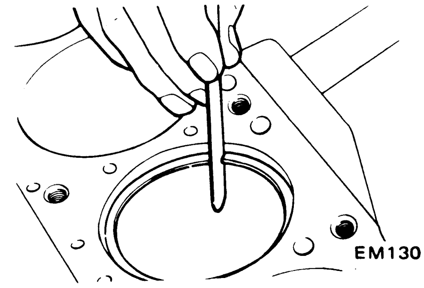


Fig. EM-57 Measuring ring gap

Notes:

a. **When piston ring only is to be replaced, without cylinder bore being corrected, measure gap at bottom of cylinder where wear is minor.**

b. **Oversize piston rings are available for service.**

Oversize:
0.5 mm (0.0197 in) and
1.0 mm (0.0394 in)

5. Measure piston pin hole in relation to outer diameter of pin. If wear exceeds limit, replace each piston pin together with the piston on which it is installed.
6. Determine the fitting of piston pin into piston pin hole to such an extent that it can be finger pressed at room temperature. This piston pin must be a tight press fit into connecting rod.

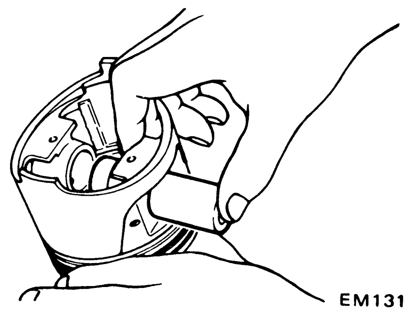


Fig. EM-58 Piston pin fitting

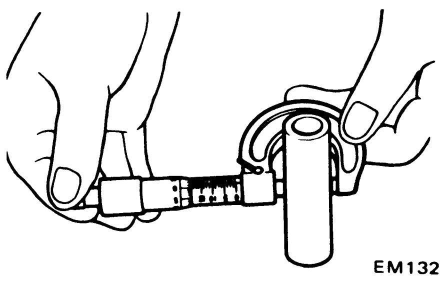


Fig. EM-59 Measuring piston pin diameter

Unit: mm (in)

Piston pin outside diameter	20.993 to 20.998 (0.8265 to 0.8267)
Piston pin hole diameter	21.001 to 21.008 (0.8268 to 0.8271)
Piston pin to piston clearance	0.003 to 0.015 (0.0001 to 0.0006)
Interference fit of piston pin to connecting rod	0.015 to 0.033 (0.0006 to 0.0013)

CONNECTING ROD

1. If a connecting rod has any flaw on either side of the thrust face or the large end, correct or replace it.

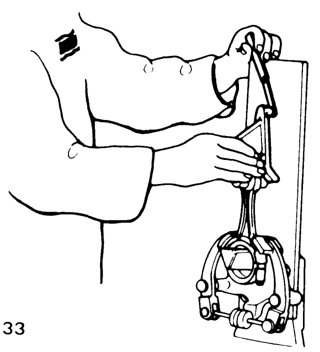

EM133

Fig. EM-60 Checking rod alignment

2. Check connecting rod for bend or torsion using a connecting rod aligner. If bend or torsion exceeds the limit, correct or replace.

	Standard	Maximum
Connecting rod bend or torsion (per 100 mm or 3.94 in length) mm (in)	0.03 (0.0012)	0.05 (0.0020)

3. When replacing connecting rod, select rod so that weight difference between new and old ones is within 7 gr (0.25 oz).
4. Install connecting rods with bearings on to corresponding crank pins and measure thrust clearance. If measured value exceeds limit, replace.

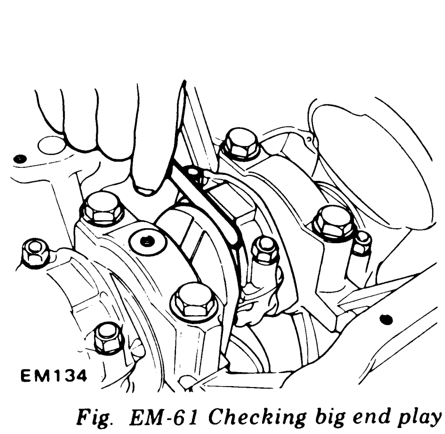

EM134

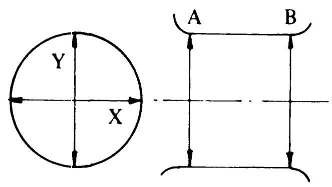
Fig. EM-61 Checking big end play

	Standard	Maximum
Big end play mm (in)	0.2 to 0.3 (0.0079 to 0.0118)	0.6 (0.0236)

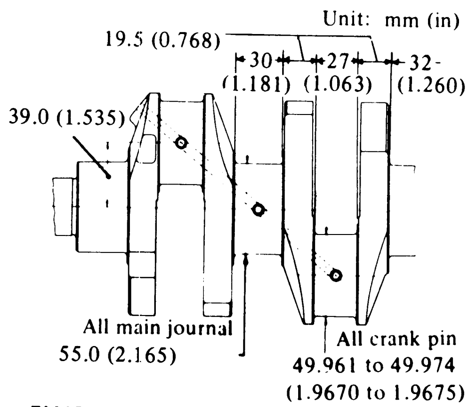
CRANKSHAFT

1. Whenever crankshaft is removed from engine, it should be cleaned thoroughly in a suitable solvent. After cleaning, check crankshaft journal and crank pin for score, bias wear or cracks. Repair or replace as required. If damage is minor, dress with fine crocus cloth.
2. Check journals and crank pins for taper and out-of-round with a micrometer. Measurement should be taken along journals for taper and around journals for out-of-round. See Figure EM-63 for detailed information.

If journals or crank pins are tapered or out-of-round beyond limits, replace with a new shaft.



Out-of-round	X-Y
Taper	A-B



EM136

Fig. EM-62 Crankshaft and journal dimensions

	Standard	Maximum
Taper and out-of-round of journal and crank pin mm (in)	less than 0.01 (0.0004)	0.025 (0.0010)

3. Crankshaft bend can be checked by placing it on V-blocks and using a dial gauge with its indicating finger resting on center journal.

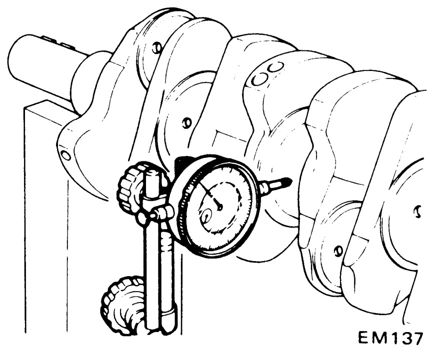


Fig. EM-63 Checking crankshaft bend

	Standard	Maximum
Crankshaft bend mm (in)	less than 0.05 (0.0020)	0.10 (0.0039)

Note: **When measuring bend, use a dial gauge. Bend value is half of the reading obtained when crankshaft is turned one full revolution with a dial gauge attached to its center journal.**

4. After regrinding crankshaft, finish it to the necessary size indicated on page EM-18 by using an adequate undersize bearing according to the extent of required repair.
5. Install crankshaft in cylinder block and measure crankshaft free end play.

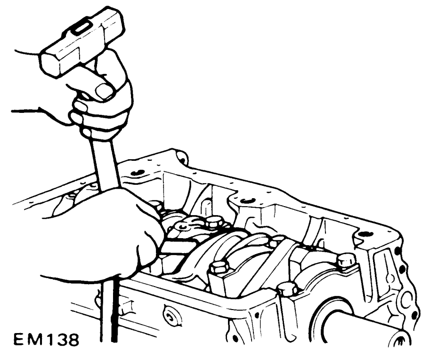


Fig. EM-64 Checking crankshaft end play

	Standard	Wear limit
Crankshaft free end play mm (in)	0.05 to 0.18 (0.0020 to 0.0071)	0.3 (0.0118)

6. At the rear end of crankshaft, check crankshaft pilot bushing for wear or damage. Replace it if any fault is detected.

To replace crankshaft rear pilot bushing, proceed as follows:
(1) Pull out bushing using Pilot Bushing Puller ST16610001.

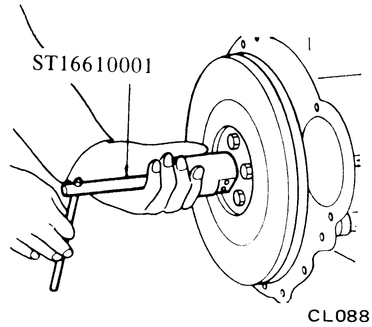


Fig. EM-65 Pulling out pilot bushing

(2) Before installing a new bushing, thoroughly clean bushing hole. Press fit bushing so that its height above flange end is 4.5 to 5.0 mm (0.177 to 0.197 in). Do not oil bushing.

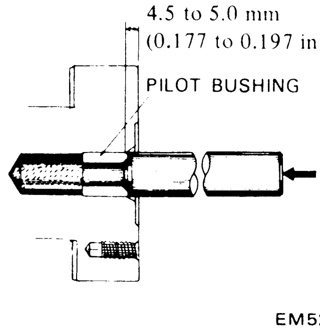


Fig. EM-66 Press-fitting new pilot bushing

BUSHING AND BEARING

Measurement of main bearing clearance

1. Thoroughly clean all bearings and check for scratches, melting score or wear.

Replace bearings if any fault is detected.

2. Crankshaft journals and bearings should be clean and free from dust and dirt before oil clearance is measured.
3. Set main bearing on cap block.
4. Cut a plastigage to width of bearing and place it in parallel with crank pin, getting clear of the oil hole. Install cap on the assembly and tighten them together to the specified torque.

Tightening torque:
4.5 to 5.5 kg-m (33 to 40 ft-lb)

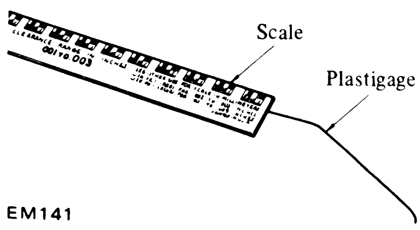


Fig. EM-67 Plastigage

Note: Do not turn crankshaft while plastigage is being inserted.

5. Remove cap, and compare width of the plastigage at its widest part with the scale printed in plastigage envelope.

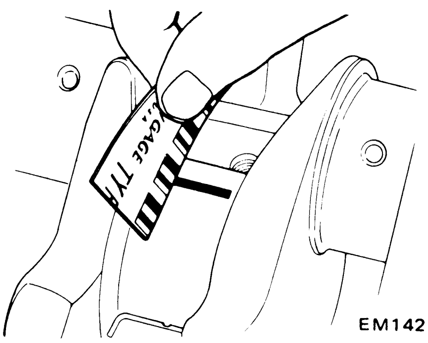


Fig. EM-68 Measuring bearing clearance

Measurement of connecting rod bearing clearance

1. Measure connecting rod bearing clearance in the same manner as above.

Tightening torque:
4.5 to 5.5 kg-m (33 to 40 ft-lb)

Bearing oil clearance

	Standard	Wear limit
Main bearing clearance mm (in)	0.020 to 0.062 (0.0008 to 0.0024)	0.12 (0.0047)
Connecting rod bearing clearance mm (in)	0.025 to 0.055 (0.0010 to 0.0022)	0.12 (0.0047)

2. If clearance exceeds specified value, replace bearing with an undersize bearing and grind crankshaft journal adequately.

Fitting bearings

Bearings are manufactured with crush to make bearing snug down into its bore. To measure this, proceed as follows:

1. Set main bearing in main bearing cap recess or cylinder block bearing recess correctly.
2. Lock one side of bearing and press other side until bearing back surface touches the recess.
3. Then, measure bearing crush "H" with a feeler gauge. See Figure EM-69. The standard bearing crush value is listed below.

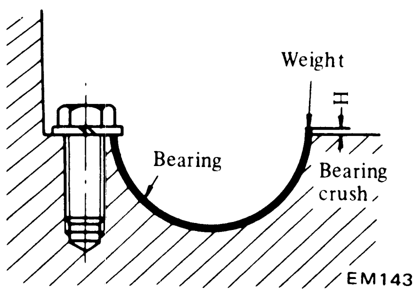


Fig. EM-69 Checking bearing crush

Bearing crush

All main bearings mm (in)	0 to 0.03 (0 to 0.0012)
All connecting rod bearings mm (in)	0.015 to 0.045 (0.0006 to 0.0018)

4. Handle connecting rod bearing in the same manner as above.

Main bearing undersize

Unit: mm (in)

	Bearing top thickness	Crank journal diameter
STD	1.827 to 1.835 (0.0719 to 0.0722)	54.942 to 54.955 (2.1631 to 2.1636)
0.25 (0.0098) Undersize	1.952 to 1.960 (0.0769 to 0.0772)	54.692 to 54.705 (2.1532 to 2.1537)
0.50 (0.0197) Undersize	2.077 to 2.085 (0.0818 to 0.0821)	54.442 to 54.455 (2.1434 to 2.1439)
0.75 (0.0295) Undersize	2.202 to 2.210 (0.0867 to 0.0870)	54.192 to 54.205 (2.1335 to 2.1341)
1.00 (0.0394) Undersize	2.327 to 2.335 (0.0916 to 0.0919)	53.942 to 53.955 (2.1237 to 2.1242)

Connecting rod bearing undersize

Unit: mm (in)

	Bearing top thickness	Crank pin diameter
STD	1.493 to 1.506 (0.0588 to 0.0593)	49.961 to 49.974 (1.9670 to 1.9675)
0.06 (0.0024) Undersize	1.523 to 1.536 (0.0600 to 0.0605)	49.901 to 49.914 (1.9646 to 1.9651)
0.12 (0.0047) Undersize	1.553 to 1.566 (0.0611 to 0.0617)	49.841 to 49.854 (1.9622 to 1.9628)
0.25 (0.0098) Undersize	1.618 to 1.631 (0.0637 to 0.0642)	49.711 to 49.724 (1.9571 to 1.9576)
0.50 (0.0197) Undersize	1.743 to 1.756 (0.0686 to 0.0691)	49.461 to 49.474 (1.9473 to 1.9478)
0.75 (0.0295) Unsersize	1.868 to 1.881 (0.0735 to 0.0741)	49.211 to 49.224 (1.9374 to 1.9379)
1.00 (0.0394) Undersize	1.993 to 2.006 (0.0785 to 0.0790)	48.961 to 48.974 (1.9276 to 1.9281)

MISCELLANEOUS COMPONENTS

Crankshaft sprocket, camshaft sprocket

1. Check tooth surface for flaws or wear. Replace sprocket if fault is found.
2. Install camshaft sprocket in position and check for runout. If it exceeds 0.1 mm (0.0039 in) total indicator reading. replace camshaft sprocket. Also check for end play.

Camshaft end play:
0.08 to 0.38 mm
(0.0031 to 0.0150 in)

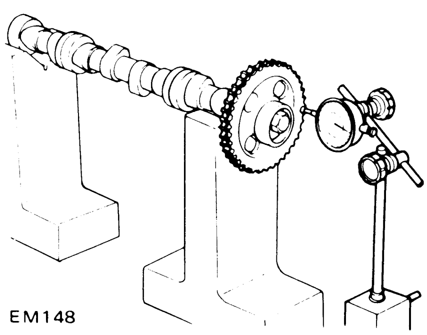

EM148

Fig. EM-70 Checking camshaft sprocket runout

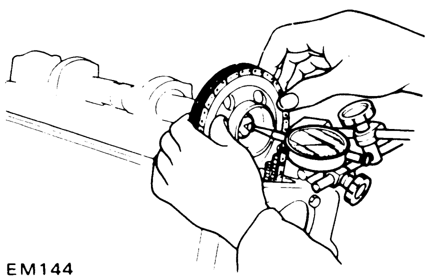
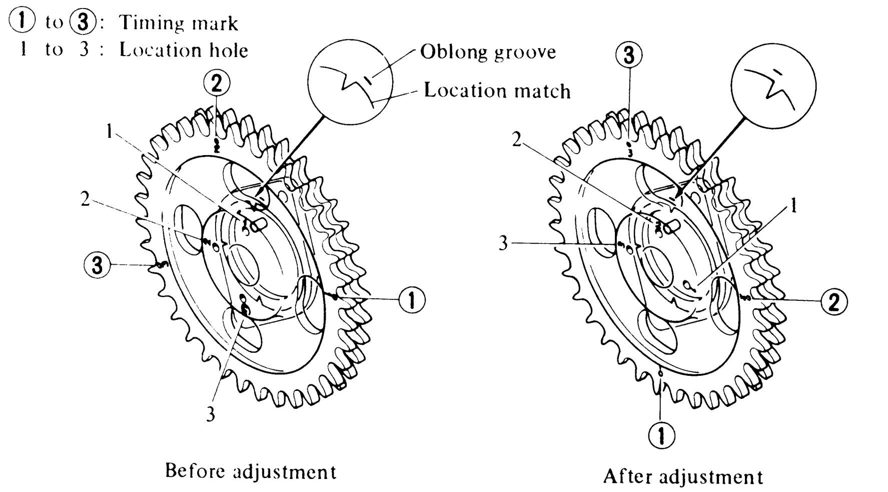

EM144

Fig. EM-71 Checking camshaft end play

3. Check chain for damage, excessive wear or stretch at roller links. Replace if faulty.
4. To properly adjust chain tension (or valve timing), camshaft sprocket has a cam locating plate and three location holes (Nos. 1, 2 and 3).

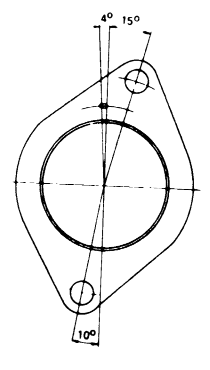
Camshaft sprocket is preset at No. 1 hole at the factory. If chain becomes loose, adjust it by setting camshaft sprocket at No. 2 hole. If chain is too loose, adjust it by setting camshaft sprocket at No. 3 hole.



EM145

Fig. EM-72 Adjusting camshaft sprocket location

(1) Turn engine until No. 1 piston is at T.D.C. on its compression stroke. Determine whether camshaft sprocket location notch comes off the left end of the oblong groove on camshaft locator plate. (If the location notch is off the left end of the oblong groove, chain stretch is beyond limits.)



EM146

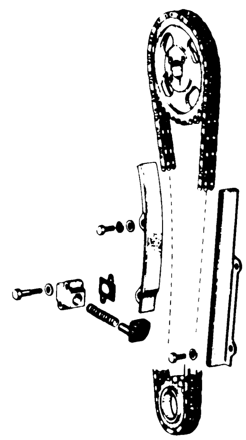
Fig. EM-73 Camshaft locate plate

(2) Turn engine until No. 1 piston is at T.D.C. on its compression stroke, setting camshaft on No. 2 location hole in camshaft sprocket. This No. 2 notch should then be on the right end of the oblong groove. When No. 2 hole is used, No. 2 timing mark must also be used. The amount of the modification is a 4° rotation of crankshaft.

(3) When modification becomes impossible even by transferring camshaft location hole, replace chain assembly.

Chain tensioner and chain guide

Check for wear and breakage. Replace if necessary.

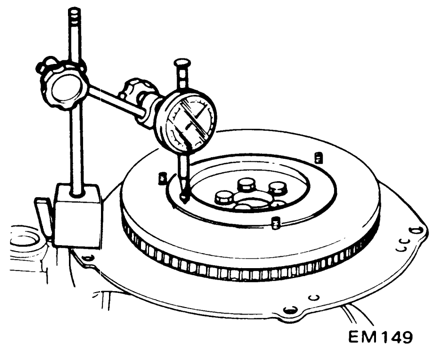


EM147

Fig. EM-74 Camshaft drive mechanism

Flywheel

1. Check clutch disc contact surface with flywheel for damage or wear. Repair or replace if necessary.
2. Measure runout of clutch disc contact surface with a dial gauge. If it exceeds 0.15 mm (0.0059 in) total indicator reading, replace it.



EM149

Fig. EM-75 Checking flywheel deviation

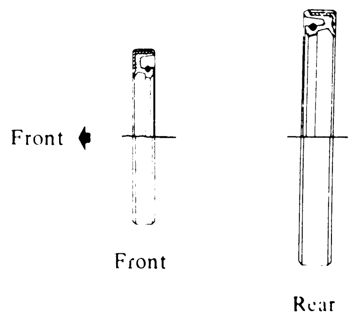
3. Check tooth surfaces of ring gear for flaws or wear.
   Replace if necessary.

Note: Replace ring gear at about 180 to 220°C (356 to 428°F).

Front cover and rear oil seal

First check front cover and rear oil seal for worn or folded over sealing lip or oil leakage. If necessary, install a new seal. When installing a new seal, pay attention to mounting direction.

Note: It is good practice to replace oil seal whenever engine is overhauled.



EM150

Fig. EM-76 Oil seal of crankshaft

ENGINE ASSEMBLY

CONTENTS

PRECAUTIONS

1. Use thoroughly cleaned parts. Especially, make sure that oil holes are clear of foreign matter.
2. When installing sliding parts such as bearings, be sure to apply engine oil to them.
3. Use new packings and oil seals.
4. Do not reuse lock washers.
5. Keep tools and work benches clean.
6. Keep necessary parts and tools near at hand.
7. Be sure to follow specified tightening torque and order.
8. Applying sealant

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

(1) Front cover and corners of cylinder block: See Figure EM-77.

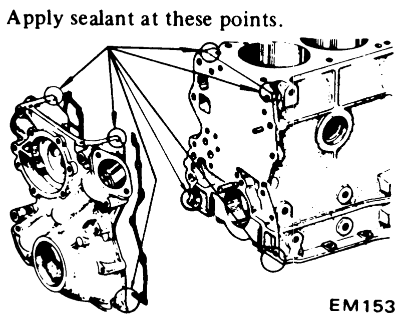


Fig. EM-77 Applying sealant (Front cover and cylinder block)

(2) Main bearing cap and cylinder block: Each side of rear main bearing cap and each corner of cylinder block. See Figure EM-78.

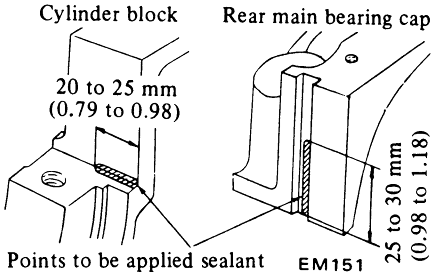


Fig. EM-78 Applying sealant (Main bearing cap and cylinder block)

(3) Cylinder block: Step portions at four mating surfaces (cylinder block to front chain cover and cylinder block to rear main bearing cap). See Figure EM-79.

Note: **Do not apply too much sealant.**

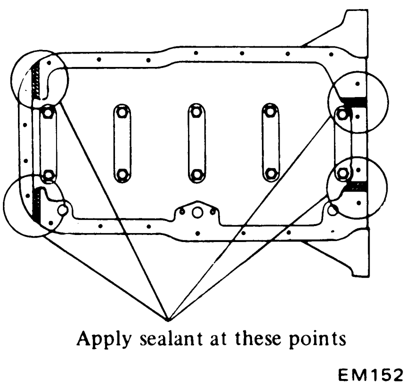


Fig. EM-79 Applying sealant (Cylinder block)

CYLINDER HEAD

1. Valve assembly and valve spring

Using 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.

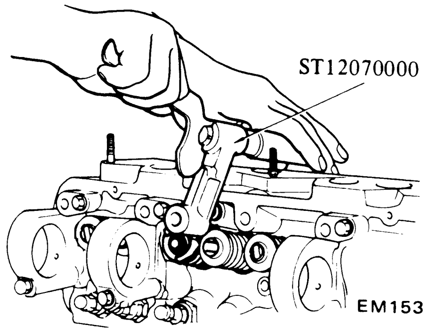


Fig. EM-80 Installing valve

Notes:

a. Ensure that valve face is free from foreign matter.

b. The L18 engine uses double type valve springs.

2. Valve rocker pivot assembly

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

3. Camshaft assembly

Set locating plate and carefully install camshaft in cylinder head. Do not damage the bearing inside. Oblong groove of locating plate must be directed toward front side of engine.

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

Tightening torque:
12 to 16 kg-m
(87 to 116 ft-lb)

At this time, check camshaft end play.

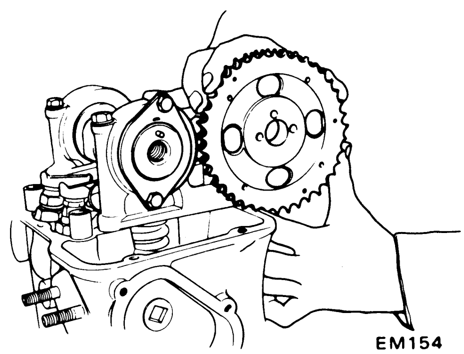


Fig. EM-81 Installing camshaft sprocket

5. Install rocker arms by pressing valve springs down with a screwdriver.
6. Install valve rocker springs.
7. After assembling cylinder head, turn camshaft until No. 1 piston is at T.D.C. on its compression stroke.

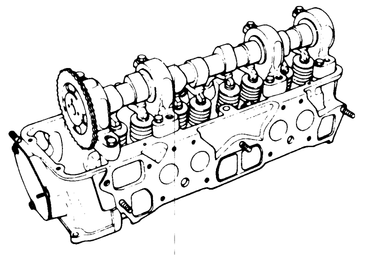


Fig. EM-82 Assembling cylinder head

PISTON AND CONNECTING ROD

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

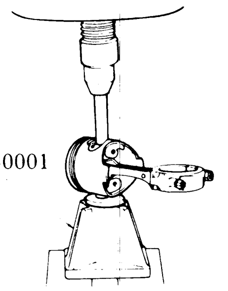


Fig. EM-83 Installing piston pin

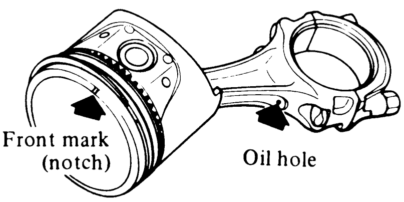


Fig. EM-84 Assembling piston and connecting rod

Notes:

a. **Piston is pressed into connecting rod, with fitting force of 0.5 to 1.5 tons; aid of Piston Pin Press Stand ST13030001 is necessary. When pressing piston pin into connecting rod, apply engine oil to pin and small end of connecting rod.**
b. **Arrange so that oil jet of connecting rod big end is directed toward right side of cylinder block.**
c. **Be sure to install piston in cylinders with notch mark of piston head toward front of engine.**

2. Install piston rings

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

Notes:

a. **Top ring is chromium-plated on liner contacting face.**
b. **Second ring has larger taper surface than top ring.**
c. **In the combined oil ring, upper rail is same as lower one.**

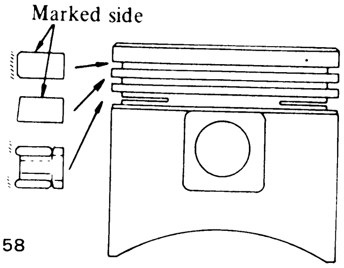


Fig. EM-85 Installing piston ring

3. Fix bearings on connecting rod and connecting rod cap.

Note: **Clean back side of bearing carefully.**

ENGINE ASSEMBLY

1. The first step in engine assembly is to bolt Engine Attachment ST05260001 to right hand side of cylinder block. Next, install block on another Engine Stand ST0501S000 with engine bottom up.
2. Set main bearings at the proper portion of cylinder block.

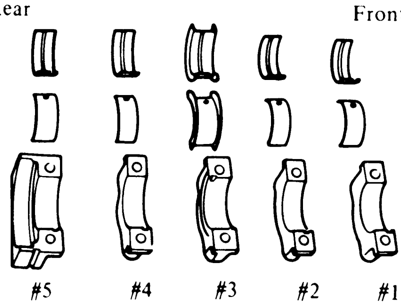


Fig. EM-86 Main bearings

3. Install baffle plate including cylinder block net.

Notes:

a. **Only center bearing (No. 3) is a flanged type.**
b. **All inter-bearings (No. 2 and No. 4) are the same type.**
c. **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.**
d. **All upper and lower bearings are interchangeable.**

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

Install crankshaft.

5. Install main bearing cap and tighten bolts to specified torque.

Tightening torque:
4.5 to 5.5 kg-m (33 to 40 ft-lb)

Notes:

a. **Apply sealant to each side of rear main bearing cap and each corner of cylinder block as shown in Figure EM-78.**
b. **Arrange parts so arrow mark on bearing cap faces toward front of engine.**
c. **Prior to tightening bearing cap bolts, place bearing cap in proper position by shifting crankshaft in the axial direction.**
d. **Tighten bearing cap bolts gradually, in two to three stages outwardly from center bearing in the sequence as shown in Figure EM-87.**
e. **After securing bearing cap bolts, ascertain that crankshaft turns smoothly.**

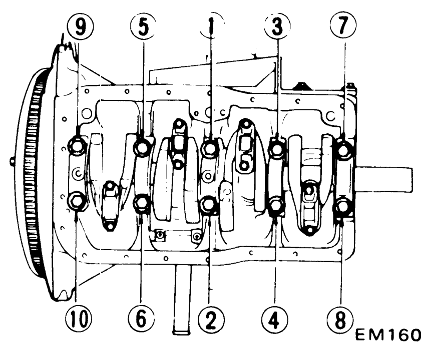


Fig. EM-87 Torque sequence of cap bolts

6. Make sure that crankshaft has oper end play.

Crankshaft end play:
0.05 to 0.18 mm
(0.0020 to 0.0071 in)

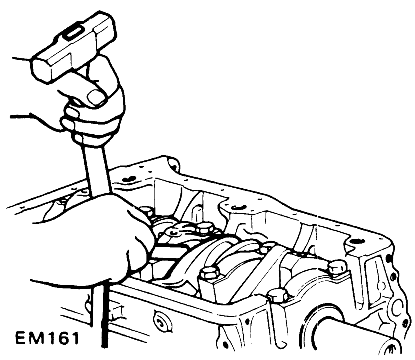


Fig. EM-88 Checking crankshaft end play

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

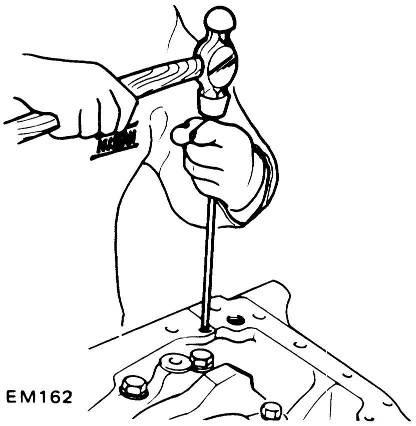


Fig. EM-89 Driving side oil seal

8. Install rear oil seal using Crankshaft Rear Oil Seal Drift ST15310000.

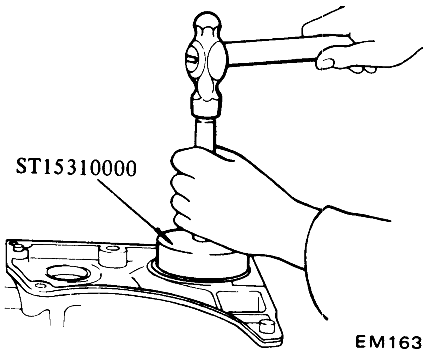


Fig. EM-90 Installing rear oil seal

Note: When installing oil seal, give coating of engine oil to mating shaft to prevent scratches and folded lip. Also give coating of oil to periphery of oil seal.

9. Install rear end plate.
10. Install flywheel securely, and tighten bolts to specified torque.

Tightening torque:
14 to 16 kg-m
(101 to 116 ft-lb)

11. Insert pistons in corresponding cylinder using Piston Ring Compressor EM03470000.

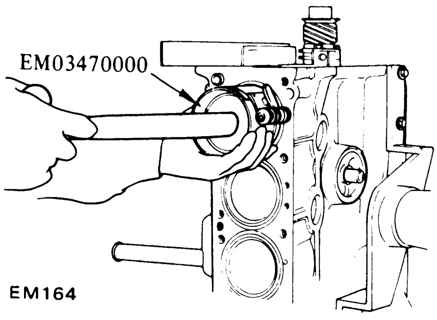


Fig. EM-91 Installing piston-rod assembly

Notes:
a. Apply engine oil to sliding parts.
b. Arrange so that notch mark on piston head faces to front of engine.
c. Install piston rings at 180° to each other, avoiding their fit in the thrust and piston pin directions.

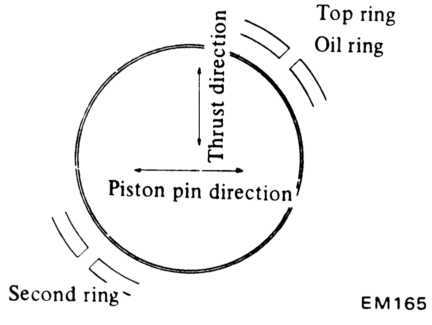


Fig. EM-92 Piston ring direction

12. Install connecting rod caps.

Tightening torque:
4.5 to 5.5 kg-m (33 to 40 ft-lb)

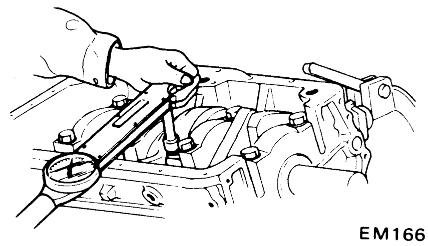


Fig. EM-93 Installing connecting rod cap

Note: Install connecting rods and connecting rod caps so that their assigned numbers are positioned on the same side and in the same direction with respect to cylinders.

13. Make sure that connecting rod big end has proper end play.

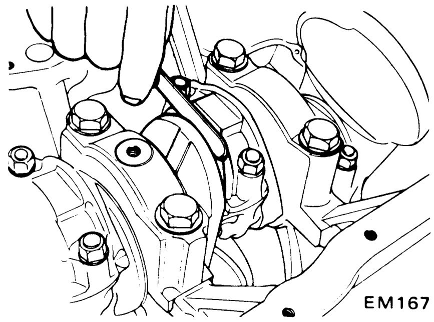


Fig. EM-94 Checking big end play

Big end play:
0.2 to 0.3 mm
(0.008 to 0.012 in)

14. Install cylinder head assembly.

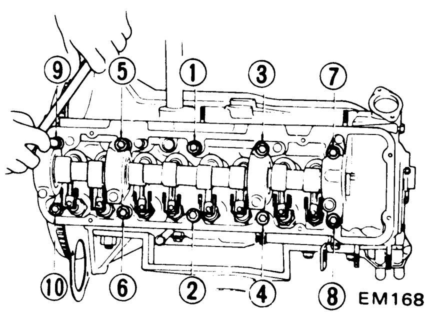


Fig. EM-95 Tightening sequence

(1) Thoroughly clean cylinder block and head surface.

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

(2) Turn crankshaft until No. 1 piston is at T.D.C. on its compression stroke.
(3) Make sure that camshaft sprocket location notch and plate oblong groove are aligned at their correct positions.
(4) When installing cylinder head, make sure that all valves are apart from heads of pistons.
(5) Do not rotate crankshaft and camshaft separately, or valves will hit heads of pistons.
(6) Temporarily tighten two bolts ①, ② shown in Figure EM-95.

Tightening torque:
2 kg-m (14 ft-lb)

15. Install crankshaft sprocket and oil pump drive gear, and fit oil thrower.

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

16. Install timing chain.

Notes:

a. **Make sure that crankshaft and camshaft keys point upwards.**

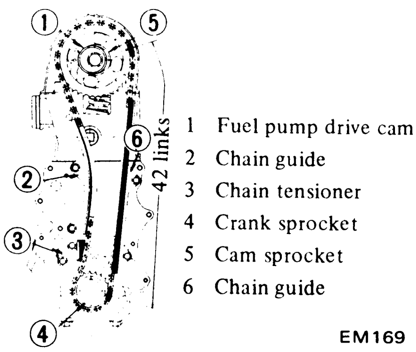


Fig. EM-96 Installing timing chain

b. **Set timing chain by aligning its mating marks with those of crankshaft sprocket and camshaft sprocket at the right hand side. There are forty-four chain links between two mating marks of timing chain.**
c. **No. 2 hole is factory adjusted. When chain stretches excessively, adjust camshaft sprocket at No. 3 hole.**
d. **Use a set of timing marks and location hole numbers.**

17. Install chain slack side guide to cylinder block.
18. Install chain tensioner.

Note: **Adjust protrusion of chain tensioner spindle to 0 mm (0 in).**

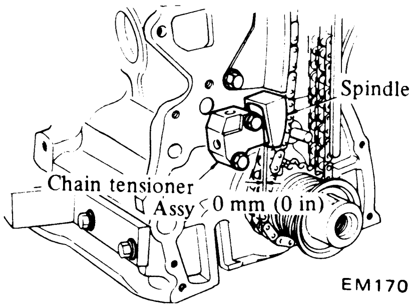


Fig. EM-97 Installing chain tensioner

19. Press new oil seal in front cover.

Notes:

a. **Front cover oil seal should be replaced when front cover is disassembled.**
b. **Before pressing oil seal into front cover, give coating of engine oil to periphery of oil seal.**
c. **This oil seal is a threaded seal type which has improved sealing characteristics. Do not apply grease to sealing lip.**

20. Install front cover with gasket in place.

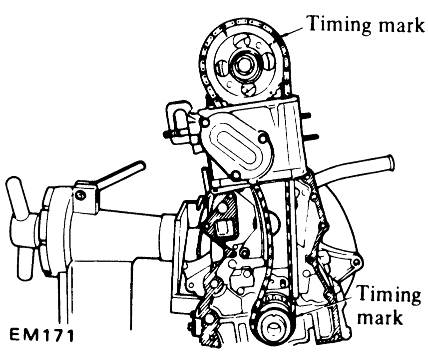


Fig. EM-98 Installing front cover

Notes:

a. **Apply sealant to front cover and corners of upper section of cylinder block as shown in Figure EM-77.**
b. **Install front cover with head gasket in place.**
c. **Check height difference between cylinder block upper face and front cover upper face. Difference must be less than 0.15 mm (0.0059 in).**
d. **Note that different types of bolts are used.**
e. **Before installing front cover on cylinder block, apply coating of engine oil to sealing lip of oil seal.**

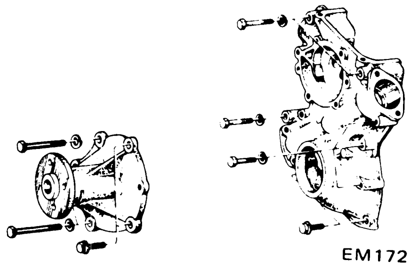


Fig. EM-99 Front cover bolts

Tightening torque:
Size M8 (0.315 in)
1.0 to 1.3 kg-m (7.2 to 9.4 ft-lb)
Size M6 (0.236 in)
0.4 to 0.6 kg-m (2.9 to 4.3 ft-lb)

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

Crankshaft pulley nut tightening torque:
12 to 16 kg-m (87 to 116 ft-lb)

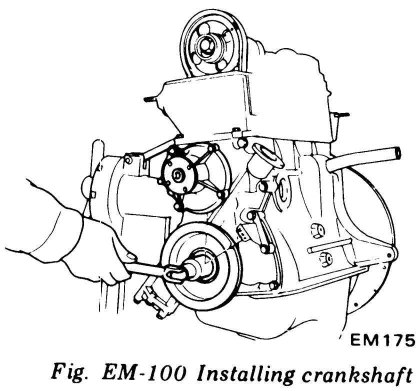


Fig. EM-100 Installing crankshaft pulley and water pump

22. Finally, tighten head bolts to the specified torque in three steps according to the tightening sequence shown in Figure EM-95.

Note that two types of bolts are used.

Special tool Cylinder Head Bolt Wrench ST10120000

Tightening torque:
1st turn
4.0 kg-m (29 ft-lb)
2nd turn
6.0 kg-m (43 ft-lb)
3rd turn
6.5 to 8.5 kg-m
(47 to 61 ft-lb)

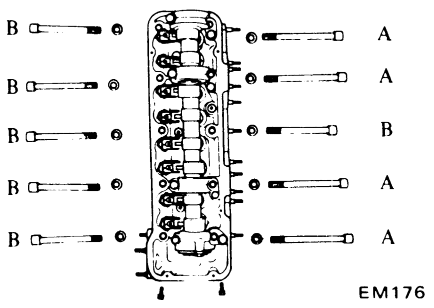


Fig. EM-101 Cylinder head bolts

Notes:
a. **Be sure to tighten two small bolts.**
b. **After engine has been operated for several minutes retighten if necessary.**

23. Install oil pump and distributor driving spindle in front cover.

Tightening torque:
1.1 to 1.5 kg-m
(8.0 to 10.8 ft-lb)

Notes:
a. **Assemble oil pump and drive spindle, aligning driving spindle face with oil pump hole.**
b. **Install oil pump together with drive spindle so that the projection on its top is located at the 11:25 a.m. position. At this point, the smaller bow-shape will be facing toward the front.**
c. **Do not forget to install gasket.**

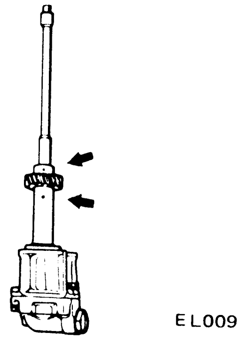


Fig. EM-102 Setting distributor driving spindle

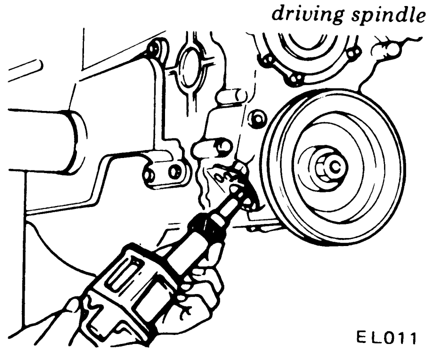


Fig. EM-103 Installing oil pump

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

Fuel pump tightening torque:
1.2 to 1.8 kg-m
(8.7 to 13.0 ft-lb)

Note: **Do not forget to install fuel pump spacer and packing between spacer and block, spacer and fuel pump.**

25. Install oil strainer, oil pan gasket and oil pan.

Notes:
a. **Apply sealant to the step portions at four mating surfaces as shown in Figure EM-80.**
b. **Oil pan should be tightened in criss-cross pattern to a final torque of 0.6 to 0.9 kg-m (4.3 to 6.5 ft-lb).**

26. Adjust valve clearance to the specified dimensions.

Special tool
Pivot Adjuster ST10640001

Tightening torque:
5.0 to 6.0 kg-m (36 to 43 ft-lb)

Notes:
a. **First set clearance to the cold specifications.**

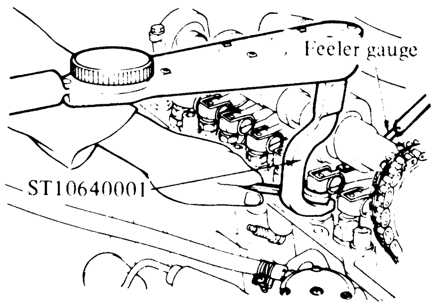


Fig. EM-104 Adjusting valve clearance

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

Valve clearance mm (in)	Cold	Intake	0.20 (0.0079)
		Exhaust	0.25 (0.0098)
	Warm	Intake	0.25 (0.0098)
		Exhaust	0.30 (0.0118)

27. Install rear engine slinger, exhaust manifold and intake manifold.

Tightening torque:
1.2 to 1.6 kg-m
(8.7 to 11.6 ft-lb)

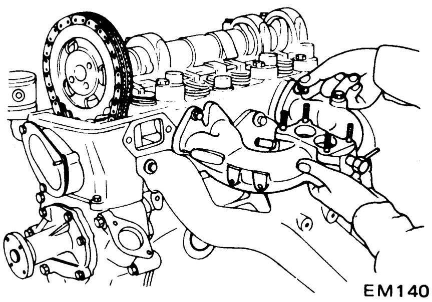


Fig. EM-105 Installing manifolds

28. Install distributor assembly.
29. Install rocker cover.

Tightening torque:
0.8 to 1.0 kg-m (5.8 to 7.2 ft-lb)

30. Install air gallery.
31. Install thermostat housing, thermostat and water outlet in their positions.

Do not forget to install gasket.

32. Install carburetor assembly and carburetor insulator with stamp facing upward.

Tightening torque:
0.5 to 1.0 kg-m
(3.6 to 7.2 ft-lb)

33. Install E.G.R. valve.
34. Install check valve.
35. Install fuel pipes. Clamp them securely, being careful not to allow them to interfere with adjacent parts.
36. Connect the following hoses to AB valve and clamp securely.

1) AB Valve to Intake Manifold
2) AB Valve to Check Valve
3) Air Pump to AB Valve

Install AB valve unit along with hoses in position, and clamp hoses securely.

37. Connect the following hoses to their positions, and clamp securely.

1) Air Cleaner to Air Pump
2) Crankcase to P.C.V. Valve
3) Fuel Hoses
4) Rocker Cover to Air Cleaner
5) Intake Manifold to Thermostat Housing
6) Intake Manifold to Water Outlet

38. Install spark plugs.
39. Connect distributor to plug high tension cable.
40. Install engine mounting bracket L.H.
41. Install clutch assembly.

Special tool
Clutch Aligning Bar ST20600000

Tightening torque:
1.2 to 2.2 kg-m
(8.7 to 15.9 ft-lb)

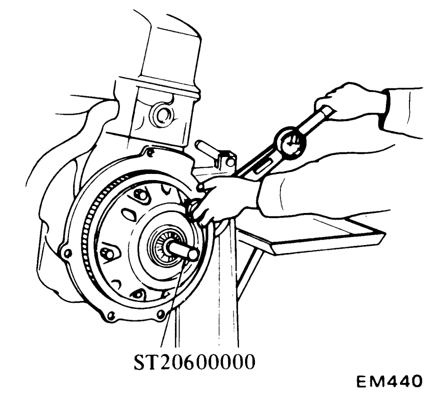


Fig. EM-106 Installing clutch assembly

42. Install air pump bracket and install air pump and belt.
43. Install oil level gauge.
44. Using an overhead hoist and lifting cable, hoist engine away from engine stand and then down onto engine carrier. Install alternator bracket, adjusting bar, alternator, fan pulley, fan and fan belt in that order. Then, check to be sure that deflection of fan belt is held within 8 to 12 mm (0.315 to 0.472 in) when thumb pressure is applied midway between pulleys [A pressed force is about 10 kg (22.0 lb).].

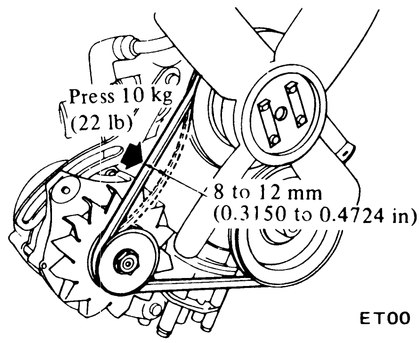


Fig. EM-107 Fan belt tension

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

Note: Do not overtighten filter, or oil leakage may occur.

46. Fill engine oil up to specified level.

SERVICE DATA AND SPECIFICATIONS

GENERAL SPECIFICATIONS

Cylinder arrangement		4, in-line
Displacement	cc (cu in)	1,770 (108.0)
Bore and stroke	mm (in)	85 x 78 (3.35 x 3.07)
Valve arrangement		O.H.C.
Firing order		1-3-4-2
Engine idle	rpm	
Manual transmission		800
Automatic transmission (in "D" range)		650
Compression ratio		8.5
Oil pressure (Warm at 2,000 rpm)	kg/cm² (psi)	3.5 to 4.0 (50 to 57)

TIGHTENING TORQUE

Cylinder head bolts	kg-m (ft-lb)	3rd Turn 6.5 to 8.5 (47 to 61)
Connecting rod big end nuts	kg-m (ft-lb)	4.5 to 5.5 (33 to 40)
Flywheel fixing bolts	kg-m (ft-lb)	14 to 16 (101 to 116)
Main bearing cap bolts	kg-m (ft-lb)	4.5 to 5.5 (33 to 40)
Camshaft sprocket bolt	kg-m (ft-lb)	12 to 16 (87 to 116)
Oil pan bolts	kg-m (ft-lb)	0.6 to 0.9 (4.3 to 6.5)
Oil pump bolts	kg-m (ft-lb)	1.1 to 1.5 (8.0 to 10.8)
Oil pan drain plug	kg-m (ft-lb)	2.0 to 3.0 (14 to 22)
Rocker pivot lock nuts	kg-m (ft-lb)	5.0 to 6.0 (36 to 43)
Camshaft locating plate bolts	kg-m (ft-lb)	0.6 to 0.9 (4.3 to 6.5)
Carburetor nuts	kg-m (ft-lb)	0.5 to 1.0 (3.6 to 7.2)
Manifold bolts	kg-m (ft-lb)	1.2 to 1.6 (8.7 to 11.6)
Fuel pump nuts	kg-m (ft-lb)	1.2 to 1.8 (8.7 to 13.0)
Crank pulley bolt	kg-m (ft-lb)	12 to 16 (87 to 116)

ENGINE MECHANICAL

SPECIFICATIONS

a) Valve mechanism

Valve clearance (Warm)		mm (in)	
	Intake		0.25 (0.0098)
	Exhaust		0.30 (0.0118)
Valve clearance (Cold)		mm (in)	
	Intake		0.20 (0.0079)
	Exhaust		0.25 (0.0098)
Valve head diameter		mm (in)	
	Intake		41.9 to 42.1 (1.650 to 1.657)
	Exhaust		35.0 to 35.2 (1.378 to 1.386)
Valve stem diameter		mm (in)	
	Intake		7.965 to 7.980 (0.3136 to 0.3142)
	Exhaust		7.945 to 7.960 (0.3128 to 0.3134)
Valve length		mm (in)	
	Intake		114.9 to 115.2 (4.524 to 4.535)
	Exhaust		115.7 to 116.0 (4.555 to 4.567)
Valve lift		mm (in)	
	Intake		10.5 (0.413)
	Exhaust		10.5 (0.413)
Valve spring free length		mm (in)	
	Intake	Outer	49.98 (1.968)
		Inner	44.85 (1.766)
	Exhaust	Outer	49.98 (1.968)
		Inner	44.85 (1.766)
Valve spring pressured length (Valve open)		mm/kg (in/lb)	
	Intake	Outer	29.5/49.0 (1.161/108)
		Inner	24.5/25.5 (0.965/56.2)
	Exhaust	Outer	29.5/49.0 (1.161/108)
		Inner	24.5/25.5 (0.965/56.2)
Valve spring assembled height (Valve close)		mm/kg (in/lb)	
	Intake	Outer	40.0/21.3 (1.575/47.0)
		Inner	35.0/12.3 (1.378/27.1)
	Exhaust	Outer	40.0/21.3 (1.575/47.0)
		Inner	35.0/12.3 (1.378/27.1)
Valve spring effective turns			
	Intake	Outer	5.0
		Inner	5.5
	Exhaust	Outer	5.0
		Inner	5.5
Valve spring wire diameter		mm (in)	
	Intake	Outer	4.0 (0.157)
		Inner	2.7 (0.106)
	Exhaust	Outer	4.0 (0.157)
		Inner	2.7 (0.106)

Valve spring coil diameter	mm (in)	
Intake Outer		29.4 (1.150)
Inner		24.2 (0.953)
Exhaust Outer		29.4 (1.150)
Inner		24.2 (0.953)
Valve guide length	mm (in)	
Intake		59.0 (2.323)
Exhaust		59.0 (2.323)
Valve guide height from head surface	mm (in)	10.6 (0.417)
Valve guide inner diameter	mm (in)	
Intake		8.000 to 8.018 (0.3150 to 0.3157)
Exhaust		8.000 to 8.018 (0.3150 to 0.3157)
Valve guide outer diameter	mm (in)	
Intake		12.023 to 12.034 (0.4733 to 0.4738)
Exhaust		12.023 to 12.034 (0.4733 to 0.4738)
Valve guide to stem clearance	mm (in)	
Intake		0.020 to 0.053 (0.0008 to 0.0021)
Exhaust		0.0040 to 0.0073 (0.0002 to 0.0003)
Valve seat width	mm (in)	
Intake		1.4 to 1.6 (0.0551 to 0.0630)
Exhaust		1.8 to 2.2 (0.0709 to 0.0866)
Valve seat angle		
Intake		45°30′
Exhaust		45°30′
Valve seat interference fit	mm (in)	
Intake		0.081 to 0.113 (0.0032 to 0.0044)
Exhaust		0.064 to 0.096 (0.025 to 0.038)
Valve guide interference fit	mm (in)	0.027 to 0.049 (0.0011 to 0.0019)

b) Camshaft and timing chain

Camshaft end play	mm (in)	0.08 to 0.38 (0.0031 to 0.0150)
Camshaft lobe lift	mm (in)	
Intake		7.0 (0.276)
Exhaust		7.0 (0.276)
Camshaft journal diameter	mm (in)	
1st		47.949 to 47.962 (1.8878 to 1.8883)
2nd		47.949 to 47.962 (1.8878 to 1.8883)
3rd		47.949 to 47.962 (1.8878 to 1.8883)
4th		47.949 to 47.962 (1.8878 to 1.8883)
Camshaft bend	mm (in)	0.02 (0.0008)
Camshaft journal to bearing clearance	mm (in)	0.038 to 0.067 (0.0015 to 0.0026)

Camshaft bearing inner diameter mm (in)		
1st		48.000 to 48.016 (1.8898 to 1.8904)
2nd		48.000 to 48.016 (1.8898 to 1.8904)
3rd		48.000 to 48.016 (1.8898 to 1.8904)
4th		48.000 to 48.016 (1.8898 to 1.8904)

c) Rocker arm lever ratio 1.5

d) Connecting rod

Center distance	mm (in)	130.35 (5.132)
Bearing material		F770
Bearing thickness (S.T.D.)	mm (in)	1.493 to 1.506 (0.0588 to 0.0593)
Big end play	mm (in)	0.20 to 0.30 (0.0079 to 0.0118)
Connecting rod bearing clearance	mm (in)	0.025 to 0.055 (0.0010 to 0.0022)
Connecting rod bend or torsion (per 100 mm or 2.937 in)	mm (in)	less than 0.03 (0.012)

e) Crankshaft and main bearing

Journal diameter	mm (in)	59.942 to 59.955 (2.3599 to 2.360)
Journal taper & out-of-round	mm (in)	less than 0.01 (0.0004)
Crankshaft free end play	mm (in)	0.05 to 0.18 (0.0020 to 0.0071)
Wear limit of dittoed play	mm (in)	0.3 (0.0118)
Crank pin diameter	mm (in)	49.961 to 49.974 (1.9670 to 1.9675)
Crank pin taper & out-of-round	mm (in)	less than 0.01 (0.0004)
Main bearing material		F770
Main bearing thickness (S.T.D.)	mm (in)	1.827 to 1.835 (0.0719 to 0.0722)
Main bearing clearance	mm (in)	0.020 to 0.062 (0.0008 to 0.0024)
Wear limit of dittoed clearance	mm (in)	0.12 (0.0047)
Crankshaft bend	mm (in)	0.05 (0.0020)

f) Piston

Piston diameter (S.T.D.)	mm (in)	84.965 to 85.015 (3.3451 to 3.3470)
0.50 (0.0197) Oversize	mm (in)	85.465 to 85.515 (3.3648 to 3.3667)
1.00 (0.0394) Oversize	mm (in)	85.965 to 86.015 (3.3844 to 3.3864)
Ellipse difference	mm (in)	0.39 to 0.42 (0.0154 to 0.0165)

Ring groove width	mm (in)	
Top		2.030 to 2.050 (0.0799 to 0.0807)
Second		2.020 to 2.040 (0.0795 to 0.0803)
Oil		4.015 to 4.040 (0.1581 to 0.1591)
Piston to bore clearance	mm (in)	0.025 to 0.045 (0.0010 to 0.0018)
Piston pinhole off-set	mm (in)	0.95 to 1.05 (0.0374 to 0.0413)

g) Piston pin

Pin diameter	mm (in)	20.993 to 20.998 (0.8265 to 0.8267)
Pin length	mm (in)	72.25 to 73.00 (2.8445 to 2.8740)
Piston pin to piston clearance	mm (in)	0.003 to 0.015 (0.0001 to 0.0006)
Interference fit of piston pin to connecting rod bushing	mm (in)	0.015 to 0.033 (0.0006 to 0.0013)

h) Piston ring

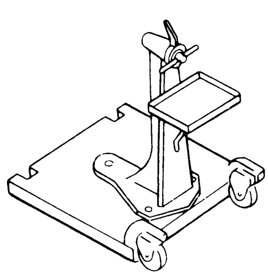
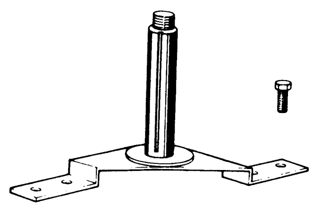
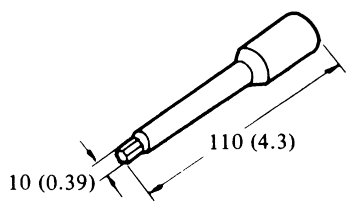
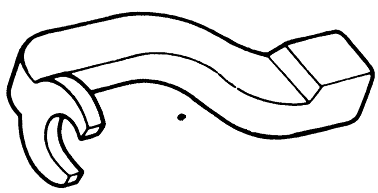
Ring height	mm (in)	
Top		1.977 to 1.990 (0.0778 to 0.0783)
Second		1.970 to 1.990 (0.0776 to 0.0783)
Side clearance	mm (in)	
Top		0.040 to 0.073 (0.0016 to 0.0029)
Second		0.030 to 0.070 (0.0012 to 0.0028)
Ring gap	mm (in)	
Top		0.25 to 0.40 (0.0098 to 0.0157)
Second		0.30 to 0.50 (0.0118 to 0.0197)
Oil		0.30 to 0.90 (0.0118 to 0.0354)

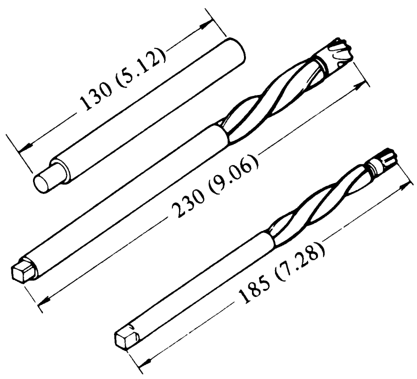
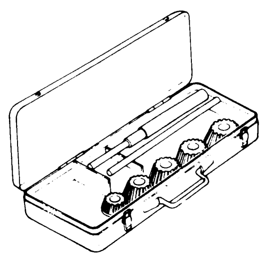
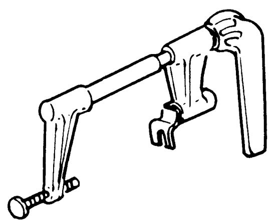
TROUBLE DIAGNOSES AND CORRECTIONS

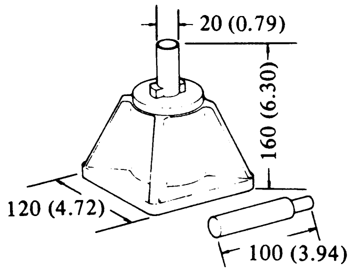
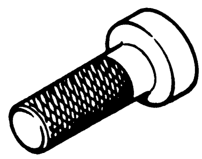
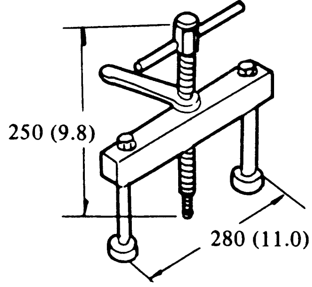
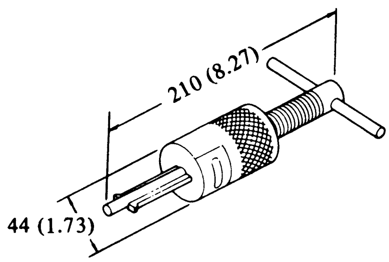
Condition	Probable cause	Corrective action
I. Noisy engine		
Knocking of crankshaft and bearing	Loose main bearing.	Replace.
	Seized bearing.	Replace.
	Bent crankshaft.	Repair or replace.
	Uneven wear of journal.	Correct.
	Excessive crankshaft end play.	Replace center bearing.
Knocking of piston and connecting rod	Loose bearing.	Replace.
	Seized bearing.	Replace.
	Loose piston pin.	Replace pin or bushing.
	Loose piston in cylinder.	Recondition cylinder.
	Broken piston ring.	Replace.
	Improper connecting rod alignment.	Realign.
Camshaft knocking	Loose bearing.	Replace.
	Excessive axial play.	Replace bearing thrust plate.
	Rough gear teeth.	Repair.
	Broken cam gear.	Replace.
Timing chain noise	Improper chain tension.	Adjust.
	Worn and/or damaged chain.	Replace.
	Worn sprocket.	Replace.
	Worn and/or broken tension adjusting mechanism.	Replace.
	Excessive camshaft and bearing clearance.	Replace.
Camshaft and valve mechanism knocking	Improper valve clearance.	Adjust.
	Worn adjusting screw.	Replace.
	Worn rocker face.	Replace.
	Loose valve stem in guide.	Replace guide.
	Weakened valve spring.	Replace.
	Seized valve.	Repair or replace.
Water pump knocking	Improper shaft end play.	Replace.
	Broken impeller.	Replace.
II. Other mechanical troubles		
Stuck valve	Improper valve clearance.	Adjust.
	Insufficient clearance between valve stem and guide.	Clean stem or ream guide.
	Weakened or broken valve spring.	Replace.
	Biting or damage of valve stem.	Replace or clean.
	Poor quality of fuel.	Use good fuel.

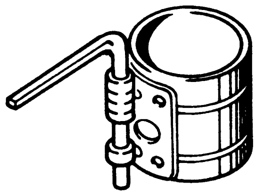
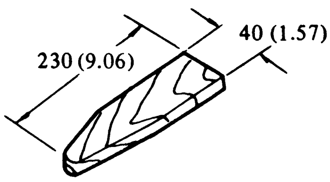
Condition	Probable cause	Corrective action
Seized valve seat	Improper valve clearance.	Adjust.
	Weakened valve spring.	Replace.
	Thin valve head edge.	Replace valve.
	Narrow valve seat.	Reface.
	Overheating.	Repair or replace.
	Over speeding.	Drive at proper speeds.
	Stuck valve guide.	Repair.
Excessively worn cylinder and piston	Shortage of engine oil.	Add or replace oil.
	Dirty engine oil.	Clean crankcase, replace oil and oil filter element.
	Poor quality of oil.	Use right oil.
	Overheating.	Repair or replace.
	Wrong assembly of piston with connecting rod.	Repair or replace.
	Improper piston ring clearance.	Adjust.
	Broken piston ring.	Replace.
	Dirty air cleaner.	Clean.
	Mixture too rich.	Adjust.
	Engine over run.	Drive at proper speeds.
	Stuck choke valve.	Clean and adjust.
	Overchoking.	Start correct way.
Faulty connecting rod	Shortage of engine oil.	Add oil.
	Low oil pressure.	Correct.
	Poor quality of engine oil.	Use proper oil.
	Rough surface of crankshaft.	Grind and replace bearing.
	Clogged oil passage.	Clean.
	Bearing worn or eccentric.	Replace.
	Bearing improperly assembled.	Correct.
	Loose bearing.	Replace.
	Connecting rod alignment incorrect.	Repair or replace.
Faulty crankshaft bearing	Shortage of engine oil.	Add or replace.
	Low oil pressure.	Correct.
	Poor quality of engine oil.	Use proper oil.
	Crankshaft journal worn or out-of-round.	Repair.
	Clogged oil passage in crankshaft.	Clean.
	Bearing worn or eccentric.	Replace.
	Bearing improperly assembled.	Correct.
	Eccentric crankshaft or bearing.	Replace.

SPECIAL SERVICE TOOLS

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or figure No.
1.	ST0501S000 Engine stand assembly -ST05011000 Engine stand -ST05012000 Base	This engine stand assembly is used for disassembling or assembling engine block or differential carrier throughout 360° in all directions.  SE184	All models	Fig. EM-11 Page EM-22
2.	ST05260001 Engine attachment	This engine attachment is installed to engine stand ST0501S000 in disassembling or assembling engine.  SE185	L16 L18	Fig. EM-11 Page EM-22
3.	ST10120000 Cylinder head bolt wrench	Special hollow set bolts are used in tightening cylinder heads in L-series engines. This wrench is used to torque cylinder head bolts and its head can be inserted into the torque wrench.  SE186	All L-series	Fig. EM-17 Page EM-25
4.	ST10640001 Pivot adjuster	This tool is used together with a torque wrench in tightening pivot lock nut for valve clearance adjustment.  SE187	All L-series	Fig. EM-104

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or figure No.
5.	ST1103S000 Valve guide reamer set -ST11031000 Reamer (12.2 mm dia.) -ST11032000 Reamer (8.0 mm dia.) -ST11033000 Drift	This guide is used for: o Pressing used guide out of place. o Driving a new guide into place. o Finishing the bore of new guide.  SE192	All L-series	Fig. EM-43
6.	ST11650001 Valve seat cutter set	This valve seat cutter set is used to or refinish a valve seat.  SE193	All L-series	Fig. EM-44
7.	ST12070000 Valve lifter	This tool is used to compress valve spring by the combined action of its cam and lever, thereby facilitating the removal or installation of collect (for general use).  SE194	All models	Fig. EM-31 Page EM-21 Fig. EM-80

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or figure No.
8.	ST13030001 Piston pin press stand	This tool is used with a press to drive pin into, or out of, connecting rod.  	All L-series	Fig. EM-28 Fig. EM-83
9.	ST15310000 Crankshaft rear oil seal drift	This tool is used to push a lip type rear oil seal for L-series engine into place by giving hammer blows.  	All L-series	Fig. EM-90
10.	ST1651S000 Crankshaft main bearing cap puller ST16511000 Body ST16512001 Adapter	This tool is used to remove the cap from main bearing. When using this tool, turn its adapter into the threaded hole in main bearing cap.  	All L-series	Fig. EM-24
11.	ST16610001 Pilot bush puller	This tool is used to push pilot bush out of place.  	L16 L18	Fig. EM-65

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or figure No.
12.	EM03470000 Piston ring compressor	This tool is used to compress piston rings while piston is being inserted into cylinder.  SE199	All models	Fig. EM-91
13.	ST17420001 Chain stopper	This tool is used to prevent chains from falling out of place in removing cylinder heads or cam gears and shafts.  SE195	All L-series	Fig. EM-18

SERVICE MANUAL

DATSUN PICK-UP
MODEL 620 SERIES

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

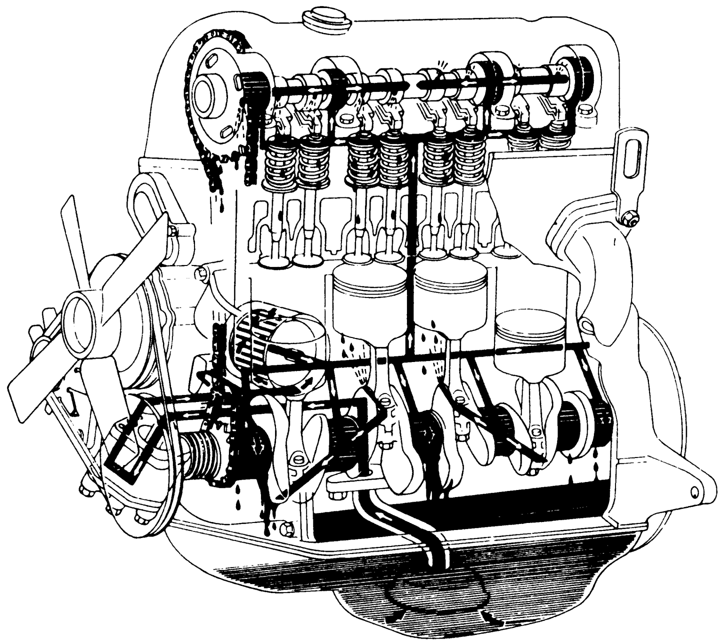
SECTION EL

ENGINE LUBRICATION SYSTEM

EL

ENGINE LUBRICATION SYSTEM

CONTENTS

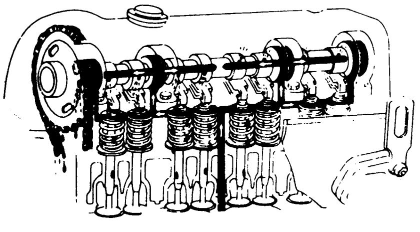


EL007

Fig. EL-1 Lubricating circuit

LUBRICATION CIRCUIT

The pressure lubrication of the engine is accomplished by a trochoid-type oil pump. This pump draws the oil through the oil strainer into pump housing and then forces it through the full flow type oil filter into the main oil gallery. Part of the oil is supplied to all crankshaft bearings, chain tensioner and timing chain. Oil supplied to crankshaft bearings is fed to connecting rod bearings through the drilled passages in the crankshaft. Oil injected from jet holes on connecting rods lubricates the cylinder walls and piston pins. The other part of the oil is brought to the oil gallery in the cylinder head to provide lubrication of the valve mechanism and timing chain as shown in Figure EL-2.



EL008

Fig. EL-2 Lubricating cylinder head

From this gallery, oil holes go directly to all camshaft bearings through cam brackets.

Oil supplied through the No. 2 and No. 3 camshaft bearings is then fed to the rocker arm, valve and cam lobe through the oil gallery in the camshaft and the small channel at the base circle portion of each cam.

OIL PUMP

The oil pump is secured on th bottom of the front cover with fou bolts and driven by the oil pump drive spindle assembly which is driven by the helical gear on the crankshaft.

The oil pump assembly consists of an oil pressure regulator valve and outer and inner rotors.

The spring-loaded oil pressure regulator valve limits the oil pressure to a maximum of 5.6 kg/cm^2 (80 psi).

Removal

1. Remove distributor.
2. Drain engine oil, if necessary.
3. Remove oil pump body with drive spindle assembly.

Installation

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

2. Fill pump housing with engine il, then align punch mark of spindle with hole in oil pump as shown in Figure EL-3.

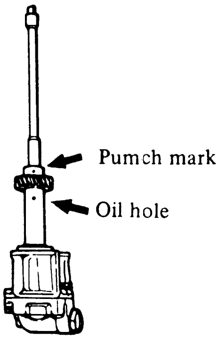


Fig. EL-3 Aligning punch mark and oil hole

3. 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 EL-4.

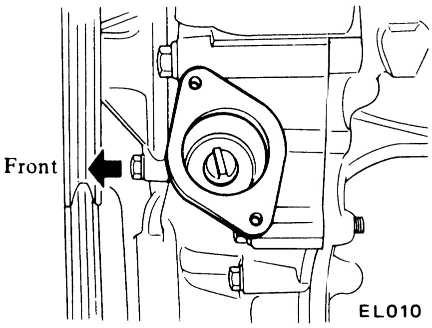


Fig. EL-4 Setting drive spindle

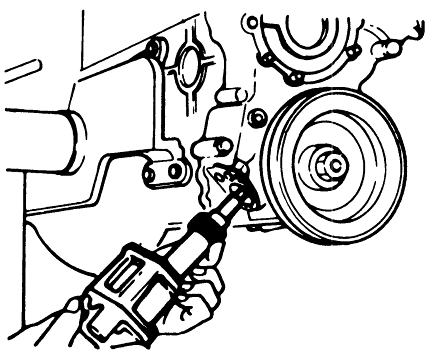


Fig. EL-5 Installing oil pump

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

4. Tighten bolts securing oil pump to front cover.

Disassembly and assembly

1. Remove pump cover attaching bolts, pump cover and cover gasket, and slide out pump rotors.
2. Remove regulator cap, regulator valve and spring.
3. Install pressure regulator valve and related parts.
4. Install outer rotor, inner rotor and shaft in pump body and do not turn cover gasket up.

1 Oil pump body
2 Inner rotor and shaft
3 Outer rotor
4 Oil pump cover
5 Regulator valve
6 Regulator spring
7 Washer
8 Regulator cap
9 Cover gasket

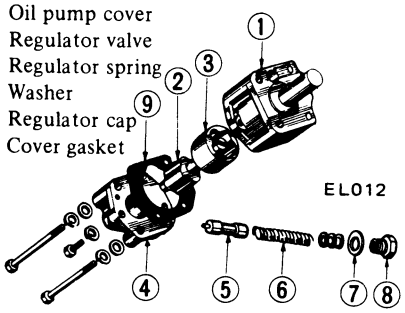


Fig. EL-6 Oil pump

Inspection

Wash all parts in cleaning solvent and dry with compressed air.

1. Inspect pump body and cover for cracks or excessive wear.
2. Inspect pump rotors for damage or excessive wear.
3. Check inner rotor shaft for looseness in pump body.
4. Inspect regulator valve for wear or scoring.
5. Check regulator spring to see that it is not worn on its side or collapsed.
6. Using a feeler gauge, check tip clearance and outer rotor-to-body clearances shown in Figure EL-7.

1 Side clearance
2 Tip clearance
3 Outer rotor to body clearance
4 Rotor to bottom cover clearance

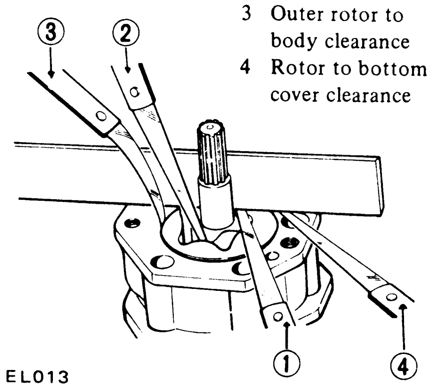


Fig. EL-7 Checking rotor clearances

7. Place a straight edge across the face of pump as shown in Figure EL-7. Check side clearance (outer to inner rotor) and gap between body and straight edge.

The gap should be –0.03 to 0.06 mm (–0.0012 to 0.0024 in), then rotor to bottom cover clearance with gasket should satisfy the specifications.

L16 and L18		Standard	Wear limit
Rotor side clearance (outer to inner rotor)	mm (in)	0.05 to 0.12 (0.0020 to 0.0047)	0.20 (0.0079)
Rotor tip clearance	mm (in)	Less than 0.12 (0.0047)	0.20 (0.0079)
Outer rotor to body clearance	mm (in)	0.15 to 0.21 (0.0059 to 0.0083)	0.5 (0.0197)
Rotor to bottom cover clearance	mm (in)	0.03 to 0.13 (0.0012 to 0.0051)	0.20 (0.0079)

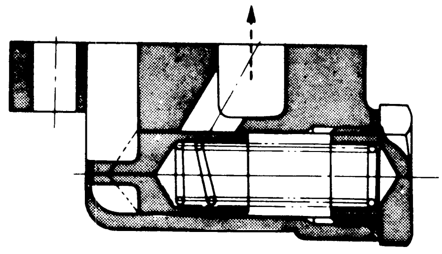
Notes:

a. **Pump rotors and body are not serviced separately. If pump rotors or body are damaged or worn, replacement of the entire oil pump assembly is necessary.**

b. **The clearances with an asterisk "*" in the chart are those obtained with cover gaskets of three different sizes.**
   When re-assembling the pump, be sure to use a new cover gasket of the same size as that formerly used.

OIL PRESSURE REGULATOR VALVE

The oil pressure regulator valve is not adjustable. At the released position, the valve permits the oil to by-pass through the passage in the pump cover to the inlet side of the pump. Check regulator valve spring to ensure that spring tension is correct.



EL014

Fig. EL-8 Regulator valve

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 36)
Specifications		
Oil pressure at idling	kg/cm^2 (psi)	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 (psi)	3.5 to 5.0 (50 to 71)
Regulator valve clearance	mm (in)	0.04 to 0.10 (0.0016 to 0.0039)

OIL FILTER

The oil filter is a cartridge type. The oil filter element should be replaced at regular intervals, with the use of special tool.

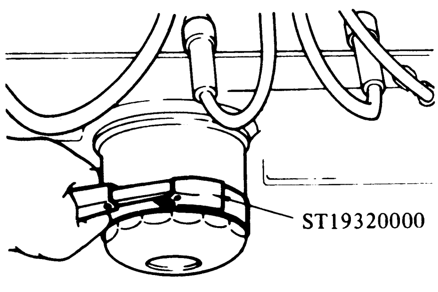
"Oil Filter Wrench"
ST19320000

When installing an oil filter, fasten it to cylinder block by hand.

Note: **Do not overtighten filter, or oil leakage may occur.**

RELIEF VALVE

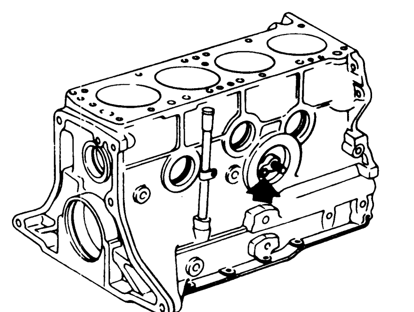
The relief valve located at the center portion securing oil filter to the cylinder block by-passes the oil into the main gallery when the oil filter element is excessively clogged.



EL015

Fig. EL-9 Removing oil filter

With oil filter removed, check valve unit for operation. Inspect for a cracked or broken valve. If replacement is necessary, remove valve by prying it out with a screwdriver. Install a new valve in place by tapping it.



EL016

Fig. EL-10 Relief valve

SERVICE DATA AND SPECIFICATIONS

Oil pump

		Standard	Wear limit
Rotor side clearance (outer to inner rotor)	mm (in)	0.04 to 0.08 (0.0016 to 0.0031)	0.20 (0.0079)
Rotor tip clearance	mm (in)	less than 0.12 (0.0047)	0.20 (0.0079)
Outer rotor to body clearance	mm (in)	0.15 to 0.21 (0.0059 to 0.0083)	0.5 (0.0197)
Rotor to bottom cover clearance	mm (in)	0.03 to 0.13 (0.0012 to 0.0051)	0.20 (0.0079)

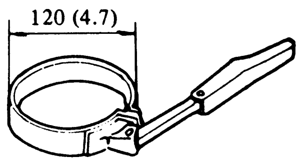
Oil pressure regulator valve

Oil pressure at idling	kg/cm^2 (psi)	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 (psi)	3.5 to 5.0 (50 to 71)
Regulator valve clearance	mm (in)	0.04 to 0.10 (0.0016 to 0.0039)
Tightening torque:		
Oil pump mounting bolts	kg-m (ft-lb)	1.1 to 1.5 (8.0 to 10.8)
Oil pump cover bolts	kg-m (ft-lb)	0.7 to 1.0 (5.1 to 7.2)
Regulator valve cap nut	kg-m (ft-lb)	4 to 5 (29 to 36)

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable causes	Corrective actions
Oil leakage	Damaged or cracked body cover.	Replace.
	Oil leakage from gasket.	Replace.
	Oil leakage from regulator valve.	Tighten or replace.
	Oil leakage from blind plug.	Replace.
Decreased oil pressure	Leak of oil in engine oil pan.	Correct.
	Dirty oil strainer.	Clean or replace.
	Damaged or worn pump rotors.	Replace.
	Faulty regulator.	Replace.
	Use of poor quality engine oil.	Replace.
Warning light remains "on" engine running	Decreased oil pressure.	Previously mentioned.
	Oil pressure switch unserviceable.	Replace.
	Electrical fault.	Check circuit.
Noise	Excessive backlash in pump rotors.	Replace.

SPECIAL SERVICE TOOL

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or figure No.
1.	ST19320000 Oil filter wrench	This tool is used to take oil filter out of place. In tightening the filter, do not use this tool, to prevent excess tightening.  SE197	All models	Page EM-5 Fig. EL-9 Page ET-3

SERVICE MANUAL

DATSUN PICK-UP
MODEL 620 SERIES

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION CO

COOLING SYSTEM

CO

COOLING SYSTEM

CONTENTS

DESCRIPTION

The cooling system is a conventional pressure type. A centrifugal pump built in the front cover circulates the coolant.

The pressure type radiator filler cap installed on the radiator controls the cooling system at higher than atmospheric pressure. The higher pressure raises the boiling point of the coolant and increases the cooling efficiency of the radiator.

When the thermostat is closed, the coolant remains in the cylinder head and block for quick warm up of the engine. After reaching normal operating temperature, the coolant circulates through the radiator.

The cooling fan drive is a rigid type for the conventional model, and a coupling type for the model (710) equipped with an air conditioning system. The torque coupling and the water pump are built into a unit construction.

A large-capacity cooling fan unit is used on the model equipped with an air conditioning system. Figure CO-1 shows the torque coupling with the large-capacity cooling fan unit.

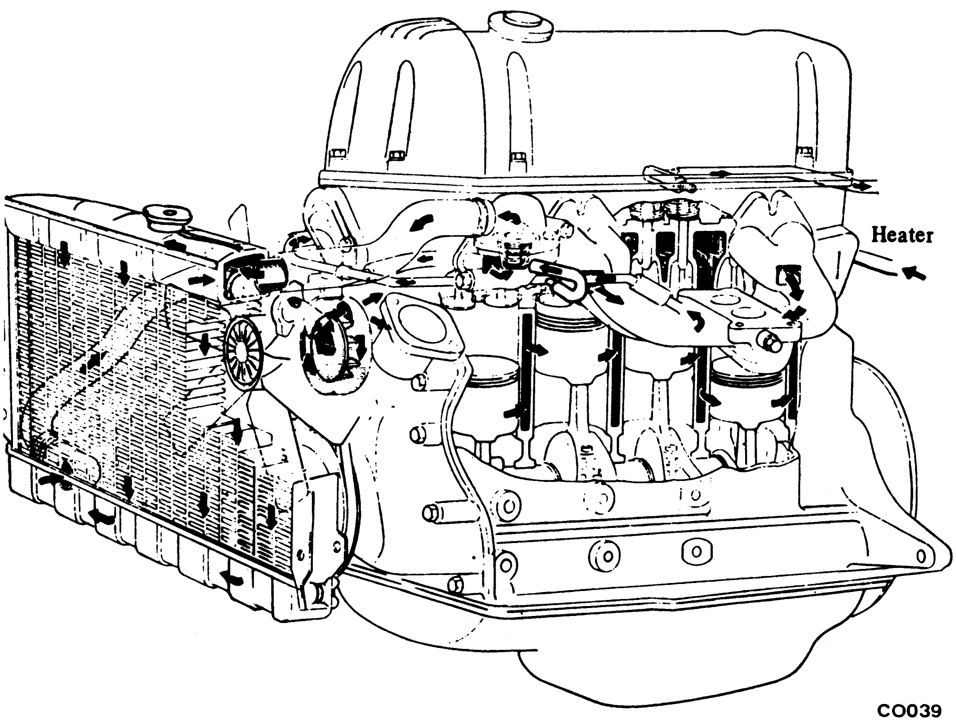


Fig. CO-1 Cooling system

Coolant level

The radiator coolant level should be checked and maintained 30 mm (1.18 in) (for 710, 620 model) below the bottom of the filler neck, when the engine is cold.

The expansion of the coolant will cause the level to drop due to overflow.

CAUTION:

To avoid serious personal injury, never remove radiator cap quickly when the engine is hot. Sudden release of cooling system pressure is very dangerous.

If it is necessary to remove the radiator cap when the radiator is hot, turn cap slowly counterclockwise to first stop. After all pressure in cooling system is released, turn cap past the stop and remove it.

Draining and flushing the cooling system

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

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

WATER PUMP

The water pump, fan pulley and torque coupling are built into a unit construction. The water pump assembly is a centrifugal type and is mounted on the engine front cover. The fan is bolted at the torque coupling. The torque coupling keeps the fan speed at 2,500 rpm (rated) or below to conserve horsepower at high engine speed. It also helps reduce fan noise to a minimum during high speed operation. This unit is filled with a special silicone oil used as a fluid coupling which controls the fan speed. (Silicone oil can not be replenished.) The pump shaft is supported by a double row ball bearing pressed into an aluminum die cast pump body. The bearing is permanently lubricated and sealed to prevent loss of lubricant and entry of dirt. The pulley hub is pressed onto the front end of the pump shaft. The torque coupling disc is pressed onto the pump shaft through the ball bearing and is securely staked at the front end face of the bearing. The torque coupling wheel is spline-fitted to the pump shaft and is securely staked at the front end face. The torque coupling disc and its wheel can not be disassembled. The fan pulley is welded to the pulley hub. The pump incorporates the impeller and volute chamber in it. The impeller rotates together with the torque coupling wheel. The volute chamber is provided in the front cover assembly. The inlet of the pump is connected to the radiator lower tank by a hose.

The torque coupling is installed only in the 710 model.

The 620 model continues to use the same L18 engine as that offered in 1973.

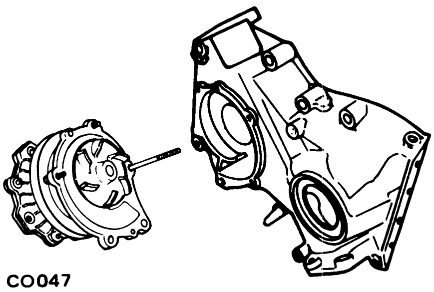


Fig. CO-2 Water pump and front cover

Removal

1. Drain coolant into a clean container.
2. Loosen four bolts securing fan shroud to radiator and remove shroud.
3. Loosen four bolts securing fan blade to torque coupling, and remove fan blade.
4. To loosen fan belt, loosen bolt securing alternator to bracket.
5. Remove five bolts securing water pump assembly to engine front cover, and detach water pump assembly and gasket from engine front cover. See Figure CO-3.

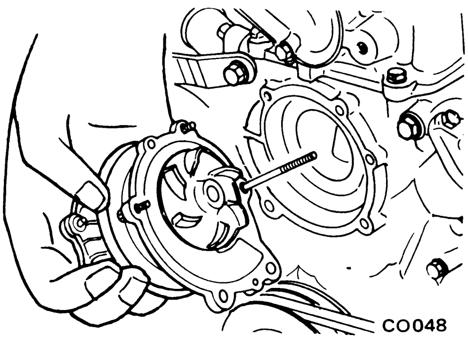


Fig. CO-3 Removing water pump

Disassembly

The water pump is so designed that it can not be disassembled.

Inspection

Inspect water pump assembly for the following. Replace pump assembly, if necessary.

1. Badly rusted or corroded body assembly and vane.
2. Excessive end play or rough operation of bearings.
3. Reduced cooling efficiency due to deteriorated silicone oil.
4. Oil leakage in torque coupling.

Installation

1. Make sure to clean gasket surfaces
1. Clean gasket surfaces on pump and front cover. Always use new gasket when installing pump assembly. Be sure to tighten bolts uniformly.
2. Fill cooling system and check for leaks at pump.
3. Install fan blade, and tighten fixing bolts securely.

Install belt and adjust for proper tension. Refer to page ET-2, for Fan Belt Adjustment.

Fan belt adjustment

The fan belt should be properly adjusted at all times. A tight belt causes wear of alternator and water pump bearings. A loose belt causes improper cooling fan, water pump and alternator operation.

Check belt slack between alternator and fan pulley by pressing a force of 10 kg (22 lb).

Slackness of fan belt:
8 to 12 mm
(0.31 to 0.47 in)

If adjustment is necessary, loosen bolt retaining alternator adjusting bar to alternator. Move alternator toward or away from engine until correct tension is obtained.

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 the 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.

Removal and installation

1. Partially drain coolant.
2. Disconnect upper radiator hose at water outlet.
3. Loosen two securing nuts and remove water outlet, gasket, and thermostat from thermostat housing.
4. After checking thermostat, reinstall, replacing with a new housing gasket.
5. Reinstall water outlet and tighten securing nuts.
6. Replenish coolant and check for leaks.

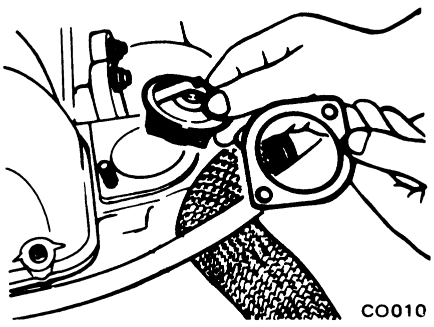


Fig. CO-4 Removing thermostat

Inspection

A sticking thermostat will prevent the cooling system from functioning properly. If thermostat sticks in the open position, engine will warm up very slowly. If thermostat sticks in the closed position, overheating will result.

Therefore, the thermostat should be inspected to make sure it is in good condition.

1. Submerge thermostat in hot water 5°C (9°F) above the temperature specified in following table.
2. Measure lift height of valve by inserting a screwdriver marked at point about 8 mm (0.315 in) from its tip.
3. Remove thermostat and place in water 5°C (9°F) below temperature stamped on the frame.
4. Under above condition, valve should be closed completely.

Agitate water to maintain an even temperature throughout the container.

If thermostat does not operate at above specified temperatures, it must be replaced.

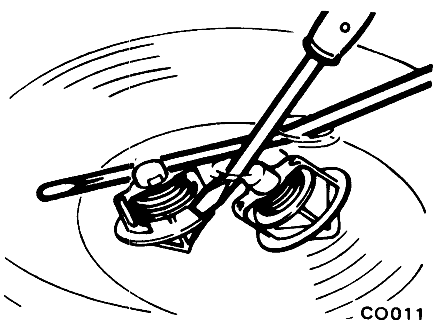


Fig. CO-5 Inspecting thermostat

If thermostat does not operate at above specified temperatures, it must be replaced because it can not be repaired.

	U.S.A.	Canada	Puerto Rico, Guam and U.N.T.T.
Valve opening temp.	82°C (180°F)	88°C (190°F)	76.5°C (170°F)
Max. valve lift	Above 8 mm at 95°C (0.315 in at 203°F)	Above 8 mm at 100°C (0.315 in at 212°F)	Above 8 mm at 90°C (0.315 in at 194°F)

Note: It is necessary to check a new thermostat before installing it in engine.

RADIATOR

The radiator is a conventional down flow type with top and bottom tanks to distribute 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/cm² (13 psi) above atmospheric pressure. The relief valve consisting of a blow-off valve and a vacuum valve, helps to prevent coolant loss from boiling by raising the pressure on the coolant. On the contrary, when 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.

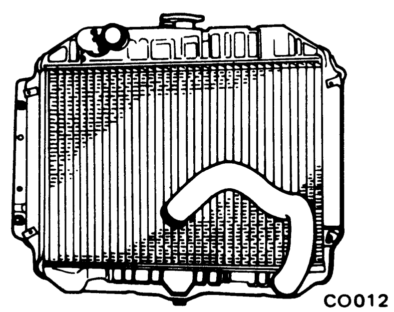


Fig. CO-6 Radiator for manual transmission

Removal and installation

1. Drain coolant into a clean container.
2. Remove front grille.
3. Disconnect radiator upper and lower hoses. On car with automatic transmission, disconnect cooler inlet and outlet lines from radiator.
4. Remove four bolts securing radiator shroud to radiator, and detach radiator shroud from radiator.
5. Remove four bolts securing radiator to radiator side supports. Remove radiator from car after pulling two hooks out through holes in radiator upper support. These hooks are installed on the front top face of radiator.

Inspection

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

Also, inspect radiator for water leakage using cap tester applying a pressure of 1.2 kg/cm² (17 psi). If malfunction is detected, repair or replace radiator.

SERVICE DATA AND SPECIFICATIONS

Thermostat

	U.S.A.	Canada	Puerto Rico, Guam and U.N.T.T.
Valve opening temp.	82°C (180°F)	88°C (190°F)	76.5°C (170°F)
Max. valve lift	Above 8 mm at 95°C (0.315 in at 203°F)	Above 8 mm at 100°C (0.315 in at 212°F)	Above 8 mm at 90°C (0.315 in at 194°F)

Radiator

Model	710		620	
Transmission type	Manual	Automatic	Manual	Automatic
Dimension of radiator core height x width x thickness mm (in)	360 x 544 x 32 (14.2 x 21.4 x 1.26)	360 x 544 x 32 (14.2 x 21.4 x 1.26)	330 x 446 x 32 (13.0 x 17.6 x 1.26)	330 x 446 x 32 (13.0 x 17.6 x 1.26)
Type	Corrugated fin type	Corrugated fin type (Equipped with oil cooler)	Corrugated fin type	Corrugated fin type (Equipped with oil cooler)
Radiator fin pitch mm (in)	2.3 (0.091)	2.3 (0.091)	2.5 (0.098)	2.5 (0.098)
Cap working pressure kg/cm^2 (psi)	0.9 (13)	0.9 (13)	0.9 (13)	0.9 (13)
Cooling system capacity Without heater	6.0 liters (6 3/8 U.S. qt., 5 1/4 Imp. qt.)	6.0 liters (6 3/8 U.S. qt., 5 1/4 Imp. qt.)	6.0 liters (6 3/8 U.S. qt., 5 1/4 Imp. qt.)	6.0 liters (6 3/8 U.S. qt., 5 1/4 Imp. qt.)
With heater	6.5 liters (6 7/8 U.S. qt., 5 3/4 Imp. qt.)	6.5 liters (6 7/8 U.S. qt., 5 3/4 Imp. qt.)	6.6 liters (7 U.S. qt., 5 7/8 Imp. qt.)	6.6 liters (7 U.S. qt., 5 7/8 Imp. qt.)

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Loss of water	Radiator coolant overfilled.	Do not fill up coolant to top of filler neck while cold.
	Damaged radiator seams.	Repair.
	Excessive wear in water pump.	Replace.
	Leak at heater connections or plugs.	Repair.
	Leak at water temperature gauge.	Tighten.
	Loose joints.	Tighten.
	Damaged cylinder head gasket.	Replace. Check engine oil for contamination and refill as necessary.
	Cracked cylinder block.	Replace. Pull engine oil level gauge to check for water in crankcase.
	Cracked cylinder head.	Replace.
	Loose cylinder head bolts.	Tighten.
Poor circulation	Restriction in system.	Check hoses for crimps, reverse flush radiator, and clear the system of rust and sludge.
	Insufficient coolant.	Replenish.
	Inoperative water pump.	Replace.
	Loose fan belt.	Adjust.
	Inoperative thermostat.	Replace.
Corrosion	Excessive impurity in water.	Use soft, clean water. (rain water is satisfactory).
	Infrequent flushing and draining of system.	Cooling system should be drained and flushed thoroughly at least twice a year. [Nissan long life coolant (L.L.C.) can be used throughout the year. Change coolant every two years or total running mileage of 40,000 km (24,000 miles)].
Overheating	Malfunctioning thermostat.	Replace.
	Radiator fins choked with mud, chaff, etc.	Clean out air passage thoroughly from engine side of radiator using compressed air.
	Incorrect ignition and valve timing.	Adjust.
	Dirty oil and sludge in engine.	Refill.
	Inoperative water pump.	Replace.
	Loose fan belt.	Adjust.
	Restricted radiator.	Flush radiator.
	Inaccurate temperature gauge.	Replace.
	Impurity in water.	Use soft, clean water.

Condition	Probable cause	Corrective action
cooling	Malfunctioning thermostat.	Replace.
	Inaccurate temperature gauge.	Replace.

SERVICE MANUAL

DATSUN PICK-UP
MODEL 620 SERIES

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION EF

FUEL SYSTEM

EF

AUTOMATIC TEMPERATURE CONTROL AIR CLEANER (A.T.C. AIR CLEANER)

CONTENTS

DESCRIPTION

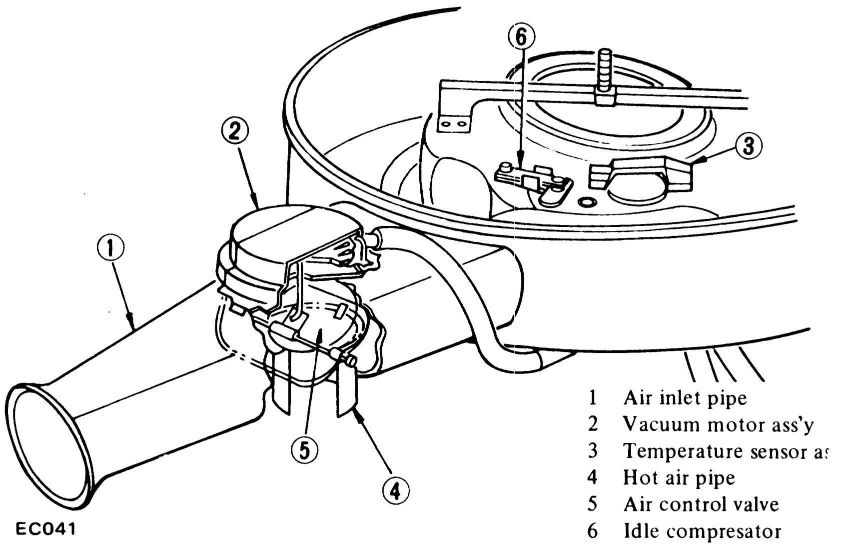
Air cleaner element

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 EF-1

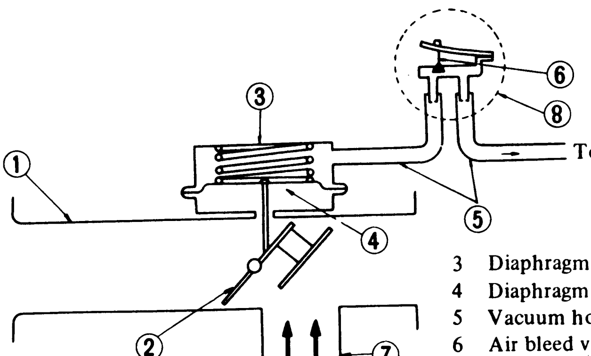


1 Air inlet pipe
2 Vacuum motor ass'y
3 Temperature sensor as
4 Hot air pipe
5 Air control valve
6 Idle compresator

Fig. EF-1 Automatic temperature control air cleaner

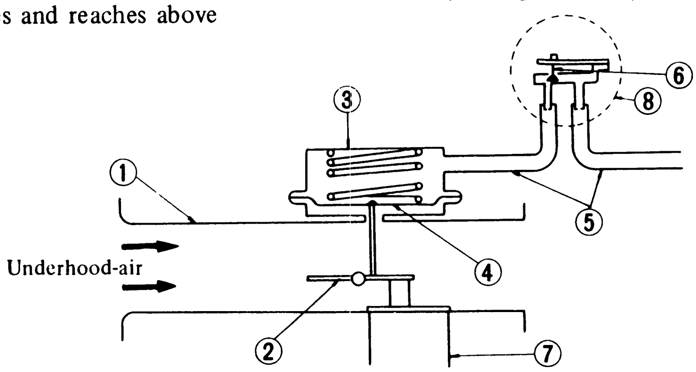
If the temperature of suction air is low when the engine is running, the air control valve closes the underhood-air inlet, and introduces hot air through the cover which is installed on the exhaust manifold (See Figure EF-2.).

When the temperature of suction air around the sensor reaches 38°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 55°C (131°F), the air control valve completely opens to prevent the entrance of hot air, and allows underhood-air alone to be introduced into the carburetor. (See Figure EF-3.)



1 Air inlet pipe
2 Air control valve
3 Diaphragm spring
4 Diaphragm
5 Vacuum hose
6 Air bleed valve (Partially open)
7 Hot air pipe
8 Temperature sensor assembly

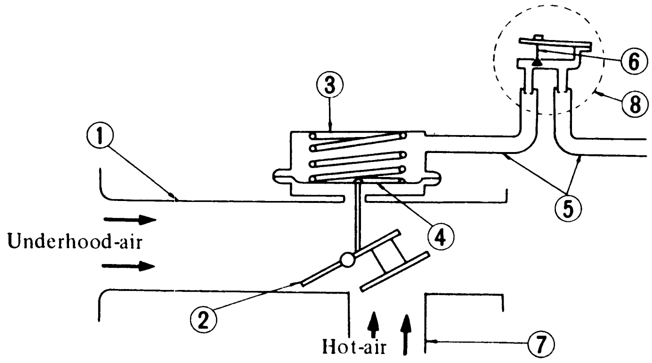
Fig. EF-2 Hot-air delivery mode (During cold engine operation)



1 Air inlet pipe
2 Air control valve
3 Diaphragm spring
4 Diaphragm
5 Vacuum hoses
6 Air bleed valve (fully open)
7 Hot air pipe
8 Temperature sensor assembly

Fig. EF-3 Underhood-air delivery mode (During hot engine operation)

The air control valve acts in the ınner described previously, and the ιemperature of suction air around the sensor is always kept at about 43°C (109°F). (See Figure EF-4.)



1 Air inlet pipe
2 Air control valve
3 Diaphragm spring
4 Diaphragm
5 Vacuum hose
6 Air bleed valve (closed)
7 Hot air pipe
8 Temperature sensor assembly

EC009

Fig. EF-4 Regulating air delivery mode

When the engine is operating under heavy load, the air control valve fully opens the underhood-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 ng.

TEMPERATURE SENSOR

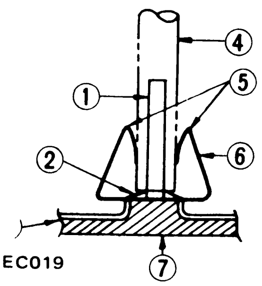
Removal and installation

Removal

1. Flatten tabs of clip with pliers.
2. Pull off hoses.

Note: Note the respective positions of hoses from which they were removed.

3. Take off sensor and clip.



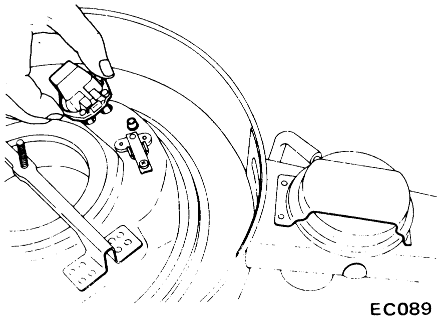
1 Pipe
2 Catch
3 Fixed with adhesive
4 Hose
5 Tab
6 Clip
7 Gasket

EC019

Fig. EF-6 Removal of sensor

Installation of sensor

1. Install sensor and gasket assembly in the proper positions. See Figure EF-7.



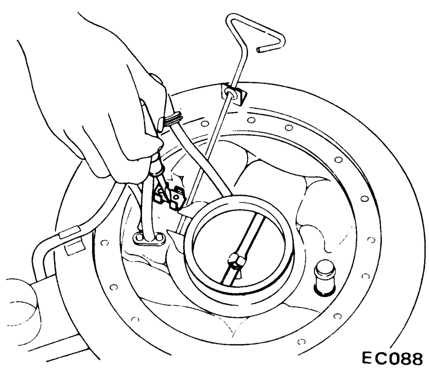
EC089

Fig. EF-7 Installing sensor

2. Insert clip. Be sure to hold sensor at its correct position in Figure EF-7 to avoid damage. See Figure EF-8.

Press fit clips into pipe while straightening tabs.

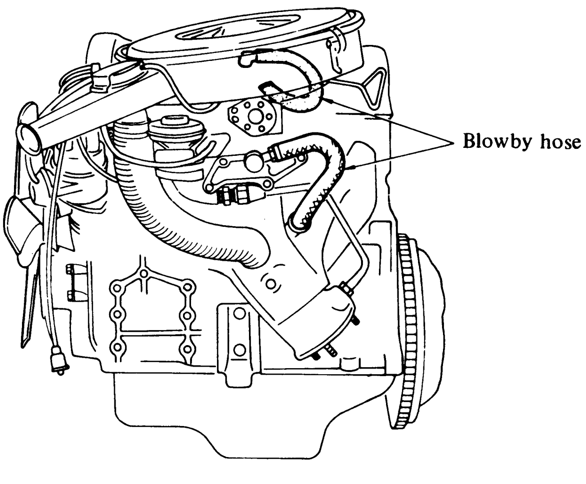
Note: Use care not to damage sensor.



EC088

Fig. EF-8 Inserting clip

3. Connect hoses to their proper positions. See Figure EF-9.



EF105

Fig. EF-9 Connect hoses

IDLE COMPENSATOR

DESCRIPTION

The idle compensator is essentially a thermostatic valve which compensates for excessive enriching of the mixture as a result of high idle temperatures. When under-the-hood temperatures are high, the bi-metal located in the air cleaner is heated by intake hot air and opens the valve. The idle compensator thermostatic valve opens partially at 60°C (140°F) and fully at 75°C (167°F).

If bi-metal does not function when it reaches specified operating temperature and valve does not open, or if valve opens before bi-metal reaches the operating temperature, erratic engine operation at idling may be the cause.

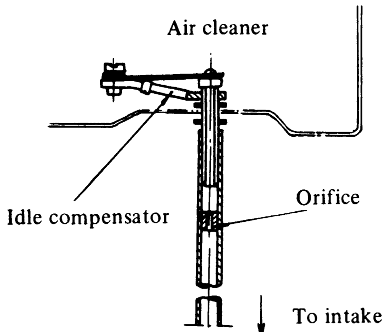


Fig. EF-10 Schematic of idle compensator

REMOVAL AND INSTALLATION

To remove idle compensator, detach air cleaner cover and loosen two screws securing compensator in place. To install, reverse the order of removal.

CHECKING IDLE COMPENSATOR

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

1. Make sure that valve is closed when bi-metal is held below specified operating temperature. To do so, inhale air in or out of tube as shown in Figure EF-11. If there is excessive air leakage at or around valve, renew valve.

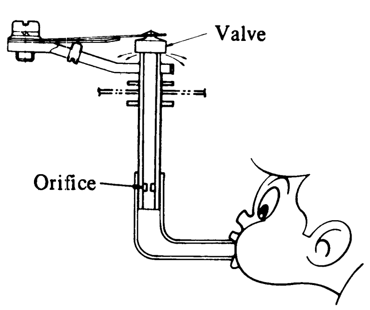


Fig. EF-11 Checking idle compensator

2. Visually check that valve is open when bi-metal is held at specified operating temperature. If valve does not open, replace.

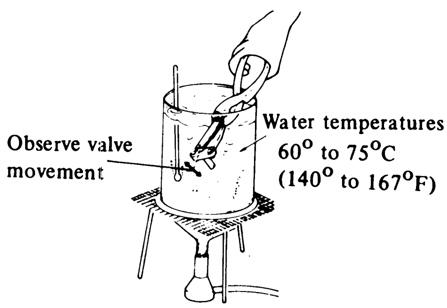


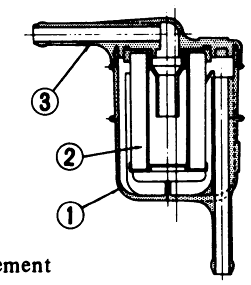
Fig. EF-12 Checking idle compensator

3. If checks given in steps 1 and 2 above reveals that valve is inoperative, renew valve.

FUEL STRAINER

DESCRIPTION

The fuel strainer is a cartridge type. It uses a paper element which can be checked for condition from the outside.



1 Body
2 Paper element
3 Cover

EF005

Fig. EF-13 Sectional view of cartridge type fuel strainer

REMOVAL

Disconnect inlet and outlet fuel lines from fuel strainer, and remove fuel strainer.

Note: **Before disconnecting fuel lines. use a container to receive the fu remaining in lines.**

FUEL PUMP

CONTENTS

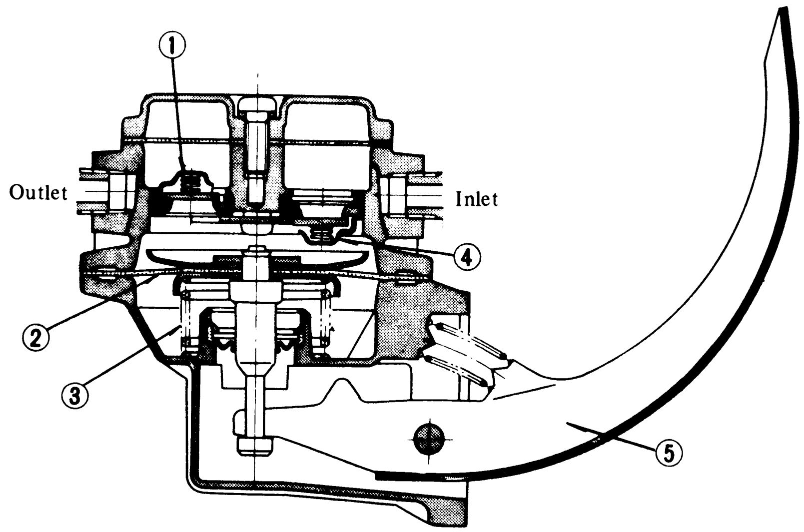
DESCRIPTION

The fuel pump transfers fuel from the tank to the carburetor in sufficient quantity to meet the engine requirements at any speed or load.

The fuel pump is a pulsating type designed for easy maintenance. It consists of a body, rocker arm assembly, fuel diaphragm, fuel diaphragm spring, seal inlet- and outlet-valves. Figure EF-14 shows a cross-sectional view of the pump.

The fuel diaphragm consists of specially treated rubber, which is not affected by gasoline and held in place by two metal discs and a pull rod.

This type of fuel pump is also used in the L24 engine.



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

EF006

Fig. EF-14 Schematic view of fuel pump

FUEL PUMP TESTING

A fuel pump is operating properly when its pressure is within specifications and its capacity is equal to the engine's requirements at all speeds. Pressure and capacity must be determined by two tests, while the pump is still mounted on the engine. Be sure there is fuel in the tank when carrying out the tests.

Static pressure test

The static pressure test should be made as follows:

1. Disconnect fuel line between carburetor and fuel pump.
2. Connect a rubber hose to each open end of a T-connector, and connect this connector-hose assembly between carburetor and fuel pump.

Note: Locate this T-connector as close to carburetor as possible.

3. Connect a suitable pressure gauge to the opening of T-connector, and fasten hose between carburetor and T-connector with a clip securely.

4. Run the engine at varying speeds.
5. The pressure gauge indicates static fuel pressure in the line. The gauge reading should be within the following range.

0.21 to 0.27 kg/cm^2
(3.0 to 3.8 psi)

Note: **If the fuel in carburetor float chamber has run out and engine has stopped, remove clip and pour fuel into carburetor. Fasten clip securely and repeat static pressure test.**

Pressure below the lower limit indicates extreme wear on one part or a small amount of wear on each working part. It also indicates ruptured diaphragm; worn, warped, dirty or gumming valves and seats, or a weak diaphragm return spring. Pressure above the upper limit indicates an excessively strong tension of diaphragm return spring or a diaphragm that is too tight. Both of these conditions require the removal of pump assembly for replacement or repair.

Capacity test

The capacity test is made only when static pressure is within the specification. To make this test, proceed as follows:

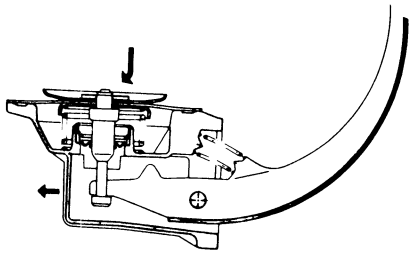
1. Disconnect pressure gauge from T-connector and, in its vacant place, install a suitable container as a fuel sump.
2. Run engine at 1,000 rpm.
3. The pump should deliver 1,000 cc (2.11 US pt) of fuel in one minute or less.

If little or no fuel flows from the open end of pipe, it is an indication that fuel line is clogged or pump is malfunctioning.

REMOVAL AND DISASSEMBLY

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

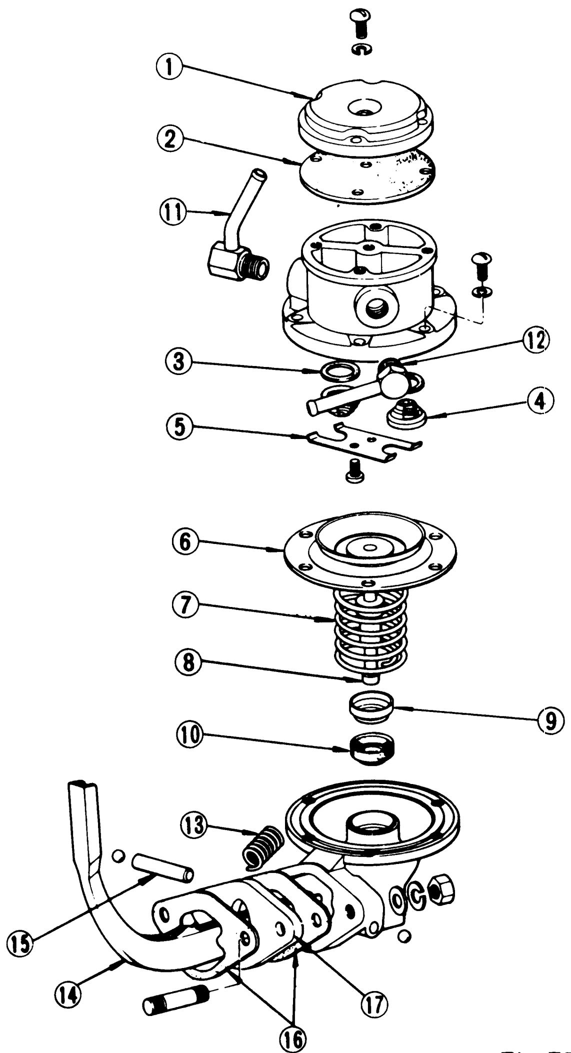
1. Separate upper body and lower body by unscrewing body set screws.
2. Take off cap and cap gasket by removing cap screws.
3. Unscrew elbow and connector.
4. Take off valve retainer by unscrewing two retainer screws and remove two valves.
5. To remove diaphragm, press down its center against spring force. With diaphragm pressed down, tilt it until the end of pull rod touches the inner wall of body. Then, release diaphragm to unhook push rod. Be careful during this operation not to damage diaphragm or oil seal.



EF007

Fig. EF-15 Removing pull rod

6. Drive rocker arm pin out with a press or hammer.



1 Fuel pump cap
2 Cap gasket
3 Valve packing assembly
4 Fuel pump valve assembly
5 Valve retainer
6 Diaphragm assembly
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

EF008

Fig. EF-16 Structure of fuel pump

INSPECTION

1. Check upper body and lower body for cracks.
2. 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.

4. Check rocker arm for wear at the mating portion with camshaft.

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

6. Check all other components for any abnormalities and replace if necessary.

ASSEMBLY

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

1. Use new gaskets.
2. Lubricate rocker arm, rocker arm link and rocker arm pin before installation.
3. To test the function, proceed as follows:

Position fuel pump assembly about 1 meter (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.

CARBURETOR

CONTENTS

DESCRIPTION

	710 model	620 model
For manual transmission	DCH340-10	DCH340-12
For automatic transmission	DCH340-11	DCH340-13

These carburetors are a down-draft type which produces the optimum air-fuel mixture under different operating conditions.

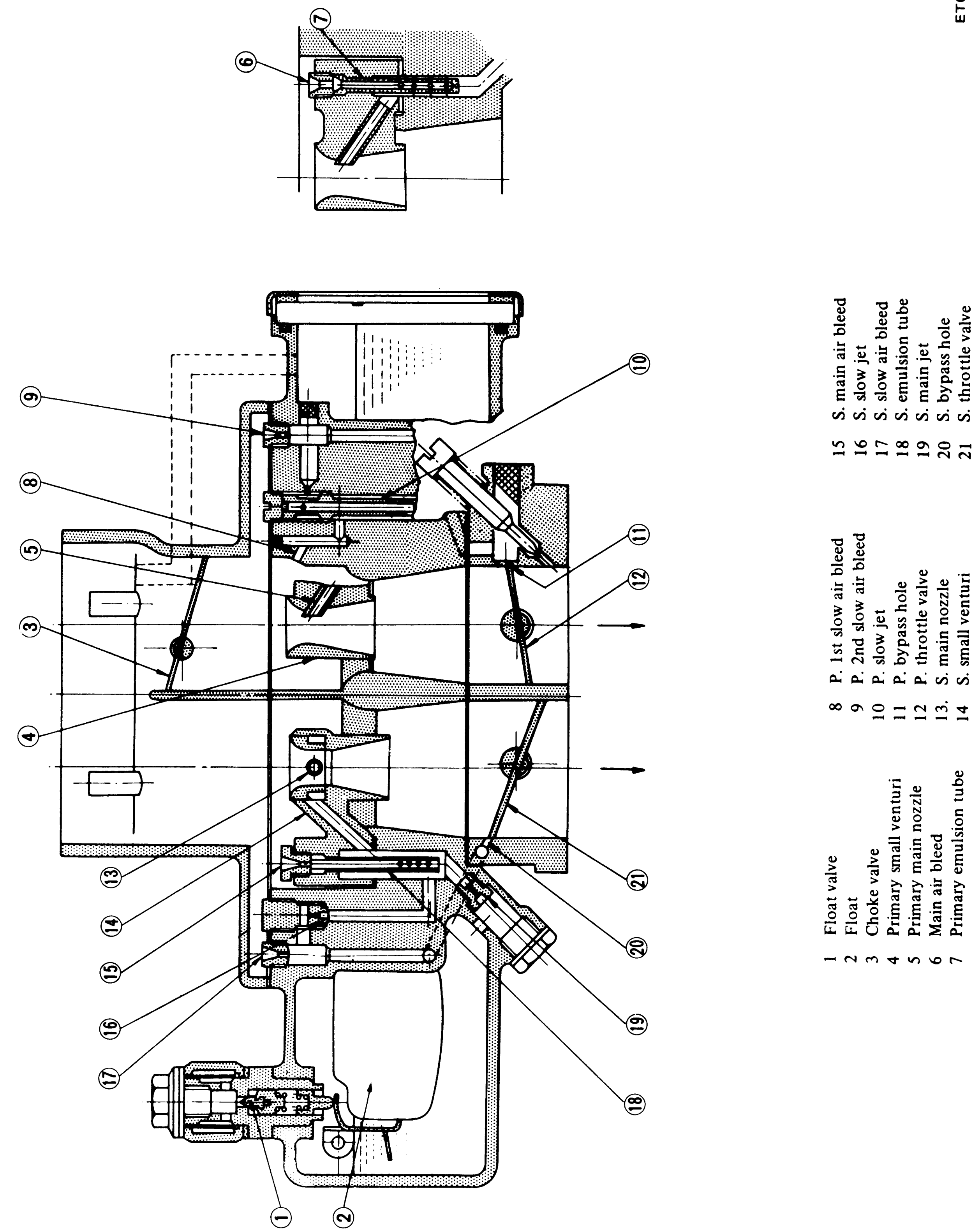
These carburetors present several distinct features of importance to the vehicle owners. A summary of the features is as follows:

1. Slow economizer to make a smooth connection with acceleration or deceleration during light load running. It also assures stable low speed performance.
2. Idle limiter to reduce harmful exhaust emissions to a minimum.
3. B.C.D.D. device for reducing "HC."
4. Electric automatic choke to facilitate cold starting as well as to reduce exhaust emissions.
5. Anti-dieseling solenoid to eliminate dieseling (run-on).
6. Power valve, or vacuum actuated booster, to insure smooth high-speed operation.

STRUCTURE AND OPERATION

The carburetors consist of the primary circuit for part-throttle operation, the secondary circuit for high-speed full-power operation, boost controlled deceleration device for coasting, and anti-dieseling solenoid for idle stop.

The float circuit, common between the primary and secondary circuits, incorporates the secondary switchover and starting mechanisms. Zenith Stromberg nozzles are used for the primary and secondary circuits.



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. EF-17 Sectional view of carburetor

Primary system

. Primary main system

The primary main system is a Zenith Stromburg type. Fuel flows as shown in Figure EF-17 through the main jet, mixing with air which comes in from the main air bleed and passes through the emulsion tube, and is pulled out into the venturi through the main nozzle.

2. Idling and slow system

During low engine speed, as shown in Figure EF-17, fuel flows through the slow jet located on rear right side of main nozzle, mixing with air coming from the 1st slow air bleed, again mixing with air coming from the 2nd slow air bleed and then is pulled out into the engine through the idle hole and bypass hole.

Adoption of the submerged type of slow jet eliminates such hesitation as occurs on sudden deceleration of the car.

Slow economizer system obtains smooth deceleration at high speed.

Small opening of the throttle valve at idling or partial load creates a large vacuum pressure in the intake manifold.

By this vacuum pressure, fuel is measured through the slow jet located behind the main jet. And air coming from the 1st slow air bleed is mixed with fuel in the emulsion hole.

This mixture is further mixed and atomized with air coming from the 2nd slow air bleed. The atomized mixture is supplied to the engine from the idle hole and bypass hole via the slow system passage.

3. Accelerating mechanism

The carburetor is equipped with the piston type accelerating mechanism linked to the throttle valve. When the primary throttle valve, shown in Figure EF-19, is closed, the piston goes up, and fuel flows from the float chamber through the inlet valve into the space under the piston. When the throttle valve is opened, the piston goes down, opening the outlet valve, and fuel is forced out through the injector.

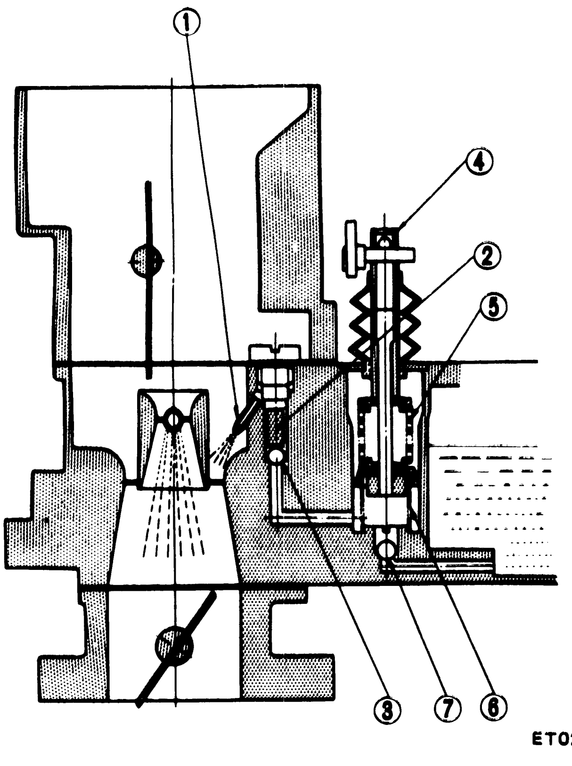


Fig. EF-18 Acceleration mechanism

4. Power valve mechanism

The power valve mechanism, so-called vacuum piston type, utilizes the vacuum below the throttle valve.

When the throttle valve is slightly opened during light load running, a high vacuum is created in the intake manifold. This vacuum pulls the vacuum piston upward against the spring, leaving the power valve closed. When the vacuum below the throttle valve is lowered during full load or accelerating running, the spring pushes the vacuum piston downward, opening the power valve to furnish fuel.

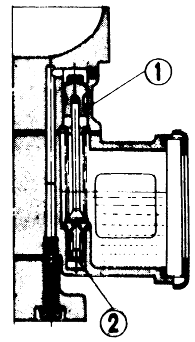


Fig. EF-19 Sectional view of power valve

Secondary system

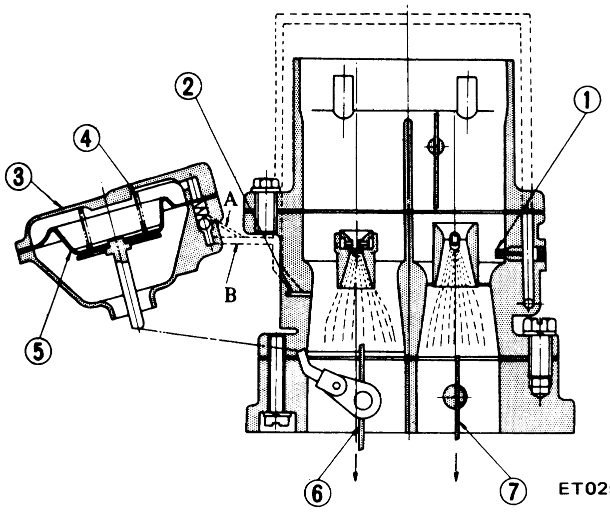
1. Secondary main system

The secondary main system is a Zenith Stromburg type.

Fuel-air mixture produced by the functions of the main jet, main air bleed and emulsion tube, in the same manner as in the primary system, is pulled out through the main nozzle into the small venturi.

Due to the double venturi of the secondary system, the higher velocity air current passing through the main nozzle promotes the fuel atomization.

The structure is almost the same as the primary side.



1 Primary vacuum port
2 Secondary vacuum port
3 Diaphragm chamber cover
4 Diaphragm spring
5 Diaphragm
6 Secondary throttle valve
7 Primary throttle valve

Fig. EF-20 Full throttle at high speed

2. Step system

The construction of this system may correspond to the idling and slow system of the primary system.

This system aims at the proper filling up of the gap when fuel supply is transferred from the primary system to the secondary one. The step port is located near the secondary throttle valve edge in its fully closed state.

3. Secondary switchover mechanism

The secondary throttle valve is linked to the diaphragm which is actuated by the vacuum created in the venturi. A vacuum jet is provided at each of the primary and secondary venturies, and the composite vacuum of these jets actuates the diaphragm.

As the linkage causes the secondary throttle valve to close until the primary throttle valve opening reaches approximately 50°, fuel consumption during normal operation is not excessive.

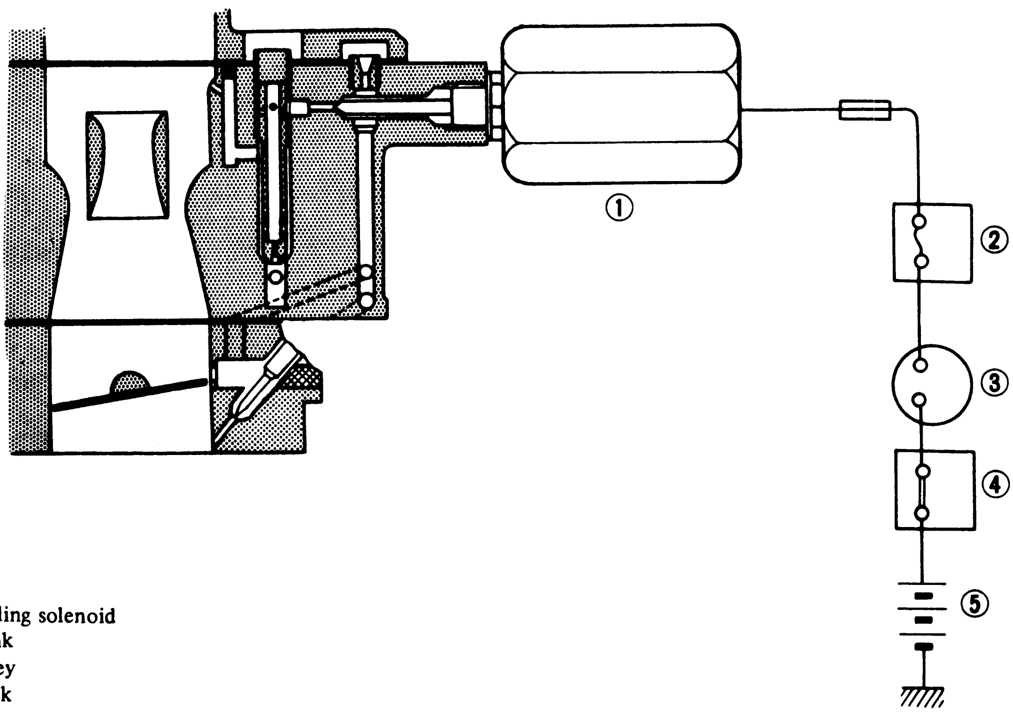
During high speed running, as shown in Figure EF-20, as the vacuum at the venturi is increased, the diaphragm is pulled against the diaphragm spring force, and then secondary throttle valve is opened.

The other side, during low speed running (as the primary throttle valve opening does not reach 50°), the secondary throttle valve is locked to close completely by the locking arm which is interlocked with primary throttle arm by linkage.

When the primary throttle valve opening reaches wider position than 50°, the secondary throttle valve is ready to open, because the locking arm revolves and leaves from the secondary throttle arm.

Anti-dieseling system

The carburetor is equipped with an anti-dieseling solenoid valve. As the ignition switch is turned off, the valve is brought into operation, shutting off the supply of fuel to the slow circuit. The following figure shows a sectional view of this control.



1 Anti-dieseling solenoid
2 Fusible link
3 Ignition key
4 Fusible link
5 Battery

EF106

Fig. EF-21 Schematic drawing of anti-dieseling solenoid

Float system

There is only one float chamber, while two carburetor systems, primary and secondary, are provided.

Fuel fed from the fuel pump flows through the filter and needle valve into the float chamber. A constant fuel level is maintained by the float and needle valve.

Because of the inner air vent type of the float chamber ventilation, the fuel consumption will not be influenced by some dirt accumulated in the air cleaner.

The needle valve includes special hard steel ball and will not wear for all its considerably long use. Besides, the insertion of a spring will prevent the flooding at rough road running.

Boost controlled deceleration device (B.C.D.D.)

Boost controlled deceleration device (B.C.D.D.) serves to reduce HC emissions emitted from engine during coasting.

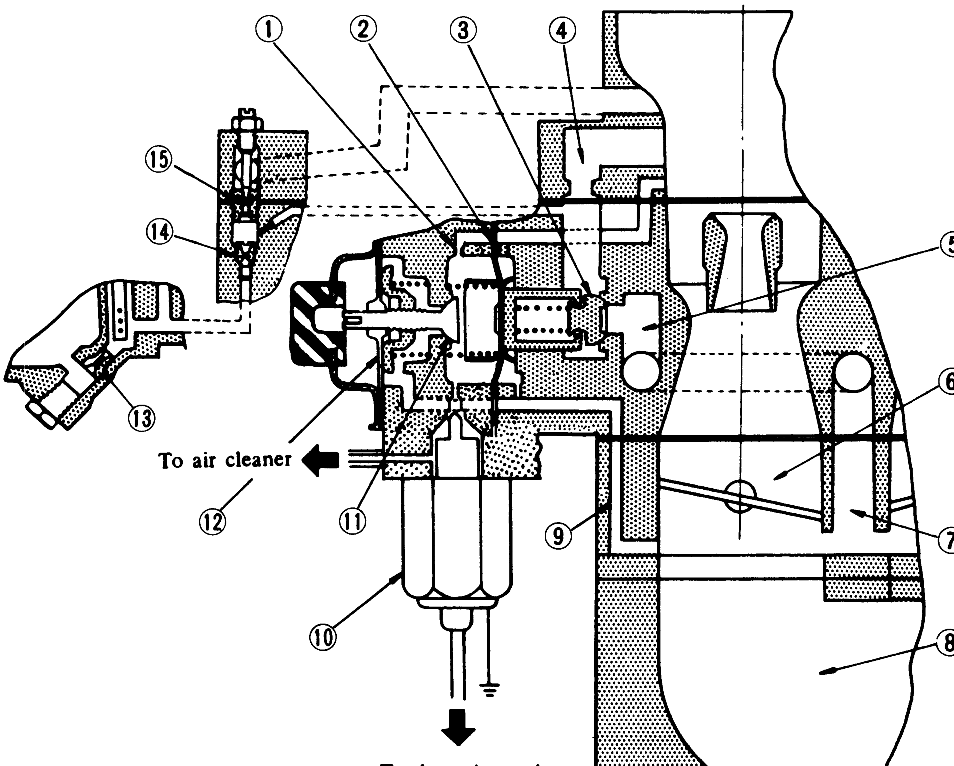
The high manifold vacuum during coasting prevents the mixture from complete combustion because of reduced amount of mixture per cylinder per rotation of engine, with a result that large amount of HC emissions is emitted into the atmosphere.

B.C.D.D. has been designed based on the idea of eliminating this objection. It operates in such a way that, when manifold vacuum exceeds a predetermined value, it provides an additional mixture of optimum mixture ratio and quantity into the manifold by opening the separate mixture passage in the carburetor. Complete combusion of fuel is assisted by this additional mixture, and remarkably reduces the amount of HC contained in exhaust gases.

During the period from coasting to idling, the transmission produces a signal which in turn energizes the vacuum control solenoid.

As this takes place, the valve is lifted off its seat, releasing the vacuum chamber to the atmosphere.

The mixture control valve will then be closed, returning engine speed to the predetermined idling..



1 Air jet
2 Diaphragm H
3 Mixture control valve
4 Coasting air bleed H
5 Mixture air passage
6 Secondary barrel
7 Mixture outlet
8 Intake manifold
9 Boost passage
10 Vacuum control solenoid valve
11 Vacuum control valve
12 Diaphragm I
13 Secondary main jet
14 Coasting jet
15 Coasting air bleed I

EF103

Fig. EF-22 Sectional view of B.C.D.D.

Performance

The diaphragm I ① detects the manifold vacuum and, when the vacuum exceeds a pre-determined value, acts so as to open the vacuum control valve ②. This opening makes the manifold vacuum introduce into the second vacuum chamber and actuates the diaphragm II ③.

When diaphragm II operates, the mixture control valve ④ opens the passage and introduces the additional mixture into the manifold.

The amount of the mixture is controlled by the servo-action of the mixture control valve ④ and vacuum control valve ② so that the manifold vacuum may be kept at the pre-determined value.

The amount of mixture depends mainly upon the coasting air bleed II ⑤, while its mixture ratio is determined by the coasting jet ⑦ and coasting air bleed ⑥.

Performance of vacuum control solenoid valve

Manual transmission

The vacuum control solenoid valve is controlled by a speed switch that is actuated by the speedometer needle.

As the vehicle speed falls below 10 mph, this switch is activated, producting a signal.

This signal is then amplified as it passes through a built-in amplifier, causing the vacuum control valve to function.

Automatic transmission

The automatic transmission incorporates an inhibitor switch.

This switch is operated only when the transmission is placed in either "N" or "P" position.

With the transmission placed in either of the above ranges, the switch causes the vacuum control valve to function.

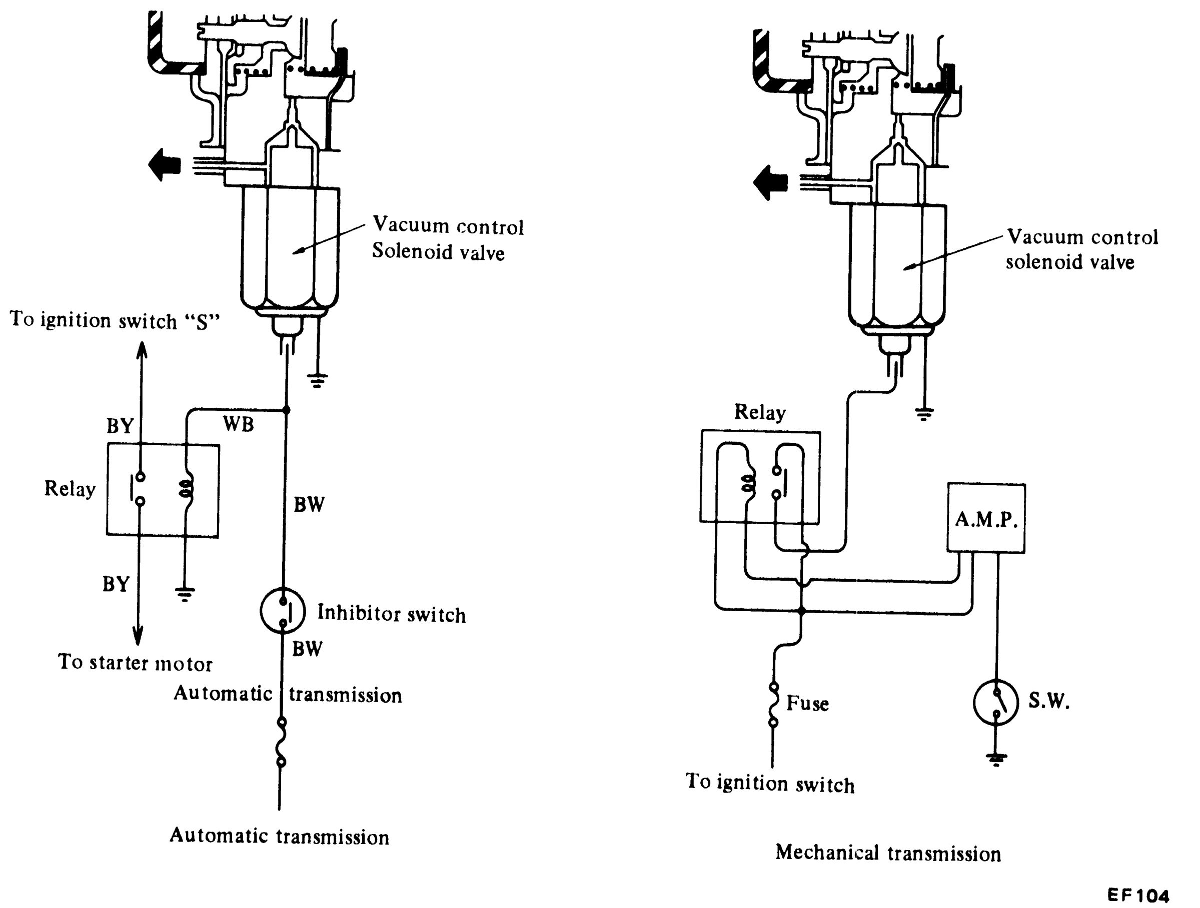


Fig. EF-23 Electrical control system of B.C.D.D.

Electric automatic choke

An electric heater warms a bimetal interconnected to the choke valve, and controls the position of choke valve and throttle valve in accordance with the elapse of time, or the warm-up condition of engine.

The construction and function of each part of this carburetor are as follows:

(1) Bimetal and heater in thermostat cover

Electric current flows through the heater as the engine starts, and warms bimetal. The deflection of bimetal is transmitted to the choke valve through the choke valve lever.

(2) Fast idle cam

The fast idle cam determines the opening of throttle valve so as to obtain proper amount of mixture corresponding to the opening of the choke valve which in turn depends upon the warmed-up condition of the engine.

) Fast idle adjusting screw

This screw adjusts the opening of the throttle valve of fast idle cam.

(4) Unloader

When accelerating the engine during the warm-up period, that is, before choke valve opens sufficiently, this unloader makes the choke valve open to a certain extent so as to obtain an adequate air-fuel mixture.

(5) Vacuum diaphragm

The moment when engine is ready just after the engine has started by cranking, this diaphragm forces open choke valve to the predetermined extent so as to provide proper air-fuel ratio.

(6) Bimetal case index mark

The bimetal case index mark is used for setting the moment of the bimetal which controls the air-fuel mixture ratio required for starting.

Dash pot device Automatic transmission cars only)

These carburetors are equipped with a dash pot interlocked with the primary throttle valve through a link mechanism. The dash pot, which is exclusively installed on vehicles equipped with automatic transmission, is intended to prevent engine stall that would result from quick application of the brake immediately after driving the vehicle, or from the quick release of the accelerator pedal after treading it slightly.

In such condition, a throttle lever strikes against the dash pot stem and makes the primary throttle valve gradually close, thus keeping the engine running.

ADJUSTMENT

Adjusting carburetor idle-rpm and mixture ratio

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 up and calibrated.

1. Warm up engine sufficiently.
2. Continue engine operation for one minute under idling speed.
3. Adjust throttle adjusting screw so that engine speed is 800 rpm for cars with a manual transmission (in "N" range for automatic transmission).
4. Check ignition timing, if necessary adjust it to the specifications. 12^{o}/800 rpm).
5. Adjust idle adjusting screw so that "CO" percentage is 1.5%.
6. Repeat the procedures as described in items 3 and 5 above so that "CO" percentage is 1.5% at 800 rpm.

Caution:

a. **On automatic transmission equipped model, check should be done in "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.**

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

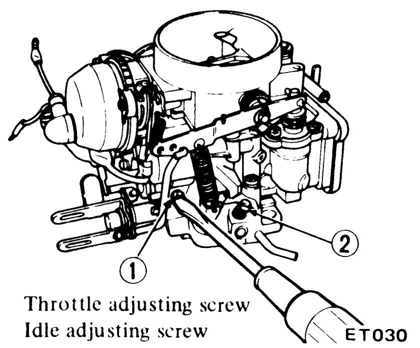
And then check the specifications with the lever in "D" position. Insure that CO percent and idle speed are as follows:

Idling rpm	650
"CO" percentage	1.5 %

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

Notes:

a. **Do not attempt to screw down idle adjusting 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.**



1 Throttle adjusting screw
2 Idle adjusting screw

Fig. EF-24 Throttle and idle adjusting screws

Idle limitter cap

Do not remove this idle limitter 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.

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

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

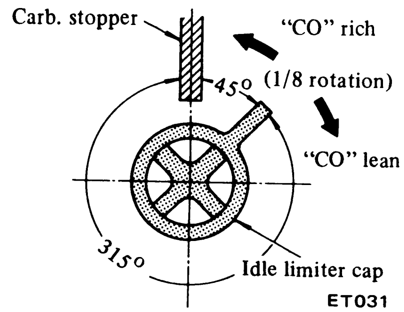


Fig. EF-25 Setting of idle limiter cap

Fuel level adjustment

A constant fuel level is maintained by float level and ball valve. If fuel level is in accord with level gauge line, float level is properly set. If float level is not correct, adjust it by bending float seat as shown in Figure EF-26.

Approximately H mm is required for effective stroke of needle valve. So adjust gap between valve stem and float seat to H mm with float fully lifted up by bending float stopper.

H; 1.5 mm (0.059 in)

Fast idle adjustment

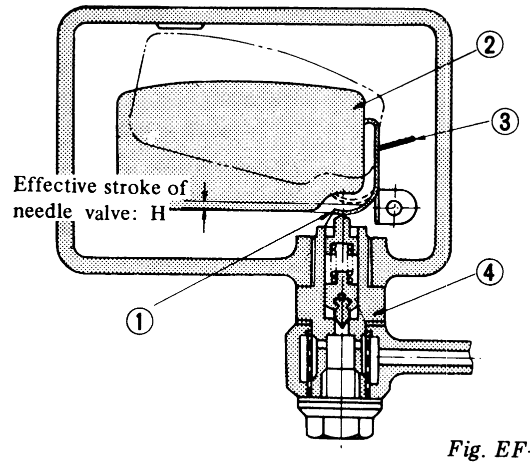
Choke valve at fully closed position automatically opens throttle valve at an optimum angle for starting engine through a link mechanism.

Normal Tune-up

In moderate climates, adjust manual transmission fast idle RPM to the specifications by turning fast idling screw in or out as necessary.

Carburetor removed

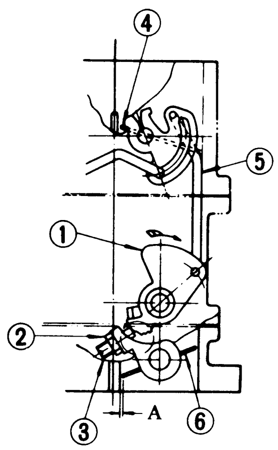
If a new or reconditioned carburetor is being installed, tune as follows:
1. With carburetor assembly removed from engine, measure throttle valve clearance ("A" in Figure EF-27) with a wire gauge, placing the upper side of fast idling screw on the second step of the fast idling cam.
2. Install carburetor on engine.
3. Start engine and measure RPM. It should be approximately 2,000 rpm for Manual transmission and 2,4 rpm for Automatic transmission.
4. Turn fast idling screw counterclockwise to increase, or clockwise to decrease, to adjust fast idle RPM.



1 Float seat
2 Float
3 Float chamber
4 Needle valve

Fig. EF-26 Adjusting fuel level

	Throttle opening (degree)	Clearance "A" mm (in)	Engine revolution (rpm)
Manual Transmission	12 ± 0.5	0.95 ± 0.05 (0.0374 ± 0.0020)	2,000 ± 100
Automatic Transmission	14 ± 0.5	1.17 ± 0.05 (0.0461 ± 0.0020)	2,400 ± 100

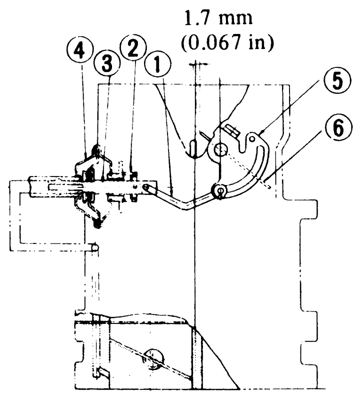


1 Fast idle cam
2 Nut
3 Fast idle screw
4 Choke valve
5 Choke connecting rod
6 Throttle valve

Fig. EF-27 Adjustment fast idle opening

Vacuum break adjustment

1. Completely close choke valve.
2. Hold choke valve by streching a rubber band between choke piston lever and stationary part of carburetor.
3. Grip vacuum break rod with pliers, and pull straight fully.
4. Under this condition, adjust the gap between choke valve and carburetor body to 1.7 mm (0.067 in) by bending vacuum brake rod. See Figure EF-28.



1 Choke piston rod
2 Choke spring
3 Choke piston
4 Diaphragm cover
5 Choke piston lever
6 Choke valve

Fig. EF-28 Vacuum break adjustment

Choke unloader adjustment

1. Close choke valve completely.
2. Hold choke valve by streching a rubber band between choke piston lever and stationary part of carburetor.
3. Open throttle lever until it opens fully.

Under this condition, adjust the clearance between choke valve and carburetor body to 4.4 mm (0.173 in) by bending unloader tongue.

Note: **Make sure that throttle valve opens when carburetor is mounted on the car.**
If throttle valve fails to open, unloader becomes inoperative, resulting in poor acceleration after engine is started.

Bimetal setting

1. Measurement of bimetal heater resistance:

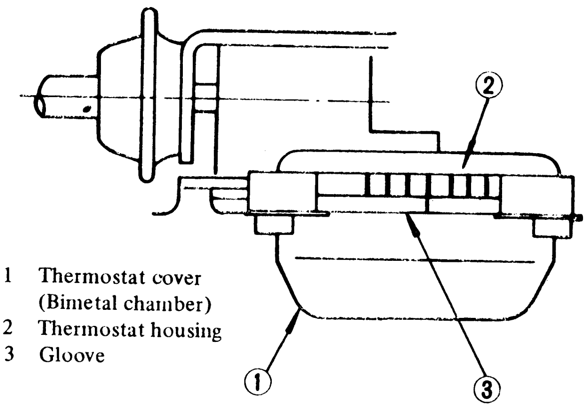
Install bimetal cover on carburetor. Make sure that resistance across the terminal and carburetor body is in the range of 9.8 to 10.2 ohms. Measure the resistance without the folow of electric current through heater and at about 21°C (70°F).

Note: **Use an accurate measuring instrument, such as a wheatstone bridge.**

2. Bimetal cover setting.

Position bimetal cover so that the index marks are aligned as shown in Figure EF-29. (Center of the index marks.)

Note: **When somewhat over-choked, set bimetal cover by turning it clockwise about one division of the scale graduations.**



1 Thermostat cover (Bimetal chamber)
2 Thermostat housing
3 Gloove

Fig. EF-29 Bimetal setting

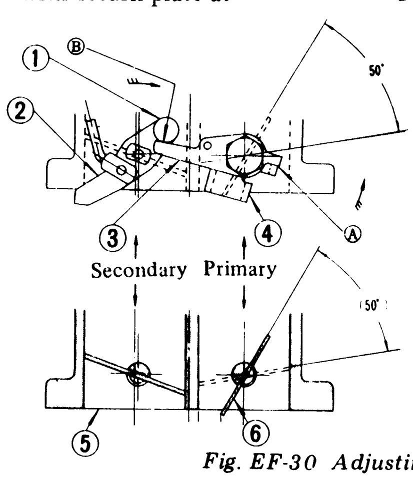
Adjustment of interlock opening of primary and secondary throttle valves

Figure EF-30 shows that primary throttle valve opens 50°. When primary throttle valve opens 50° adjusting plate integrated with throttle valve is in contact with return plate at A.

When throttle valve further opens, locking arm is detached from secondary throttle arm, permitting secondary system to start operation.

Linkage between primary and secondary throttles will operate properly if distance between throttle valve and inner wall of throttle chamber is 7.4 mm (0.291 in).

Adjustment is made by bending connecting link. See Figure EF-30.



1 Roller
2 Connecting lever
3 Return plate
4 Adjust plate
5 Throttle chamber
6 Throttle valve

Fig. EF-30 Adjusting interlock opening

Dash pot adjustment (Automatic transmission cars 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

1. It is necessary that the idling speed of engine and mixture have been well turned up and engine is sufficiently warm.
2. Turn throttle valve by hand, and read engine speed when dash pot just touches the stopper lever.
3. Adjust the position of dash pot by turning nut until engine speed is in the range of 1,600 to 1,800 rpm.
4. Then fasten loosened lock nut.
5. Make sure that the engine speed is smoothly reduced from 2,000 to 1,000 rpm in about three seconds.

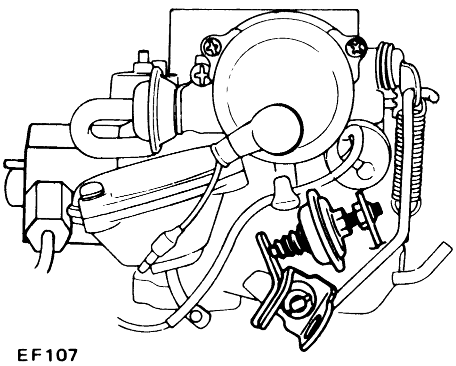


Fig. EF-31 Dash pot adjustment

Adjustment of B.C.D.D.

Usually, it is unnecessary to adjust the B.C.D.D., however if there is any requirement the adjustment procedure is as follows;

Prepare the following tools:

1. A tachometer to measure the engine speed while idling, and screwdriver.
2. A Vacuum gauge and connecting pipe.

Notes:

a. A quick-response boost gauge such as Bourdon's tube is recommended. Do not use manometer.

b. Special tools are not required.

Warming-up operation

Continue warning-up operation until the engine reaches its normal operating temperature.

Connecting vacuum gauge

Connect rubber hose between vacuum gauge and intake manifold as shown.

Disconnect solenoid valve and let solenoid valve free.

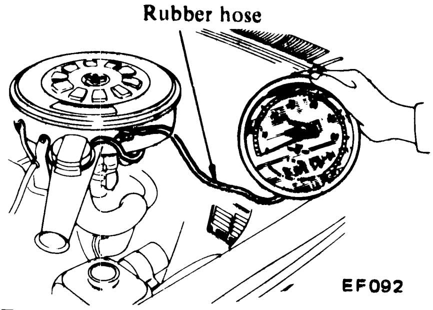


Fig. EF-32 Connecting vacuum gauge

Adjustment of idling

Adjust the engine at normal idling setting.

	Engine idling (rpm)	Idling timing	CO (%)
M/T Vehicle	800	12° B.T.D.C.	1.5
A/T Vehicle	650 (in "D" range)	12° B.T.D.C.	1.5

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

Racing

Place shift lever in neutral for **manual transmission,** or N or P for **automatic transmission.** Raise the **engine speed up to** 3,000 to 3,500 rpm under no-load, and close the throttle **valve, releasing it by hand. Ascertain** whether engine revolution falls to idling revolution or not.

B.C.D.D. SET PRESSURE AND VACUUM PRESSURE

Before checking the B.C.D.D. operating pressure, keep in mind the relationship between the B.C.D.D. set pressure and the idling vacuum pressure.

When the operating pressure equals the set pressure

As shown in Figure EF-33, the B.C.D.D. set pressure is preset at a level somewhat higher than the vacuum pressure at idling. However, the actual B.C.D.D. operating pressure should be set at the set pressure.

B.C.D.D. set pressure:
 −500 mmHg (−19.69 inHg)
 Manual transmission model
 −480 mmHg (−18.90 inHg)
 Automatic transmission model

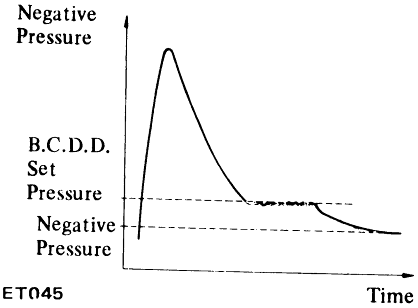


Fig. EF-33 Characteristic curve — proper negative pressure —

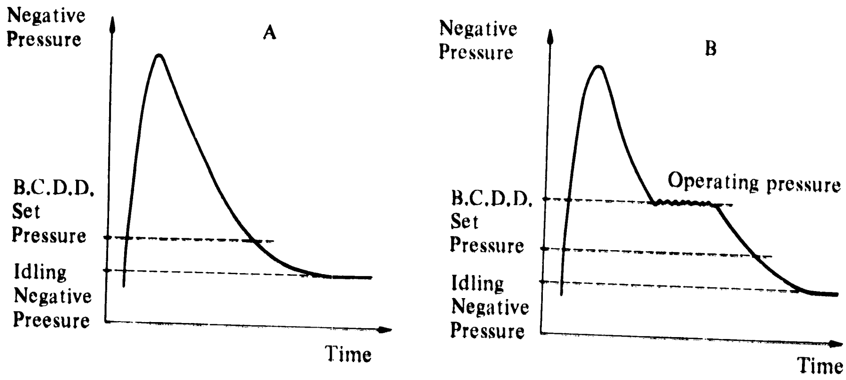
When the operating pressure is too high

When the operating pressure is not properly set to the set pressure, the following conditions will be encountered.

1. If the operating pressure is set at a level higher than the maximum vacuum pressure (Fig. EF-34 A) during periods of deceleration, the B.C.D.D.

will not be activated at all. This results an unsatisfactory emission of exhaust gases.

2. If the operating pressure is lower than the maximum vacuum pressure, or higher than the set pressure (Fig. ET-22 B) during periods of deceleration, the B.C.D.D. will not be properly activated. This results in an unsatisfactory emission of exhaust gases.



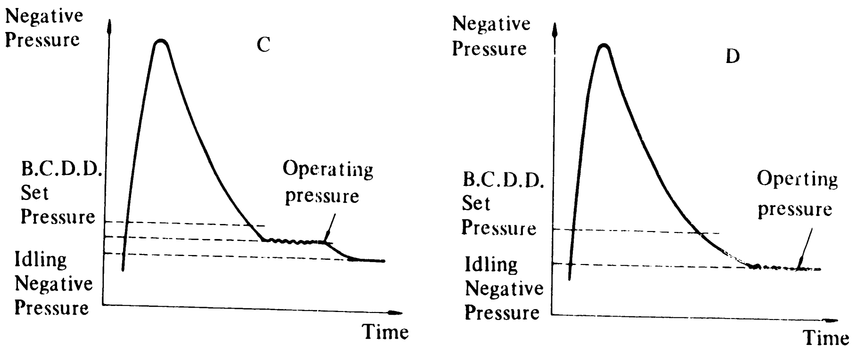
ET043

Fig. EF-34 Characteristic curve — high negative pressure —

When the operating pressure is too low

1. If the B.C.D.D. operating pressure is lower than the set pressure, or higher than the idling vacuum pressure (Fig. EF-35 C), the B.C.D.D. will not activated properly. This results in an unsatisfactory emission of exhaust gases.

2. When the operating pressure equals the idling vacuum pressure (Fig. EF-35 D), the idle rpm will be unusually increased or instable engine operation will be encountered.



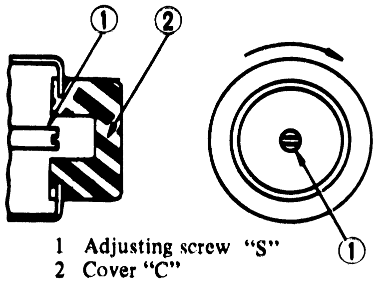
ET044

Fig. EF-35 Characteristic curve — low negative pressure —

ADJUSTMENT OF B. C. D. D. OPERATING PRESSURE

To properly set the B.C.D.D. operating pressure, proceed as follows:

1. Run the engine under no load. Increase engine rpm to 3,000 to 3,500 rpm, then quickly close throttle valve. At this time, the manifold vacuum pressure increases abruptly to –600 mmHg (–23.62 inHg) or above and then gradually decreases to the level set at idling.
2. Check that the B.C.D.D. operating pressure is within the specified range.



ET037

Fig. EF-36 Adjusting operation pressure

3. If it is higher than the set level, turn the adjusting screw counterclockwise until correct adjustment is made.
4. Race the engine and check for adjustment.
5. If it is lower than the set level, turn the adjusting screw clockwise until correct adjustment is made.
6. Race the engine and check for adjustment.

B.C.D.D. set pressure:
–500 mmHg (–19.69 inHg)
Manual transmission model
–480 mmHg (–18.90 inHg)
Automatic transmission model

When the engine revolution does not fall to the idling speed (See Figure EF-37)

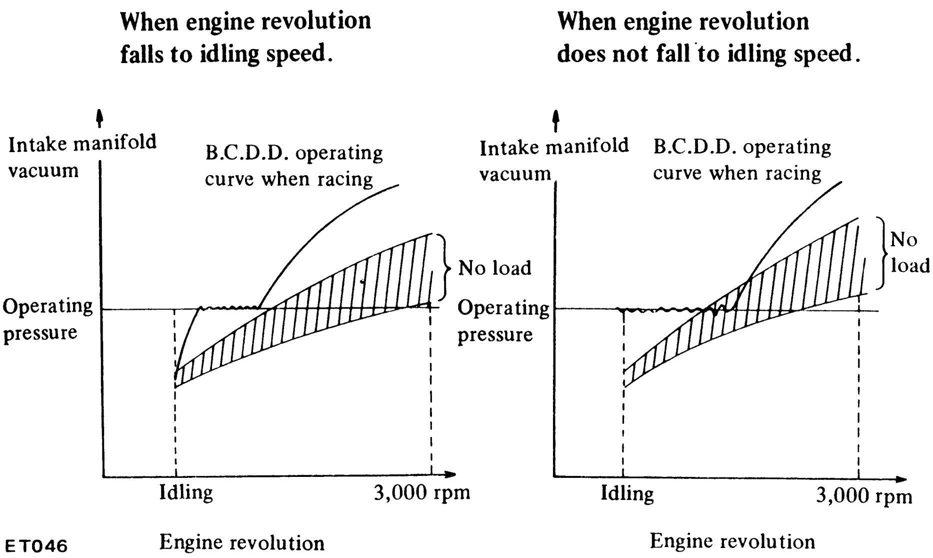


Fig. EF-37 Characteristic curve of B.C.D.D.

When the engine revolution does not fall to the idling speed, it is necessary to fall the idling negative pressure of manifold to lower than the set pressure of B.C.D.D. (The engine revolution does not fall to the idling speed when the idling negative pressure is higher than the set pressure of B.C.D.D.).

In this case, there requires to labour the engine by (1) road test or (2) chassis dynamometer or (3) raise up rear suspension member by stand. And accelerate the car 40 to 50 mph with top gear for M/T or D range for A/T, then release the accelerater pedal and let the car deceleration. Then check the B.C.D.D. set pressure whether it is in the predetermined value or not. The process of this pressure fall takes one of the three forms as illustrated in Figures EF-33, EF-34 and EF-35 according to the difference of the operating pressure of B.C.D.D.

When the operating pressure is too high

When the operating pressure is higher than the set pressure. The negative pressure which has once rise is kept constant at a certain value (operating pressure) for about one second, and then gradually falls to the idling negative pressure. See diagram (B). Adjustment of this condition is exactly same as that of when the engine revolution falls to the idling speed. (Mentioned above.)

When the operating pressure is too low

1. When the operating pressure is somewhat low, the negative pressure becomes constant for some while at a value below set pressure, and then falls to idling negative pressure. See diagram (C).
2. When the operating pressure is exceedingly low, the negative pressure will not fall to idling pressure and the speed of engine is not restored to idling speed. In extreme cases the engine' speed fails to attain idling speed although to that of idling. See diagram (D).

Turn adjusting screw "S" until correct pressure is obtained. Slightly turn this adjusting screw counterclockwise and then race the engine. Do not fit tip of screwdriver tightly in screw slot.

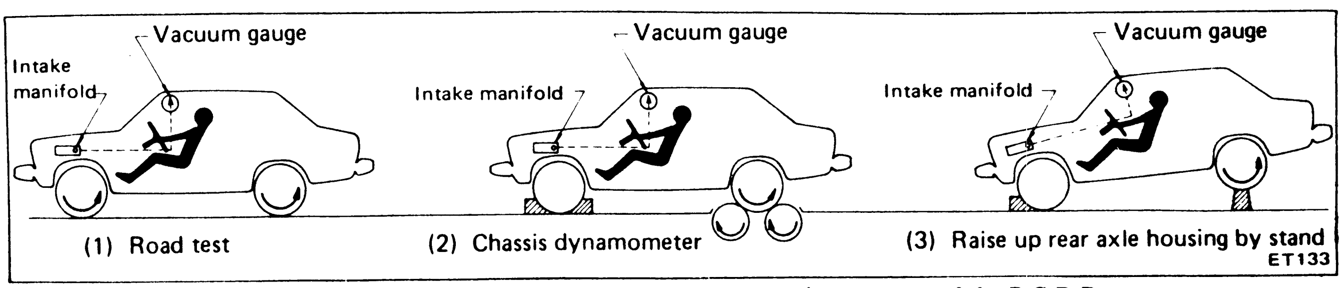


Fig. EF-38 Testing operating pressure of the B.C.D.D. [when the engine revolution does not fall to the idling speed (II)]

MAJOR SERVICE OPERATION

The perfect carburetor delivers the proper fuel and air ratios for all speeds of the particular engine for which it was designed. By completely disassembling at regular intervals, which will allow cleaning of all parts and passages, the carburetor can be returned to its original condition and it will then deliver the proper ratios as it did when new.

To maintain the accurate carburetion of passages and discharge holes, extreme care must be taken in cleaning.

Use only carburetor solvent and compressed air to clean all passages and dicharge holes. Never use wire or other pointed instrument to clean as calibration of carburetor will be affected.

Removal

1. Remove air cleaner.
2. Disconnect fuel and vacuum lines from carburetor.
3. Remove throttle lever.
4. Remove four nuts and washers retaining carburetor to manifold.
5. Lift carburetor off manifold.
6. Remove and discard the gasket used between carburetor and manifold. Replace it, if necessary.

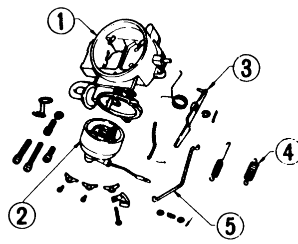
Disassembly and assembly

Disassembly

Do not remove throttle plates.

Carburetor assembly

1. Remove throttle return spring from primary side.
2. Remove pump lever and pump rod.
3. Remove cam connecting rod.
4. Remove thermostat cover by unscrewing three set screws.
5. Remove choke chamber by unscrewing four set screw and remove throttle return spring from secondary side.



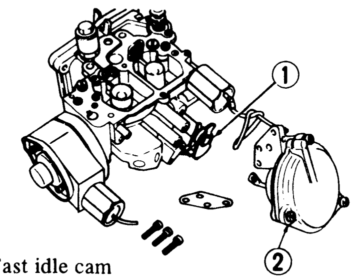
1 Chock chamber
2 Thermostat cover
3 Pump lever
4 Throttle return spring
5 Pump rod

Fig.e EF-39 Removing thermostat

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

Float chamber

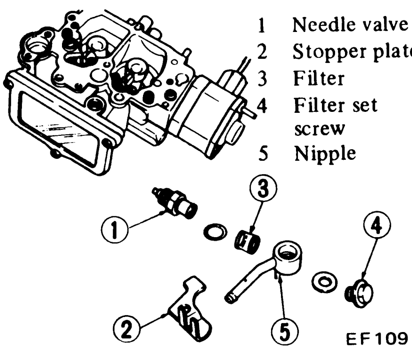
1. Remove diaphragm chamber assembly and diaphragm chamber gasket.
2. Remove fast idle cam, cam spring and counter lever.



1 Fast idle cam
2 Diaphragm chamber

Fig. EF-40 Removing diaphragm chamber

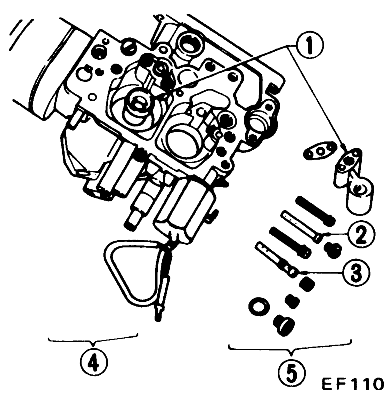
3. Remove filter set screw, nipple filter, needle valve and stopper plate.



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

Fig. EF-41 Removing filter

4. Remove cylinder plate, pump cover, piston, piston return spring and inlet valve by unscrewing two set screws.
5. Remove injector spring and outlet valve.
6. Remove small venturies, main air bleeds and emulsion tubes from primary and secondary sides.



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

Fig. EF-42 Removing venturies

7. Remove slow jet and slow air bleed.
8. Remove primary and secondary main jets.
9. Remove level gauge cover, float chamber, level gauge, rubber seal, float shaft colour and float.
10. Remove power valve.
11. Remove return plate, sleeve, fast idle lever, spring hanger and throttle lever.

Anti-dieseling solenoid

Removal

The anti-dieseling solenoid valve can be easily removed by loosening hexagon part with a conventional wrench.

Installation

1. 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.

Then, torque screws to 180 to 350 kg-cm (156 to 304 in-lb).

2. 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.

B.C.D.D.

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

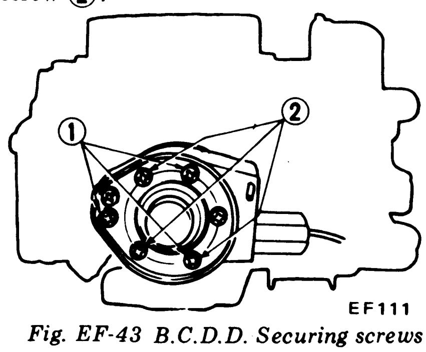


Fig. EF-43 B.C.D.D. Securing screws

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.

Tightening torque:
20 to 40 kg-cm (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.

1. 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.

2. 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.

(1) Check float needle and seat for wear. If wear is noted, assembly must be replaced.
(2) Check throttle and choke shaft bores in throttle chamber and choke chamber for wear or out-of-roundness.
(3) Inspect idle adjusting needle for burrs or ridges. Such a condition requires replacement.

3. 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.
4. Check filter screen for dirt or lint. Clean, and if it is distorted or remains plugged, replace.
5. Check linkage for operating condition.
6. 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 provide 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.

TROUBLE DIAGNOSES AND CORRECTIONS

In the following table, the symptoms and causes of carburetor troubles and remedies for them are listed to facilitate quick repairs.

There are various causes of engine troubles. It sometimes happens that the carburetor which has no defect seems apparently to have some troubles, when electric system is defective. Therefore, whenever the engine has troubles, electric system must be checked first before taking to carburetor adjustment.

Condition	Probable cause	Corrective action
Overflow	Dirt accumulated on needle valve.	Clean needle valve.
	Fuel pump pressure too high.	Repair pump.
	Needle valve seat improper.	Lap or replace.
Excessive fuel consumption	Fuel overflow.	See above item.
	Each main jet, slow jet too large.	Replace.
	Each main air bleed clogged.	Clean.
	Choke valve does not fully open.	Adjust.
	Outlet valve seat of accelerator pump improper.	Lap.
	Linked opening of secondary throttle valve too early.	Adjust.

Condition	Probable cause	Corrective action
Power shortage	Each main jet clogged.	Clean.
	Each throttle valve does not fully open.	Adjust.
	Idling adjustment incorrect.	Repair.
	Fuel strainer clogged.	Clean.
	Vacuum jet clogged.	Clean.
	Air cleaner clogged.	Clean.
	Diaphragm damaged.	Replace.
	Power valve operated improperly.	Adjust.
Improper idling	Slow jet clogged.	Clean.
	Each throttle valve does not close.	Adjust.
	Secondary throttle valve operated improperly.	Overhaul and clean.
	Each throttle valve shaft worn.	Replace.
	Packing between manifold/carburetor defective.	Replace packing.
	Manifold/carburetor tightening improper.	Correct tightening.
	Fuel overflow.	See the first item.
	B.C.D.D. adjustment incorrect.	Adjust.
	Damaged vacuum control solenoid.	Replace.
	Sticked anti-stall dash pot.	Replace.
Engine hesitation	Main jet or slow jet clogged.	Clean.
	By pass hole, idle passage clogged.	Clean tube.
	Emulsion tube clogged.	Clean.
	Idling ajdustment incorrect.	Correct adjustment.
	Secondary throttle valve operated improperly.	Overhaul and clean.
Engine does not start.	Fuel overflows.	See the first item.
	No fuel.	Check pump, fuel pipe and needle valve.
	Idling adjustment incorrect.	Adjust.
	Fast idle adjustment incorrect.	Adjust.
	Damaged anti-dieseling solenoid.	Replace.

EVAPORATIVE EMISSION CONTROL SYSTEM

CONTENTS

DESCRIPTION

This system consists of four basic elements indicated below:

1. Fuel tank with positive sealing filler cap.
2. Vapor-liquid separator.
3. Vapor vent line.
4. Flow guide valve.

The flow guide valve prevents blow-by gas from flowing into the fuel tank and guides fresh air into it, preventing gasoline vapor from escaping into the carburetor air cleaner.

Flow guide valve operates and blow-by gas and gasoline vapor flow as fllows.

When the engine is not running, the vapor vent line, vapor liquid separator and fuel tank are filled with gasoline vapor produced in the sealed type fuel tank. A flow guide valve opens when the gas pressure is above 0.4 inch Hg. The gas passed through the flow guide valve (2) is accumulated in the crankcase. Once the engine starts, the gas evaporating in the carnkcase, is sucked into the manifold for combustion. When the pressure of the sealed type fuel tank, vapor liquid separator and vapor vent line becomes negative by decreasing the fuel, the flow guide valve (1) opens to send fresh air from the carburetor air cleaner to the fuel tank.

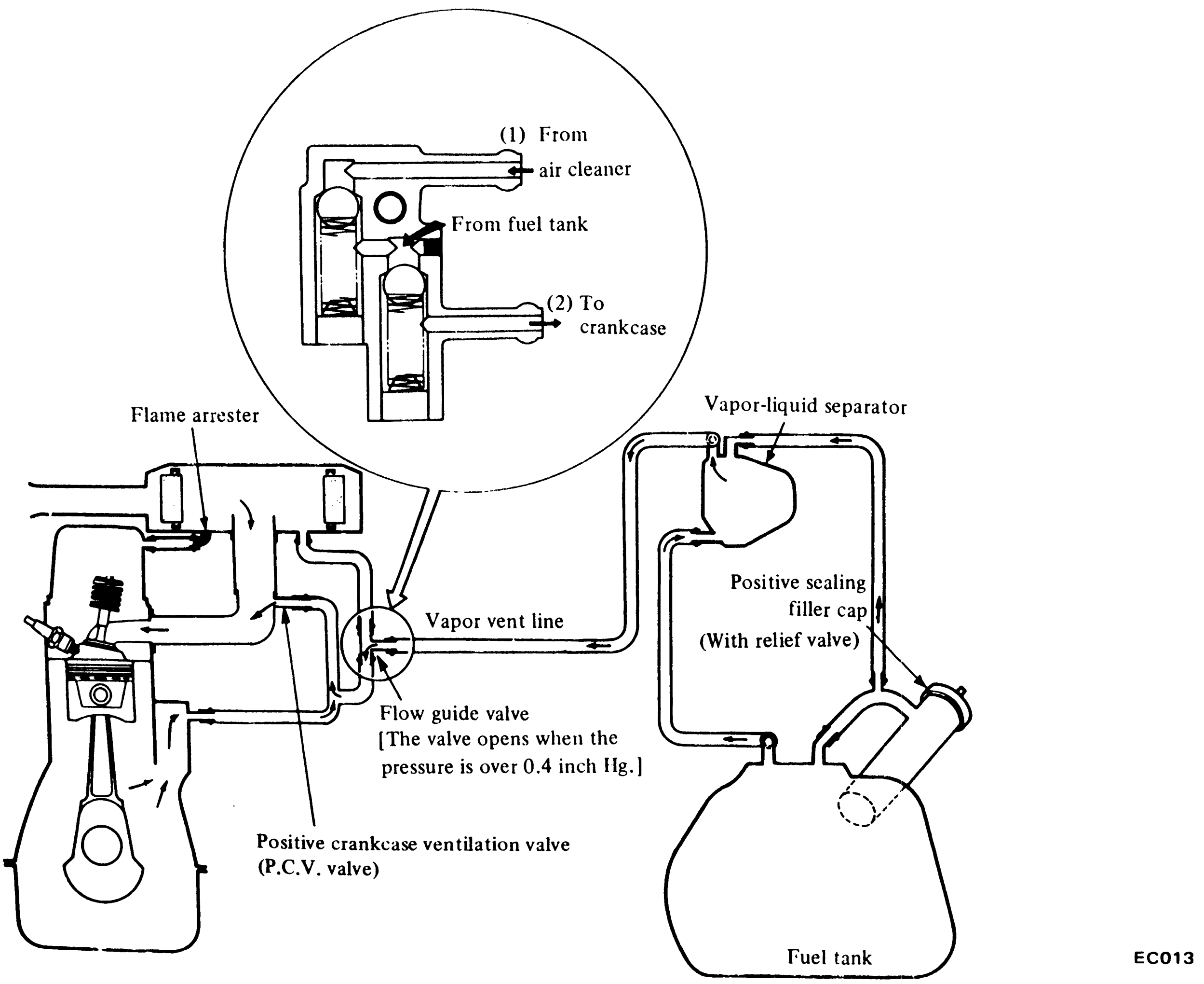


Fig. EF-44 Evaporative emission control system

FLOW GUIDE VALVE

This valve is mounted in the engine compartment. Marks A, F and C are engraved in the body of the valve to indicate the connection of the vapor vent line.

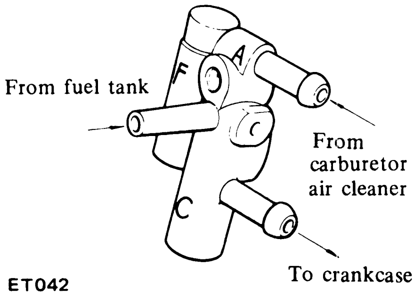


Fig. EF-45 Flow guide valve

Checking fuel tank, vapor-liquid separator and vapor vent line

1. Check all hoses and fuel tank filler cap.
2. Disconnect the vapor vent line connecting flow guide valve to vapor-liquid separator.
3. Connect a 3-way connector, a manometer and a cock (or an equivalent 3-way change cock) to the end of the vent line.
4. Supply fresh air into the vapor vent line through the cock little by little until the pressure becomes 14.5 inch Aq.
5. Shut the cock completely and leave it that way.
6. After 2.5 minutes, measure the height of the liquid in the manometer.
7. Variation of height should remain within 1.0 inch Aq.
8. When the filler cap does not close completely the height should drop to zero in a short time.
9. If the height does not drop to zero in short time when the filler cap is removed, it is the cause of the stuffy hose.

Note: In case the vent line is stuffy, the breathing in fuel tank is not thoroughly made, thus causing insufficient delivery of fuel to engine or vapor lock. It must therefore be repaired or replaced.

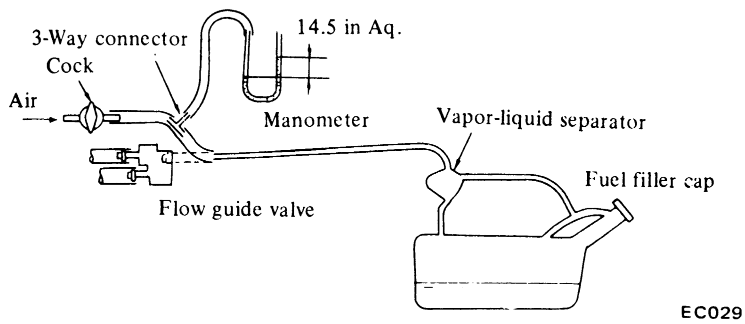


Fig. EF-46 Checking evaporative emission control system

Checking flow guide valve

1. Disconnect all hoses connected to the flow guide valve.
2. While lower pressure air is pressed into the flow guide valve from the ends of vent line of fuel tank side, the air should go through the valve and flow to crankcase side. If the air does not flow the valve should be eplaced. But when the air is blown from carnkcase side, it should never flow to the other two vent lines.
3. While the air is pressed into the flow guide valve from the carburetor air cleaner side, it flows to the fuel tank side and/or carnkcase side.
4. This valve opens when the inner pressure is 0.4 inch Hg. In case of improper operations or breakage, replace it.

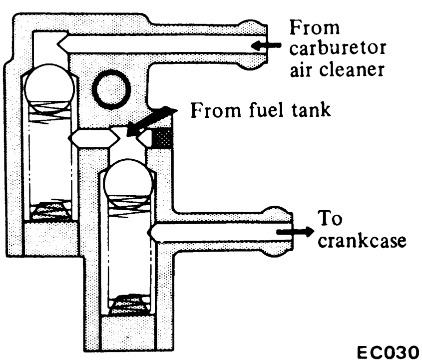


Fig. EF-47 Flow guide valve

Checking fuel tank vacuum refief valve operation

Remove fuel filler cap and see if it functions properly as follows:

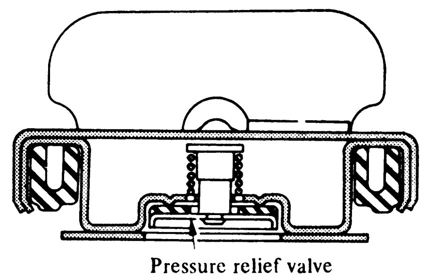


Fig. EF-48 Fuel filler cap

1. Wipe clean valve housing and have it in your month.
2. Inhaling air. A Slight resistance accompanied by valve indicates that valve is in good mechanical condition. Note also that, by further inhaling air the resistance should be disappeared with valve clicks.
3. If valve seems to be clogged, or if no resistance is felt replace cap as an assembled unit.

SERVICE DATA AND SPECIFICATIONS

Air cleaner

Air control valve partially opens	°C (°F)	above 38 (100)
Air control valve fully opens	°C (°F)	above 55 (131)
Idle compensator partially opens	°C (°F)	above 60 (140)
Idle compensator fully opens	°C (°F)	above 75 (167)

Fuel system

Fuel pressure	kg/cm^2 (psi)	0.18 to 0.24 (2.6 to 3.4)
Fuel pump capacity	cc (U.S. pt.)/min. at rpm	1,000 (2.11)/1,000

Carburetor

		Primary	Secondary
Outlet dia.	mm (in)	30 (1.18)	34 (1.34)
Venturi dia.	mm (in)	23 x 8 (0.906 x 0.315)	30 x 9 (1.181 x 0.354)
Main jet		#100	#170
Main air bleed		#60	#60
Slow jet		#45	#90
Slow air bleed		#145	#100
Slow economizer	mm (in)	1.8 (0.071)	
Power jet		#41	
Float level	mm (in)	23 (0.91)	
Fuel pressure	kg/cm^2 (psi)	0.17 (2.4))	
Main nozzle Inner dia. x Outer dia.	mm (in)	2.5 x 3.5 (0.098 x 0.138)	2.5 x 4 (0.098 x 0.157)

Adjustment

Engine idling

Manual Transmission	12°/800 rpm, CO 1.5%
Automatic Transmission	12°/650 rpm, CO 1.5% (in D range)

Fuel level adjustment

Gap between valve stem and float seat	mm (in)	1.5 (0.059)

Fast idle adjustment (Fast idle cam, second step)

Gap between throttle valve and carburetor body

Manual Transmission	mm (in)	0.9 to 1.0 (0.035 to 0.039)
Automatic Transmission	mm (in)	1.12 to 1.22 (0.0441 to 0.0480)

Vacuum break adjustment

Gap between choke valve and carburetor body	mm (in)	1.7 (0.067)

Choke unloader adjustment

Gap between choke valve and carburetor body	mm (in)	4.4 (0.173)

Bimetal setting

Resistance between terminal and carburetor body [at 21°C (70°F)]	ohms	9.8 to 10.2
Bimetal setting		22° (L18) (Center of the index marks)

Interlock opening of primary and secondary

Throttle valves	mm (in)	7.4 (0.291)
Dash pot adjustment (Without loading)		1,600 to 1,800 rpm
Anti-dieseling solenoid tightening torque	kg-cm (in-lb)	180 to 350 (156 to 304)

B.C.D.D. set pressure

Manual Transmission	mmHg (inHg)	-500 ± 20 (-19.69 ± 0.79)
Automatic Transmission	mmHg (inHg)	-480 ± 20 (-18.90 ± 0.79)
B.C.D.D. tightening torque	kg-cm (in-lb)	20 to 40 (17 to 35)

SERVICE MANUAL

DATSUN PICK-UP
MODEL 620 SERIES

SECTION EC

EMISSION CONTROL SYSTEM

EC

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

GENERAL DESCRIPTION

CONTENTS

There are three types of emissions to be controlled. The control systems are;

1. Closed type crankcase emission control system.
2. Exhaust emission control system.
   Exhaust gas recirculation system (E.G.R.)
3. Evaporative emission control system.

Periodic inspection and required servicing of these systems should be carried out at the recommended intervals to reduce harmful exhaust gas emission to a minimum.

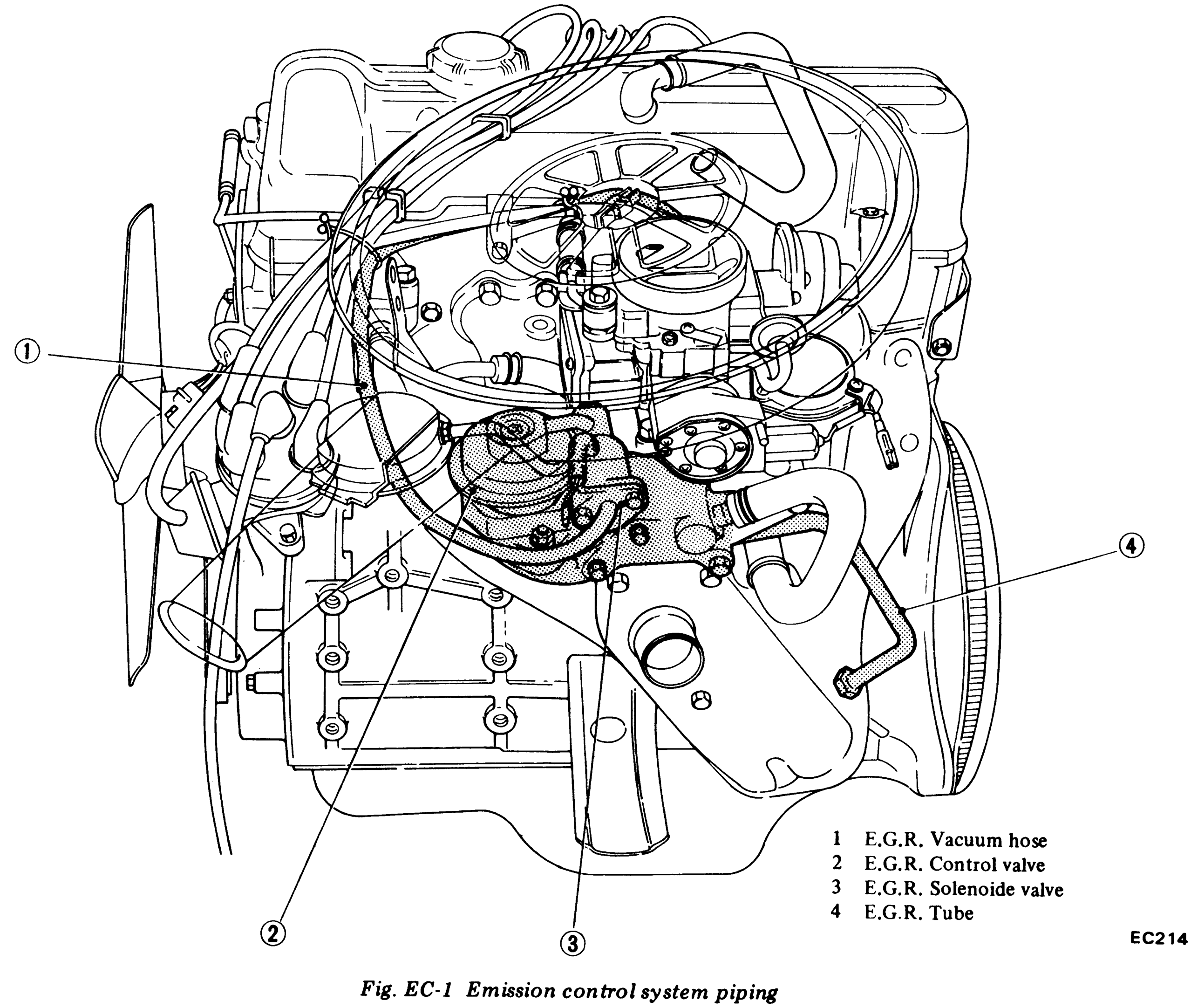


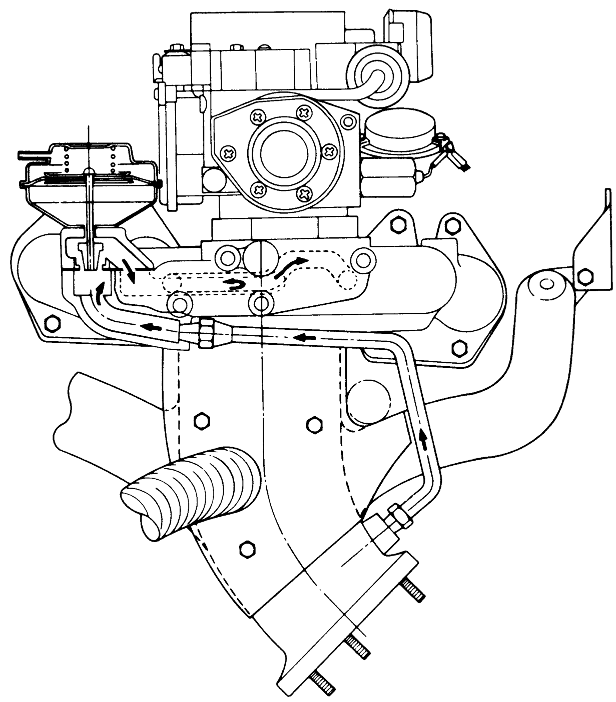
Fig. EC-1 Emission control system piping

EXHAUST GAS RECIRCULATION (E.G.R.) CONTROL SYSTEM

Description

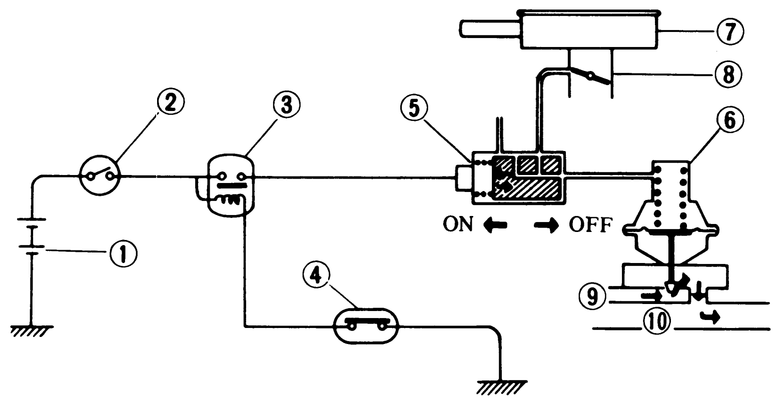
The exhaust gas recirculation system lets exhaust gases recirculate into the combustion chamber and reduces the combustion temperature so as to reduce NOx produced in combustion process.

This system comprizes the E.G.R. control valve, solenoid valve, water temperature switch, relay, E.G.R. tube and vacuum tube. When the E.G.R. control valve opens, exhaust gases from the exhaust manifold is admitted in the chamber of the adapter equipped with the E.G.R. control valve through the E.G.R. tube, which is measured by the E.G.R. control valve and is drawn into the intake manifold.



ET202

Fig. EC-2 E.G.R. control system



ET145

1 Battery
2 Ignition key
3 E.G.R. control relay
4 Water temperature switch
5 E.G.R. solenoid valve
6 E.G.R. control valve
7 Air cleaner
8 Throttle valve
9 Exhaust passage
10 Intake manifold

E.G.R.	Switch operating temperature		Water temperature switch	Relay	E.G.R. solenoid valve	E.G.R. control valve
Actuated	31 to * 41°C (88 to 106°F)	Above	ON	OFF	OFF	Open
Not actuated		Below	OFF	ON	ON	Close

Note *: **The water temperature switch is designed to operate at a coolant temperature somewhere between 31°C (88°F) and 41°C (106°F). Operating points vary slightly with individual characteristics.**

Fig. EC-3 Schematic drawing of E.G.R. control system

OPERATION OF E.G.R. CONTROL VALVE

This valve is operated by vacuum pressure produced in the intake manifold, and opens and closes the exhaust gas passage.

At idling, the control valve does not operate and the exhaust gases do not recirculate.

When the throttle valve of the carburetor opens to increase the vacuum pressure in the intake manifold, this valve starts to operate and the exhaust gases recirculate.

However, when the throttle valve is fully open and the vacuum pressure is decreased below 50 mmHg (2.0 inHg), this valve will close again.

OPERATION OF E.G.R. SOLENOID VALVE

This improves the starting ability and durability of the engine in the cold condition. The water temperature switch detects the cooling water temperature and operates the E.G.R. solenoid valve fitted to the intake manifold. The E.G.R. solenoid valve intermittently shuts off the vacuum passage which leads from the carburetor to the E.G.R. control valve. When the cooling water temperature is below operating temperature, the current flows through the solenoid and so actuates the E.G.R. solenoid valve to shut off the vacuum passage. This prevents the exhaust gases from recirculating.

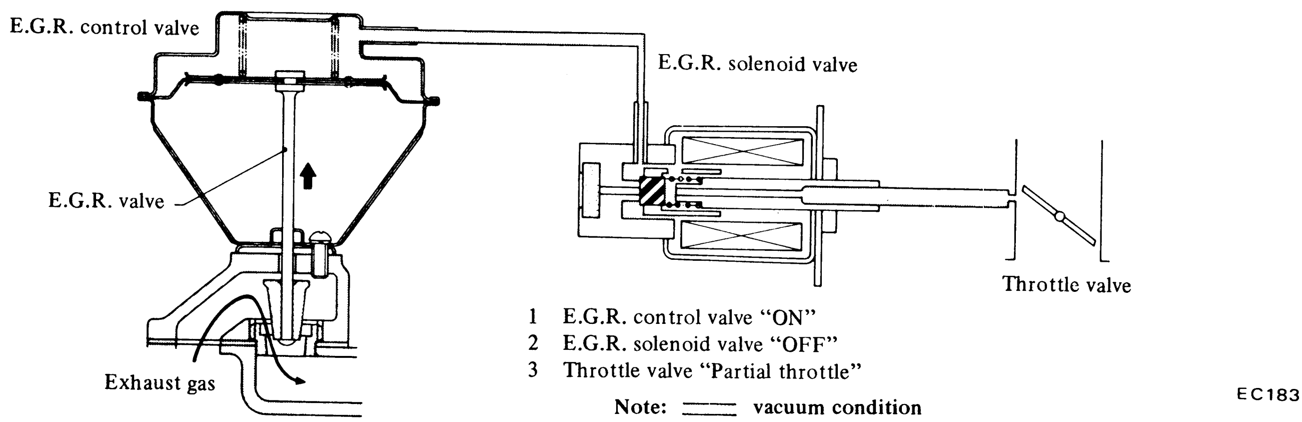


Fig. EC-4 E.G.R. actuated

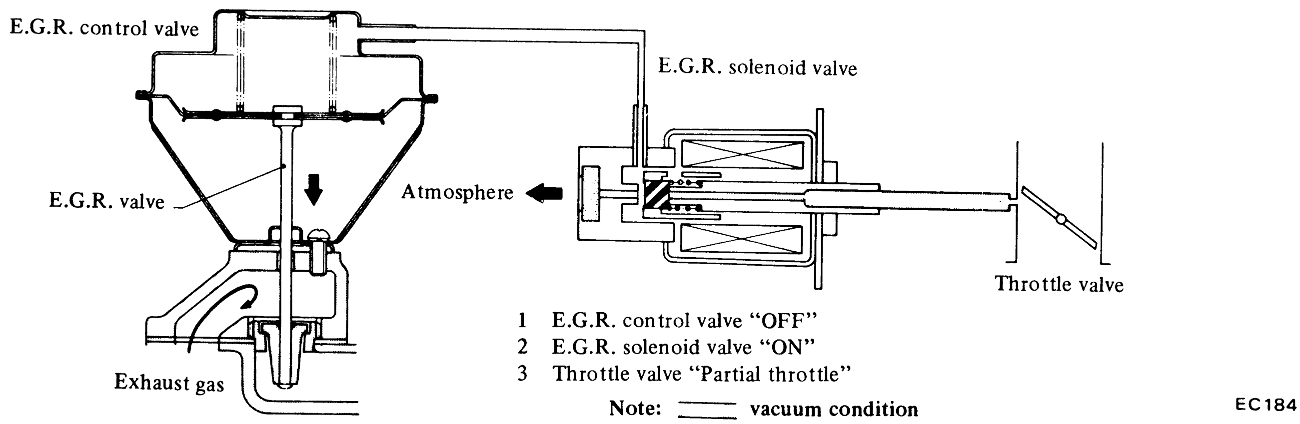


Fig. EC-5 E.G.R. not actuated

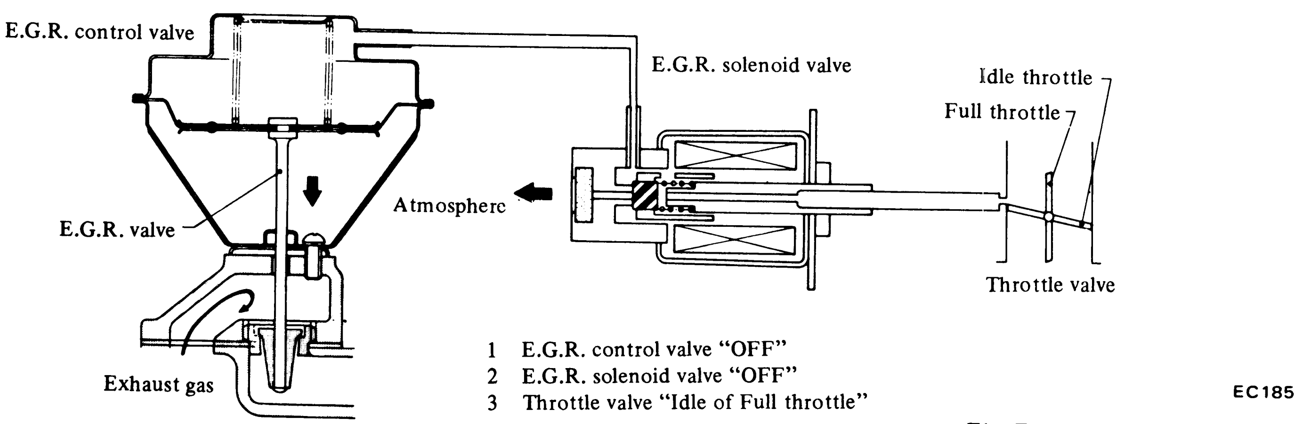


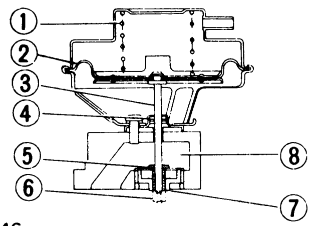
Fig. EC-6 E.G.R. not actuated

EXHAUST GAS RECIRCULATION CONTROL SYSTEM

CONTENTS

E.G.R. CONTROL VALVE

The E.G.R. control valve controls the amount of recirculating exhaust gas using the engine vacuum pressure



1 Diaphragm spring
2 Diaphragm
3 Valve shaft
4 Seal
5 Valve (open)
6 Valve (close)
7 Valve seat
8 Valve chamber

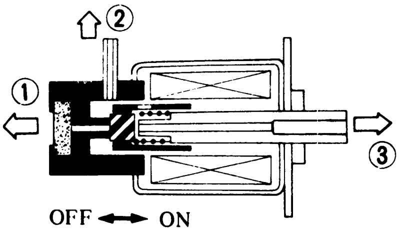
Fig. EC-7 E.G.R. control valve

The E.G.R. control valve is tightened with two nuts on the E.G.R. passage.

E.G.R. SOLENOID VALVE

The solenoid valve opens and connects the vacuum line with the switch turned on and off respectively, thereby putting on or off the E.G.R. valve.

The solenoid valve is attached to the E.G.R. valve with two screws.



1 To atmosphere
2 To E.G.R. control valve
3 To carburetor ET147

Fig. EC-8 Solenoid valve

WATER TEMPERATURE SWITCH

The water temperature switch turns the line to solenoid valve on or off at the operating temperature of engine coolant in order to control the E.G.R. system.

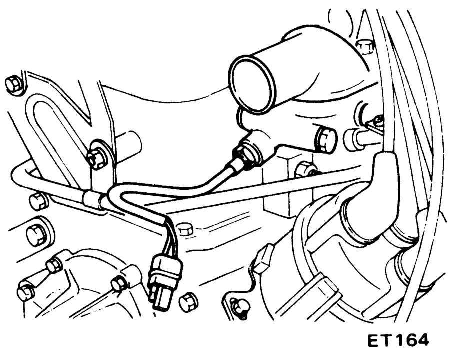


Fig. EC-9 Water temperature switch

REMOVAL AND INSTALLATION

Note: This E.G.R. control system requires a regular maintenance, especially cleaning.

The E.G.R. control valve is secured with two nuts on the E.G.R. passage attached to the intake manifold. The E.G.R. solenoid valve is tightened to the E.G.R. control valve with two screws.

Removal and installation can be done in a few steps. Remove and install E.G.R. system as follows:

REMOVAL

E.G.R. control valve

1. Remove air cleaner hot air hose by loosening screw from air cleaner side.
2. Loosen two air cleaner attaching bolts and air cleaner lock bolt to remove air cleaner.
   (The hose attached to air cleaner need not be removed.)
3. Pull out vacuum hose connecting carburetor and E.G.R. solenoid valve from solenoid valve side. Disconnect E.G.R. solenoid valve power cords at the terminal.
4. Remove two nuts securing E.G.R. valve. Use caution not to damage gasket.

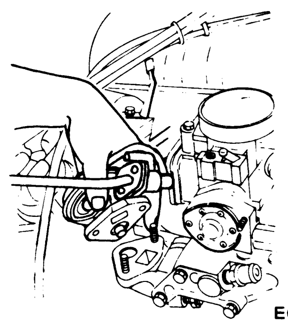


Fig. EC-10 Removing E.G.R. control valve

E.G.R. passage

1. Remove exhaust gas return tube connecting E.G.R. passage to exhaust manifold.
2. Remove blow-by hose connecting P.C.V. valve to cylinder block.
3. Remove vacuum hose connecting AB valve to E.G.R. passage.
4. Remove four bolts securing E.G.R. passage on intake manifold.

5. Remove two bolts securing E.G.R. control relay, and detach E.G.R. control relay.

The location of E.G.R. control relay:

710 model - On the left dash side finish.

620 model - On the reinforcement in the center of instrument panel.

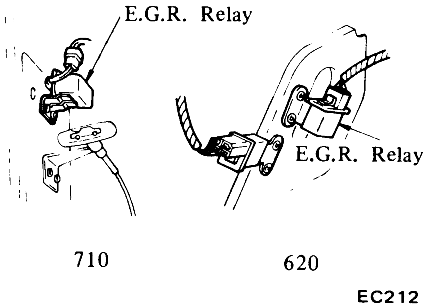


Fig. EC-11 E.G.R. control relay

INSTALLATION

Installation should be made in the reverse of removal.

CHECKING E.G.R. CONTROL SYSTEM

WITH E.G.R. CONTROL SYSTEM EQUIPPED ON ENGINE

1. Visually inspect entire E.G.R. control system. Clean it for ease of inspection if it is contaminated with oil. Replace rubber hoses if found cracked or broken.
2. When it becomes necessary to inspect E.G.R. control valve, check to be sure that E.G.R. solenoid valve is properly wired.
3. Increase engine speed from idling to 3,000 to 3,500 rpm, noting if plate of E.G.R. control valve diaphragm and valve shaft move upwards as speed is increased.
4. Disconnect E.G.R. solenoid valve harness, and connect it directly to battery to apply battery voltage (12V) to E.G.R. solenoid valve. Race engine again without disturbing above setup.

E.G.R. control valve should be kept stationary.

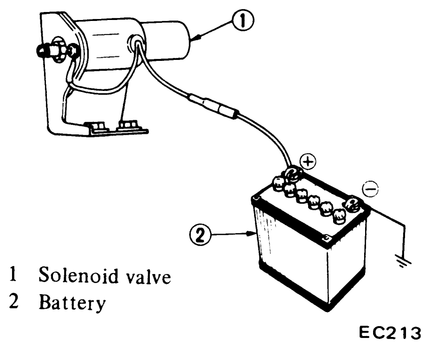


Fig. EC-12 Inspecting E.G.R. solenoid valve

5. With engine running at idling speed, push up E.G.R. control valve diaphragm by manually pressing bottom dish.

It is normal if engine loses stability.

CHECKING E.G.R. CONTROL VALVE

To inspect parts, it is necessary first to remove E.G.R. control valve from engine.

1. Remove E.G.R. vacuum hose and check to be certain that vacuum hose is not deformed excessively. If it is, the probability is that E.G.R. control valve is not operating properly due to leakage of vacuum signals. To remedy this condition, replace vacuum hose.
2. Remove E.G.R. control valve from intake manifold.

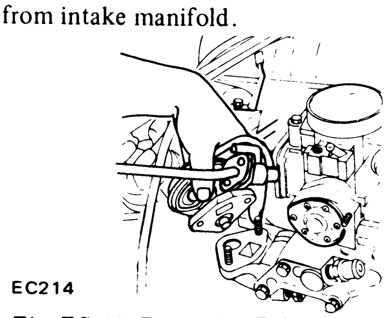


Fig. EC-13 Removing E.G.R. control valve

3. Apply a vacuum of −120 to −130 mm Hg (−4.72 to −5.12 in Hg) to E.G.R. control valve. Vacuum application can easily be made by the method illustrated in Figure EC-14.

It is correct if valve moves into full-up position.

E.G.R. control valve should stay uplifted for more than 30 seconds after vacuum is stopped.

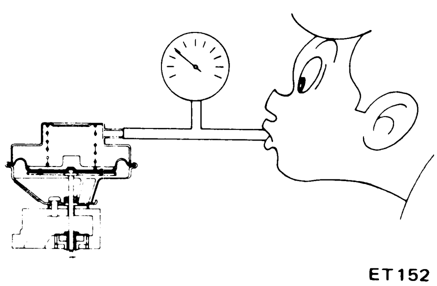


Fig. EC-14 Checking E.G.R. control valve

4. Visually inspect E.G.R. control valve for sign of damage, wrinkle or otherwise deformation.
5. Clean the E.G.R. control valve seat with brush and compressed air as shown in Figure EC-15 to eliminate clogging of E.G.R. control valve.

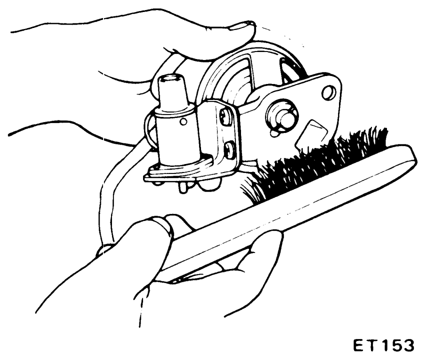


Fig. EC-15 Cleaning E.G.R. control valve seat

CHECKING E.G.R. SOLENOID VALVE

Check E.G.R. solenoid valve as instructed below. An ohmmeter and battery are required in this checking.

1. Check E.G.R. solenoid valve for proper conduction as shown in Figure EC-16.

If ohmmeter pointer does not deflect, it is considered as broken and needs to be replaced.

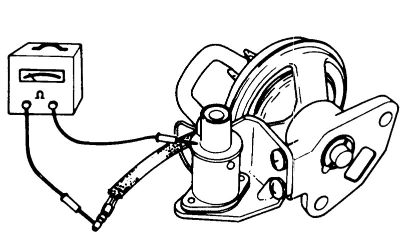


Fig. EC-16 Checking E.G.R. solenoid valve

2. If ohmmeter pointer deflects in step (1) above. Check E.G.R. solenoid valve to ensure that it clicks when intermittently electrified as shown in Figure EC-17.

If a click is heard, E.G.R. solenoid valve is normal.

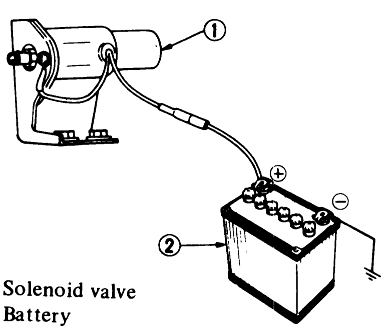


Fig. EC-17 Inspecting E.G.R. solenoid valve

3. E.G.R. solenoid valve is considered as sticking and must be replaced when it does not click in item 2 above.

Checking water temperature switch

1. A thermometer and ohmmeter are needed for checking water temperature switch.
2. Checking "OFF" of water temperature switch

Starting from water temperature at 25°C (77°F) and below, check continuity of water temperature switch and ensure that a reading is infinite, that is, switch is open.

3. Checking "ON" of water temperature switch

Increasing water temperature from about 25°C (77°F), make continuity check of water temperature switch. Operation is normal if an ohmmeter reading drops to zero, at water temperature somewhere between 31 to 41°C (88 to 106°F) and remains zero at above 41°C (106°F).

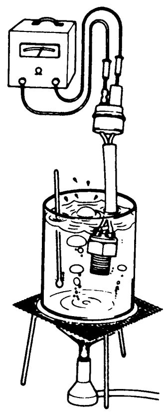


Fig. EC-18 Checking water temperature switch operation

4. If it is satisfied both in steps (2) and (3) above, switch is good.

SERVICE MANUAL

DATSUN PICK-UP
MODEL 620 SERIES

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION EE

ENGINE ELECTRICAL SYSTEM

BATTERY

CONTENTS

REMOVAL

1. Disconnect negative and positive terminals.
2. Remove nuts from battery clamps; take off clamps.
3. Remove battery.

CHECKING ELECTROLYTE LEVEL

Battery comes into two types; self-filling and conventional. To check the level, remove one vent plug and see if the float is raised to the correct level (self-filling type).

If it is below the specified level, raise to correct level by pouring distilled water into the battery case.

On standard type, remove six vent plugs and check for electrolyte level in each cell.

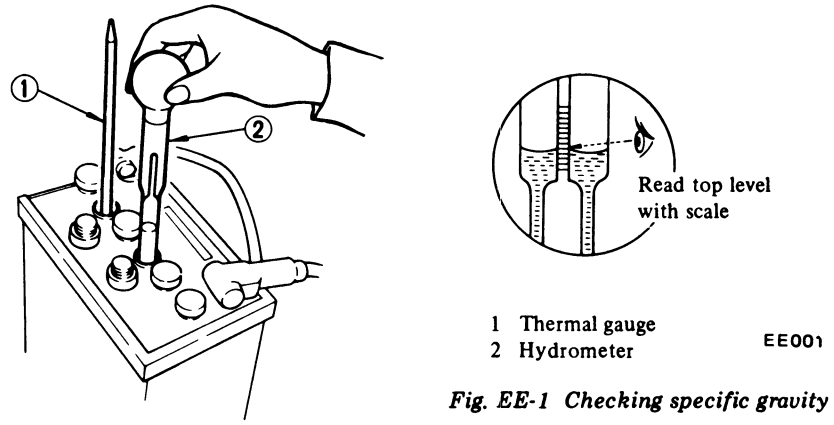
If necessary, pour distilled water.

CHECKING SPECIFIC GRAVITY

Specific gravity of battery electrolyte is tested by a hydrometer. If the state of charge of battery is 60% or specific gravity reading is below 1.20 [as corrected at 20°C (68°F)], battery must be recharged or battery-electrolyte concentration adjusted.

Add or subtract gravity points according to whether the electrolyte temperature is above or below 20°C (68°F) standard.

The gravity of electrolyte changes 0.0007 for every 1°C (1.8°F) temperature. A correction can then be made by using the following formula:



1 Thermal gauge
2 Hydrometer

EE001

Fig. EE-1 Checking specific gravity

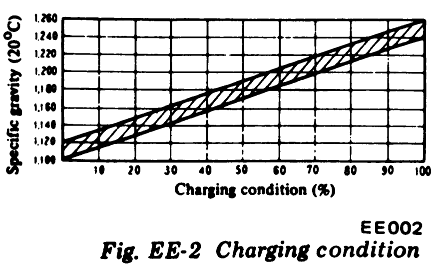
$$S_{20} = S_t + 0.0007 (t - 20)$$

Where

- S_t: Specific gravity of electrolyte at t°C
- S_{20}: Specific gravity of electrolyte corrected at 20°C (68°F)
- t: Electrolyte temperature

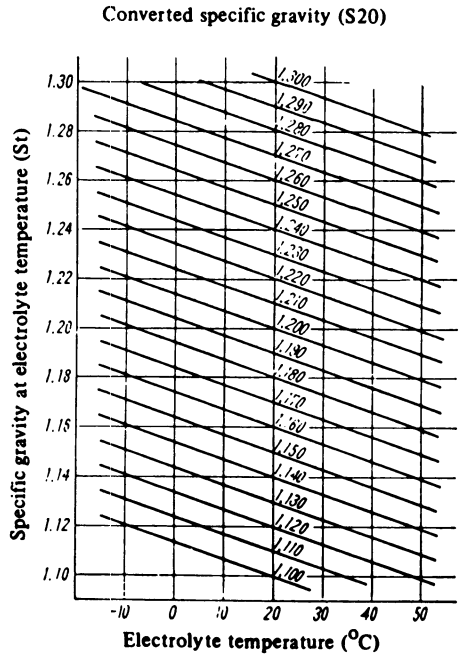
For example: A hydrometer reading of 1.260 at 30°C (86°F) would be 1.267 corrected to 20°C (68°F), indicating fully charged battery. On the other hand, a hydrometer reading of 1.220 at −10°C (14°F) would be 1.199 corrected to 20°C (68°F), indicating a partially charged battery.

The state of charge of battery can be determined by the following table if the specific gravity of electrolyte is known. Before checking, be sure that cells are filled to correct level.



EE002

Fig. EE-2 Charging condition



EE003

Fig. EE-3 Specific gravity at electrolyte temperature

"attery freezing

Battery electrolyte freezing point varies with acid concentration or its specific gravity. A battery with an insufficient charge will freeze at lower temperatures. If specific gravity of a battery falls below 1.1, this is an indication that battery is completely discharged and will freeze readily when temperatures fall below freezing.

Note: Use extreme caution to avoid freezing battery since freezing will generally ruin the battery.

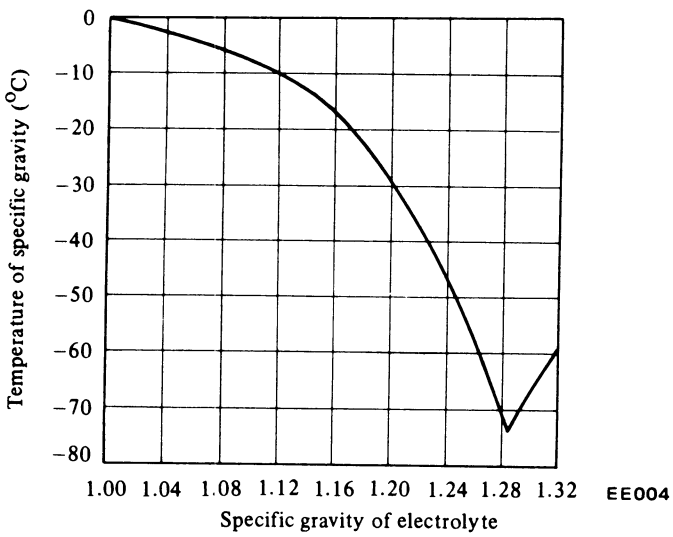


Fig. EE-4 Freezing point of electrolyte

CHARGING

If electrolyte level is satisfactory, battery must be recharged when electrolyte-gravity reading falls below 1.20. If battery is quick-charged to bring it up to full charge, the operation should be carried out with negative terminal removed.

Prior to charging, corroded terminals should be cleaned with a brush and common baking-soda solution. In addition:

1. Be sure that electrolyte level is above top of each plate.
2. Keep removed plugs in a safe place.
3. Do not allow electrolyte temperature to go over 45°C (113°F).
4. After recharging, check to be certain that specific gravity does not exceed 1.260 [at 20°C (68°F)]. Correction can be made by adding distilled water into cells as necessary.
5. Keep battery away from open flame while it is being recharged.
6. After all vent plugs have been tightened, clean all sprayed electrolyte off upper face of battery.

INSTALLATION

1. Install and tighten clamps securely.
2. After clamps have been tightened, clean battery cable terminals and apply grease to retard formation of corrosion.

STARTING MOTOR

CONTENTS

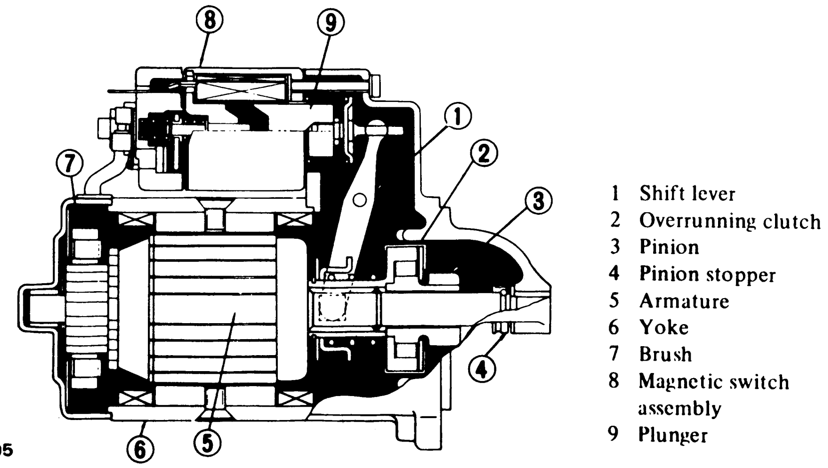
ENGINE ELECTRICAL SYSTEM

SPECIFICATIONS

Model		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 (11.2)	5.8 (12.8)

DESCRIPTION

The function of the starting system which consists of the battery, ignition switch, starting motor and solenoid, is to crank the engine. The electrical energy is supplied from the battery, the solenoid completes the circuit to operate the starting motor, and then the motor carries out the actual cranking of the engine.



EE005

Fig. EE-5 Sectional view of starting motor

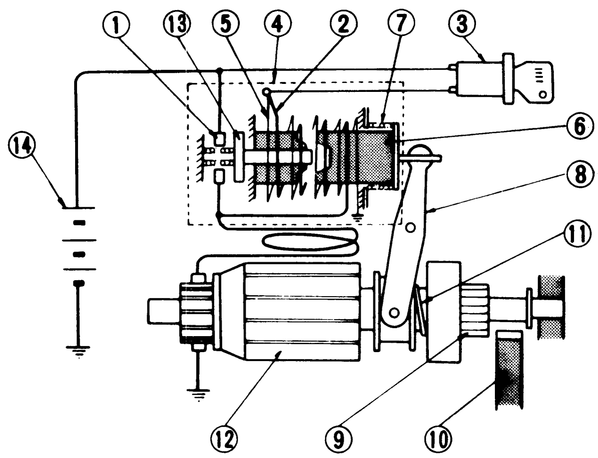
OPERATION

When the ignition switch is turned fully clockwise to the START position, battery current flows through "series" and "shunt" coils of the solenoid, magnetizing the solenoid. The plunger is pulled into the solenoid so that it operates the shift lever to move the drive pinion into the flywheel ring gear. Then the solenoid switch contacts close after the drive pinion is partially engaged with the ring gear.

Closing of the solenoid switch contacts causes the motor to crank the engine and also cut out the "series" coil of the solenoid, the magnetic pull of the "shunt" coil being sufficient to hold the pinion in mesh after the shifting has been performed.

After the engine starts running, the driver releases the ignition key and it automatically returns to the ON position.

This breaks the solenoid circuit so that reverse current flows through the series coil, and the magnetic field builds up in the direction in which the plunger moves back. As this happens, the resultant force of the magnetic fields in the shunt coil and the series coil becomes zero. The return spring then actuates the shift lever to pull th plunger, which allows the solenoid switch contacts to open. Consequently, the starting motor stops.



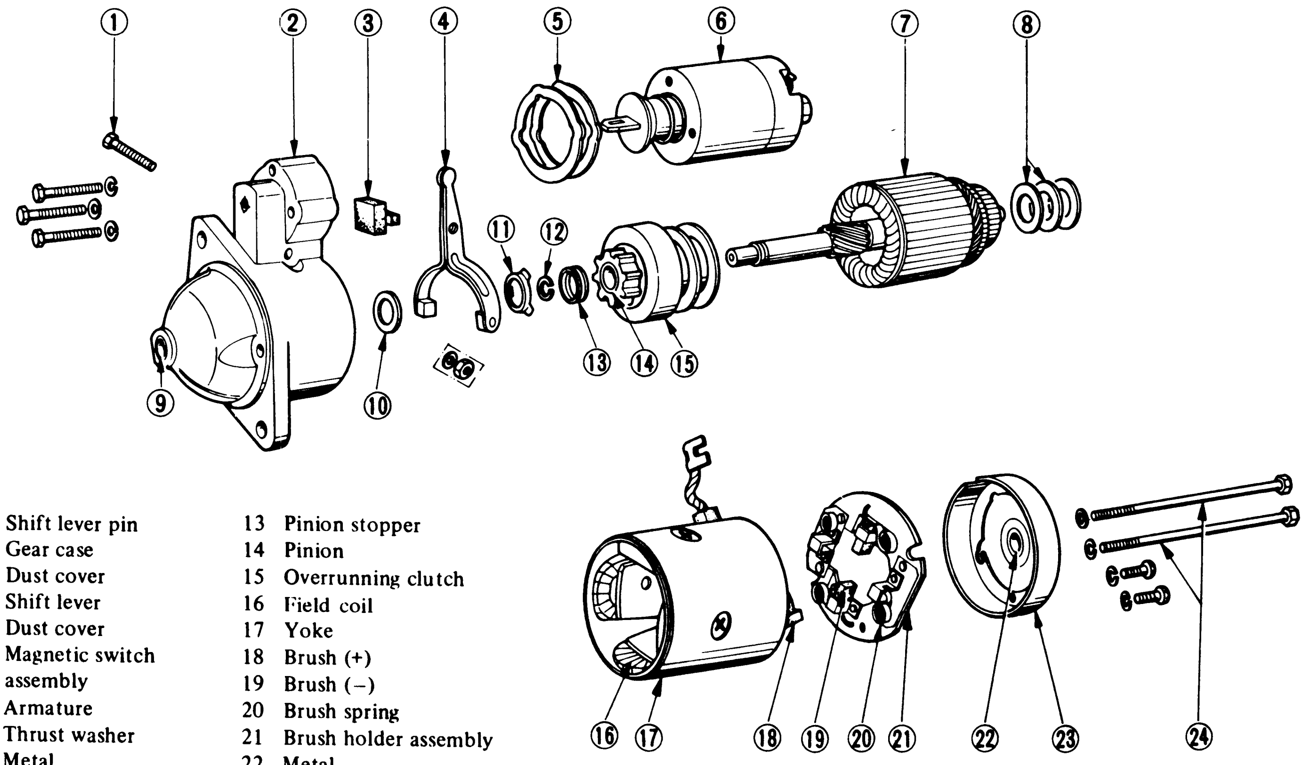
1 Stationary contact
2 Series coil
3 Ignition switch
4 Solenoid
5 Shunt coil
6 Plunger
7 Return spring
8 Shift lever
9 Drive pinion
10 Ring gear
11 Pinion sleeve spring
12 Armature
13 Movable contactor
14 Battery

EE118

Fig. EE-6 Starting motor circuit

More positive meshing and demeshing of the pinion and the ring gear teeth are secured by means of the overrunning clutch. The overrunning clutch employs a shift lever to slide the pinion along the armature shaft, into or out of mesh with the ring gear teeth. The overrunning clutch is designed to transmit driving torque from the motor armature to the ring gear, but permits the pinion to overrun the armature after the engine has started.

CONSTRUCTION



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

EE007

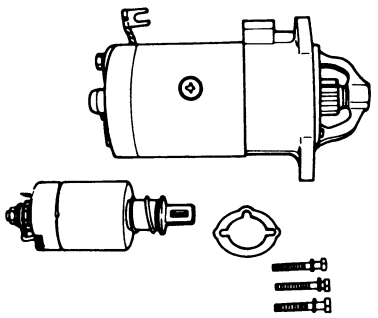
Fig. EE-7 Exploded view of starting motor

REMOVAL

1. Disconnect battery ground cable.
Disconnect black wire with yellow tracer from magnetic switch terminal, and black battery cable from battery terminal of magnetic switch.
2. Remove two bolts securing starting motor to gear case. Pull starter assembly forward and remove starting motor.

DISASSEMBLY

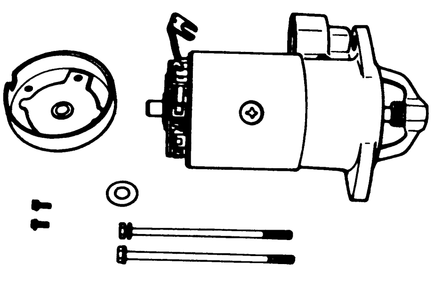
1. Loosen nut securing connecting plate to magnetic switch "M" terminal. Remove three screws securing magnetic switch and remove magnetic switch assembly.



EE149

Fig. EE-8 Removing magnetic switch assembly

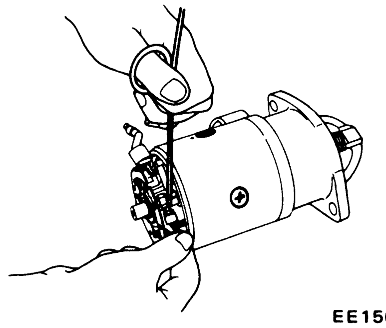
2. Remove two through bolts and brush cover assembly.



EE009

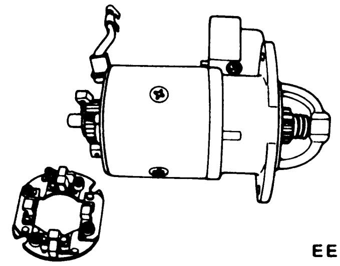
Fig. EE-9 Removing brush cover

3. Unsolder brushes, using a soldering-iron and remove each brush.



EE150

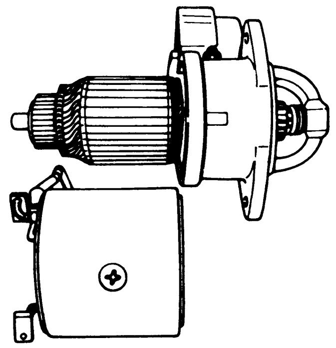
Fig. EE-10 Removing brush



EE151

Fig. EE-11 Removing brush holder

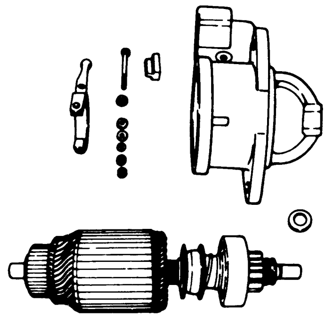
4. Remove yoke assembly by hitting lightly with a wooden hammer.



EE152

Fig. EE-12 Removing yoke assembly

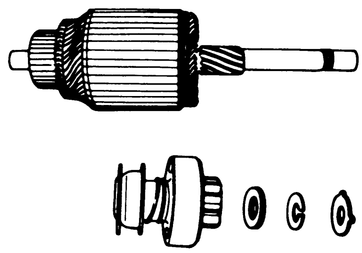
5. Withdraw armature assembly and shift lever.



EE153

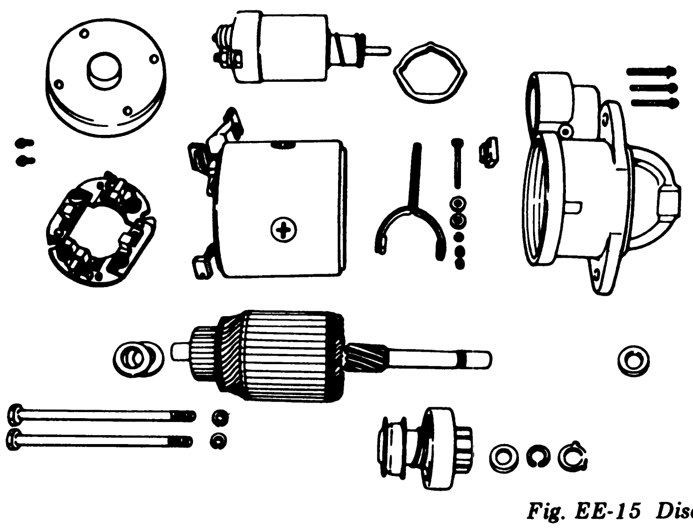
Fig. EE-13 Removing armature assembly and shift lever

6. Remove pinion stop ring located at the end of armature shaft. To remove stop ring, first push stop ring to clutch side and then, after removing snap ring, remove stop ring with overrunning clutch. Withdraw overrunning clutch assembly from armature shaft.



EE012

Fig. EE-14 Removing overrunning clutch assembly



EE154

Fig. EE-15 Disassembly

CLEANING AND INSPECTION

Clean all disassembled parts, but do not use grease dissolving solvents for cleaning overrunning clutch, armature assembly, magnetic switch assembly and field coils since such a solvent would dissolve grease packed in clutch mechanism and would damage coils or other insulators.

Check them for excessive damage or wear, and replace if necessary.

Terminal

Check terminal for damage and wear, and replace if necessary.

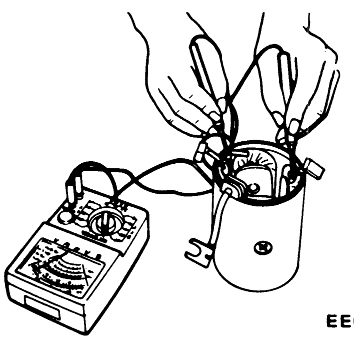
Field coil

Check field coil for insulation. If the insulation of coil is damaged or worn it should be replaced.

Testing field coil for continuity:

Connect the probe of a circuit tester or an ohmmeter to field coil positive terminal and positive brush holder.

If tester shows no conduction field circuit or coil is open.



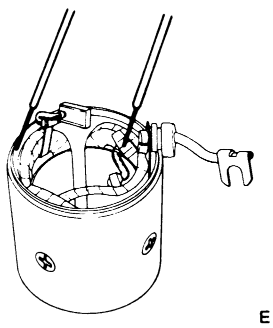
EE016

Fig. EE-16 Testing field coil for continuity

Testing field coil for ground:

Place one probe of circuit tester onto yoke and the other onto field coil lead (positive terminal).

If very little resistance is read, field coil is grounded.



EE017

Fig. EE-17 Testing field coil for ground

Testing field coil for short:

Unsolder the connected portion of each coil and proceed as described above.

If a damaged coil is found, it should be replaced.

Armature assembly

Check external appearance of armature and commutator.

1. Measure armature shaft for bend with a dial gauge. Replace armature shaft if the bend exceeds 0.08 mm (0.0031 in).

Brushes and brush lead wire

Check the surface condition of brush contact and wear of brush. If a loose contact is found it should be replaced.

If brush is worn so that its length is less than 6.0 mm (0.236 in), replace.

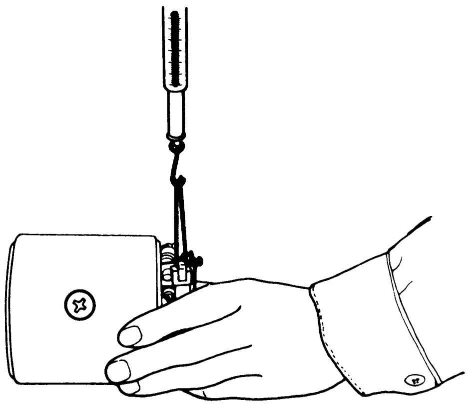
Check the connection of lead clip and lead wire.

Check brush holders and spring clip to see if they are not deformed or bent, and will properly hold brushes against the commutator.

If brushes or brush holders are dirty, they should be cleaned.

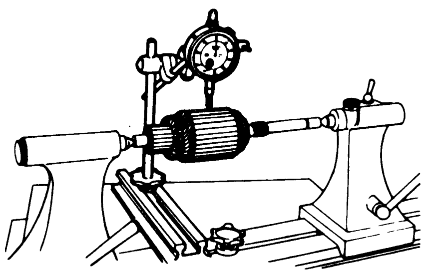
Brush spring tension

Check brush spring tension by a spring scale as shown in Figure EE-18. The reading should be 1.6 kg (3.5 lb). Replace spring if tension is lower than 1.4 kg (3.1 lb).



EE018

Fig. EE-18 Inspecting brush spring tension



EE019

Fig. EE-19 Inspecting armature shaft for bend

2. Inspect commutator. If the surface of commutator is rough, it must be sanded lightly with a No. 500 emery cloth. Commutator must also be checked for out-of-round. If the out-of-round is more than 0.2 mm (0.0079 in), or the depth of insulating mica is less than 0.2 mm (0.0079 in) from commutator surface, commutator (armature) should be turned in a lathe, until the out-of-round is less than 0.05 mm (0.0020 in). Insulating mica should also be undercut so that the depth of it is 0.5 to 0.8 mm (0.0197 to 0.0315 in).

The wear limit of commutator diameter is 2 mm (0.079 in). If commutator is beyond repair, replace.

Note: **If worn or damaged, it is recommended to replace commutator as an assembly.**

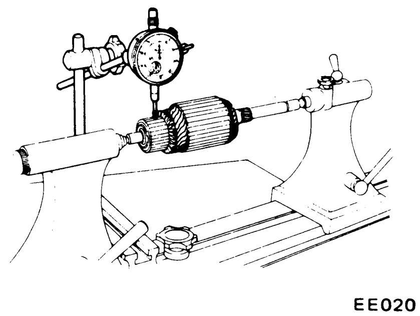


Fig. EE-20 Inspecting commutator

Overrunning clutch assembly

Inspect pinion assembly and screw sleeve. Screw sleeve must slide freely along armature shaft splines. If damage is found or resistance is felt when sliding, it must be repaired. Inspect pinion teeth. If excessive rubbing is found on teeth, replace. Flywheel ring gear also must be inspected.

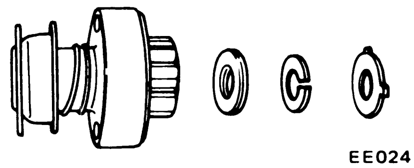


Fig. EE-24 Over-running clutch assembly

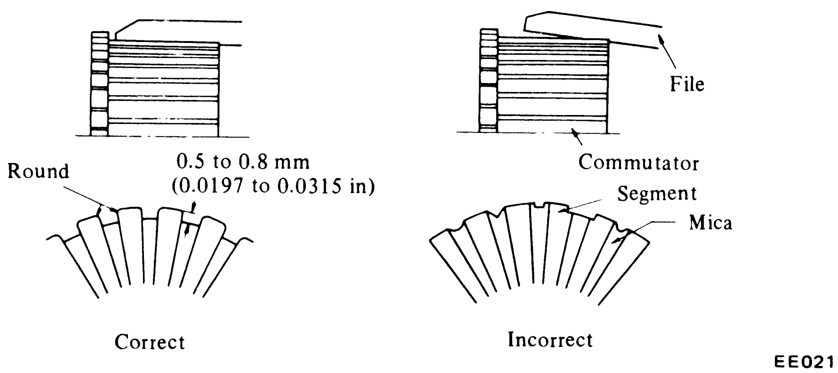


Fig. EE-21 Undercutting insulating mica

3. Inspect soldered connection of armature lead and commutator. If loose connection is found, solder it using rosin flux.
4. Armature test for ground

Using a circuit tester, place one test probe onto armature shaft and the other onto each commutator bar.

If tester shows conduction, armature is grounded and must be replaced.

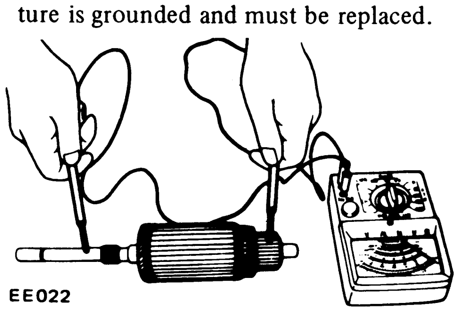


Fig. EE-22 Testing armature for ground

5. Check armature for short by placing it on armature tester (growler) with a piece of iron over armature core, rotating armature. If the plate vibrates, armature is shorted.

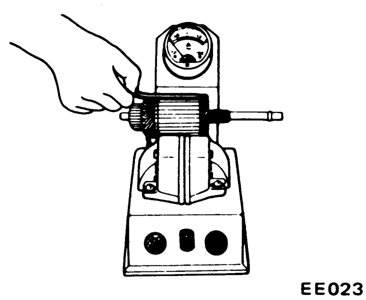


Fig. EE-23 Testing armature for short

6. Check armature for continuity by placing probes of tester on two segments side by side. If tester shows no conduction, the circuit is open.

Brush holder test for ground

Using a circuit tester, place one test probe onto negative side of brush holder and another onto positive side If tester shows conduction, brush holder is shorted to ground. Replace an insulator or brush holder.

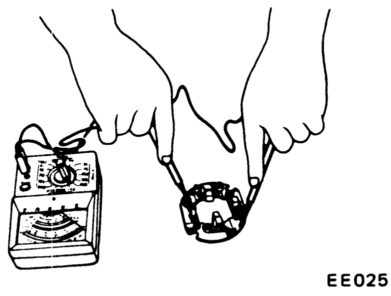


Fig. EE-25 Testing brush for ground

Pinion case bearing metal

Inspect bearing metal for wear or side play. If the clearance between bearing metal and armature shaft is more than 0.2 mm (0.0079 in), replace metal. Press in a new bearing and adjust the clearance to 0.03 to 0.10 mm (0.0012 to 0.0039 in). Bearing metal should be pressed in so that the end of bearing metal is flush with gear case.

Magnetic witch assembly

Inspect magnetic switch contacts. If a rough welding is found on the contact, it should be repaired.

ASSEMBLY

Reassemble starting motor in reverse sequence of disassembly.

When assembling, be sure to apply grease to gear case and rear cover bearing metal, and apply oil lightly to pinion.

TEST

Performance test

Starter motor should be subjected to a "no-load" test whenever it has been overhauled to ensure that its performance will be satisfactory when installed to engine. Starter motor should also be subjected to the test when the cause of abnormal operation is to be determined. A brief outline of the test is given below.

No-load test

Connect starting motor in series with specified (12 volts) battery and an ammeter capable of indicating 1,000 amperes.

Specified current draw and revolution in these test are shown in "specification."

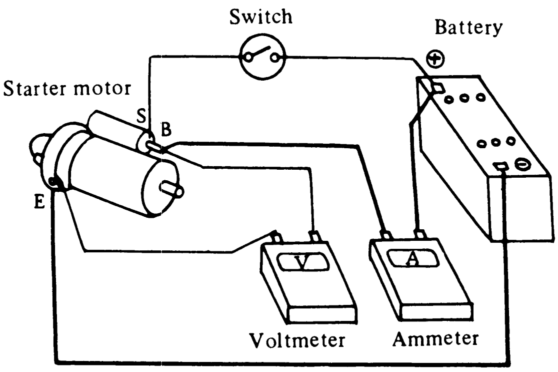


Fig. EE-26 No-load testing

Diagnosis of test

1. Low speed with no-load and high current draw may result from the following :

(1) Tight, dirty or worn bearings.

(2) Bent armature shaft or loosened field probe.

(3) Shorted armature;
Check armature further.

(4) A grounded armature or field;

a. Remove input terminal.

b. Raise two negative side brushes from commutator.

c. Using a circuit tester, place one probe onto input terminal and the other onto yoke.

d. If tester indicates conduction, raise the other two brushes and check field and armature separately to determine whether field or armature is grounded.

2. Failure to operate with high current draw may be caused by the following:

(1) A grounded or open field coil:
Inspect the connection and trace circuit by a circuit tester.

(2) Armature coil does not operate:
Inspect commutator for excessive burning. In this case, arc may occur on damaged commutator when motor is operated with no-load.

(3) Burned out commutator bar:
Weak brush spring tension, broken brush spring, rubber bush, thrust out of mica in commutator or a loose contact between brush and commutator would cause commutator bar to burn.

3. Low current draw and low no-load speed would cause high internal resistance due to loose connections, damaged leads, dirty commutator and causes listed on item 2-(3).

Magnetic switch assembly test

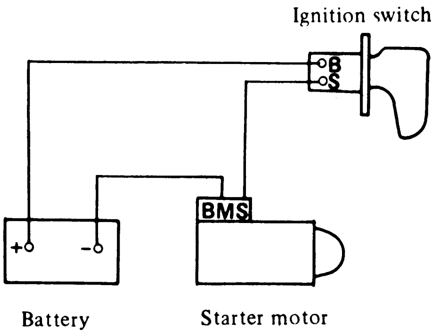


Fig. EE-27 Circuit of magnetic switch assembly test

If the starting motor check is "OK", check magnetic switch assembly. Connect cables between "negative" battery terminal and starting motor "M" terminal, "positive" battery terminal and starting motor "S" terminal connecting ignition switch in series as shown in Figure EE-27.

With ignition switch on, measure the gap "ℓ" between pinion front edge and pinion stopper.

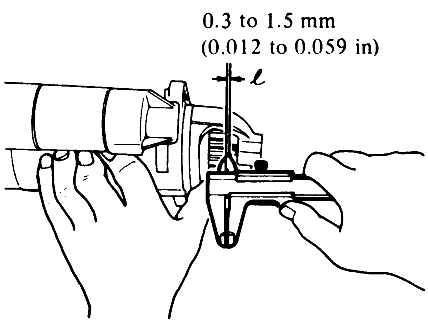


Fig. EE-28 Measuring gap "ℓ"

ENGINE ELECTRICAL SYSTEM

SERVICE DATA

Item / Model		S114-103P	S114-126M
Armature shaft diameter (pinion side)	mm (in)	10.950 to 10.968 (0.4311 to 0.4318)	12.950 to 12.968 (0.5098 to 0.5106)
Armature shaft diameter (rear end)	mm (in)	11.450 to 11.468 (0.4508 to 0.4515)	←
Amendment limit of shaft diameter	mm (in)	0.1 (0.0039)	←
Amendment limit of shaft bent	mm (in)	0.08 (0.0031)	←
Clearance between shaft and bush	mm (in)	0.03 to 0.10 (0.0012 to 0.0039)	←
Amendment limit of dittoed clearance	mm (in)	0.2 (0.0079)	←
Outer diameter of commutator	mm (in)	35.0 (1.378)	←
Wear limit of commutator diameter	mm (in)	2.0 (0.079)	←
Brush length	mm (in)	18.5 (0.728)	←
Wear limit of dittoed length	mm (in)	6.0 (0.236)	←
(remaining brush should be more than)	mm (in)	12.5 (0.492)	←
Brush spring tension	kg (lb)	1.6 (3.5)	←
Front bracket metal inner diameter	mm (in)	11.000 to 11.018 (0.4331 to 0.4338)	13.000 to 13.018 (0.5118 to 0.5125)
Rear cover metal inner-diameter	mm (in)	11.500 to 11.521 (0.4528 to 0.4536)	←
Center bearing metal inner diameter	mm (in)	——	17.650 to 17.675 (0.6949 to 0.6959)

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Starting motor will not operate.	Discharged battery.	Charge or replace battery.
	Damaged solenoid switch.	Repair or replace solenoid switch.
	Loose connections of terminal.	Clean and tighten terminal.
	Damaged brushes.	Replace brushes.
	Starting motor inoperative.	Remove starting motor and make test.

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

CHARGING CIRCUIT

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.

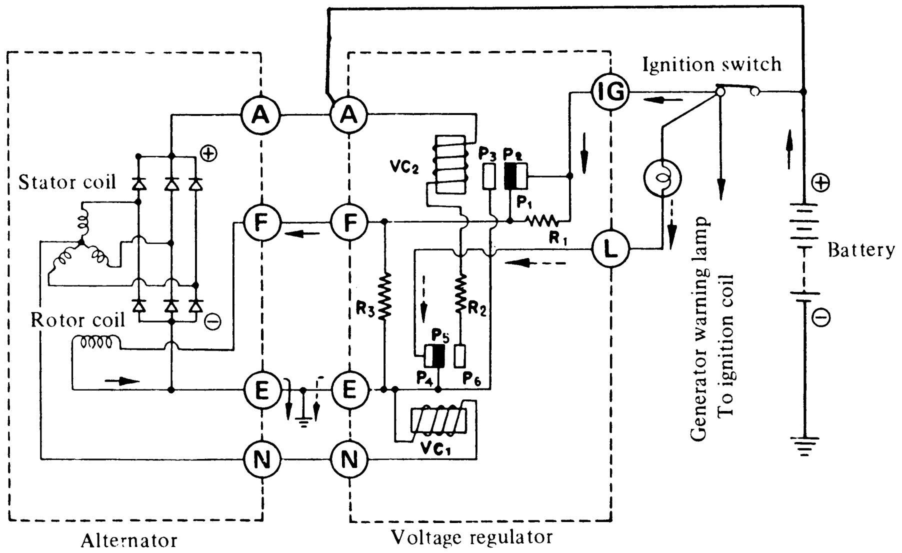
When the ignition switch is set to "ON", current flows from the battery to ground through the ignition switch, voltage regulator IG terminal, primary side contact point "P1," movable contact point "P2", voltage regulator "F" terminal, alternator "F" terminal, field coil and alternator "E" terminal, as shown in Figure EE-29 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 EE-30 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.

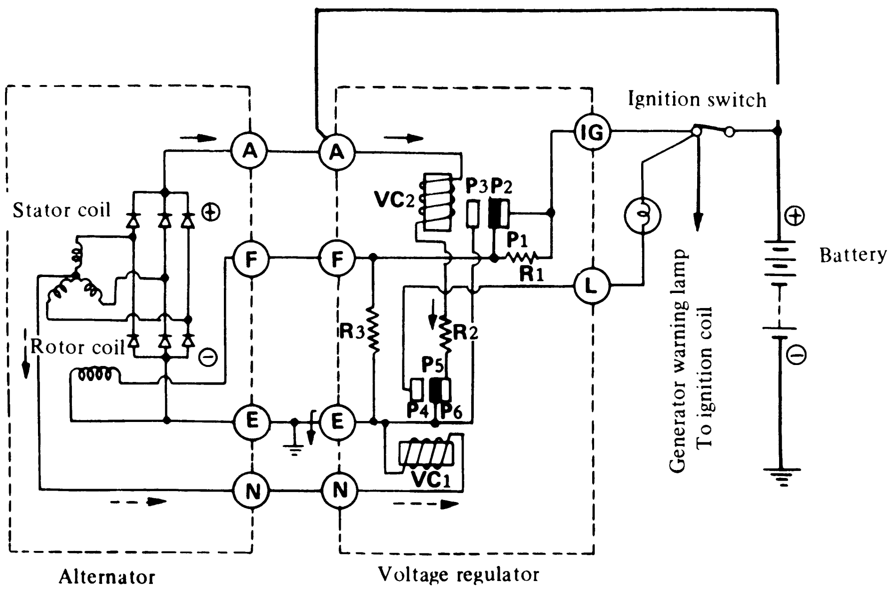
When the alternator speed is increased or the voltage starts to rise excessively, the movable contact point "P2" is separated from the primary side contact "P1" by the magnetic force of coil "VC2". Therefore, registor "R1" is applied into the rotor circuit and output voltage is decreased. As the output 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 "P2", maintains an alternator output 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 movable contact "P2" to separate 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.



EE029

Fig. EE-29 Charging circuit (I)



EE030

Fig. EE-30 Charging circuit (II)

ALTERNATOR

CONTENTS

DESCRIPTION

Alternator	Car
LT150-13	710 model except for Canada
LT160-24	710 model for Canada
LT135-13B	620 model

In the alternator, a magnetic field is produced by the rotor which consists of alternator shaft, field coil, pole pieces, and slip rings. The slip rings pressed in the shaft conduct only a small field current. Output current is generated in the armature coils located in the stator. The stator has three windings and generates three-phase alternating current. Silicon diodes act like a one-way valve for electricity so that charging current passes easily but reverse current is shut out.

In model LT160-13, conventional type diodes are used.

Six diodes (three negatives and three positives), are installed in positive and negative plates as an assembly.

These diodes are direct-soldered at their tips, and constructed with positive and negative conjunction.

They are mounted on the two plates which combine the function of heat-dissipating plate and positive/negative terminals and are light in weight and easy to service.

In model LT150-24, pack type silicon diodes are used.

Three diodes each (three negatives and three positives) are installed in positive and negative side rear cover.

In this chapter, under LT150-13 is used as the standard and explanations in instruction procedure are added to it when the other models differ from it.

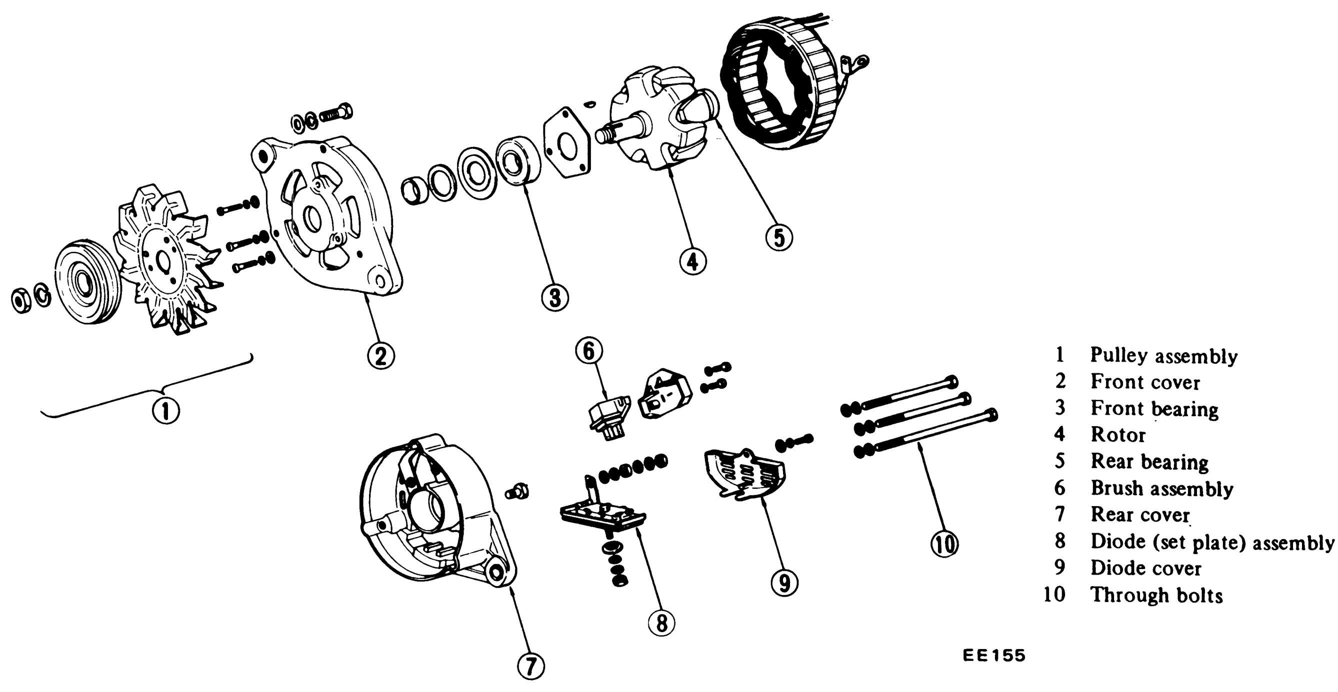


Fig. EE-31 Exploded view of LT150-13

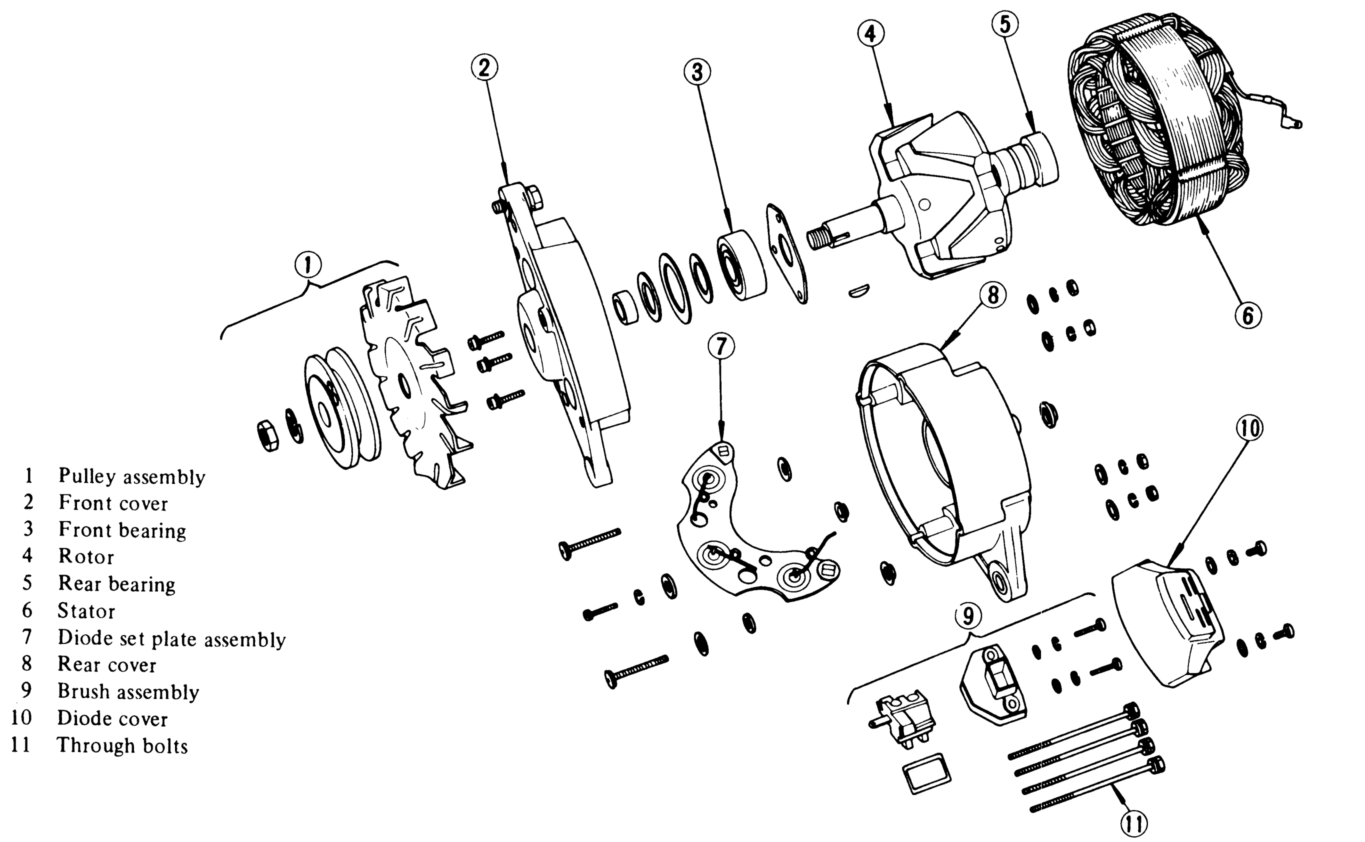


Fig. EE-32 Exploded view of LT160-24

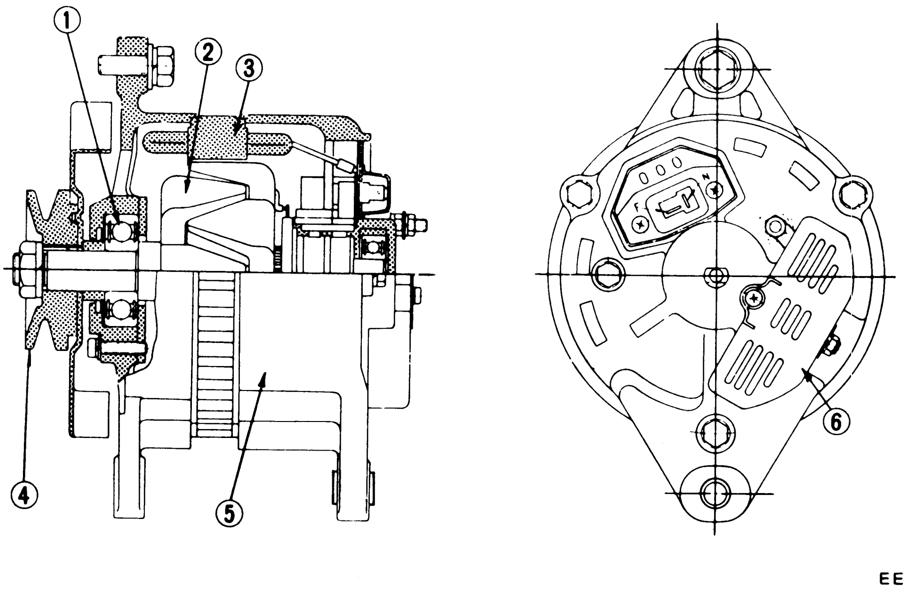
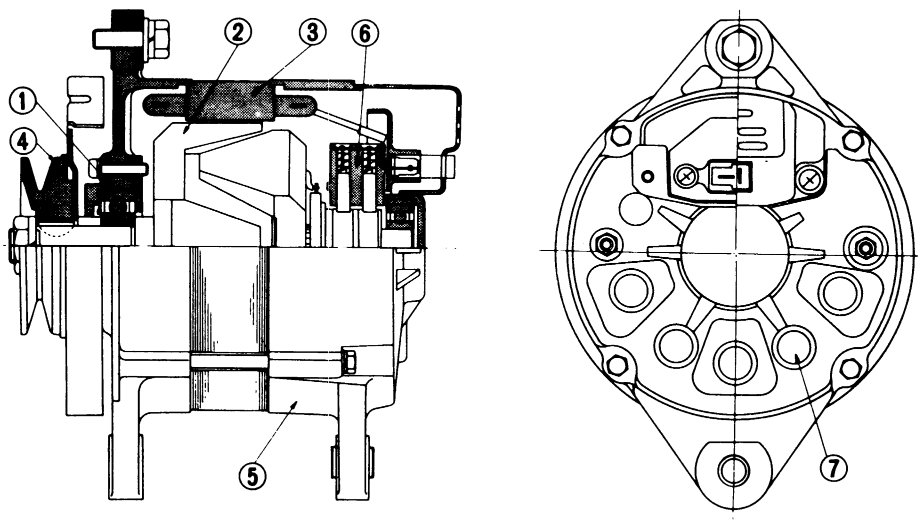


Fig. EE-33 Sectional view of LT150-13 (LT135-13B)



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

EE121

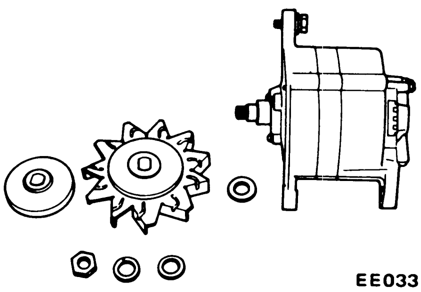
Fig. EE-34 Sectional view of LT160-24

REMOVAL

1. Disconnect negative battery terminal.
2. Disconnect two lead wires and connector from alternator.
3. Loosen adjusting bolt.
4. Remove alternator drive belt.
5. Remove parts associated with alternator from engine.
6. Remove alternator from car.

DISASSEMBLY

1. Remove pulley nut, pulley rim, fan and spacer.

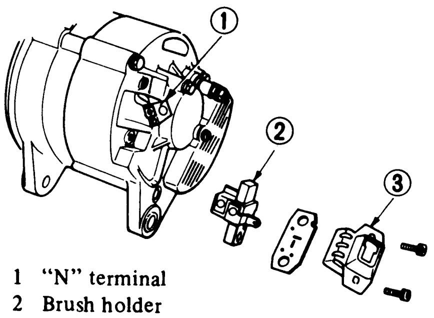


EE033

Fig. EE-35 Removing pulley and fan

2. Remove brush holder fixing screws, and remove brush holder cover. Pull brush holder forward, and remove brushes together with brush holder.

Note: Do not disconnect N terminal from stator coil lead wire.

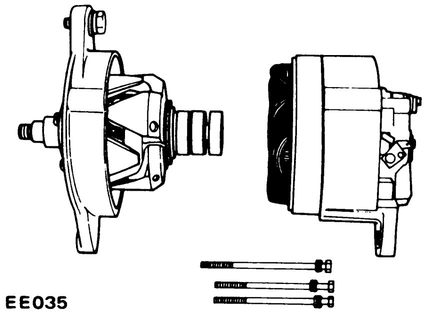


1 "N" terminal
2 Brush holder
3 Brush holder cover

EE034

Fig. EE-36 Removing brush

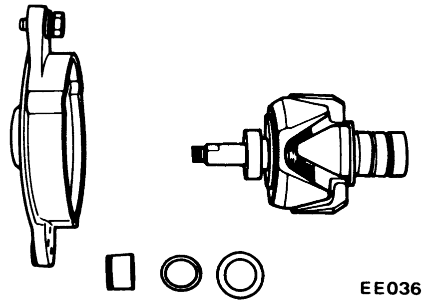
3. Remove through bolts. Separate front cover with rotor from rear cover with stator by lightly tapping front bracket with a wooden mallet.



EE035

Fig. EE-37 Separating front cover with rotor from rear cover

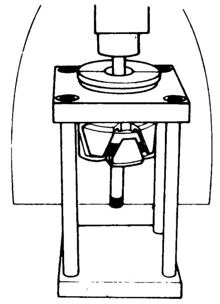
4. Remove three set screws from bearing retainer, and separate rotor from front cover.



EE036

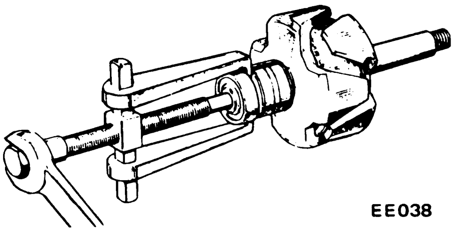
Fig. EE-38 Removing rotor

5. Pull rear bearing out from rotor assembly with a press or bearing puller.



EE037

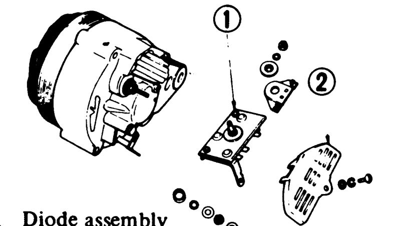
Fig. EE-39 Pulling out of rear bearing (I)



EE038

Fig. EE-40 Pulling out of rear bearing (II)

6. Remove diode cover fixing screw, and remove diode cover. Disconnect three stator coil lead wires from diode terminal with a soldering iron.
7. Remove A terminal nut and diode installation nut, and remove diode assembly.



1 Diode assembly
2 Diode cover

EE039

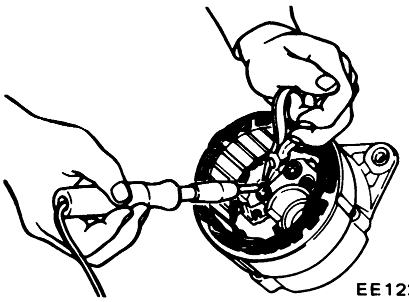
Fig. EE-41 Removing diode assembly

Note: Use care in handling diode assembly to prevent an undue stress on it.

Disassembly of diode

≪ MODEL LT160-24 ≫

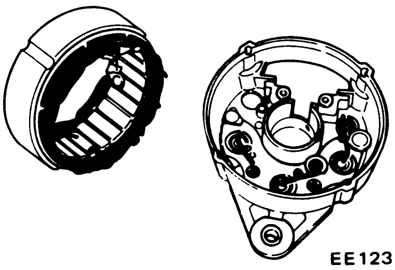
1. Disconnect three stator coil lead wires from diode terminals with a soldering iron. It is also necessary to disconnect jumper wires between diodes.



EE122

Fig. EE-42 Removing soldered connection of stator coil and diode

2. Pull stator coils out of rear cover.

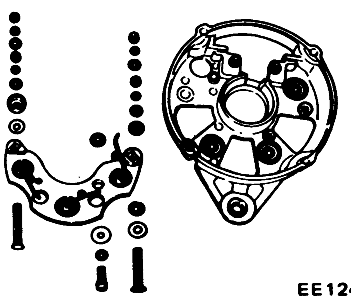


EE123

Fig. EE-43 Separating stator coil from rear cover

3. Remove diode from rear cover.

Caution: Place packings and insulators in order so that they can be placed back to their original places or locations from which they were removed.



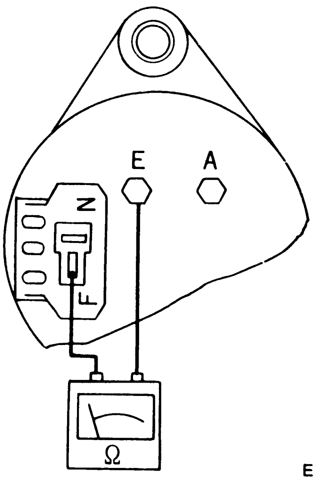
EE124

Fig. EE-44 Exploded view of diode

INSPECTION AND REPAIR

Remove alternator from car and apply tester between lead wire F (white with black tracer) and lead wire E (black color).

When the resistance is approximately 5Ω, the condition of brush and field coil is satisfactory. When no conduction exists in brush or field coil, or when resistance differs significantly between those parts, disassemble and inspect.



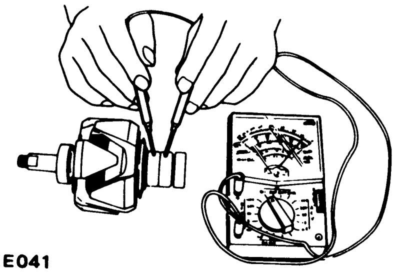
EE040

Fig. EE-45 Inspecting alternator

Rotor inspection

1. Conduction test of rotor coil

Apply tester between slip rings of rotor as shown in Figure EE-46. If there is no conduction, discontinuity of field coil may exist. When resistance is approximately 4.4Ω at normal ambient temperature, condition is satisfactory.

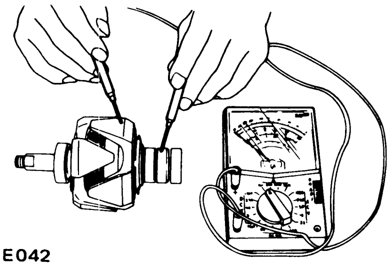


EE041

Fig. EE-46 Conduction test of rotor coil

2. Ground test of rotor coil

Check conduction between slip ring and rotor core. If conduction exists, replace rotor assembly, because field coil or slip ring may be grounded.



EE042

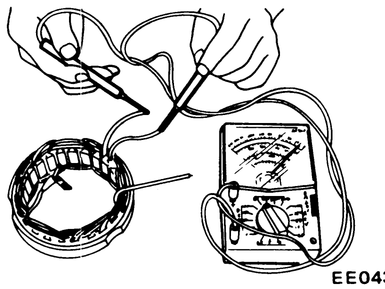
Fig. EE-47 Testing rotor coil for ground

Inspection of stator

1. Conduction test

Stator is normal when there is conduction between individual stator coil terminals. When there is no conduction between individual terminals, cable is broken.

Replace with stator assembly.

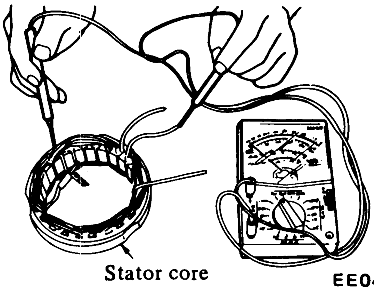


EE043

Fig. EE-48 Testing stator for conduction

2. Ground test

If each lead wire of armature coil (including neutral wire) is not conductive with stator core, condition is satisfactory. If there is conduction, stator coil is grounded.

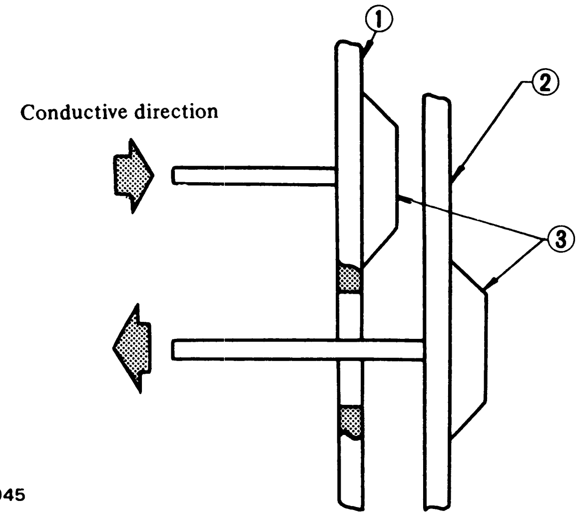


EE044

Fig. EE-49 Testing stator for ground

Inspection of diode

Perform a conduction test on diodes in both directions, using an ohmmeter. A total of six diodes are used; three are mounted on the positive ⊕ plate, and other three are on the negative ⊖ plate. The conduction test should be performed on each diode, between the terminal and plate.

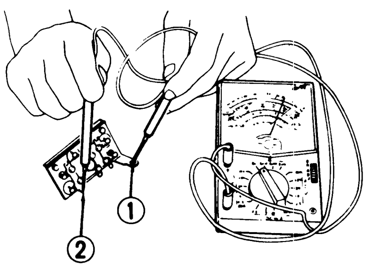


1 (+) plate
2 (–) plate
3 Diode

EE045

Fig. EE-50 Conductive direction of diode

Diode installed on ⊕ plate is a positive diode which allows current flowing from terminal to ⊕ plate only. In other words, current does not flow from ⊕ plate to terminal.

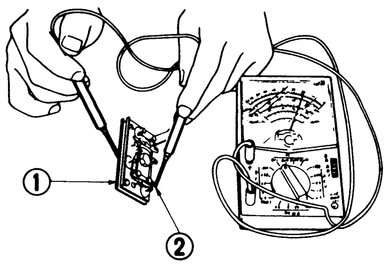


1 (+) plate
2 Terminal

EE046

Fig. EE-51 Inspecting positive diode

Diode installed on ⊖ plate is a negative diode which allows current flowing from ⊖ plate to terminal only. In other words, current does not flow from terminal to ⊖ plate.



1 (–) plate
2 Terminal

EE047

Fig. EE-52 Inspecting negative diode

If current flows in both positive and negative directions, diode is short-circuited. If current flows in one direction only, diode is in good condition. If there is a faulty diode, replace all diodes (six diodes) as an assembly. (See table below.) These diodes are unserviceable.

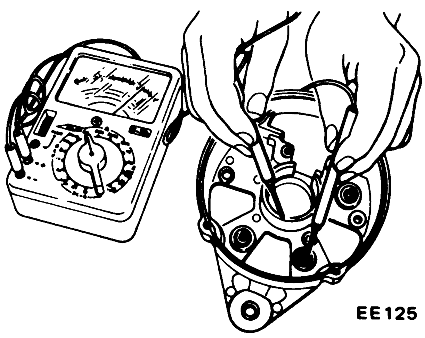
Test probe of a circuit tester		Conduction
⊖	⊕	
terminal	⊕ plate	O
⊕ plate	terminal	–
terminal	⊖ plate	–
⊖ plate	terminal	O
⊖ plate	⊕ plate	O
⊕ plate	⊖ plate	–

Fig. EE-53 Inspecting diodes

≮ MODEL LT160-24 ≯

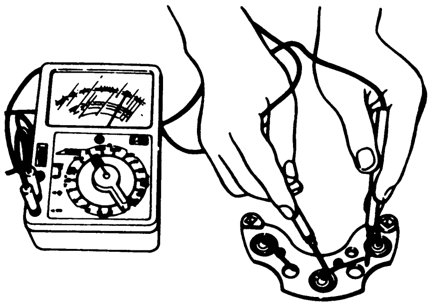
Inspection of diode

Use a tester to check diodes. Three diodes are placed between alminum plate and rear cover. Testing consists of checking conduction between diode terminal and alminum plate, and between diode terminal and rear cover. Measurements should then be evaluated as per the instructions given under LT150-13.



EE125

Fig. EE-54 Conduction test of diode (I)



EE126

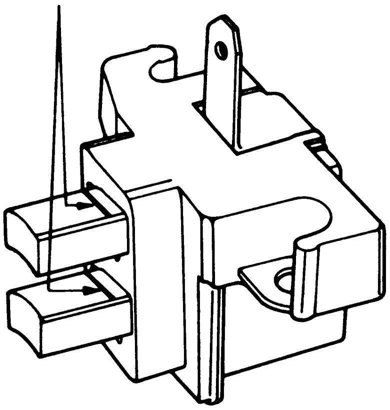
Fig. EE-55 Conduction test of diode (II)

Inspection of brush

Check movement of brush and if movement is not smooth, check brush holder and clean if necessary.

Check brush for wear. If it is worn down to less than the specified limit, replace brush assembly.

Check brush pig tail and, if damaged, replace.



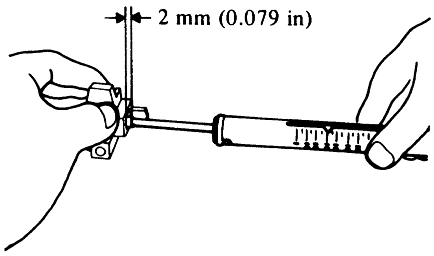
EE127

Fig. EE-56 Brush wear limit

Spring pressure test

With brush projected approximately 2 mm (0.079 in) from brush holder, measure brush spring pressure by the use of a spring balance. Normally, the rated pressure of a new brush spring is 255 to 345 g (9.0 to 12.2 oz).

Moreover, when brush is worn, pressure decreases approximately 20 g (0.7 oz) per 1 mm (0.0394 in) wear.



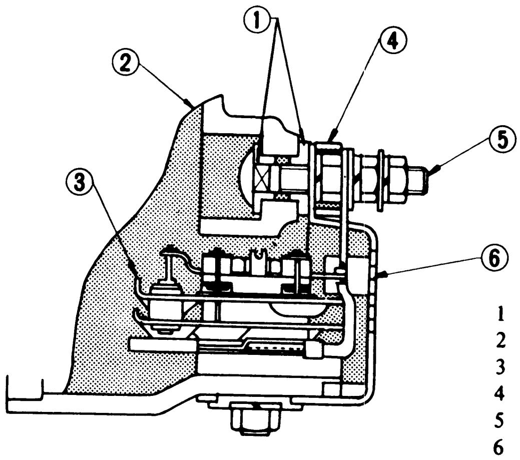
EE049

Fig. EE-57 Measuring spring pressure

REASSEMBLY

Reassemble alternator in the reverse sequence of disassembly noting the following:

1. When soldering each stator coil lead wire to diode assembly terminal, carry out the operation as fast as possible.
2. When installing diode A terminal, install insulating bush and insulating tube correctly.

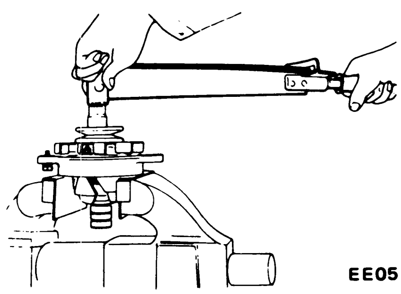


EE050

1 Insulating bush
2 Rear cover
3 Diode assembly
4 Insulating tube
5 A terminal bolt
6 Diode cover

Fig. EE-58 Sectional view of diode and A terminal

3. Tighten pulley nut with tightening torque of 350 to 400 kg-cm (304 to 347 in-lb). When pulley is tightened, make sure that deflection of V-groove is less than 0.3 mm (0.012 in).



EE051

Fig. EE-59 Tightening pulley nut

ALTERNATOR TEST

Before conducting an alternator test, make sure that the battery is fully charged.

A 30-Volt voltmeter and suitable test probes are necessary for the test.

Set up a test circuit as shown in Figure EE-60 and test alternator in the manner indicated in the flow chart below:

1. Disconnect connectors at alternator.
2. Connect one test probe from voltmeter positive terminal to "N" terminal or "BAT" terminal. Connect the other test probe to ground. Make sure that voltmeter registers battery voltage.
3. Turn on headlights and switch to Main Beam.
4. Start engine.
5. Increase engine speed gradually until it is approx. 1,100 rpm., and take the voltmeter reading.

Measured value: Below 12.5 Volts
Alternator is in trouble. remove and check it for condition.

Measured value: Over 12.5 Volts
Alternator is in good condition.

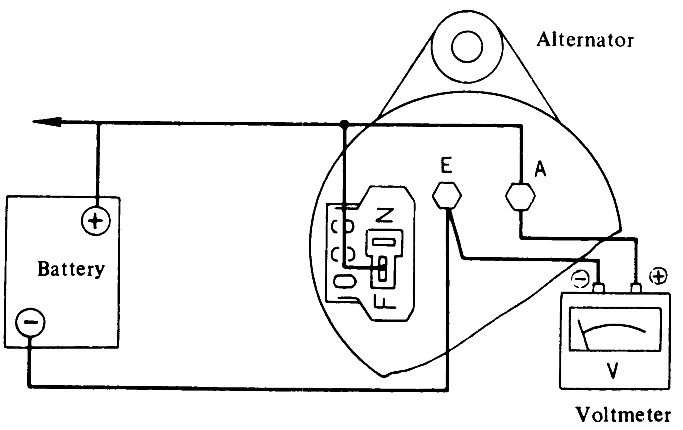


Fig. EE-60 Testing alternator

Notes:

a. **Do not run engine at the speed of more than 1,100 rpm while test is being conducted on alternator.**

b. **Do not race engine.**

SPECIFICATIONS AND SERVICE DATA

Specifications

Item \ Model	LT150-13	LT160-24	LT135-13B
Applicable to	710 model except for Canada	710 model for Canada	620 model
Maker	HITACHI	←	←
Nominal rating	12V-50A	12V-60A	12V-35A
Ground polarity	Negative	←	←

Item \ Model		LT150-13	LT160-24	LT135-13B
Revolution	rpm	1,000 to 13,500	1,000 to 12, 000	1,000 to 13,500
Minimum revolution under no-load	rpm	Less than 1,000	←	←
Output current	rpm	37.5A (14V, 2,500)	45A (14V, 2,500)	28A (14V, 2,500)
Pulley ratio		2.09	2.09	2.25

Service data

Item \ Model		LT150-13	LT160-24	LT135-13B
Stator coil				
Resistance per a phase	Ω	0.17 [at 20°C (68°F)]	0.05 [at 20°C (68°F)]	0.17 [at 20°C (68°F)]
Rotor coil				
Resistance	Ω	4.4 [at 20°C (68°F)]	4.0 [at 20°C (68°F)]	4.4 [at 20°C (68°F)]
Brush				
Brush length	mm (in)	14.5 (0.571)	←	←
Wear limit	mm (in)	7 (0.276)	←	←
Spring pressure	kg (lb)	0.25 to 0.35 (0.55 to 0.77)	←	←
Slip ring				
Outer dia.	mm (in)	31 (1.22)	←	←
Reduction limit	mm (in)	1 (0.039)	←	←
Repair accuracy	mm (in)	0.05 (0.0020)	←	←

REGULATOR

CONTENTS

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 an 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 produce alternator output.

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

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

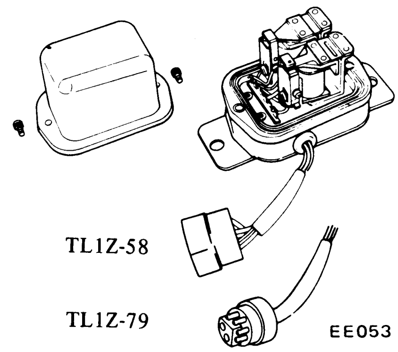
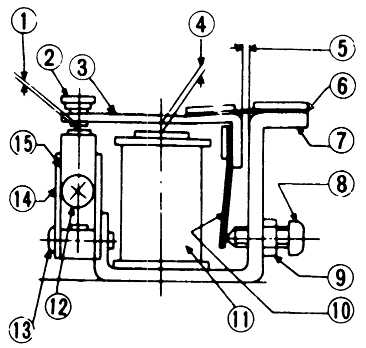


Fig. EE-61 View of removing cover

Regulator model	Car	Alternator
TL1Z-58	710 model	LT150-13 or *LT160-24
TL1Z-79	620 model	LT135-13B

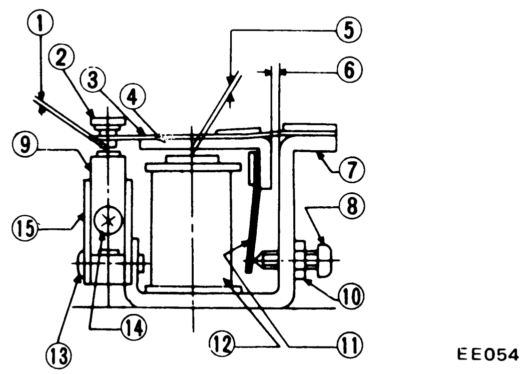
*LT160-24: For Canada

As regards the construction, the voltage regulator is very similar to the charge relay as shown in Figure EE-62.



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 (0.118 in) dia. screw
13 4 mm (0.157 in) dia. screw
14 Contact set
15 Upper contact

(a) Construction of voltage regulator



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 (0.118 in) dia. screw
14 4 mm (0.157 in) dia. screw
15 Contact set

(b) Construction of charge relay

Fig. EE-62 Structural view

MEASUREMENT OF REGULATOR VOLTAGE

Regulator voltage is measured with regulator assembled with alternator. When measuring voltage with regulator mounted on car, 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.

1. Check to be sure that all electrical loads such as lamps, air conditioner, radio etc. are disconnected.
2. 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 precaution will cause needle of ammeter to swing violently, resulting in a damaged ammeter.

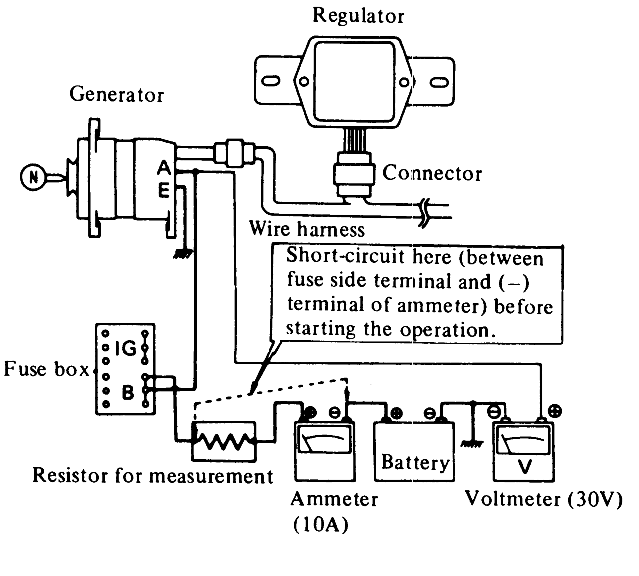
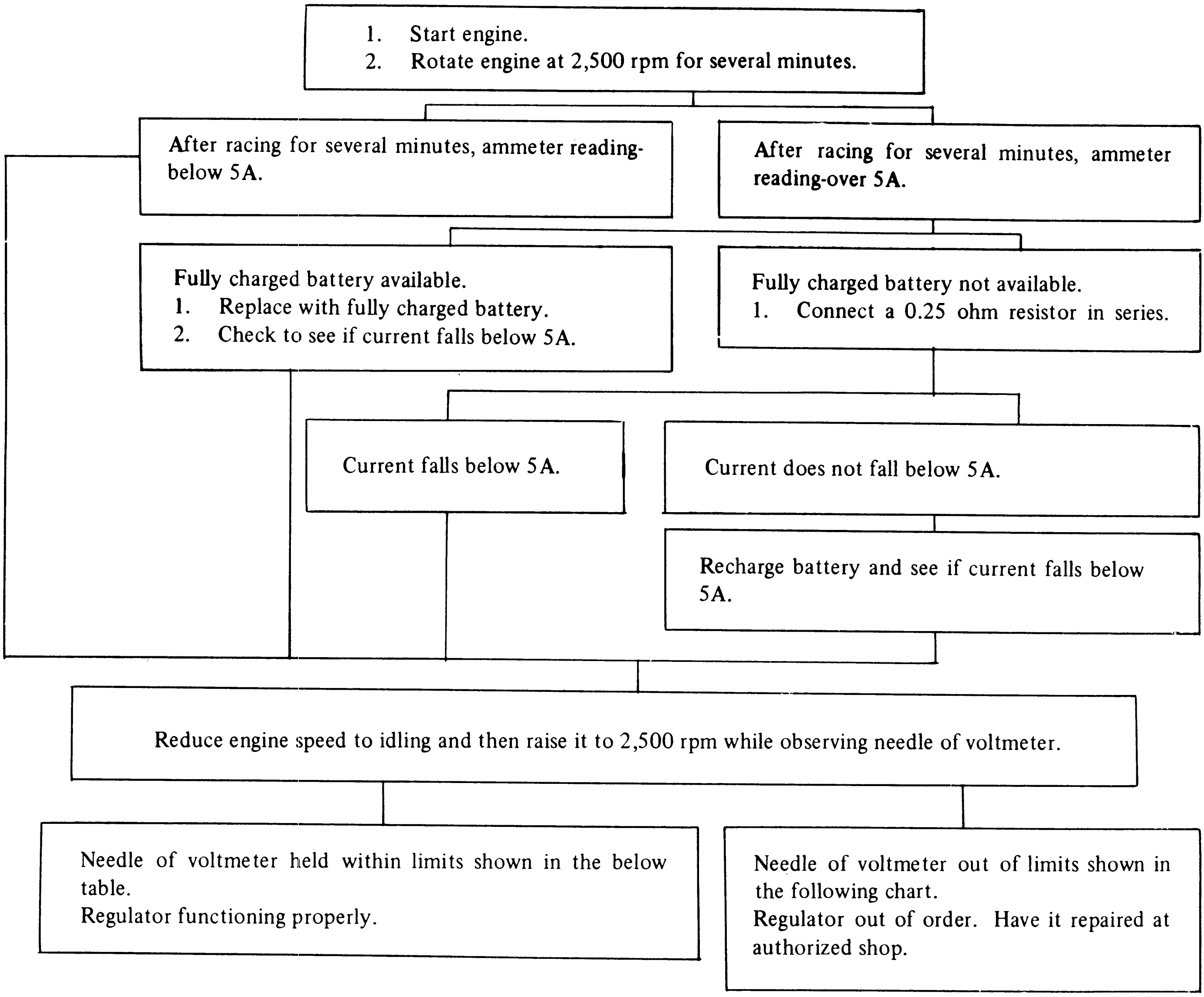


Fig. EE-63 Measuring regulator voltage with regulator on vehicle

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



Regulator models TL1Z-58, TL1Z-79, (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

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.

c. Voltage may be approximately 0.3 V higher than 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 at left.

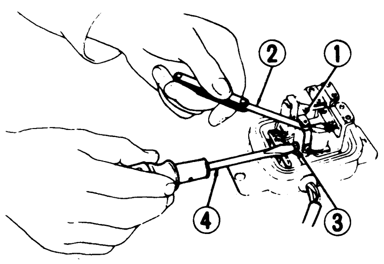
ADJUSTMENT

Voltage regulator

When regulating voltage, as measured above, deviates from rated value, adjust regulator in accordance with the following instructions.

1. Inspect contact surface, and if rough, lightly polish 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 (0.157 in) diameter] which is used to secure contact set on yoke, and move contact upward or downward properly. (See Figure EE-64.)



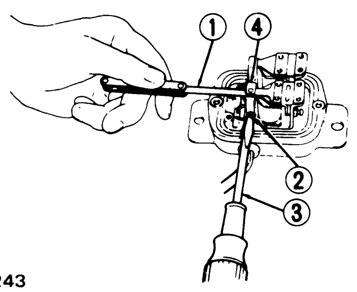
EE242

1 Contact set
2 Thickness gauge
3 4 mm (0.157 in) dia. screw
4 Crosshead screwdriver

Fig. EE-64 Adjusting core gap

4. Adjusting point gap

Loosen screw [3 mm (0.118 in) diameter] used to secure upper contact, and move upper contact upward or downward as necessary. (See Figure EE-65.)



EE243

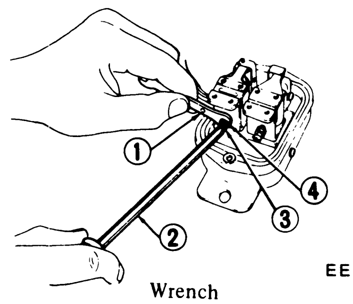
1 Thickness gauge
2 3 mm (0.118 in) dia. screw
3 Crosshead screwdriver
4 Upper contact

Fig. EE-65 Adjusting point gap

5. Adjusting voltage

Adjust regulating voltage as follows:

Loosen lock nut securing adjusting screw. Turn this screw clockwise to increase, or counterclockwise to decrease, regulating voltage. (See Figure EE-66.)



EE244

Wrench
2 Crosshead screwdriver
3 Adjusting screw
4 Lock nut

Fig. EE-66 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 5 V.

Use a DC voltmeter, and set up a circuit as shown in Figure EE-67.

1. Connect positive terminal of voltmeter to regulator lead connector "N" terminal with negative terminal grounded.
2. Start engine and keep it idle.
3. Take voltmeter reading.

0 Volt

1. Check for continuity between "N" terminals of regulator and alternator.
2. Alternator circuit inoperative if continuity exists.

Below 5.2 Volts

(Pilot lamp remains lighted.)
1. Check fan belt tension.
2. If correct, remove regulator and adjust as necessary.

Over 5.2 Volts

(Pilot lamp remains lighted.)
Pilot lamp relay coil or contact points out of order.
Replace regulator.

Over 5.2 Volts

(Pilot lamp does not light.)
Pilot lamp relay assembly is in good condition.

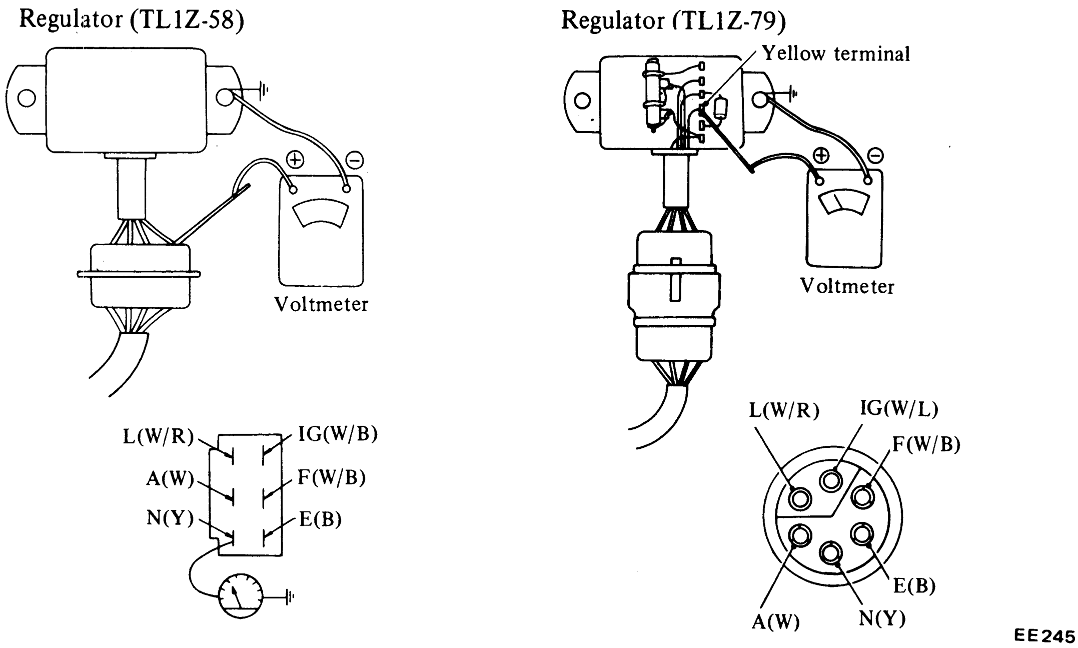


Fig. EE-67 Testing charging relay

SPECIFICATIONS AND SERVICE DATA

Voltage regulator		
Model		TL1Z-58 (710) TL1Z-79 (620)
Regulating voltage (with fully charged battery)	V	*14.3 to 15.3 [at 20°C (68°F)]
Voltage coil resistance	Ω	10.5 [at 20°C (68°F)]
Rotor coil inserting resistance	Ω	10
Voltage coil series resistance	Ω	31
Smoothing resistance	Ω	40
Core gap	mm (in)	0.6 to 1.0 (0.024 to 0.039)
Point gap	mm (in)	0.3 to 0.4 (0.012 to 0.016)
Charge relay		
Release voltage	V	4.2 to 5.2 at "N" terminal
Voltage coil resistance	Ω	37.8 [at 20°C (68°F)]
Core gap	mm (in)	0.8 to 1.0 (0.031 to 0.039)
Point gap	mm (in)	0.4 to 0.6 (0.016 to 0.024)

*Standard temperature gradient: –0.015V/°C

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.
	Shorted rotor.	Replace rotor.
	Shorted stator.	Repair or replace.
	Grounded "BAT" terminal.	Replace insulator.
	Broken fan belt.	Replace.
Excessive output	Broken neutral wire (color of wire is white.)	Replace.
	Voltage regulator breakdown.	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.
Low output	Loose or worn fan belt.	Retighten or replace.
	Sticking brushes.	Correct or replace brushes and springs if necessary.
	Low brush spring tension.	Replace brush springs.
	Voltage regulator breakdown.	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 damaged diode.	Replace diode.
Noisy alternator	Loose mounting.	Retighten bolts.
	Loose drive pulley.	Retighten.
	Broken ball bearing.	Replace.
	Improperly seated brushes.	Seat correctly.

IGNITION CIRCUIT

The ignition circuit consists of the ignition switch, coil, distributor, wiring, spark plugs and battery.

The circuit is equipped with a resistor. During cranking, electrical current bypasses the resistor, thereby connecting the ignition coil directly to battery. This provides full battery voltage available at coil and keeps ignition voltage as high as possible.

The low voltage current is supplied by the battery or alternator and flows through the primary circuit. It consists of the ignition switch, resistor, primary winding of the ignition coil, distributor contact points, condenser and all connecting low tension wiring.

The high voltage current is produced by the ignition coil and flows through the secondary circuit, resulting in high voltage spark between the electrodes of the spark plugs in engine 'inders. This circuit contains the secondary winding of the ignition coil, coil to distributor high tension cables, distributor rotor and cap.

When the ignition switch is turned on and the distributor contact points are closed, the primary current flows through the primary winding of the coil and through the contact points to ground. This flowing produces a magnetic field around the coil winding and then electrical energy in the coil.

When the contact points are opened by the revolving distributor cam, the magnetic field built up in the primary winding of the coil moves through the secondary winding of the coil inducing high voltage. The high voltage is produced every time the contact points open. The high voltage current flows through the high tension cable to the distributor cap. Then the rotor distributes the current to one of the spark plug terminals in the distributor cap.

Then the spark obtains while the high voltage current jumps the gap between the insulated electrode and the ground side electrode of the spark plug. This process is repeated for each power stroke of the engine.

The distributor contact points and spark plugs require periodic service. That is, the breaker points should be inspected, cleaned and regapped at tune up or replaced if necessary. In addition, lubricate distributor shaft and cam heel. Spark plugs should be removed, inspected and maintained to obtain good firing.

The remainder of the ignition component parts should be inspected for only their operation, tightness of electrical terminals, and wiring condition.

The ignition circuit is shown below:

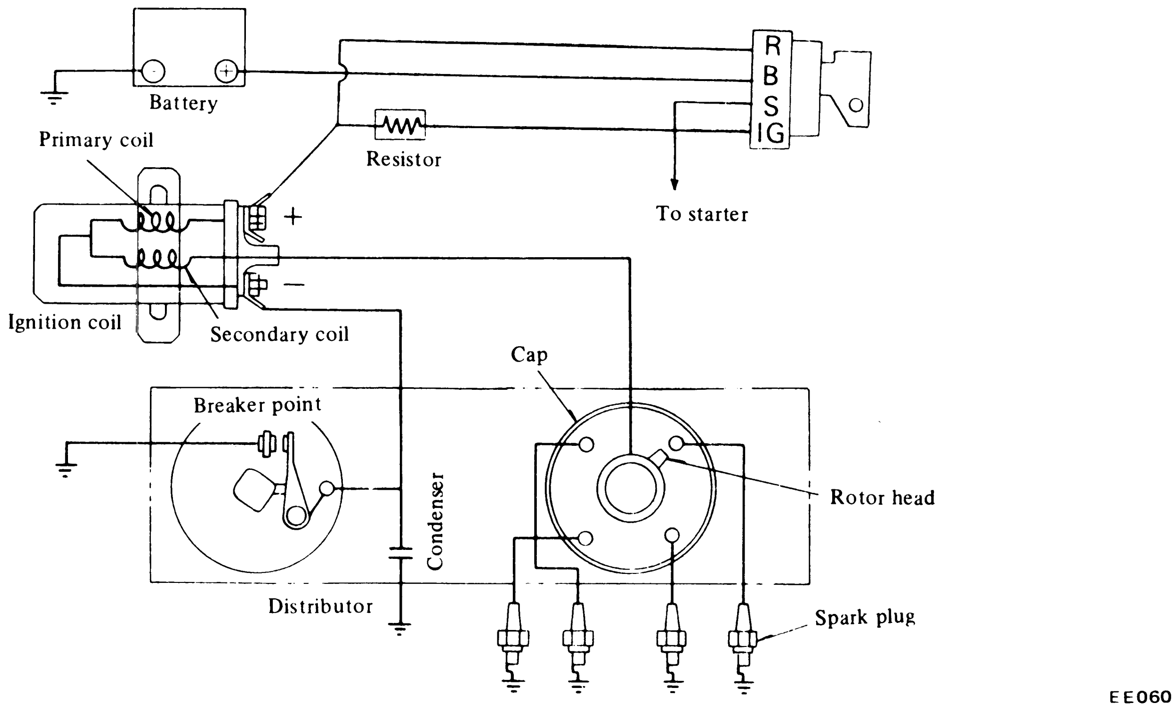


Fig. EE-68 Ignition system circuit diagram

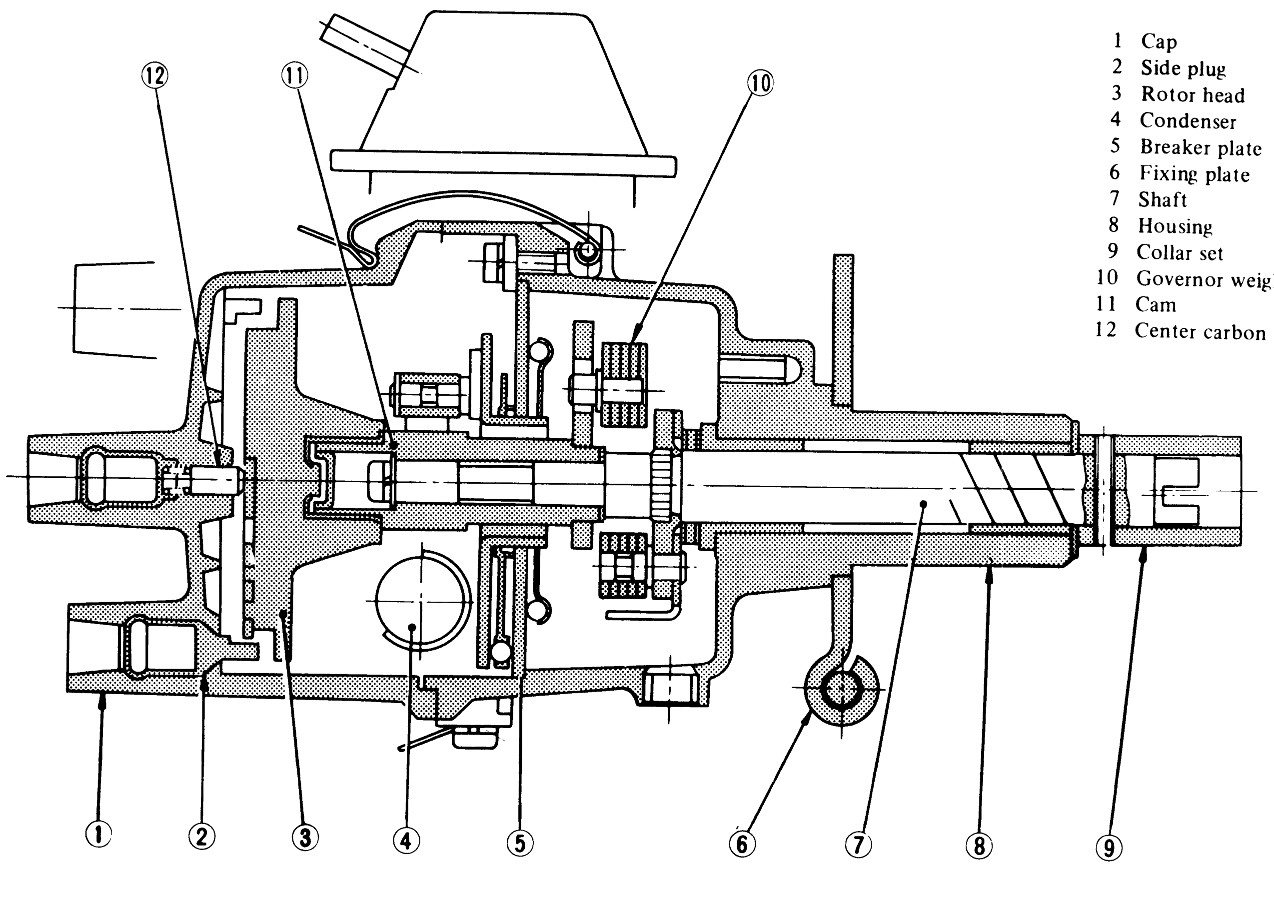
DISTRIBUTOR

CONTENTS

CONSTRUCTION

Distributor model	Applied engine
D4A2-01	L18

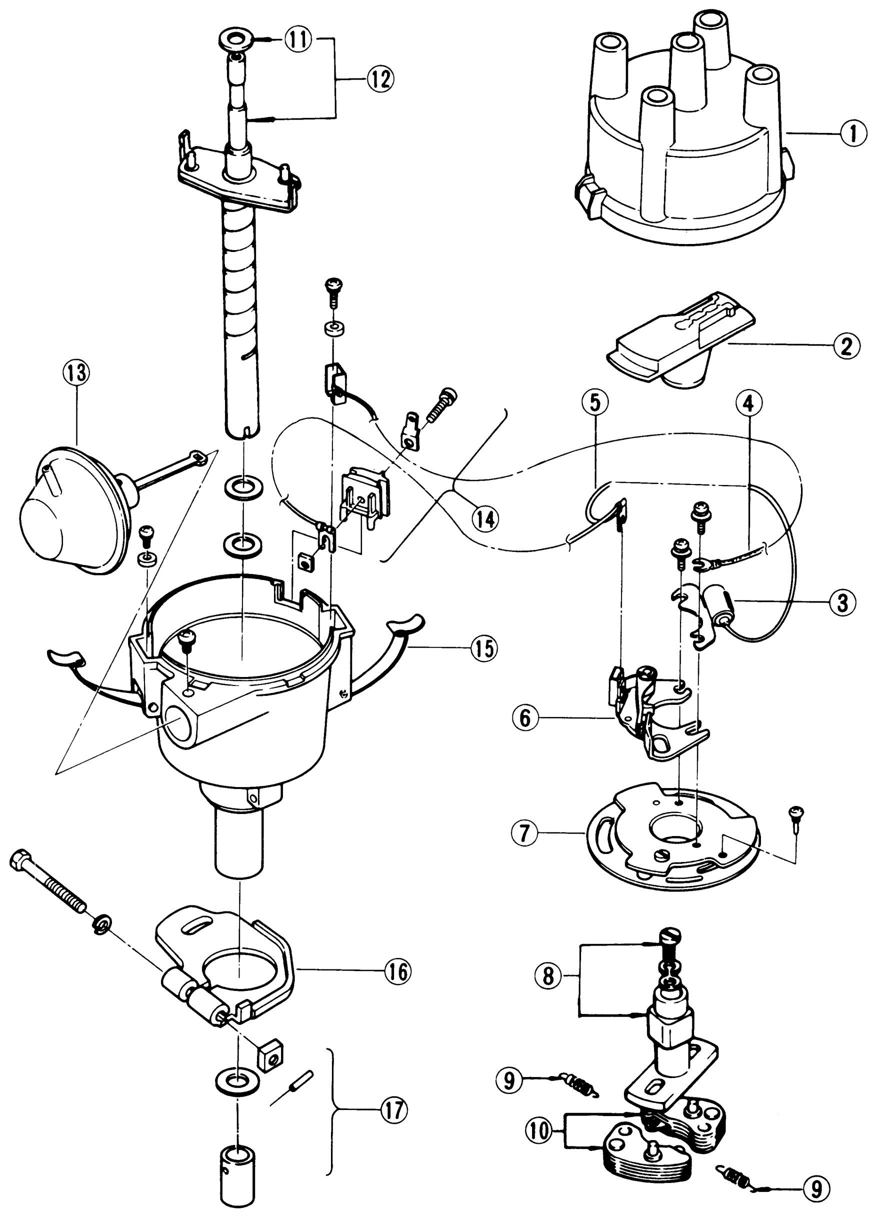
The distributor consists of breaker plate with contact points, centrifugal advance mechanism, vacuum unit, drive shaft, and rotor. Figures EE-69 and 70 show an sectional view of the unit



1 Cap
2 Side plug
3 Rotor head
4 Condenser
5 Breaker plate
6 Fixing plate
7 Shaft
8 Housing
9 Collar set
10 Governor weight
11 Cam
12 Center carbon

EE205

Fig. EE-69 Construction



1 Cap assembly
2 Rotor head assembly
3 Condenser assembly
4 Earth wire assembly
5 Lead wire assembly
6 Contact set
7 Breaker plate assembly
8 Cam assembly
9 Governor spring
10 Governor weight
11 Thrust washer
12 Shaft assembly
13 Vacuum control assembly
14 Terminal assembly
15 Clamp
16 Fixing plate
17 Collar set

EE206

Fig. EE-70 Components of distributor

CHECKING AND ADJUSTMENT

Cap and rotor head

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

Point

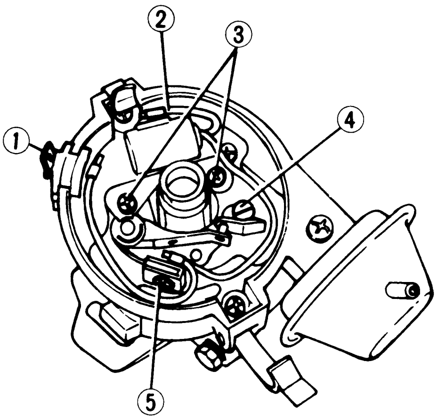
Standard point gap is 0.45 to 0.55 mm (0.0177 to 0.0217 in). In case size is off the standard, adjustment is made by loosening point screws. Gap gauge is required for adjustment.

Point gap must be checked at regular intervals.

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 camshaft head and cam heel.

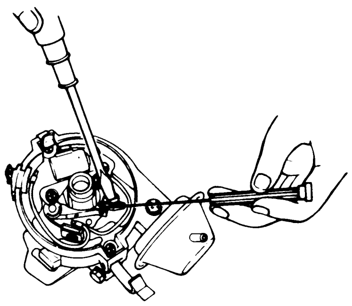
When wear on breaker points is noticeable, replace points together with contact arm. To replace, proceed as follows:



1 Primary lead terminal
2 Ground lead wire
3 Set screw
4 Adjuster
5 Screw

EE196

Fig. EE-71 Breaker



EE195

Fig. EE-72 Measuring point gap

First turn out set screws 1 to 1.5 turns at contact arm and primary lead wire connection just for enough to pull out primary lead terminal.

Referring to Figure EE-71, unscrew two contact set fixing screws and remove lead wire.

While holding contact arm by fingers, pull out contact set toward you by raising it slightly. Contact point and arm can then be removed together.

Install new contact point and arm assembly in reverse sequence of removal. Coat cam heel and cam shaft head with a light coating of grease.

Condenser

Satisfactory performance of condenser depends on capacity and degree of insulation, requiring attention to be sure that terminals are clean and set screws are tight.

Checking of condenser is made by a capacity tester. This can also be made by a circuit tester with its range set to high resistance reading. When needle of tester swings violently and then moves back to infinite gradually, it is an indication that condenser is in good condition.

If needle shows any steady reading or if it registers zero, the likelihood is that transformer is out of order, calling for replacement.

Advance mechanisms

≪ Specifications ≫

Vacuum advance [Distributor degrees/ Distributor mmHg (in Hg)]	0°/150 (5.91) 3.5°/250 (9.84)
Centrifugal advance (Distributor degrees/ Distrubutor rpm)	0°/550 10°/2,150

≪Vacuum advance mechanism mechanical parts ≫

If vacuum advance mechanism fails to operate properly, check for the following items and correct the malfunction as required.

1. Check vacuum inlet for signs of leakage at its connection. If necessary, retighten or replace with a new one.
2. Check vacuum diaphragm for air leak.

If leak is found, replace vacuum controller assembly.

3. Inspect breaker plate for smooth moving.

If plate does not move smoothly, this condition could be due to sticky steel balls or pivot. Apply grease to steel balls or, if necessary, replace breaker plate as an assembly.

≪Centrifugal advance mechanical parts ≫

When cause of engine malfunction is traced to centrifugal advance mechanical part, use distributor tester to check its characteristic.

See the specifications above.

When nothing is wrong with its characteristic, conceivable causes are break-down abnormal wearing-out of driving part or others. So do not disassemble it.

In case of improper characteristic, take off contact breaker assembly and check closely cam assembly, governor weight, shaft and governor spring, etc.

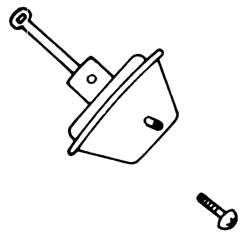
In case centrifugal advance mechanical part is reassembled, be sure to check advance characteristic by distributor tester.

DISASSEMBLY AND ASSEMBLY

Disassembly

To disassemble, follow the below procedure.

1. Take off cap and disconnect rotor head.
2. Remove vacuum controller.

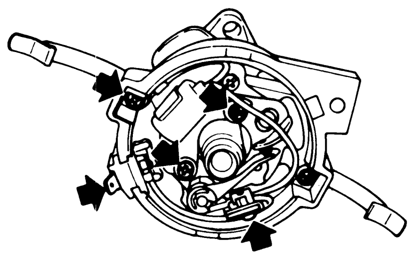


EE198

Fig. EE-73 Disassembling vacuum controller

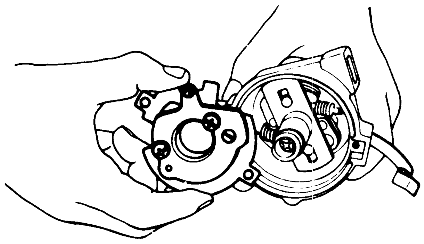
3. Remove contact breaker.

Refer to Page EE-74, when contact set is removed.



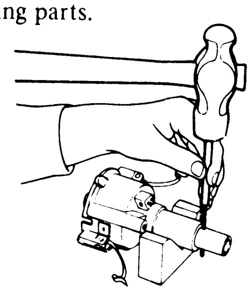
EE199

Fig. EE-74 Removing contact set

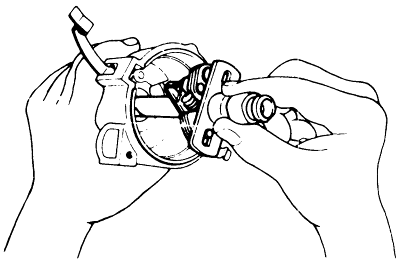


EE072
Fig. EE-75 Removing contact breaker

4. When contact breaker is disassembled, be careful not to lose steel balls between breaker spring and breaker plate.
5. Pull knock pin out and disconnect collar to remove the entire rotating parts.

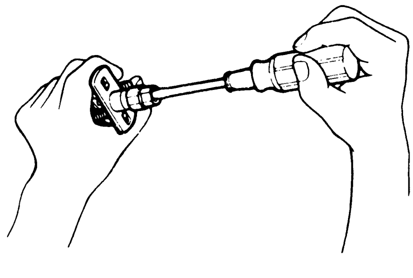


EE073
Fig. EE-76 Removing knock pin



EE074
Fig. EE-77 Removing rotation parts

6. 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.



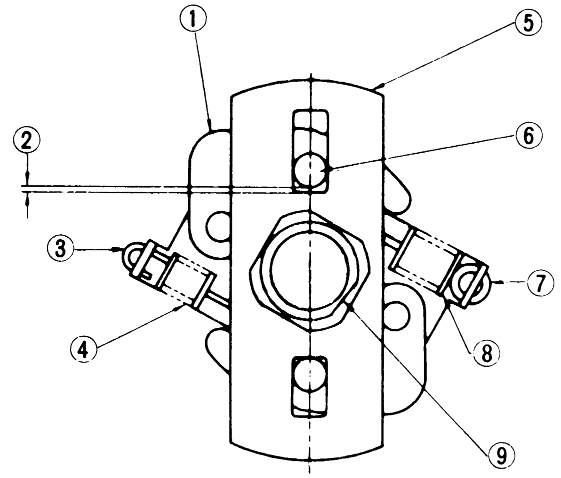
EE075
Fig. EE-78 Removing cam

7. 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 EE-79 for replacement and reassembly of governor spring and cam.



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

EE077
Fig. EE-79 Setting governor spring and cam

SPECIFICATIONS AND SERVICE DATA

Distributor type		D4A2-01
Make		HITACHI
Applied engine		L18
Firing order		1-3-4-2
Rotating direction		Counterclockwise
Ignition timing (B.T.D.C.)		12°/800 rpm *12°/650 rpm at "D" range
Dwell angle	degree	49° to 55°
Condenser capacity	μF	0.20 to 0.24

*: Models equipped with automatic transmission.

Point gap	mm (in)	0.45 to 0.55 (0.0177 to 0.0217)
Point pressure	kg (lb)	0.50 to 0.65 (1.10 to 1.43)
Shaft diameter (lower part)	mm (in)	12.435 to 12.440 (0.4896 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 0.033 (0.0004 to 0.0013)
Repair limit of clearance	mm (in)	0.08 (0.0031)
Shaft diameter (upper part)	mm (in)	7.986 to 7.995 (0.3144 to 0.3148)
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 (0.1957 to 0.1965)
Clearance between pivot and hole	mm (in)	0.01 to 0.046 (0.0004 to 0.0018)

IGNITION COIL

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.

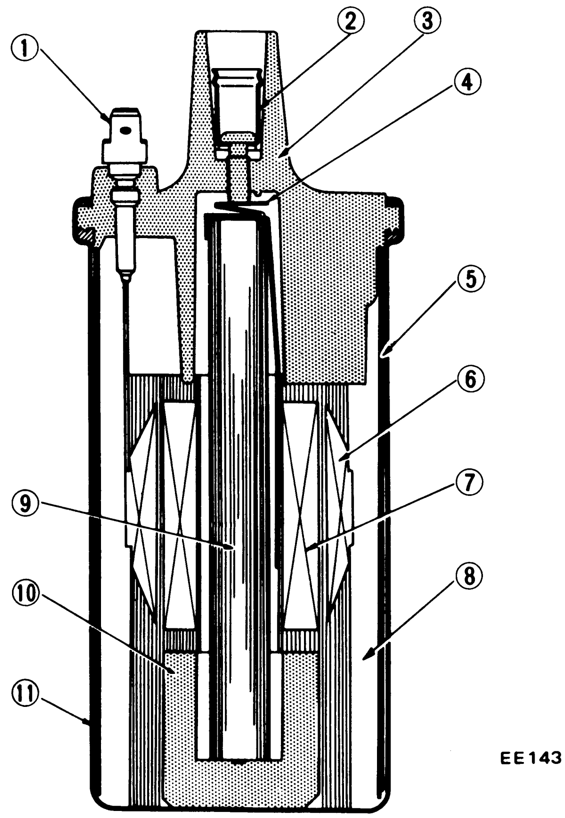
The ignition coil has a greater ratio between the primary and secondary windings to step up the battery voltage to the high voltage to cause stronger sparks to jump the spark plug gap.

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.



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. EE-80 Construction

SPECIFICATIONS

Item / Car model (applied engine)		710 (L18) 620 (L18)
Make and type		HANSHIN H5-15-1
Applied resistor		RC-15
Primary voltage	V	12
Spark gap	mm (in)	more than 7 (0.276)
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

SPARK PLUG

CONTENTS

DESCRIPTION

The spark plugs are of the resistor type, having 14 mm (0.551 in) threads and a gap of 0.7 to 0.8 mm (0.0276 to 0.0315 in). 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 the same number of heat range.**

INSPECTION

1. Remove spark plug wire by pulling on boot, not on wire itself.
2. Remove spark plugs.
3. Check electrodes and inner and outer porcelains of plugs, noting the type of deposits and the degree of electrode erosion. Refer to Figure EE-81.

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 are usually 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 indicate 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.

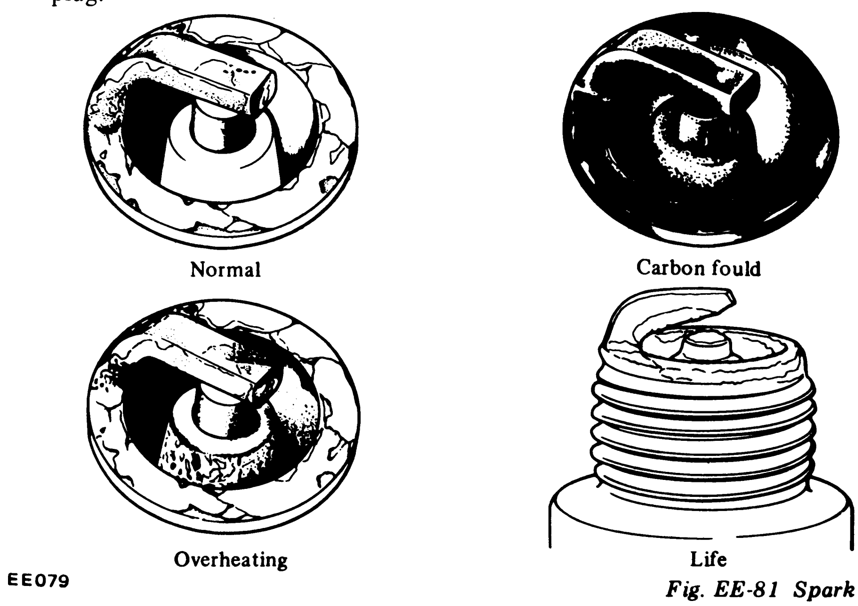


Fig. EE-81 Spark plug

4. 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.
5. Install spark plugs and torque each plug to 1.5 to 2.0 kg-m (11 to 14 ft-lb).
6. Connect spark plug wires.

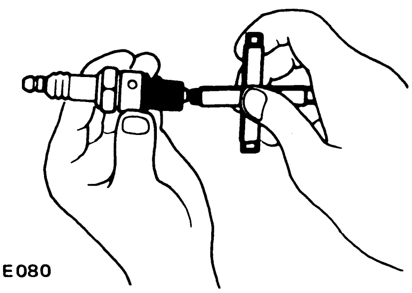

EE080

Fig. EE-82 Setting spark plug gap

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.

After cleaning spark plugs, renew firing surface of electrodes with file mentioned above. Then gap spark plugs to 0.7 to 0.8 mm (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.

SERVICE DATA AND SPECIFICATIONS

Item / Make	NGK
Item / Model	B6ES
Applied engine	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 to 18)

TROUBLE DIAGNOSES AND CORRECTIONS

1. When engine does not start

If there is no trouble in fuel system, ignition system should be checked. This can be easily done by detaching a high tension cable from spark plug, starting engine and observing condition of spark that occurs between high tension cable and spark plug terminal. After checking this, repair as necessary.

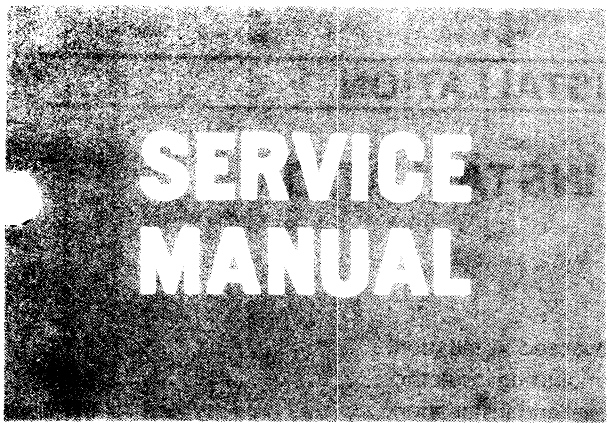
Spark length	Location	Probable cause	Corrective action
No sparks at all	Distributor	Damaged insulation of condenser.	Replace.
		Breakage of lead-wire on low tension side.	Repair.
		Damaged insulation of cap and rotor head.	Replace.
		Point does not open or close.	Repair.
	Ignition coil	Wire breakage or short circuit of coil.	Replace.
	High tension cable	Wire coming off.	Repair.
		Damaged 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.

Spark length	Location	Probable cause	Corrective action
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.

2. When engine rotates but does not run smoothly.

This may be caused by the ignition system or other engine conditions not related to ignition. Therefore, first complete inspection of ignition system should be carried out.

Troubles	Location	Probable cause	Corrective action
Engine misses	Distributor	Dirty point.	Clean.
		Improper point gap.	Correct.
		Leak of electricity at cap and rotor head.	Repair or replace.
		Damaged insulation of condenser.	Replace.
		Malfunctioning arm.	Oil shaft.
		Damaged 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 inferior quality coil.	Replace with good one.
	High tension code	Deterioration of insulation with consequent leak of electricity	Replace.
	Spark plugs	Dirty.	Clean.
		Leak of electricity at upper porcelain insulator .	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 worn pin or hole of governor portion.	Replace.
	Spark plugs	Burnt too much.	Replace.
Engine does not deliver enough power	Distributor	Improper and retarded timing.	Correct the fitting.
		Malfunction of governor.	Replace assembly.
		Dirty point.	Clean.
		Point gap too narrow.	Correct.
	Spark plugs	Dirty.	Clean.



DATSUN PICK-UP
MODEL 620 SERIES

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION ER

ENGINE REMOVAL AND INSTALLATION

ER

ENGINE REMOVAL AND INSTALLATION

CONTENTS

ENGINE REPLACEMENT

Removal

It is much easier to remove the engine with the transmission as a single unit than to remove the engine alone. The engine can then be separated from the transmission assembly.

Note: Fender covers should be used to prevent damaging vehicle body.

1. Disconnect battery ground cable.
2. Scribe hood hinge location for proper reinstallation and remove hood.
3. Remove air cleaner after disconnecting blow-by hose from rocker cover.
4. Drain radiator coolant and engine oil.
5. Disconnect radiator upper and lower hoses from engine.
6. Remove four bolts securing radiator and detach radiator and radiator shroud.

Note: Securing bolt at upper right hand side is tightened toghther with body harness terminal. See Figure ER-1.

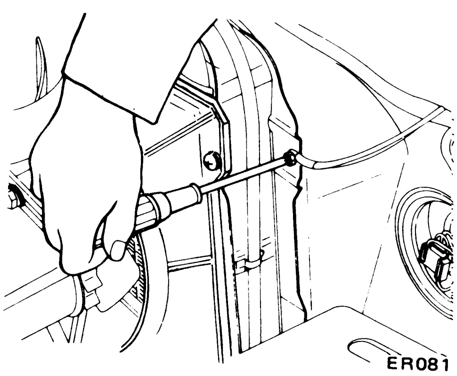


Fig. ER-1 Removing radiator securing bolts

7. Disconnect the following cables and wires:

(1) Engine ground cable at the engine connection end. See Figure ER-2.

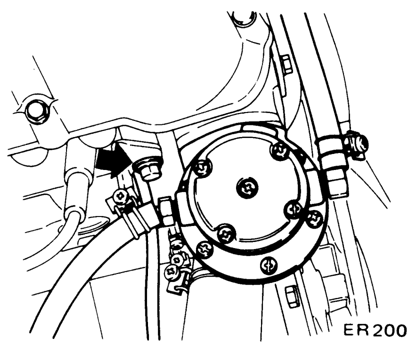
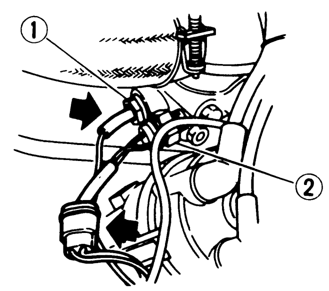


Fig. ER-2 Disconnecting engine ground cable

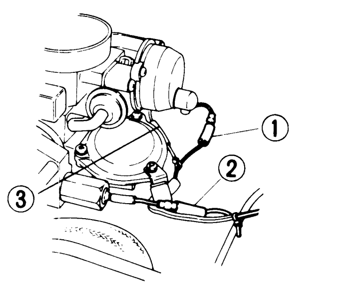
(2) Accelerator wire at carburetor.
(3) High tension cable between ignition coil and distributor.
(4) Wire to distributor.
(5) Wire to oil pressure switch.
(6) Wires to thermal transmitter and water temperature switch. See Figure ER-3.



1 Thermal transmitter wire connection
2 Water temperature switch

Fig. ER-3 Disconnecting wires for thermal transmitter and water temperature switch

(7) Auto choke heater wire. See Figure ER-4.
(8) Wire for vacuum control solenoid valve of boost control deceleration device. See Figure ER-4.
(9) Wire for anti-dieseling solenoid valve. See Figure ER-4.



1 Auto choke heater harness
2 Vacuum control solenoid valve harness
3 Anti-dieseling solenoid valve harness

Fig. ER-4 Disconnecting wires for auto choke heater, vacuum control solenoid valve and anti dieseling solenoid valve

(10) Wire for exhaust gas recirculation (E.G.R.) solenoid valve. See Figure ER-5.

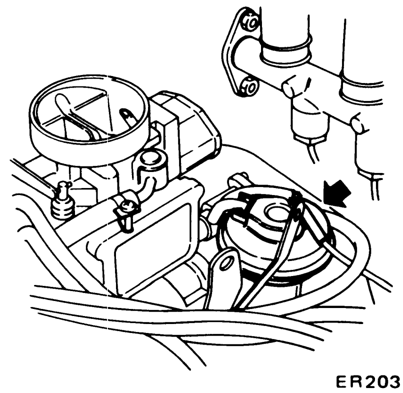
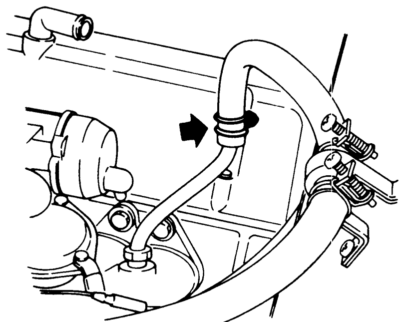


Fig. ER-5 Disconnecting wire for E.G.R. solenoid valve

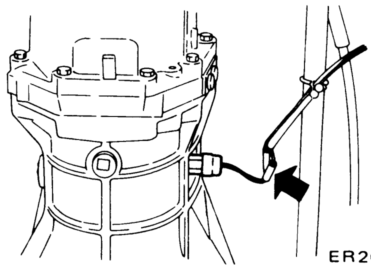
(11) Wires to alternator.
(12) Wires to starter motor.
(13) Heater inlet and outlet hoses, if so equipped.
(14) Vacuum hose of Master-Vac at intake manifold. See Figure ER-6.



ER204

Fig. ER-6 Disconnecting vacuum hose of Master-Vac

(15) Wires for back-up lamp at the connection. See Figure ER-7.



ER205

Fig. ER-7 Disconnecting wires for back-up lamp

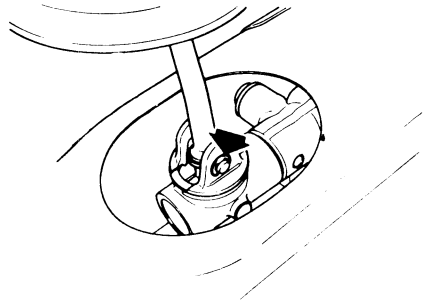
Note: On automatic transmission equipped cars:
Disconnect wire connections at inhibitor switch.

(16) Cable to speedometer at rear extension.

8. Remove transmission control linkage from transmission.

≪ Manual transmission model ≫

(1) Remove console box, if so equipped.
(2) Remove floor cover.
(3) Detach rubber boot.
(4) Remove nut from shift lever and detach shift lever. See Figure ER-8.



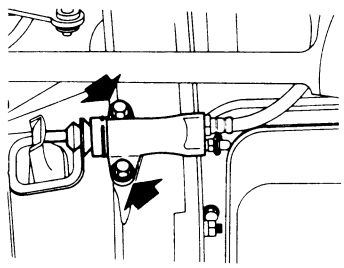
TM335

Fig. ER-8 Removing shift lever

≪ Automatic transmission model ≫

(1) Disconnect control knob from control lever by removing screws.
(2) Remove console box.
(3) Remove selector rod, selector range lever and control lever assembly with bracket.

9. Remove two bolts securing clutch operating cylinder. Then disconnect operating cylinder and flexible tube as an assembly. (Manual transmission model only) See Figure ER-9.

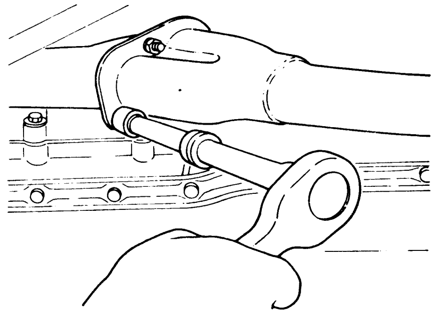


ER087

Tightening torque:
2.5 to 3.5 kg-m
(18 to 25 ft-lb)

Fig. ER-9 Removing clutch operating cylinder

10. Disconnect exhaust front tube from exhaust manifold.

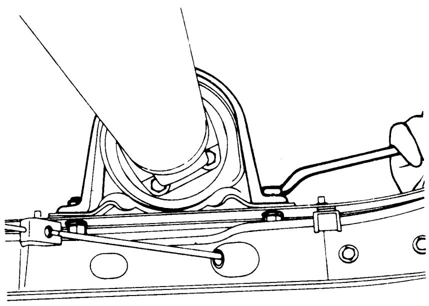


ER192

Tightening torque:
1.6 to 2.1 kg-m
(12 to 15 ft-lb)

Fig. ER-10 Disconnecting exhaust front tube

11. Remove propeller shaft.
(1) Disconnect propeller shaft center bearing bracket from third crossmember. See Figure ER-11.

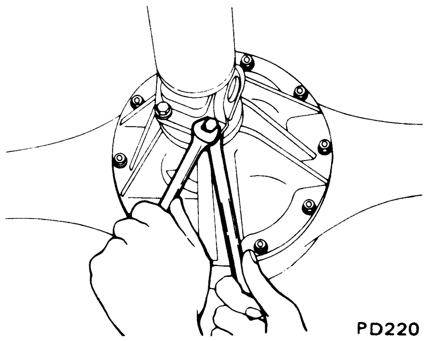


PD219

Tightening torque:
1.6 to 2.2 kg-m
(12 to 16 ft-lb)

Fig. ER-11 Removing propeller shaft center bearing bracket

(2) Disconnect propeller shaft from companion flange of gear carrier. See Figure ER-12.



PD220

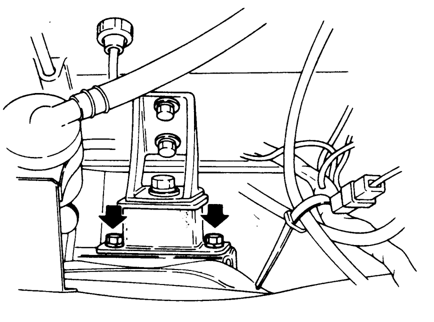
Tightening torque:
2.0 to 2.7 kg-m
(14 to 20 ft-lb)

Fig. ER-12 Disconnecting propeller shaft

(3) Remvoing propeller shaft from transmission, plug up rear end of extention housing of transmission to prevent oil leakage.

12. Attach a suitable wire to shift engine.

Remove engine front mounting bolts at engine mounting front support. See Figure ER-13.



ER207

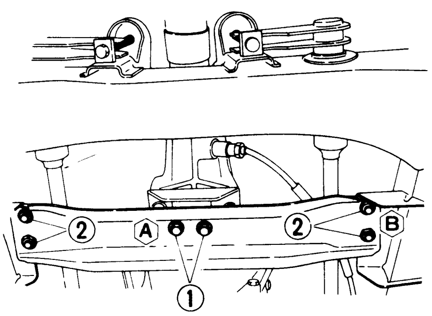
Tightening torque:
1.4 to 1.8 kg-m
(10 to 13 ft-lb)

Fig. ER-13 Removing engine front mounting bolts

13. Place a jack under transmission and jack it up.

14. Loosen two (1) engine rear mounting bolts.

Remove four (2) bolts securing engine mounting rear support to side member and detach the rear support. See Figure ER-14.



ER208

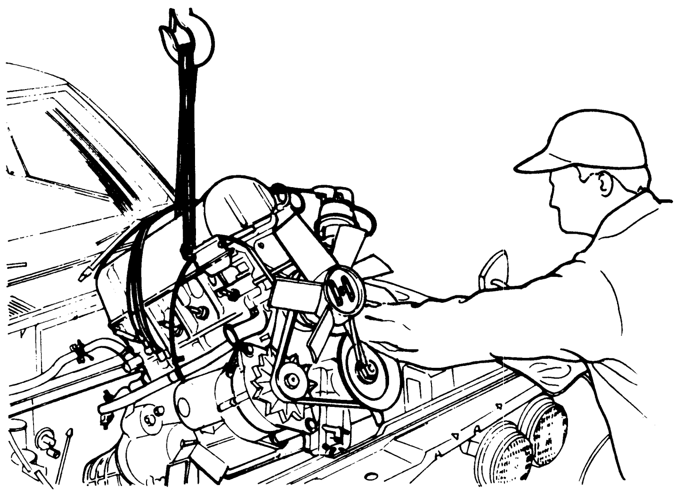
Tightening torque:
Ⓐ 1.6 to 2.2 kg-m
(12 to 16 ft-lb)
Ⓑ 3.2 to 4.3 kg-m
(23 to 31 ft-lb)

Fig. ER-14 Removing engine mounting rear support

15. Pull engine towards the front as far as possible and carefully raise engine with transmission by means of a hoist and wire. See Figure ER-15.

Then support them on engine stand.

Note: In this operation, care should always be taken not to allow the unit hitting against any adjac parts.



ER220

Fig. ER-15 Lifting engine and transmissi

Installation

To install, reverse the order of removal.

Do not connect any parts to engine until engine mounting insulators are placed and power unit weight is supported by them.

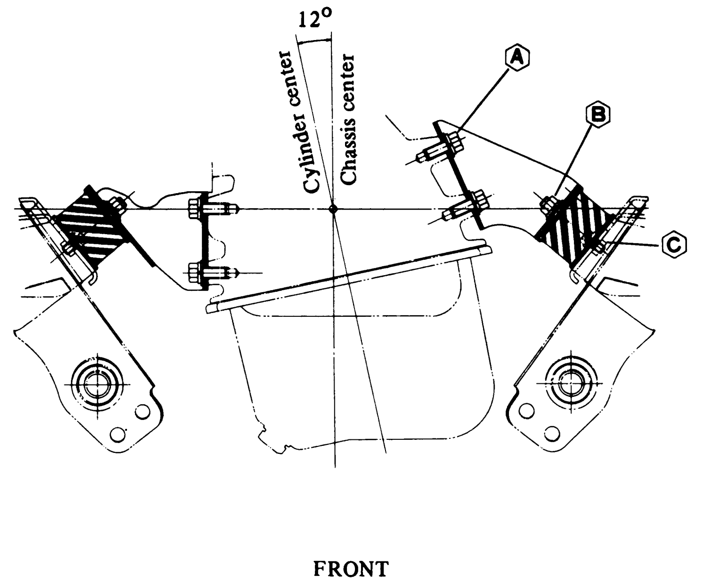
Notes:

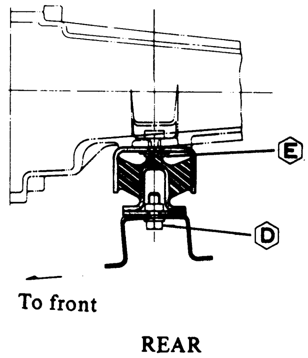
a. **As the sequence of installation, first secure engine mounting rear support to frame.**

b. **When installing front mounting insulator with engine to engine mounting front support, use upper positioning pin of insulator as a guide and engine installation can be carried out easily.**

ENGINE MOUNTING INSULATOR

Three insulators are used to mount the engine; two at left and right front ends of the cylinder block and one at the transmission rear extension housing.





Tightening torque:
Ⓐ 1.9 to 2.5 kg-m (14 to 18 ft-lb)
Ⓑ 1.6 to 2.2 kg-m (12 to 16 ft-lb)
Ⓒ 1.4 to 1.8 kg-m (10 to 13 ft-lb)
Ⓓ 1.6 to 2.2 kg-m (12 to 16 ft-lb)
Ⓔ 3.2 to 3.7 kg-m (23 to 27 ft-lb)

ER095

Fig. ER-16 Structural view of engine mounting

Notes:

a. Replace front or rear insulator assembly when rubber of engine mounting insulator is cracked, abnormally worn or deteriorated.

b. Keep insulator free from oil or grease.

Front mounting insulator

Front mounting insulators are the same parts between right and left hand sides and interchangeable with each other.

Removal and installation

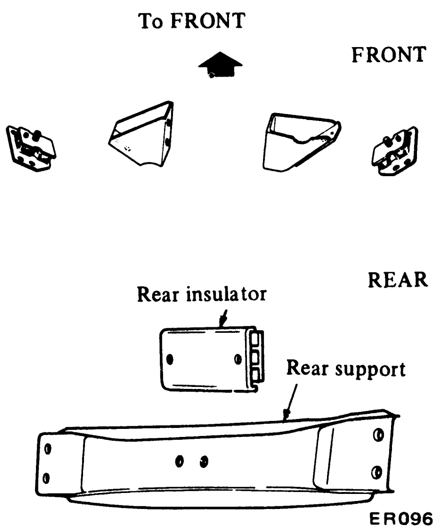
1. Remove hood.
2. Remove air cleaner after disconnecting blow-by hose.
3. Disconnect hoses and cables as same manner in removing engine assembly.
4. Attach a suitable wire to lift engine.
5. Remove engine front mounting nuts at front mounting brackets.

   Carefully raise engine a little by means of a hoist and wire.
6. Remove front mounting insulators at front supports after removing front mounting bolts.
7. To install, reverse the order of removal.

Rear mounting insulator

It is possible to locate the both face of rear mounting insulator facing toward front.

But engine mounting support must be located as shown in Figure ER-17.



ER096

Fig. ER-17 Mounting insulator and rear support

ENGINE REMOVAL AND INSTALLATION

Removal and installation

1. Place a jack under transmission and jack it up slightly.
2. Loosen two engine rear mounting bolts.
3. Remove four bolts securing engine mounting rear support to side member and detach rear support.
4. Remove rear mounting insulator at transmission rear extension after removing insulator securing bolts.
5. To install, reverse the order of removal.

TIGHTENING TORQUE

Fixing bolts and nuts

Front mounting bracket to cylinder block	kg-m (ft-lb)	1.9 to 2.5 (14 to 18)
Front mounting insulator to bracket	kg-m (ft-lb)	1.6 to 2.2 (12 to 16)
Front mounting insulator to front support	kg-m (ft-lb)	1.4 to 1.8 (10 to 13)
Rear mounting insulator to transmission	kg-m (ft-lb)	3.2 to 3.7 (23 to 27)
Rear mounting insulator to rear support	kg-m (ft-lb)	1.6 to 2.2 (12 to 16)
Rear support to frame	kg-m (ft-lb)	3.2 to 4.3 (23 to 31)
Clutch operating cylinder to transmission	kg-m (ft-lb)	2.5 to 3.5 (18 to 25)
Exhaust front tube to exhaust manifold	kg-m (ft-lb)	1.6 to 2.1 (12 to 15)
Center bearing bracket to crossmember	kg-m (ft-lb)	1.6 to 2.2 (12 to 16)
Propeller shaft to companion flange	kg-m (ft-lb)	2.0 to 2.7 (14 to 20)

SERVICE MANUAL

DATSUN PICK-UP
MODEL 620 SERIES

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION CL

CLUTCH

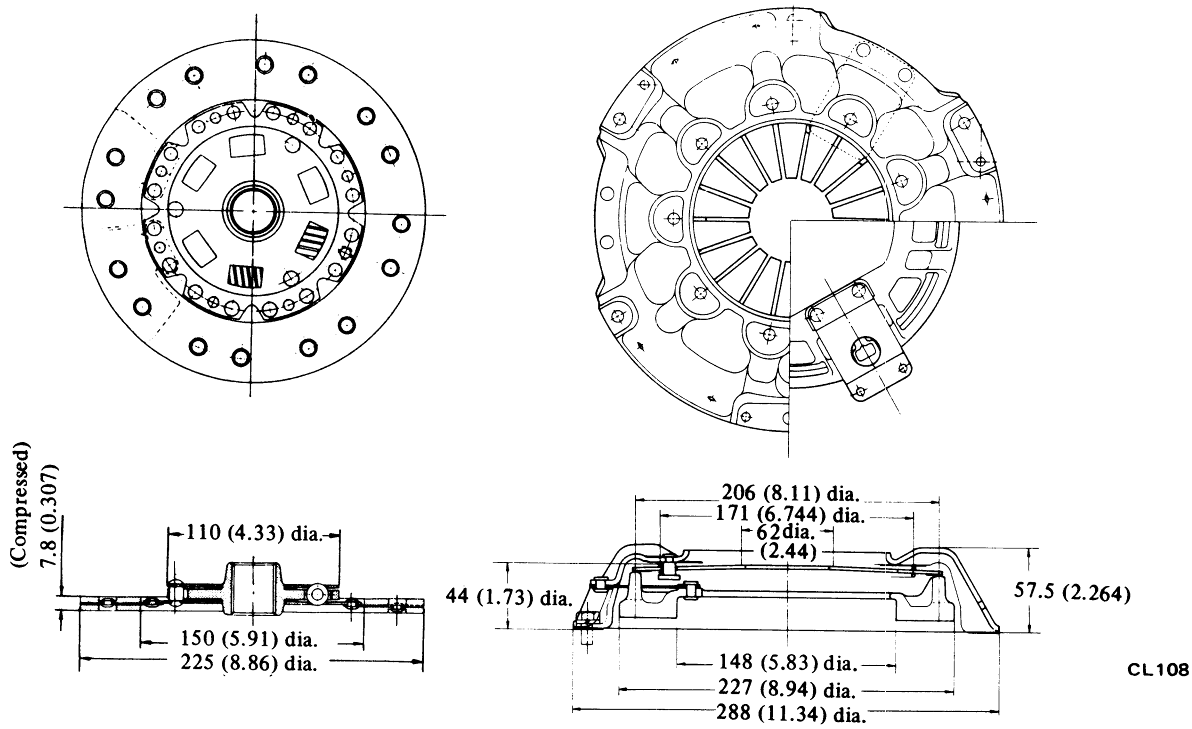
CL

CLUTCH

CONTENTS

DESCRIPTION

The clutch is a single dry disc type using a diaphragm spring. It consists of the clutch disc, pressure plate, diaphragm spring, thrust rings, clutch cover, and clutch release bearing.



Unit: mm (in)

Fig. CL-1 Construction of clutch disc and cover assembly

REMOVAL AND INSTALLATION

Removal

1. Remove transmission from vehicle.

For details of transmission removal, refer to "Transmission Section."

2. Insert Clutch Aligning Bar ST20630000 into clutch disc hub until it will no longer go. It is important to support weight of clutch disc during further steps. See Figure CL-2.

3. Loosen six screws attaching clutch cover to flywheel one turn at a time each until spring pressure is released. Be sure to turn them out in a crisscross fashion.

Note: Exercise special care to avoid grease or oil getting on clutch linings.

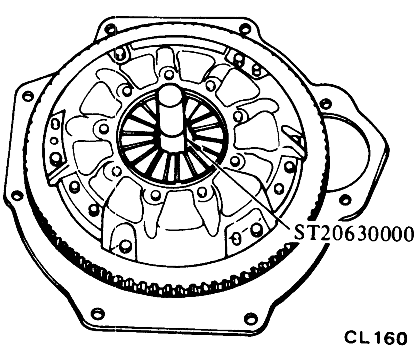


Fig. CL-2 Supporting clutch assembly

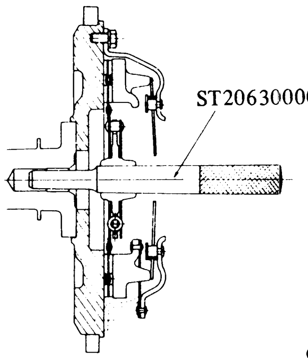
Installation

Apply a light coat of lithium base grease (containing disulphide molybdenum) on transmission main drive gear splines.

Slide clutch disc on main drive gear several times. Remove clutch disc and wipe off excess lubricant pushed off by disc hub.

2. Install clutch disc and clutch cover assembly on flywheel. Support two assemblies with Clutch Aligning Bar ST20630000. See Figure CL-3.

Note: Be sure to keep disc facings, flywheel, and, pressure plate clean and dry.



CL109

Fig. CL-3 Installing clutch cover assembly

3. Install six bolts to tighten clutch cover assembly to flywheel squarely. Each bolt should be tightened one turn at a time to the specified torque 1.5 to 2.2 kg-m (11 to 16 ft-lb).

Note: Three dowels are used to locate clutch cover on flywheel properly.

4. Remove Clutch Aligning Bar ST20630000 after tightening the bolts securely.
5. Install transmission.

Note: Make certain that withdrawal lever engages lever ball pin.

6. Connect push rod of clutch operating cylinder to withdrawal lever.

DISASSEMBLY AND \SSEMBLY

Disassembly

1. Clutch cover assembly can not be disassembled since diaphragm spring is securely reveted to clutch cover and clutch cover assembly is balanced.

If necessary, replace clutch cover assembly as a complete unit.

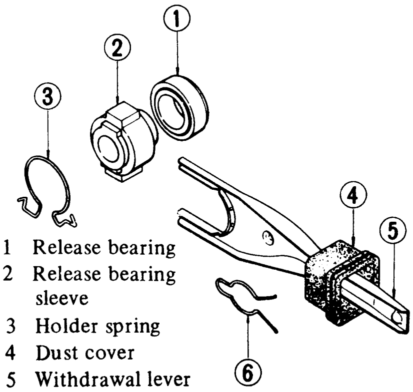
2. Remove clutch release mechanism as follows (See Figure CL-4):

(1) Remove dust cover from clutch houisng.

(2) Remove withdrawal lever from clutch housing.

(3) Remove retainer spring from withdrawal lever.

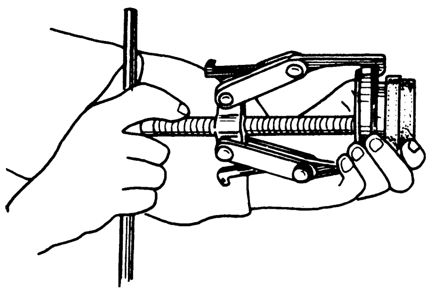
(4) Remove release bearing, bearing sleeve and holder spring from clutch housing as an assembly.



CL119

Fig. CL-4 Exploded view of clutch release mechanism

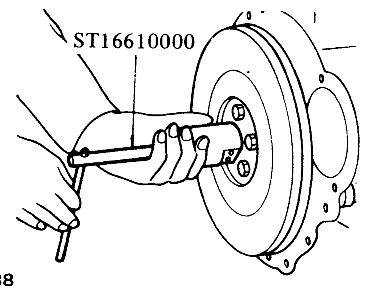
3. Take out clutch release bearing from bearing sleeve, using a universal puller. See Figure CL-5.



CL014

Fig. CL-5 Disassembling release bearing

4. Remove pilot bushing in crankshaft by Pilot Bush Puller ST16610001 if necessary. See Figure CL-6.



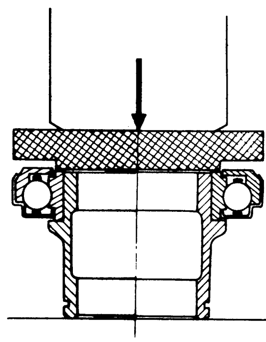
CL088

Fig. CL-6 Removing pilot bushing

Assembly

Release mechanism

1. When assembling release bearing on sleeve, use a press and seat bearing squarely on sleeve. See Figure CL-7.

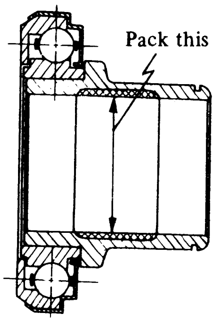


CL117

Fig. CL-7 Installing release bearing

2. Before or during assembling, lubricate the following points with a light coat of multi-purpose grease.

(1) Inner groove of release bearing sleeve. See Figure CL-8.



CL093

Fig. CL-8 Lubricating recess of bearing sleeve

(2) Contact surfaces of withdrawal lever, lever ball pin and bearing sleeve.

(3) Contact surfaces of transmission front cover. See Figure CL-9.

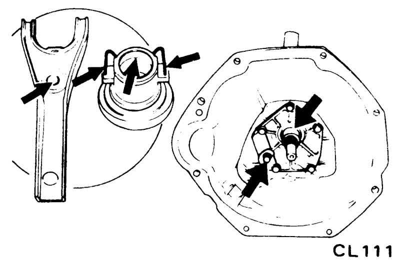


Fig. CL-9 Lubricating points of withdrawal lever and front cover

(4) Contact surfaces of transmission main drive gear splines. [lithium base grease (including disulphide molybdenum)].

Note: Very small amount of grease should be coated to the above points. If too much lubricant is applied, it will run out on the friction plates when hot, resulting in damaging clutch disc facings.

3. Install retainer spring to withdrawal lever. Fit holder spring to release bearing and sleeve assembly, then assemble withdrawal lever and bearing sleeve as a unit. Install this assembly on transmission case. Then install dust cover.

Pilot bushing

Before installing a new bushing, thoroughly clean bushing hole. Install bushing in crankshaft using a soft hammer. Bushing need not be oiled.

INSPECTION

Wash all the disassembled parts except release bearing and disc assembly in suitable cleaning solvent to remove dirt and grease before making inspection and adjustment.

Flywheel and pressure plate

Check friction surface of flywheel and pressure plate for scoring or roughness. Slight roughness may be smoothed by using fine emery cloth.

If surface is deeply scored or grooved, the part should be replaced.

Clutch disc assembly

Inspect clutch disc for worn or oily facings, loose rivets, and broken or loose torsional springs.

1. If facings are oily, the disc should be replaced. In this case, inspect transmission front cover oil seal, pilot bushing, engine rear oil seals and other points for oil leakage.
2. The disc should also be replaced when facings are worn locally or worn down less than 0.3 mm (0.0118 in) at revets. See Figure CL-10.

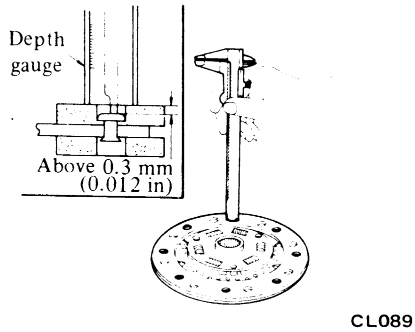


Fig. CL-10 Measuring clutch lining

3. Check disc plate for runout whenever the old disc or a new one is installed.
4. If runout exceeds the specified value at the outer circumference, replace or repair disc. See Figure CL-11.

Runout:
0.5 mm (0.020 in)
total indicator reading
R (from the hub center):
107.5 mm (4.232 in)

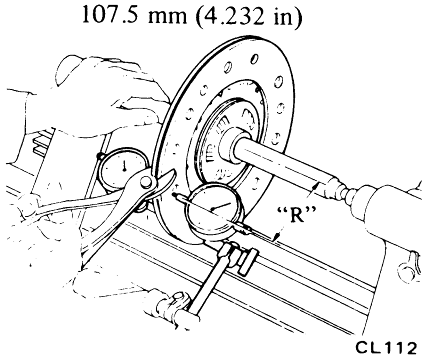


Fig. CL-11 Measuring disc runout

5. Check the fit of disc hub on transmission main drive gear for smoothly sliding. If splines are worn, clutch disc or main drive gear should be replaced; that is, backlash exceeds 0.4 mm (0.016 in) at the outer edge of clutch disc.

Clutch cover assembly

1. Check the end surface of diaphragm spring for wear.

If excessive wear is found, replace clutch cover as an assembly.

2. Measure the height of diaphragm spring as outlined below. See Figure CL-12.

a. Place Distance Piece ST20050100 on Base Plate ST20050010 and then tighten clutch cover assembly on the base plate by using Set Bolts (ST20050051).
b. Measure the height "A" at several points with a vernier caliper depth gauge.

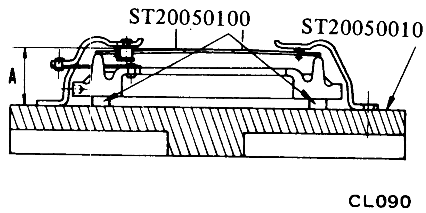


Fig. CL-12 Measuring the height of diaphragm spring

If the height "A" of spring end i beyond the specified value of 43 to 45 mm (1.69 to 1.77 in), adjust the spring height with Diaphragm Adjust Wrench ST20050240. See Figure CL-13.

If necessary, replace clutch cover as an assembly. Also, unevenness of diaphragm spring toe height should be less than 0.5 mm (0.020 in).

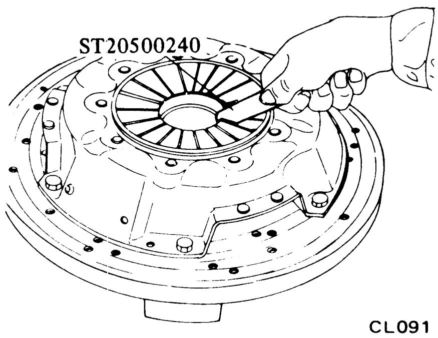


Fig. CL-13 Adjusting the spring height

3. Inspect thrust rings for wear or damage. As these parts are invisible from outside, shake cover assembly up and down to listen for chattering noise, or lightly hammer on rivets for a slightly cracked noise. Any of these noises mean requirement for replacement as a complete assembly.

Release bearing and sleeve

Check for abnormal wear on contact surface of withdrawal lever, ball pin and bearing sleeve.

Pilot bushing

Check pilot bushing in crankshaft for wear or roughness. If necessary, replace it.

When bushing is faulty, be sure to check transmission main drive gear at the same time.

CLUTCH CONTROL

CONTENTS

DESCRIPTION

The hydraulic clutch control consists of a pendent pedal, master cylinder, operating cylinder and withdrawal lever.

When the clutch pedal is depressed, the piston of the master cylinder forwards clutch fluid to the operating cylinder via a pipe line. The movement of the operating cylinder piston is transmitted to the withdrawal lever through the push rod, thus disengaging the clutch.

The operating cylinder is a non-adjustable type that uses no return spring. In this unit, the withdrawal -to-push rod play adjustment is not necessary since the "S" as shown in Figure CL-15 serves to automatically compensate for wear on clutch disc.

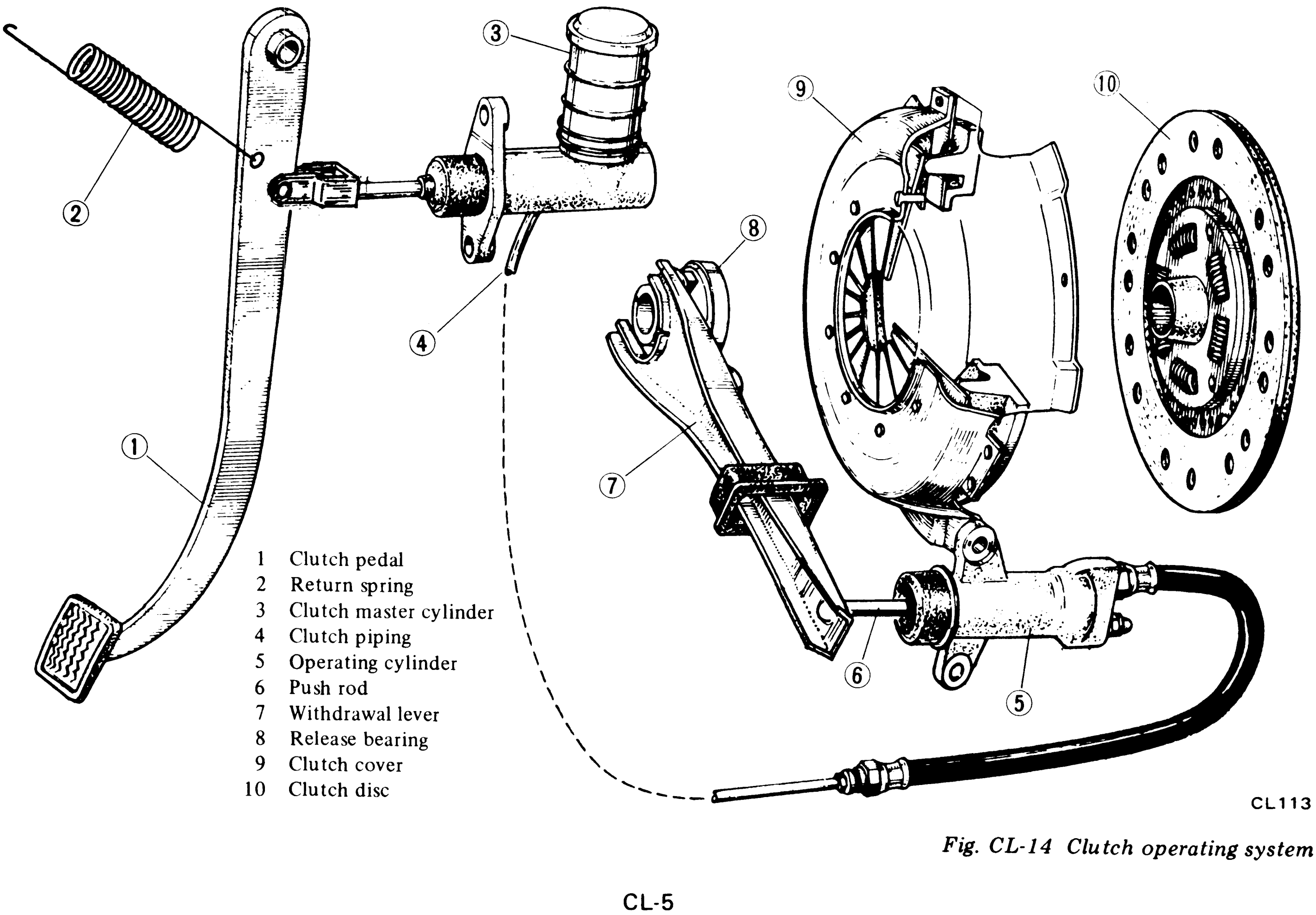


Fig. CL-14 Clutch operating system

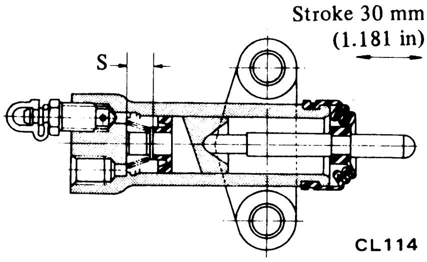


Fig. CL-15 Non-adjustable operating cylinder

CLUTCH PEDAL

Removal and installation

Removal (See Figure CL-16.)

1. Pry off cotter pin and take out clevis pin; disconnect push rod from pedal assembly.
2. Unhook return spring. Loosen off fulcrum pin and remove pedal assembly.

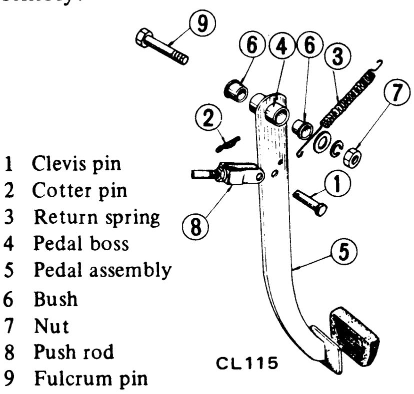


Fig. CL-16 Exploded view of clutch pedal

Note: Before removing clutch pedal, note toe board clearance at pedal pad.

Installation

To install, reverse the order of removal. Apply multi-purpose grease to the friction surfaces of the disassembled parts as shown in Figure CL-17.

Tightening torque:
Pedal installation bolt (Fulcrum pin):
1.9 to 2.4 kg-m
(14 to 17 ft-lb)
Lock nut "A" "B":
0.8 to 1.2 kg-m
(5.8 to 8.7 ft-lb)

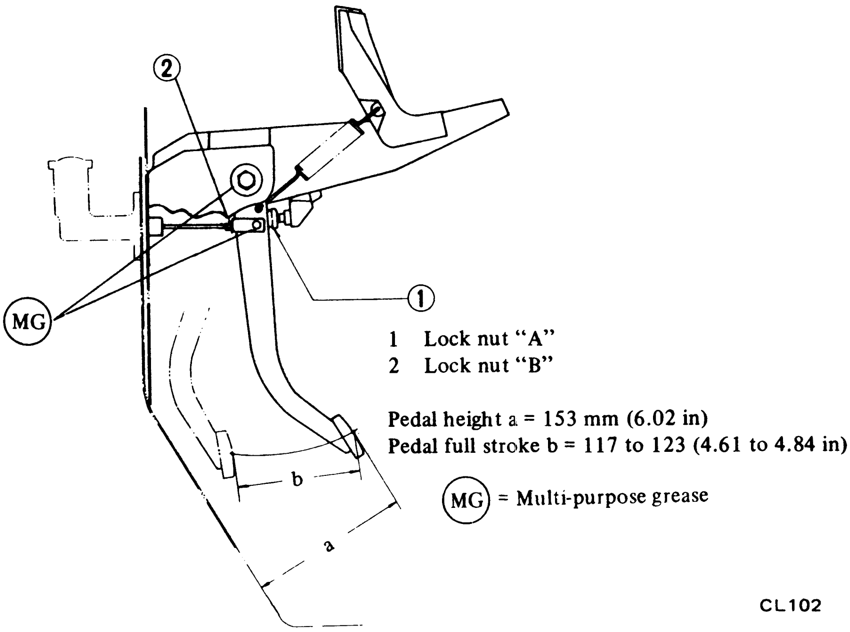


Fig. CL-17 Adjusting pedal height

Note: Refer to Figure CL-18 for the correct direction of return spring.

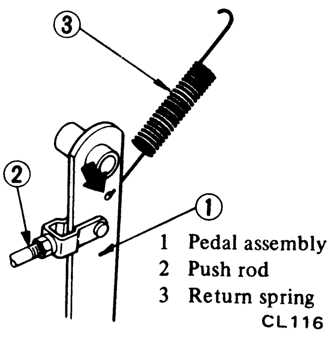


Fig. CL-18 Hooking return spring

Inspection and adjustment

Clean all the following parts in cleaning solvent and check for wear, damage or any other abnormal condition. Replace the parts which are faulty.

(1) Return spring
(2) Bush
(3) Pedal boss, etc.

1. Adjust the pedal height to 153 mm (6.02 in) by adjusting pedal stopper and tighten lock nut "A" to the specified torque 0.8 to 1.2 kg-m (5.8 to 8.7 ft-lb).
2. Turn in or out push rod adjusting screw until a play of 1 to 3 mm (0.039 to 0.118 in) at clevis pin is obtained. Then tighten lock nut "B" to the specified torque 0.8 to 1.2 kg-m (5.8 to 8.7 ft-lb).

Note: Exercise care in adjusting the play not to block the port or master cylinder. A blocked port may result if too small play at clevis pin exists.

3. After adjusting, check the pedal full stroke is in 117 to 123 mm (4.61 to 4.84 in).

Note: Depress and release clutch pedal over its entire stroke to ensure that the clutch linkage operates smoothly without squeak noise, interference and binding.

MASTER CYLINDER-CLUTCH

Removal and installation

Removal

1. Remove clevis pin at push rod.
2. Disconnect clutch tube from master cylinder and drain clutch fluid.
3. Remove bolts securing master cylinder to the vehicle, and dismount master cylinder.

Note: Remove dust cover from master cylinder body, on the side of driver's seat.

Installation

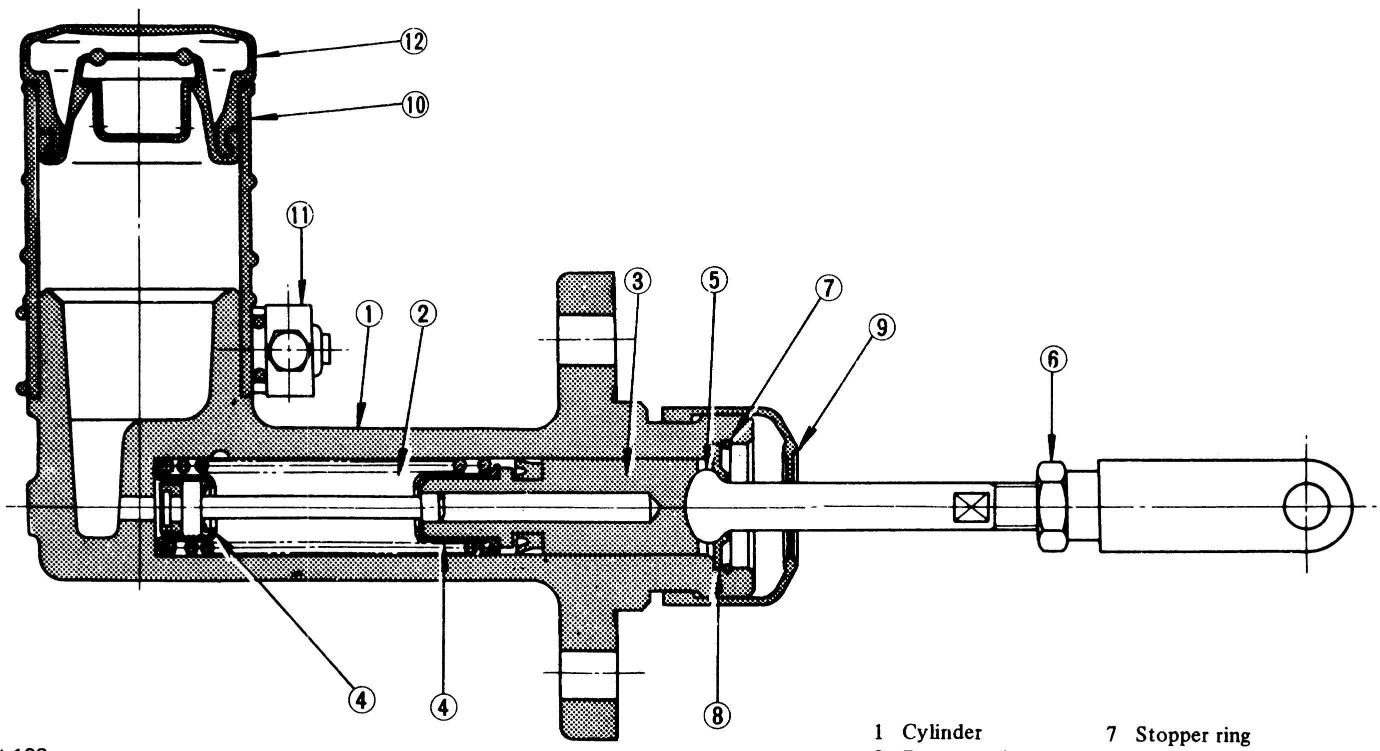
To install, reverse the order of removal. Closely observe the following instructions.

1. Adjust pedal height by changing pedal stopper length.
2. Bleed air out of hydraulic system.

Tightening torque:
Master cylinder to dash panel:
0.8 to 1.2 kg-m
(5.8 to 8.7 ft-lb)
Clutch tube connector (Flare nut):
1.5 to 1.8 kg-m
(11 to 13 ft-lb)

3. Using Brake Pipe Torque Wrench GG94310000, tighten each connector to the specified torque.

Disassembly and assembly

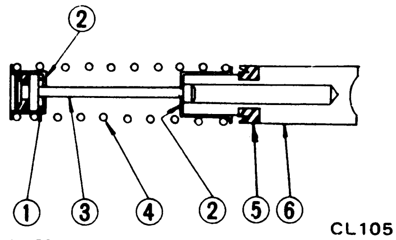


1	Cylinder	7	Stopper ring
2	Return spring	8	Stopper
3	Piston	9	Dust cover
4	Spring seat	10	Oil reservoir
5	Push rod	11	Reservoir band
6	Nut	12	Reservoir cap

Fig. CL-19 Clutch master cylinder

Disassembly (See Figure CL-20.)

1. Remove dust cover and take off stopper ring from body.
2. Remove push rod and piston assembly.
3. When replacing piston cup, disassemble piston assembly by straightening the tooth of spring seat, if necessary.



1	Valve spring	4	Return spring
2	Spring seat	5	Piston cup
3	Valve assembly	6	Piston

Fig. CL-20 Piston assembly

Assembly

To assemble, reverse the order of disassembly. Closely observe the following instructions.

1 Dip piston cup in brake fluid before installing. Make sure that it is correctly faced in position.
2 Apply a coating of brake fluid to cylinder and piston when assembling.

Inspection

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

1. Check cylinder and piston for uneven wear or damage, and if necessary, replace.
2. If the clearance between cylinder and piston is more than 0.15 mm (0.0059 in), replace cylinder.
3. Renew piston cup when disassembled. It must also be replaced when wear or deformation due to fatigue or damage is found.
4. Damaged dust cover, oil reservoir or cap, should be replaced.

   Return spring and valve spring must also be replaced when they are broken or weak.
5. Replace clutch hose and tube if any abnormal sign of damage or defromation is found.

OPERATING CYLINDER

Removal and installation

Removal

1. Detach clutch hose from operating cylinder.
2. Remove two bolts securing operating cylinder to clutch housing.

Installation

Install in the reverse order of removal.

Observe the following instructions.

1 Bleed air thoroughly from clutch hydraulic system.

2 Do not install return spring, or clutch will not be disengaged properly.

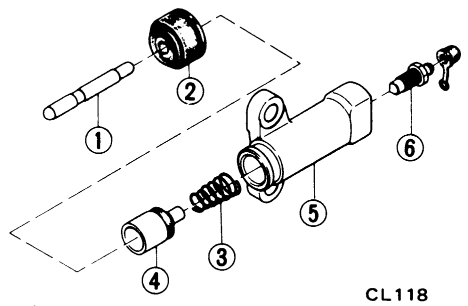
Tightening torque:

Operating cylinder securing bolt:
2.5 to 3.5 kg-m (18 to 25 ft-lb)
Bleeder screw:
0.7 to 0.9 kg-m (5.1 to 6.5 ft-lb)
Clutch hose connector:
1.7 to 2.0 kg-m (12 to 14 ft-lb)

Disassembly and assembly

Disassembly (See Figure CL-21.)

1. Remove push rod with dust cover.
2. Remove piston assembly and piston spring.
3. Remove bleeder screw.



1 Push rod
2 Dust cover
3 Piston spring
4 Piston
5 Piston cup
6 Operating cylinder
7 Bleeder screw

Fig. CL-21 Exploded view of operating cylinder

Assembly

Assemble in the reverse order of disassembly. Closely observe the following instructions.

1. Prior to assembly, dip piston cup in clean brake fluid.

   When installing cup, pay particular attention to its direction.
2. Dip cylinder and piston in clean brake fluid before assembly.

Note: Be sure to install piston assembly with piston spring in place.

Inspection

Visually inspect all disassembled parts, replacing those found worn or damaged too badly beyond specifications.

BLEEDING CLUTCH SYSTEM

To bleed clutch system, use the same procedure as described in Brake System.

1. Fill oil reservoir of operating cylinder with brake fluid.
2. Detach cap from bleeder screw on operating cylinder and, in its place, connect a vinyl tube.
3. Pour a small amount of brake fluid into a clean container and insert the open end of the vinyl tube into it
4. Have a co-worker depress clut pedal two or three times. With clutch pedal depressed fully, loosen bleeder screw to bleed air out of clutch system.
5. Tighten bleeder screw and release the pedal.
6. Repeat above steps until no air bubbles appear in vinyl tube.

Notes:

a. Always keep brake fluid in oil reservoir so that it flows into the line continuously.

b. Use care not to allow brake fluid coming into contact with painted surfaces.

c. Make sure that no leak occurs at connections.

d. Pour brake fluid into oil reservoir up to the specified level.

SERVICE DATA AND SPECIFICATIONS

.utch cover			All 620 series
Clutch cover type			Diaphragm (C225R)
Diaphragm spring-to-flywheel distance	mm (in)		43 to 45 (1.69 to 1.77)
Unevenness of diaphragm spring toe height	mm (in)		less than 0.5 (0.020)
Full load	kg (lb)		400 (882)
Out of flatness of pressure plate	mm (in)		0.1 (0.004)
Allowable refacing limit of pressure plate	mm (in)		1.0 (0.040)
Clutch disc			
Facing size			
Outer dia. x inside dia. x thickness	mm (in)		225 x 150 x 3.5 (8.86 x 5.91 x 0.138)
Thickness of disc assembly			
Free	mm (in)		8.3 to 8.9 (0.327 to 0.350)
Compressed	mm (in)		7.6 to 8.0 (0.299 to 0.315)
Number of torsion springs			6
Allowable minimum depth of rivet head from surface	mm (in)		0.3 (0.012)
Allowable facing run-out	mm (in)		0.5 (0.020)
Allowable free play of spline (at the outer edge of disc)	mm (in)		0.4 (0.016)
utch pedal			
Pedal height	mm (in)		153 (6.02)
Play at clevis pin	mm (in)		1 to 3 (0.039 to 0.118)
Full stroke	mm (in)		117 to 123 (4.61 to 4.84)
Excess stroke (with clutch disengaged)			
Pressing strength at full stroke	kg (lb)		8.4 (19)
Master cylinder-clutch			
Dia. of master cylinder	mm (in)		15.87 (0.6248)
Allowable maximum clearance between cylinder and piston	mm (in)		0.15 (0.0059)
Clutch operating cylinder			
Dia. of operating cylinder	mm (in)		19.05 (¾)
Tightening torque			
Clutch assembly to flywheel securing bolt	kg-m (ft-lb)		1.5 to 2.2 (11 to 16)
Pedal installation bolt (Fulcrum pin)	kg-m (ft-lb)		1.9 to 2.4 (14 to 17)
Pedal stopper lock nut	kg-m (ft-lb)		0.8 to 1.2 (5.8 to 8.7)
Push rod lock nut	kg-m (ft-lb)		0.8 to 1.2 (5.8 to 8.7)
Master cylinder to dash panel securing bolt	kg-m (ft-lb)		0.8 to 1.2 (5.8 to 8.7)
Clutch tube connector (Flare nut)	kg-m (ft-lb)		1.5 to 1.8 (11 to 13)
Clutch hose connector	kg-m (ft-lb)		1.7 to 2.0 (12 to 14)
Operating cylinder to clutch housing securing bolt	kg-m (ft-lb)		2.5 to 3.5 (18 to 25)
Bleeder screw	kg-m (ft-lb)		0.7 to 0.9 (5.1 to 6.5)

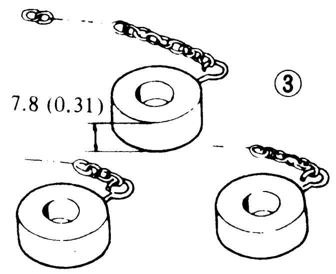
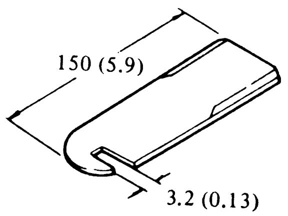
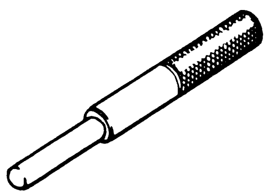
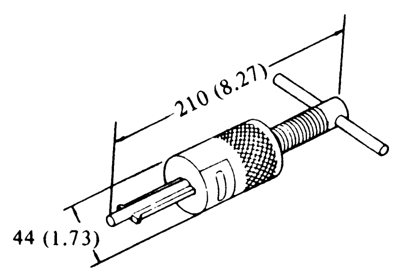
TROUBLE DIAGNOSES AND CORRECTIONS

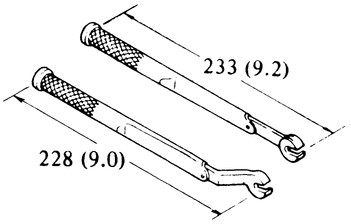
Condition	Probable cause and testing	Corrective action
Clutch slips	Slipping of the clutch may be noticeable when any of the following symptoms is encountered during operation. (1) Vehicle will not respond to engine speed during acceleration. (2) Insufficient car speed. (3) Lack of power during uphill driving. Some of the above conditions are also experienced when engine problem is occurring. First determine whether engine or clutch is causing the problem. If slipping clutch is left unheeded, wear and/or overheating will occur on clutch facing until it is no longer serviceable. TO TEST FOR SLIPPING CLUTCH, proceed as follows: During upgrade travelling, run engine at about 40 to 50 km/h (25 to 31 MPH) with gear shift lever in 3rd speed position, shift into highest gear and at the same time rev up engine. If clutch is slipping, car will not readily respond to depression of accelerator pedal.	
	• Clutch facing worn excessively.	Replace.
	• Oil or grease on clutch facing.	Replace.
	• Warped clutch cover or pressure plate.	Repair or replace.
Clutch drags	Dragging clutch is particularly noticeable when shifting gears, especially into low gear. TO TEST FOR DRAGGING CLUTCH, proceed as follows: (1) Start engine. Disengage clutch. Shift into reverse gear, and then into Neutral. Gradually increase engine speed, and again shift into reverse gear. If clutch is dragging, gear "grating" is heard when shifting from Neutral into Reverse. (2) Stop engine and shift gear. (Conduct this test at each gear position.) (3) Gears are smoothly shifted in step (2), but drag when shifting to 1st speed position at idling. a. If dragging is encountered at the end of shifting, check condition of synchro-mechanism in transmission. b. If dragging is encountered at the beginning of shifting, proceed to step (4) below. (4) Push change lever toward Reverse side, depress pedal to check for free travel. a. If pedal can be depressed further, check clutch condition. b. If pedal cannot be depressed further, proceed to step (5) below. (5) Check clutch control. (pedal height, free pedal play, free travel withdrawal lever play, etc.) If no abnormal condition exists and if pedal cannot be depressed further, check clutch condition.	
	• Clutch disc runout or warped.	Repair or replace.
	• Wear or rust on hub splines in clutch disc.	Clean and lubricate with grease, or replace.
	• Diaphragm spring toe height out of adjustment or toe tip worn.	Adjust or replace.
	• Worn or improperly installed parts.	Repair or replace.

Condition	Probable cause and testing	Corrective action
Clutch chatters	Clutch chattering is usually noticeable when vehicle is just rolled off with clutch partially engaged.	
	• Weak or broken clutch disc torsion spring.	Replace.
	• Oil or grease on clutch facing.	Replace.
	• Clutch facing out of proper contact or clutch disc runout.	Replace.
	• Loose rivets.	Replace.
	• Warped pressure plate or clutch cover surface.	Repair or replace.
	• Unevenness of diaphragm spring toe height.	Adjust or replace.
	• Loose engine mounting or deteriorated rubber.	Retighten or replace.
Noisy clutch	A noise is heard after clutch is disengaged.	
	• Damaged release bearing.	Replace.
	A noise is heard when clutch is disengaged.	
	• Insufficient grease on the sliding surface of bearing sleeve.	Apply grease.
	• Clutch cover and bearing are not installed correctly.	Adjust.
	A noise is heard when vehicle is suddenly started off with clutch partially engaged.	
	• Damaged pilot bushing.	Replace.
Clutch grabs	When grabbing of clutch occurs, vehicle will not start off smoothly from a standing start or clutch is engaged before clutch pedal is fully depressed.	
	• Oil or grease on clutch facing.	Replace.
	• Clutch facing worn or loose rivets.	Replace.
	• Wear or rust on splines in drive shaft and clutch disc.	Clean or replace.
	• Warped flywheel or pressure plate.	Repair or replace.
	• Loose mountings for engine or power train units.	Retighten.

CLUTCH

SPECIAL SERVICE TOOLS

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or Figure No.
1	ST20050010 Base plate	 SE002	620 610 710 S30	Fig. CL-12
2	ST20050051 Set bolt			
3	ST20050100 Distance piece 7.8 mm (0.31 in)	 SE003	620 610 710 S30	
4	ST20050240 Diaphragm spring adjusting wrench	 SE032	620 610 710 S30	Fig. CL-13
5	ST20630000 Clutch aligning bar	This tool is used to conduct disc centering by inserting the tool into pilot bush in flywheel, when installing clutch assembly to flywheel.  SE001	620 610 710 S30	Fig. CL-2 Fig. CL-3
6	ST16610001 Pilot bush puller	 SE191	L18 L14 L16 L24 L26	Fig. CL-6

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or Figure No.
7	GG94310000 Brake pipe torque wrench	This tool is used to tighten and loosen brake and clutch type flare nut. A built-in torque limiting wrench is provided to assure torque accuracy. 	All models	Page CL-7

SERVICE MANUAL

DATSUN PICK-UP
MODEL 620 SERIES

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION TM

TRANSMISSION

TM

TRANSMISSION

CONTENTS

DESCRIPTION

The model 620 series vehicles adopt the type F4W71B transmission.

The transmission is of a 4-speed forward, fully synchronized constant-mesh type that uses helical gears.

The reverse gear is of a sliding-mesh type using spur gears.

The shift control is floor mounted.

In construction, the main drive gear is meshed with the counter drive gear which is keyed to the countershaft. The forward speed gears on the countershaft are in constant mesh with the mainshaft gears which ride on the mainshaft freely through the needle bearing. When shifting is accomplished, the inner teeth of the coupling sleeve slide over the synchronizer hub and mesh with the outer teeth which are provided on the mainshaft gear.

The synchronizer hub is fitted to the mainshaft by splines so the mainshaft gear turns together with the mainshaft.

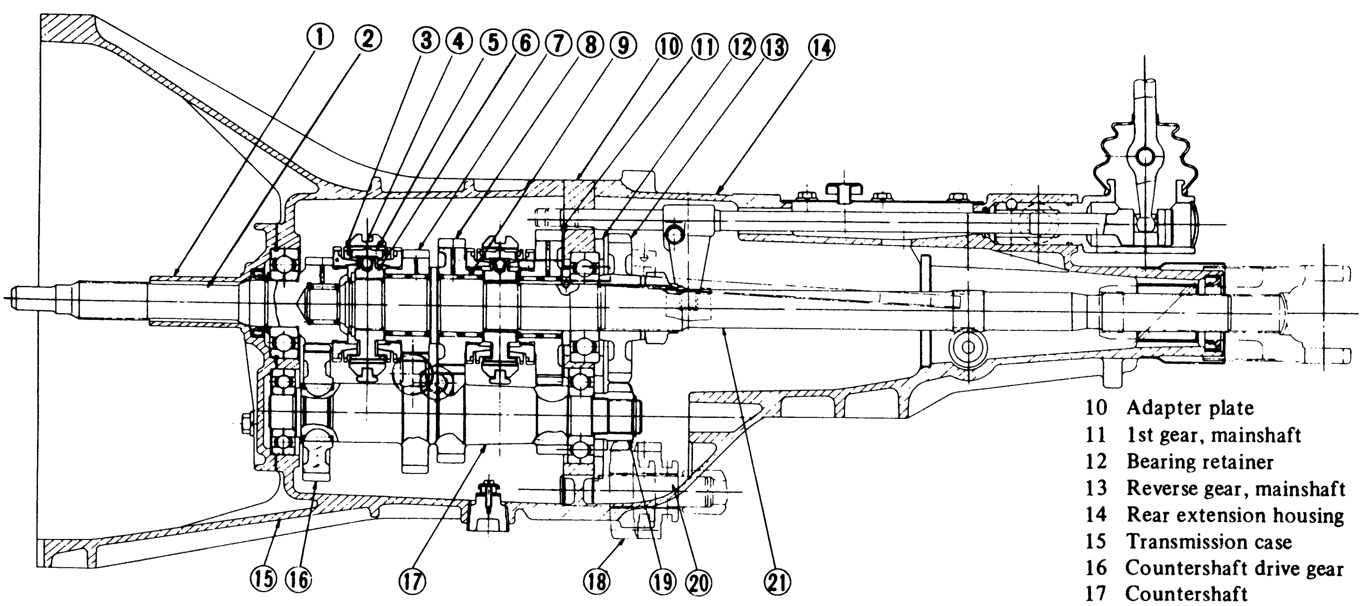
The baulk ring serves to synchronize the coupling sleeve and mainshaft gear.

Placing the control lever in reverse position brings the reverse idler gear into mesh with mainshaft reverse gear.

The transmission assembly consists of three main parts; a transmission case with clutch housing, adapter plate to which all gears and shafts are installed, and rear extension.

The cast-iron adapter plate supports the mainshaft, countershaft, reverse idler shaft and three fork rods, and bolted at the front to the transmission case and, at the rear, to the rear extension by means of through-bolts.

By removing these through-bolts all gears and shafts are stripped.



10 Adapter plate
11 1st gear, mainshaft
12 Bearing retainer
13 Reverse gear, mainshaft
14 Rear extension housing
15 Transmission case
16 Countershaft drive gear
17 Countershaft
18 Reverse idler gear
19 Reverse counter gear
20 Reverse idler shaft
21 Mainshaft

TM334

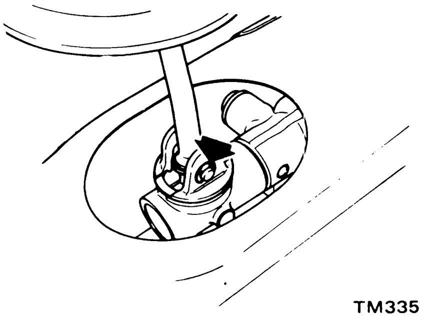
1 Front cover
2 Main drive gear
3 Baulk ring
4 Coupling sleeve
5 Shifting insert
6 Synchronizer hub, 3rd & 4th
7 3rd speed gear, mainshaft
8 2nd speed gear, mainshaft
9 Needle bearing

Fig. TM-1 Sectional view of F4W71B transmission

REMOVAL

In dismounting transmission from the vehicle, proceed as follows:

1. Disconnect battery ground cable from terminal.
2. Place transmission control lever in neutral position.
3. Remove C-ring and control lever pin from transmission striking rod guide, and remove control lever. See Figure TM-2.

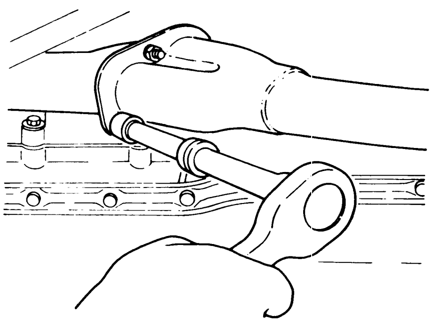


TM335

Fig. TM-2 Removing control lever

4. Jack up the vehicle and support its weight on safety stands. Use a hydraulic hoist or open pit, if available.

   Confirm that safety is insured.
5. Disconnect exhaust front tube. See Figure TM-3.

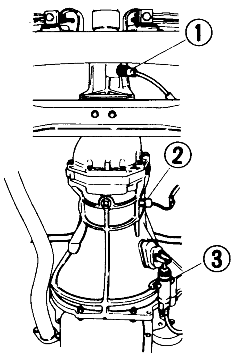


Tightening torque: 1.6 to 2.1 kg-m (12 to 15 ft-lb)

ER192

Fig. TM-3 Disconnecting exhaust front tube

6. Disconnect wires from reverse lamp switch. See Figure TM-4.
7. Disconnect speedometer cable from rear extension housing. See Figure TM-4.
8. Remove clutch operating cylinder from transmission case. See Figure TM-4.

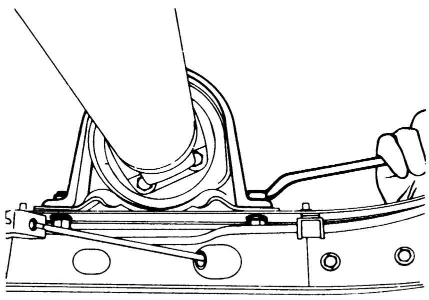


1 Speedometer cable
2 Reverse lamp switch
3 Clutch operating cylinder

TM774

Fig. TM-4 Bottom view of car

9. Remove bracket holding center bearing on 3rd crossmember by loosening off attaching bolts. See Figure TM-5.

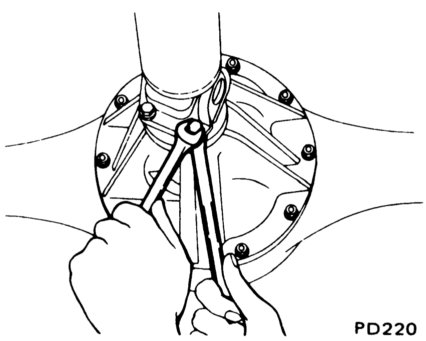


PD219

Fig. TM-5 Removing center bearing holding bracket

10. Detach propeller shaft from companion flange of gear carrier by backing off four bolts. See Figure TM-6.

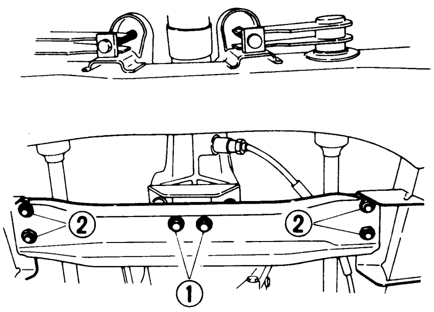
Note: Plug up the opening in the rear of rear extension housing to prevent oil from flowing out.



PD220

Fig. TM-6 Removing four bolts securing propeller shaft to companion flange

11. Support engine by locating a jack under oil pan with a wooden block used between oil pan and jack.
12. Support transmission with a transmission jack.
13. Remove rear engine mounting insulator securing bolts and rear mounting member securing bolts. See Figure TM-7.



1 Rear engine mounting insulator securing bolts
2 Rear mounting member securing bolts

Fig. TM-7 Removing engine mounting rear support

14. Remove starter motor.
15. Remove bolts securing transmission to engine.

    After removing these bolts, support the engine and transmission with jacks, and then slide transmission rearward away from engine and remove from the vehicle.

Note: Take care in dismounting transmission not to strike any adjacent parts and main drive shaft.

INSTALLATION

To install, reverse the order of removal observing the following note.

Remove filler plug at the inspection hole, and fill transmission case with recommended gear oil to the level of the filler hole. [Approximately 1.6 liters (3⅜U.S. pt., 2⅞Imp. pt.)].

Tightening torque of bolts and nuts:

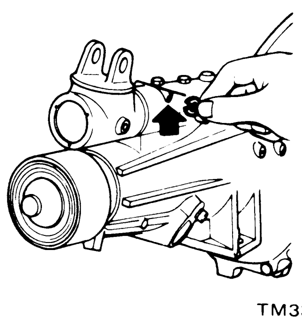
- Bolt securing transmission to engine
  4.0 to 5.0 kg-m
  (29 to 36 ft-lb)

- Startor motor installation bolt
  2.7 to 3.6 kg-m
  (20 to 26 ft-lb)
- Crossmember mounting bolt
  3.2 to 4.3 kg-m
  (23 to 31 ft-lb)
- Bolt securing propeller shaft to companion flange
  2.4 to 3.3 kg-m
  (17 to 24 ft-lb)
- Bolt holding center bearing on 3rd crossmember
  1.6 to 2.2 kg-m
  (12 to 16 ft-lb)
- Clutch operating cylinder installing bolt
  2.5 to 3.5 kg-m
  (18 to 25 ft-lb)
- Exhaust front tube securing nut
  1.6 to 2.1 kg-m
  (12 to 15 ft-lb)

DISASSEMBLY

TRANSMISSION CASE DISASSEMBLY

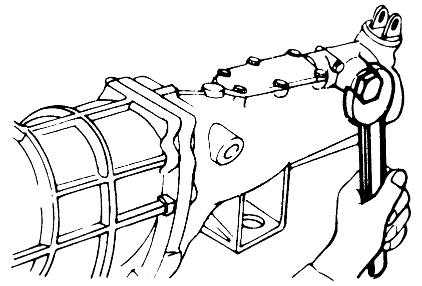
1. Prior to disassembling transmission, thoroughly wipe off dirt and grease from it.
2. Drain oil thoroughly.
3. Remove dust cover from transmission case.
   Remove release bearing and withdrawal lever.
4. Remove reverse lamp switch.
5. Remove speedometer pinion and pinion sleeve by taking off lock plate.
6. Remove C-ring and stopper guide pin from rear end of rear extension. See Figure TM-8.



TM337

Fig. TM-8 Removing striking rod C-ring and stopper pin

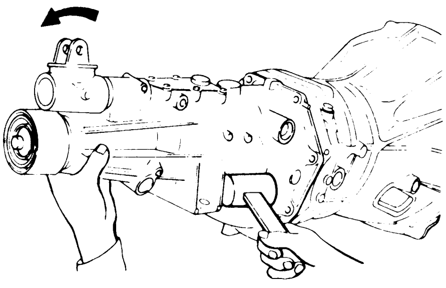
7. Remove return spring plug, return spring, reverse check spring, and plunger from rear extension. See Figure TM-9.



TM338

Fig. TM-9 Removing return spring plug

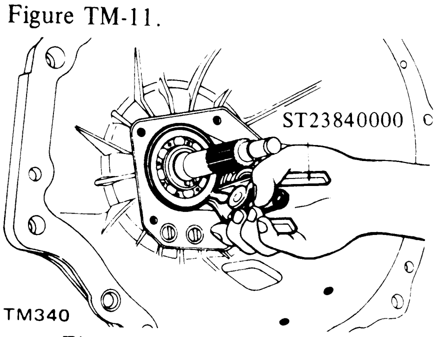
8. Remove rear extension securing bolts and turn the striking rod toward left.
   Drive out rear extension backward by lightly tapping around it with a soft hammer. See Figure TM-10.



TM339

Fig. TM-10 Removing rear extension

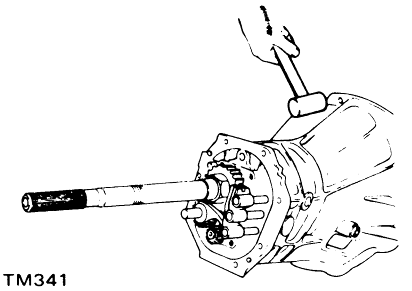
9. Remove front cover securing bolts and remove front cover.
   Detach countershaft front bearing shim.
10. Remove main drive bearing snap ring with Expander ST23840000. See Figure TM-11.



TM340

Fig. TM-11 Removing main drive bearing snap ring

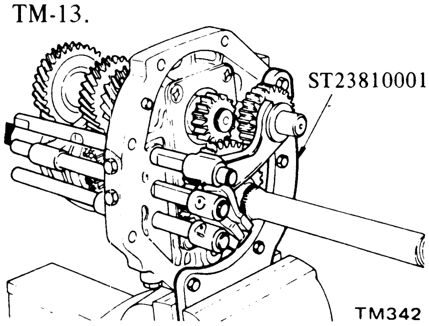
11. Separate transmission case from adapter plate with a soft hammer. See Figure TM-12.



TM341

Fig. TM-12 Remvoing transmission case

12. Set up Setting Plate Adapter ST23810001 on adapter plate.
    With countershaft side up, place the above assembly in a vise. See Figure TM-13.



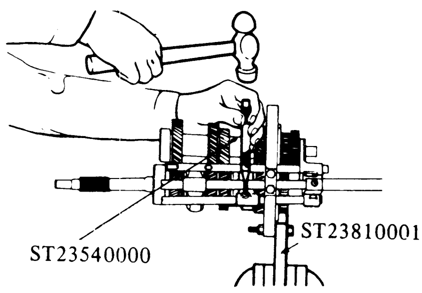
TM342

Fig. TM-13 Attaching gear assembly to special tool

DISASSEMBLY OF GEAR ASSEMBLY

Fork rod

1. Drive out retaining pins from each fork rod with Fork Rod Pin Punch ST23540000. See Figure TM-14.



TM343

Fig. TM-14 Drive out retaining pins

2. Remove three(3) check ball plugs, and drive out fork rods from adapter plate by lightly tapping on the front end.
   Be careful not to lose three(3) check balls and four(4) interlock balls. See Figure TM-15.

Note: Each gear and shaft can be detached from adapter plate without removing each fork rod.

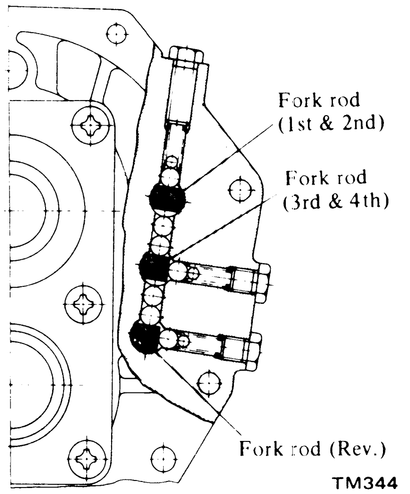


Fig. TM-15 Layout of check ball and interlock ball

Gear assembly

1. With gears doubly engaged, draw out countershaft front bearing using a suitable gear puller. See Figure TM-16.
2. Remove counter drive gear snap ring.
3. Draw out counter drive gear complete with main drive gear assembly by means of a gear puller.

When drawing out main drive gear assembly, be careful not to drop pilot needle bearing onto floor from the front end of mainshaft. See Figure TM-17.

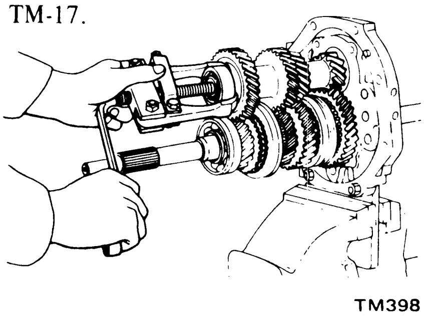


Fig. TM-16 Removing countershaft front bearing

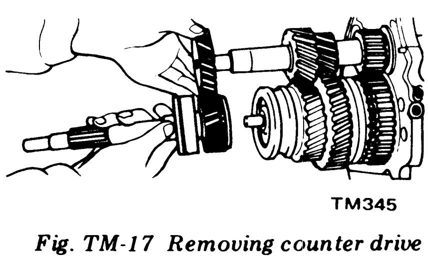


Fig. TM-17 Removing counter drive gear and main drive gear

4. Remove snap ring and then thrust washer from mainshaft front end.

Draw out 3rd & 4th synchronizer assembly and remove 3rd gear assembly.

5. Release caulking on mainshaft nut and loosen it. See Figure TM-18.

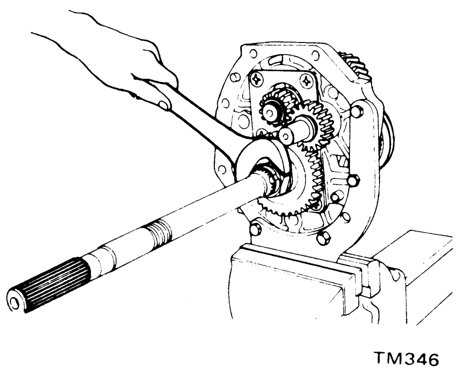


Fig. TM-18 Removing mainshaft nut

6. Remove mainshaft nut, thrust washer and mainshaft reverse gear.
7. Remove snap ring from countershaft rear end, and remove reverse idler gear.
8. Draw out mainshaft gear assembly together with countershaft by lightly tapping the rear end with a soft hammer while holding the front of mainshaft gear assembly by hand.

Be careful not to drop off gear shaft. See Figure TM-19.

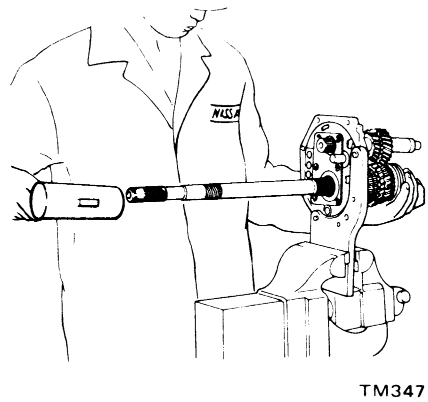
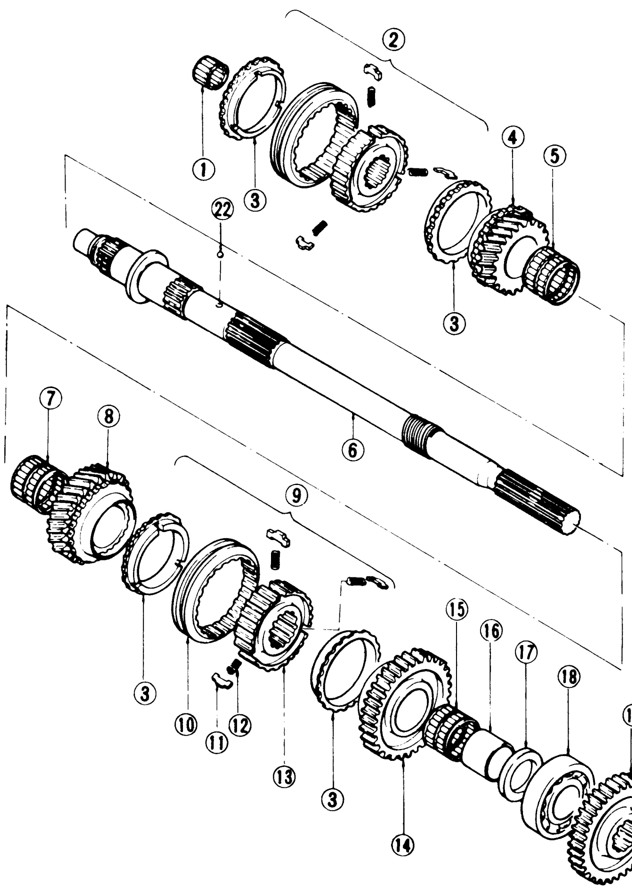


Fig. TM-19 Driving out gear assembly

Mainshaft assembly

Disassemble mainshaft gear assembly. See Figure TM-20.



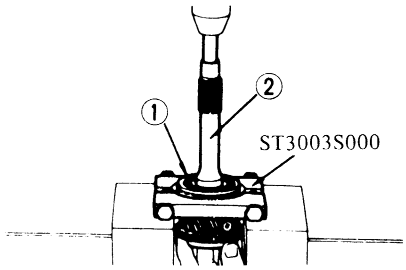
1 Pilot bearing
2 3rd & 4th synchronizer assembly
3 Baulk ring
4 3rd speed gear, mainshaft
5 Needle bearing
6 Mainshaft
7 Needle bearing
8 2nd speed gear, mainshaft
9 1st & 2nd synchronizer assembly
10 Coupling sleeve
11 Shifting insert
12 Shifting insert spring
13 Synchronizer hub
14 1st speed gear, mainshaft
15 Needle bearing
16 Bush, 1st speed gear
17 Thrust washer, mainshaft
18 Mainshaft bearing
19 Reverse gear, mainshaft
20 Thrust washer
21 Nut
22 Steel ball

Fig. TM-20 Exploded view of main shaft assembly

Mainshaft drive assembly

1. Remove main drive gear snap ring and spacer. See Figure TM-21.

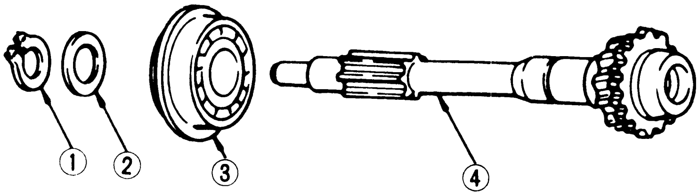
2. Remove main drive bearing with Bearing Puller ST3003S000 and a suitable press. See Figure TM-22.



1 Main drive bearing
2 Main drive gear

TM349

Fig. TM-22 Removing main drive bearing



1 Snap ring
2 Spacer
3 Main drive bearing with snap ring
4 Main drive gear

TM350

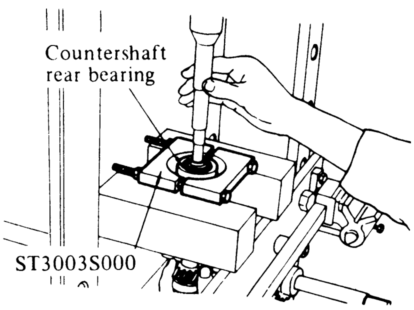
Fig. TM-21 Exploded view of main drive gear

Countershaft assembly

Install Bearing Puller ST3003S000 on countershaft rear bearing; press out countershaft rear bearing through a rod.

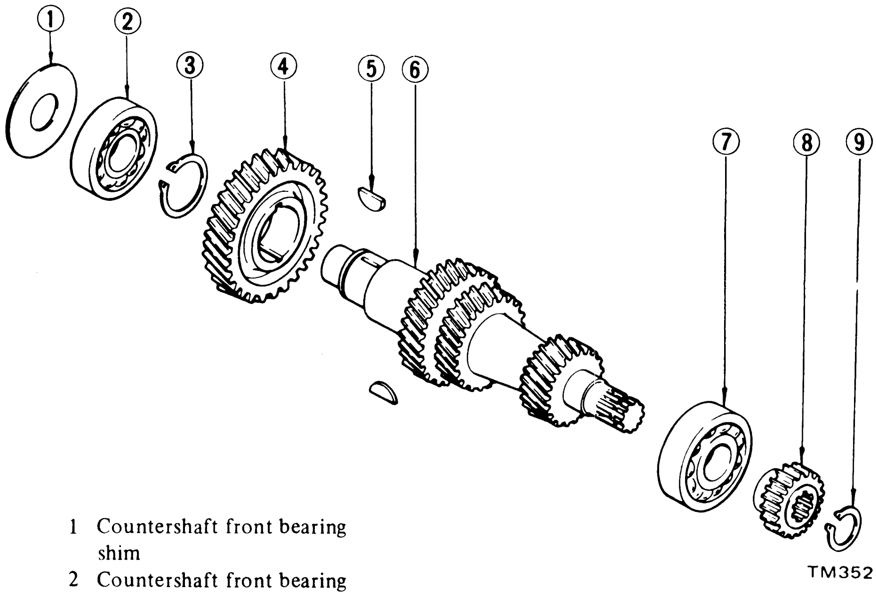
See Figure TM-23.

Note: **When pressing out bearing, hold shaft by hand so as not to drop shaft onto floor.**



TM351

Fig. TM-23 Removing countershaft bearing



1 Countershaft front bearing shim
2 Countershaft front bearing
3 Snap ring
4 Countershaft drive gear
5 Woodruff key
6 Countershaft
7 Countershaft rear bearing
8 Reverse counter gear
9 Snap ring

TM352

Fig. TM-24 Exploded view of countershaft assembly

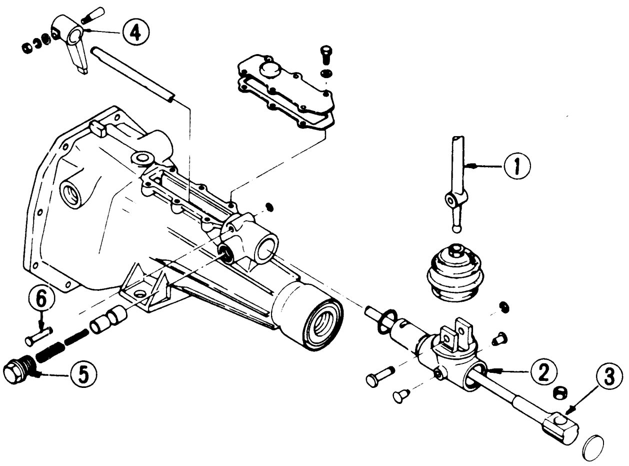
REAR EXTENSION DISASSEMBLY

Remove lock pin from striking lever, and remove striking rod. See Figure TM-25.

Note: Do not disassemble rear extension bush from rear extension.

3. Replace needle bearing if worn or damaged.

1 Control lever
2 Striking rod guide
3 Striking rod
4 Striking lever
5 Return spring plug
6 Stopper pin
7 Lock pin



TM353

Fig. TM-25 Exploded view of shifting mechanism

GEARS AND SHAFTS

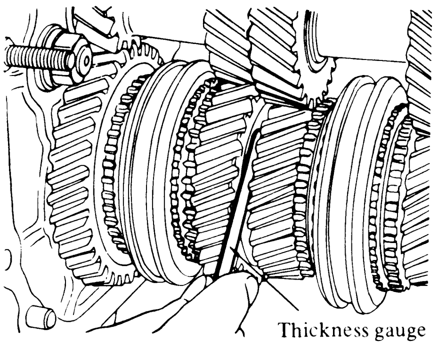
1. Check all gears for excessive wear, chips or cracks; replace as required.
2. Check shaft for bending, crack, wear, and worn spline; if necessary, replace.
3. Measure backlash in gears.

Standard:
0.05 to 0.10 mm
(0.0020 to 0.0039 in)

If the above limits are exceeded, replace drive and driven gears as a set.

4. Measure gear end play. See Figure TM-27.

1st gear:
0.32 to 0.39 mm
(0.0126 to 0.0154 in)
2nd and 3rd gears:
0.12 to 0.19 mm
(0.0047 to 0.0075 in)



TM374

Fig. TM-27 Measuring end play

DAPTER PLATE DISASSEMBLY

1. Remove six(6) bearing retainer attaching screws with an impact wrench and remove bearing retainer from adapter plate.
2. Remove reverse idler shaft.
3. Remove mainshaft bearing from the rear extension side.

INSPECTION

Wash all parts in a suitable cleaning solvent and check for wear, damage or other faulty conditions.

Notes:

a. **Be careful not to damage any parts with scraper.**
b. **Do not clean, wash or soak oil seals in solvent.**

TRANSMISSION CASE AND REAR EXTENSION HOUSING

. Clean with solvent thoroughly and check for cracks which might cause oil leak or other faulty conditions.

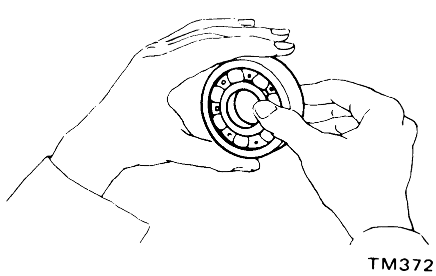
2. Check mating surface of the case to engine or adapter plate for small nicks, projection or sealant.

Remove all nicks, projection or sealant with a fine stone.

3. If rear extension bush is worn or cracked, replace it as an assembly of bush and rear extension housing.

BEARING

1. Thoroughly clean bearing and dry with a compressed air.
2. When race and ball surfaces are worn or rough, or when balls are out-of-round or rough, replace bearing with a new one. See Figure TM-26.



TM372

Fig. TM-26 Inspecting ball bearing

5. Check for stripped or damaged speedometer pinion gear. If necessary, replace.

BAULK RING

1. Replace baulk ring if found to be deformed, cracked or otherwise damaged excessively.
2. Place baulk ring in position on gear cone.

While holding baulk ring against gear as far as it will go, measure gap between baulk ring and outer gear.

If gap is small, discard baulk ring. See Figure TM-28.

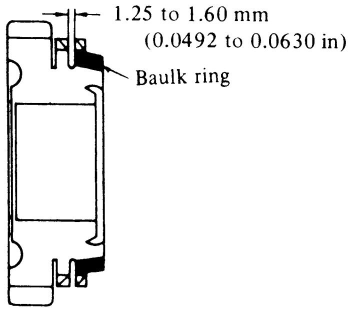


Fig. TM-28 Baulk ring-to-cone gap

OIL SEAL

Discard O-ring or oil seal which is once removed. Replace oil seal if sealing lip is deformed or cracked. Also discard oil seal if spring is out of position.

ASSEMBLY

To assemble, reverse the order of disassembly. Observe the following instructions.

FRONT COVER ASSEMBLY

1. Wipe clean seal seat in front cover, then press fit oil seal in place. See Figure TM-29.

Coat oil seal with gear oil to provide initial lubrication.

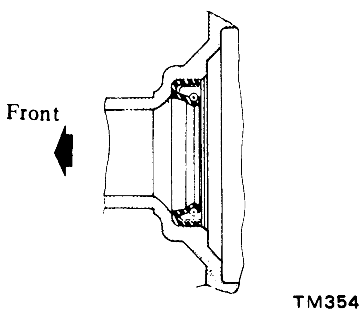


Fig. TM-29 Front cover oil seal

2. Apply sealant to withdrawal lever ball pin screw. Install withdrawal lever ball pin to front cover and tighten screw to 2.0 to 3.5 kg-m (14 to 25 ft-lb) torque.

REAR EXTENSION ASSEMBLY

1. Wipe clean seal seat in rear extension housing; press fit oil seal in place. See Figure TM-30.

Coat oil seal and bushing with gear oil for initial lubrication.

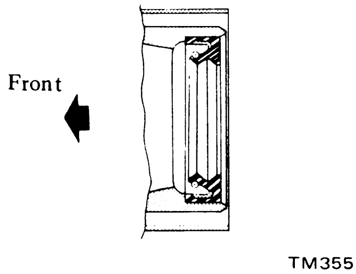


Fig. TM-30 Rear extension oil seal

2. Apply grease to O-ring and plunger grooves in striking rod.

Insert striking rod with striking rod guide through rear extension.

3. Install striking lever on front end of striking rod. Install lock pin and torque screw to 0.9 to 1.2 kg-m (6.5 to 8.7 ft-lb).

ADAPTER PLATE ASSEMBLY

1. Place dowel pin, mainshaft bearing and oil gutter on adapter plate, and tap with a soft hammer until they are properly positioned in place.

Use a new dowel pin.

Bend oil gutter on front side and expand on rear side. See Figure TM-31.

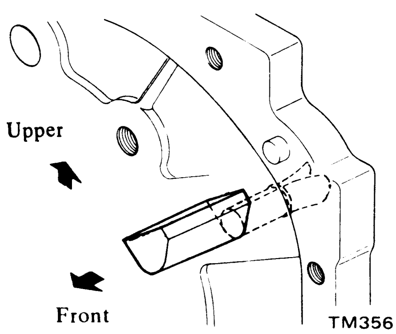


Fig. TM-31 Oil gutter

2. Install mainshaft bearing by lightly tapping around it with a soft hammer.

3. Insert drive reverse idler shaft in adapter plate by 1/3 of its entire length.

Make sure that the cut-out portion of reverse idler shaft is lined up with inner face of adapter plate.

4. Install bearing retainer in adapter plate.

Align bearing retainer with reverse idler shaft at the cut-out portion of this shaft, torque screws to 1.9 to 2.5 kg-m (14 to 18 ft-lb) and stake each screw at two points with a punch. See Figure TM-32.

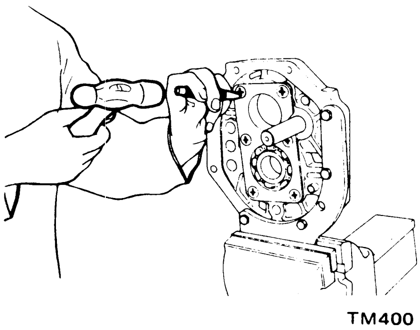


Fig. TM-32 Staking screw

5. Install countershaft rear bearing in adapter plate by lightly tapping around it with a soft hammer.

GEAR ASSEMBLY

Clean all parts in solvent and dry with compressed air.

Synchronizer assembly

Assemble synchronizer assembly.

Position shifting insert springs and shifting inserts in three(3) slots in synchronizer hub; put coupling sleeve on synchronizer hub. See Figure TM-33.

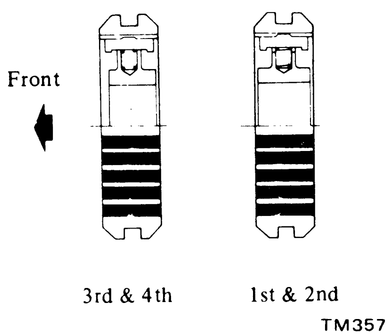
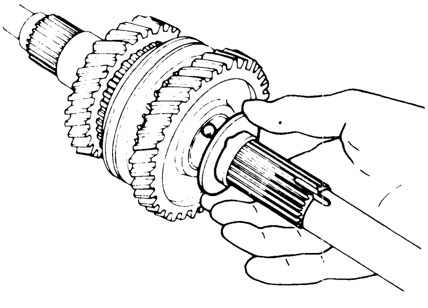


Fig. TM-33 Installing synchronizer hub

Mainshaft assembly

1. Assemble 2nd gear needle bearing, 2nd gear, baulk ring, 1st & 2nd speed synchronizer assembly, 1st gear baulk ring, 1st gear bush, needle bearing, 1st gear, steel ball, and thrust washer on mainshaft. Before installing

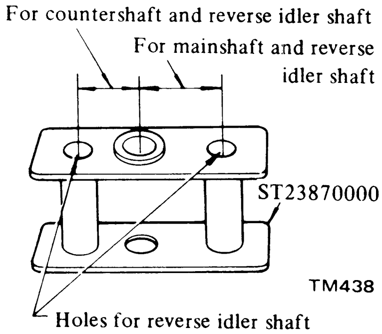
a steel ball, apply grease to it. See Figure TM-34.



TM358

Fig. TM-34 Installing thrust washer

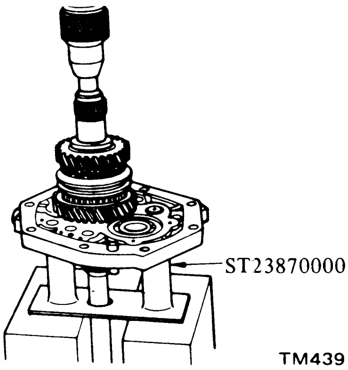
2. Set Transmission Press Stand ST23870000 and place adapter plate assembly on it. See Figure TM-35.



TM438

Fig. TM-35 Transmission Press Stand

3. Install mainshaft assembly to adapter plate assembly. Be sure to place bearing squarely against shaft and press it into place on shaft gradually. See Figure TM-36.



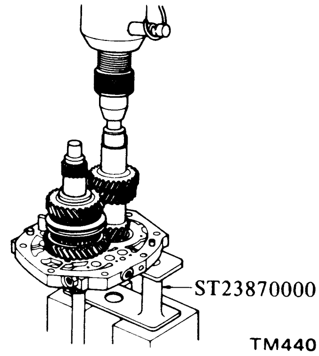
TM439

Fig. TM-36 Installing mainshaft assembly

Countershaft assembly

1. Place new woodruff keys in rooves in countershaft and tap them lightly until they are seated securely.
   Use a soft hammer to avoid damaging keys.

2. Place adapter plate assembly and mainshaft assembly so that countershaft rear bearing rests on Transmission Press Stand ST23870000 properly.
3. Install countershaft into adapter plate by pressing it. See Figure TM-37.



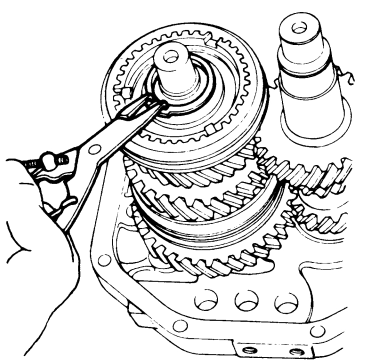
TM440

Fig. TM-37 Installing countershaft

4. Position 3rd gear needle bearing, mainshaft 3rd gear, baulk ring, and 3rd & 4th synchronizer assembly on the front of mainshaft.
5. Install thrust washer on mainshaft and secure it with snap ring of proper thickness that will fit the groove in mainshaft. See Figure TM-38.

Available snap ring

No.	Thickness mm (in)
1	1.4 (0.0551)
2	1.5 (0.0591)
3	1.6 (0.0630)



TM441

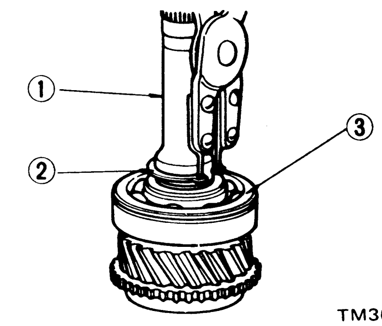
Fig. TM-38 Installing snap ring

Main drive gear assembly

1. Using Transmission Adapter ST23800000, press main drive bearing onto the shaft of main drive gear. Make sure that snap ring groove on shaft clears bearing.
2. Place main drive bearing spacer on main drive bearing and secure main drive bearing with thicker snap ring that will eliminate end play. See Figure TM-39.

Available snap ring

No.	Thickness mm (in)
1	1.80 (0.0709)
2	1.87 (0.0736)
3	1.94 (0.0764)
4	2.01 (0.0791)
5	2.08 (0.0819)
6	1.73 (0.0681)



TM364

Fig. TM-39 Installing snap ring

3. Position baulk ring on cone surface of main drive gear. Apply gear oil to mainshaft pilot bearing and install it on mainshaft.
   Assemble main drive gear assembly on the front end of mainshaft.
4. Press counter drive gear onto countershaft with Counter Gear Drift ST23860000 by meshing gears and secure counter drive gear with thicker snap ring. See Figures TM-40 and TM-41.

Note: Be sure to drive in counter drive gear and main drive gear simultaneously.

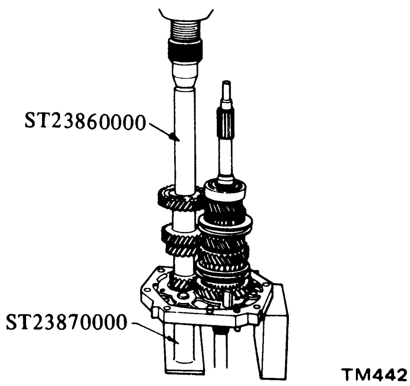


Fig. TM-40 Installing countershaft drive gear

Available counter drive gear snap ring

No.	Thickness mm (in)
1	1.4 (0.0551)
2	1.5 (0.0591)
3	1.6 (0.0630)

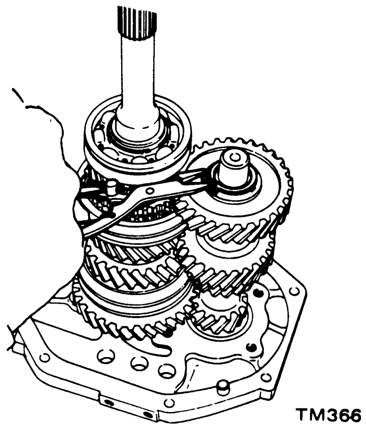


Fig. TM-41 Installing snap ring

5. Press countershaft front bearing onto countershaft with Drift C ST22360001. See Figure TM-42.

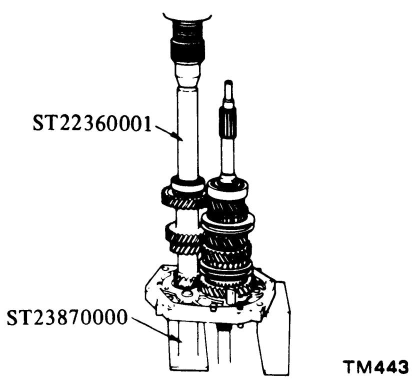


Fig. TM-42 Installing countershaft front bearing

6. Support adapter plate in a vise with Setting Plate Adapter ST23810001, with mainshaft facing down.

7. Install mainshaft reverse gear, plain washer on the rear of mainshaft and install mainshaft nut.

Tighten mainshaft nut temporarily.

8. Install counter reverse gear on the rear of countershaft and secure with snap ring.

Use snap ring to give a minimum gear end play. See Figure TM-43.

No.	Thickness mm (in)
1	1.4 (0.0551)
2	1.5 (0.0591)
3	1.6 (0.0630)

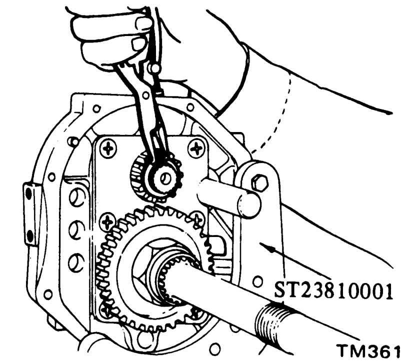


Fig. TM-43 Installing counter reverse gear snap ring

9. Install reverse idler gear on reverse idler shaft.

10. Tighten mainshaft nut to 14.0 to 17.0 kg-m (101 to 123 ft-lb) torque, and stake mainshaft nut to groove of mainshaft with a punch. See Figure TM-44.

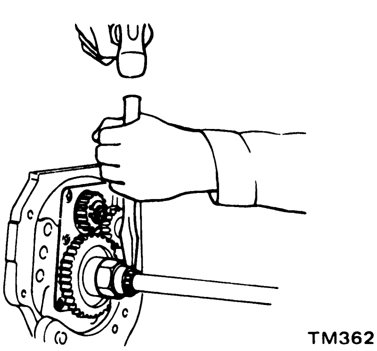


Fig. TM-44 Staking mainshaft nut

11. Measure gear end play and backlash.

Make sure that they are held witl the specified values.

For details, refer to the instructions under topic "Inspection."

Note: **The main drive gear and counter drive gear should be handled as a matched set.**
When you replace a main drive gear or counter drive gear, be sure to replace as a set of main drive gear and counter drive gear.

Shift forks and fork rods assembly

1. Place 1st & 2nd shift fork in groove in 1st & 2nd coupling sleeve, and slide 1st & 2nd fork rod through adapter plate and 1st & 2nd shift fork. Prior to installing 1st & 2nd fork rod, install 3rd & 4th shift fork in groove in 3rd & 4th coupling sleeve.

Note: **Shift forks for 1st & 2nd and 3rd & 4th are one and the san parts.**
Make sure that the long end of shift fork for 1st & 2nd is placed on the counter gear side and the long end for 3rd & 4th is on the opposite side.

Secure 1st & 2nd fork rod to shift fork with a new retaining pin.

2. Install check ball, check ball spring, and check ball plug. Prior to tightening check ball plug, apply sealant to check ball plug.

Align notch in 1st & 2nd fork rod with check ball. See Figure TM-45.

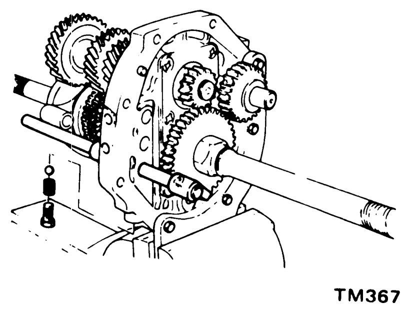


Fig. TM-45 Installing 1st & 2nd fork rod

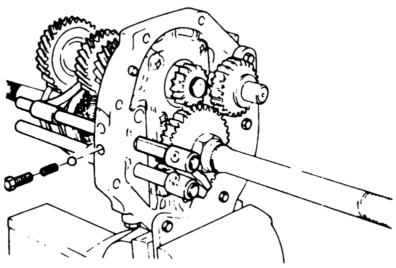
3. Slide 3rd & 4th fork rod through apter plate and 3rd & 4th shift fork, d secure with a new retaining pin.

Note: Prior to assembling 3rd & 4th fork rod, install two(2) interlock balls into adapter plate as shown in Figure TM-14.

4. Install check ball and check ball spring.

Apply sealant to check ball plug and install it in place.

Align notch in 3rd & 4th fork rod with check ball by sliding 3rd & 4th fork rod as necessary. See Figure TM-46.



TM368

Fig. TM-46 Installing 3rd & 4th fork rod

5. Place reverse shift fork in reverse idler gear.

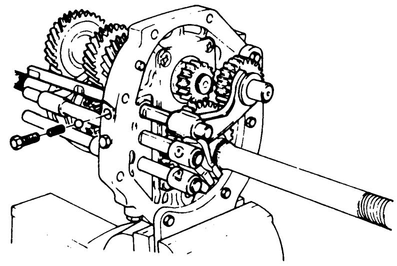
Slide reverse fork rod through reverse shift fork and adapter plate, and secure with a new retaining pin.

Note: Prior to assembling reverse fork rod, install two(2) interlock balls into adapter plate as shown in Figure TM-14.

6. Install check ball and check ball spring.

Apply sealant to check ball plug and install it in place.

Align notch in reverse fork rod with check ball. See Figure TM-47.



TM369

Fig. TM-47 Installing reverse fork rod

7. Torque each check ball plug to 1.9 to 2.5 kg-m (14 to 18 ft-lb).

Note: Ball plug for 1st & 2nd fork rod is longer than those for reverse shift fork rod and 3rd & 4th fork rod.

8. Apply gear oil to all sliding surfaces and check to see that shift rods operate correctly and gears are engaged smoothly.

TRANSMISSION ASSEMBLY

Transmission case assembly

1. Clean mating surfaces of adapter plate and transmission case.

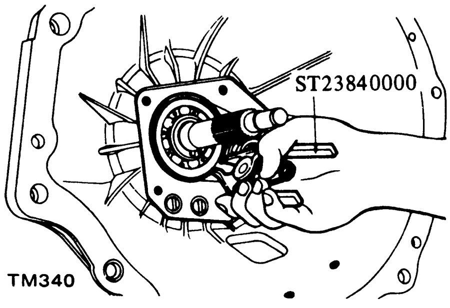
Apply sealant to mating surfaces of adapter plate and transmission case.

2. Slide transmission case onto adapter plate by lightly tapping with a soft hammer until case bears against adapter plate.

Carefully install main drive bearing and countershaft front bearing.

Make certain that mainshaft rotates freely.

3. Fit main drive bearing snap ring to groove in main drive bearing by using Expander ST23840000. See Figure TM-48.



TM340

Fig. TM-48 Fitting main drive bearing snap ring

Rear extension assembly

1. Clean mating surfaces of adapter plate and rear extension.

Apply sealant to mating surfaces of adapter plate and rear extension.

2. With fork rods in their neutral positions, gradually slide rear extension onto adapter plate, making sure that speed change cross lever engages with fork rod brackets correctly.

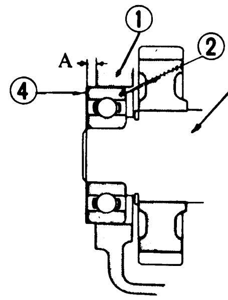
3. Install washers and through-bolts and torque to 1.6 to 2.1 kg-m (12 to 15 ft-lb).

Front cover assembly

1. Select countershaft front bearing shim as follows: See Figure TM-49.

(1) Measure depth "A" from front end of transmission case to countershaft front bearing.

(2) Select a shim of thickness "A" measured.



1 Transmission case
2 Countershaft front bearing
3 Countershaft
4 Shim

TM371

Fig. TM-49 Selecting countershaft front bearing shim

Available shim

No.	"A" mm (in)		Countershaft front bearing shim mm (in)
1	2.92 to 3.01	(0.1150 to 0.1185)	0.6 (0.0236)
2	3.02 to 3.11	(0.1189 to 0.1224)	0.5 (0.0197)
3	3.12 to 3.21	(0.1228 to 0.1264)	0.4 (0.0157)
4	3.22 to 3.31	(0.1268 to 0.1303)	0.3 (0.0118)
5	3.32 to 3.41	(0.1307 to 0.1343)	0.2 (0.0079)
6	3.42 to 3.51	(0.1346 to 0.1382)	0.1 (0.0039)
7	3.52 to 3.61	(0.1386 to 0.1421)	–
8	3.62 to 3.71	(0.1425 to 0.1461)	–

2. Clean mating surfaces of front cover and transmission case.

Apply grease to shim selected to retain it on front cover; install front cover to transmission case with gasket in place.

Install through-bolts with washers under them and tighten to 1.6 to 2.1 kg-m (12 to 15 ft-lb) torque.

Apply sealant to threads of through-bolts before installation.

3. Install speedometer pinion assembly on rear extension. After making sure that lock plate is lined up with groove in speedometer pinion sleeve, install through-bolts and torque to 0.4 to 0.5 kg-m (2.9 to 3.6 ft-lb).

4. Install back-up lamp switch and torque to 2.0 to 3.0 kg-m (14 to 22 ft-lb).

Be sure to apply sealant before installation.

5. Apply a light coat of multi-purpose grease to withdrawal lever, release bearing and bearing sleeve; install them on clutch housing.

After connecting them with holder spring, install dust cover on clutch housing.

6. Install control lever temporarily, and shift control lever through all gears to make sure that gears operate smoothly.

Note: Install drain plug and filler plug with sealant in place.

SERVICE DATA AND SPECIFICATIONS

GENERAL SPECIFICATIONS

Transmission model	F4W71B
No. of speeds	4
Synchromesh type	Warner
Shift type	Floor
Gear ratio	
1st	3.592
2nd	2.246
3rd	1.415
4th	1.000
Reverse	3.657
Speedometer gear ratio	20/6

TIGHTENING TORQUE

Installation		
Engine to transmission installation bolt	kg-m (ft-lb)	4.0 to 5.0 (30 to 36)
Transmission to engine rear plate	kg-m (ft-lb)	0.55 to 0.75 (4.0 to 5.4)
Clutch operating cylinder installation bolt	kg-m (ft-lb)	2.5 to 3.5 (18 to 25)
Exhaust front tube to exhaust manifold	kg-m (ft-lb)	1.6 to 2.1 (12 to 15)
Rear mounting insulator to transmission	kg-m (ft-lb)	0.8 to 1.1 (5.8 to 8.0)
Propeller shaft to companion flange	kg-m (ft-lb)	2.4 to 3.4 (17 to 24)
Crossmember mounting bolt	kg-m (ft-lb)	3.2 to 4.3 (23 to 31)
Startor motor installation bolt	kg-m (ft-lb)	2.7 to 3.6 (20 to 26)
Gear assembly		
Machine screw for bearing retainer	kg-m (ft-lb)	1.9 to 2.5 (14 to 18)
Mainshaft nut	kg-m (ft-lb)	14.0 to 17.0 (101 to 123)
Check ball plug	kg-m (ft-lb)	1.9 to 2.5 (14 to 18)
Rear extension installation bolt	kg-m (ft-lb)	1.6 to 2.1 (12 to 15)
Front cover installation bolt	kg-m (ft-lb)	1.6 to 2.1 (12 to 15)
Speedometer pinion sleeve locking plate nut	kg-m (ft-lb)	0.4 to 0.5 (2.9 to 3.6)
Reverse lamp switch	kg-m (ft-lb)	2.0 to 3.0 (14 to 22)
Gear oil filler plug	kg-m (ft-lb)	2.5 to 3.5 (18 to 25)
Gear oil drain plug	kg-m (ft-lb)	2.5 to 3.5 (18 to 25)
Withdrawal lever ball pin	kg-m (ft-lb)	2.0 to 3.5 (14 to 25)
Return spring plug	kg-m (ft-lb)	0.8 to 1.0 (5.8 to 7.2)
Rear extension upper cover installation bolt	kg-m (ft-lb)	0.4 to 0.5 (2.9 to 3.6)
Striking lever installation bolt	kg-m (ft-lb)	0.9 to 1.2 (6.5 to 8.7)

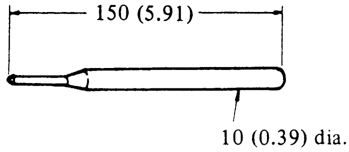
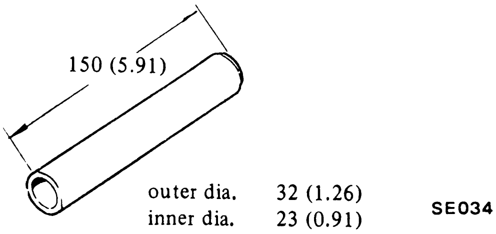
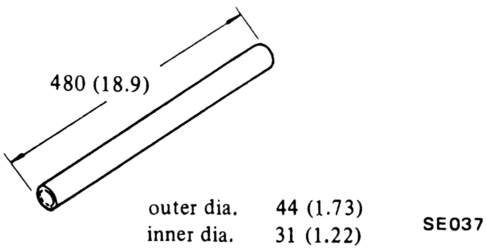
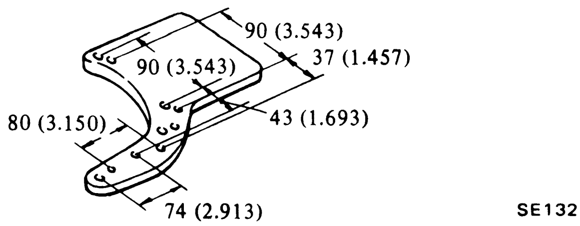
SPEAFICATIONS

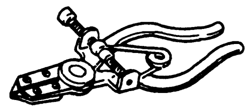
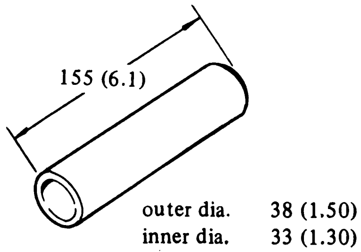
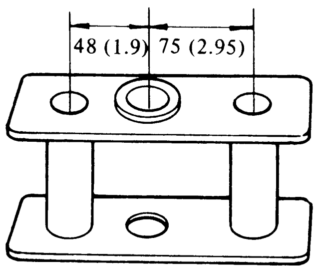
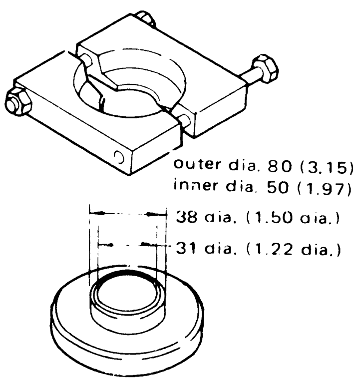
Oil capacity	ℓ (U.S. pt., Imp. pt.)	1.6 (3⅜, 2⅞)
Gear backlash		
All gears	mm (in)	0.05 to 0.10 (0.0020 to 0.0039)
Gear end play		
1st gear	mm (in)	0.32 to 0.39 (0.0126 to 0.0154)
2nd gear	mm (in)	0.12 to 0.19 (0.0047 to 0.0075)
3rd gear	mm (in)	0.12 to 0.19 (0.0047 to 0.0075)
Clearance between baulk ring and gear	mm (in)	1.25 to 1.6 (0.0492 to 0.0630)

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Difficult to intermesh gears Causes for difficult gear shifting are classified to troubles concerning control system and transmission. When gear shift lever is heavy and it is difficult to shift gears, clutch disengagement may also be unsmooth. First, make sure that clutch operates correctly, and inspect transmission.	Worn gears, shaft, and/or bearing. Insufficient operating stroke due to worn or loose sliding part. Faulty or damaged synchronizer.	Replace. Repair or replace. Replace.
Gear slips out of mesh. In most cases, this trouble occurs, when interlock ball, check ball, and/or spring is worn or weakened, or when control system is faulty. In this case, the trouble cannot be corrected by replacing gears, and therefore, trouble shooting must be carried out carefully. It should also be noted that gear slips out of mesh due to vibration generated by weakened front and rear engine mounts.	Worn interlock plunger. Worn check ball and/or weakened or broken spring. Worn fork rod ball groove. Worn or damaged bearing. Worn or damaged gear.	Replace. Replace. Replace. Replace. Replace.
Noise When noise occurs with engine idling and ceases when clutch is disengaged, or when noise occurs while shifting gears, it is an indication that the noise is from transmission. (Transmission may rattle during engine idling. Check air-fuel mixture and ignition timing. After above procedure, readjust engine idling.)	Insufficient or improper lubricant. Oil leaking due to faulty oil seal or sealant, clogged breather, etc. Worn bearing (High humming occurs at a high speed.). Damaged bearing (Cyclic knocking sound occurs also at a low speed.). Worn spline. Worn bushing.	Add oil or replace with designated oil. Clean or replace. Replace. Replace. Replace. Replace.

SPECIAL SERVICE TOOLS

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or Figure No.
1.	ST23540000 Fork rod pin punch	For removal of fork rod retaining pin. 	63L & 71BT/M	Fig. TM-14
2.	ST22360001 Drift C	For assembly of counter drive bearing. 	71BT/M	Fig. TM-42
3.	ST23800000 Transmission adapter	For assembly of main bearing. 	620 521 S30	Page TM-9
4.	ST23810001 Setting plate adapter	For setting adapter plate in a vise. 	71BT/M	Fig. TM-13 Fig. TM-14 Fig. TM-43

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or Figure No.
5.	ST23840000 Expander	For removal and assembly of main drive bearing snap ring.  SE099	620 S30	Fig. TM-11 Fig. TM-48
6.	ST23860000 Counter gear drift	For assembly of counter drive gear.  SE039	71BT/M	Fig. TM-40
7.	ST23870000 Transmission press stand	For assembly of mainshaft, countershaft, counter drive gear and counter drive bearing.  TM438	71BT/M	Fig. TM-35 Fig. TM-36 Fig. TM-37 Fig. TM-40 Fig. TM-42
8.	ST3003S000 Drive pinion rear bearing inner race replacer (Bearing puller) ST30031000 Puller ST30032000 Base	For replacing bearing.  SE041	65L, 63L & 71BT/M	Fig. TM-21 Fig. TM-22

SERVICE MANUAL

DATSUN PICK-UP
MODEL 620 SERIES

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION AT

AUTOMATIC TRANSMISSION

AT

AUTOMATIC TRANSMISSION

DESCRIPTION

The model 3N71B automatic transmission is a fully automatic unit consisting primarily of 3-element hydraulic torque converter and two planetary gear sets. Two multiple-disc clutches, a multiple-disc brake, a band brake and a one way sprang clutch provide the friction elements required to obtain the desired function of the two planetary gear sets.

The two planetary gear sets give three forward ratios and one reverse. Changing of the gear ratios is fully automatic in relation to vehicle speed and engine torque input. Vehicle speed and engine manifold vacuum signals are constantly fed to the transmission to provide the proper gear ratio for maximum efficiency and performance at all throttle openings.

The Model 3N71B has six selector positions: P, R, N, D, 2, 1.

"P" – Park position positively locks the out put shaft to the transmission case by means of a locking pawl to prevent the vehicle from rolling either direction.
This position should be selected whenever the driver leaves the vehicle.
The engine may be started in Park position.

"R" – Reverse range enables the vehicle to be operated in a reverse direction.

"N" – Neutral position enables the engine to be started and run without driving the vehicle.

"D" – Drive range is used for all normal driving conditions.
Drive range has three gear ratios, from the starting ratio to direct drive.

"2" – "2" range provides performance for driving on slippery surfaces. "2" range can also be used for engine braking.
"2" range can be selected at any vehicle speed, and prevents the transmission from shifting out of second gear.

"1" – "1" range can be selected at any vehicle speed and the transmission will shift to second gear and remain in second until vehicle speed is reduced to approximately 40 to 50 km/h (25 to 31 MPH).

"1" range position prevents the transmission from shifting out of low gear. This is particularly beneficial for maintaining maximum engine braking, when continuous low gear operation is desirable.

The torque converter assembly is of welded construction and can not be disassemble for service.

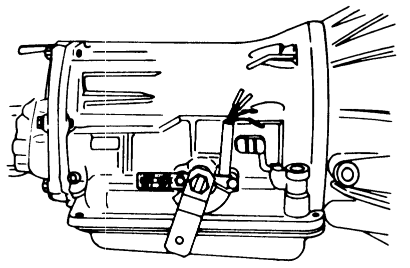
Fluid recommendation

Use automatic transmission fluid having "DEXRON" identifications only in the 3N71B automatic transmission.

Identification number

Stamped position:

The plate attached to the right hand side of transmission case as shown in Figure AT-1.



AT057

Fig. AT-1 Identification number

Identification of number arrangements:

See below.

Model code

JAPAN AUTOMATIC
TRANSMISSION CO., LTD.

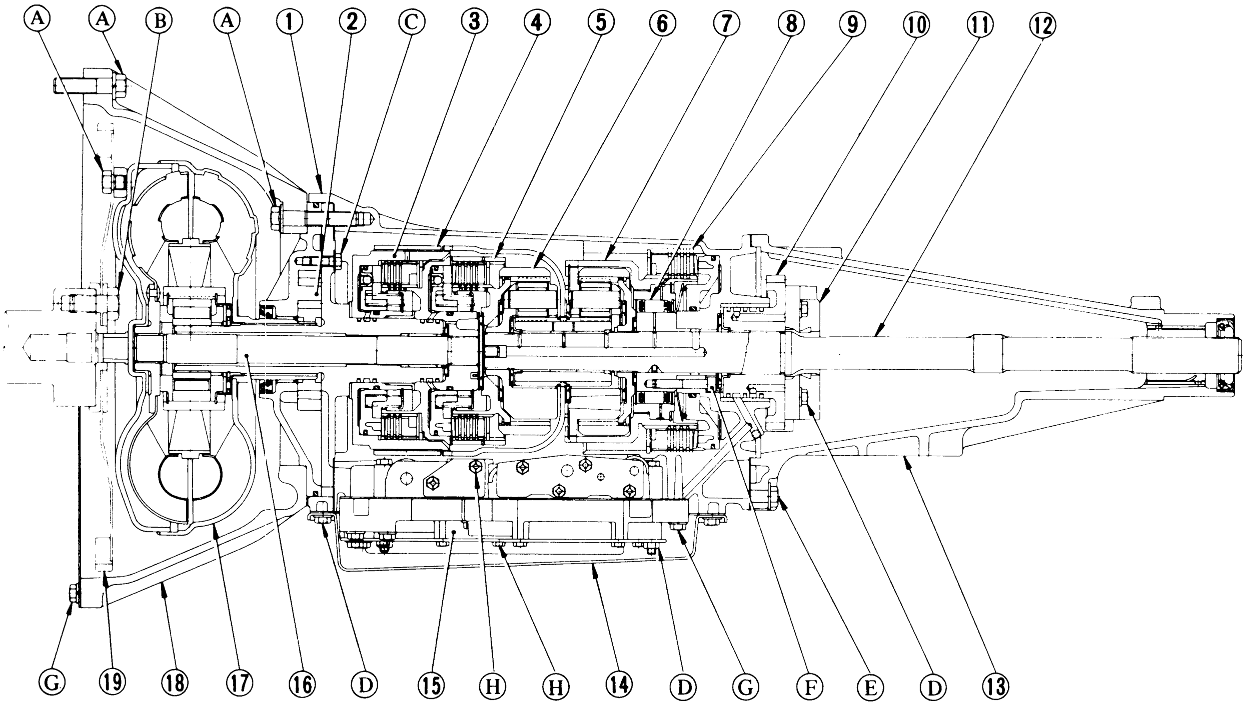
MODEL	X2401
NO.	2712345

Unit number

Number designation

2 7 1 2 3 4 5

- 2 — Last figure denoting the year (A.D.)
- 7 — Month of production (X: Oct., Y: Nov., Z: Dec.)
- 12345 — Serial production number for the month



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 kg-m (ft-lb)

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

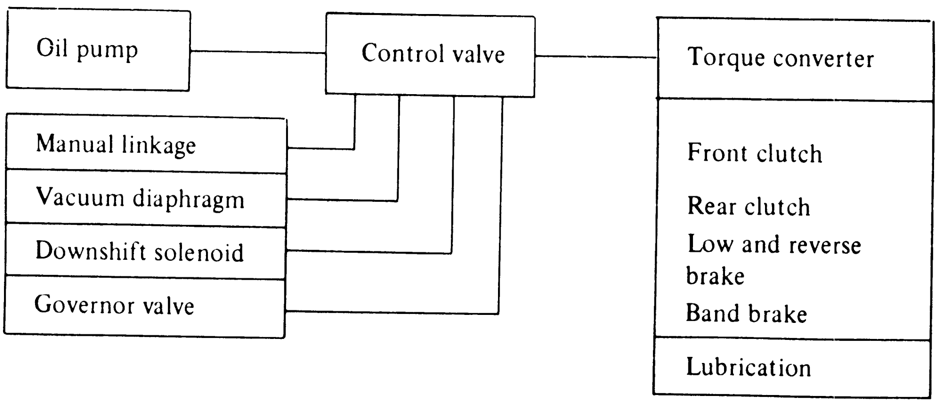
Fig. AT-2 Cross-sectional view of 3N71B automatic transmission

HYDRAULIC CONTROL SYSTEM

CONTENTS

FUNCTIONS OF HYDRAULIC CONTROL UNIT AND VALVES

The hydraulic control system contains a oil pump for packing up oil from the oil pan through the oil strainer. A shift control is provided by two centrifugally operated hydraulic governors on the output shaft, vacuum control diaphragm and downshift solenoid. These parts work in conjunction with valves in the valve body assembly located in the base of the transmission. The valves regulate oil pressure and direct it to appropria transmission components.



Oil pump

The oil pump is the source of control medium (in other words, oil) for the control system.

The oil pump is of an internal, involute gear type. The drive sleeve is a part of the torque converter pump impeller and serves to drive the pump inner gear with the drive sleeve directly coupled with the engine operation.

The oil flows through the following route:

Oil pan – Oil strainer (bottom of the control valve) – Control valve lower body suction port – Transmission case suction port – Pump housing suction port – Pump gear space – Pump housing delivery port – Transmission case delivery port – Lower body delivery port – Control valve line pressure circuit.

Manual linkage

The hand lever motion (The hand lever is located in the driver's compartment.) mechanically transmitted from the remote control linkage is further transmitted to the inner manual lever in the transmission case from the range selector lever in the right center portion of the transmission case through the manual shaft. The inner manual lever is thereby turned.

A pin installed on the bottom of the inner manual lever slides the manual valve spool of the control valve, and thus, the spool is appropriately positioned opposing to each select position.

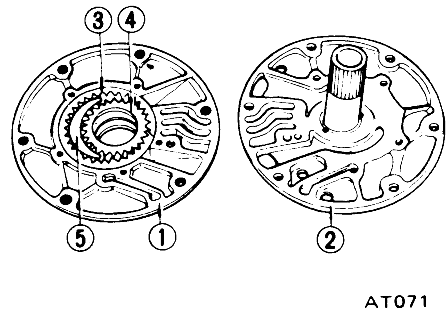
The parking rod pin is held in the groove on the top of the inner manual plate. The parking rod pin operates the rod at "P" range, and operates the mechanical lock system.

Moreover, the above described manual shaft is equipped with an inhibitor switch. A rotor inside the inhibitor switch rotates in response to ach range. When the range is selected at "P" or "N," the rotor closes the starter magnet circuit so that the engine can be started. When the range is selected at "R," the rotor closes the back-up lamp circuit, and the back-up lamp lights.

Vacuum diaphragm

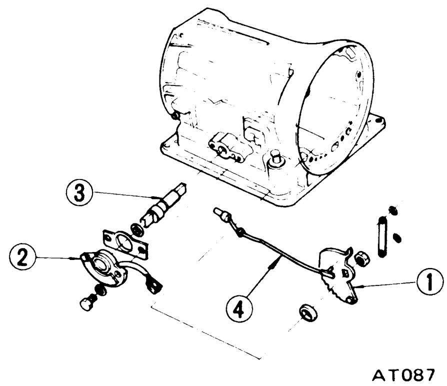
The vacuum diaphragm is installed on the left center portion of the transmission case. The internal construction of the vacuum diaphragm is as follows. A rubber diaphragm forms a partition in the center. The engine intake manifold negative pressure led through vacuum tube and spring force are applied to the front surface of the rubber diaphragm, and atmospheric pressure is applied to the back surface. A difference between pressure applied to the front and back surfaces becomes a vacuum reaction, and thus, the throttle valve of the control valve inside the transmission case is operated.

When accelerator pedal is fully depressed and the carburetor is fully opened but the engine speed is not



1 Housing
2 Cover
3 Outer gear
4 Inner gear
5 Crescent

Fig. AT-3 Oil pump



1 Manual plate
2 Inhibitor switch
3 Parking rod
4 Manual shaft

Fig. AT-4 Manual linkage

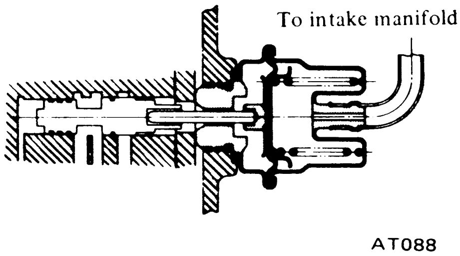


Fig. AT-5 Vacuum diaphragm

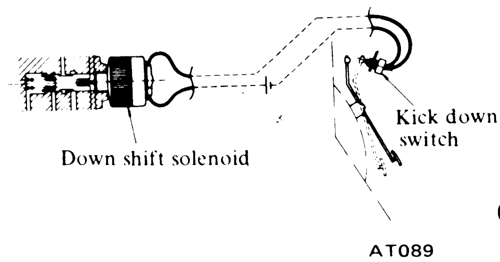


Fig. AT-6 Downshift solenoid

sufficiently increased, the manifold negative pressure lowers (becomes similar to the atmospheric pressure) and the vacuum reaction increases since the flow velocity of mixture inside the intake manifold is slow. Contrarily, when the engine speed increases and the flow velocity of the mixture increases or when the carburetor is closed, the manifold negative pressure increases (becomes similar to vacuum) and the vacuum reaction reduces.

Thus, a signal to generate hydraulic pressure completely suited to the engine loading at the control valve is transmitted from the vacuum diaphragm, and most suitable speed change timing and line pressure are obtained so that the most proper torque capacity is obtained against the transmitting torque.

Downshift solenoid

The downshift solenoid is of a magnetic type installed on the left rear portion of the transmission case. When a driver requires accelerating power and depresses the accelerator pedal down to the stopper, a kickdown switch located in the middle of the accelerator link is depressed by a push rod, the kickdown switch closes, current flows to the solenoid, the solenoid push rod is depressed, the downshift valve of the control valve inside the transmission case is depressed, and the speed is changed forcedly from "3rd" to "2nd" within a certain vehicle speed limit.

Note: **As the kickdown switch closes when the accelerator pedal is depressed from 7/8 to 15/16 of the whole stroke, the accelerator pedal should be correctly adjusted and fixed so as to afford complete stroke.**
The arrangement of the switch differs according the models of vehicle.

Governor valve

The primary and secondary governor valves are installed separately on the back of the oil distributor on the transmission output shaft. They operate in the same speed as that of the output shaft. (In other words, they operate at a speed in proportion to the vehicle speed.) To those valves, the line pressure is applied as the input from the control valve through the transmission case, rear flange and oil distributor. The governor pressure [in proportion to the output shaft speed (vehicle speed)] is led to the shift valve of the control valve through inverse route as the output, and thus, the speed change and the line pressure are controlled.

Operation of secondary governor valve

The secondary valve is a control valve which receives line pressure (1) and controls the governor pressure.

When the manual valve is selected at "D," "2," or "1" range, line pressure is applied to the ring shape area of this valve from circuit (1), and this valve is depressed toward the center side. Movement of this valve to a certain position closes the circuit from (1) to (15) simultaneously while making a space from the (15) to the center drain port, and pressure in the circuit (15) is lowered.

When the vehicle is stopped and the centrifugal force of this valve is zero, the valve is balanced. In this, a governor pressure which is balanced with the spring force occurs on the (15).

When the vehicle is started and the centrifugal force increases, this valve slightly moves to the outside, and when the space from (1) to (15) increases, space from the (15) to the drain port reduces simultaneously. As the result, governor pressure of the (15) increases, and the governor pressure is balanced with the sum of centrifugal force and the spring force. The governor pressure thus changes in response to the vehicle speed change (centrifugal force).

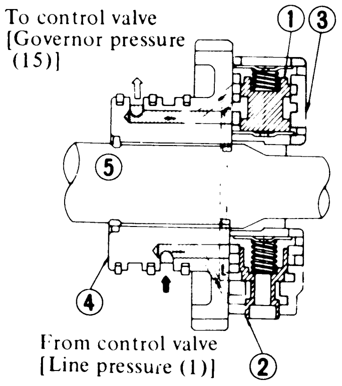
Operation of primary governor valve

The valve is an ON-OFF valve which closes the governor pressure (15) regulated by the secondary governor valve when the vehicle speed reaches the minimum speed, and when the vehicle speed exceeds a certain level open the governor and forwards the governor pressure (15) to the control valve.

When the vehicle is stopped, the governor pressure is zero. However, when the vehicle is running slowly, this valve is depressed to the center side and the groove to the (15) is closed since the governor pressure applied to the ring shape area is higher than the centrifugal force of this valve. When the governor speed exceeds certain revolution, the governor pressure in the circuit (15) also increases. However, as the centrifugal force increases and exceeds the governor pressure, this valve moves toward the outside, and the governor pressure is transmitted to the circuit (15).

Two different valves are employed in the governor so that it will independently control the speed at high speed and at low speed. That is, within the low speed range, the governor pressure is not generated owing to the primary valve; whereas at the high speed range above the break point, a governor pressure regulated by the secondary valve is introduced.

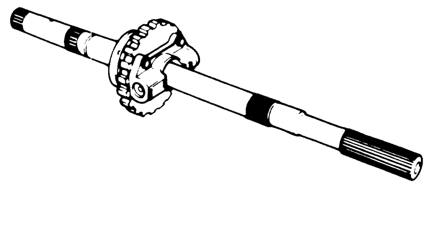
* The break point is the point at which the function of one of the governors is transferred to the other when the speed changes from the low-speed range to the high-speed range.



AT090

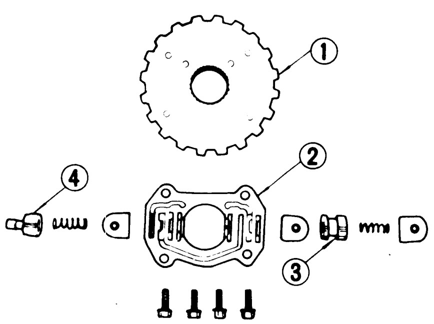
1 Primary governor
2 Secondary governor
3 Governor valve body
4 Oil distributor
5 Output shaft

Fig. AT-7 Cross-sectional view of governor



AT091

Fig. AT-8 Output shaft with oil distributor and governor

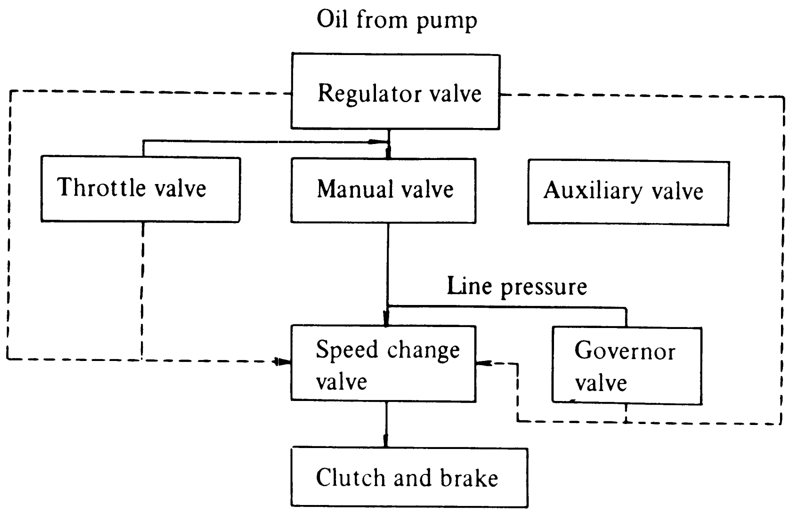


AT092

1 Oil distributor
2 Governor valve body
3 Primary governor valve
4 Secondary governor valve

Fig. AT-9 Exploded view of governor

Control valve assembly



Flow chart of control valve system

The control valve assembly receives ' from the pump and the individual signals from the vacuum diaphragm, and transmits the individual line pressures to the transmission friction element, torque converter circuit, and lubricating system circuit as the outputs. To be more specifically, the oil from the oil pump is regulated by the regulator valve and line pressures build up. The line pressures are fed out from the control valve assembly as they are through various direction changeover valves (including ON-OFF valve) and regulator valves, newly reformed to a throttle system oil pressure and operates other valves, or finally, the line pressure are transmitted to the required clutch or brake servo piston unit in response to the individual running conditions after receiving signals from the previously described vacuum diaphragm, downshift solenoid, governor valve, and/or manual linkage.

The control valve assembly consists the following valves:

1. Pressure regulator valve
2. Manual valve
3. 1st-2nd shift valve
4. 2nd-3rd shift valve
5. Pressure modifier valve
6. Vacuum throttle valve
7. Throttle back-up valve
8. Solenoid downshift valve
9. Second lock valve
10. 2nd-3rd timing valve

Pressure regulator valve (PRV)

The pressure regulator valve receives valve spring force, force from plug created by the throttle pressure (16) and line pressure (7), and force of the throttle pressure (18). With the mutual operations of those forces, the PRV regulates the line pressure (7) to the most suitable pressures at the individual driving conditions.

The oil from the oil pump is applied to the ring-shaped area through orifice (20). As the result, the PRV is depressed downward, and moves from port (7) up to such extent that the space to the subsequent drain port (marked with "x" in Figure AT-10) opens slightly. Thus, the line pressure (7) is balanced with the spring force, and the PRV is thereby balanced. In this, the space from the port (7) to the subsequent converter oil pressure (14) circuit has also been opened. As the result, the converter is filled with the pressurized oil in the circuit (14), and the oil is further used for the lubrication of the rear unit. Moreover, a part of the oil is branched and used for the lubrication of front unit for the front and rear clutches.

When the accelerator pedal is depressed, the throttle pressure (16) increases as described in the preceding paragraph, oil pressure is applied to the plug through orifice (21), and the pressure is added to the spring force. As the result, the PRV is contrarily depressed upward, space to the drain port is reduced, and the line pressure (7) increases.

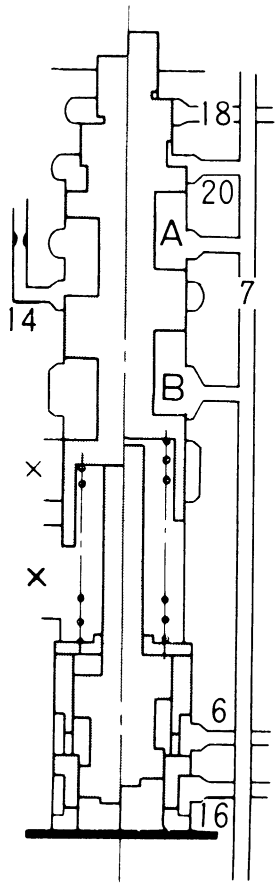


Fig. AT-10 Pressure regulator valve

When the range is selected at "R" (Reverse), the line pressure (6) is applied to the plug in the manner identical to the throttle pressure (16) and is added to the spring force. Consequently, the line pressure (7) further increases.

When the vehicle speed increases and the governor pressure rises, the throttle pressure (18) is applied to the port on the top of the PRV, and pressure is applied contrarily against the spring force. As the result, the line pressure (7) lowers. Moreover, at the individual conditions, the line pressure (7) is equal to the line pressure (6) and the throttle pressure (16) is equal to (18).

Manual valve (MNV)

The manual lever turning motion is converted to reciprocating motion of the manual valve through a pin, and the MNV is properly positioned so that the line pressure (7) is distributed to the individual line pressure circuits at each "P," "R," "N," "D," "2" or "1" range as shown below.

"P" range:
(7) – (4) – SDV and TBV
 (5) – FSV (12) – TBV and Low & reverse brake

"R" range:
(7) – (4) – Same as above
 (5) – Same as above
 (6) – PRV and SSV – (F.C.) and band release

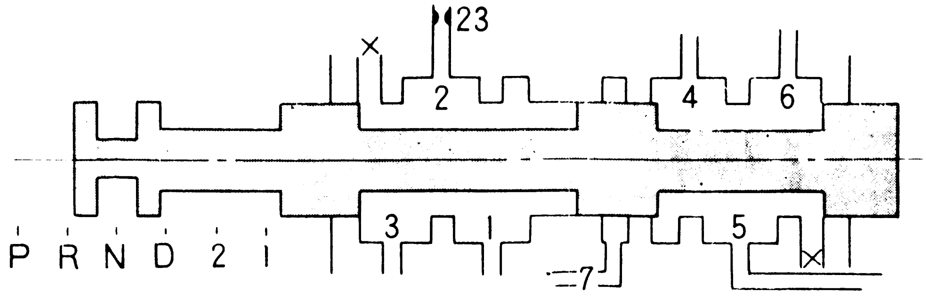
"N" range: (7) – None

"D" range:
(7) – (1) – Governor valve, FSV, and rear clutch
 (2) – SLV
 (3) – SLV and SSV

"2" range:
(7) – (1) – Same as above
 (2) – SLV – (9) Band applied
 (4) – SDV and TBV

"1" range:
(7) – (1) – Same as above
 (4) – Same as above
 (5) – FSV

Moreover, (1), (2), (3), (4), (5), and (6) are always drained at a position where the line pressure is not distributed from (7).



AT096

Fig. AT-11 Manual valve

1st-2nd shift valve (FSV)

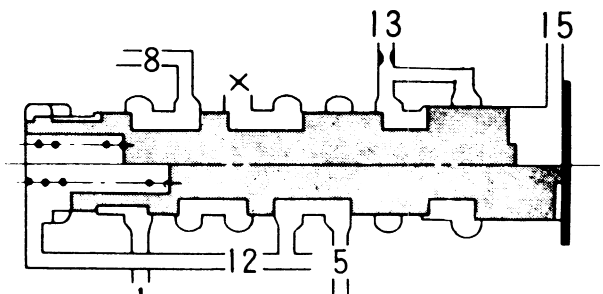
The FSV is a transfer valve which shifts speed from low to second. When the vehicle is stopped, the FSV is depressed to the right side by the force of a spring located in the left side, and thus, the FSV is in the "Low" position.

When the vehicle speed increases, the governor pressure (15) is applied to the right side of the FSV, and the FSV is depressed toward the left. Contrarily, the line pressure (1) and throttle pressure (19) depress the FSV toward the right together with the spring force, and thus, oppose to the governor pressure (15).

When the vehicle speed exceeds a certain level, the governor pressure (15) exceeds the sum of the throttle pressure and the spring force, and the FSV is depressed toward the left.

When the FSV is depressed and reaches a certain position, the line pressure (1) and the throttle pressure (19) are closed, only the spring depresses the FSV toward the right, and the FSV is depressed to the end for a moment. As the result, the line pressure (1) is forwarded to (8), the band servo is engaged through the SLV, and thus, the speed is shifted to "2nd" With the accelerator pedal depressed the FSV is remained in the "Low" position unless the governor pressure (15) increases to a high level corresponding to the line pressure (1) and the throttle pressure (19) since the line pressure (1) and the throttle pressure (19) increase when the accelerator pedal is depressed.

Contrarily, when the vehicle speed lowers, the governor pressure (15) reduces. However, the speed is not shifted to "Low" unless the governor pressure (15) becomes zero since the force to depress the FSV toward the right is remained only on the spring.



AT097

Fig. AT-12 "1st-2nd" shift valve

"Low" in the range "1" is led to : low and reverse clutch from the line pressure (5) through the line pressure (12), and at the same time, the same is led to the left end spring unit. Consequently, although the governor pressure increases, the valve is still depressed toward the right, and the SFV is fixed in the "Low" position. When kicked down at the "2nd" speed, the SDV operates, and the line pressure (13) depresses the FSV toward the right. Although the governor pressure (15) is considerably high, the valve is depressed completely toward the right, and the FSV is returned to the "Low" position. (This operation is called "Kickdown shift.")

2nd-3rd shift valve (SSV)

The SSV is a transfer valve which shifts speed from "2nd" to "3rd." When the vehicle is stopped, the SSV is depressed toward the right by the ring, and is in the "2nd" position. It is provided, however, that the FSV decides the shifting either to "Low" or "2nd."

When the vehicle is running, the governor pressure (15) is applied to the right end surface, and the SSV is depressed toward the left. Contrarily, the spring force, line pressure (3), and throttle pressure (19) depress the SSV toward the right.

When the vehicle speed exceeds a certain level, the governor pressure exceeds the sum of the spring force, line pressure, and throttle pressure, the valve is depressed toward the left, and the line pressure (3) is closed. Consequently, the forces are rapidly unbalanced, the force to depress the SSV toward the right reduces, and thus, the SSV is depressed to the left end for a moment. With the SSV depressed toward the left end, the line pressure (3) is connected with the line pressure (10), the band servo is released, the ·ont clutch is engaged, and speed is ~~s~~hifted to "3rd."

When the accelerator pedal is depressed, both the line pressure (3) and the throttle pressure (19) are high, and therefore, the SSV is retained in "2nd" unless the governor pressure (15) exceeds the line pressure (3) and the throttle pressure (19).

In the "3rd" position, force to depress the SSV toward the right is remained only on the throttle pressure (16), and the throttle pressure (16) is slightly lower than that toward the right which is applied while shifting from "2nd" to "3rd."

Consequently, the SSV is returned to the "2nd" position at a slightly low speed side. (Shifting from "3rd" to "2nd" occurs at a speed slightly lower than that for "2nd" to "3rd" shifting.)

When kicked down at the "3rd," line pressure (13) is led from the SDV, and the SSV is depressed toward the right. Although the governor pressure is considerably high, the valve is depressed completely toward the right, and thus, the SSV is returned to "2nd" position. (This operation is called "Kickdown shift.")

When the shift lever is shifted to "2" or "1" range at the "3rd" speed, the line pressure (3) is drained at the MNV. Consequently, the front clutch operating and band servo releasing oils are drained. As the result, the transmission is shifted to the "2nd" or "low" speed although the SSV is in the "3rd" position.

When the speed is shifted to the "3rd," a one-way orifice (24) on the top of the SSV relieves oil transmitting velocity from the line pressure (3) to the line pressure (10), and reduces a shock generated from the shifting. Contrarily, when shifted from "3rd" to "2" or "1" range and the speed is shifted to the "2nd," spring of the orifice (24) is depressed, the throttle becomes ineffective, the line pressure (10) is drained quickly, and thus, delay in the speed shifting is eliminated.

Throttle of the line pressure (6) relieves the oil transmitting velocity from the line pressure (6) to the line pressure (10) when the lever is shifted to the "R" range, and relieves drain velocity from the line pressure (10) to the line pressure (6) when shifting from "3rd" to "2nd" at the "D" range. Thus, the throttle of the line pressure (6) reduces a shock generated from the shifting.

A plug in the SSV left end readjusts the throttle pressure (16) which varies depending on the engine throttle condition, to a throttle pressure (19) suited to the speed change control. Moreover, the plug is a valve which applies line pressure (13), in lieu of the throttle pressure, to the SSV and the FSV when kickdown is performed.

When the throttle pressure (16) is applied to the left side of this plug, and the plug is depressed toward the right, a slight space is made from the throttle pressure (16) to (19). A throttle pressure (19) which is lower by the pressure loss equivalent to this space is generated, the pressure loss is added to the spring force, and thus, the plug is depressed back from the right to the left. When this pressure (19) increases excessively, the plug is further depressed toward the left, space from the throttle pressure (19) to the drain circuit (13) increases, and the throttle pressure (19) lowers. Thus, the plug is balanced, and the throttle pressure (19) is reduced in a certain value

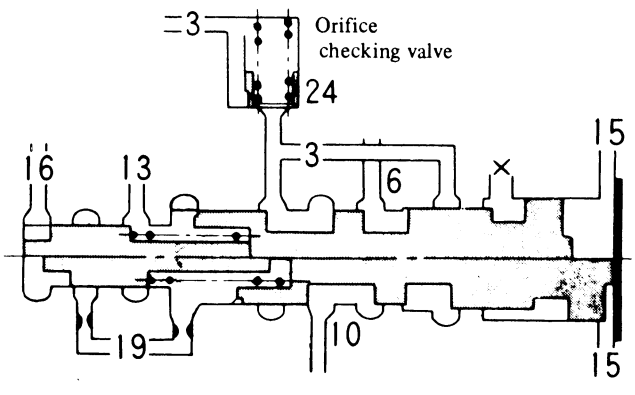


Fig. AT-13 "2nd-3rd" shift valve

against the throttle pressure (16).

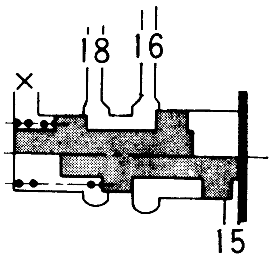
When performing the kickdown, the SDV moves, a high line pressure is led to the circuit (19) from the line pressure circuit (13) (which had been drained), the plug is depressed toward the left, and the circuit (19) becomes equal to the line pressure (13). Thus, the kickdown is performed.

Pressure modifier valve (PMV)

In comparison with the operating pressure required in starting the vehicle, power transmitting capacity of the clutch (in other words, required operating pressure) may be lower when the vehicle is once started. When the line pressure is retained in a high level up to a high vehicle speed, a shock generated from the shifting increases, and the oil pump loss also increases. In order to prevent the above described faulty occurrences, with the operation of the governor pressure (15), the throttle pressure must be changed over to reduce the line pressure. The PMV is used for this purpose.

When the governor pressure (15) which is applied to the right side of the PMV is low, the valve is depressed toward the right by the throttle pressure (16) (applied to the area difference of the value) and the spring force, and the circuit from the circuit (16) to the circuit (18) is closed. However, when the vehicle speed increases and the governor pressure (15) exceeds a certain level, the governor pressure toward the left which is applied to the right side exceeds the spring force and the throttle pressure (16) toward the right, the valve is depressed toward the left, and the throttle pressure is led from the circuit (16) to the circuit (18). This throttle pressure (18) is applied to the top of the PRV, and pressure of the line pressure source (7) is reduced. Contrarily, when the vehicle speed lowers and the governor pressure (15) lowers, the force toward the right exceeds the governor pressure, the valve is depressed back toward the right, the throttle pressure (18) is drained to the spring unit.

This valve is switched when the throttle pressure and the governor pressure are high or when the throttle pressure is low and the governor pressure is low.



AT099

Fig. AT-14 Pressure modifier valve

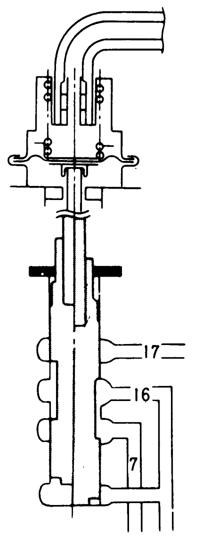
Vacuum throttle valve (VTV)

The vacuum throttle valve is a regulator valve which uses the line pressure (7) for the pressure source and regulates the throttle pressure (16) which is proportioned to the force of the vacuum diaphragm. [The vacuum diaphragm varies depending on the engine throttle condition (negative pressure in the intake line)].

When the line pressure (7) is applied to the bottom through the valve hole and the valve is depressed upward, space from the line pressure (7) to the throttle pressure (16) is closed, and the space from the throttle pressure (16) to the drain circuit (17) is about to open. In this, the throttle pressure (16) becomes lower than the line pressure (7) by the pressure equivalent to the pressure loss of the space, and the force to depress through the rod of the vacuum diaphragm is balanced with the throttle pressure (16) applied upward to the bottom.

When the engine torque is high, the negative pressure in the intake line rises (similar to the atmospheric pressure), and the force of the rod to depress the valve increases. As the result, the valve is depressed downward, the space from the throttle pressure (16) to the drain (17) reduces, and the space from the line pressure (7) to the throttle pres: (16) increases.

Consequently, the throttle pressure (16) increases, and the valve is balanced. Contrarily, when the engine torque lowers and the negative pressure in the intake line lowers (similar to vacuum), force of the rod to depress the valve lowers, and the throttle pressure (16) also lowers. When a pressure regulated by the throttle back-up valve (described in the subsequent paragraph) is led to the circuit (17), a high pressure is applied through the space from the circuit (17) to the throttle pressure (16). Consequently, the VTV is unbalanced, the throttle pressure (16) becomes equal to the back-up pressure (17), and the valve is locked upward.



AT100

Fig. AT-15 Vacuum throttle valve

Throttle back-up valve (TBV)

Usually, this valve is depressed downward by the spring force, and the circuit (17) is drained upward.

As soon as the lever is shifted either to "2" or "1" range, line pressure is led from the circuit (4), the li. pressure is applied to the area difference of the valve, the valve is depressed upward, the space from the circuit (4) to the circuit (17) is timely sed, and with the space from the .cuit (17) to the upper drain being about to open, the back-up pressure (17) which is lower than the line pressure (4) by the pressure loss due to the space from the circuit (4) to the circuit (17) is balanced with the spring force.

Further, when speed is shifted from "2nd" to "Low" at the range "1," line pressure is led from the circuit (12), and the line pressure is applied upward to the bottom of the valve through the valve hole. Consequently, the valve is depressed upward, and locked. As the result, the space from the line pressure (4) to the back-up pressure (17) is closed completely, and the back-up pressure (17) is drained upward.

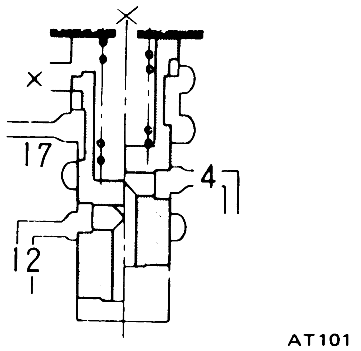


Fig. AT-16 Throttle back-up valve

Solenoid downshift valve (SDV)

This valve is a transfer valve which leads the line pressure (7) to (13) and transmits the same to the FSV and SSV when a kickdown signal is received from the downshift solenoid. Usually, the solenoid push rod and valve are locked upward by the spring in the lower end, and circuit from the line pressure (4) to the line pressure (13) is opened.

When kickdown is performed, the push rod operates, the valve is depressed downward, and the circuit from the line pressure (7) to the line pres- (13) opens. The line pressure (13) opposes the governor pressure (15) at the SSV and FSV, and thus, performs the downshift operation.

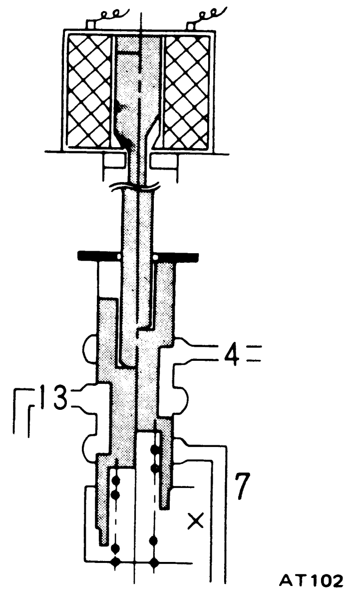


Fig. AT-17 Solenoid downshift valve

Second lock valve (SLV)

This valve is a transfer valve which assists the shift valve in order to decide the fixed "2nd" speed at the "2" range.

In the "D" range, the sum of the spring force and line pressure (3) applied upward exceeds the line pressure (2) which is applied to the valve area difference as the downward force. As the result, the valve is locked upward, and the circuit from the line pressure (8) to the line pressure (9) is opened.

Consequently, the FSV becomes the "2nd" speed condition, and line pressure is led to the band servo engaging circuit (9) only when the line pressure (1) is released to the line pressure (8).

In the "2" range, the upward force is retained only on the spring, and the downward line pressure (2) exceeds the upward force.

As the result, the valve is locked downward, the line pressure (2) is released to (9) regardless of the operating condition of the FSV, and the band servo is engaged.

2nd-3rd timing valve (TMV)

This valve is a transfer valve which switches the bypass circuit of the

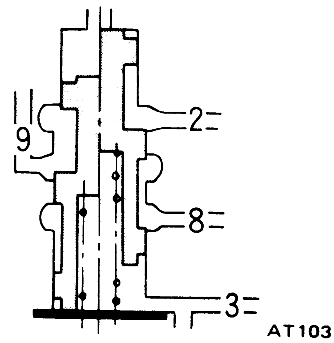


Fig. AT-18 Second lock valve

orifice (22) in the front clutch pressure circuit (11) in response to the vehicle speed and the throttle condition. A force created when the governor pressure (15) applies to the bottom of the TMV is used for the upward force, and a force created when the spring force and the throttle pressure apply to the top of the TMV is used for the downward force.

When the throttle pressure (16) is lower than the governor pressure (15), the upward force exceeds the downward force, the valve is locked upward, and passage from the circuit (10) ("2nd" from the "Top") to the circuit (11) is closed. Consequently, the line pressure (10) is led to the front clutch circuit (11) through the orifice (22), and thus, the oil pressure is transmitted slowly. However, under the normal shifting, the throttle pressure (16) has a pressure exceeding a certain level, and the downward force exceeds the upward force. As the result, the valve is locked downward, the passage from the circuit (10) to the circuit (11) is opened, and the orifice (22) is disregarded.

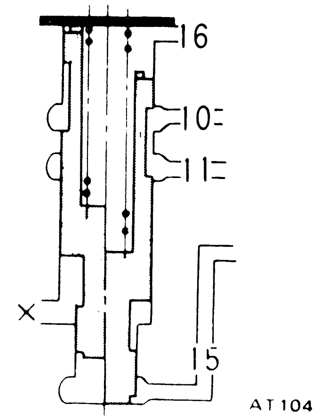
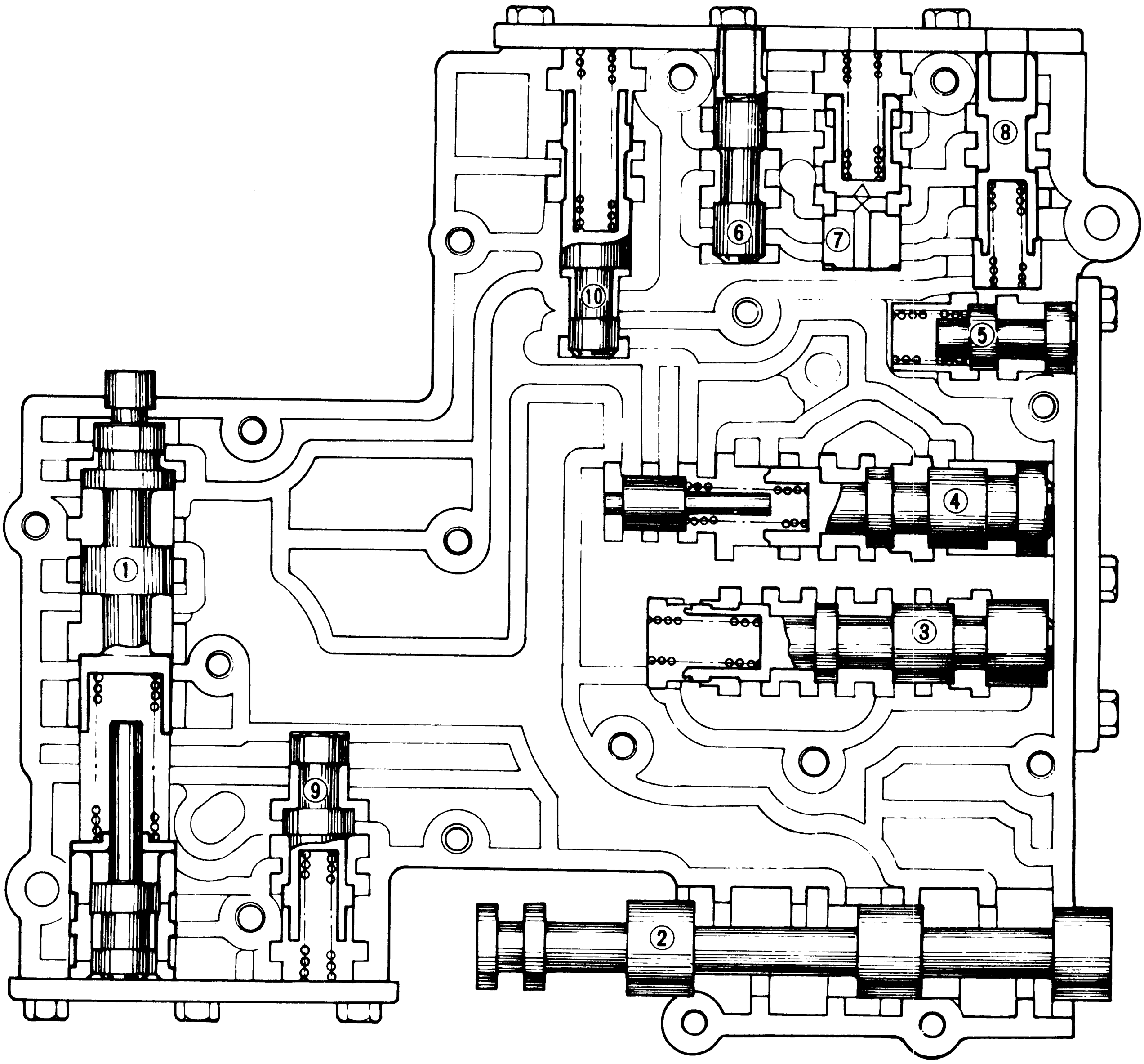


Fig. AT-19 "2nd-3rd" timing valve



1 Pressure regulating valve
2 Manual valve
3 1st-2nd shift valve
4 2nd-3rd shift valve
5 Pressure modifier valve
6 Vacuum throttle valve
7 Throttle back-up valve
8 Solenoid down shift valve
9 Second lock valve
10 2 - 3 timing valve

Fig. AT-20 Control valve

HYDRAULIC SYSTEM AND MECHANICAL OPERATION

The operating system of oil pressure in each range is described below:

The oil pressure in each circuit shown in the illustration is classified as follows according to the function. (The numerals show the circuit numbers.)

Pressure source of the line: 7

Operating line pressure for friction elements:
1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12.

Auxiliary line pressure: 13

Pressure of throttle system:
16, 17, 18, 19.

Others: 14, 15

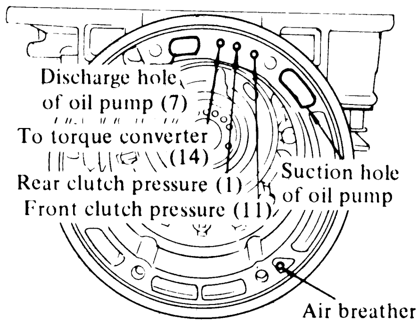


Fig. AT-22 Identification of oil channels in case front face

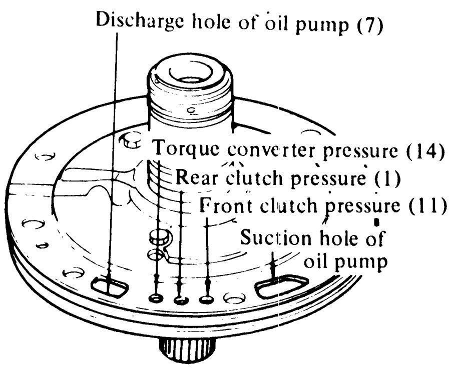


Fig. AT-21 Identification of oil channels in oil pump

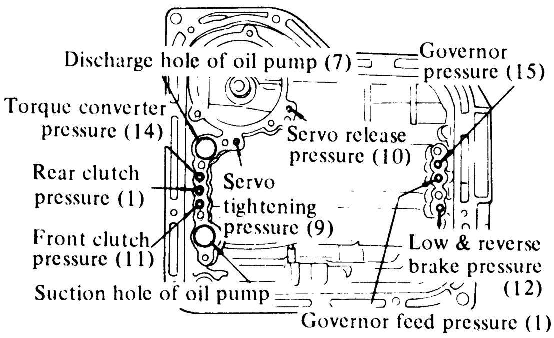


Fig. AT-23 Identification of oil channels in case face

"P" range (Park)

The operation of clutches and band are functionally quite the same as in "Neutral."

In parking, however, as the parking pawl meshes in a gear which is splined to the output shaft, the output shaft is mechanically locked from rotating.

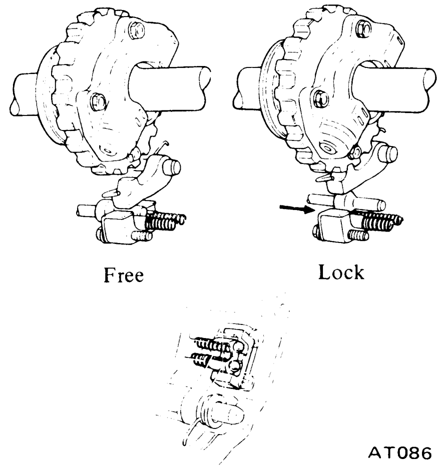


Fig. AT-24 Parking mechanism

The oil discharged from the oil pump is fed to each part in a similar manner to that of the "N" range. The oil having the line pressure (7) which has been introduced to the manual valve 2 reaches the "1st-2nd" shift valve 3 through the line pressure circuit (5). As the "1st-2nd" shift valve is forced to the right-hand side by the spring the line pressure (5) and (12) actuates the low and reverse brake through the groove. Also, the parking pawl engages with the outer teeth of the oil distributor by the manual lever, mechanically locking the output shaft.

Range			Gear ratio	Clutch		Low & reverse brake	Band servo		One way clutch	Parking pawl
				Front	Rear		Operation	Release		
Park						on				on
Reverse			2.182	on		on		on		
Neutral										
Drive	D1	Low	2.458		on				on	
	D2	Second	1.458		on		on			
	D3	Top	1.000	on	on		(on)	on		
2		Second	1.458		on		on			
1	1_2	Second	1.458		on		on			
	1_1	Low	2.458		on	on				

"P" range (Park)

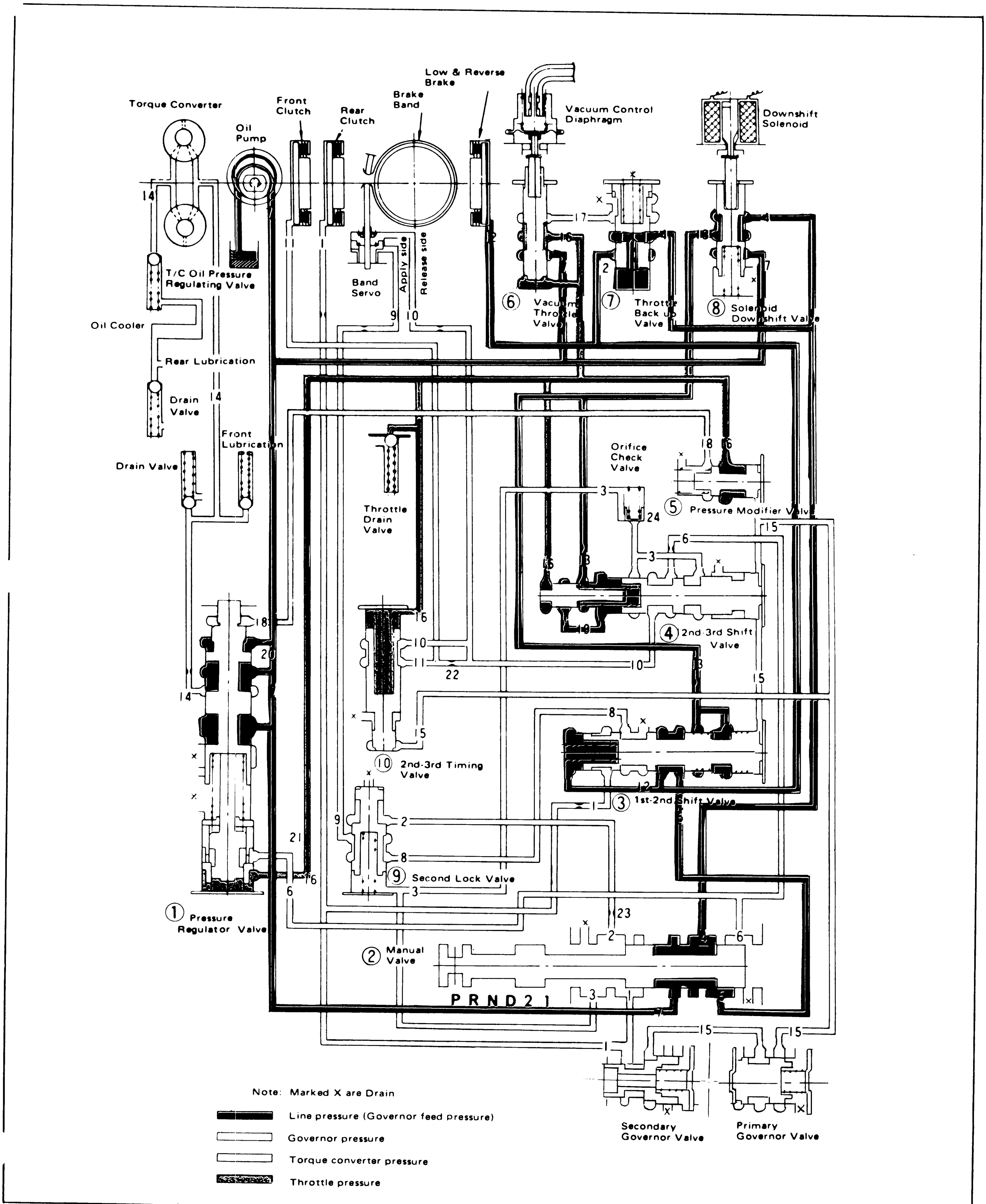


Fig. AT-25 Oil pressure circuit diagram — "P" range (Park)

"R" range (Reverse)

In "R" range, the front clutch and low and reverse brake are applied. The power flow is through the input shaft, front clutch, connecting shell and to the sun gear. Clockwise rotation of the sun gear causes counterclockwise rotation of the rear planetary gears. With the connecting drum held stationary by the low and reverse brake, the rear planetary gears rotate the rear internal gear and drive flange counterclockwise. The rear drive flange splined to the output shaft rotates the output shaft counterclockwise at a reduced speed with an increase in torque for reverse gear.

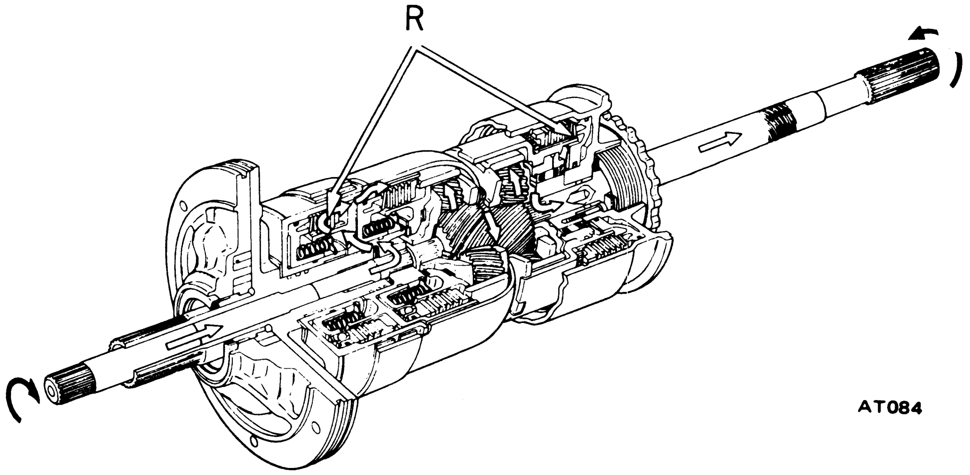


Fig. AT-26 Power transmission during "R" range

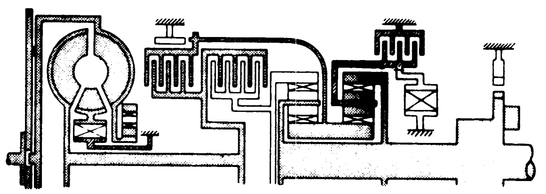


Fig. AT-27 Operation of each mechanism duirng "R" range

When the manual valve ② is positioned at "R" range, the oil having the line pressure (7) is directed to the line pressure circuits (5) and (6), The pressure in the circuit ⑤ actuates the low and reverse brake after being introduced into the line pressure circuit (12) through the "1st-2nd" shift valve ③. The pressure in the circuit operates the release side of band servo and the front clutch after being led to the line pressure circuit (10) through the "2nd-3rd" shift valve ④. The throttle pressure (16) and the line pressure (6) which vary with the degree of the depression of accelerator pedal both act on the pressure regulator valve ① and press its valve ①, increasing the line pressure (7). In "R" range, the governor pressure is absent, making all such valves inoperative as the "1st-2nd" shift valve ③, "2nd-3rd" shift valve ④, and pressure modifier valve ⑥.

Range			Gear ratio	Clutch		Low & reverse brake	Band servo		One way clutch	Parking pawl
				Front	Rear		Operation	Release		
Park						on				on
Reverse			2.182	on		on		on		
Neutral										
Drive	D1	Low	2.458		on				on	
	D2	Second	1.458		on		on			
	D3	Top	1.000	on	on		(on)	on		
2		Second	1.458		on		on			
1	1_2	Second	1.458		on		on			
	1_1	Low	2.458		on	on				

"R" range (Reverse)

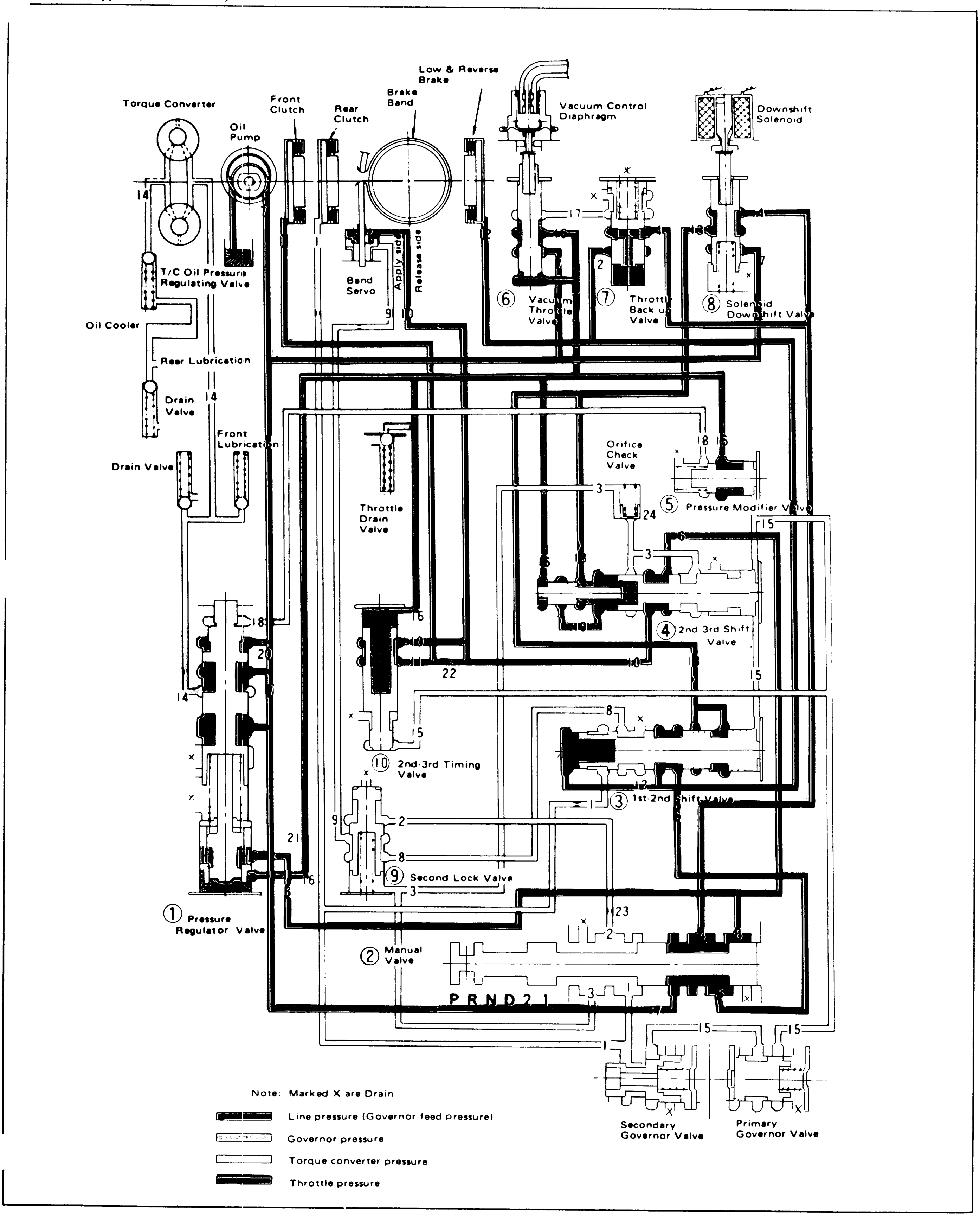


Fig. AT-28 Oil pressure circuit diagram — "R" range (Reverse)

"N" range (Neutral)

In "N" range all the clutches and band are not applied, therefore, no power is transmitted to the output shaft.

The pressure of oil discharged from the oil pump is regulated by the pressure regulator valve ① to maintain the line pressure (7), and the oil is led to the manual valve ②, vacuum throttle valve ⑥, and solenoid down shift valve ⑧. The oil is further introduced into the torque converter at its operating pressure (14), and a portion of this oil is distributed to each part as the front lubricant. The oil which has been discharged from the torque converter is also distributed to each part as the rear lubricant.

As the oil pump rotates at the same speed as that of the engine, the discharge of oil pump increases with the engine speed. But the surplus oil is returned to the oil pan by the pressure regulator valve ①.

Range			Gear ratio	Clutch		Low & reverse brake	Band servo		One way clutch	Parking pawl
				Front	Rear		Operation	Release		
Park						on				on
Reverse			2.182	on		on		on		
Neutral										
Drive	D1	Low	2.458		on				on	
	D2	Second	1.458		on		on			
	D3	Top	1.000	on	on		(on)	on		
2		Second	1.458		on		on			
1	1_2	Second	1.458		on		on			
	1_1	Low	2.458		on	on				

"N" range (Neutral)

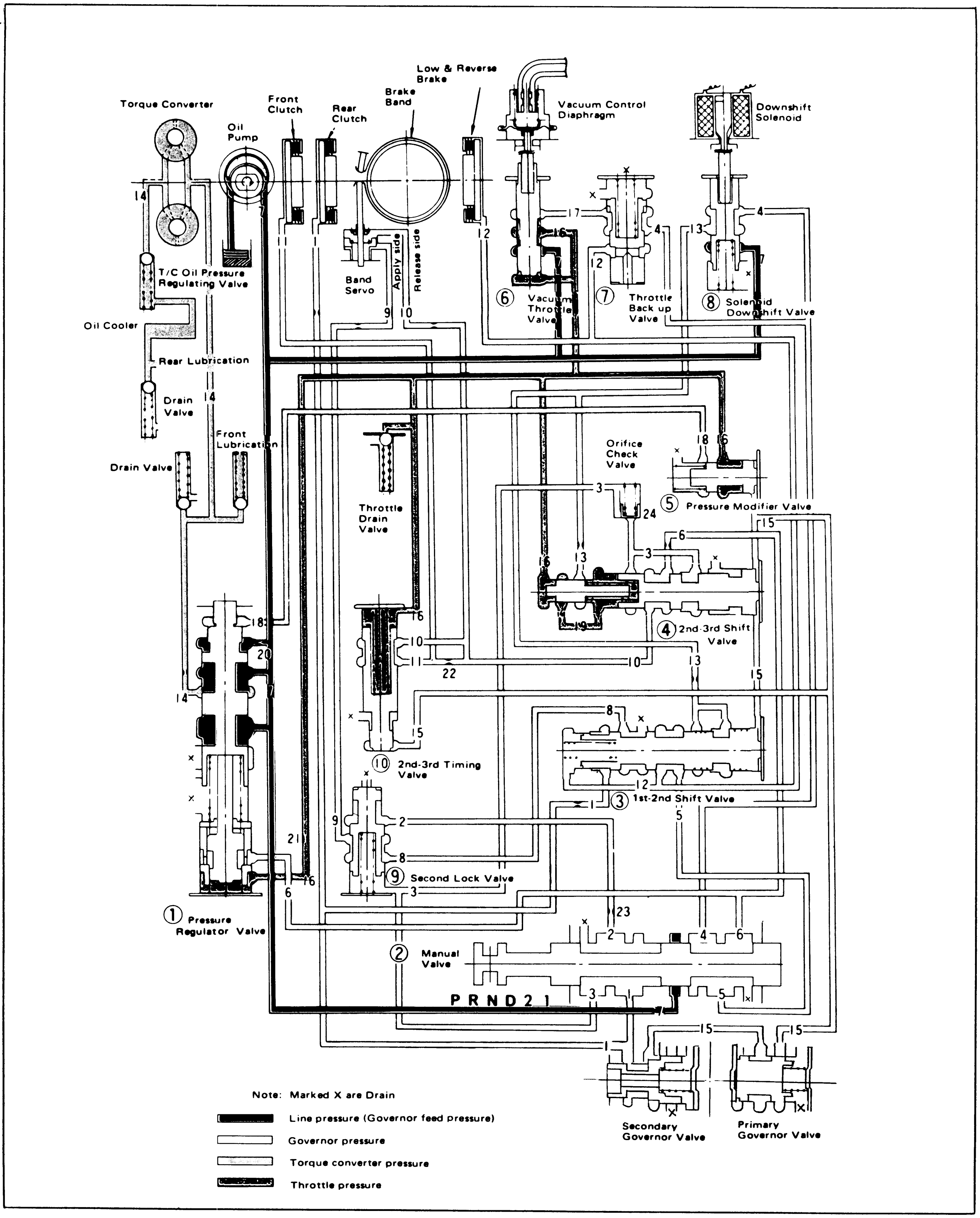


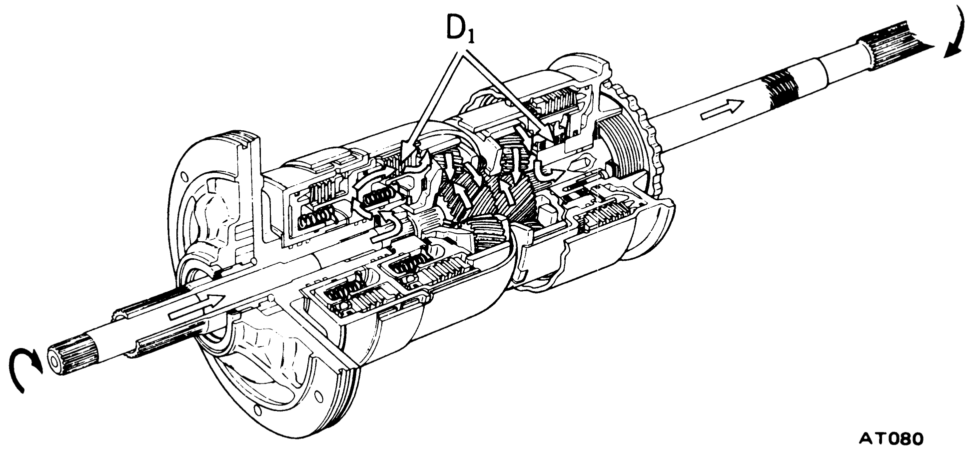
Fig. AT-29 Oil pressure circuit diagram — "N" range (Neutral)

"D_1" range (Low gear)

The low gear in "D" range is somewhat different from that in "1_1" range.

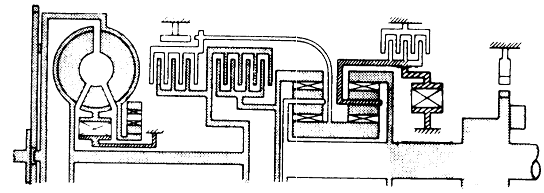
The rear clutch is applied as in "1_1" range, but the one-way clutch is holding the connecting drum. The power flow is the same as in "1_1" range. That is, the power flow takes place through the input shaft and into the rear clutch. The input shaft is splined to the rear clutch drum and drives it. Rotation of the rear clutch drives the rear clutch hub and front internal gear.

The front internal gear rotates the front planetary gears clockwise to cause the sun gear to rotate counterclockwise. Counterclockwise rotation of the sun gear turns the rear planetary gears clockwise. With the rear planetary carrier held stationary by the one-way clutch, the clockwise rotation of the rear planetary gears rotates the rear internal gear and drives flange clockwise. The internal drive flange is splined to the output shaft and rotates the output shaft clockwise.



AT080

Fig. AT-30 Power transmission during "D1" range



AT081

Fig. AT-31 Operation of each mechanism during "D1" ran

Range			Gear ratio	Clutch Front	Clutch Rear	Low & reverse brake	Band servo Operation	Band servo Release	One way clutch	Parking pawl
Park						on				on
Reverse			2.182	on		on		on		
Neutral										
Drive	D1	Low	2.458		on				on	
	D2	Second	1.458		on		on			
	D3	Top	1.000	on	on		(on)	on		
2		Second	1.458		on		on			
1	1_2	Second	1.458		on		on			
	1_1	Low	2.458		on	on				

When the manual valve is positioned at "D," the line pressure (7) introduced into the manual valve is led to the line pressure circuits (1), (2) and (3). The pressure in the circuit (1) actuates the rear clutch and the governor, and at the same time, operates the "1st-2nd" shift valve ③ to change the speed. The circuit (2) leads to the second lock valve ⑨. The circuit (3) actuates the "2nd-3rd" shift valve ④ for the "2nd-3rd" speed change, and the same time, locks the second lock valve ⑨.

The throttle pressure (16) which changes with the degree of accelerator pedal depression, presses the pressure regulator valve ① and increases the line pressure (7). When the speed of vehicle has increased, the governor pressure (15) introduced from the line pressure circuit (1) actuates the "1st-2nd" shift valve ③, "2nd-3rd" shift valve ④, and pressure modifier valve ⑤. When the governor pressure is high, the pressure modifier valve ⑤ acts in such a direction as to compress the spring, and the throttle pressure is led to the throttle pressure (18). This pressure acts against the force of spring of the pressure regulator valve ① and also against the throttle pressure (16), thus lowering the line pressure (7).

The governor pressure also increases with the speed of vehicle, exerting a pressure on one side of the "1st-2nd" shift valve, and counteracts the throttle pressure (19), line pressure (1), and the spring which are exerting against the governor pressure. Therefore, when the governor pressure exceeds this pressure, the speed is shifted from the "1st" gear to the "2nd" gear. The further the accelerator pedal is depressed, the higher becomes the throttle pressure (19), increasing the governor pressure and shifting the speed change point to the higher side.

"D1" range (Low gear)

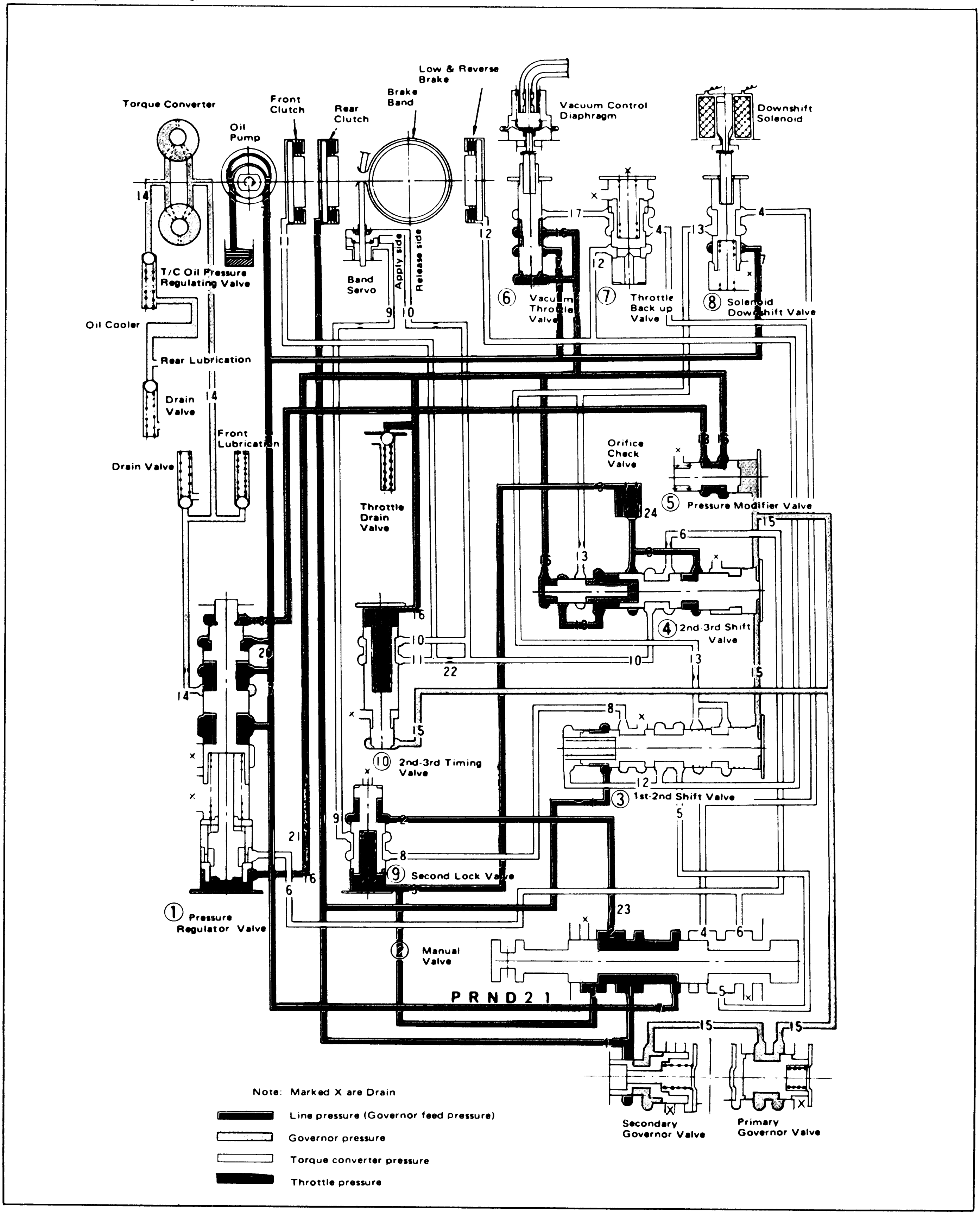
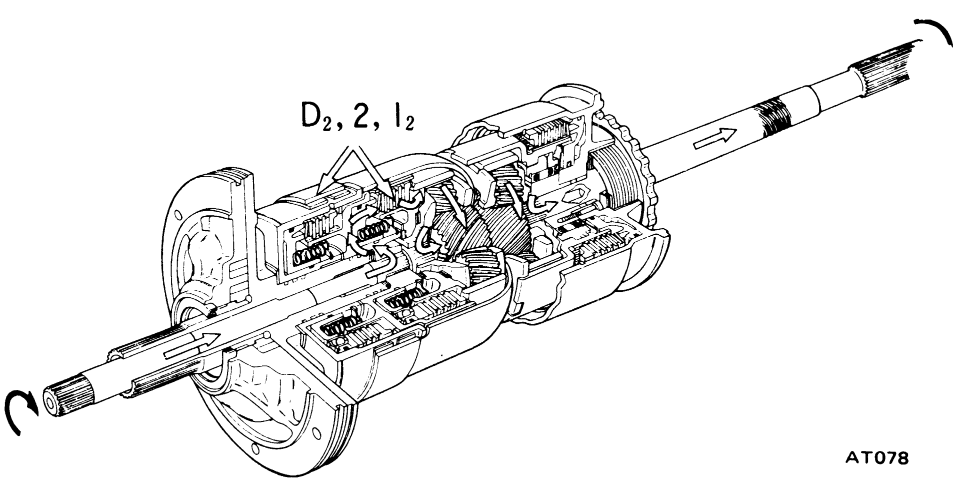


Fig. AT-32 Oil pressure circuit diagram — "D1" range (Low gear)

"D_2" range (2nd gear)

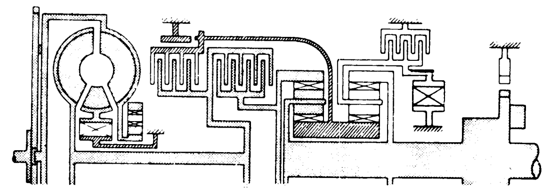
In this case, the rear clutch is applied and the band brake holds the front clutch drum, connecting shell and sun gear from rotating.

The power flow takes place through the input shaft into the rear clutch and the front internal gear. With the sun gear held stationary, the front planetary gears rotate around the sun gear, carrying the front planet carrier with them. The front planet carrier, being splined to the output shaft, causes clockwise rotation of the output shaft at a reduced speed compared with the speed of the input shaft with an increase in torque. As the low and reverse brake is not applied, the clockwise rotation of the output shaft causes clockwise rotation of rear internal gear and the rear planet carrier also rotates around the sun gear in a clockwise direction. The one-way clutch will act to allow the clockwise rotation of connecting drum.



AT078

Fig. AT-33 Power transmission during "D2" range



AT079

Fig. AT-34 Operation of each mechanism during "D2" range

Range			Gear ratio	Clutch Front	Clutch Rear	Low & reverse brake	Band servo Operation	Band servo Release	One way clutch	Parking pawl
Park						on				on
Reverse			2.182	on		on		on		
Neutral										
Drive	D1	Low	2.458		on				on	
	D2	Second	1.458		on		on			
	D3	Top	1.000	on	on		(on)	on		
2		Second	1.458		on		on			
1	1_2	Second	1.458		on		on			
	1_1	Low	2.458		on	on				

When the car speed increases while running at "D_1" range (1st gear), the "1st-2nd" shift valve ③ moves allowing the line pressure (1) to be introduced into the line pressure (8) through itself. The line pressure (8) is further led to the line pressure (9) through the second lock valve ⑨, and by locking the band servo, obtains the "2nd" gear condition.

"D₂" range (2nd gear)

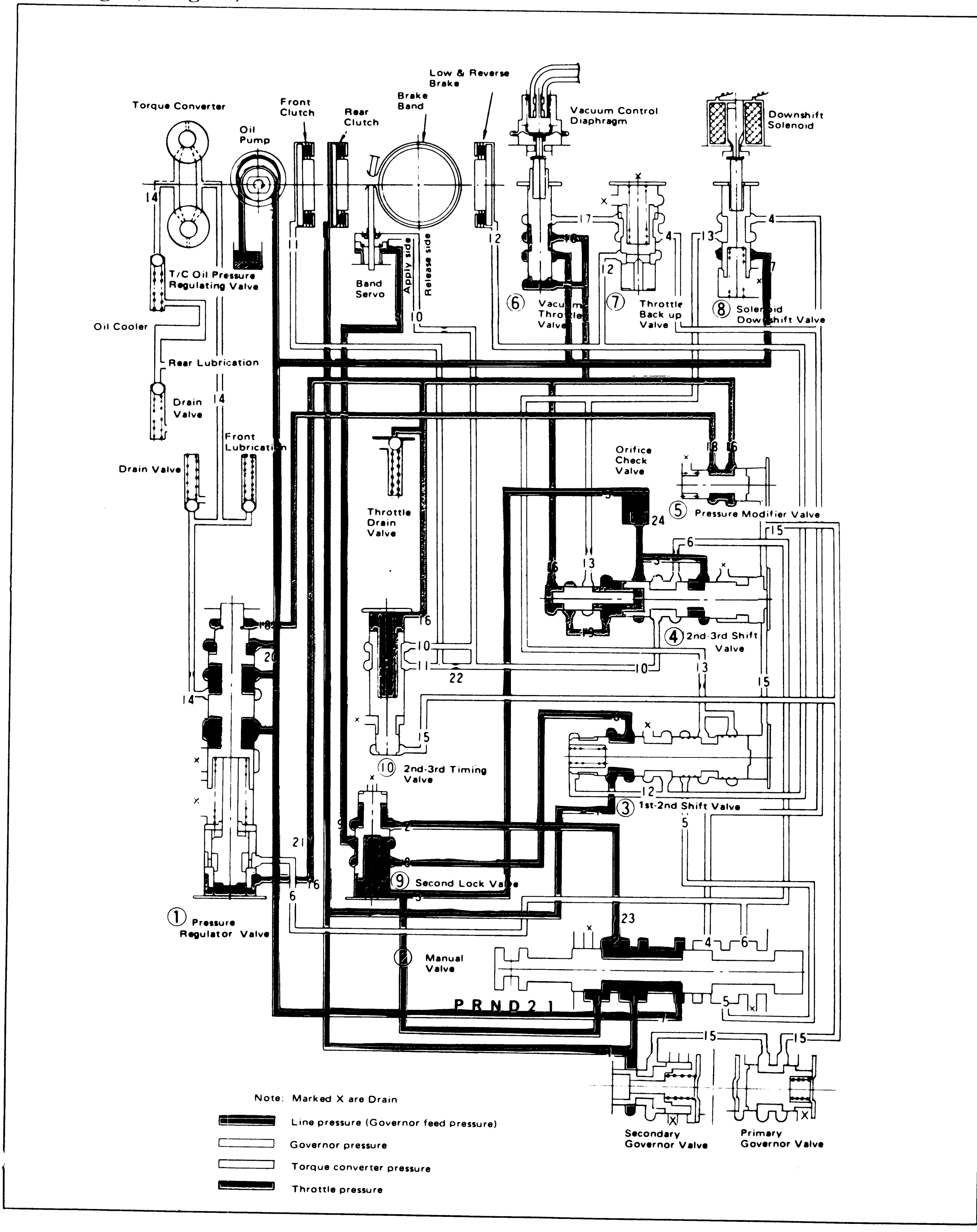
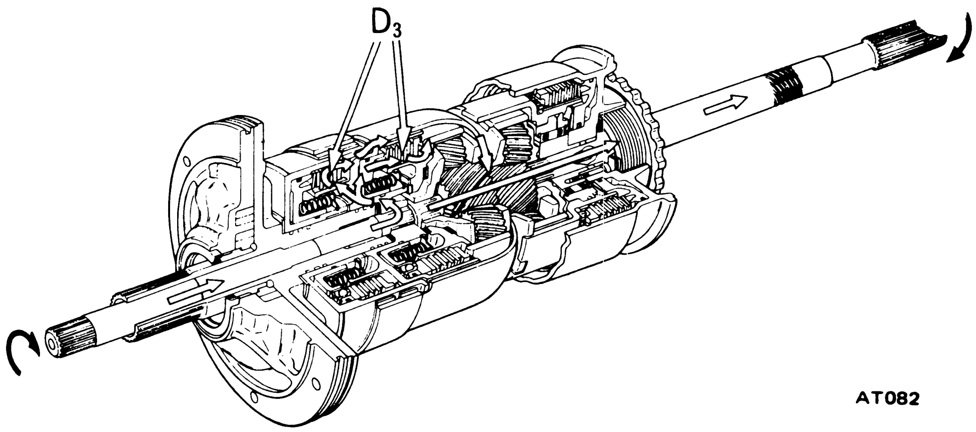


Fig. AT-35 Oil pressure circuit diagram — "D2" range (2nd gear)

"D_3" range (Top gear)

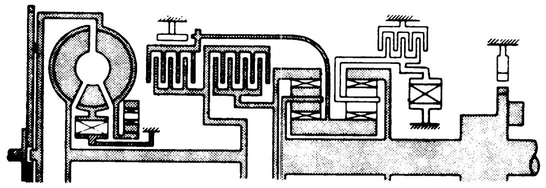
In 3rd gear position, the fornt and rear clutches are applied. The power flow takes place through the input shaft into rear clutch drum. The rear clutch drum rotates the steel drive plates of the rear clutch and the lined drive plates of the rear clutch and the lined drive plates of the front clutch. The rear clutch directs the power flow through the rear clutch hub and front internal gear to the front planet carrier.

The front clutch directs the power flow through the connecting shell to the sun gear. With the sun gear and the rear clutch hub driven at the same speed, the front planet assembly is forced to rotate the output shaft at the same speed in the direction to provide the top gear.



AT082

Fig. AT-36 Power transmission during "D3" range



AT083

Fig. AT-37 Operation of each mechanism "D3" range

When the car speed further increases while running at "D_2" range (2nd gear) and the governor pressure (15) exceeds the combined force of the spring of the "2nd-3rd" shift valve ④ and the throttle pressure (19), the "2nd-3rd" shift valve ④ moves, and the line pressure (8) acts to release the front clutch and band servo through the line pressure (10).

Range			Gear ratio	Clutch		Low & reverse brake	Band servo		One way clutch	Parking pawl
				Front	Rear		Operation	Release		
Park						on				on
Reverse			2.182	on		on		on		
Neutral										
Drive	D1	Low	2.458		on				on	
	D2	Second	1.458		on		on			
	D3	Top	1.000	on	on		(on)	on		
2		Second	1.458		on		on			
1	1_2	Second	1.458		on		on			
	1_1	Low	2.458		on	on				

"D_3" range (Top gear)

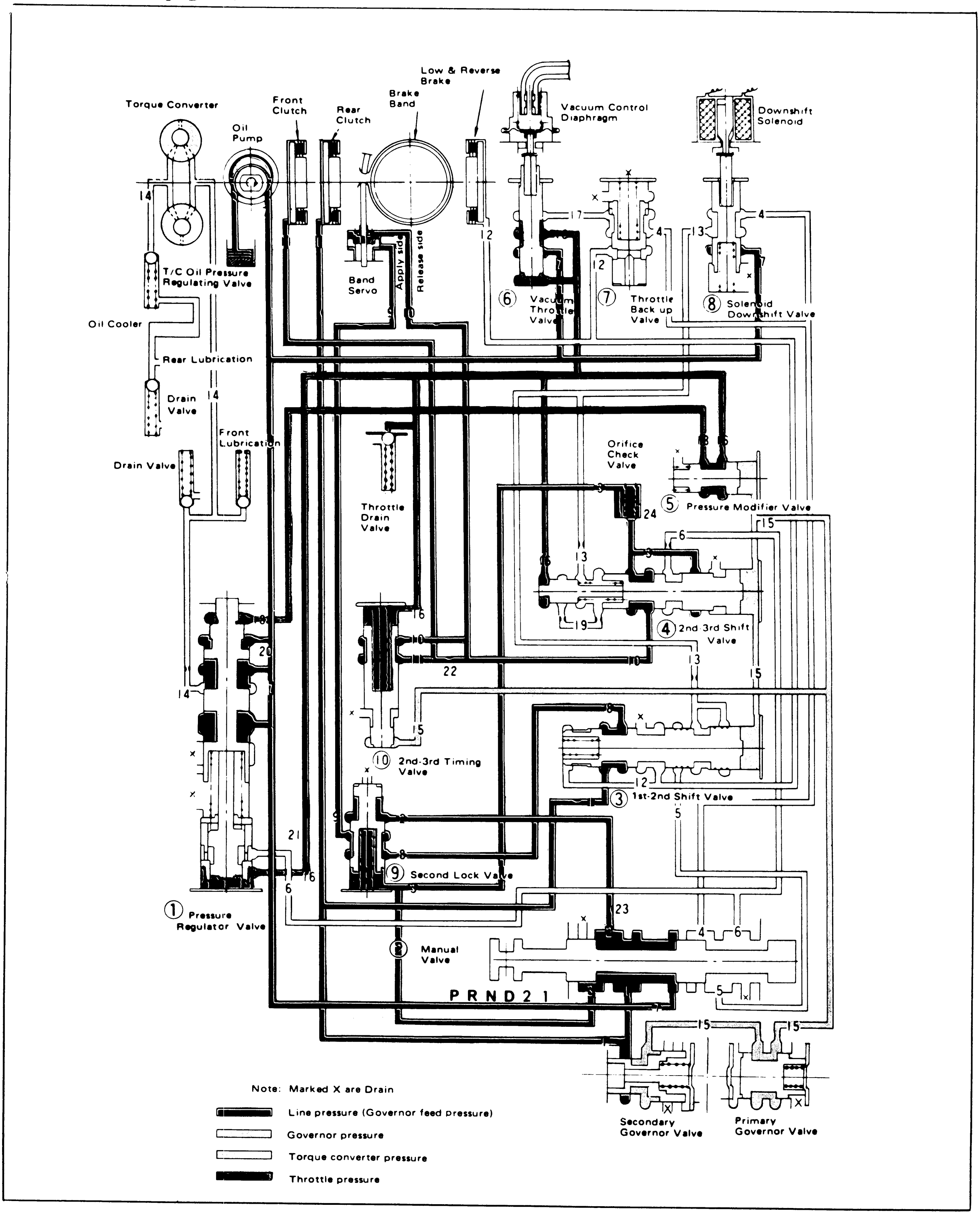


Fig. AT-38 Oil pressure circuit diagram —"D3"range (Top gear)

"D" range kickdown

While operating at speeds below approximately 75 to 85 km/h (47 to 53 MPH), a kick "3rd-2nd" downshift can be accomplished by fully depressing the accelerator.

A kick "3rd-1st" or "2nd-1st" downshift can also be accomplished below approximately 40 to 50 km/h (25 to 31 MPH).

When kickdown is performed, the push rod operates by the solenoid, the valve is depressed downward, and the circuit from the line pressure (7) to the line pressure (13) opens. The line pressure (13), (3) plus the force of the "2nd-3rd" shift valve spring oppose the governor pressure (15) at the "2nd-3rd" shift valve ④, and thus, performs "3rd-2nd" downshift operation.

Moreover, the line pressure (13) plus the force of the "1st-2nd" shift valve spring oppose the governor pressure (15) at the "1st-2nd" shift valve ③, and thus, perform "3rd-2nd" or "2nd-1st" downshift operation.

Range			Gear ratio	Clutch		Low & reverse brake	Band servo		One way clutch	Parking pawl
				Front	Rear		Operation	Release		
Park						on				on
Reverse			2.182	on		on		on		
Neutral										
Drive	D1	Low	2.458		on				on	
	D2	Second	1.458		on		on			
	D3	Top	1.000	on	on		(on)	on		
2		Second	1.458		on		on			
1	1_2	Second	1.458		on		on			
	1_1	Low	2.458		on	on				

"D" range kickdown (shift valves in 2nd gear position)

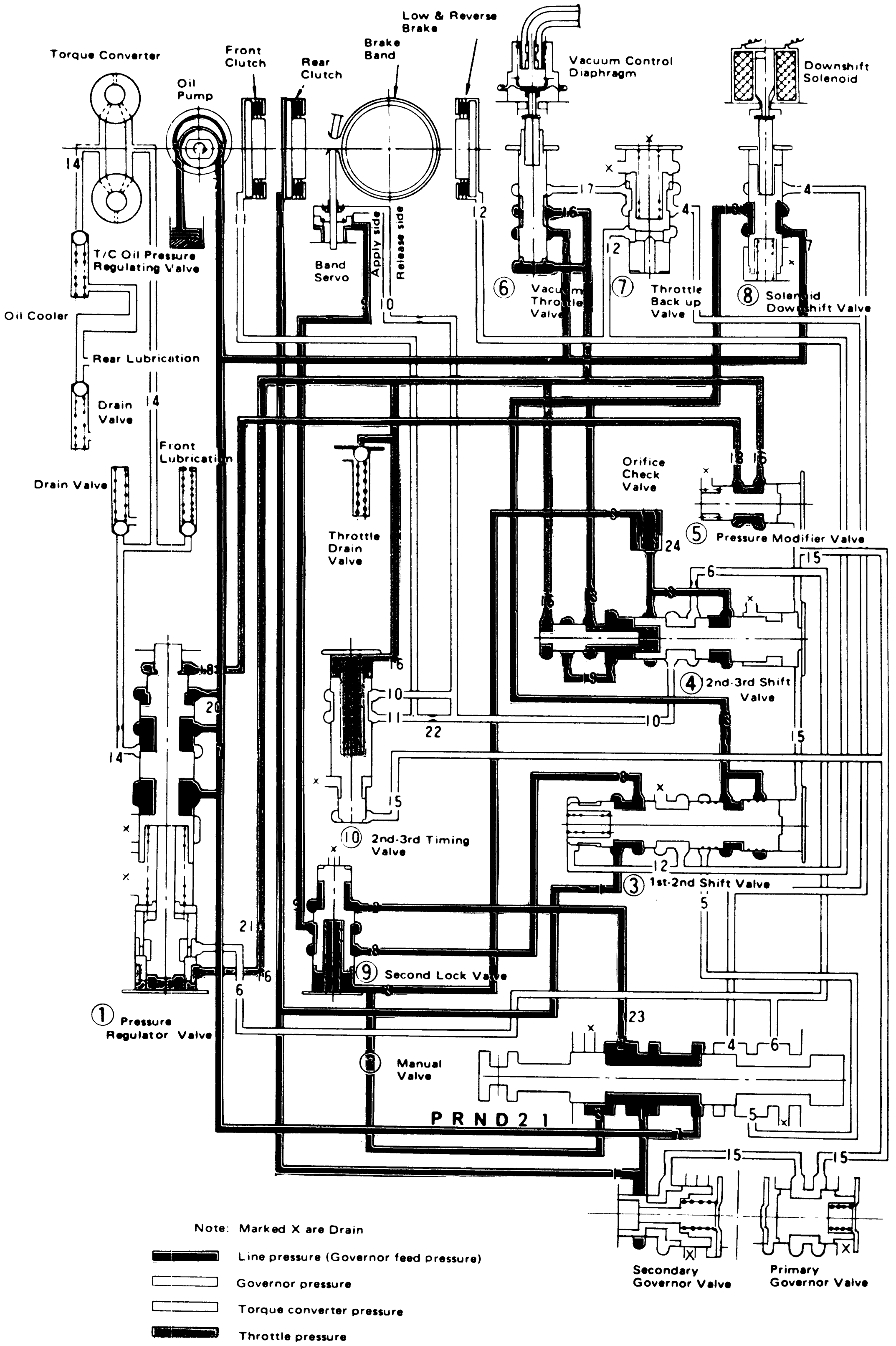
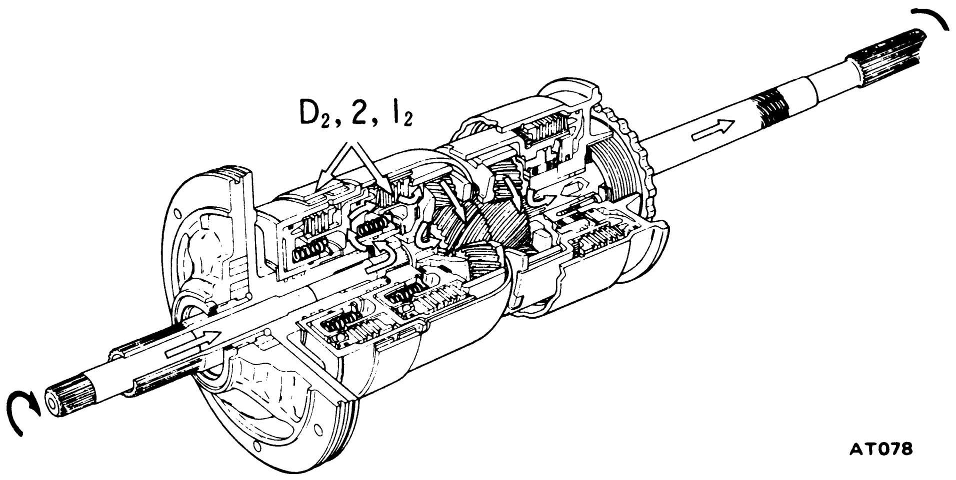


Fig. AT-39 Oil pressure circuit diagram — "D" range kickdown (shift valves in 2nd gear position)

"2" range (2nd gear)

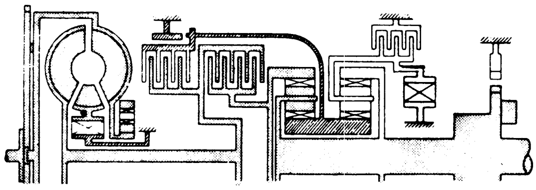
In "2" range the gear ratio is locked to the 2nd forward speed. In this case, the rear clutch is applied and the band brake holds the front clutch drum, connecting shell and sun gear from rotating.

The power flow takes place through the input shaft into the rear clutch and the front internal gear. With the sun gear held stationary, the front planetary gears rotate around the sun gear, carrying the front planet carrier with them. The front planet carrier, being splined to the output shaft, causes clockwise rotation of the output shaft at a reduced speed compared with the speed of the input shaft with an increase in torque. As the low and reverse brake is not applied, the clockwise rotation of the output shaft causes clockwise rotation of rear internal gear and the rear planet carrier also rotates around the sun gear in a clockwise direction. The one-way clutch will act to allow the clockwise rotation of connecting drum.



AT078

Fig. AT-40 Power transmission during "2" range



AT079

Fig. AT-41 Operation of each mechanism during "2" range

When the manual valve ② is positioned at "2," the line pressure (7) is introduced into the line pressure circuits (1), (2) and (4). The line pressure (1) is led to the governor, rear clutch and "1st-2nd" shift valve ③ as in the case of "D" range. The line pressure (2) locks the second lock valve ⑨ and is led to the tightening side of the band servo.

The "2nd" gear is therefore fixed regardless of the car speed. When "D_3" range (3rd gear) is shifted to "2" range, the line pressure (4) enters the throttle back-up valve ⑦ and produces a high pressure in the circuit (17), increasing the throttle pressure (16). The line pressure (7) is, therefore, increases and quickly tightens the band.

Range		Gear ratio	Clutch Front	Clutch Rear	Low & reverse brake	Band servo Operation	Band servo Release	One way clutch	Parking pawl
Park					on				on
Reverse		2.182	on		on		on		
Neutral									
Drive	D1 Low	2.458		on				on	
	D2 Second	1.458		on		on			
	D3 Top	1.000	on	on		(on)	on		
2	Second	1.458		on		on			
1	1_2 Second	1.458		on		on			
	1_1 Low	2.458		on	on				

Note: "D_3" range (3rd gear) to "2" range.
If "D_3" range (3rd gear) is shifted to "2" range during operation, the manual valve ② is also shifted to "2" position, causing the line pressure circuit (3) to be drained. Therefore, the line pressure circuit (10) which is situated at the release side of the front clutch and servo is also drained through the "2nd-3rd" shift valve ④, forcing the speed to decrease from "3rd gear" to "2nd gear." In this case the speed change quickly takes place because the line pressure (7) and other pressure are heightened by the action of the line pressure (4), in the same manner as described under "2" range.

"2" range (2nd gear)

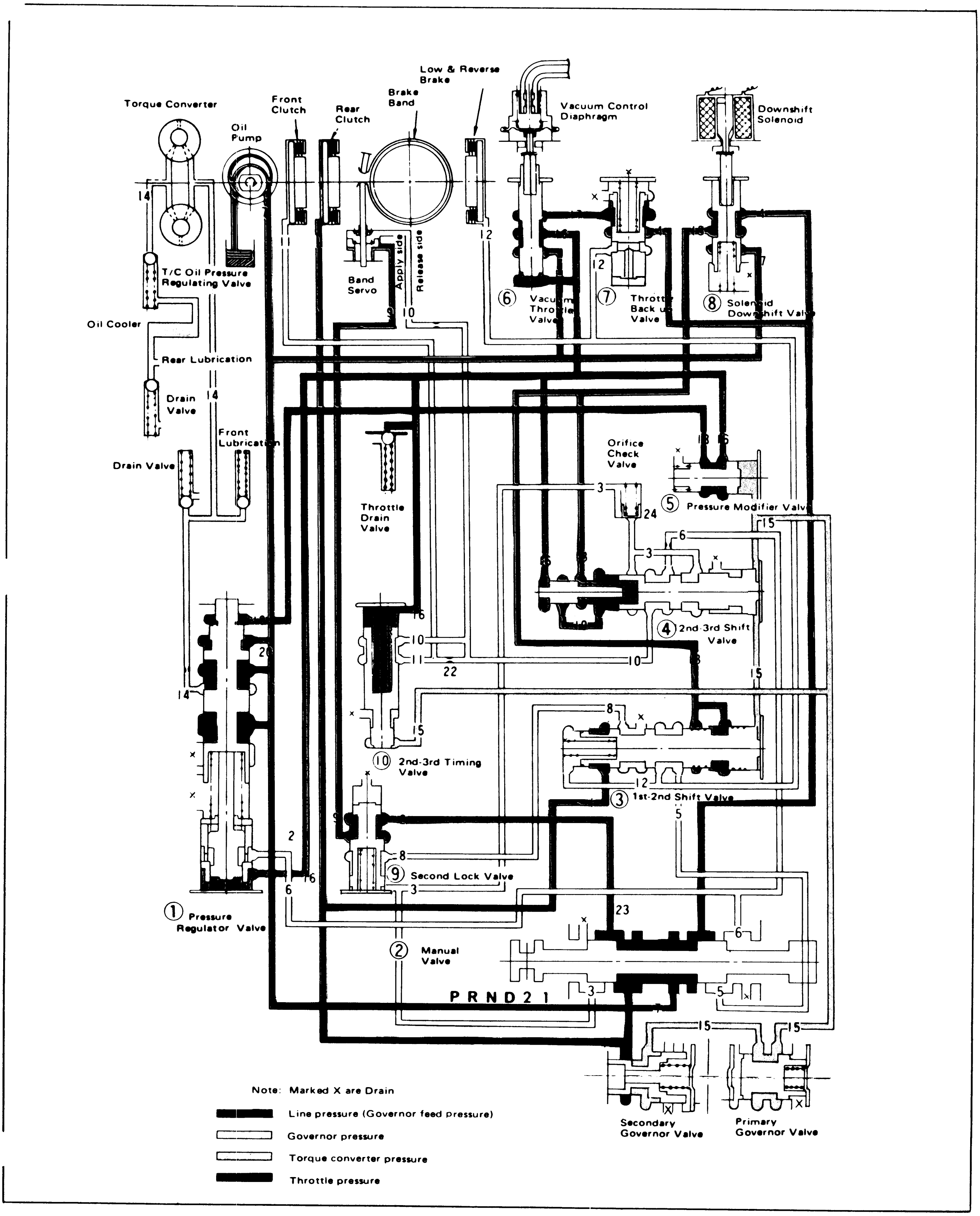


Fig. AT-42 Oil pressure circuit diagram — "2" range (2nd gear)

"1₁" range (Low gear)

When starting in "1" range, the driving gear is locked to the low gear ratio.

In "1" range, the rear clutch is applied and the low and reverse brake holds the connecting drum and rear planet carrier from rotating. The power flow takes place through the input shaft and into the rear clutch. Rotation of the rear clutch drives the rear clutch hub and front internal gear. The front internal gear rotates the front planetary gears clockwise to cause the sun gear to rotate counter-clockwise.

Counterclockwise rotation of the sun gear turns the rear planetary gear clockwise.

The rear planet carrier splined to the connecting drum is held from rotating by the low and reverse brake.

The clockwise rotation of the rear planetary gears therefore rotates the rear internal gear and internal drive flange. The internal drive flange is splined to the output shaft and rotates the output shaft clockwise. However, the output shaft rotates at a lower speed compared with that of the input shaft. This is caused by the fact that the front planet carrier rotates at the same speed as the output shaft in the same direction since the carrier is splined to the output shaft. The front internal gear and planetary gear assembly are rotating in the same direction, but the planet carrier is rotating at a speed slower than the ring gear. So the gear ratio of this speed range is a combination of the ratios provided by the front and rear planetary gear assemblies.

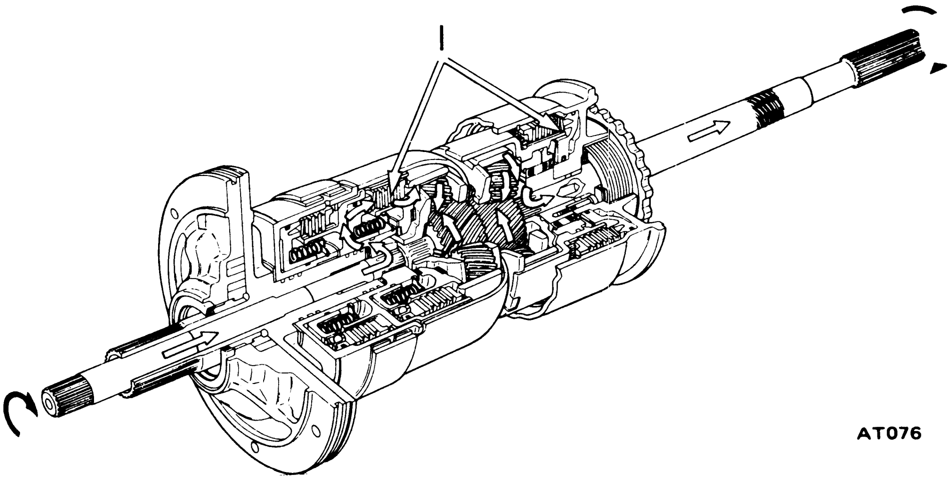


Fig. AT-43 Power transmission during "1₁" range

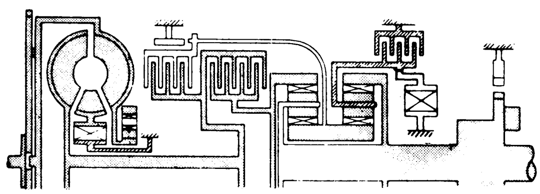


Fig. AT-44 Operation of each mechanism during "1₁" range

Range			Gear ratio	Clutch		Low & reverse brake	Band servo		One way clutch	Parking pawl
				Front	Rear		Operation	Release		
Park						on				on
Reverse			2.182	on		on		on		
Neutral										
Drive	D1	Low	2.458		on				on	
	D2	Second	1.458		on		on			
	D3	Top	1.000	on	on		(on)	on		
2		Second	1.458		on		on			
1	1_2	Second	1.458		on		on			
	1_1	Low	2.458		on	on				

When the manual valve ② is positioned at "1," the line pressure (7) is applied into the line pressure circuits (1), (4) and (5). The oil pressure in (5) actuates the low and reverse brake after being introduced into the circuit (12) through the "1st-2nd" shift valve ③, and the line pressure (1) acts on the rear clutch and governor. The line pressure (4) acts in the same manner as in "2" range.

Similar to that of the "D" range, the line pressure increases with the degree of depression of the accelerator pedal, and the line pressure decreases with the increase of car speed. The governor pressure (15) which acts on the "1st-2nd" shift valve does not increase until it overcomes the combined force of the line pressure (12) and the spring, causing no "1st-2nd" speed change.

"1₁" range (Low gear)

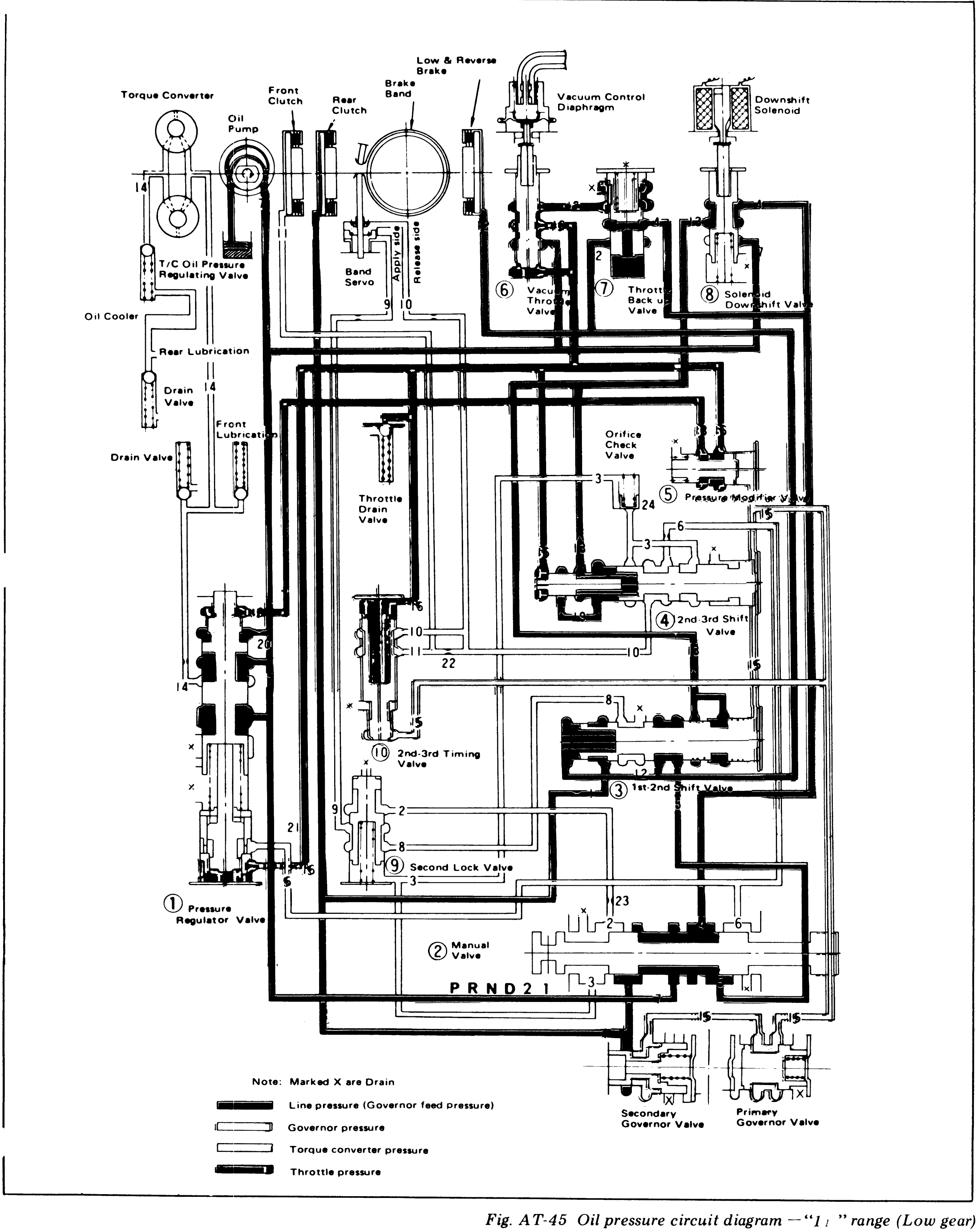


Fig. AT-45 Oil pressure circuit diagram — "1₁" range (Low gear)

"1_2" range (2nd gear)

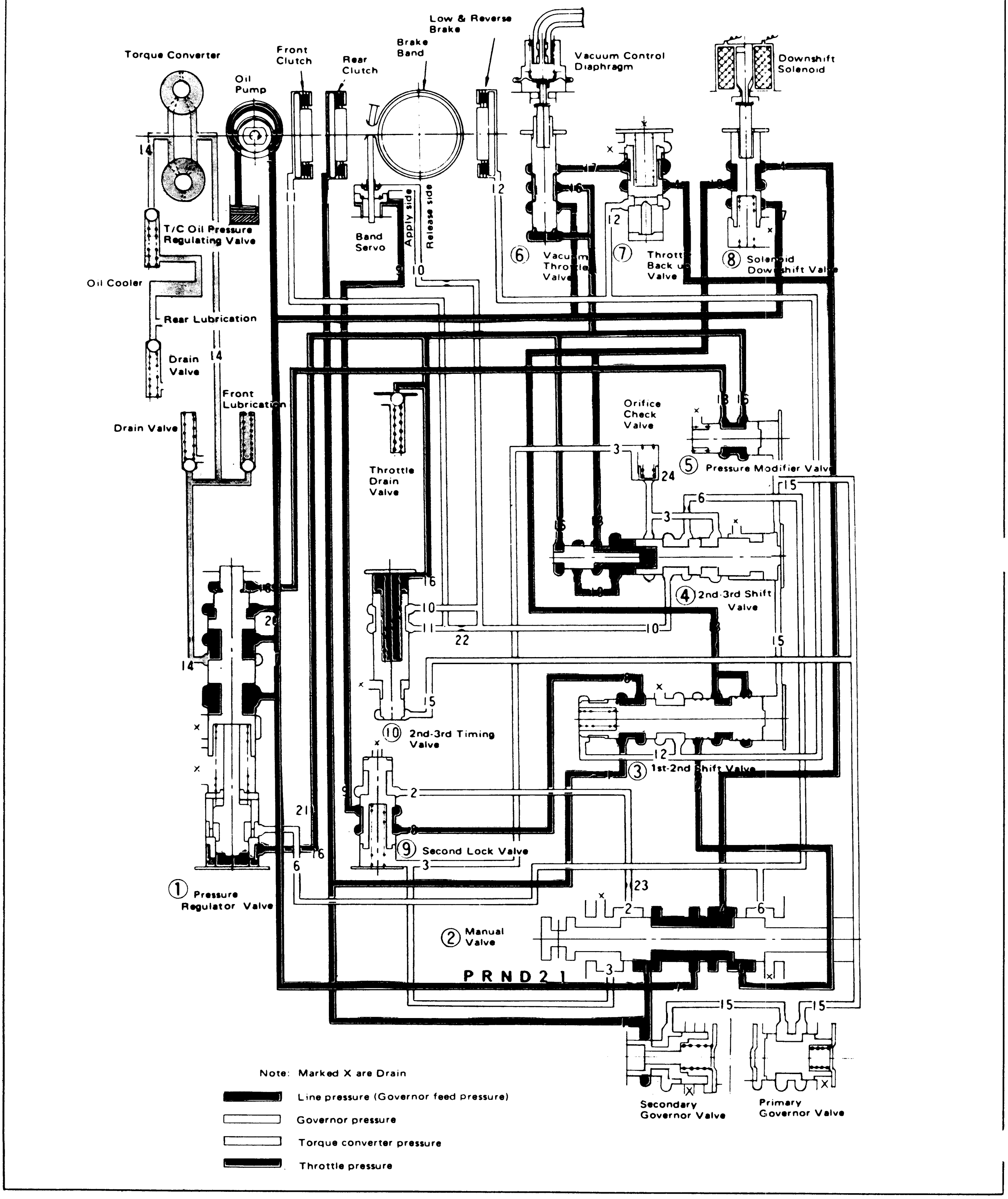


Fig. AT-46 Oil pressure circuit diagram — "1_2" range (2nd gear)

REMOVAL AND INSTALLATION

CONTENTS

TRANSMISSION ASSEMBLY

When dismounting the automatic transmission from a vehicle, pay attention to the following points:

1. Before dismounting the transmission, rigidly inspect it by aid of the "Troubleshooting Chart," and dismount it only when considered to be necessary.
2. Dismount the transmission with utmost care; and when mounting, observe the tightening torque indicated on another table, not to exert cessive force.

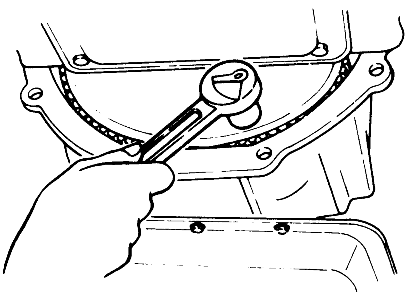
Removal

In dismounting automatic transmission from vehicle, proceed as follows:

1. Disconnect battery ground cable from terminal.
2. Disengage torsion shaft from accelerator linkage.
3. Jack up vehicle and support its weight on safety stands. Recommend a hydraulic hoist or open pit be utilized, if available.
   Make sure that safety is insured.
4. Remove propeller shaft.

Note: **Plug up the opening in the rear extension to prevent oil from flowing out.**

5. Disconnect front exhaust tube.
. Disconnect selector range lever from manual shaft.
7. Disconnect wire connections at inhibitor switch.
8. Disconnect vacuum tube from vacuum diaphragm, and wire connections at downshift solenoid.
9. Disconnect speedometer cable from rear extension.
10. Disconnect oil charging pipe.
11. Disconnect oil cooler inlet and outlet tubes at transmission case.
12. Support engine by locating a jack under oil pan with a wooden block used between oil pan and jack. Support transmission by means of a transmission jack.
13. Detach converter housing dust cover. Remove bolts securing torque converter to drive plate. See Figure AT-47.



AT261

Fig. AT-47 Removing torque converter attaching bolts

Note: **Before removing torque converter, scribe match marks on two parts so that they may be replaced in their original positions at assembly.**

14. Remove rear engine mount securing bolts and crossmember mounting bolts.
15. Remove starter motor.
16. Remove bolts securing transmission to engine. After removing these bolts, support engine and transmission with jack, and lower the jack gradually until transmission can be removed and take out transmission under the car.

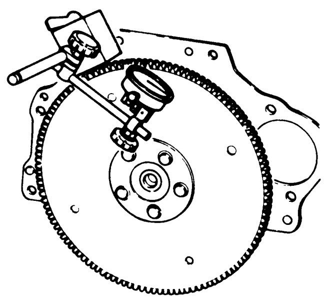
Note: **Plug up the opening such as oil charging pipe, oil cooler tubes, etc.**

Installation

Installation of automatic transmission on vehicle is reverse order of removal. However, observe the following installation notes.

1. Drive plate runout
   Turn crankshaft one full turn and measure drive plate runout with indicating finger of a dial gauge rested against plate. See Figure AT-48.
   [Replace drive plate if in excess of 0.5 mm (0.020 in).]

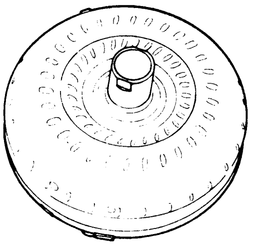
- Maximum allowable runout:
  0.3 mm (0.012 in)



AT262

Fig. AT-48 Measuring drive plate runout

2. Installation of torque converter
   Line up notch in torque converter with that in oil pump. Be extremely careful not to cause undue stresses in parts in installing torque converter. See Figure AT-49.



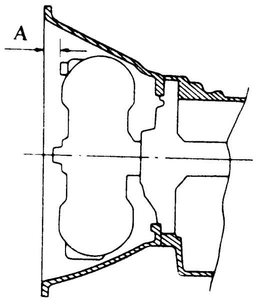
AT116

Fig. AT-49 Torque converter aligning cut

3. When connecting torque converter to transmission, measure distance "A" to be certain that they are correctly assembled. See Figure AT-50.

Distance "A":

More than 21.5 mm (0.846 in)



AT117

Fig. AT-50 Installing torque converter

4. Bolt converter to drive plate.

Note: **Align chalk marks painted across both parts during disassembling processes.**

5. After converter is installed, rotate crankshaft several turns and check to be sure that transmission rotates freely without binding.
6. Pour recommended automatic transmission fluid up to correct level through oil charge pipe.
7. Connect manual lever to shift rod. Operation should be carried out with manual and selector levers in "N."
8. Connect inhibitor switch wires.

Notes: **a. Refer to covering topic under "Checking and adjusting inhibitor switch" on page AT-51.**

b. Inspect and adjust switch as above whenever it has to be removed for service.

9. Check inhibitor switch for operation:

Starter should be brought into operation only when selector lever is i "P" and "N" positions (it should not be started when lever is in "D," "2," "1" and "R" positions).

Back-up lamp should also light when selector lever is placed in "R" position.

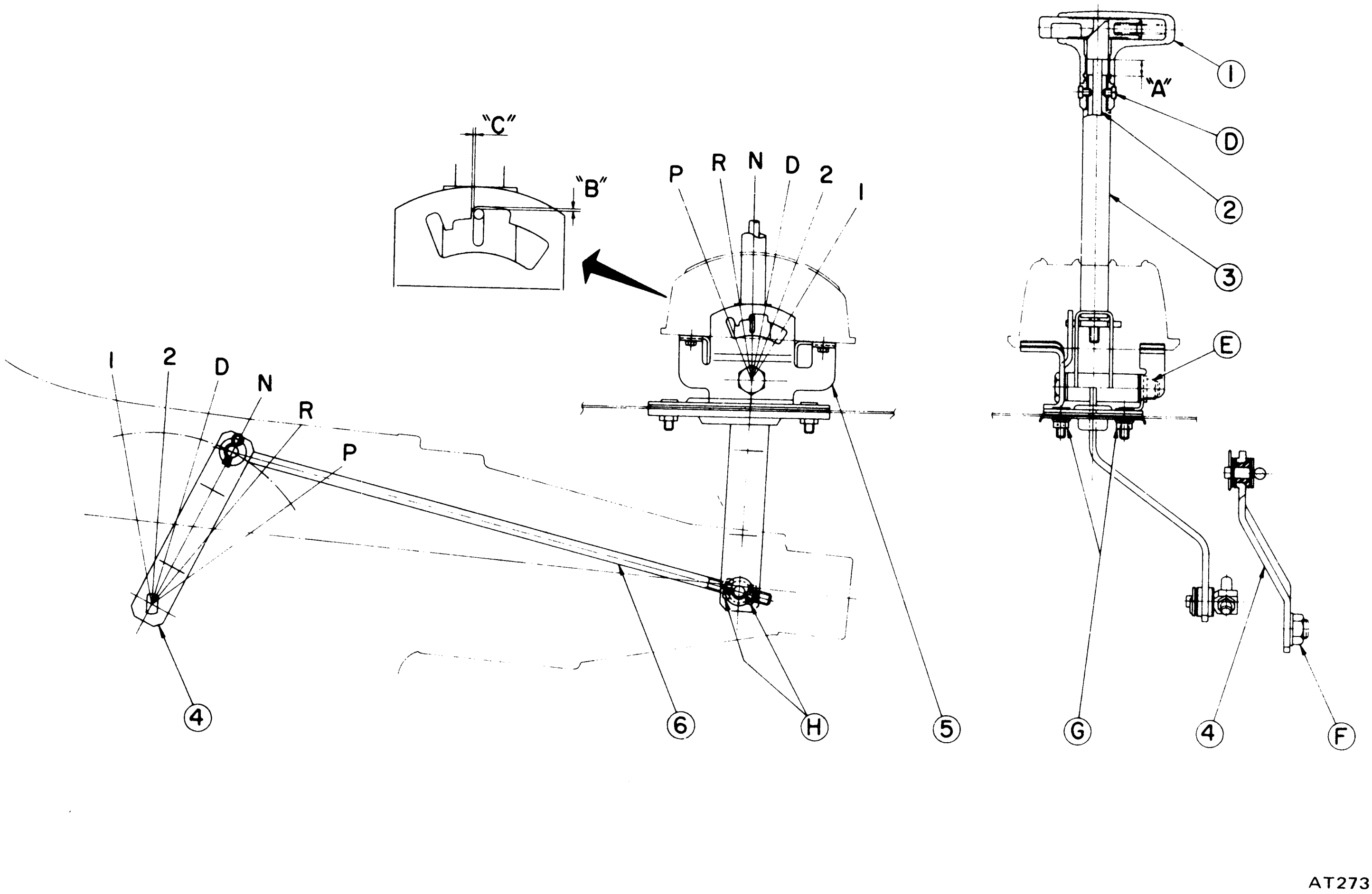
10. Check level of oil in transmission. For detailed procedure, see page AT-49.
11. Move selector lever through all positions to be sure that transmission operates correctly.

With hand brake applied, rotate engine at idling. Without disturbing the above setting, move selector lever through "N" to "D," to "2," to "1" and to "R." A slight shock should be felt by hand gripping selector each time transmission is shifted.

Note: **See page AT-50 for checking enigne idling.**

12. Check to be sure that line pressure is correct. To do this, refer to relative topic under "Testing line pressure" on page AT-53.
13. Perform stall test as per the instructions on page AT-51.

TRANSMISSION CONTROL LINKAGE



1 Control lever knob
2 Pusher
3 Control lever assembly
4 Selector range lever
5 Control lever bracket
6 Selector rod

Tightening torque (T) of nuts and screws kg-m (ft-lb)

D T = 0.07 to 0.13 (0.15 to 0.29)
E T = 1.6 to 2.2 (12 to 16)
F T = 3 to 4 (22 to 29)
G T = 0.35 to 0.45 (2.5 to 3.3)
H T = 0.8 to 1.1 (5.8 to 2.4)

Fig. AT-51 Control linkage system

Removal and installation

1. Disconnect control knob from control lever by removing two (2) screws.
2. Remove console box.
3. Remove selector rod, selector range lever and control lever assembly with bracket.

To install, reverse the order of removal.

Adjustment

The adjustment of linkage is as important as "Inspection of oil level" for the automatic transmission.

Therefore, great care should be exercised because faulty adjustment will result in the breakdown of the transmission.

1. Prior to installing control knob, set the dimension "A" to 11 to 12 mm (0.43 to 0.47 in).
2. Install control knob on lever. At the same time, check the dimension "B" and adjust it to 0.1 to 1.1 mm (0.004 to 0.043 in) by turning pusher ②. See Figure AT-51.
3. Loosen adjust nuts Ⓗ. Set control lever ③ and selector lever ④ at "N" position, moreover, set tl. clearance "C" to 1 mm (0.039 in) by turning in or out adjusting nuts at trunnion with connects selector rod ⑥.

After adjusting, make sure that control lever can be set in any position correctly and that selector lever operates properly without any binding.

If levers do not operate satisfactorily, readjust or replace parts as necessary.

MAJOR REPAIR OPERATION

CONTENTS

SERVICE NOTICE FOR DISASSEMBLY AND ASSEMBLY

1. It is desirable that the repair operations are carried out in the dust-proof room.
2. Due to the differences of the engine capacities, the specifications of component parts for each model's transmission may be different. However, they do have common adjustments and repair as well as cleaning and inspection procedures, outlined hereinafter.
3. During the repair operations, refer to the "Service Data and Specifications" section for the correct parts for the applicable model transmission.
4. Before removing any of subassemblies, thoroughly clean the outside of the transmission to prevent dirt from entering the mechanical parts.
5. Do not use a waste rag. Use a nylon waste or paper waste.
6. After disassembling, wash all disassembled parts clean, and examine them to see if there are any worn, damaged or faulty parts, and how they are affected. Refer to Service Data for the extent of damage that justifies replacement.
7. Packings, seals and similar parts once disassembled should be replaced with new ones as a rule.

TORQUE CONVERTER

The torque converter is a welded construction and can not be disassembled.

Inspection

1. Check torque converter for any sign of damage, bending, oil leak or deformation. If necessary, replace.
2. Remove rust from pilots and bosses completely.

If torque converter oil is fouled or contaminated due to burnt clutch, flush the torque converter as follows:

(1) Drain oil in torque converter.
(2) Pour none-lead gasoline or kerosene into torque converter [approximately 0.5 liter (1 U.S. pt., 7/8 Imper. pt.)].
(3) Blow air into torque converter and flush and drain out gasoline.
(4) Fill torque converter oil into torque converter [approximately 0.5 liter (1 U.S. pt., 7/8 Imper. pt.)].
(5) Again blow air into torque converter, and drain torque converter oil.

TRANSMISSION

Disassembly

1. Drain oil from the end of rear extension. Mount transmission on Transmission Case Stand ST07860000 or ST07870000. Remove oil pan. See Figure AT-52.
2. Remove bolts securing converter housing to transmission case. Remove torque converter.
3. Remove speedometer pinion sleeve bolt. Withdraw pinion.
4. Turn off by hand downshift solenoid and vacuum diaphragm. Do not leave diaphragm rod at this stage of disassembly. Rod is assembled in top of vacuum diaphragm. See Figure AT-53.

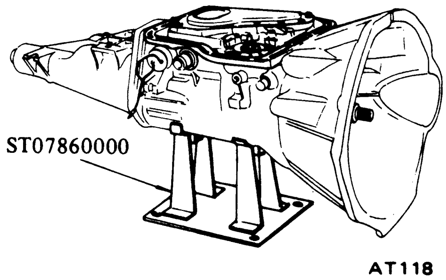


Fig. AT-52 Removing oil pan

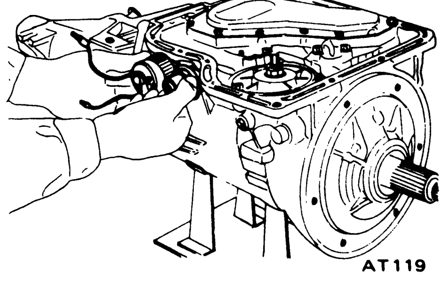


Fig. AT-53 Downshift solenoid and vacuum diaphragm

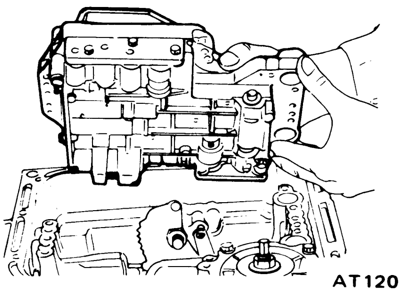


Fig. AT-54 Removing valve body

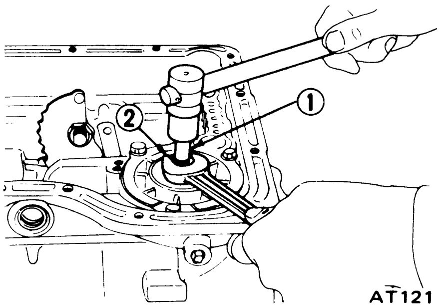


Fig. AT-55 Loosening band servo

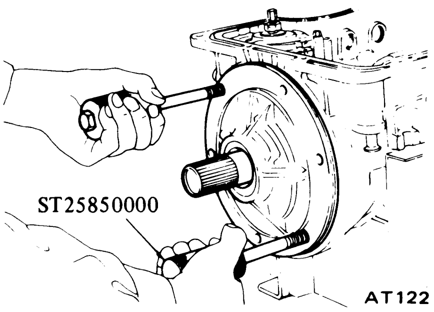


Fig. AT-56 Removing oil pump

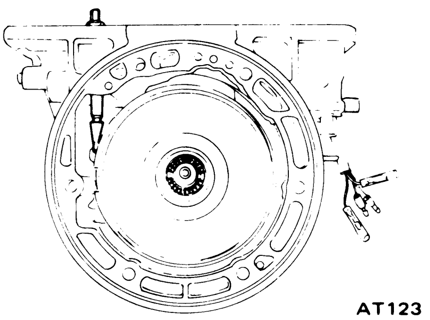


Fig. AT-57 Removing band strut

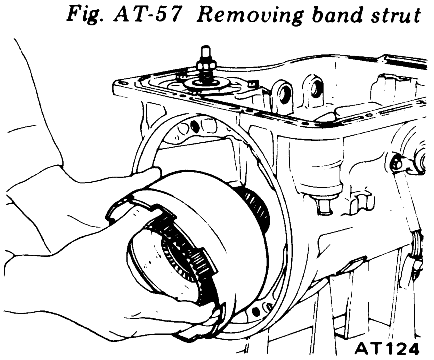


Fig. AT-58 Removing connecting shell

5. Remove bolts which hold valve body to transmission case. See Figure AT-54.

6. Loosen lock nut ② on piston stem ① as shown in Figure AT-55. Then tighten piston stem in order to prevent to fall front clutch drum down when oil pump is withdrawn.

7. Pull out input shaft.

8. Withdraw oil pump using Sliding Hammer ST25850000. Exercise care not to allow front clutch to come out of position and drop onto floor. See Figure AT-56.

9. Remove band strut. This can be done by loosening piston stem further. See Figure AT-57.

10. Remove brake band, front clutch and rear clutch as an assembled unit.

11. Remove connecting shell, rear clutch hub and front planetary carrier as a unit. See Figure AT-58.

12. With the aid of Snap Ring Plier HT69860000, pry snap ring off output shaft. See Figure AT-59.

13. Remove connecting drum and inner gear of rear planetary carrier as an assembly. See Figure AT-60.

14. Remove snap rings and then remove rear planetary carrier, internal gear, connecting drum, one-way clutch outer race and one-way clutch in this written order.

15. Remove rear extension loosening securing bolts. See Figure AT-61.

16. Pull out output shaft; remove oil distributor ② together with governor valve ①. See Figure AT-62.

17. Pry off snap ring using a pair of pliers. Remove retaining plate, drive plate, driven plate and dish plate in this written order. See Figure AT-63.

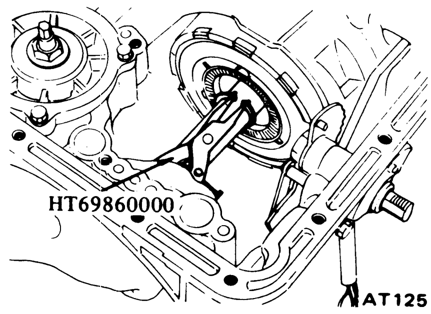


Fig. AT-59 Removing snap ring

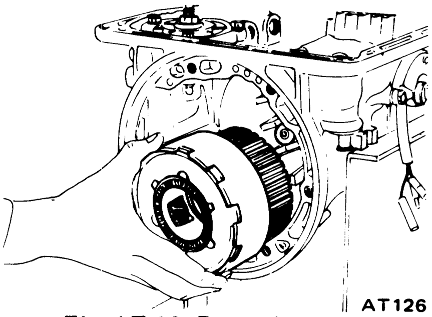


Fig. AT-60 Removing connecting drum

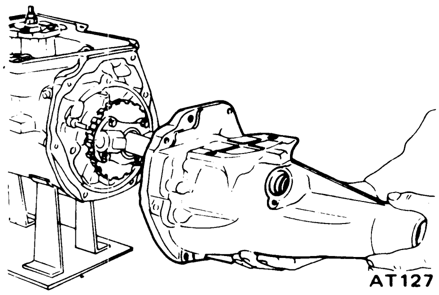


Fig. AT-61 Removing rear extension

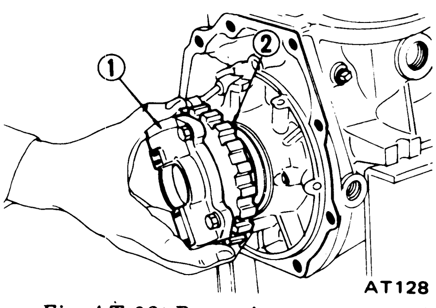


Fig. AT-62 Removing governor and oil distributor

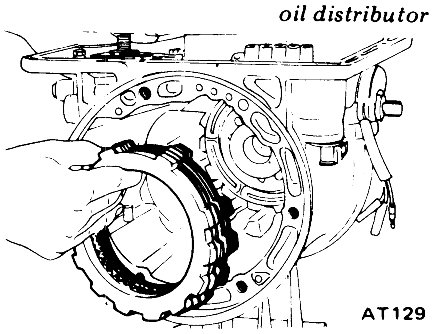


Fig. AT-63 Removing drive and driven plates

18. Reaching through back side of ransmission case, remove hex-head slotted bolts as shown in Figure AT-64. To do this, use Hex-head Extension ST25570000. One-way clutch inner race, thrust washer, piston return spring and thrust spring ring can now be removed.
19. Blow out low and reverse brake piston by directing a jet of air into hole in cylinder. See Figure AT-65.
20. Remove band servo loosening attaching bolts.

Note: If difficulty is encountered in removing retainer, direct a jet of air toward release side as shown in Figure AT-66.

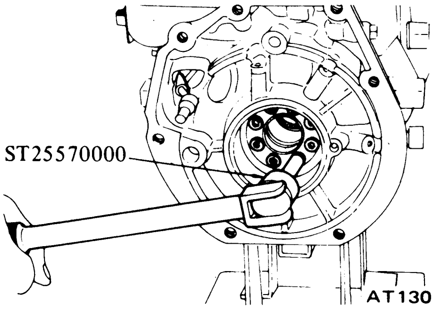


Fig. AT-64 Removing hex-head slotted bolt

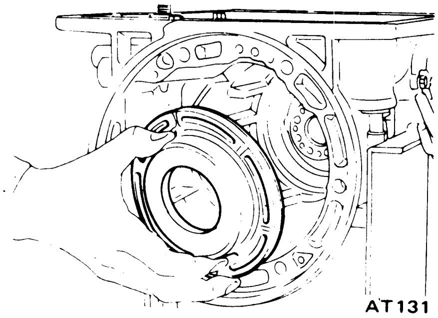


Fig. AT-65 Removing piston

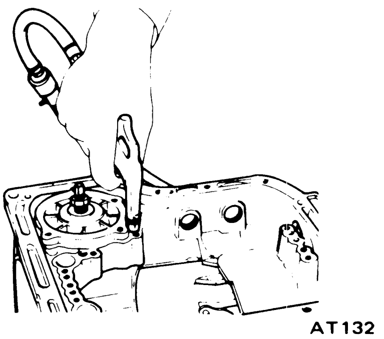


Fig. AT-66 Removing band servo

21. Pry snap rings ① from both ends of parking brake lever ② and remove the lever. Loosen off manual shaft lock nut ③ and remove manual plate ④ and parking rod ⑤. See Figure AT-67.

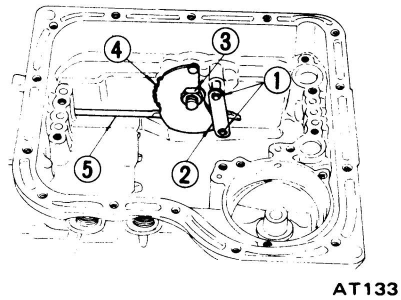


Fig. AT-67 Removing manual plate

22. Remove inhibitor switch and manual shaft loosening two securing bolts.

Inspection

Torque converter housing, transmission case and rear extension

1. Check for damage or cracking; if necessary, replace.
2. Check for dent or score mark on their mating surfaces. Repair as necessary.
3. Check for score mark or sign of burning on extension bushing; if necessary, replace.

Gaskets and O-ring

1. Always use new gaskets when the units are to be disassembled.
2. Check O-rings for burrs or cracking. If necessary, replace with new rings.

Oil distributor

1. Check for sign of wear on seal ring and ring groove, replacing with new ones if found worn too badly beyond use.
2. Test if clearance between seal ring and ring groove is correct. If out of specifications, replace whichever worn excessively beyond limits. Correct clearance is from 0.04 to 0.16 mm (0.0016 to 0.0063 in). See Figure AT-68.

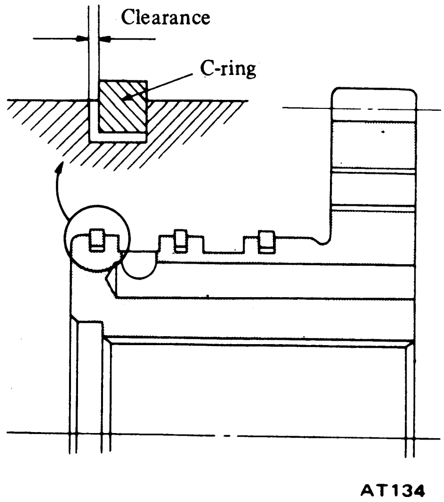


Fig. AT-68 Measuring seal ring to ring groove clearance

Assembly

Assembly is reverse order of disassembly. However, observe the following assembly notes.

1. After installing piston of low and reverse brake, assemble thrust spring ring, return spring, thrust washer and one-way clutch inner race. Torque hex-head slotted bolt to 1.3 to 1.8 kg-m (9.4 to 13 ft-lb), using Hex-head Extension ST25570000, Torque Wrench GG93010000 and Socket Extension ST25512001. See Figure AT-69.

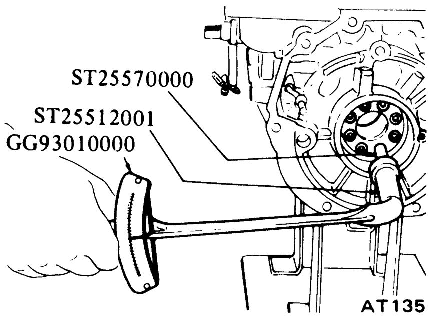


Fig. AT-69 Installing one-way clutch inner race

2. After low and reverse brake has been assembled, measure the clearance between snap ring ① and retaininig plate ②. Select proper thickness of retaining plate that will give correct ring to plate clearance. See Figure AT-70.

- Low and reverse brake clearance: 0.8 to 1.05 mm (0.031 to 0.041 in)

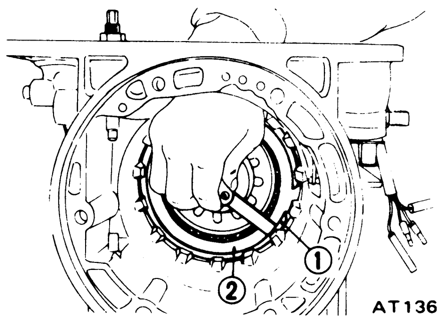


Fig. AT-70 Measuring ring to plate clearance

Available retaining plate

No.	Thickness mm (in)
1	11.8 (0.465)
2	12.0 (0.472)
3	12.2 (0.480)
4	12.4 (0.488)
5	12.6 (0.496)
6	12.8 (0.504)

As to inspection procedure for low and reverse brake, see page AT-43.

3. Install one-way clutch so that the arrow mark "→" is toward front of vehicle. It should be free to rotate only in clockwise direction. See Figure AT-71.

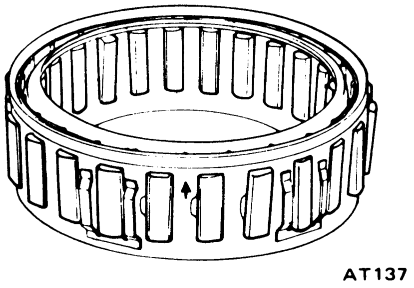


Fig. AT-71 One-way clutch

4. After installing rear extension, torque attaching bolts to 2.0 to 2.5 kg-m (14 to 18 ft-lb). Place manual lever in "P" range and check to be sure that rear output shaft is securely blocked.

5. Tighten servo retainer temporarily at this stage of assembly.

6. Place rear clutch assembly with needle bearing on front assembly.

7. Install rear clutch hub and front planetary carrier in the manner as shown in Figure AT-72.

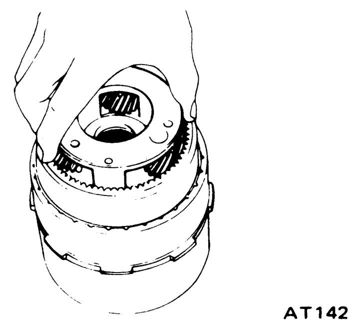


Fig. AT-72 Installing planetary carrier

8. Assemble connecting shell and other parts up to front clutch in reverse order of disassembly.

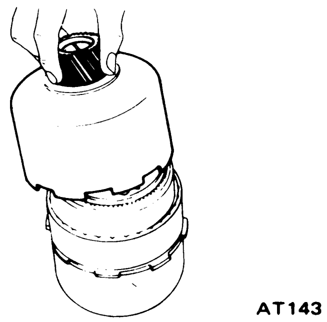
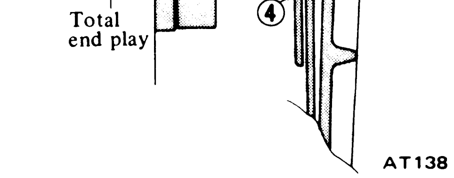


Fig. AT-73 Installing connecting shell

9. Adjust total end play and front end play as follows:



1 Front clutch thrust washer
2 Oil pump
3 Front clutch
4 Rear clutch
5 Transmission case
6 Oil pump gasket
7 Oil pump cover bearing race

Fig. AT-74 End play

(1) Measure the distance "A" and "C" by vernier calipers as shown in Figure AT-75.

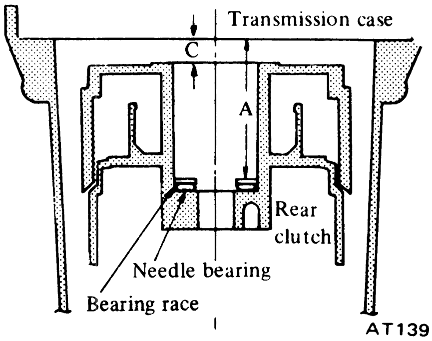


Fig. AT-75 Measuring the distance "A" and "C"

(2) Measure the distance "B" and "D" of oil pump cover as shown in Figure AT-76.

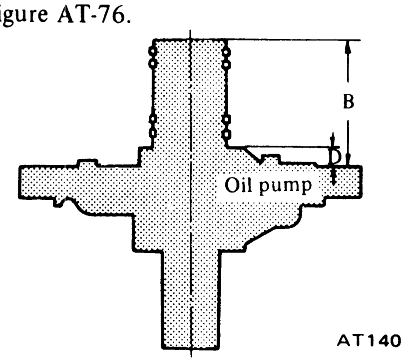


Fig. AT-76 Measuring the distanc "B" and "D

Adjustment of total end play

Select oil pump cover bearing race by calculating the following formula:

$$T_T = A - B + W$$

where,

T_T = Required thickness of oil pump cover bearing race mm (in)

A = Measured distance A mm (in)

B = Measured distance B mm (in)

W = Thickness of bearing race temporarily inserted mm (in)

Available oil pump cover bearing race

No.	Thickness mm (in)
1	1.2 (0.047)
2	1.4 (0.055)
3	1.6 (0.063)
4	1.8 (0.071)
5	2.0 (0.079)
6	2.2 (0.087)

Specified total end play:
0.25 to 0.50 mm (0.009 to 0.020 in)

Adjustment of front end play

Select front clutch thrust washer by calculating the following formula:

$$T_F = C - D - 0.2 \text{ (mm)}$$

where,

T_F = Required thickness of front clutch thrust washer mm (in)

C = Measured distance C mm (in)

D = Measured distance D mm (in)

Available front clutch thrust washer

No.	Thickness mm (in)
1	1.5 (0.059)
2	1.7 (0.067)
3	1.9 (0.075)
4	2.1 (0.083)
5	2.3 (0.091)
6	2.5 (0.098)
7	2.7 (0.106)

Specified front end play:
0.5 to 0.8 mm
(0.020 to 0.031 in)

Notes: **a. Correct thickness of bearing race and thrust washer is always the one which is nearest the calculated one.**
b. Installed thickness of oil pump gasket is 0.4 mm (0.016 in).

10. Check to be sure that brake servo piston moves freely. For detailed procedure, refer to covering topic on page AT-43. Use care to prevent piston from coming out of place during testing since servo retainer is not tightened at this point of assembly.
11. Make sure that brake band strut is correctly installed. Torque piston stem to 1.2 to 1.5 kg-m (8.7 to 11 ft-lb); Back off two full turns and secure with lock nut. Lock nut tightening torque is 1.5 to 4.0 kg-m (11 to 29 ft-lb).
12. After inhibitor switch is installed, check to be sure that it operates properly in each range. For detailed procedure, refer to covering topic on page AT-51.
13. Check the length "L" between case end to rod end of vacuum throttle valve fully pushed in. Then select adequate diaphragm rod corresponding measured length. See Figure AT-77.

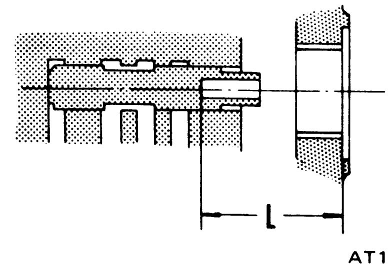


Fig. AT-77 Measuring the distance "L"

Available diaphragm rod

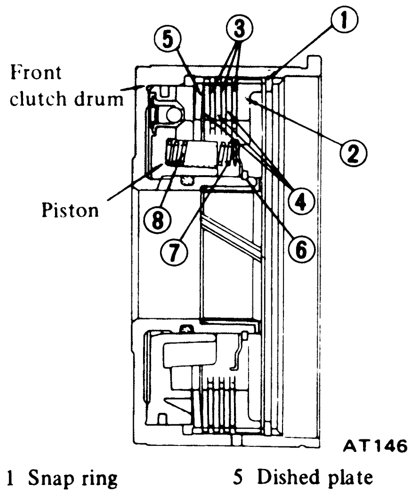
Distance measured "L" mm (in)	Diaphragm rod length mm (in)
Under 25.55 (1.006)	29.0 (1.142)
25.65 to 26.05 (1.010 to 1.026)	29.5 (1.161)
26.15 to 26.55 (1.030 to 1.045)	30.0 (1.181)
26.65 to 27.05 (1.049 to 1.065)	30.5 (1.201)
Over 27.15 (1.069)	31.0 (1.220)

COMPONENT PARTS

The transmission consists of many small parts that are quite alike in construction yet machined to very close tolerances. When disassembling parts, be sure to place them in order in a part rack so they can be restored in the unit in their proper positions. It is also very important to perform functional test whenever it is designated.

Front clutch

Disassembly



1 Snap ring
2 Retaining plate
3 Drive plate
4 Driven plate
5 Dished plate
6 Snap ring
7 Spring retainer
8 Coii spring

Fig. AT-78 Sectional view of front clutch

1. Pry off snap ring ① with a suitable screwdriver or a pair of pliers. Remove a retaining plate ②, drive plate ③, driven plate ④ and dish plate ⑤ in the order listed as shown in Figure AT-78.
2. Compress clutch springs, using Clutch Spring Compressor ST25420000 (or ST2542001). Remove snap ring ⑥ from spring retainer, using Snap Ring Remover ST25320001. See Figure AT-79.

Note: **When Clutch Spring Compressor ST25420000 is to be used, cut the toe-tips of three legs by a grinding wheel. See Figure AT-80.**

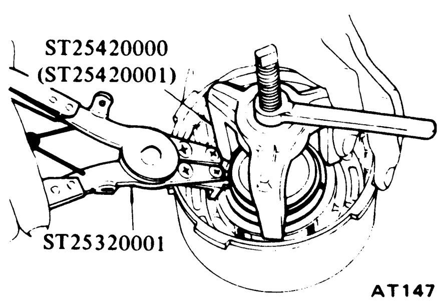


Fig. AT-79 Removing snap ring

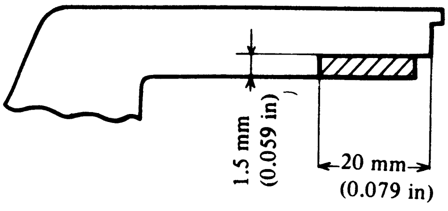


Fig. AT-80 Modifying of coil spring compressor

3. Take out spring retainer ⑦ and spring ⑧. See Figure AT-78.
4. Blow out piston by directing a jet of air into hole in clutch drum. See Figure AT-81.

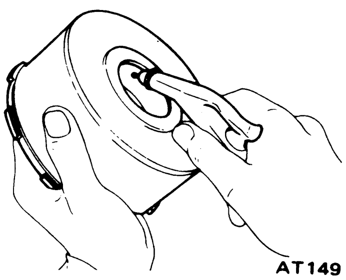


Fig. AT-81 Blowing out piston

Inspection

1. Check for sign of wear or damage to clutch drive plate facing. If found worn or damaged excessively, discard. See Service Data for limits.
2. Check for wear on snap ring and for weakened or broken coil spring.
   If necessary, replace with new ones.
   Spring retainer should also be inspected for warpage.

Assembly

1. Assembly is reverse order of disassembly. Dip all parts in clean automatic transmission fluid before they can be installed.
2. Line up driven plates so that stripped arcs are properly aligned, paying particular attention to the location of oil holes in clutch drum. See Figure AT-82.

Note: **The number of drive and driven plates varies with the type of vehicles. For detailed information, also see Service Data & Specifications.**

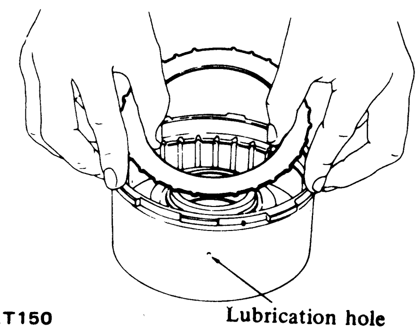


Fig. AT-82 Inserting clutch plate

3. After clutch is assembled, make sure that clearance between snap ring ① and retaining plate ② is held within specified limits. If necessary, try with other plates having different thickness until correct clearance is obtained. See Figure AT-83.

Specified clearance:
1.6 to 1.8 mm
(0.063 to 0.071 in)

Available retaining plate

No.	Thickness mm (in)
1	10.6 (0.417)
2	10.8 (0.425)
3	11.0 (0.433)
4	11.2 (0.441)
5	11.4 (0.449)
6	11.6 (0.457)

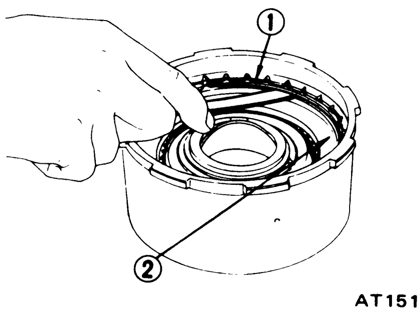


Fig. AT-83 Measuring ring to plate clearance

4. Testing front clutch
   With front clutch assembled on oil pump cover, direct a jet of air into hole in clutch drum. See Figure AT-84.

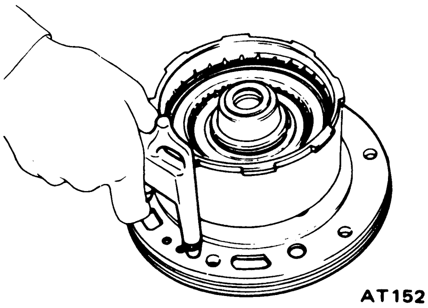
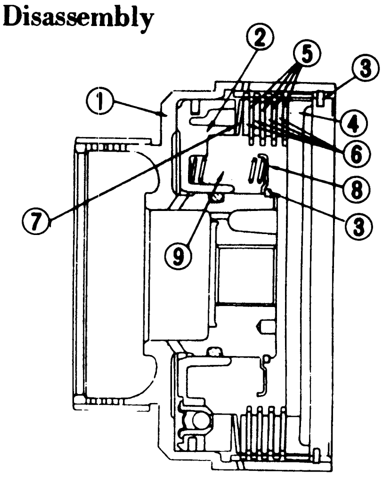


Fig. AT-84 Testing front clutch

Rear clutch

Disassembly



1 Rear clutch drum
2 Front clutch piston
3 Snap ring
4 Retaining plate
5 Drive plate
6 Driven plate
7 Dished plate
8 Spring retainer
9 Coil spring

Fig. AT-85 Sectional view of rear clutch

1. Take out snap ring ③, retaining plate ④, drive plate ⑤, driven plate ⑥ and dished plate ⑦. Same technique can be applied as in disassembling front clutch. See Figure AT-85.
2. Remove snap ring from coil spring retainer. See Figure AT-86.

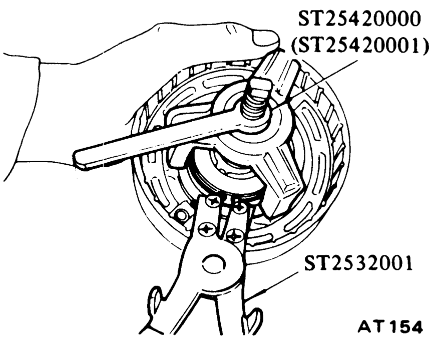


Fig. AT-86 Removing snap ring

3. Blow out piston by directing a jet ᶜ air into hole in clutch drum. See ɾigure AT-87.

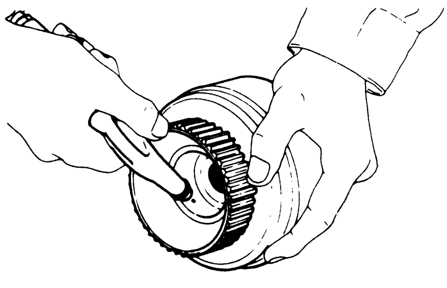


Fig. AT-87 Blowing out piston

Inspection

Refer to covering topic under "Front Clutch."

Assembly

Assembly is reverse order of disassembly. Dip all parts in clean automatic transmission fluid before assembling. Note that the number of drive and driven plates varies with types of vehicles. For details, refer to ›rvice Data & Specifications.

1. After rear clutch is assembled, check to be sure that clearance between snap ring ① and retaining plate ② is held within prescribed tolerances. See Figure AT-88.

Specified clearance:
1.0 to 1.5 mm
(0.039 to 0.059 in)

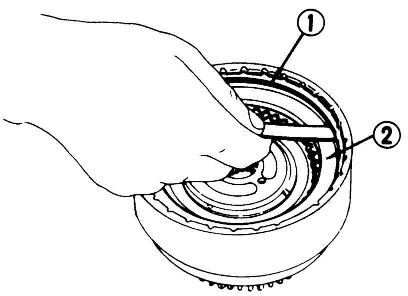


Fig. AT-88 Measuring ring to plate clearance

2. Testing rear clutch
Install rear clutch on oil pump ver.
Blow air under pressure into oil hole to listen for definite clutch operation as shown in Figure AT-89.

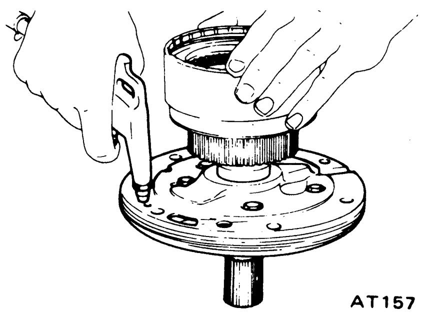


Fig. AT-89 Testing rear clutch

Low & reverse brake

Disassembly

1. Follow steps as per instructed on page AT-38.
2. Blow out piston by directing a jet of air into oil hole in clutch piston.

Inspection

1. Check drive plate facing for wear or damage; if necessary, replace. Refer to Service Data & Specifications for limits.
2. Test if piston return spring is not weakened. Discard if weakened too badly beyond use.
3. Replace any faulty parts with new ones.

Assembly

1. After low & reverse piston is installed, assemble thrust spring ring, return spring, thrust washer and one-way clutch inner race. With the aid of Hex-head Extension ST25570000, tighten hex-head slotted bolt 1.3 to 1.8 kg-m (9.4 to 13 ft-lb).
2. Enter dished plate, driven plate, drive plate and retaining plate into transmission case in this written order. Install snap ring to secure the installation.

Note: The number of drive and driven plates varies with types of vehicles. For detailed information, refer to Service Data & Specifications.

3. Without disturbing the above setting, check to be sure that clearance between snap ring and retaining plate is held within specified limits. If necessary, try with other plates having different thickness until correct clearance is obtained.

Specified clearance:
0.80 to 1.05 mm
(0.031 to 0.041 in)

4. Blow under pressure air into oil hole in low & reverse brake to listen for definite brake operation as shown in Figure AT-90.

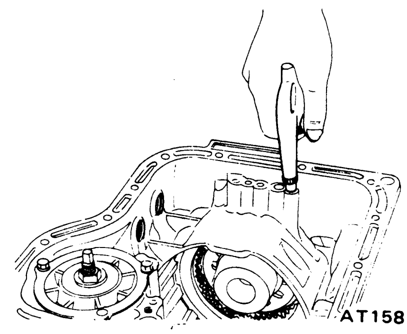


Fig. AT-90 Testing low & reverse brake

Servo piston

Disassembly

1. Blow out piston by directing a jet of air into hole in release-side of piston.
2. Remove servo piston return spring.

Inspection

Check piston for wear, damage or any other faults which might interfere with proper brake operation.

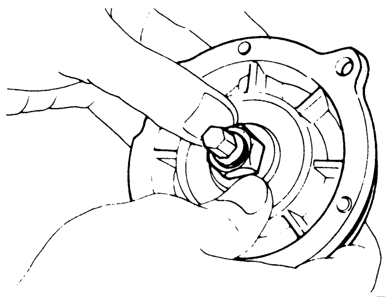
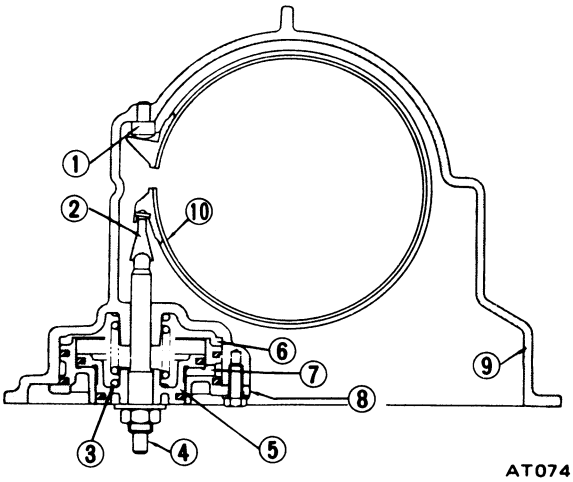


Fig. AT-91 Removing piston



1 Anchor end pin
2 Band strut
3 Return spring
4 Piston stem
5 Band servo piston
6 Release
7 Apply
8 Servo piston retainer
9 Transmission case
10 Band brake

Fig. AT-92 Sectional view of servo piston

Assembly

1. Prior to assemlbing, dip all parts in clean automatic transmission fluid.
   Reverse disassembly procedure to assemble brake.
2. Use extreme care to avoid damaging rubber ring when installing seal lace.
3. Blow under pressure air from apply-side of piston to listen for definite piston operation as shown in Figure AT-93.

4. With apply-side of piston plugged with thumb, blow air under pressure into cylinder from release-side as shown in Figure AT-94. If retainer is raised a little, it is an indication that attaching bolts are loosened, calling for retightening.

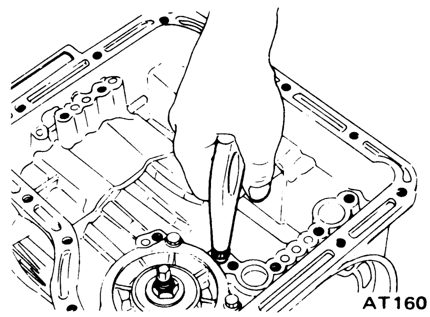


Fig. AT-93 Testing piston (Apply side)

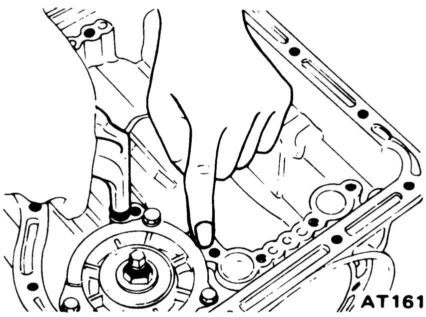


Fig. AT-94 Testing piston (Release side)

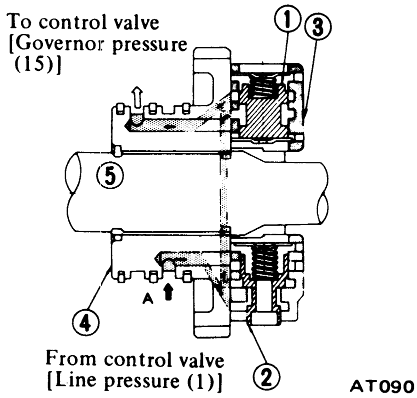
Governor

Disassembly

1. Separate governor from oil distributor by unscrewing attaching bolts.
2. To disassemble secondary governor, remove spring seat, spring and secondary governor valve from valve body in this written order as shown in Figure AT-95.
3. If primary governor is to be disassembled for any purpose, remove spring seat, primary governor valve, spring and spring seat.

Inspection

1. Check valve for faulty condition. Replace spring if found weakened too badly beyond use. Faulty piston should also be replaced with a new one.
2. Examine if primary governor slides freely without binding.
3. To determine if secondary governor is in good condition, blow air under light pressure into hole at "A" to listen for noise like a model plane.



1 Primary governor
2 Secondary governor
3 Governor valve body
4 Oil distributor
5 Output shaft

Fig. AT-95 Testing secondary governor

Assembly

Reverse disassembly procedure to assemble governor.

Note: **Do not confuse primary governor with secondary governor. After installation, check to be sure that spring is not deflected.**

Oil pump

Disassembly

1. Free pump cover from pump housing by removing attaching bolts.
2. Take out inner and outer gears from pump houisng.

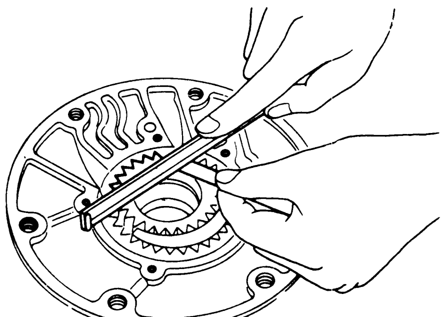
Inspection

1. Inspect gears for wear or damage to gear teeth. Replace rubber ring if found damaged excessively beyond use.
2. Using a straight edge and feelers, measure pump and gear clearances as follows:

- Clearance between inner (or outer) gear and pump cover. See Figure AT-96.
  Standard clearance:
  0.02 to 0.04 mm
  (0.0008 to 0.0016 in)

[Replace if going over 0.08 mm (0.0031 in).]

- Clearance between seal ring and ring groove. See Figure AT-97.
  Standard clearance:
  0.04 to 0.16 mm
  (0.0016 to 0.0063 in)



AT162

Fig. AT-96 Measuring clearance

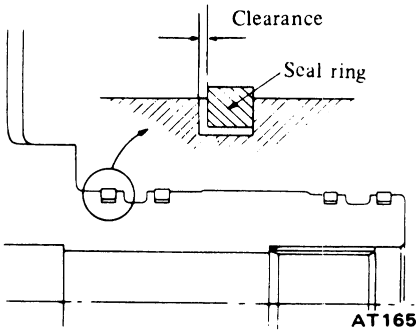
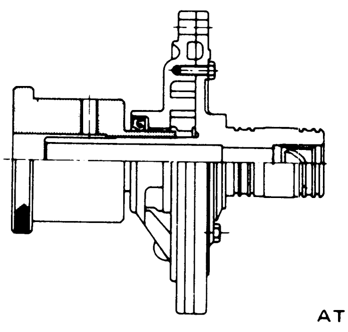


Fig. AT-97 Measuring clearance

Assembly

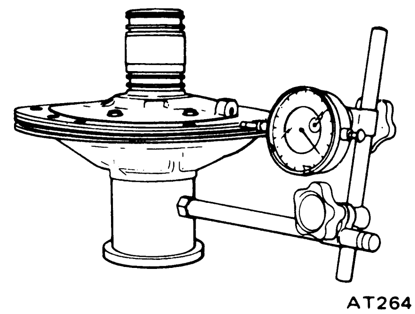
1. Set up pump housing and inner and outer pump gears on it.
2. With the aid of Oil Pump Assembling Gauge ST25580000, install pump cover to pump housing as shown in Figure AT-98.



AT166

Fig. AT-98 Centering oil pump

3. Temporarily tighten pump secur-g bolts.
4. Set the runout of oil pump cover within 0.07 mm (0.0028 in) total indicator reading. See Figure AT-99.



AT264

Fig. AT-99 Measuring runout

5. Tighten pump securing bolts to specified torque 0.6 to 0.8 kg-m (4.3 to 5.8 ft-lb).

Note: **Be sure to align converter housing securing bolt holes.**

6. Again, check the runout of oil pump cover.

Note: **When former Oil Pump Assembling Gauge is to be used, make a screw hole in side of it.**

Planetary carrier

The planetary carrier cannot be divided into its individual components.

If any part or component is faulty, replace the carrier as a unit.

Inspection

Check with a feeler clearance between pinion washer and planetary carrier. See Figure AT-100.

- Standard clearance:
  0.20 to 0.70 mm
  (0.0079 to 0.0276 in)

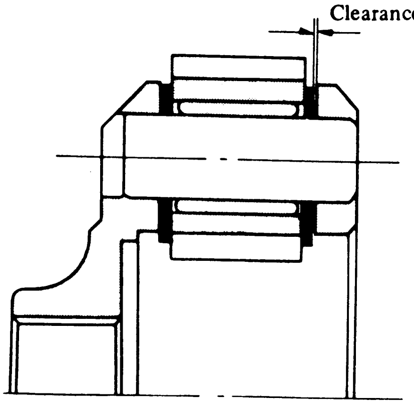


Fig. AT-100 Measuring pinion washer to carrier clearance

[Replace if going over 0.80 mm (0.0315 in).]

Control valve

The control valve assembly consists of many precision parts and requires extreme care when it has to be removed and serviced. It is good practice to place parts in a part rack so that they can be restored in valve body in their proper positions. Added care should also be exercised to prevent springs and other small parts from being scattered and lost.

Before assembly, dip all parts in clean automatic transmission fluid and check to be certain that they are free of lint and other minute particles. If clutch or band is burnt or if oil becomes fouled, the control valve assembly should be disassembled and flushed.

Disassembly

1. Remove bolts and nuts which retain oil strainer. Bolts may be removed with a screwdriver, but it is recommended to use Hexagon Wrench HT61000800 and Spinner Handle HT62350000. See Figure AT-101.
2. Remove attaching bolts. With bolts removed, lower valve body, separate plate and upper valve body are free for removal. See Figure AT-102.

Note: **Do not allow orifice check valve and valve spring in lower valve body from being scattered and lost when removing separate plate.**

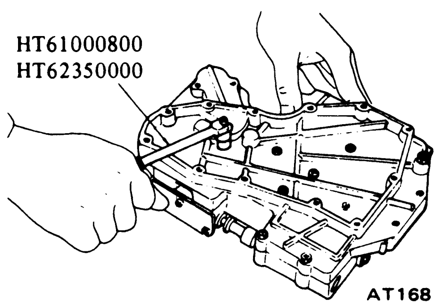


Fig. AT-101 Removing valve body

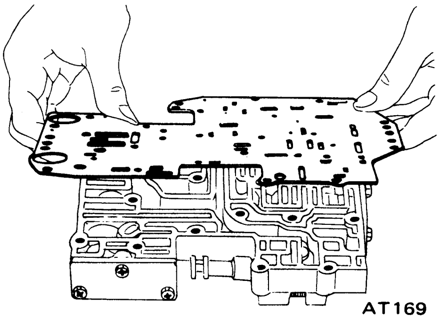


Fig. AT-102 Removing separate plate

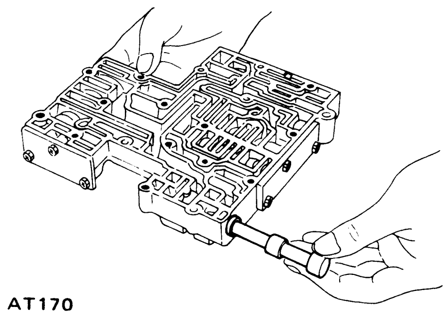


Fig. AT-103 Removing manual valve

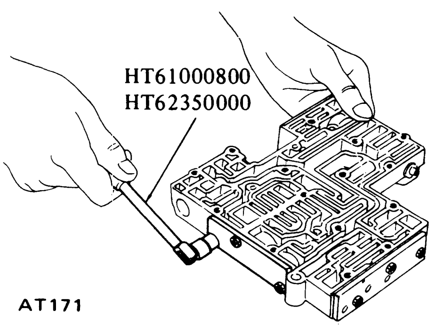


Fig. AT-104 Removing side plate

3. Pull out manual valve as shown in Figure AT-103.

4. Remove side plate. Take out "1st-2nd" shift valve, "2nd-3rd" shift valve, pressure modifier valve and three valve springs. See Figure AT-104.

Note: Do not work it off with screwdrivers to avoid damaging machine screws.

5. Remove side plate; pull out pressure regulator valve, second lock valve, pressure regulator plug and two valve springs.

6. Remove side plate. With side plate removed, solenoid downshift valve; throttle back-up valve, vacuum throttle valve, "2nd-3rd" timing valve and three valve springs are free for removal.

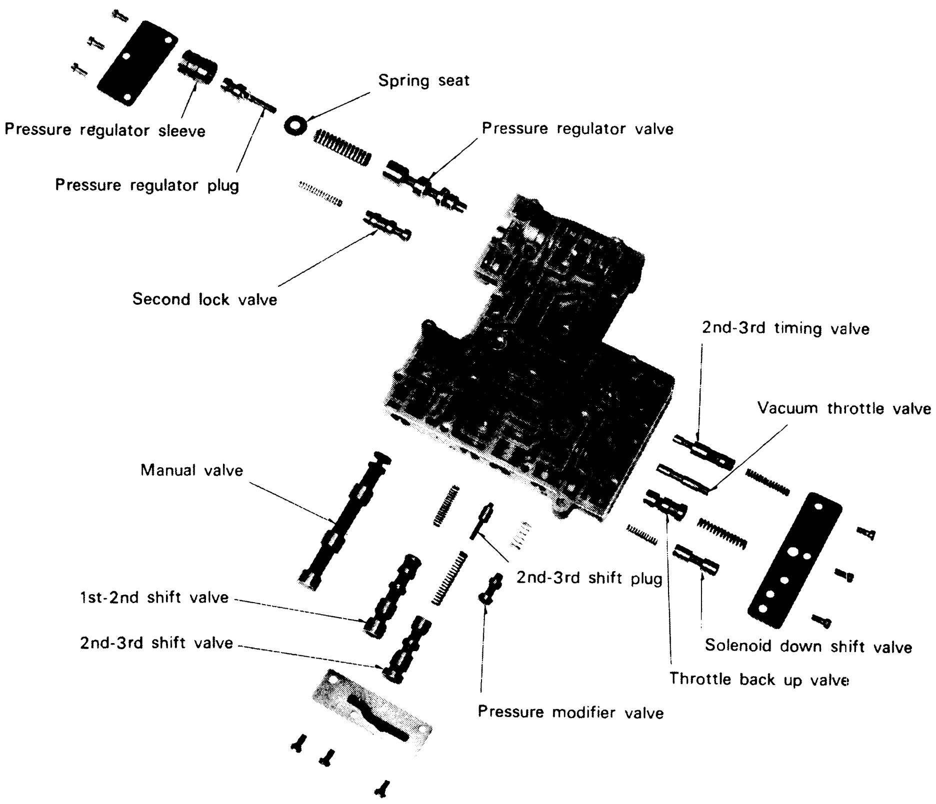


Fig. AT-105 Components parts of control valve

Inspection

1. Check valves for sign of burning and, if necessary, replace.
2. Check to be certain that oil strainer is in good condition. If found damaged in any manner, discard.
3. Test valve springs for weakened tension; if necessary, replace.
4. Examine if there is any sign of damage or score marks on separate plate. If left unheeded, oil will bypass correct oil passages causing many types of abnormalities in the system.
5. Check oil passages in valve body for sign of damage or other conditions which might interfere with proper valve operation.
6. Check bolts for stripped threads. Replace as required.

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)	Installed Load kg (lb)
Manual detent	1.3 (0.051)	6.0 (0.236)	15.0	32.4 (1.276)	26.5 (1.043)	5.5 (12)
Pressure regulator	1.2 (0.047)	10.5 (0.413)	13.0	43.0 (1.693)	23.5 (0.925)	2.8 (6.2)
Pressure modifier	0.4 (0.016)	8.0 (0.315)	5.0	18.5 (0.728)	9.0 (0.3543)	0.1 (0.2)
1st - 2nd shift	0.6 (0.024)	6.0 (0.236)	16.0	32.0 (1.260)	16.0 (0.630)	0.625 (1.4)
2nd - 3rd shift	0.7 (0.028)	6.2 (0.244)	18.0	41.0 (1.614)	17.0 (0.669)	1.40 (3.1)
2nd - 3rd timing	0.7 (0.028)	5.5 (0.217)	15.0	32.5 (1.280)	27.0 (1.063)	0.55 (1.2)
Throttle back-up	0.8 (0.031)	6.5 (0.256)	14.0	36.0 (1.417)	18.8 (0.740)	1.92 (4.2)
Solenoid downshift	0.55 (0.022)	5.0 (0.197)	12.0	22.0 (0.866)	12.5 (0.492)	0.60 (1.3)
Second lock	0.55 (0.022)	5.0 (0.197)	16.0	33.5 (1.319)	21.0 (0.827)	0.60 (1.3)
Throttle relief	0.9 (0.035)	5.6 (0.220)	14.0	26.8 (1.055)	19.0 (0.748)	2.19 (4.8)
Orifice check	0.2 (0.008)	4.8 (0.189)	15.0	21.5 (0.846)	11.5 (0.453)	0.01 (0.02)
Primary governor	0.45 (0.018)	8.3 (0.327)	5.0	21.8 (0.858)	7.5 (0.2953)	0.215 (0.5)
Secondary governor	0.7 (0.028)	8.5 (0.335)	5.5	25.1 (0.988)	10.5 (0.413)	1.10 (2.4)

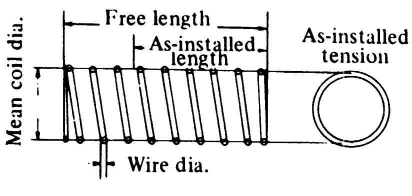


Fig. AT-106 Valve spring

Assembly

Assembly is reverse order of disassembly. However, observe the following assembly notes. Refer to Valve Spring Chart and illustration in assembling valve springs. Dip all parts in clean automatic transmission fluid before assembly. Tighten parts to specifications whenever designated.

1. Slide valve into valve body and be particularly careful that they are not forced in any way.
2. Install side plates using Torque Driver ST25160000. See Figure AT-107.

Tightening torque:
0.25 to 0.35 kg-m
(1.9 to 2.5 ft-lb)

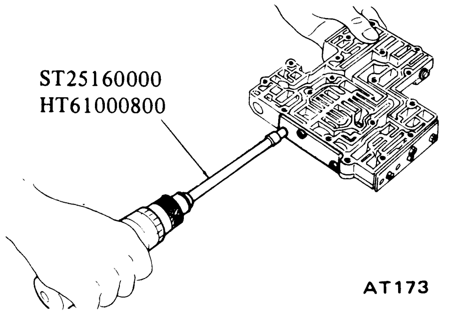


Fig. AT-107 Installing side plate

3. Install orifice check valve, valve spring, throttle relief valve spring and steel ball in valve body.

Note: Install check valve and relief spring so that they are properly positioned in valve body.

4. Install upper and lower valves. See Figure AT-108.

Tightening torque:
0.25 to 0.35 kg-m
(1.8 to 2.5 ft-lb)

Reamer bolt tightening torque:
0.5 to 0.7 kg-m
(3.6 to 5.1 ft-lb)

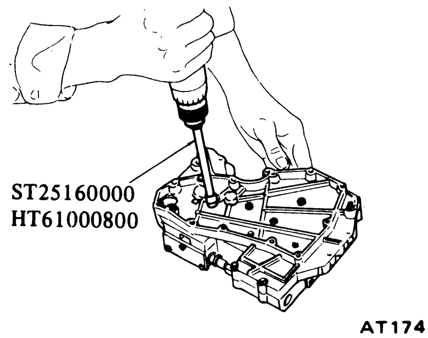


Fig. AT-108 Installing valve body

5. Install oil strainer.

Tightening torque:
0.25 to 0.35 kg-m
(1.8 to 2.5 ft-lb)

TROUBLE DIAGNOSES AND ADJUSTMENT

CONTENTS

As the problems on the automatic transmission can be mostly repaired by doing simple adjustment, so do not disassemble immediately if the automatic transmission is in problem.

Firstly inspect and adjust the automatic transmission with mounting on vehicle by observing the trouble diagnoses and corrections chart.

If the problem could not be solved by this procedure, then remove and disassemble the automatic transmission. It is advisable to check, overhaul and repair each point in the order itemized in the "trouble diagnoses and corrections chart."

1. In the "trouble diagnoses and corrections chart" the diagnoses items are arranged in the order from easy to difficult and therefore please follow these items. The transmission should not be removed, unless necessary.
2. The test and adjustment for trouble diagnosis should be made on the basis of standard values and the data should be recorded.

INSPECTION AND ADJUSTMENT BEFORE TROUBLE DIAGNOSIS

Testing instrument for inspection

1. Engine tachometer
2. Vacuum gauge
3. Oil pressure gauge

It is convenient to install these instruments in a way that allows measurements to be made from the driver's seat.

Checking oil level

In checking the automatic transmission the oil level and the condition of oil around the oil level gauge should be examined every 5,000 km (3,000 miles). These steps are easy and effective in trouble diagnoses and corrections as some change of oil conditions are linked with developed problems in many cases.

For instance:

Lack of oil causes faulty operation by making the clutches and brakes slip, developing severe wear.

The cause of this operation is that the oil pump has begun to suck air which caused oil foaming, thus rapidly deteriorating the oil quality and producing sludge and varnish.

Meanwhile, excessive oil is also bad as in the case of a lack of oil, because of oil foaming by being stirred up by the gears. Moreover, in high speed driving with excessive oil in the transmission the oil often blows out from the breather.

1. Measuring oil level

When checking the fluid level, start the engine and run it until normal operating temperatures [oil temperature: 50 to 80°C (122 to 176°F). Approximately ten-minute operation will elevate the temperature to this range.] and enigne idling conditions are stabilized. Then, apply the brakes and move the transmission shift lever through all drive positions and place the lever in park "P" position. In this inspection, the car must be placed on a level surface.

The amount of the oil varies with the temperature. As a rule the oil level must be measured after its temperature becomes sufficiently high.

(1) Fill the oil to the line "H." The difference of capacities between both "H" and "L" is approximately 0.4 liter (7/8 U.S. qt., 3/4 Imper. qt.)and, therefore, take care not to fill beyond the line "H."

(2) At the time of the above topping-up and changing of oil, care should be taken of to prevent mixing the oil with dust and water.

2. Inspecting oil condition

The condition of oil sticking to the level gauge indicates whether to overhaul and repair the transmission or look for the faulty part.

If the oil has deteriorated into a varnish-like quality, it causes the control valve to stick. The blackened oil gives the proof of the burned clutch, brake band, etc. In these cases, the transmission must be replaced.

Notes: **a. In oil level checking, use special paper waste to handle the level gauge and take care not to let the scraps of paper and cloth stick to the gauge.**
b. Insert the gauge fully and take it out quickly before splashing oil adheres to the gauge and then observe the level.
c. Use automatic transmission fluid having "DEXRON" identifications only in the 3N71B automatic transmission.
d. Pay attention because the oil to be used differs from that is used in the Nissan Full Automatic Transmission 3N71A. Never mix the oil with that.

Inspection and repair of oil leakage

When oil leakage takes place, the portion near the leakage is covered with oil, presenting difficulty in detecting the spot. Therefore, the places where oil seals and gaskets are equipped are enumerated below:

(1) Converter housing
- The rubber ring of oil pump housing.
- The oil seal of oil pump housing.
- The oil seal of engine crankshaft.
- The bolts of converter housing to case.

(2) Transmission and rear extension
- Junction of transmission and rear extension.
- Oil cooler tube connectors.
- Oil pan.
- Oil-pressure inspection holes (Refer to Figure AT-112.
- The mounting portion of vacuum diaphragm and downshift solenoid.
- Breather and oil charging pipe.
- Speedometer pinion sleeve.
- The oil seal of rear extension.

To exactly locate the place of oil leakage, proceeds as follows:

- Place the vehicle in a pit, and by sampling the leaked oil, examine whether it is the torque converter oil or not. The torque converter oil assumes a color like red wine when shipped from the factory, so it is easily distinguished from engine oil or gear oil.
- Cleanly wipe off the leaking oil and dust and detect the spot of oil leakage. Use nonflammable organic solvent such as carbon tetrachloride for wiping.
- Raise the oil temperature by operating the engine and shift the lever to "D" to heighten the oil pressure. The spot of oil leakage will then be found more easily.

Note: **As the oil leakage from the breather does not take place except when running at high speed, it is impossible to locate the spot of leakage with vehicle stalled.**

Checking engine idling rpm

The engine idling revolution should be properly adjusted.

If the engine revolution is too low, the engine does not operate smoothly, and if too high, a strong shock or creep develops when changing over from "N" to "D" or "R."

Specified idling speed:
650 rpm at "D" position
(800 rpm at "N" position)

Checking and adjusting kick-down switch and downshift solenoid

When the kickdown operation is not made properly or the speed changing point is too high, check the kickdown switch, downshift soler and wiring between them. When , ignition key is positioned at the 1st stage and the accelerator pedal is depressed deeply, the switch contact should be closed and the solenoid should click. If it does not click, it indicates a damaged. Then check each part with the testing instruments. See Figure AT-109.

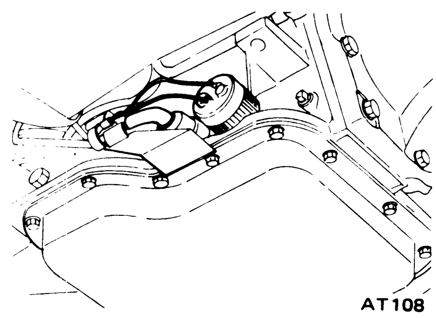


Fig. AT-109 Downshift solenoid

Note: **Watch for oil leakage from transmission case.**

Insnection and adjustment oı ..ıanual linkage

The adjustment of linkage is equally important as "Inspection of oil level" for the automatic t:ansmission. Therefore, great care should be exercised because faulty adjustment will result in the breakdown of the transmission.

Inspection:

Pull the selector lever toward you and turn it so far as "P" to "1" range, where clicks will be felt by hand. This is the detent of manual valve in the body, and indicates the correct position of the lever.

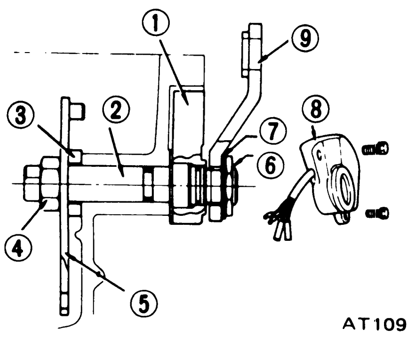
Inspect whether the pointer of selector dial corresponds to this point, and also whether the lever comes in alignment with the stepping of position plate when it is released.

Adjustment:

s procedure can be accomplis..ed by referring to "Removal and Installation."

Checking and adjusting inhibitor switch

The inhibitor switch serves to light the reverse lamp in the range "R" of the transmission operation and also to rotate the starter motor in the ranges "N" and "P."



1 Inhibitor switch
2 Manual shaft
3 :her
4 .t
5 Manual plate
6 Washer
7 Nut
8 Inhibitor switch
9 Range select lever

Fig. AT-110 Construction of inhibitor switch

Check whether the reverse lamp and the starter motor operate normally in these ranges. If there is any problem, first check the linkage. If no fault is found in the linkage, check the inhibitor switch.

Separate selector range lever from selector rod and turn the range select lever to "N."

Note: **In the position "N" the slot of the manual shaft is vertical.**

By the use of the tester, check the two black-yellow (BY) wires from the inhibitor switch in the ranges "N" and "P" and the two red-black (RB) wires in the range "R" for continuity. Turn range select lever to both directions from each lever set position and check each continuity range. It is normal if the electricity is on while the lever is within an angle of about 3° on both sides from each lever set line. However, if its continuity range is obviously unequal on both sides, the adjustment is required.

If any malfunction is found, unscrew the fastening nut of the range selector lever and two fastening bolts of the switch body and then remove the machine screw under the switch body. Adjust the manual shaft correctly to the position "N" by means of the selector lever. (When the slot of the shaft becomes vertical, the detent works to position the shaft correctly with a click sound.)

Move the switch slightly aside so that the screw hole will be aligned with the pin hole of the internal rotor combined with the manual shaft and check their alignment by inserting a 1.5 mm (0.0591 in) diameter pin into the holes. If the alignment is made correct, fasten the switch body with the bolts, pull out the pin and tighten up the screw again into the hole, and fasten the selector lever as before. Check over again the continuity with the tester. If the malfunction still remains, replace the inhibitor switch.

STALL TEST

The purpose of this test is to check the transmission and engine for trouble by measuring the maximum numbers of revolutions of the engine while vehicle is held in a stalled condition and the carburetor is in full throttle operation with the selector lever in ranges "D," "2" and "1" respectively and by compairing the measured results with the standard values.

Standard stall revolution:
1,800 to 2,000 rpm

Components to be tested and test items

1. Clutches, brake and band in transmission for slipping.
2. Torque converter for function
3. Engine for overall property

Stall test procedures

Before testing, check the enigne oil and torque converter oil, warm up the engine cooling water to the suitable temperature by warming up operation at 1,200 rpm with the selector lever in the range "P" for several minutes, and warm up the torque converter oil to the suitable temperature [60 to 100°C (140 to 212°F)].

1. Mount the engine tachometer at a location that allows good visibility from the driver's seat and put a mark on specified revolutions on the meter.
2. Secure the front and rear wheels completely with chocks and apply the hand brake. Be sure to depress the brake pedal firmly with the left foot before depressing down the accelerator pedal.
3. Throw the selector lever into the range "D."
4. Slowly depress the accelerator pedal down till the throttle valve is fully opened. Quickly read and record the engine revolution when the engine begins to rotate steadily and then release the accelerator pedal.
5. Turn the selector lever into "N" and operate the enigne at approximately 1,200 rpm for more than one minute to cool down the torque converter oil and coolant.
6. Make similar stall tests in the ranges "2," "1" and "R."

Note: **The stall test operation as specified in the item (4) should be made within five seconds. If it takes too long, the oil deteriorates and the clutches, brake**

and band are adversely affected. Sufficient cooling time should be given between each test for the four ranges "D," "2," "1" and "R."

Judgement

1. High stall revolution more than standard revolution

If the engine revolution in stall condition is higher than the standard values, it indicates that one or more clutches in the transmission are slipping and, therefore, no further test is required.

For the following abnormalities, the respective causes are presumed.

- High rpm in all ranges . . . Low line pressure
- High rpm in "D," "2" and "1" and normal rpm in "R" . . . Rear clutch slipping
- High rpm in "D" and "2" and normal rpm in "1" . . . One-way clutch slipping
- High rpm in "R" only . . . Front clutch or low and reverse brake slipping

To determine which is slipping, either front clutch or low and reverse brake, a road test is needed.

If, while coasting after starting with the lever in "1" range, engine braking does not work properly, it is determined the low and reverse brake is slipping. Otherwise, the front clutch is slipping.

The slipping of the band brake is difficult to ascertain. However, if it occurs with the lever in "2" range, the enigne revolution increases up to the same level as in "1st" speed and therefore it can be found out by careful observation. It is impossible to check it in the stall test.

2. Standard stall revolution

If the enigne revolution in stall condition is within the standard values, the control elements are normally operating in the ranges "D," "2," "1" and "R."

Also, the engine and one way clutch of the torque converter are normal in performance and operation.

The one-way clutch of the torque converter, however, sometimes sticks. This should be determined in the road test.

3. Low stall revolution less than standard revolution

If the engine revolution in stall condition is lower than the standard values, it indicates that the engine is in abnormal condition or the torque converter's one-way clutch is slipping.

4. Others

(1) If the accelerating performance is poor until vehicle speed of approximately 50 km/h (30 MPH) is attained and then normal beyond that speed, it can be judged that the torque converter's one-way clutch is slipping.

(2) If the torque converter's one-way clutch sticks, vehicle speed can not exceed approximately 80 km/h (50 MPH) in the road test. In such a case, the torque converter oil te a-ture rises up abnormally and so special care is required.

(3) If the transmission does not operate properly in all vehicle speeds, it indicates poor engine performance.

ROAD TEST

An accurate knowledge of the automatic transmission is prerequisite to its exact diagnosis by a road test.

It is recommended to prepare a diagnosis guide chart in which are written the standard vehicle speeds for each stage of the up- and down-shiftings. Measured vehicle speeds are to be filled in the adjoining column in each testing.

Also it is advisable to mount a stopper for positioning the throttle opening.

Car speed at gear shift

Throttle opening (mmHg)	Gear shift	Propeller shaft rpm
Kickdown (0)	$D_1 \rightarrow D_2$ $D_2 \rightarrow D_3$ $D_3 \rightarrow D_2$ $D_2 \rightarrow D_1$	1,840 to 2,34C 3,340 to 3,840 3,460 to 2,960 1,790 to 1,290
Half throttle (200)	$D_1 \rightarrow D_2$ $D_2 \rightarrow D_3$ $D_3 \rightarrow D_2$ or $D_3 \rightarrow D_1$ $D_2 \rightarrow D_1$	330 to 830 1,720 to 2,220 1,350 to 850 700 Max.
Full throttle (0)	$1_2 \rightarrow 1_1$ *1	1,860 to 1,360
Minimum throttle (450)	$1_2 \rightarrow 1_1$ *1	1,860 to 1,360

*1 Reduce the speed by shifting to "1" range from "D" range (output shaft 2,000 rpm).

Note: **Car speed can be calculated by the following formula;**

$$V = \frac{2 \times \pi \times r \times N_P \times 60}{R_F \times 1{,}000}$$

where, V = **Car speed (km/h)**
N_P = **Propeller shaft revolution (rpm)**
R_F = **Final gear ratio**
r = **Tire effective radius (m)**
π = **The ratio of circumference of a circle to its diameter: 3.14**

^hecking speed changing ˽ondition

The driver's feeling during gear changes should also be checked attentively.

1. A sharp shock or unsmoothness are felt during a gear change.
2. A gear change is made with a long and dragging feeling.

These indicate that the throttle pressure is too low or some valve connected to the throttle is faulty.

Checking items during speed change

1. In "D" range, gear changes, $D_1 \rightarrow D_2 \rightarrow D_3$ are effected. In "R" range, the speed does not increase.
2. The kickdown operates properly.
3. By moving the lever from "D" into "1," gear changes $D_3 \rightarrow 2(1_2) \rightarrow 1_1$ are effected. In the ranges "1_2" and "1_1," the engine braking works properly.
4. In "1," the speed does not in- ase.
5. Should be quickly fixed at "2" range.
6. In "P," vehicle can be parked properly.

If any malfunction occurs in the second gear during the road test, that is, if vehicle shakes, drags or sling in shifting up from "D_1," directly to "D_3" or in shifting up from "D_1" to "D2," the brake band should be adjusted. If these problems remain after the brake band is adjusted, check the servo piston seal for oil leakage.

Shift schedule

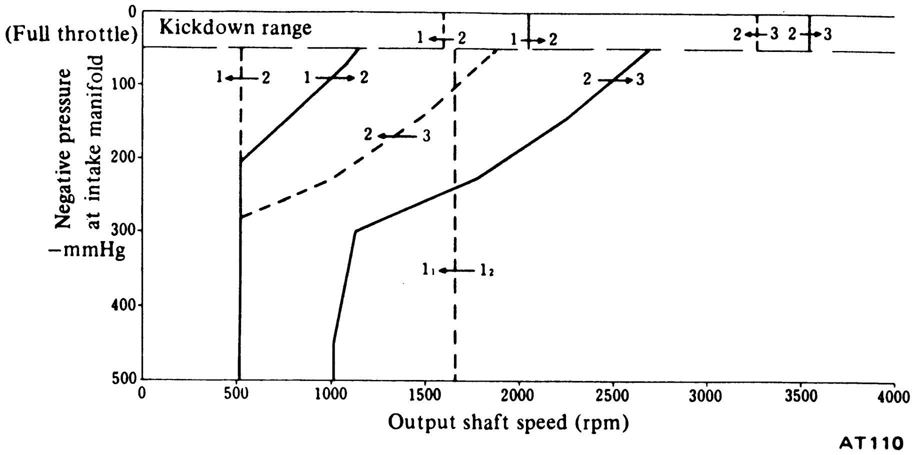


Fig. AT-111 Shift schedule

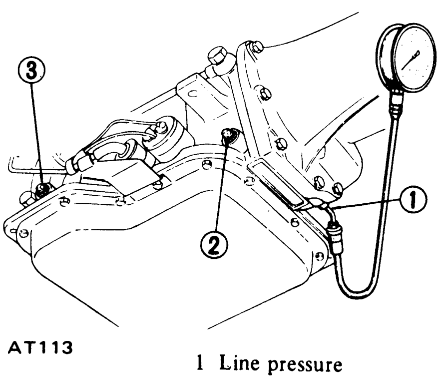
LINE PRESSURE TEST

When any slipping occurs in clutch or brake, or the feeling during a speed change is not correct, the line pressure must be checked.

Measuring the line pressure is done by a pressure gauge attached to two pressure measuring holes after removing blind plugs located at transmission case. See Figure AT-112.

The line pressure measurement is begun at idling and taken step by step by enlarging the throttle opening.

1. A sharp shock in up-shifting or too high changing speeds are caused mostly by too high throttle pressure.
2. Slipping or incapability of operation is mostly due to oil pressure leakage within the gear trains or spool valve.



1 Line pressure
2 Governor feed
3 Servo release pressure

Fig. AT-112 Measuring line pressure

Line pressure (governor feed pressure)

Range	Throttle opening Unit: mmHg		At cut back point [under approximately 15 km/h (9 MPH)] Unit: kg/cm² (psi)	After cut back [over approximately 35 km/h (22 MPH)] Unit: kg/cm² (psi)
"D"	Full throttle	0	9.4 to 11.0 (134 to 156)	5.5 to 6.5 (78 to 92)
	Minimum throttle	450	3.0 to 4.0 (43 to 57)	3.0 to 4.0 (43 to 57)
"2"	Full throttle	0	10.0 to 12.0 (142 to 171)	5.5 to 7.0 (78 to 100)
	Minimum throttle	450	6.0 to 12.0 (85 to 171)	5.5 to 7.0 (78 to 100)
"R"	Full throttle	0	14.0 to 16.0 (199 to 228)	14.0 to 16.0 (199 to 228)
	Minimum throttle	450	3.0 to 5.5 (43 to 78)	3.0 to 5.5 (43 to 78)

Notes: a. The line pressure during idling corresponds to the oil pressure before cut down at minimum throttle.
b. The oil pressure "After cut back" means that after the pressure modifier valve has operated.

Judgement in measuring line pressure

1. Low idling line pressures in the ranges "D," "2," "1," "R" and "P."

It can be attributed to problem in the pressure supply system or too low output of power caused by:

(1) A worn oil pump

(2) An oil pressure leakage in the oil pump, valve body or case

(3) A sticking regulator valve

2. Low idling, line pressures in certain ranges only

It is caused pressumably by an oil leakage in the devices or circuits connected to the relevant ranges.

(1) When there is an oil leakage in the rear clutch and governor, the line pressures in "D," "2" and "1" are low but the pressure is normal in "R."

(2) When an oil leakage occurs in the low and reverse brake circuit, the line pressures in "R" and "P" are low but the pressure is normal in "D," "2" and "1."

3. High idling line pressures

It is presumed to be caused by an increased vacuum throttle pressure owing to a leakage in the vacuum tube or diaphragm or by an increased line pressure due to a sticking regulator valve.

Vacuum leakage is checked by directly measuring the negative pressure after removing the vacuum pipe.

A puncture of the vacuum diaphragm can be easily ascertained because the torque converter oil is absorbed into the engine and the exhaust pipe blows up the white smoke.

4. Checking items when the line pressure is increasing

In this checking, the line pressure should be measured with vacuums of 450 mmHg and 0 mmHg in accordance with the stall test procedure.
test procedure.

(1) If the line pressures do not increase despite the vacuum decrease, check whether the vacuum rod is incorporated.

(2) If the line pressures do not meet the standard, it is caused mostly by a sticking pressure regulating valve, pressure regulating valve plug, or amplifier.

TROUBLE DIAGNOSES AND CORRECTIONS

Inspecting items

1. Inspection with automatic transmission on vehicle.

A Oil level
B Range select linkage
C Inhibitor switch and wiring
D Vacuum diaphragm and piping
E Downshift solenoid, kickdown switch and wiring
F Engine idling rpm
G Oil pressure (throttle)
H Engine stall rpm
I Rear lubrication
J Control valve (manual)
K Governor valve
L Band servo
M Transmission air check
N Oil quantity
O Ignition switch and starter motor
P Engine adjustment and brake inspection

2. Inspection after inspecting automatic transmission on vehicle.

m Rear clutch
n Front clutch
q Band brake
r Low and reverse brake
s Oil pump
t Leakage of oil passage
u One-way clutch of torque converter
v One-way clutch of transmission
w Front clutch check ball
x Parking linkage
y Planetary gear

Trouble diagnoses and corrections chart for 3N71B Automatic Transmission

(The number shown below indicates the sequence of the checking items to be taken up.)

Trouble	A B C D	E F G H	I J K L	M N O P	m n q r	s t u v	w x y
Engine can not start in "N," "P" ranges.	. 2 3 .	. . . .	. . . .	. . 1 .	. . . .	. . . .	. . .
Engine start in other range than "N," "P" ranges.	. 1 2 .	. . . .	. . . .	. . . .	. . . .	. . . .	. . .
Sharp shock in shifting from "N" to "D" range.	. . . 2	. 1 3 .	. 4 . .	. . . .	⑤. . .	. . . .	. . .
Vehicle will not run in "D" range (but runs in "2," "1" and "R" ranges).	. 1 . .	. . 2 .	. 3 . .	. . . .	. . . .	. . . ④	. . .
Vehicle will not run in "D," "1," "2" ranges (but runs in "R" range). Clutch slips. Very poor acceleration.	1 2 . .	. . 4 .	. 5 . .	6 3 . 7	⑧ . . .	. ⑨ . .	. . .
Vehicle will not run in "R" range (but runs in "D," "2" and "1" ranges.) Clutch slips. Very poor acceleration.	1 2 . .	. . 3 .	. 5 . .	6 4 . .	⑨⑧. ⑦	. ⑩ . .	⑪ . .
Vehicle will not run in all ranges.	1 2 . .	. . 3 .	. 5 . .	6 4 . .	. . . .	⑦⑧ . .	. ⑨ .
Clutches or brakes somewhat slip in starting.	1 2 . 6	. . 3 .	. 5 . .	7 4 . .	. . . .	⑧⑨ . .	. . .
Vehicle runs in "N" range.	. 1 . .	. . . .	. 3 . .	. 2 . .	④. . .	. . . .	
Maximum speed not attained. Acceleration poor.	1 2 . .	. . 4 5	. 7 . 6	. 3 . 8	⑪⑫⑨⑩	⑬ . . .	. . .
Vehicle braked by throwing lever into "R" range.	. . . .	. . . .	. . . 3	2 1 . .	④. ⑤.	. . . .	. ⑥ .
Large creep.	. . . .	. 1 . .	. . . .	. . . .	. . . .	. . . .	. . .
No creep at all.	1 2 . .	. 3 . .	. 5 . .	. 4 . .	⑧⑨ . .	⑥⑦ . .	. . .
Failure to change gear from "2nd" to "3rd."	. 1 . 2	3 . . .	. 5 6 8	7 4 . .	. . ⑨ .	. ⑩ . .	. . .
Failure to change gear from "1st" to "2nd."	. 1 . 2	3 . . .	. 5 6 8	7 4 . .	. ⑨ . .	. ⑩ . .	⑪ . .
Too high gear change point in case from "1st" to "2nd," from "2nd" to "3rd."	. . . 1	2 . 3 .	. 5 6 .	. 4 . .	. . . .	. ⑦ . .	. . .
Gear change from "1st" to "3rd" occurs.	. . . .	. . . .	. 2 4 .	3 1 . .	. . ⑤ .	. ⑥ . .	. . .

Trouble	A B C D	E F G H	I J K L	M N O P	m n q r	s t u v	w x y
Too sharp shock in change from "1st" to "2nd."	. . . 1	. . . 2	. 4 . 5	. 3 . .	. . ⑥ .	. . . .	. . .
Too sharp shock in change from "2nd" to "3rd."	. . . 1	2 . 3 .	. 3 . 5	4 . . .	. ⑥ . .	. . . .	. . .
Almost no shock or clutches slipping in change from "1st" to "2nd."	1 2 . 3	. . 4 .	. 6 . 8	7 5 . .	. . ⑨ .	. ⑩ . .	. . .
Almost no shock or slipping in change from "2nd" to "3rd." Engine extremely races.	1 2 . 3	. . 4 .	. 6 . 8	7 5 . .	. ⑨ . .	. ⑩ . .	⑪ . .
Vehicle braked by gear change from "1st" to "2nd."	. . . .	. . . .	. 2 . .	. 1 . .	. ④ . ③	. . . ⑤	. . .
Vehicle braked by gear change from "2nd" to "3rd."	. . . .	. . . .	. 3 . 2	. 1 . .	. . ④ .	. . . .	. . .
Failure to change gear from "3rd" to "2nd."	. . . 1	. . . .	. 3 4 6	5 2 . .	. ⑦⑧ .	. ⑨ . .	. . .
Failure to change gear from "2nd" to "1st" or from "3rd" to "1st."	. . . 1	. . . .	. 3 4 6	5 2 . .	. . ⑦ .	. . . ⑧	. . .
Gear change shock felt during car speed decrease by releasing accelerating pedal.	. 1 . 2	3 . 4 .	. 5 6 .	. . . .	. . . .	. ⑦ . .	. . .
Too high change point in case from "3rd" to "2nd," from "2nd" to "1st."	. 1 . 2	3 . 4 .	. 5 6 .	. . . .	. . . .	. ⑦ . .	. . .
Kickdown does not operate by depressing pedal in "3rd" within kickdown vehicle speed.	. . . 2	1 . . .	. 4 5 .	. 3 . .	. . ⑥ .	. ⑦ . .	. . .
Kickdown operates or engine overruns by depressing pedal in "3rd" beyond kickdown vehicle speed limit.	. 1 . 2	. . 3 .	. 5 6 .	7 4 . .	. ⑧ . .	. ⑨ . .	. . .
Extremely races or slips in changing from "3rd" to "2nd" by depressing pedal.	. . . 1	. . 2 .	. 4 . 6	5 3 . .	. ⑦⑧ .	. ⑨ . .	⑩ . .
Failure to change from "3rd" to "2nd" by changing lever into "2" range.	. 1 . .	. . 2 .	. 4 . 5	. 3 . .	. . ⑥ .	. ⑦ . .	. . .
Gear change from "2nd" to "1st" or from "2nd" to "3rd" in "2" range.	. 1 . .	. . 2 .	. 3 . .	. . . .	. . . .	. . . .	. . .

Trouble	A B C D	E F G H	I J K L	M N O P	m n q r	s t u v	w x y
No shock at changing from "1" to "2" range or engine extremely races.	1 2 . 3	. 4 . 1	. 6 . .	7 5 . .	. . ⑨ .	⑩ . . .	. . .
Failure to change from "3rd" to "2nd" by turning lever into "1" range.	. 1 . .	. . 2 .	. 4 5 7	6 3 . .	. ⑧⑨ .	. ⑩ . .	. . .
Engine brake does not operate in "1" range.	. 1 . .	. . 2 .	. 4 . .	5 3 . .	. . . ⑥	. ⑦ . .	. . .
Gear change from "1st" to "2nd" or from "2nd" to "3rd" in "1" range.	. 1 . .	. . . .	. 2 . .	. . . .	. . . .	. ③ . .	. . .
Does not change from "2nd" to "1st" in "1" range.	1 2 . .	. . . .	. 4 5 6	7 3 . .	. . . ⑧	. ⑨ . .	. . .
Large shock changing from "2nd" to "1st" in "1" range.	. . . 1	. . . 2	. 4 . .	. 3 . .	. . . ⑤	. . . .	. . .
Vehicle will move when changing into "P" range or parking gear does not disengage by turning off "P" range.	. 1 . .	. . . .	. . . .	. . . .	. . . .	. . . .	. ② .
Transmission overheats.	1 . . .	. . 3 4	2 6 . 8	7 5 . .	. ⑨⑩⑪	⑫⑬⑭ .	. . ⑮
Oil shoots out during run. White smoke issues out from tail pipe during run.	1 . . 3	. . 5 6	2 7 . .	8 4 . .	. ⑨⑩⑪	⑫⑬⑭ .	. . ⑮
Offensive smell at oil charging pipe.	1 . . .	. . . .	. . . .	. 2 . .	③④⑤⑥	⑦⑧⑨ .	. . ⑩
Transmission noise in "P" and "N" ranges.	1 . . .	. . 2 .	. . . .	. . . .	. . . .	③ . . .	. . .
Transmission noise in "D," "2," "1" and "R" ranges.	1 . . .	. . 2 .	. . . .	. . . .	③ . . .	④ . . ⑤	. . ⑥

Trouble diagnoses and corrections guide for 3N71B Automatic Transmission

Order	Test item	Procedure
Checking	1. Oil level gauge	Check gauge for oil level and leakage before and after each test.
	2. Downshift solenoid	Check by sound whether solenoid operates when depressing accelerating pedal fully with ignition key "ON."
	3. Manual linkage	Check changing conditions into "P," "R," "N," "D," "2" and "1" ranges by moving selector lever.
	4. Inhibitor switch	Check whether starter operates in "N" and "P" ranges only and whether reverse lamp operates in "R" range only.
	5. Engine idling rpm.	Check whether idling rpm meet standard.
	6. Vacuum pressure of vacuum pipe.	Checking whether vacuum pressure is more than 450 mmHg in idling and whether it decreases with increasing rpm.
	7. Operation in each range.	Check whether transmission engages positively by shifting "N"→"D," "N"→"2," "N"→"1" and "N"→"R" range while idling with brake applied.
	8. Creep of vehicle.	Check whether there is any creep in "D," "2," "1" and "R" ranges.
Stall test	1. Oil pressure before testing.	Measure line pressures in "D," "2," "1," and "R" range while idling.
	2. Stall test.	Measure engine rpm and line pressure in "D," "2," "1" and "R" ranges during full throttle operation. Notes: **a. Temperature of torque converter oil used in test should be from 60° to 100°C (140° to 212°F) i.e., sufficiently warmed up but not overheated.** **b. For cooling oil between each stall test for "D," "2," "1" and "R" ranges, idle engine, i.e., rpm at about 1,200 rpm for more than 1 minute in "P" range. Measurement time must not be more than 5 seconds.**
	3. Oil pressure after testing	Same as the item 1.
Road test	1. Slow acceleration, 1st→2nd, 2nd→3rd	Check vehicle speeds and engine rpm in shifting up 1st→2nd range and 2nd→3rd range while running with lever in "D" range and engine vacuum pressure of about 200 mmHg.
	2. Quick acceleration, 1st→2nd 2nd→3rd	Same as the item 1 above except with engine vacuum pressure of 0 mmHg (i.e., in position just before kick-down).
	3. Kickdown operation, 3rd→2nd or 2nd→1st	Check whether the kickdown operates and measure the time delays while running at 30, 40, 50, 60, 70 km/h (19, 25, 31, 38, 44 MPH) in "D3" range.

Order	Test item	Procedure
	4. Shift down, $D_3 \rightarrow D_2 \rightarrow D_1$	Check vehicle speeds and engine rpm in shifting down 3rd → 2nd → 1st (continued) while coasting with accelerating pedal released in "D_3" range and engine vacuum pressure of about 450 mmHg.
	5. Shift down, $D_3 \rightarrow 1_2 \rightarrow 1_1$	Check for shifting down $D_3 \rightarrow 1_2$ and engine braking, and further for shifting down $1_2 \rightarrow 1_1$ and engine braking, after shifting the lever into "1" range with the accelerator pedal released and the engine vacuum pressure of 0 mmHg while driving at about 50 km/h (31 MPH) in "D_3" range.
	6. Shift down, $D_3 \rightarrow 2$	Check for quick shifting down $D_3 \rightarrow 2$ and engine braking, after shifting the lever into "2" range while driving at about 50 km/h (31 MPH) in "D_3" range. Further, check the transmission for being locked to the 2nd gear ratio regardless of vehicle speed.
	7. Shift up, $1_1 \rightarrow 1_2$	Check for the transmission not shifting up during acceleration, when starting in "1" range.
	8. Shift up or down when starting in "2" range.	Check the transmission for not shifting up or down during acceleration or deceleration, when starting in "2" range.
	9. Parking.	Confirm that vehicle will not move on grade when shifting to "P" range.
Others	Abnormal shock, oil leakage.	Put on record of observed conditions during these tests such as gear noise, abnormal noise of clutches and acceleration performance.

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 and adjustment

Automatic transmission assembly		
Model code number		X2401
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 (0.063 to 0.071)
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)

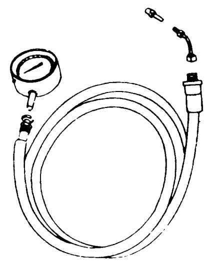
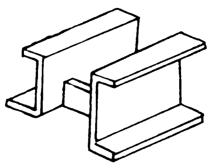
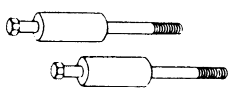
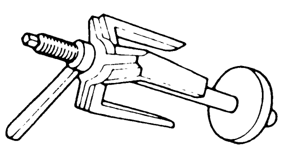
Idling revolution	rpm	650 at "D" position (800 at "N" position)
Stall revolution	rpm	1,800 to 2,000

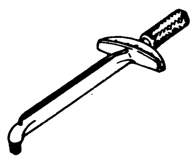
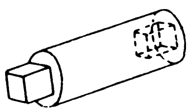
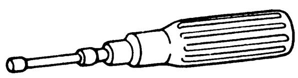
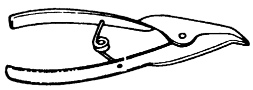
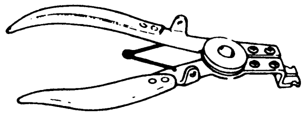
Tightening torque kg-m(ft-lb)

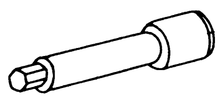
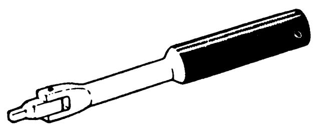
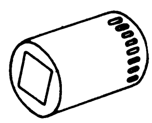
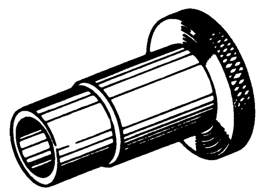
Drive plate to crankshaft	14.0 to 16.0	(101 to 116)
Drive plate to torque converter	4.0 to 5.0	(29 to 36)
Converter housing to engine	4.0 to 5.0	(29 to 36)
Transmission case to converter housing	4.0 to 5.0	(29 to 36)
Transmission case to rear extension	2.0 to 2.5	(14 to 18)
Oil pan to transmission case	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	(4.3 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)
Oil cooler pipe to transmission case	3.0 to 5.0	(22 to 36)
Oil cooler pipe connecting nut	0.7 to 1.1	(5.1 to 8.0)
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 8.0)
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 1.1	(5.8 to 8.0)
Control lever bolt	1.6 to 2.2	(12 to 16)
Control lever bracket to floor	0.35 to 0.45	(2.5 to 3.3)
Control lever knob to lever	0.20 to 0.25	(1.4 to 1.8)

* Turn back two turns after tightening.

SPECIAL SERVICE TOOLS

No.	Tool number & tool name	Description		For use on	Reference page or Figure No.
			Unit: mm (in)		
1.	ST25050001 Oil pressure gauge set	 SE119	Use for checking hydraulic pressure	3N71B A/T	Fig. AT-112
2.	ST07870000 Transmission case stand	 SE120	Use for setting transmission	3N71B A/T	Page AT-37
3.	ST25850000 Sliding hammers	 SE121	Use for removing oil pump	3N71B A/T	Fig. AT-56
4.	ST25420001 (ST2542000) Clutch spring compressor	 SE122	Use for assembling or dis-assembling front and rear clutch	3N71B A/T	Fig. AT-79 Fig. AT-86

No.	Tool number & tool name	Description	Unit: mm (in)	For use on	Reference page or Figure No.
5.	GG93010000 Torque wrench	 SE123	Use for tightening correct torque Max. torque: 4.6 kg-m (33 ft-lb) Drive angle 3/8" square	3N71B A/T	Fig. AT-69
6.	ST25512001 Socket extension	 SE124	Socket extension to connect torque wrench (GG93010000) with ½" square socket wrench	3N71B A/T	Fig. AT-69
7.	ST25160000 Torque driver	 SE125	Use for tightening correct torque Max. torque: 1.04 kg-m (7.5 ft-lb)	3N71B A/T	Fig. AT-107 Fig. AT-108
8.	HT69860000 Snap ring remover	 SE126	Use for removing and replacing snap ring	3N71B A/T	Fig. AT-59
9.	ST25320001 Snap ring remover	 SE127	Use for removing and replacing snap ring	3N71B A/T	Fig. AT-79

No.	Tool number & tool name	Description Unit: mm (in)		For use on	Reference page or Figure No.
10.	ST25570000 Hex-head extension	 SE128	Use for removing and installing one-way clutch inner race with torque wrench. Drive angle ½" square and 6 mm (across flat width)	3N71B A/T	Fig. AT-64 Fig. AT-69
11.	HT62350000 Spinner handle	 SE129	Use for disassembling and assembling control valve	3N71B A/T	Fig. AT-101 Fig. AT-104
12.	HT61000800 Hexagon wrench	 SE130	Use for disassembling and assembling control valve	3N71B A/T	Fig. AT-101 Fig. AT-104 Fig. AT-107 Fig. AT-108
13.	ST25580000 Oil pump assembling gauge	 SE131	Use for centering oil pump	3N71B A/T	Page AT-45

SERVICE MANUAL

DATSUN PICK-UP
MODEL 620 SERIES

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

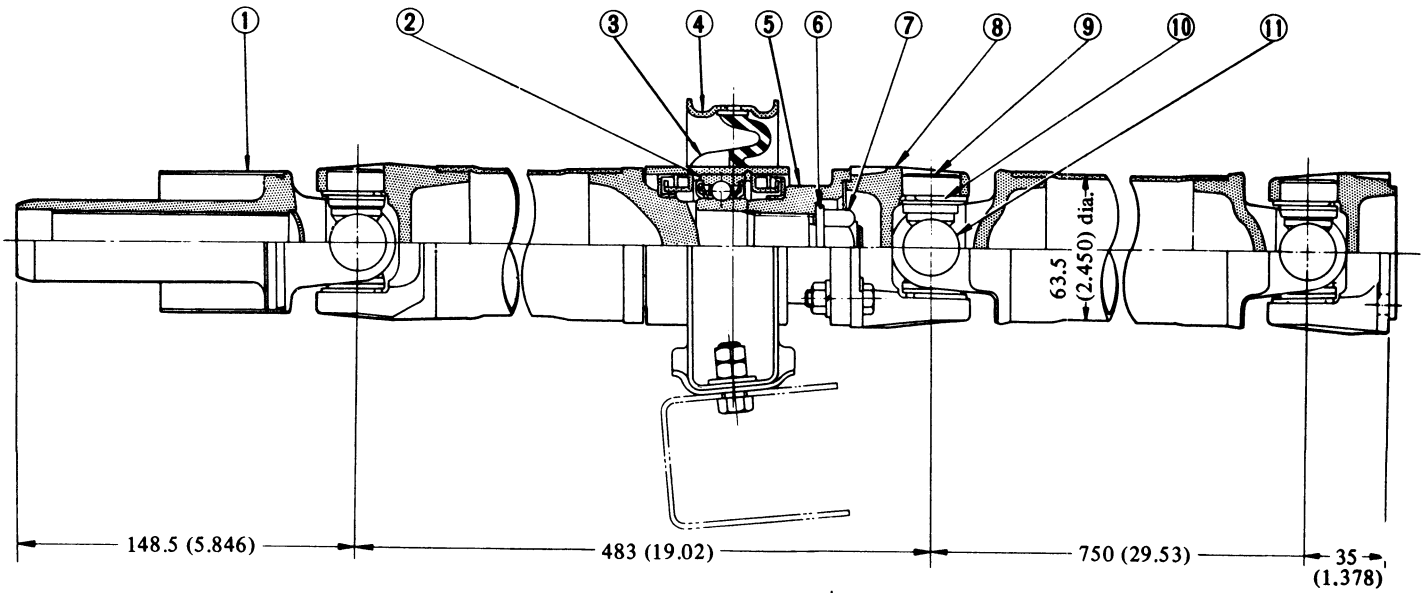
SECTION PD

PROPELLER SHAFT AND DIFFERENTIAL CARRIER

PD

PROPELLER SHAFT AND CENTER BEARING

CONTENTS



1 Sleeve yoke assembly
2 Center bearing
3 Center bearing insulator
4 Center bearing bracket
5 Companion flange
6 Plain washer
7 Self locking nut
8 Flange yoke
9 Bearing race assembly
10 Snap ring
11 Journal assembly

Unit: mm (in)

PD218

Fig. PD-1 Cross-sectional view of propeller shaft

DESCRIPTION

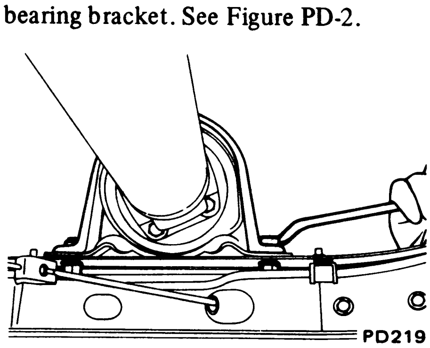
The propeller shaft on the 620 series is 3-joint type.

The propeller shaft and universal joint assembly is carefully balanced during original assembly; that is, the dynamic unbalance is under 35 gr-cm (0.5 in-oz) at 5,800 rpm.

If the propeller shaft has to be assembled, it must be made carefully so that the above limit is not exceeded. Therefore, when the vehicle is to be undercoated, cover the propeller shaft and universal joints to prevent application of the undercoating material.

REMOVAL AND INSTALLATION

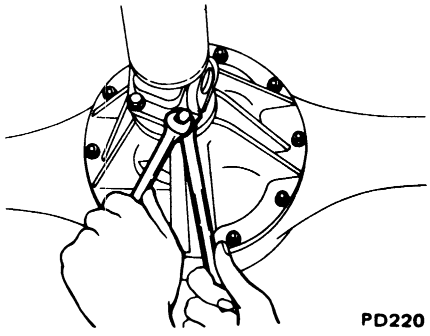
1. Raise vehicle on hoist. Put match marks both on propeller shaft and companion flange so that shaft can be reinstalled in the original position.
2. Remove bolts retaining center bearing bracket. See Figure PD-2.



PD219

Fig. PD-2 Removing center bearing bracket

3. Remove bolts connecting shaft to companion flange of differential carrier. See Figure PD-3.



PD220

Fig. PD-3 Removing propeller shaft

4. Withdraw propeller shaft sleeve yoke from transmission by moving shaft rearward, passing it under rear axle.

Watch for oil leakage from transmission end.

Note: Remove propeller shaft carefully not so as to damage spline, sleeve yoke and rear oil seal.

To install, reverse the foregoing removal procedure.

1. Align propeller shaft with companion flange using reference marks prescribed in removal procedure and assemble with bolts.

Tightening torque:
2.4 to 3.3 kg-m
(17 to 24 ft-lb)

2. Insert bolts through the holes of center bearing bracket and torque nuts to retain center bearing on crossmember.

Tightening torque:
1.6 to 2.2 kg-m
(12 to 16 ft-lb)

DISASSEMBLY AND ASSEMBLY

Primarily, do not disassemble propeller shaft because it is balanced as an assembly.

However, check propeller shaft with journal for movement. When journal does not move smoothly, disassemble.

1. Mark propeller shaft and journal so that the original combination can be restored at assembly.
2. Remove snap ring with a standard screwdriver.
3. Lightly tap base of yoke with a hammer, and withdraw bearing race. See Figure PD-4.

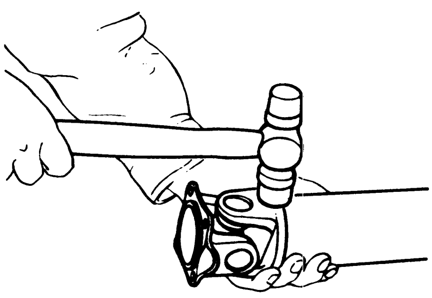


Fig. PD-4 Removing bearing

Note: When removing journal from yoke, be careful not to damage journal and yoke hole.

When disassembling and repairing center bearing are required, the following procedures are applied.

1. Put match marks on flange and front propeller shaft. Remove bolts connecting flange yoke to companion flange.
2. Applying Drive Pinion Flange Wrench ST31530000, loosen off locking nut and remove center bearing. See Figure PD-5.

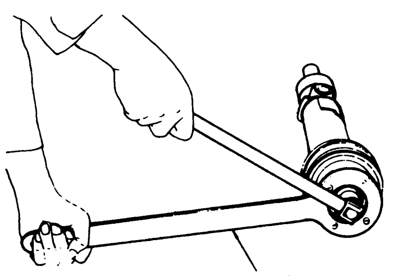


Fig. PD-5 Removing locking nut

To assemble, reverse the foregoing procedure using reference marks prescribed in disassembly procedure.

New bearing need not be lubricated since it is lubricated for life. Fill joint with recommended multi-purpose grease whenever propeller shaft is overhauled.

Use related snap rings of the same thickness and be sure that play is below 0.02 mm (0.0008 in).

Available snap ring

Thickness mm (in)	Color identification
2.00 (0.0787)	White
2.02 (0.0795)	Yellow
2.04 (0.0803)	Red
2.06 (0.0811)	Green
2.08 (0.0819)	Blue
2.10 (0.0827)	Right Brown
2.12 (0.0835)	No paint

Install and assemble components correctly so that joint moves under friction resistance of less than 15 kg-cm (13 in-lb).

When the above steps are complete, place the shaft in a balancing machine and adjust unbalance less than 35 gr-cm (0.49 in-oz) at 5,800 rpm.

Center bearing assembling procedures are as follows:

1. Install center bearing in center bearing insulator.
2. Install center bearing assembly and companion flange on front shaft using reference marks established in disassembly procedure.
3. Install washer and locking nut on front shaft and tighten nut using Drive Pinion Flange Wrench ST31530000 to specified torque.

Tightening torque:
20 to 24 kg-m
(145 to 174 ft-lb)

4. Join companion flange of front shaft with flange yoke of rear shaft and tighten connect bolts to specified torque.

Tightening torque:
2.4 to 3.3 kg-m
(17 to 24 ft-lb)

5. Install center bearing bracket on center bearing.

INSPECTION

1. Check journal pin for dent or brinell marks, and yoke hole for sign of wear or damage.

Snap ring, bearing and seal ring should also be inspected to see if these are damaged, worn or deformed. Replace if necessary.

2. Check center bearing by rotating bearing race. If it is rough, noisy or damaged, discard. Cracked bearing insulator cannot be tolerated hear.
3. Check propeller shaft tube surface for dent or crack. Change if necessary.

PROPELLER SHAFT AND DIFFERENTIAL CARRIER

SERVICE DATA

Permissible dynamic unbalance	gr-cm (in-oz)	35 (0.5) at 5,800 rpm
Axial play of spider journal	mm (in)	Less than 0.02 (0.0008)
Journal swinging torque	kg-cm (in-lb)	Less than 15 (13)
Propeller shaft (front and rear) out of round	mm (in)	Less than 0.6 (0.024)
Tightening torque		
Shaft to companion flange (Gear carrier) bolt	kg-m (ft-lb)	2.4 to 3.3 (17 to 24)
Self locking nut (front shaft)	kg-m (ft-lb)	20 to 24 (145 to 174)
Flange yoke (rear shaft) to companion flange (front shaft) bolt	kg-m (ft-lb)	2.4 to 3.3 (17 to 24)
Center bearing bracket to cross member bolt	kg-m (ft-lb)	1.6 to 2.2 (11.6 to 15.9)

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Vibration during at medium or high speed.	Worn or damaged universal joint needle bearing.	Replace.
	Unbalance due to bent or dented propeller shaft.	Replace.
	Loose propeller shaft installation.	Retighten.
	Worn transmission rear extension bushing.	Replace.
	Damaged center bearing or insulator.	Replace.
	Tight universal joints.	Impact yokes with hammer to free up. Replace joint if unable to free up or if joint feels rough when rotated by hand.
	Undercoating or mud on the shaft causing unbalance.	Clean up shaft.
	Tire unbalance.	Balance wheel and tire assembly or replace from known good vehicle.
	Balance weights missing.	Replace.
Knocking sound during starting or noise during coasting on propeller shaft.	Worn damaged universal joint.	Replace.
	Worn sleeve yoke and main shaft spline.	Replace.
	Loose propeller shaft installation.	Retighten.
	Loose joint installation.	Adjust snap ring.
	Damaged center bearing or insulator.	Replace.
	Loose or missing bolts at center bearing bracket to body.	Replace or tighten bolts.
Scraping noise.	Dust cover on sleeve yoke rubbing on transmission rear extension. Dust cover on companion flange rubbing on differential carrier.	Straighten out dust cover to remove interference.
Whine or whistle	Damaged center bearing.	Replace.

DIFFERENTIAL CARRIER (TYPE H190)

CONTENTS

DESCRIPTION

The differential gear carrier assembly on the 620 series is prepared two different gear ratio as follows:

Applied models	Gear ratio
Manual transmission	4.375
Automatic transmission	4.625

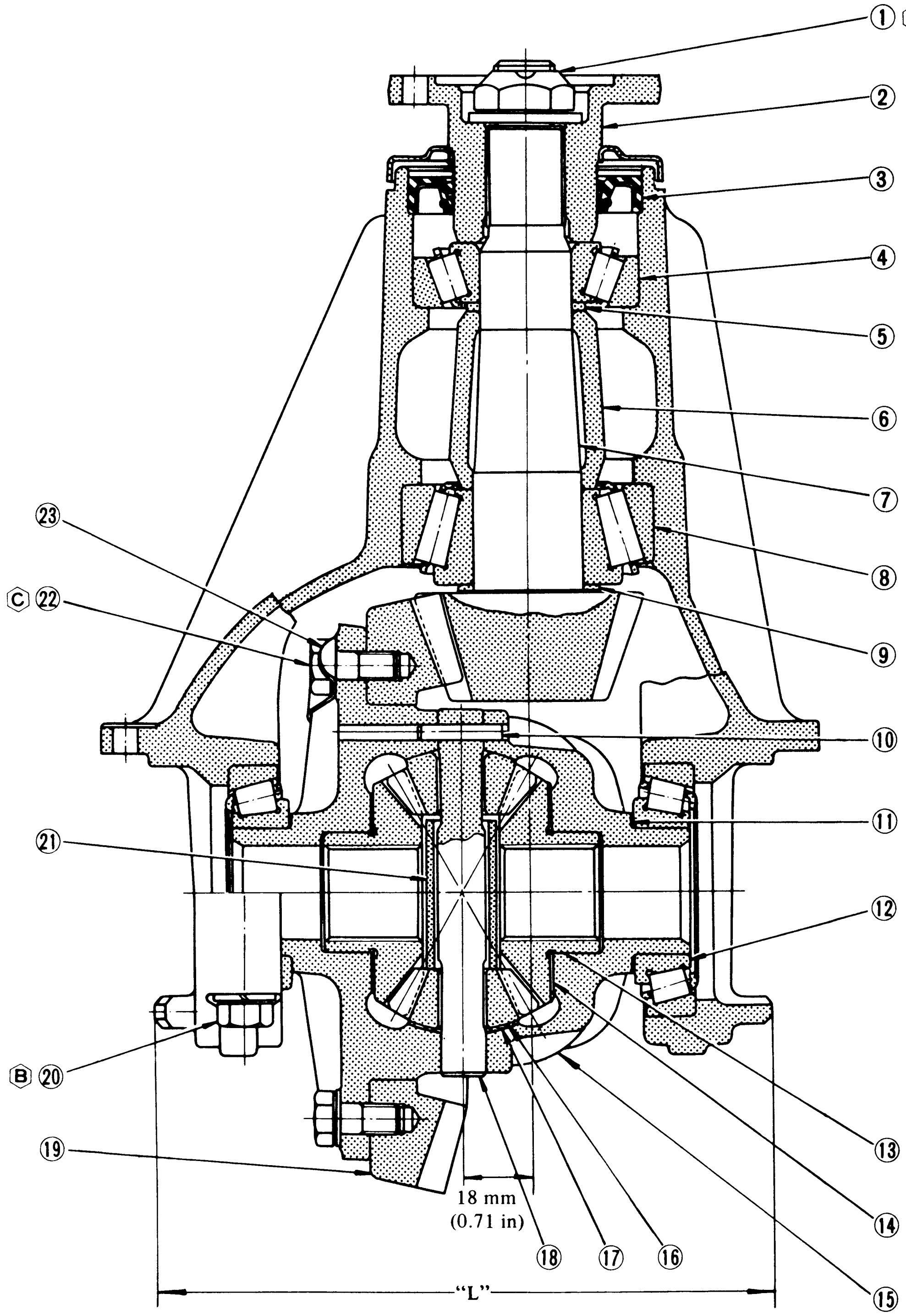
The drive pinion is mounted in two tapered roller bearings which are preloaded by pinion bearing adjusting spacer and washer during assembly.

The drive pinion is positioned by a washer located between a shoulder of the drive pinion and the rear bearing.

The differential case is supported in the carrier by two tapered roller side bearings. These are preloaded by inserting shims between the bearings and the differential case. The differential case assembly is positioned for proper ring gear and drive pinion backlash by varying these shims. The ring gear is bolted to the differential case. The case houses two side gears in mesh with two pinions mounted on a pinion shaft. The pinion shaft anchored in the case by lock pin. The pinions and side gears are backed by thrust washers.

The carrier is of malleable cast iron.

(TYPE H190)



1 Drive pinion nut
2 Companion flange
3 Oil seal
4 Front bearing
5 Drive pinion bearing adjusting washer
Adjust pinion bearing preload by selecting (5) and (6).
6 Drive pinion bearing spacer
7 Drive pinion
8 Rear bearing
9 Drive pinion adjusting washer
10 Lock pin
11 Side bearing adjusting shim
Adjust side bearing preload and backlash between ring gear and drive pinion by selecting (11).
12 Side bearing
13 Side gear
14 Thrust washer
Adjust pinion mate-to-side gear backlash (or the clearance between the rear face of side gear and thrust washer) 0.02 to 0.08 mm (0.0008 to 0.0031 in) by (14).
15 Differential gear case
16 Thrust washer
17 Pinion mate
18 Differential pinion shaft
19 Ring gear
Backlash between ring gear and drive pinion : 0.15 to 0.20 mm (0.0059 to 0.0079 in).
20 Bearing cap bolt
21 Thrust block
22 Ring gear bolt
23 Lock strap

Tightening torque (T) of bolts and nut kg-m (ft-lb)
(A) T : 14 to 17 (101 to 123)
(B) T : 4 to 5 (29 to 26)
(C) T : 7 to 8 (51 to 58)

L : 198.40 to 198.55 mm (7.8110 to 7.8169 in)

PD229

Fig. PD-6 Cross-sectional view of differential carrier

REMOVAL

1. Jack up rear of vehicle and support it by placing a safety stand under rear axle case. Drain gear oil.
2. Remove propeller shaft and rear axle shafts. These works can be done by referring to "Rear Axle and Rear Suspension".
3. Loosen off bolts securing differential carrier to rear axle case, and take out differential gear carrier assembly.

PRE-DISASSEMBLY INSPECTION

Differential case or carrier should be inspected before any parts are removed from it.

These inspections are helpful to find the cause of the trouble and to determine the corrections needed.

1. Mount carrier on Gear Carrier Attachment ST06310000 (or Differential Carrier Stand ST0732S000). See Figure PD-7.

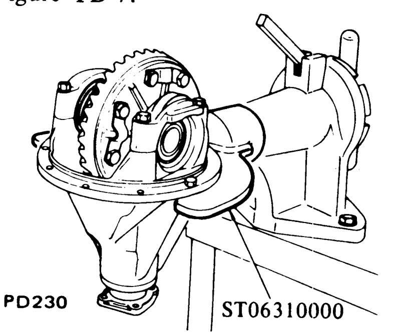


Fig. PD-7 Holding differential carrier

2. Visually inspect parts for wear or damage.
3. Rotate gears to see if there is any roughness which would indicate damaged bearings or chipped gears. Check the gear teeth for scoring or signs of abnormal wear. Measure preload of drive pinion. See Figure PD-19.
4. Set up a dial indicator and check the backlash at several points around ring gear. Backlash should be 0.15 to 0.2 mm (0.0059 to 0.0079 in).
5. Check the gear tooth contact with a mixture powdered red lead and oil applied sparingly to all ring gear teeth.

For the tooth contact pattern, see paragraph dealing with tooth contact pattern adjustment.

DISASSEMBLY

1. Put match marks on side bearing caps and carrier, and remove side bearing caps and take out differential case assembly. See Figure PD-8.

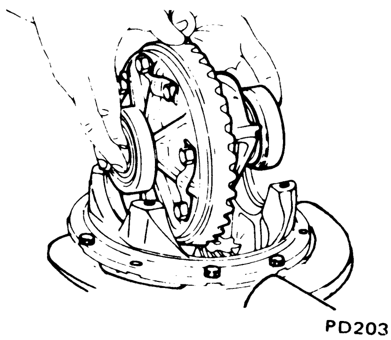


Fig. PD-8 Removing differential case assembly

Note: **Care should be taken not to confuse the left and right hand bearing caps and bearing outer race so that reassembly will be easily carried out with the same parts in the original position.**

2. Remove drive pinion nut using Drive Pinion Flange Wrench ST31530000, and pull off companion flange using a standard puller. See Figure PD-9.

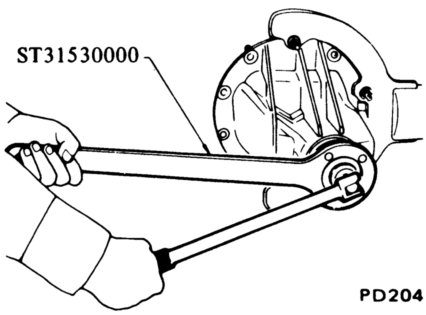


Fig. PD-9 Removing drive pinion nut

3. Extract drive pinion assembly to the rearwards by tapping the front end with a soft hammer. Drive pinion can be taken out together with rear bearing inner race, bearing spacer and washer.
4. Remove oil seal and take out front bearing inner race.

Note: **Oil seal must not be reused.**

5. Hold rear bearing inner race with Drive Pinion Rear Bearing Inner Race Puller ST30031000 and extract from drive pinion with a press. See Figure PD-10.

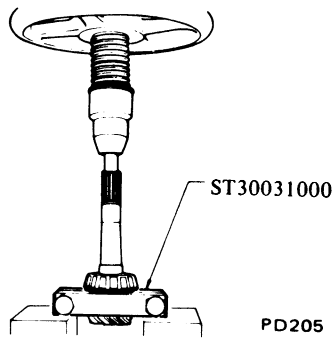


Fig. PD-10 Removing pinion rear bearing inner race

6. To remove outer races of both front and rear bearing, apply a brass drift to race side surface, and withdraw them by tapping the top of drift with a hammer. See Figure PD-11.

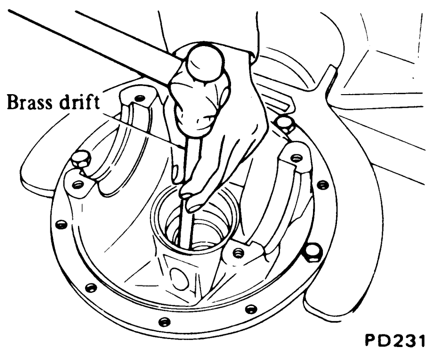


Fig. PD-11 Removing pinion front and rear bearing outer races

DISASSEMBLY OF DIFFERENTIAL CASE

1. When replacing side bearing, use Gear Carrier Side Bearing Puller ST3306S001 (set of ST33051001 and ST33061000). See Figure PD-12.

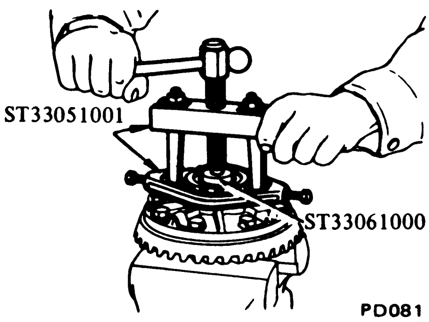


Fig. PD-12 Removing side bearing

Notes:

a. **Puller should be handled with care in catching the edge of bearing inner race.**
b. **Be careful not to confuse left and right hand parts.**

2. Remove ring gear by spreading out lock strap and loosening ring gear bolts in diagonally.
3. Punch off pinion mate shaft lock pin from ring gear side using Solid Punch ST23510001. See Figure PD-13.

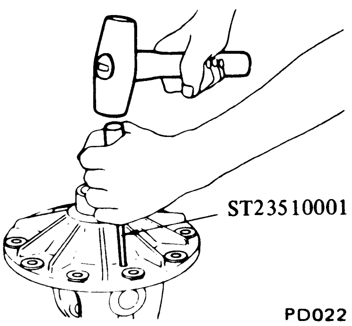


Fig. PD-13 Removing lock pin

Note: **Lock pin is caulked at pin hole mouth on differential case. Do not punch it off forcibly without checking how it is caulked.**

4. Draw out pinion mate shaft and remove thrust block, pinion mate gears, side gears and thrust washers.

Note: **Put marks on gear and thrust washer so that they can be reinstalled in their original positions from which they were removed.**

INSPECTION

Thoroughly clean all disassembled parts, and examine them to see if they are worn, damaged or otherwise faulty, and how they are affected. Repair or replace all faulty parts, whichever is necessary.

1. Check gear teeth for scoring, cracking and chipping, and make sure that tooth contact pattern indicates correct meshing depth. If any fault is evident, replace parts as required.

Note: **Drive Pinion and drive gear are supplied for replacement as a set, therefore, should either part be damaged, replace as a set.**

2. Check pinion gear shaft, and pinion gear for scores and signs of wear, and replace as required.
   Follow the same procedure for side gear and their seats on differential case.
3. Inspect all bearing races and rollers for scoring, chipping or evidence of excessive wear. They should be in tiptop condition such as not worn and with mirror-like surfaces. Replace if there is a shadow of doubt on their efficiency, as an incorrect bearing operation may result in noises and gear seizure.
4. Inspect thrust washer faces. Small faults can be corrected with sandpaper. If pinion mate-to-side gear backlash (or the clearance between side gear and thrust washer) exceeds limits 0.02 to 0.08 mm (0.0008 to 0.0032 in), replace thrust washers.
5. Inspect carrier and differential case for cracks or distortion. If either condition is evident, replace faulty parts.
6. As a general rule, oil seal should be replaced at each disassembly.

ASSEMBLY AND ADJUSTMENT

Assembly can be done in the reverse order of disassembly. The following directions for adjustment and usage of special tools enable to obtain a perfect differential operation.

PRECAUTIONS IN REASSEMBLY

1. Arrange shims, washers and the like to install them correctly.
2. Thoroughly clean the surfaces on which shims, washers, bearings and bearing caps are installed.
3. Apply gear oil when installing bearings.
4. Pack grease cavity between lips when fitting oil seal.

ASSEMBLY OF DIFFERENTIAL GEAR CASE

1. Assemble pinion mates, side gears, thrust block and thrust washers in differential case.
2. Fit pinion shaft to differential case so that it meets lock pin holes.
3. Adjust pinion mate-to-side gear backlash (or the clearance between the rear face of side gear and thrust washer) to 0.02 to 0.08 mm (0.00079 to 0.00315 in) by selecting side gear thrust washer.

Side gear thrust washer

Thickness mm (in)
Over 0.75 to 0.80 (0.0295 to 0.0315)
Over 0.80 to 0.85 (0.0315 to 0.0335)
Over 0.85 to 0.90 (0.0335 to 0.0354)
Over 0.90 to 0.95 (0.0354 to 0.0374)

4. Lock pinion shaft lock pin using a punch after it is secured into place.
5. Apply oil to gear tooth surfacε and thrust surfaces and check if they turn properly.
6. Place ring gear on differential case and install bolts and lock washers. Torque bolts to specification, and bend up lock strap.

Tightening torque:
7 to 8 kg-m
(51 to 58 ft-lb)

Notes:

a. **Use only genuine drive gear bolts and new lock strap.**
b. **Tighten bolts in criss-cross fashion lightly tapping around bolt heads with a hammer.**

7. When replacing side bearing, measure bearing width using a standard gauge [20.00 mm (0.7874 in) thickness] and a weight block 2.5 kg (5.5 lb) prior to installation. Se Figure PD-14.

Standard bearing width:
20.00 mm (0.7874 in)

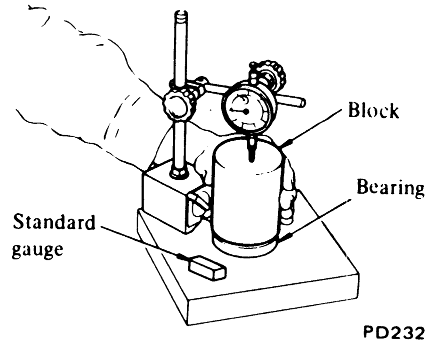


Fig. PD-14 Measuring bearing width

8. Press fit side bearing cone into differential case using Gear Carrier Side Bearing Drift ST33230000 and Adapter ST33061000. See Figure PD-15.

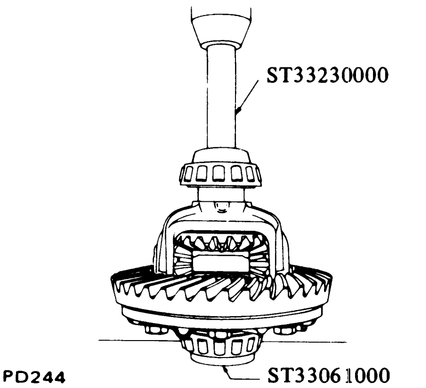


Fig. PD-15 Installing side bearing cone

ADJUSTMENT OF DRIVE PINION HEIGHT

Adjust the pinion height with washer provided between rear bearing inner race and the back of pinion gear.

1. Press fit front and rear bearing outer races into gear carrier using Drive Pinion Outer Race Drift Set ST30611000, ST30613000 and ST30621000.

Front:

ST30611000 and
ST30613000

Rear:

ST30611000 and
ST30621000

2. Fit rear bearing on carrier and install Dummy Shaft ST31942000 and Collar ST31970000 on rear bearing, and place Height Gauge ST31941000 on carrier. See Figure PD-16.

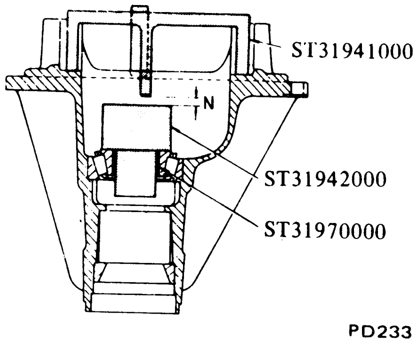


Fig. PD-16 Adjusting pinion height

3. Measure the clearance (N) between the tip end of height gauge and the end surface of dummy shaft, using a thickness gauge. See Figure PD-17.

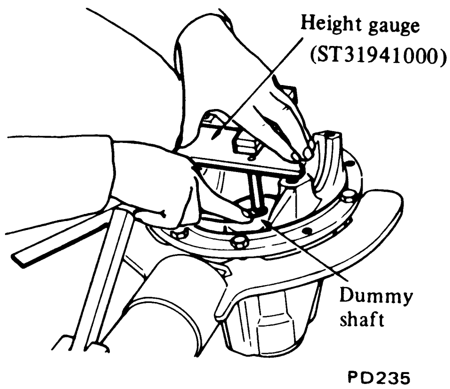


Fig. PD-17 Measuring clearance

4. The thickness of drive pinion height adjusting washers can be obtained from the following formula:

$$T = N - [(H - D' - S) \times 0.01] + 2.18$$

Where,

T : Required thickness of rear bearing adjusting washers (mm).
N : Measured value with thickness gauge (mm).
H : Figure marked on the drive pinion head. See Figure PD-18.
D' : Figure marked on the dummy shaft.
S : Figure marked on the height gauge.

Figures for H, D' and S are dimensional variations in a unit of 1/100 mm against each standard measurement.

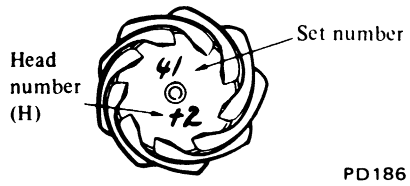


Fig. PD-18 Variation number on drive pinion

Examples of calculation

Ex. 1 ---

$N = 0.51$ mm, $H = +2$, $D' = -1$, $S = 0$

$$T = N - [(H - D' - S) \times 0.01] + 2.18$$
$$= 0.51 - [((+2) - (-1) - (0)) \times 0.01] + 2.18$$
$$= 0.51 - [(2 + 1 - 0) \times 0.01] + 2.18$$
$$= 0.51 - [3 \times 0.01] + 2.18$$
$$= 0.51 - 0.03 + 2.18$$
$$= 2.66 \text{ mm}$$

The correct washer is 2.67 mm thick. See following table for drive pinion adjusting washer.

Ex. 2 ---

N = 0.68 mm, H = –3, D' = +1
S = –2

$$T = N - [(H - D' - S) \times 0.01] + 2.18$$
$$= 0.68 - [((-3) - (+1) - (-2)) \times 0.01] + 2.18$$
$$= 0.68 - [(-3 - 1 + 2) \times 0.01] + 2.18$$
$$= 0.68 - [-2 \times 0.01] + 2.18$$
$$= 0.68 - [-0.02] + 2.18$$
$$= 0.68 + 0.02 + 2.18$$
$$= 2.88 \text{ mm}$$

The correct washer is 2.88 mm thick.

Ex. 3 ---

N = 0.70 mm, H = 0, D' = 0
S = 0

$$T = N - [(H - D' - S) \times 0.01] + 2.18$$
$$= 0.70 - [(0 - 0 - 0) \times 0.01] + 2.18$$
$$= 0.70 - [0 \times 0.01] + 2.18$$
$$= 0.70 - 0 + 2.18$$
$$= 0.70 + 2.18$$
$$= 2.88 \text{ mm}$$

The correct washer is 2.88 mm thick.

Note: If values signifying H, D' and S are not given, regard them as zero and compute. After assembly, check to see that tooth contact is correct. If not, readjust. For the tooth contact pattern, see page PD-25 for Contact Pattern.

Drive pinion adjusting washer

Thickness mm (in)
2.58 (0.1016)
2.61 (0.1028)
2.64 (0.1039)
2.67 (0.1051)
2.70 (0.1063)
2.73 (0.1075)
2.76 (0.1087)
2.79 (0.1098)
2.82 (0.1110)
2.85 (0.1122)
2.88 (0.1134)
2.91 (0.1146)
2.94 (0.1158)
2.97 (0.1169)
3.00 (0.1181)
3.03 (0.1193)
3.06 (0.1205)
3.09 (0.1217)
3.15 (0.1240)
3.18 (0.1252)

5. Fit determined drive pinion adjusting washer in drive pinion, and press fit rear bearing inner race in it, using Base ST30901000.

ADJUSTMENT OF DRIVE PINION PRELOAD

Adjust the preload of drive pinion with spacer and washer between front and rear bearing inner races.

This procedure has nothing to do with thickness of drive pinion adjusting washer.

This adjustment must be carried out without oil seal inserted.

1. Lubricate pinion front and rear bearings. Install drive pinion in gear carrier. Be sure that spacer, washer, front bearing inner race, companion flange and flat washer are fitted on pinion. Tighten nut to specified torque and confirm preload.

Tightening torque:
14 to 17 kg-m
(101 to 123 ft-lb)

Note: Replace bearing washer and spacer with thicker ones if pinion cannot be turned by hand while it is being tightened.

2. Measure pinion bearing preload using Preload Gauge ST3127S000 and select washer and spacer that will provide required preload. See Figure PD-19.

Preload (without oil seal):
10 to 13 kg-cm
(8.7 to 11.3 in-lb)
At companion flange bolt hole:
2.9 to 3.7 kg
(6.4 to 8.2 lb)

Note: Preload of old bearing is the same value as that of a new bearing.

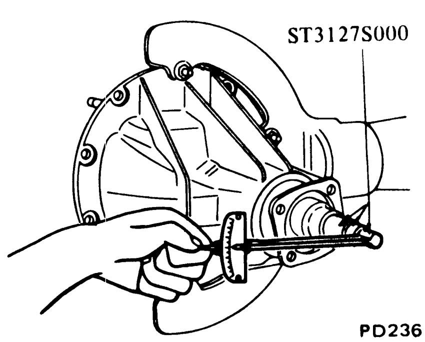


Fig. PD-19 Measuring pinion preload

Pinion bearing adjusting spacer

Length mm (in)
54.50 (2.1457)
54.80 (2.1575)
55.10 (2.1693)
55.40 (2.1811)
55.70 (2.1929)
56.00 (2.2047)

Drive pinion bearing adjusting washer

	Thickness mm (in)
over	3.80 to 3.82 (0.1496 to 0.1504)
over	3.82 to 3.84 (0.1504 to 0.1512)
over	3.84 to 3.86 (0.1512 to 0.1520)
over	3.86 to 3.88 (0.1520 to 0.1528)
over	3.88 to 3.90 (0.1528 to 0.1535)
over	3.90 to 3.92 (0.1535 to 0.1543)
over	3.92 to 3.94 (0.1543 to 0.1551)
over	3.94 to 3.96 (0.1551 to 0.1559)
over	3.96 to 3.98 (0.1559 to 0.1567)
over	3.98 to 4.00 (0.1567 to 0.1575)
over	4.00 to 4.02 (0.1575 to 0.1583)
over	4.02 to 4.04 (0.1583 to 0.1591)
over	4.04 to 4.06 (0.1591 to 0.1598)
over	4.06 to 4.08 (0.1598 to 0.1606)
over	4.08 to 4.10 (0.1606 to 0.1614)

3. Inspect pinion height again when former adjustment of bearing preload is completed. Unless anything wrong is found, remove drive pinion nut and companion flange and press new oil seal into gear carrier using Oil Seal Drift ST30720000. Apply grease cavity between seal lips.
4. Again install companion flange and washer, and tighten nut to specified torque 14 to 17 kg-m (101 to 123 ft-lb).
5. Measure preload again.

Preload (with oil seal):
11 to 14 kg-cm
(9.5 to 12.2 in-lb)

At companion flange bolt hole:
3.1 to 4.0 kg
(6.8 to 8.8 lb)

ADJUSTMENT OF SIDE BEARING SHIMS

1. If hypoid gear set, carrier, differential case or side bearing have been replaced with new ones, adjust the side bearing preload with adjusting shim.

The required thickness of adjusting shim can be calculated by the following formulas.

$$T_1 = (A - C + D - H') \times 0.01 + 0.175 + E$$
$$T_2 = (B - D + H') \times 0.01 + 0.150 + F$$

Where,

T_1 : Required thickness of left side bearing adjusting shim (mm).
T_2 : Required thickness of right side bearing adjusting shim (mm).
A : Figure marked on the left side bearing housing of gear carrier.
B : Figure marked on the right side bearing of gear carrier.
C & D : Figure marked on the differential case.
E & F : These are differences in width of left or right side bearing against the standard width (20.00 mm) (mm).
If bearing width is 19.89, the difference will be as follows:

$$20.00 - 19.89 = 0.11$$

H' : Figure marked on the ring gear. See Figures PD-20 and PD-21.

Figures for A, B, C, D and H' are dimensional variations in a unit of 1/100 mm against each standard measurement.

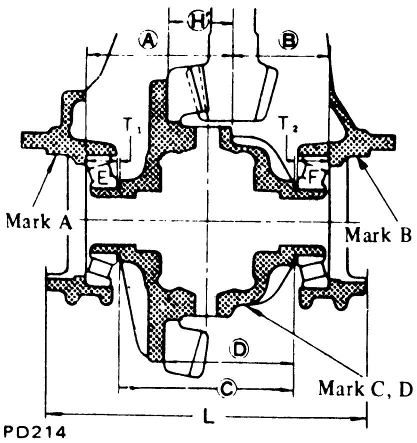


Fig. PD-20 Thickness of shim on left and right sides

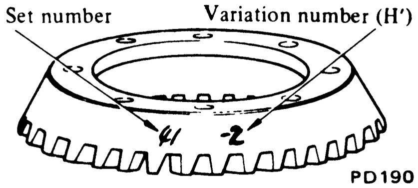


Fig. PD-21 Variation number on ring gear

Examples of calculation

Ex. 1 ---

A = 1, B = 2, C = 2, D = 3
E = 0.11 mm, F = 0.15 mm
H' = –2

Left side:

$$\begin{aligned} T_1 &= (A - C + D - H') \times 0.01 + 0.175 + E \\ &= (1 - 2 + 3 - (-2)) \times 0.01 + 0.175 + 0.11 \\ &= (1 - 2 + 3 + 2) \times 0.01 + 0.175 + 0.11 \\ &= 4 \times 0.01 + 0.175 + 0.11 \\ &= 0.04 + 0.175 + 0.11 \\ &= 0.325 \text{ mm} \end{aligned}$$

The correct shims are as follows:

Thickness		Quantity	
0.07	x	2	= 0.14
0.20	x	1	= 0.20
Total thickness			= 0.34 mm

Right side:

$$\begin{aligned} T_2 &= (B - D + H') \times 0.01 + 0.150 + F \\ &= (2 - 3 + (-2)) \times 0.01 + 0.150 + 0.15 \\ &= (2 - 3 - 2) \times 0.01 + 0.150 + 0.15 \\ &= -3 \times 0.01 + 0.150 + 0.15 \\ &= -0.03 + 0.150 + 0.15 \\ &= 0.27 \text{ mm} \end{aligned}$$

The correct shims are 0.07 plus 0.20 mm thick.

Ex. 2 ---

A = 0, B = 3, C = 1, D = 0
E = 0.20 mm, F = 0.17 mm
H' = 2

Left side:

$$T_1 = (A - C + D - H') \times 0.01 + 0.175 + E$$
$$= (0 - 1 + 0 - (+2)) \times 0.01 + 0.175 + 0.20$$
$$= (0 - 1 + 0 - 2) \times 0.01 + 0.175 + 0.20$$
$$= -3 \times 0.01 + 0.175 + 0.20$$
$$= -0.03 + 0.175 + 0.20$$
$$= 0.345 \text{ mm}$$

The correct shims are 0.05 plus 0.10 plus 0.20 mm thick.

Right side:

$$T_2 = (B - D + H') \times 0.01 + 0.150 + F$$
$$= (3 - 0 + (+2)) \times 0.01 + 0.150 + 0.17$$
$$= (3 - 0 + 2) \times 0.01 + 0.150 + 0.17$$
$$= 5 \times 0.01 + 0.150 + 0.17$$
$$= 0.05 + 0.150 + 0.17$$
$$= 0.37 \text{ mm}$$

The correct shims are 0.07 plus 0.10 plus 0.20 mm thick.

Note: If values signifying A, B, C, D and H' are not given, regard them as zero and compute.
After assembly, check to see that preload and backlash are correct. If not, readjust.

Side bearing adjusting shim

Thickness mm (in)
0.05 (0.0020)
0.07 (0.0028)
0.10 (0.0039)
0.20 (0.0079)
0.50 (0.0197)

2. Fit determined side bearing adjusting shim on differential case, and press fit left and right side bearing inner races on it, using Side Bearing Drift ST33230000 and Adapter ST33061000.
3. Install differential case assembly into gear carrier, tapping with a rubber mallet.
4. Align mark on bearing cap with that on gear carrier, and install bearing cap on carrier. And tighten bolts to specified torque.

Tightening torque:
4 to 5 kg-m
(29 to 36 ft-lb)

5. Measure "L" dimension (between left and right bearing cap edges) by Side Bearing Cap Gauge ST32110001 or a micrometer. See Figure PD-22.

"L" dimension:
198.40 to 198.55 mm
(7.8110 to 7.8169 in)

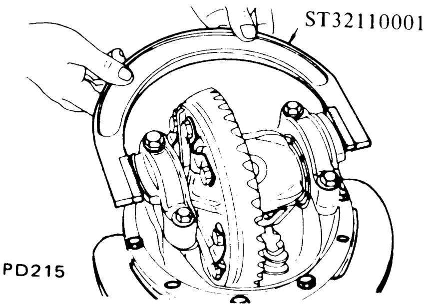


Fig. PD-22 Measuring "L" dimension

6. Measure ring gear-to-drive pinion backlash. See Figure PD-23.

If backlash is too small, remove shims from left side and add them to right side. To reduce backlash, remove shims from right side and add them to left side.

Backlash:
0.15 to 0.20 mm
(0.0059 to 0.0079 in)

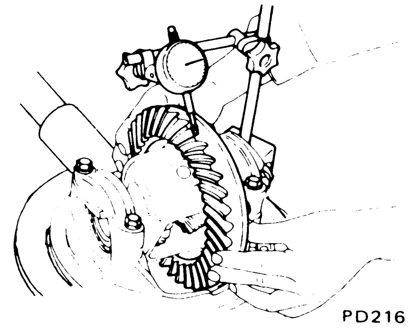


Fig. PD-23 Measuring backlash

7. At the same time, check side bearing preload. Bearing preload should read 12 to 20 kg-cm (10.4 to 17.4 in-lb) of rotating torque, [3.5 to 5.8 kg (7.7 to 12.8 lb) at ring gear bolt hole].

If preload does not accord with this specification, adjust it with side bearing shims.
8. Check and adjust the tooth contact pattern of ring gear and drive pinion.
(1) Thoroughly clean ring and drive pinion gear teeth.
(2) Paint ring gear teeth lightly and evenly with a mixture of powdered red lead and oil of a suitable consistency to produce a contact pattern.
(3) Rotate pinion through several revolutions in the forward and reverse direction until a definite contact pattern is developed on ring gear.
(4) When contact pattern is incorrect, readjust thickness of adjust shim.

Be sure to wipe off red lead completely upon completion of adjustment.
(5) Incorrect contact pattern of teeth can be adjusted in the following manner.

a. Heel contact

To correct, increase thickness of pinion height adjusting washer in order to bring drive pinion close to ring gear. See Figure PD-24.

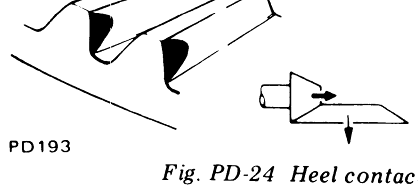
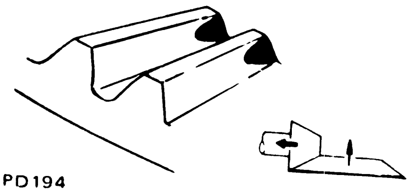


Fig. PD-24 Heel contact

b. Toe contact

To correct, reduce thickness of pinion height adjusting washer in order to make drive pinion go away from ring gear. See Figure PD-25.

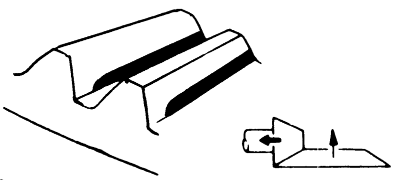


PD194

Fig. PD-25 Toe contact

c. Flank contact

Adjust in the same manner as in b. See Figure PD-26.

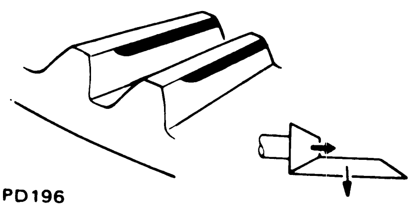


PD195

Fig. PD-26 Flank contact

. Face contact

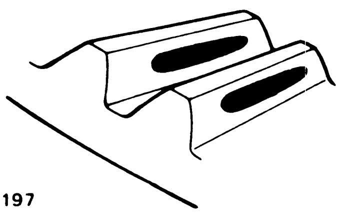
Adjust in the same manner as in a. See Figure PD-27.



PD196

Fig. PD-27 Face contact

e. Correct tooth contact



PD197

Fig. PD-28 Correct contact

ɔte: Change in thickness of adjusting washer is accompanied by change in backlash. Check it when installing gear.

INSTALLATION

Installing can be done in the reverse order of removal.

Tightening torque:
Gear carrier to rear axle case:
1.7 to 2.5 kg-m
(12 to 18 ft-lb)
Drain and filler plug:
6 to 10 kg-m
(43 to 72 ft-lb)

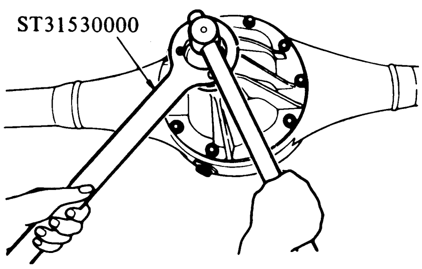
Gear oil quantity:
1.0 liter (1 U.S.qt., ⅞ Imp.qt.)

REPLACEMENT OF FRONT OIL SEAL

Replacement of front oil seal with differential gear carrier assembly installed on the vehicle.

When replacing front oil seal, do as follows:

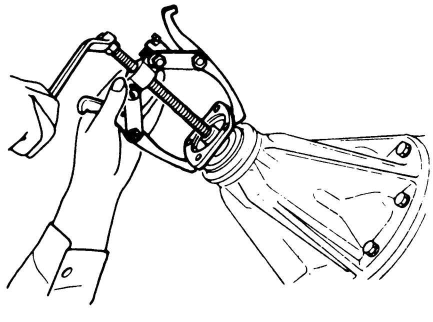
1. Drain gear oil.
2. Raise the rear end of vehicle and support it with safety stands.
3. Detach propeller shaft from companion flange of carrier.
4. Remove drive pinion nut, holding companion flange with Drive Pinion Flange Wrench ST31530000. See Figure PD-29.



PD237

Fig. PD-29 Removing drive pinion nut

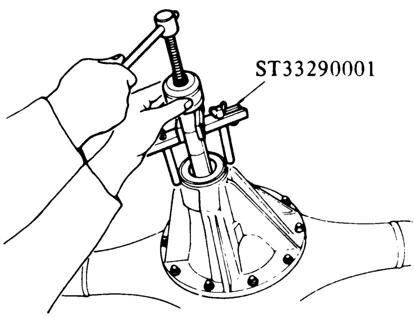
5. Extract companion flange using a standard puller. See Figure PD-30.



PD238

Fig. PD-30 Removing companion flange

6. Remove oil seal using Gear Carrier Oil Seal Puller ST33290001. See Figure PD-31.



PD239

Fig. PD-31 Removing oil seal

7. Set new oil seal in position using Oil Seal Drift ST30720000. Apply grease in between seal lips.
8. Fit companion flange and flat washer on drive pinion, and secure them in position by tightening nut to the given torque confirming specified preload, using Drive Pinion Flange Wrench ST31530000.

Tightening torque:
14 to 17 kg-m
(101 to 123 ft-lb)
Pinion bearing preload
(with oil seal):
11 to 14 kg-cm
(9.5 to 12.2 in-lb)
At companion flange bolt hole:
3.1 to 4.0 kg
(6.8 to 8.8 lb)

Notes:

a. Preload of old bearing is the same value as that of a new bearing.

b. If the desired nut tightening torque cannot be obtained, renew nut and readjust.

8. Reinstall propeller shaft, and fill up differential carrier with gear oil.

TROUBLE DIAGNOSES AND CORRECTIONS

When a gear carrier is suspected of being noisy, it is advisable to make a thorough test to determine whether the noise originates in the tires, road surface, exhaust, universal joint, propeller shaft, wheel bearings, engine, transmission, or gear carrier. Noise which originates in other places cannot be corrected by adjustment or replacement of parts in the rear axle assembly.

Condition	Probable cause	Corrective action
Noise on drive, coast and float.	Shortage of oil.	Supply gear oil. Rebuild gear carrier if necessary.
	Incorrect tooth contact between ring gear and drive pinion.	Adjust tooth contact or replace the hypoid gear set.
	Incorrect backlash between ring gear and drive pinion.	Adjust backlash or replace the hypoid gear set if necessary.
	Seized up or damaged ring gear and drive pinion.	Replace the hypoid gear set.
	Seized up, damaged or broken drive pinion bearing.	Replace the pinion bearing and faulty parts.
	Seized up, damaged or broken side bearing.	Replace the side bearing and faulty parts.
	Loosen bolts or nuts fixing ring gear, bearing cap, etc.	Clamp them to specified torque, and replace faulty parts.
Noise on turn.	Seized up, damaged or broken side and pinion gear.	Replace faulty parts.
	Seized up, damaged or broken side gear and pinion thrust washer.	Replace faulty parts.
	Pinion gears too tight on their shaft.	Replace faulty parts.
Knocking sound during starting or gear shifting.	Excessive backlash.	
	Incorrect backlash ring gear-to-drive pinion backlash, or side-to-pinion gear.	Adjust backlash.
	Worn gears or case.	Replace worn parts.
	Worn rear axle shaft and side gear spline.	Replace worn parts.
	Pinion bearing under preload.	Adjust preload.
	Loosened drive pinion nut.	Repair or replace.
	Loosen bolts or nuts fixing ring gear, bearing cap, etc.	Clamp them or replace if necessary.

Condition	Probable cause	Corrective action
Seizure of breakage.	Shortage of oil or use of unsuitable oil.	Replace faulty parts.
	Excessively small backlash.	Adjust backlash and replace as required.
	Incorrect adjustment of bearings or gears.	Replace faulty parts.
	Severe service due to an excessive loading, improper use of clutch.	Replace faulty parts.
	Loose bolts and nuts, such as ring gear bolts.	Replace faulty parts.
Oil leakage.	Worn-out, damaged or improperly driven front oil seal, or bruised, dented or abnormally worn slide face of companion flange.	Replace faulty oil seal. Repair the affected flange with sandpaper or replace if necessary.
	Worn, damaged or improperly driven side oil seal, or bruised, dented or abnormally worn slide face of side yoke.	Treat as above.
	Loose gear carrier bolts.	Tighten the bolts to specified torque.
	Faulty gasket or O-ring.	Replace faulty parts with new ones.
	Loose filler or drain plug.	Tighten the plug.
	Clogged or damaged breather.	Repair or replace.

SERVICE DATA AND SPECIFICATIONS

Type	H190
Gear carrier material	Malleable cast-iron
Gear ratio (number of teeth)	
Manaual transmission	4.375 ($\frac{35}{8}$)
Automatic transmission	4.625 ($\frac{37}{8}$)
Drive pinion preload adjusted by	Shim
Drive pinion	
Preload kg-cm (in-lb)	
(without oil seal)	10 to 13 (8.7 to 11.3)
(with oil seal)	11 to 14 (9.5 to 12.2)
At companion flange bolt hole kg (lb)	
(without oil seal)	2.9 to 3.7 (6.4 to 8.2)
(with oil seal)	3.1 to 4.0 (6.8 to 8.8)
Thickness of pinion height adjusting washer mm (in)	2.58 (0.1016)
	2.61 (0.1028)
	2.64 (0.1039)
	2.67 (0.1051)
	2.70 (0.1063)
	2.73 (0.1075)
	2.76 (0.1087)
	2.79 (0.1098)
	2.82 (0.1110)
	2.85 (0.1122)
	2.88 (0.1134)
	2.91 (0.1146)
	2.94 (0.1158)
	2.97 (0.1169)
	3.00 (0.1181)
	3.03 (0.1193)
	3.06 (0.1205)
	3.09 (0.1217)
	3.12 (0.1228)
	3.15 (0.1240)
	3.18 (0.1252)
Length of pinion bearing adjusting spacer mm (in)	54.50 (2.1457)
	54.80 (2.1575)
	55.10 (2.1693)
	55.40 (2.1811)
	55.70 (2.1929)
	56.00 (2.2047)

Thickness of pinion bearing adjusting washer	mm (in)	over 3.80 to 3.82 (0.1496 to 0.1504)
		over 3.82 to 3.84 (0.1504 to 0.1512)
		over 3.84 to 3.86 (0.1512 to 0.1520)
		over 3.86 to 3.88 (0.1520 to 0.1528)
		over 3.88 to 3.90 (0.1528 to 0.1535)
		over 3.90 to 3.92 (0.1535 to 0.1543)
		over 3.92 to 3.94 (0.1543 to 0.1551)
		over 3.94 to 3.96 (0.1551 to 0.1559)
		over 3.96 to 3.98 (0.1559 to 0.1567)
		over 3.98 to 4.00 (0.1567 to 0.1575)
		over 4.00 to 4.02 (0.1575 to 0.1583)
		over 4.02 to 4.04 (0.1583 to 0.1591)
		over 4.04 to 4.06 (0.1591 to 0.1598)
		over 4.06 to 4.08 (0.1598 to 0.1606)
		over 4.08 to 4.10 (0.1606 to 0.1614)

Side gear and pinion mate

Thickness of side gear thrust washer	mm (in)	over 0.75 to 0.80 (0.0295 to 0.0315)
		over 0.80 to 0.85 (0.0315 to 0.0335)
		over 0.85 to 0.90 (0.0335 to 0.0354)
		over 0.90 to 0.95 (0.0354 to 0.0374)
Pinion mate-to-side gear backlash (or clearance between side gear and thrust washer)	mm (in)	0.02 to 0.08 (0.0008 to 0.0032)

Ring gear

Ring gear-to-drive pinion backlash	mm (in)	0.15 to 0.20 (0.0059 to 0.0079)
Thickness of side bearing adjusting shim	mm (in)	0.05 (0.0020)
		0.07 (0.0028)
		0.10 (0.0039)
		0.20 (0.0079)
		0.50 (0.0197)
Side bearing standard width	mm (in)	20.0 (0.7874)
"L" dimension	mm (in)	198.40 to 198.55 (7.8110 to 7.8169)

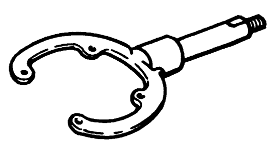
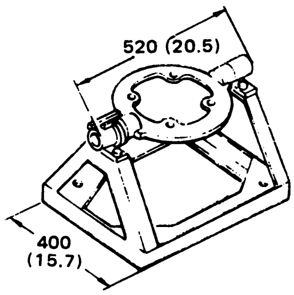
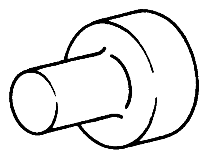
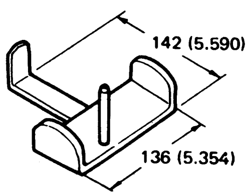
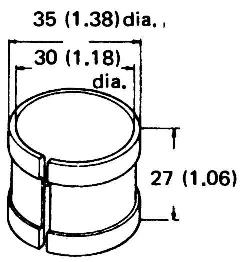
Tightening torque **kg-m (ft-lb)**

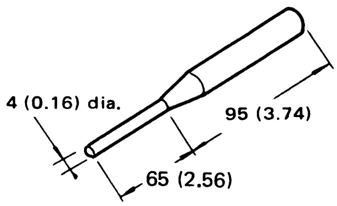
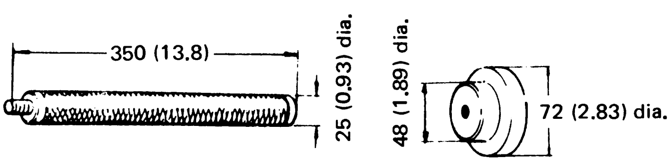
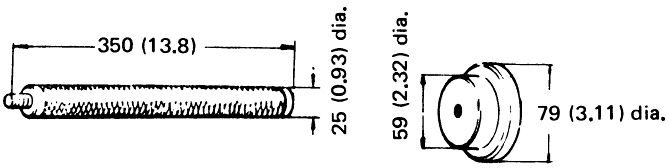
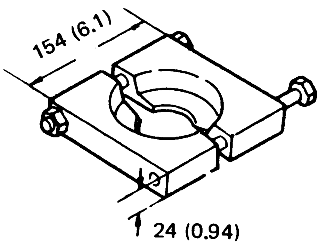
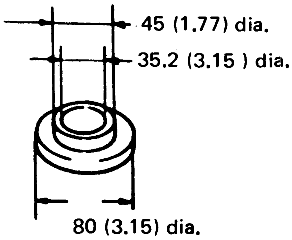
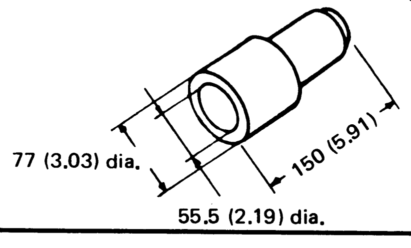
Drive pinion nut	14 to 17 (101 to 123)
Ring gear bolt	7 to 8 (51 to 58)
Side bearing cap bolt	4 to 5 (28 to 36)
Differential carrier to axle case	1.7 to 2.5 (12 to 18)
Companion flange of front shaft and flange yoke connecting nut	2.4 to 3.3 (17 to 24)
Center bearing bracket nut	1.6 to 2.2 (12 to 16)
Companion flange to propeller shaft	2.4 to 3.3 (17 to 24)
Oil drain and filler plug	6 to 10 (43 to 72)

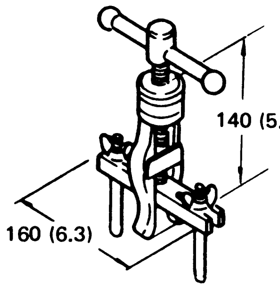
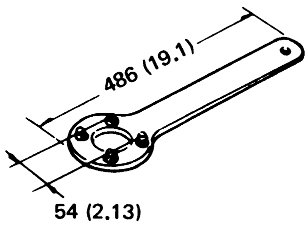
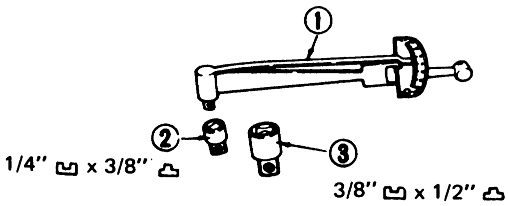
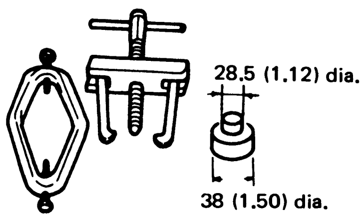
PROPELLER SHAFT AND DIFFERENTIAL CARRIER

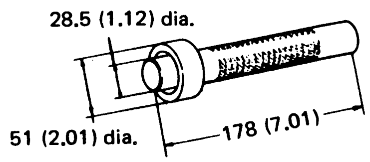
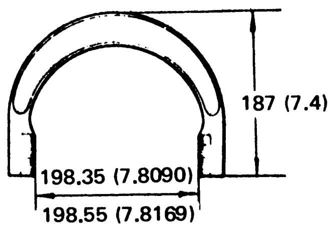
Oil capacity (about)	liters (U.S. qt., Imp. qt.)	1.0 (1, ⅞)
Adjusting methods		
Variable numbers expressed by		mm (x 0.01)
Dummy shaft		Use
Drive pinion adjusting formula		$T = N - [(H - D' - S) \times 0.01] + 2.18$
Side bearing adjusting formula		$T_1 = (A - C + D - H') \times 0.01 + 0.175 + E$ $T_2 = (B - D + H') \times 0.01 + 0.150 + F$

SPECIAL SERVICE TOOLS

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or Figure No.
1.	ST06310000 Diff. attachment	This tool is used for attaching gear carrier to ease disassembly or assembly (ST0501S000).  SE023	620 521 W510	Fig. PD-7
	ST07320000 Gear carrier stand	For supporting the differential gear carrier attachment.  SE100	620 521	Page PD-7
2.	ST3194S000 Drive pinion setting gauge assembly (H190) ST31942000 Dummy shaft ST31941000 Height gauge	These tools are used to adjust the pinion height.  SE209  SE210	620 521 W610	Fig. PD-16 Fig. PD-17
3.	ST31970000 Collar	This tool is used for Type H190 to adjust the pinion height. This tool is used with ST3194S000 or ST3110S000. 	620 W610	Fig. PD-16

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or Figure No.
4.	ST23510001 Solid punch	For driving out of lock pin of pinion mate shaft. 	620 521 610 W610 710 510 W510 S30	Fig. PD-13
5.	Drive pinion outer race drift ST30611000 Bar ST30613000 Adapter	These tools are used when assembling drive pinion outer race. 	(Front) 620 W610 W510 (Rear) 620 521 610 W610 710 510	Page PD-9
	ST30611000 Bar ST30621000 Adapter		(Rear) 620 W610 W510 S30	Page PD-9
6.	ST3090S000 Drive pinion rear inner bearing puller assembly ST30031000 Puller ST30901000 Base	This assembly clamps rear bearing inner race and pulls it out by a hydraulic press. Before insertion, place another drift facing inner race, and then press-fit. 	620 W610 W510 S30	Fig. PD-10
7.	ST30720000 Gear carrier front oil seal drift	This tool is used to drive in front oil seal without damaging it. 	620 521 610 W610 710 510 W510 S30	Page PD-11 Page PD-13

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or Figure No.
8.	ST33290001 Gear carrier oil seal puller	This tool is used to pull out oil seal from gear carrier. This tool also enables to remove side bearing outer race from retainer without damaging. 	All models	Fig. PD-31 Page PD-13
9.	ST31530000 Drive pinion flange wrench	This tool is used to hold the flange to ease the operation of tightening and loosening drive pinion nut. 	620 521 610 W610 710 510 W510 S30	Fig. PD-5 Fig. PD-9 Fig. PD-29 Page PD-3
10.	ST3127S000 Preload gauge 1. GG91030000 Torque wrench 2. HT62940000 Socket adapter 3. HT62900000 Socket adapter	This tool is used to measure the preload of pinion bearing. 	All models	Fig. PD-19
11.	ST3306S001 Diff. side bearing puller ST33051001 Body ST33061000 Adapter	This tool is used to pull out side bearing. 	620 521 610 W610 710 510 W510 S30	Fig. PD-12 Fig. PD-15

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or Figure No.
12.	ST33230000 Diff. side bearing drift	Use of this tool makes it possible to drive in bearing without damaging it. 	620 521 610 W610 710 510 W510 S30	Fig. PD-15 Page PD-9
13.	ST32110001 Diff. side bearing cap gauge	This tool is used to measure the width of side bearing caps after it is tightened to specified torque.  SE106	620 521 W610 W510	Fig. PD-22

SERVICE MANUAL

DATSUN PICK-UP
MODEL 620 SERIES

SECTION FA

FRONT AXLE AND FRONT SUSPENSION

FA

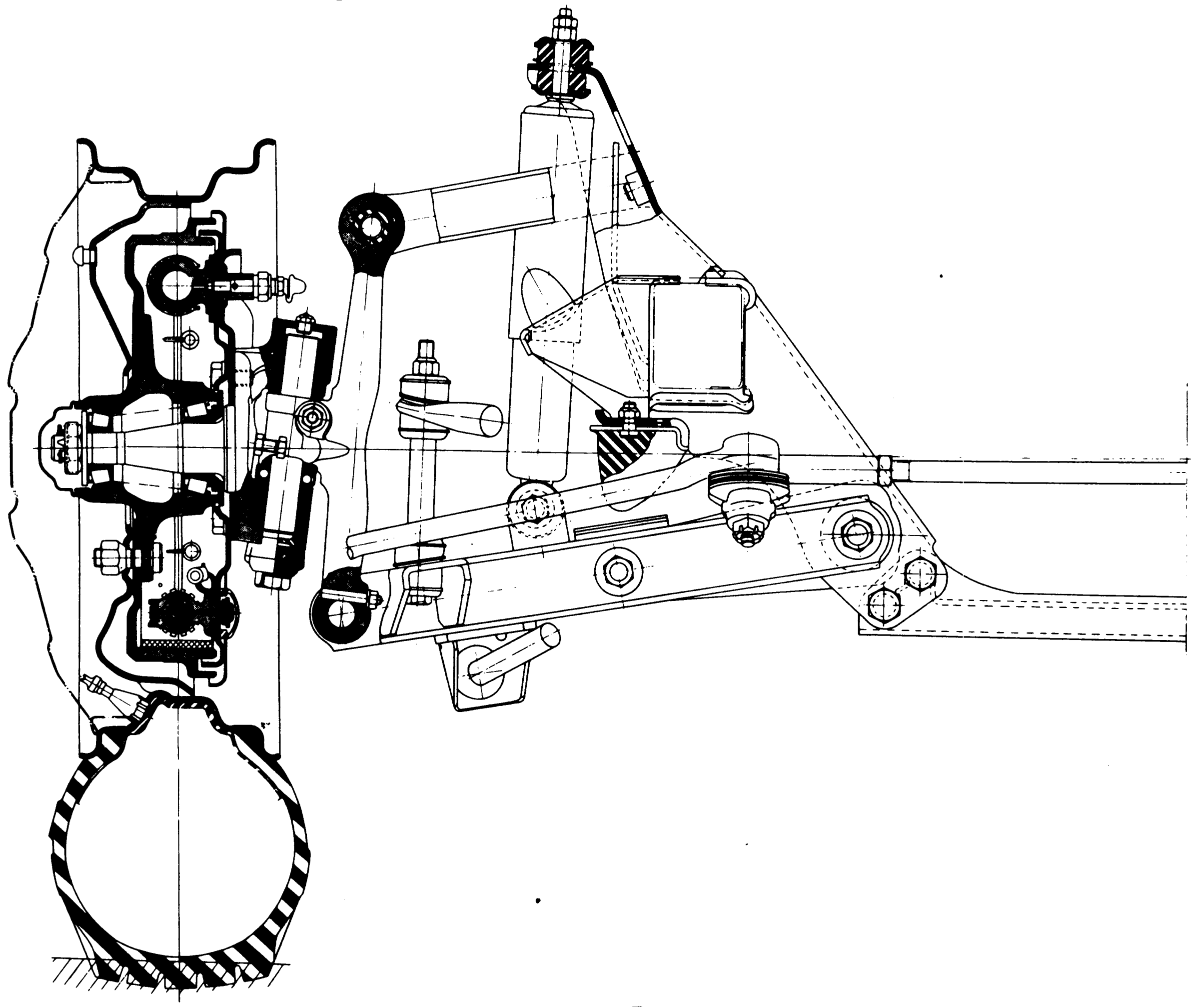
NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

FRONT AXLE AND FRONT SUSPENSION

CONTENTS

GENERAL DESCRIPTION



FA224

Fig. FA-1 Sectional view of front axle and front suspension

The design of the front suspension adopts the independent double-wishbone type suspension used the torsion bar spring. Both the upper and lower links are installed on the bracket which is welded on the frame. And the above links swing to allow the knuckle spindle to move freely in a vertical dimension.

The top and bottom of the knuckle spindle support are connected to the upper link through rubber bushing and to the lower link through screw bushing.

The tension rod held by the brackets on the chassis frame and lower link with rubber bushings, bears the force of fore and aft direction.

The front end of the torsion bar spring is installed to the torque arm which attaches to the lower link. The opposite end is installed to the spring anchor that secures to chassis frame firmly. The both ends of the torsion bar spring are serrated.

The shock absorber is double-action, telescopic hydraulic type.

The upper stem is attached to the bracket of the chassis frame. The lower insulated bracket is bolted to the lower link.

The bumper rubber secured to the bracket of the frame, limits the vertical motion of the suspension link.

The knuckle spindle is connected to the knuckle spindle arm by the king pin. The king pin bushings are fitted to the upper and lower arm portions of the knuckle spindle, and seals are provided at the portions mentioned to keep water and dirt from entering.

The knuckle arm is connected to the lower end of the knuckle spindle to transmit the movement of the steering wheel to the knuckle spindle.

The wheel hub is supported by two taper roller bearings on the knuckle spindle. The brake drum and wheel are secured to the hub by the hub bolts.

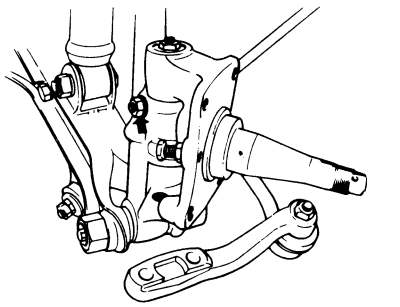
The above component parts are used on the vehicles as standard specifications, and the stabilizer is available as an optional part.

FRONT AXLE

Removal and installation

Removal

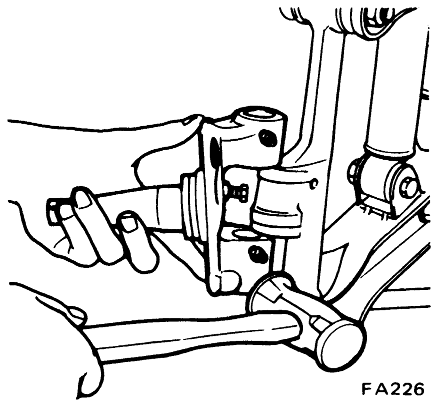
1. Jack up and support vehicle on the stands at the frame in a safe manner.
2. Remove front wheel.
3. Remove brake hose together with connector from wheel cylinder.
4. Remove brake drum.
5. Remove hub cap and then remove cotter pin, adjusting cap, and spindle nut from knuckle spindle.
6. Remove wheel hub, outer and inner wheel bearings, bearing washer and grease seal from knuckle spindle.
7. Remove brake disc assembly from the flange of knuckle spindle.
8. Remove knuckle arm from knuckle spindle.
9. Remove king pin lock bolt.



FA225

Fig. FA-2 Removing king pin lock nut

10. After removing air breather, remove plug from the top of king pin with the following method: Drill a 10.5 mm (0.413 in) diameter hole on the plug, thread hole with a tap (M12-1.25), screw a bolt into threaded hole and pull out the plug.
11. Apply drift to the top of king pin and drive out king pin along with lower plug.
12. Tap spindle with a soft hammer and detach it from knuckle spindle support. Take care not to drop thrust bearing.



FA226

Fig. FA-3 Removing knuckle spindle

Installation

Install front axle in reverse sequence to removal by noting the following matters. Furthermore, when installing front axle, lightly coat grease to sliding parts.

1. Insert O-ring on the lower end of knuckle spindle support. Install thrust bearing and spindle shim together with knuckle spindle to knuckle spindle support.

In this operation, select spindle shims to obtain the specified clearance between knuckle spindle and knuckle spindle support. To measure the clearance with a filler gauge, jack up the bottom of spindle slightly.

Standard clearance:
0.1 mm (0.004 in) or less

Note: **Be sure to install thrust bearing to face covered side upward.**

2. Line up locking bolt hole of knuckle spindle support with the notch in king pin and secure lock bolt. Be sure to check knuckle spindle for smooth movement. Be certain to move knuckle spindle smoothly and readjust shim if necessary. In addition, check bushings and king pin as required.
3. Press fit plug to the upper of knuckle spindle. Then, install lower plug to the lower knuckle spindle.

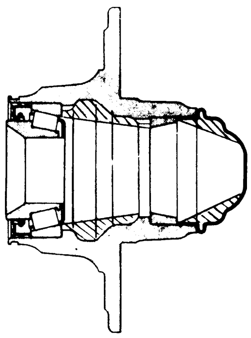
Note: **Make sure to place lower plug correctly.**

4. Secure knuckle arm to knuckle

spindle and torque bolt to 10.3 to 12.1 kg-m (75 to 88 ft-lb). Bend lock plate to engaged flats on bolt head.

Note: When disassembled, discard used lock plate.

5. Pack grease to the upper and lower bushings on knuckle spindle until grease comes out from grease seal.
6. Fill wheel hub and cap with grease up to the described level. See Figure FA-9.



FA141
Fig. FA-4 Greasing wheel hub

7. Pack roller and cone assembly and the cavity of grease seal lip with grease.
8. Coat grease to the thread of knuckle spindle, bearing washer, and bearing lock nut.
9. Secure wheel hub, bearings, bearing washer and spindle nut on knuckle spindle and adjust bearing preload referring to the paragraph "Wheel bearing adjustment."

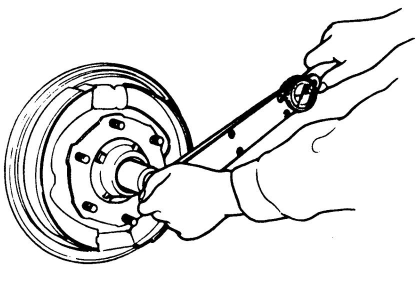
Note: Be sure to obtain correct preload on wheel bearings for the purpose of having their long life, taking care to keep wheel bearings, grease seal, bearing washer and spindle nut clean when installing them.

Wheel bearing adjustment

Wrong adjustment of wheel bearings causes abnormal wear and score on the bearings and knuckle spindle.

To attain proper preload on wheel bearings, proceed the following operations:

1. Torque spindle nut to 3.0 to 3.5 kg-m (22 to 25 ft-lb) using torque wrench.



FA227
Fig. FA-5 Tightening spindle nut

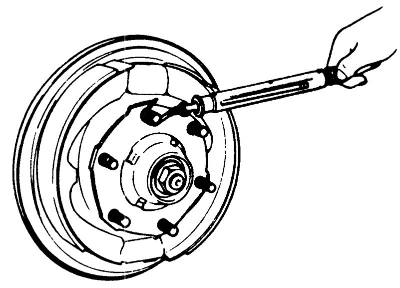
2. Rotate wheel hub a few turns clockwise and counterclockwise to seat bearings. Then, retighten spindle nut to the same tightening torque. Be certain to rotate hub smoothly.
3. Back off spindle nut in range from 40 to 70 degrees. Locate adjusting cap on spindle nut so as to align the castellation on the cap with the cotter pin hole in the spindle.
4. Check the hub rotation. If hub rotates properly, measure bearing rotation starting torque. If measured torque is deviated from the specified value, replace bearings or readjust.

The starting torque can be measured by a spring balance as shown in Figure FA-6.

Spring balance indication at hub bolt:
New bearing:
2.1 kg (4.6 lb) or less
Used bearing:
1.0 kg (2.2 lb) or less

Notes:

a. **When measuring the staring force, pull the spring balance toward tangential direction against normal line connected between hub bolt and spindle center.**
b. **Axial play is permissible to exist in 0.1 mm (0.004 in) or less.**



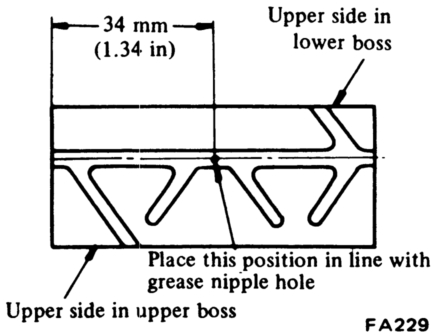
FA228
Fig. FA-6 Measuring bearing rotation starting torque

5. Install a new cotter pin. Bend the ends of cotter pin around the castellated flange of adjusting cap. Then, install hub cap.

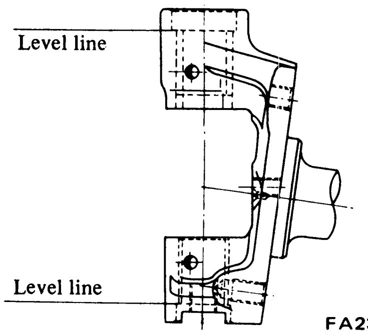
Disassembly and assembly

Knuckle spindle

1. Drive spindle bushing and grease seal out of knuckle spindle with King Pin Bush Drift ST35380000. Discard bushing and grease seal when disassembled.
2. After cleaning king pin bores thoroughly, install bushing carefully by using the above special tool. Position bushing in accordance with the instructions filled in Figure FA-7 and FA-8.



FA229
Fig. FA-7 King pin bushing



FA230

Fig. FA-8 Bushing location

3. Remove grease nipple and drill grease hole on bushing through threaded grease nipple hole. When grease hole is drilled, remove metal chip and burr thoroughly.

Drilling diameter:
approximate 3 mm (0.118 in)

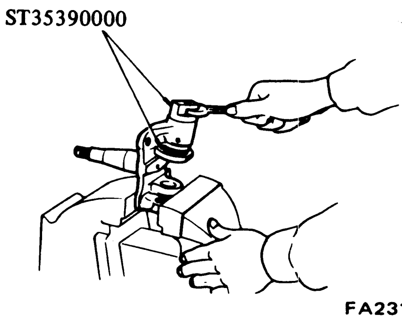
Note: When a spindle bushing has a grease nipple hole in it, an additional hole need not be drilled. When pressing it into position, align grease nipple hole with that in spindle bushing.

4. Ream the inside of bushing to the specified value with King Pin Bush Reamer HT56802000.

Bushing inner diameter (when fitted):
20.010 to 20.035 mm
(0.7878 to 0.7888 in)

Note: Carry out reaming from both upper and lower bushings. When reaming upper side, use lower side as reaming guide, and when reaming lower side, use upper side as reaming guide to align the center line correctly.

5. Press fit grease seal on upper arm with Grease Seal Drift ST35390000. In installing grease seal, take care not to damage seal lip.



FA231

Fig. FA-9 Installing grease seal

Wheel hub

1. After removing grease seal with screwdriver, lightly tap outer race circumference with a hammer by applying a brass bar and remove outer bearing race from hub. When tapping outer race circumference, tap evenly.
2. Remove all traces of old grease from bearings, hub and knuckle spindle.
3. Install inner and outer bearing races in hub with a suitable tool. Be sure to seat the races properly in hub.
4. Pack the inside of hub and hub cap with specified grease to the described level. See Figure FA-4. Also, pack the bearing cone and roller assemblies with the same lubricant.

FA009

Fig. FA-10 Greasing bearing cone and roller assembly

5. Place inner bearing cone and roller assembly in hub. Coat grease slightly to the lips of new grease seal, and seat it properly.

Inspection

1. King pin and bushing

Check and replace king pin and/or bushing if the following faulty condition is detected; deformation, scores, partial wear, and excessive clearance between king pin and bushing in diameter direction exceeding limit listed below.

Clearance limit:
0.15 mm (0.0059 in)

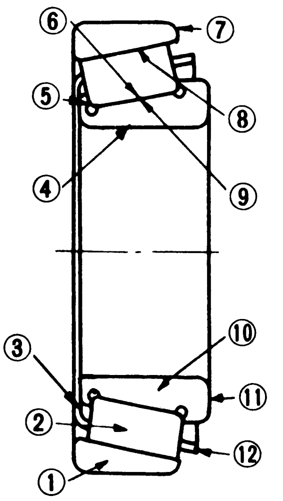
Standard dimensions
King pin outer diameter:
19.979 to 20.000 mm
(0.7866 to 0.7874 in)
Bushing inner diameter:
20.010 to 20.035 mm
(0.7878 to 0.7888 in)

2. Wheel bearing

Thoroughly clean grease and dirt from wheel bearing with cleaning solvent, and dry with compressed air free of moisture. Check wheel bearing to see that it rolls freely and is free from noise, crack, pitting, or wear. Also, check outer race for condition. Removal of outer race from drum is not necessary.

Shown below is the chart which furnishes the necessary information on "Visual Serviceability Standard for Wheel Bearing."

Visual serviceability standard for wheel bearing



1 Outer race
2 Roller
3 Small collar
4 Inner race fitted surface
5 Collar surface
6 Inner race surface
7 Outer race fitted surface
8 Outer race surface
9 Roller rolling surface
10 Inner race
11 Large collar
12 Supporter

FA006

Fig. FA-11 Wheel bearing assembly

Judgement	X : Unserviceable △ : May be used when minor * : Rust should be removed with #0 emery paper			
Components	Race and roller			Cause
	Rolling surface	Fitted surface	Supporter	
Flaking (Fig. a, b)	X			Service life due to rolling fatigue. However, this symptom occurs before the service life. The following causes are considered. • Abnormal load (overload). • Improper handling or installing.
Crack (Fig. c, d)	X	X	X	• Excessive tightening. • Excessive gap and a considerable shock received from the outside. • Rapid heat generation on the race due to creep. • Bitten supporter with seizing rollers. • Abnormal thrust load. • Tapped with a hammer while removing.
Seizure	X	X	X	In the most cases, seizure occurs as the result of grown discoloring or flaking.
Scratch	△	△	△	• Shock is given carelessly during installation. • Bit foreign matter.
Recess or wear made by pressing or striking (Fig. e, f, g)	△	△	△	• Careless installation, removal, or other rough handling (scar due to striking). • Recess made by foreign matter.
Wear	△	△	△	• Poor lubricant quality or deteriorated lubricant. • Intrusion of dust. Fitted surface is worn remarkably. • Wear due to excessive preliminary pressure.
Biting	△	△	△	• Excessive preliminary pressure or faulty lubrication.
Fretting	△*	△*	△*	• The fitted part is discolored to brown or black. • Fretting corrosion (rust on fitted part) means fine relative slip on metal contact surface.

Components	Race and roller		Supporter	Cause
	Rolling surface	Fitted surface		
Rust (Fig. h)	△*	△*	△*	• Temperature increased during operation lowers when the bearing stops, moisture inside the bearing is condensed, becoming fine drips, and the grease is moistened. • The bearing has been placed in a highly moistened place for a long period of time. • Intrusion of moisture, chemicals, etc., or the bearing is touched with bare hand and no rustproof action has been taken.
Discoloring	The wheel bearing is serviceable if discoloring can be removed with solvent or by polishing.			• Slight discoloring may become like oxidized oil stain due to grease. • In the most cases, this occurs when preliminary pressure is too high.

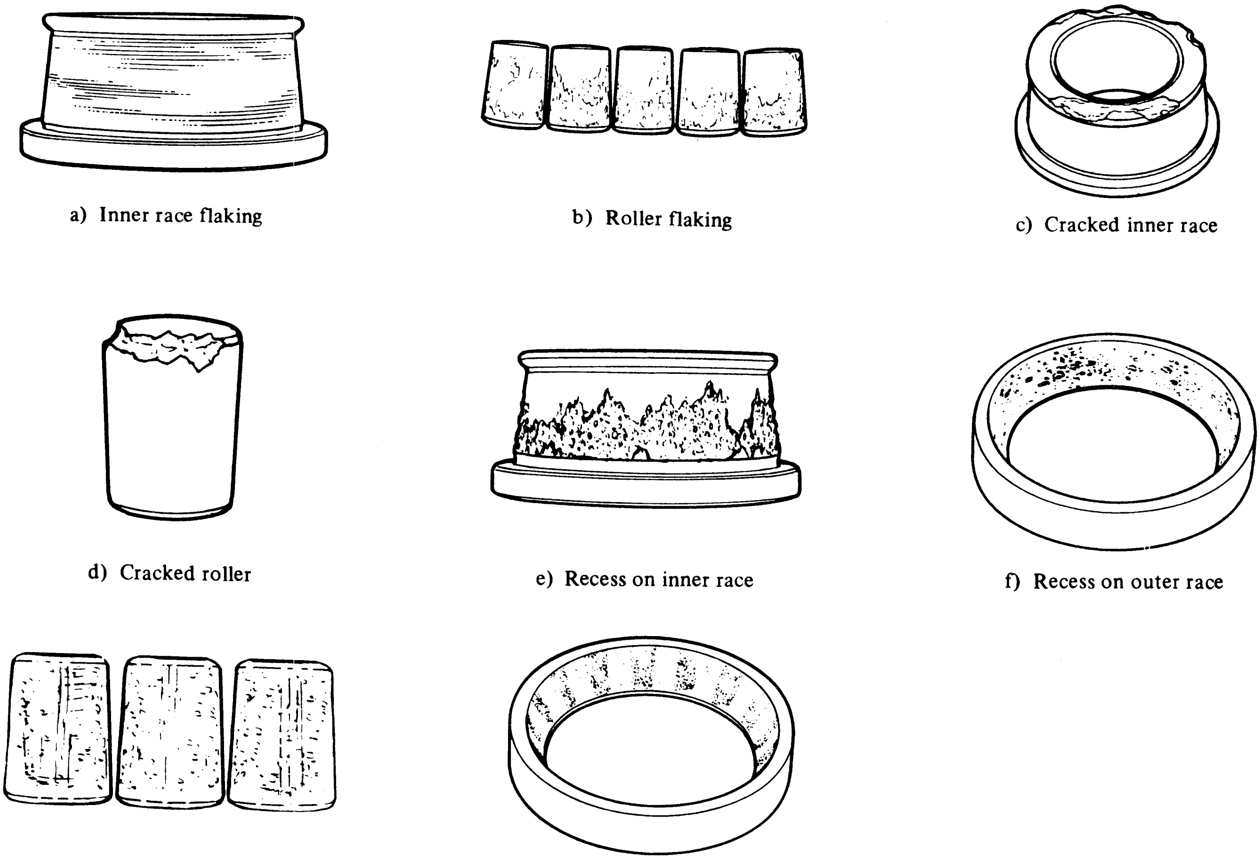
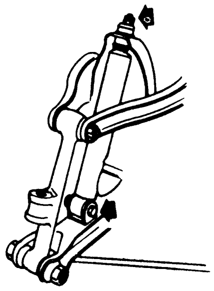


Fig. FA-12 Defective conditions of bearing

SHOCK ABSORBER

Removal and installation

1. Raise vehicle on a hoist or stands.
2. Remove wheel.
3. Hold the upper stem of shock absorber and remove nuts, washer, and rubber bushing
4. Remove bolt from the lower end of shock absorber.



FA232
Fig. FA-13 Shock absorber

5. Retain lower rubber bushing in position, install the lower end of shock absorber to the bracket of lower link, and torque the bolt to 3.1 to 4.1 kg-m (23 to 30 ft-lb).

Note: Insert the bolt from the front side of vehicle.

6. Install the upper end of shock absorber to body bracket and tighten lock nuts to the specifications.

Tightening torque:
1.6 to 2.2 kg-m (12 to 16 ft-lb)

Inspection

1. Check shock absorber for visible defects and oil leaks. Place shock absorber vertically in a vise, and hand stroke shock absorber as outlined below:

Extend and compress shock absorber as far as possible, travelling as long as possible.

If smooth hydraulic resistance is not present in both direction, replace absorber.

2. Replace rubber bushing if crack or deterioration is detected.

Specifications for shock absorber

Item \ Model		Pick-up	Double Pick-up
Piston stroke	mm (in)	110 (4.3)	
Damping force [0.3 m/sec. (0.98 ft/sec.)]	kg (lb)		
Rebound		76 (168)	110 (242.5)
Comprfession		38 (84)	55 (121.3)

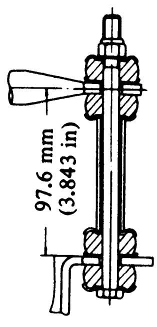
STABILIZER

Removal and installation

1. Raise vehicle on a hoist or stands.
2. Remove wheel.
3. Loosen securing nut at the lower link side of stabilizer.
4. Remove bolt securing stabilizer mounting bracket to chassis frame.

Install stabilizer in the reverse sequence to removal, noting the following instructions.

5. Attach stabilizer mounting bracket to chassis frame, tightening bolt to 1.6 to 2.2 kg-m (12 to 16 ft-lb) torque.
6. Install stabilizer lower link side to connecting rod and tighten nut to the specifications as shown in Figure FA-14. Then, torque lock nut to 1.6 to 2.2 kg-m (12 to 16 ft-lb).



FA233
Fig. FA-14 Stabilizer detail

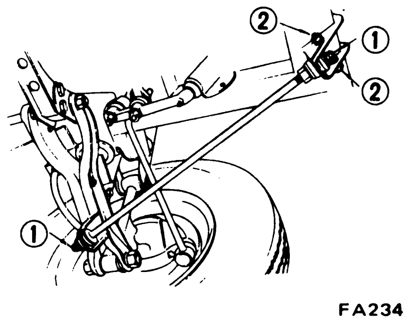
Inspection

Check stabilizer for deformation and rubber bushings for crack, wear and deterioration. Replace if necessary.

TENSION ROD

Removal and installation

1. Raise vehicle on a hoist or stands.
2. Remove wheel.
3. Remove nuts ① from both ends of tension rod.
4. Remove bracket bolt ② from the front end of tension rod, and remove tension rod with bracket.



FA234
Fig. FA-15 Tension rod

Install tension rod in reverse sequnce to removal, noting the following instructions.

5. Install tension rod at rear end, 'en nut to make the distance of rubber bushing to be 33.4 mm (1.315 in), and torque lock nut to 1.6 to 2.2 kg-m (12 to 16 ft-lb).
6. Install tension rod bracket to chassis frame bracket and torque nut to 1.6 to 2.2 kg-m (12 to 16 ft-lb).

When two rubber bushings are different in size, arrange adjusting nut. Standard dimension is 11 mm (0.433 in) as shown in Figure FA-16. Torque lock nut to 1.6 to 2.2 kg-m (12 to 16 ft-lb).

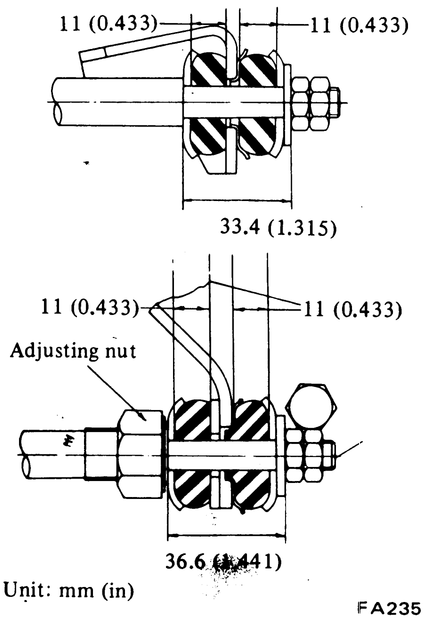


Fig. FA-16 Tension rod detail

Inspection

1. Check tension rod for bend and the thread for faulty condition. Repair or replace as required.
2. Check bushing rubber for wear and deterioration. Replace if necessary.

TORSION BAR SPRING

moval and installation

1. Raise vehicle on a hoist or stands.
2. Remove wheel.
3. Loosen nuts at spring anchor bolt.
4. Remove dust cover at the rear end of torsion bar spring and detach snap ring.
5. Withdraw torsion bar spring rearward after pulling out anchor arm rearward.

Install torsion bar spring in the reverse sequence to removal, noting the following instructions.

6. Coat grease on the serrations of torsion bar spring and install it to torque arm.

Note: Take care to install left and right torsion bar spring correctly. They can be identified with "L" (Left) and "R" (Right) marked on the end surface.

7. Install anchor arm to obtain "A" dimension to the specifications as shown in Figure FA-17, contacting lower link with bound bumper rubber. After retaining snap ring and dust cover, tighten adjusting nut until "B" dimension come to the specifications.

Note: Discard snap ring when removing it.

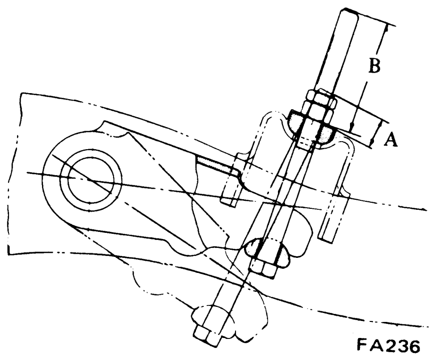


Fig. FA-17 Installing anchor arm

Unit: mm (in)

	A	B
Standard body	5 to 15 (0.197 to 0.591)	60 to 70 (2.362 to 2.756)
Long body	15 to 25 (0.591 to 0.984)	60 to 70 (2.362 to 2.756)
Double Pick-up	23.5 (0.925)	61.5 (2.421)

8. Install wheel and lower vehicle. Adjust vehicle posture at curb weight (full fuel tank, no passengers), referring to "Adjustment."
9. Torque lock nut to 3.1 to 4.1 kg-m (23 to 30 ft-lb).

Inspection

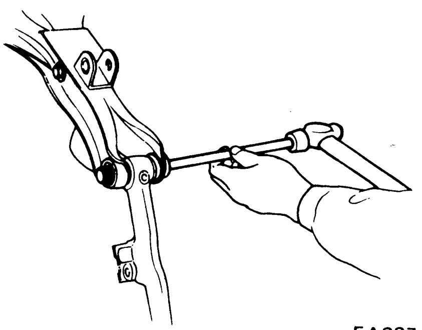
Check torsion bar spirng for wear, twist, etc. When adjusting vehicle posture, replace torsion bar spring with a new one if the specified height can not be obtained.

	Diameter x Length mm (in)	Torsional rigidity kg-m/deg. (ft-lb/deg.)
Standard body	20.7 x 830 (0.815 x 32.68)	2.99 (21.6)
Long body	21.9 x 830 (0.862 x 32.68)	3.74 (27.1)
Double Pick-up	20.7 x 830 (0.815 x 32.68)	2.99 (21.6)
U.S.A. & Canada (Optional for common countries)	21.9 x 830 (0.862 x 32.68)	3.74 (27.1)

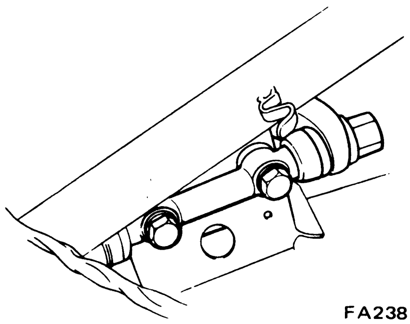
UPPER AND LOWER LINKS

Removal and installation

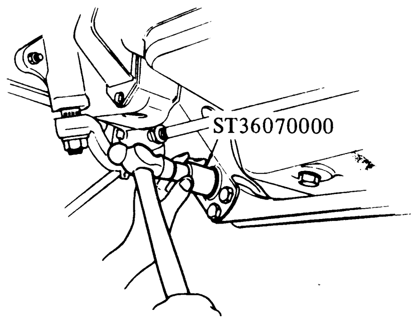
1. Raise vehicle on a hoist or stands.
2. Remove wheel and brake drum as an assembly.
3. Remove wheel hub. Refer to section "Front Axle."
4. Loosen bolts retaining brake disc to knuckle spindle and remove brake disc.
5. Remove knuckle arm, torsion bar spirng, stabilizer, shock absorber, and tension rod in this order referring the related sections.
6. Remove upper fulcrum bolt securing knuckle spindle support to upper link assembly and disassemble them.
7. Remove upper link bushings from knuckle spindle support.
8. Remove screw bushings from both ends of lower link fulcrum pin.
9. Loosen nut at lower portion of knuckle spindle support from inside and pull out cotter pin retaining fulcrum pin.
10. Pull out fulcrum pin with drift and remove knuckle spindle support with knuckle spindle from lower link. Then, detach dust cover.


FA237
Fig. FA-18 Removing fulcrum pin

11. Remove bolts retaining upper link spindle and remove upper link spindle with camber adjusting shims from body bracket.


FA238
Fig. FA-19 Removing upper link spindle

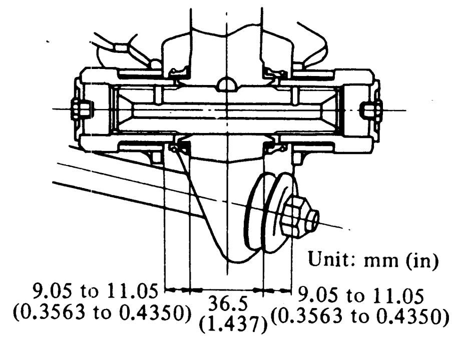
12. Remove nut retaining lower link spindle and remove lower link spindle. Remove lower link with torque arm from mounting bracket.
13. Using Lower Link Bushing Drift ST36070000 to lower link bushing, tap it with a hammer and drive out lower link bushing from bracket.



FA239
Fig. FA-20 Removing lower link bushing

Install upper and lower links in the reverse sequence to removal, noting the following instructions.

14. When the collar inside of lower link mounting bracket and bushing outside are rusted, remove rust with emery paper.
15. Fit lower link bushing into lower link mounting bracket using Lower Link Bushing Drift ST36070000. When tapping the drift with a hammer, be careful to hit the drift squarely.
16. Secure lower link to lower link bushing with lower link spindle and torque nut to 7.4 to 8.0 kg-m (54 to 58 ft-lb).
17. Install upper link spindle to u- per link mounting bracket with u camber adjusting shims and bolts.
Torque bolt to 7.0 to 9.0 kg-m (51 to 65 ft-lb).
18. Install dust seal to the lower end of knuckle spindle support.
19. Coat grease on the thread of fulcrum pin and line up the notch of fulcrum pin with knuckle spindle support for inserting cotter pin. Fit fulcrum pin to spindle support with a soft hammer. Secure cotter pin and torque lock nut to 0.8 to 1.1 kg-m (5.8 to 8.0 ft-lb).
20. Coat grease to the thread portion of screw bushing inside liberally. Position knuckle spindle support at the center of lower link and secure screw bushings temporarily by hand. After ascertaining the dimensions become correct as shown in Figure FA-21, torque screw bushings to 20 to 30 kg-m (145 to 217 ft-lb).



FA240
Fig. FA-21 Installing screw bushing

21. Replace filler plug with grease nipple and pack grease until grease comes out from dust cover. Reinstall filler plug.
22. Upon installation, make sure that fulcrum pin operates smoothly with the following torque.

Operating torque:
Less than 0.5 kg-m (3.6 ft-lb)

23. Install upper link bushing to knuckle spindle support.
24. Install knuckle spindle supp to upper link, insert fulcrum bolt, and torque nut to 3.9 to 5.3 kg-m (28 to 38 ft-lb).

Note: When installing fulcrum pin, insert it from rearward of vehicle.

25. Install tension rod, shock absorber, stabilizer, torsion bar spring, and knuckle arm, referring to the related paragraphs.
26. Install brake disc to knuckle spindle and torque securing bolt to 4.2 to 5.0 kg-m (30 to 36 ft-lb).
27. Install wheel and brake drum as an assembly and torque knuckle spindle nut to 8.0 to 9.0 kg-m (58 to 65 ft-lb).

Disassembly and assembly

Upper link

1. Detach upper link spindle from upper links and remove clamp, dust cover and dust seal. Secure upper link in a vise and loosen screw bushing.

Assemble link spindle in reverse sequence to disassembling, noting the following instructions.

2. Torque screw bushing on upper link to 35 to 55 kg-m (253 to 398 ft-lb). Install new dust seal and dust cover and secure them with clamp.
3. Coat grease to screw bushing inside and the thread portion of upper link spindle liberally. Screw front and rear links to upper link spindle in the same length so as to obtain the specified figures as shown in Figure FA-24.

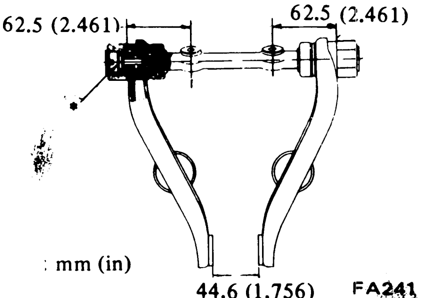


Fig. FA-22 Upper link and upper link spindle

4. Make sure to operate upper link spindle smoothly after installation.
5. Replace filler plug with grease nipple and pack grease until grease comes out from dust cover.
   Reinstall filler plug.

Lower link

When installing torque arm on lower link, tighten it to the following specifications.

Serration boss:
1.8 to 2.6 kg-m
(13 to 19 ft-lb)

Arm head:
2.7 to 3.7 kg-m
(20 to 27 ft-lb)

Inspection

Upper link spindle, fulcrum pin and screw bushing

Apply screw bushing to upper link spindle or fulcrum pin and measure axial end play between them.

When the end play exceeds 0.35 mm (0.0138 in), replace upper link spindle or fulcrum pin together with screw bushings.

Check the screw of upper link spindle, fulcrum pin, and screw bushing and repair or replace if necessary.

Note: Discard dust cover and dust seal when disassembled.

ADJUSTMENT

Vehicle posture

Vehicle posture may be incorrect due to weakened spring or other faulty condition. The following procedures are necessary when adjustment is required.

That is, the vehicle posture can be adjusted by obtaining only the specified "H" dimension, changing the length of anchor bolt.

1. Raise front of vehicle on stands.
2. Adjust "H" dimension with turning nut adjusting anchor bolt. "H" dimension changes approximately 3.5 mm (0.138 in) vertically when adjust nut is turned one complete turn.
3. To make the best vehicle posture, "H" dimension must be in the following range.

H dimension mm (in)

Condition \ Model	Pick-up	Double Pick-up
Vehicle empty no payload	78 to 82 (3.071 to 3.228)	63 to 68 (2.480 to 2.677)
Vehicle loaded	54.5 (2.146)	46 to 51 (1.811 to 2.008)

Notes:

a. Vehicle empty no payload consists of the following conditions:
   1) Full tank of gasoline, radiator filled and engine oil level full
   2) Spare tire, wheel, jack and jack handle in design position

b. Vehicle loaded consists of the following conditions:

For Pick-up model, 2-persons and 1,000 kg (2,205 lb) payload

For Double Pick-up model, 5-persons and 400 kg (882 lb) payload

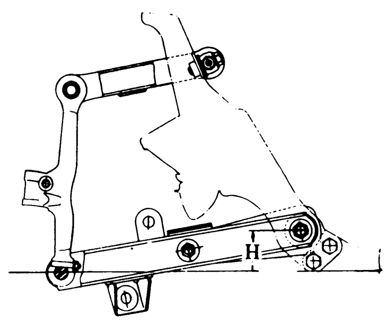


Fig. FA-23 Dimension for standard vehicle posture

Wheel alignment

Correct front wheel alignment attains proper vehicle handling characteristics and the least steering effort with a minimum amount of tire wear.

Before adjusting front wheel alignment, make sure to carry out a preliminary inspection of the front end parts for the following conditions:

1. Tire pressure and ballance
2. Wheel bearings and nuts
3. Steering gear play
4. Steering gear housing at frame
5. Steering linkage and connections
6. Shock absorber action

When using the equipment for front wheel alignment inspection, follow the instructions furnished with the equipment. Furthermore, the inspection should be made with the vehicle level and at curb weight.

Camber and caster

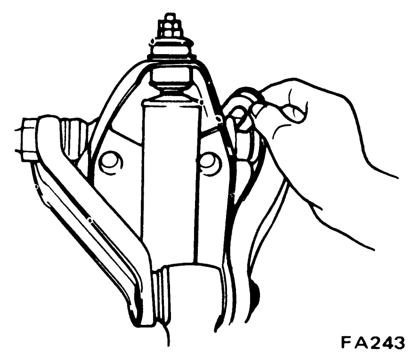
Measure camber and caster and adjsut them in accordance with the following procedures if necessary.

Both camber and caster are adjusted by increasing and decreasing thickness of adjust shim inserted between upper link spindle and upper link mounting bracket.

To adjust caster, made a difference between thickness of front and rear shims. By adding a shim 1 mm (0.039 in) at front side, caster will be decreased by 33′. At the same time, camber will also be decreased by 6.5′.

To adjust camber, add or remove an equal amount of shims to front and rear sides. By adding a pack of shims 1 mm (0.039 in) thick at both sides, camber will be decreased by 13′.

Shims are available in 1 mm (0.039 in), 2 mm (0.079 in) and 4 mm (0.157 in) thickness.



FA243

Fig. FA-24 Adjusting camber and caster

Notes:

a. **Do not make difference between front and rear shims in thickness beyond 2 mm (0.079 in) on a upper link spindle.**

b. **Limit shim thickness for any one stack within 6 mm (0.236 in).**

c. **Do not use shims for any one stack more the 2 sheets.**

Toe-in

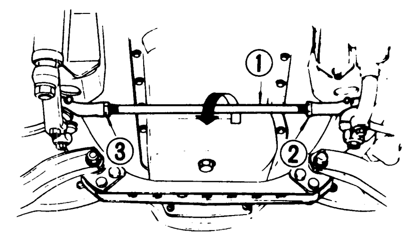
Measure toe-in and adjust if necessary. For adjustment, carry out the following procedures.

Turn steering wheel to straight ahead position with front wheels in the same position. Then, check steering gear straight ahead position.

Loosen lock nuts ② (left hand thread) and ③ (right hand thread) and turn cross rod ① to adjust toe-in. Turn cross rod to forward direction as shown by arrow, and toe-in is reduced.

When cross rod is turned to opposite side, toe-in is increased.

After correct toe-in is obtained, tighten lock nut to 8.0 to 10.0 kg-m (58 to 72 ft-lb).



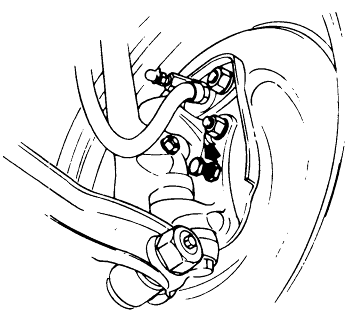
FA244

Fig. FA-25 Adjusting toe-in

Steering angle

Check steering angle and use the following procedures if necessary.

Loosen lock nut at stopper bolt and adjust steering angle with stopper bolt. After obtaining correct steering angle, secure lock nut firmly.



FA245

Fig. FA-26 Adjusting steering angle

		Pick-up	Double pick-up
Toe-in	mm (in) *1	1 to 5 (0.039 to 0.197)	2 to 3 (0.079 to 0.118)
	degree *2	5′ to 26′	10′ to 16′
Camber		1°15′ ±1°	1°30′ ±1°
Caster		1°50′ ±45′	1°50′ ±45′
Kingpin inclination		6°15′	6°
Steering angle	Inner wheel	36° ±1°	←
	Outer wheel	31° ±1°	←

*1: The extreme front and rear of the tire center.

*2: The total angle of the both tires.

Unladen

SERVICE DATA AND SPECIFICATIONS

King pin

Clearance limit between the king pin and bushing	mm (in)	0.15 (0.0059)
Bushing inner diameter (when fitted)	mm (in)	20.010 to 20.035 (0.7878 to 0.7888)
Clearance between the knuckle spindle support and spindle	mm (in)	less than 0.1 (0.004)

Wheel bearing

Tightening torque	kg-m (ft-lb)	3.0 to 3.5 (22 to 25)
Spindle nut returning angle		40 to 70°
Wheel bearing rotation starting torque		
When both bearing and seal are new	kg-cm (in-lb)	less than 15 (13.0)
When readjusted	kg-cm (in-lb)	less than 7 (6.1)
At the hub bolt		
When both bearing and seal are new	kg (lb)	less than 2.1 (4.6)
When readjusted	kg (lb)	less than 1.0 (2.2)

Suspension link

Upper link sliding resistance	kg-m (ft-lb)	less than 0.5 (3.6)
Lower link sliding resistance	kg-m (ft-lb)	less than 0.5 (3.6)

Tightening torque

	kg-m (ft-lb)
Brake hose connecting nut	1.9 to 2.5 (14 to 18)
Wheel bearing lock nut	3.0 to 3.5 (22 to 25)
Brake disc fixing bolt	4.2 to 5.0 (30 to 36)
Knuckle arm fixing bolt	10.3 to 12.1 (74 to 88)
King pin lock bolt	2.1 to 2.5 (15 to 18)
Torque arm	
Arm end	2.7 to 3.7 (20 to 27)
Serration boss	1.8 to 2.6 (13 to 19)
Lower link spindle nut	7.4 to 8.0 (54 to 58)
Upper link screw bushing	35 to 55 (253 to 398)
Upper link spindle bolt fixing to bracket	7 to 9 (51 to 65)
Cotter pin lock nut	0.8 to 1.1 (5.8 to 8.0)
Lower link screw bushing	20 to 30 (145 to 217)
Fulcrum bolt	3.9 to 5.3 (28 to 38)
Tension rod	
Lock nut	1.6 to 2.2 (12 to 16)
Bracket bolt	1.6 to 2.2 (12 to 16)
Shock absorber	
Lock nut of the upper end	1.6 to 2.2 (12 to 16)
Lower end	3.1 to 4.1 (22 to 30)
Stabilizer	
Bracket bolt	1.6 to 2.2 (12 to 16)
Lock nut of the anchor bolt	3.1 to 4.1 (22 to 30)
Bumper rubber bolt	0.8 to 1.1 (5.8 to 8.0)

TROUBLE DIAGNOSES AND CORRECTIONS

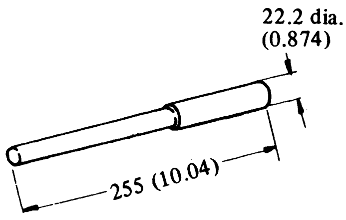
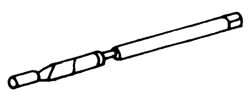
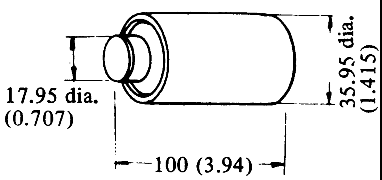
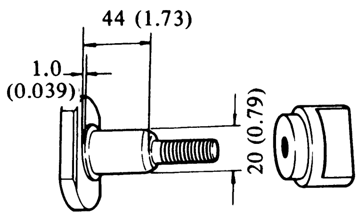
Condition	Probable cause	Corrective action
Vibration, shock and shimmying of steering wheel.	Vibration: Too much backlash of steering gear, wear of each part of linkage and vibration of front wheels are, in many cases, transmitted to the steering wheel. This is very much noticeable when travelling over bad roads and at higher speeds. Shock: When the front wheels are travelling over bumpy roads, the play of the steering linkage is transmitted to the steering wheel. This is especially noticeable when travelling rough road. Shimmy: Abnormal vibrations of the fornt suspension group and the whole steering linkage, which occur when a specific speed is attained.	
	Improper air pressure of tire.	Adjust.
	Unbalance and deformation of roadwheel.	Correct the unbalance or replace.
	Unevenly worn tire or insufficient tightening.	Replace or tighten.
	Improperly adjusted or worn front wheel bearing.	Adjust or replace.
	Faulty wheel alignment.	Adjust.
	Worn or loose suspension link screw bushing.	Replace.
	Damaged idler arm.	Replace.
	Insufficiently tightened steering gear housing.	Tighten.
	Worn steering linkage.	Replace ball joint.
	Improper steering gear adjustment (insufficient backlash).	Adjust.
	Faulty shock absorber or loose installation.	Replace or tighten.
	Unbalanced vehicle posture.	Adjust.
Vehicle pulls to right or left.	When driving with hands off the steering wheel on a flat road, the vehicle gently swerves to right or left. **Note: A faulty rear suspension may also be the cause of this condition and, therefore, see also the chapter dealing with the rear suspension.**	
	Improper air-pressure of tire or insufficient tightening of wheel nuts.	Adjust or tighten.
	Difference in height of right and left tire treads.	Replace tires.
	Incorrect adjustment or abrasion of front wheel bearing.	Adjust or replace.
	Weakened front torsion spring or deviation from standard specification.	Replace.
	Improper wheel alignment.	Readjust.
	Worn or loose suspension link screw bushing.	Replace.

Condition	Probable cause	Corrective action
Vehicle pulles to right or left.	Deformed of steering linkage and suspension link.	Replace.
	Unbalanced vehicle level.	Correct the unbalance.
Instability of vehicle.	Improper air pressure of tire.	Adjust.
	Worn or loose suspension link screw bushing.	Replace.
	Incorrect wheel alignment.	Adjust.
	Worn or deformed steering linkage and suspension link.	Replace.
	Incorrect adjustment of steering gear.	Adjust.
	Deformed unbalanced wheel.	Correct or replace.
Stiff steeirng wheel	Check and correct in the following manner. Jack up front wheels, detach the steering gear and operate the steering wheel, and: a) If it is light, check steering linkage, and suspension groups. b) If it is heavy, check steering gear and steering column groups.	
	Improper air pressure of tire.	Adjust.
	Insufficient lubricants or mixing impurities in steering linkage or excessively worn steering linkage.	Replenish grease or replace the part.
	Insufficient lubricant in gear box or contaminated lubricant.	Add or replace gear oil.
	Unsmooth king pin, damaged part, or insufficient lubrication.	Replace.
	Worn or incorrectly adjusted wheel bearing.	Replace or adjust.
	Worn damaged steering gear and bearing.	Replace.
	Incorrectly adjusted steering gear.	Adjust.
	Deformed steering linkage.	Replace.
	Incorrect wheel alignment.	Adjust.
	Interference of steering column with turn signal switch.	Adjust.
Excessive steering wheel play.	Incorrectly adjusted steering gear.	Adjust.
	Worn steering linkage idler arm.	Replace.
	Improperly fitted of gear box.	Retighten.
	Incorrectly adjusted wheel bearing.	Adjust.
	Worn or loose suspension link screw bushing.	Replace.
Noise.	Improper air pressure of tire.	Adjust.
	Insufficient lubricating oil and grease for suspension link screw bushing and steering linkage, or their breakage.	Replenish lubricating oil and grease, or replace.

FRONT AXLE AND FRONT SUSPENSION

Condition	Probable cause	Corrective action
Noise.	Loose steering gear bolts, linkage and suspension groups.	Retighten.
	Faulty shock absorber.	Replace.
	Damaged wheel bearing.	Replace.
	Worn steering linkage and steering gear.	Replace.
	Worn of loose suspension link screw bushing.	Replace.
Grating tire noise.	Improper air pressure of tire.	Adjust.
	Incorrect wheel alignment.	Adjust.
	Deformed knuckle spindle and suspension linkage.	Replace.
	Rough driving.	Avoid rough driving.
Jumping of disc wheel.	Improper air pressure of tire.	Adjust.
	Unbalanced wheels.	Adjust.
	Faulty shock absorber.	Replace.
	Worn tire.	Replace.
	Deformed wheel rim.	Replace.
Excessively or partially worn tire.	Improper air pressure of tire.	Adjust.
	Incorrect wheel alignment.	Adjust.
	Damaged wheel bearing.	Replace.
	Incorrect brake adjustment.	Adjust.
	Improper tire shifting (rotation).	Adjust.
	Rough and improper driving manner.	Drive more gently.

SPECIAL SERVICE TOOL

No.	Tool number & tool name	Description Unit: mm (in)		For use on	Reference page or figure No.
1.	ST35380000 King pin bush drift		This tool is used to drive out king pin bushing.	620 521	Page FA-4
2.	HT56802000 King pin bush reamer		This tool is used to correct king pin bushing.	620 521	Page FA-5
3.	ST36070000 Lower link bush drift		This tool is used to drive out lower link bushing.	620 521	Page FA-10 Fig. FA-20
4.	ST35390000 Grease seal drift		This tool is used to install grease seal. Newly established.	620	Page FA-5 Fig.FA-9

DATSUN PICK-UP
MODEL 620 SERIES

SECTION RA

REAR AXLE AND REAR SUSPENSION

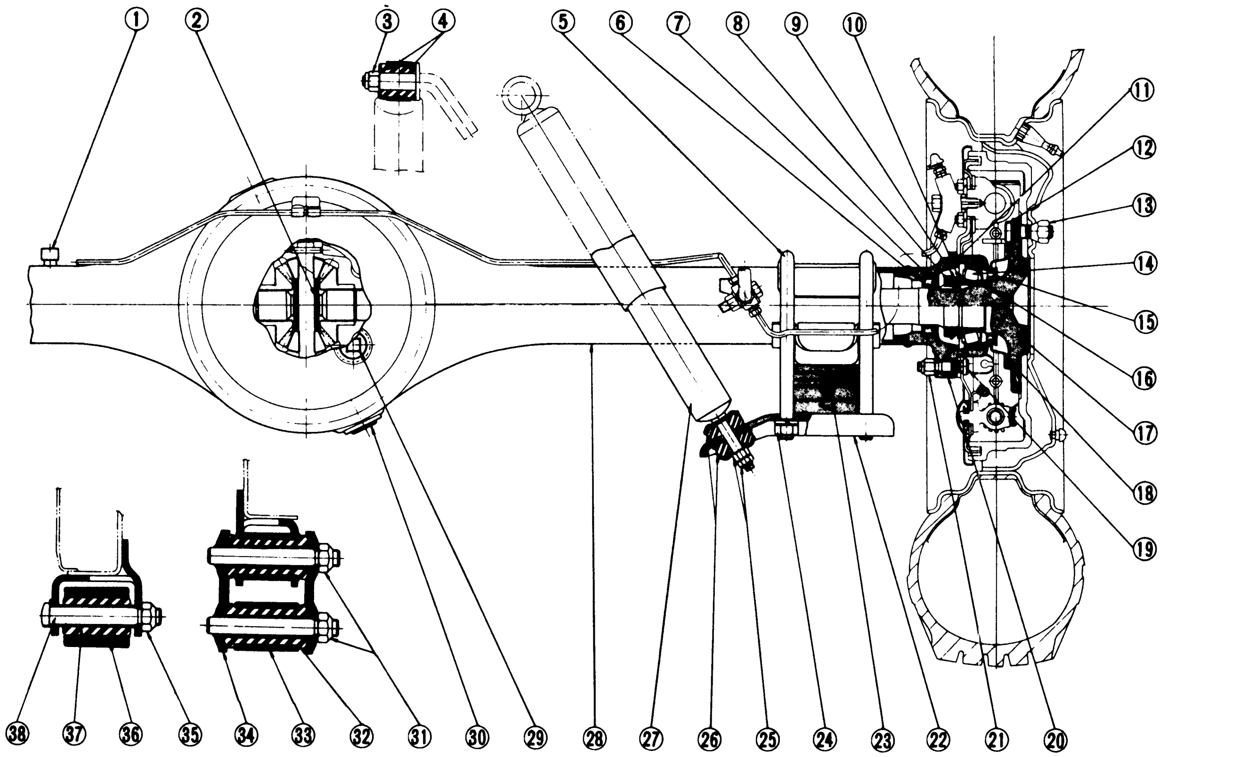
RA

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

REAR AXLE AND REAR SUSPENSION

CONTENTS



1 Air breather
2 Thrust block
3 Nut
T = 3.1 to 4.1 kg-m
(22 to 30 ft-lb)
4 Shock absorber mounting rubber bush
5 Rear spring clip (U-bolt)
6 Rear axle oil seal spacer
7 Rear axle shaft oil seal.
Supply wheel bearing grease to oil seal lip when assembly.
8 Rear axle bearing lock nut
T = 15 to 20 kg-m
(108 to 145 ft-lb)
9 Rear axle bearing lock washer
10 Plain washer
11 Rear axle bearing cage
12 Road wheel bolt
13 Road wheel nut
T = 8 to 9 kg-m
(58 to 65 ft-lb)
14 Wheel bearing
15 Rear axle bearing grease seal.
Supply wheel bearing grease to oil seal lip when assembly.
16 Rear axle bearing spacer
17 Rear axle shaft
18 Grease catcher
19 Bearing cage bolt
20 Rear axle case end shim
21 Nut
T = 5.4 to 6.4 kg-m
(39 to 46 ft-lb)
22 Rear spring pad
23 Rear spring
24 Nut
T = 7.3 to 9.9 kg-m
(53 to 72 ft-lb)
25 Nut
T = 1.6 to 2.2 kg-m
(12 to 16 ft-lb)
26 Shock absorber rubber bush
27 Shock absorber
28 Rear axle case
29 Filler plug
T = 6 to 10 kg-m
(43 to 72 ft-lb)
Oil capacity (about) = 1.0 liter
(1 US qt., 7/8 Imp.qt.)
30 Drain plug
T = 6 to 10 kg-m
(43 to 72 ft-lb)
31 Nut
T = 11.5 to 13.0 kg-m
(83 to 94 ft-lb)
32 Rear spring rear bush
33 Rear spring
34 Rear spring shackle
35 Nut
T = 11.5 to 13.0 kg-m
(83 to 94 ft-lb)
36 Rear spring
37 Rear spring front bush
38 Rear spring front pin

T: Tightening torque

Fig. RA-1 Cross-sectional view of rear axle and suspension

DESCRIPTION

The rear axle assembly is of the semi-floating type in which the vehicle weight is carried on the axle shafts through bearings enclosed in the bearing cages on outer rear axle case. The axle case is a pressed steel "Banjo" type housing.

The rear axle assembly is attached to the frame through semi-elliptic leaf springs and telescopic hydraulic shock absorbers. Rubber bushings at either end of the leaf springs and shock absorbers are designed to absorb vibration and noise.

The rear axle shaft splines engage the differential side gears with a floating fit. The outer ends are supported in the bearing cages by tapered-roller bearings.

The bearings are lubricated by wheel bearing grease. The axle shaft oil seals are located outboard and inboard of the bearing. The bearings are secured against shoulders on the shafts by press fit, and held in place by a large nuts.

The bearing cages hold the bearings against shoulders on the axle case.

Wheel side thrust is taken at the wheel bearings through the thrust block, so an axle shaft may be removed simply by removing the bolts holding the brake disc to the bearing cage and the rear axle case.

REMOVAL AND INSTALLATION

Rear axle assembly

It is not necessary to remove the rear axle assembly for any normal repairs.

However, if the axle case is damaged, the rear axle assembly may be removed and installed using the following procedures.

1. Raise rear of vehicle high enough to permit working underneath. Place a jack under center of axle case so it just starts to raise rear axle assembly.

Place stands solidly under frame members on both sides. Remove rear wheels.

2. Mark relationship across propeller shaft flange and companion flange of differential carrier so that the original combination is restored at assembly.
3. Remove bolts retaining center bearing bracket and connecting shaft to companion flange. Withdraw propeller shaft sleeve yoke from transmission by moving the shaft rearward, passing it under rear axle.
4. Disconnect rear hand brake cable ① by removing adjusting nut ② and four clamps ③. Slide front cable rearward and disconnect rear cable ④ at connector ⑤.
5. Disconnect rear brake hose at frame ⑥. Cover brake hose and pipe openings to prevent entrance of dirt.
6. Disconnect shock absorbers at lower end ⑦ and push shock absorbers up out of the way.
7. Lower jack under axle case. Remove U-bolts (spring clips) ⑧ to separate axle case from spring.

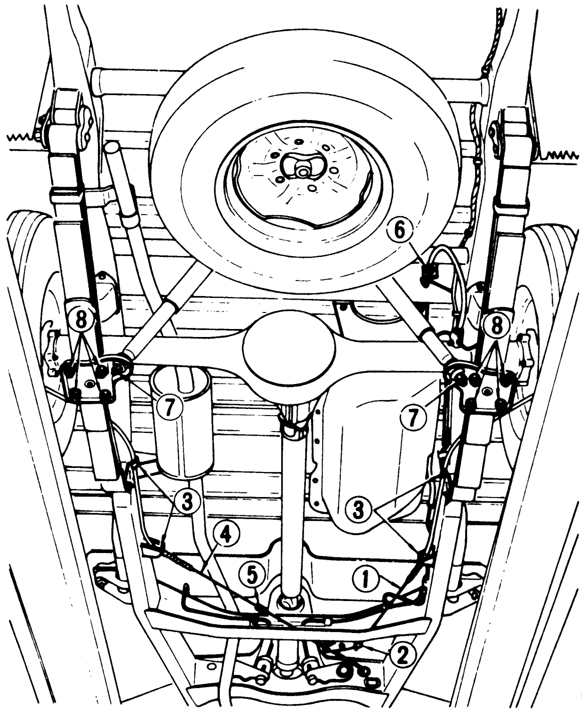


Fig. RA-2 Under view

8. Place a jack under center of axle case. Pass axle case through space above spring, and take it out to the side.

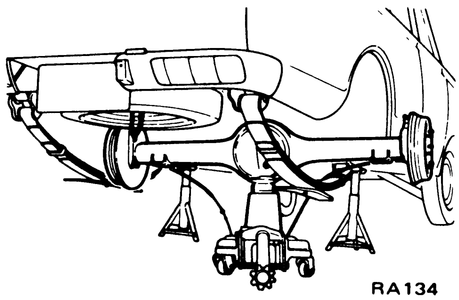


Fig. RA-3 Removing rear axle assembly

9. Install the axle case assembly in the reverse order of removal.

Tightening torque:

U-bolt (Spring clip):
7.3 to 9.9 kg-m
(53 to 72 ft-lb)

Shock absorber lower end nut:
1.6 to 2.2 kg-m
(12 to 16 ft-lb)

Brake pipe flare nut:
1.5 to 1.8 kg-m
(11 to 13 ft-lb)

Propeller shaft to companion flange connecting bolt:
2.0 to 2.7 kg-m
(14 to 20 ft-lb)

Center bearing bracket fixing bolt:
1.6 to 2.2 kg-m
(12 to 16 ft-lb)

Rear axle shaft and wheel bearing

1. Raise rear of vehicle and support under axle case on stands. Remove rear wheel.
2. Disconnect rear hand brake cable by removing adjusting nut and clamps.
3. Disconnect brake tube at rear brake disc. Cover brake tube and brake disc openings to prevent entrance of dirt.
4. Remove brake drum.
5. Remove nuts retaining wheel bearing cage to brake disc.

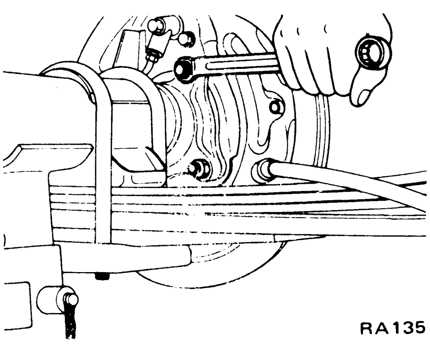


Fig. RA-4 Removing nuts

6. Pull out axle shaft assembly together with brake disc using Rear Axle Stand ST07630000 and Sliding Hammer ST36230000.

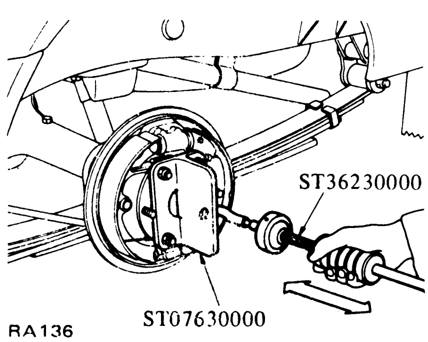


Fig. RA-5 Removing rear axle shaft assembly

7. Remove oil seal in axle case if necessary and install new seal. Insure against damaging the seal lip.
8. Position axle shaft in vise with Rear Axle Stand ST07630000.
9. Unbend lock washer with a screwdriver.

Note: Do not use used lock washer again.

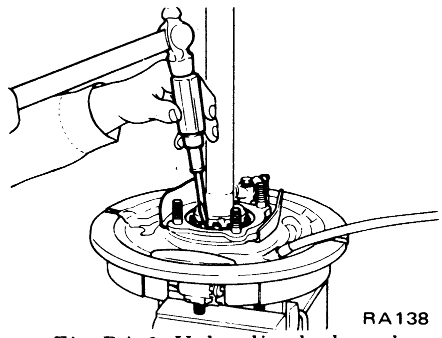


Fig. RA-6 Unbending lock washer

10. Remove lock nut using Rear Axle Bearing Lock Nut Wrench ST38020000.

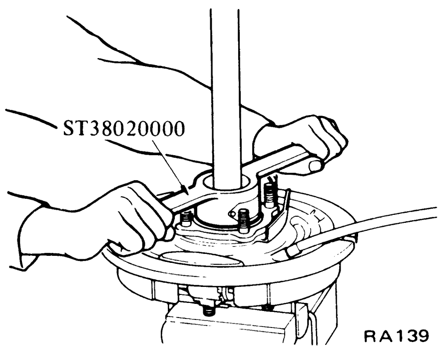


Fig. RA-7 Removing lock nut

11. Withdraw wheel bearing together with bearing cage and brake disc using Rear Axle Shaft Bearing Puller ST37140000.

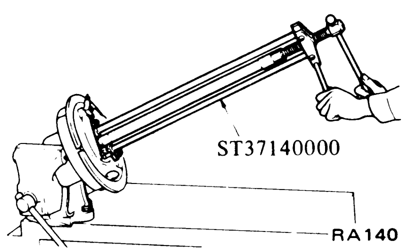


Fig. RA-8 Removing bearing

12. Remove oil seal in bearing cage if necessary.
13. To remove wheel bearing outer race after removed oil seal, apply a brass drift to race side surface, and withdraw it by tapping the top of drift with a hammer.

Installing can be proceeded in the reverse order of removal procedure as follows;

1. Fit wheel bearing outer race by tapping with a brass hammer evenly while fitting.
2. Install a new oil seal in bearing cage. Lubricate cavity between seal lips with wheel bearing grease after fitting seal.
3. Place bearing cage with brake disc and bearing spacer on axle shaft, and fit bearing cone. To install bearing cone, apply a brass drift to race side surface and tapping the top of drift with a hammer.

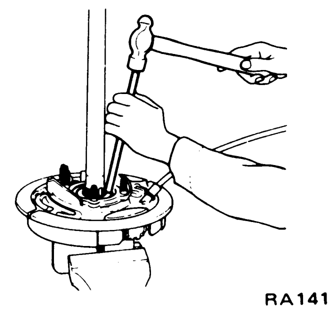


Fig. RA-9 Installing wheel bearing

4. Place bearing lock washer and bearing nut lock washer on axle shaft, and tighten lock nut using Rear Axle Bearing Lock Nut Wrench ST38020000, and bend up lock washer.

Notes:

a. **Be careful to place the faced side of nut to washer side so that washer is not damaged.**
b. **Coincide washer lip with nut groove correctly by tightening nut, and bend washer carefully so that lip will not be damaged.**

Tightening torque:
15 to 20 kg-m
(108 to 145 ft-lb)

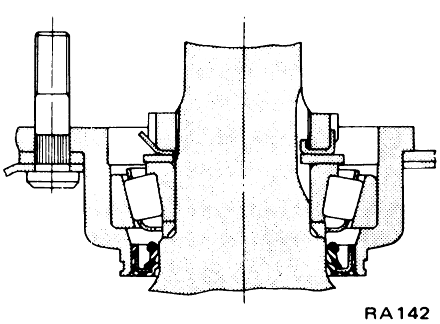
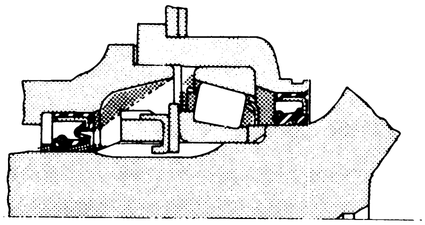


Fig. RA-10 Layout of lock nut

5. Apply wheel bearing grease in wheel bearing and recess of axle case end.



: Lubricating portion

RA143

Fig. RA-11 Lubricating portion in and around wheel bearing

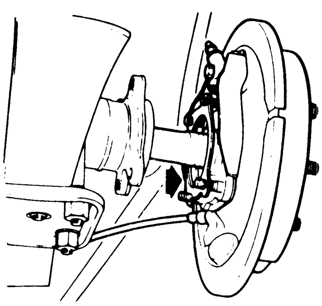
6. Apply gear oil to the spline at the inner end of axle shaft. Apply a coat of wheel bearing grease on the seal surface of the shaft.

7. Install left or right shaft, and adjust axial end play by applying rear axle case end shim (indicated by arrow mark).

Axial end play: 0.3 to 0.9 mm (0.012 to 0.035 in)

Standard shim thickness: 1.5 mm (0.059 in)

Tightening torque of bearing cage fixing nut: 5.4 to 6.4 kg-m (39 to 46 ft-lb)



RA144

Fig. RA-12 Installing rear axle shaft

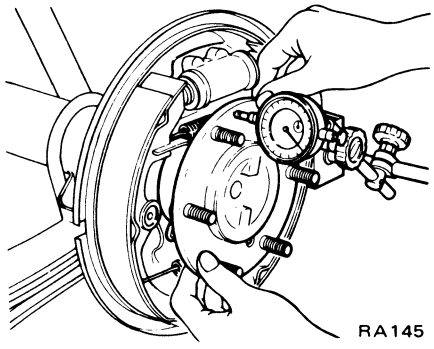
Rear axle case end shim

Thickness mm (in)
0.05 (0.0020)
0.07 (0.0028)
0.10 (0.0039)
0.20 (0.0079)
0.50 (0.0197)

8. Install shaft in opposite side, and adjust axial end play by applying shim.

Axial end play: 0.02 to 0.15 mm (0.0008 to 0.0059 in)

Tightening torque of bearing cage fixing nut: 5.4 to 6.4 kg-m (39 to 46 ft-lb)



RA145

Fig. RA-13 Measuring axial end play

9. Install other parts in reverse sequence to removal.

Rear axle case

Rear axle case may be removed and installed using the following procedures:

1. Raise rear of vehicle and support securely under both frame members with stands.
2. Remove rear axle assembly (See removal of rear axle assembly.).
3. Remove rear axle shaft at both sides (See removal of rear axle shaft and wheel bearing.).
4. Remove differential gear carrier assembly.

Installing can be proceeded in the reverse order of removal procedure.

Another procedure is available as listed below:

1. Raise rear of vehicle and support under both frame members with stands.
2. Remove rear axle shaft at both sides.
3. Remove differential gear carrier assembly.
4. Remove rear axle case.

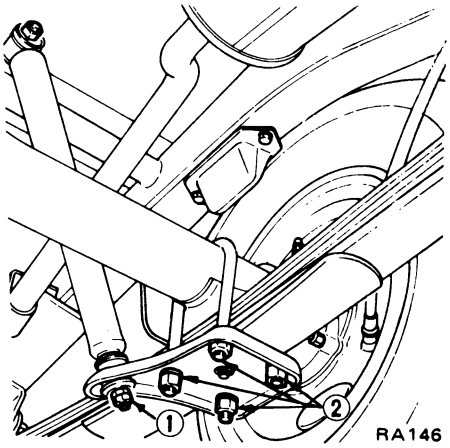
Installing can be proceeded in the reverse order of removal procedure.

Tightening torque:
Differential carrier to axle case fixing nut: 1.7 to 2.5 kg-m (12 to 18 ft-lb)

Oil drain and filler plug: 6 to 10 kg-m (43 to 72 ft-lb)

Rear spring

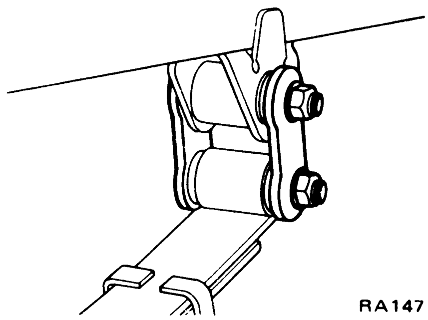
1. Raise rear of vehicle and support under both frame members with stands.
2. Disconnect shock absorber at lower end ① and remove U-bolts (Spring clips)②



RA146

Fig. RA-14 Removing shock absorber lower end and U-bolts

3. Position jack under rear axle case. Raise jack and float axle case from spring.
4. Disconnect rear spring shackle by removing nuts.



RA147

Fig. RA-15 Removing spring shackle

5. Disconnect spring from body by removing spring front pin.

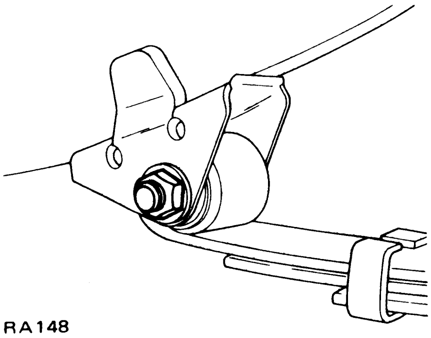


Fig. RA-16 Remvoing spring pin

6. Remove rubber bush in spring if necessary and install new bush. Coat rubber bush with a soapy solution prior to assembly.

Install rear spring in the reverse order of removal, noting the following point.

Vehicle weight must be on rear wheels when tightening front pin, shackle and shock absorber lower end nut in order to clamp rubber bush in a neutral or unloaded position.

Tightening torque:

Spring front pin nut:
11.5 to 13.0 kg-m
(83 to 94 ft-lb)

Spring shackle nut:
11.5 to 13.0 kg-m
(83 to 94 ft-lb)

U-bolt: 7.3 to 9.9 kg-m
(53 to 72 ft-lb)

Shock absorber lower end nut:
1.6 to 2.2 kg-m
(12 to 16 ft-lb)

Shock absorber

1. Raise rear of vehicle and support under axle case on stands. It is recommended that a hydraulic hoist or open pit be utilized if available.
2. Disconnect lower end of shock absorber by removing nuts ① at spring seat.
3. Disconnect upper end of shock absorber by removing nut ② at frame.

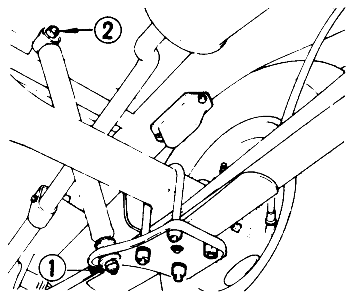


Fig. RA-17 Removing shock absorber

Installation of shock absorber in the reverse order of removal.

Note: Vehicle weight must be on rear wheels when tightening shock absorber upper and lower ends in order to clamp rubber bushings in a neutral or unloaded position.

INSPECTION

Rear axle shaft and wheel bearing

Inspect the following parts for faults and replace as required.

1. Check axle shaft for straightness, cracks, damage, wear and distortion
2. Check the lip of oil seal fo damage, deformation and wear.
3. Check bearing for wear and damage.

Rear axle case

Check axle case for yield, deformation or cracks and replace if necessary.

Rear spring

Clean all rust and dirt from spring leaves, using a wire brush if necessary.

1. Examine spring leaves for fractures or cracks.
2. Check front bracket and pin, shackle, U-bolts and spring seat for wear, cracks, straightness and damaged threads. If faulty parts are found, replace with new ones.
3. Inspect all rubber parts for wear, damage, separation and deformation. Replace them if necessary.

Shock absorber

1. Test shock absorber and compare with the specifications given in Service Data and Specifications. Replace if necessary.
2. Check for oil leakage and cracks. Also, check shaft for straightness.
3. Inspect rubber bushings for damage, cracks and deformation. Replace parts if necessary.

SERVICE DATA AND SPECIFICATIONS

Items \ Applied models	Pick-up				Double Pick-up
Rear shock absorber					
Stroke x Maximum length mm (in)	190 x 475 (7.48 x 18.70)				210 x 515 (8.27 x 20.28)
Damping force at 0.3 m/sec. kg (lb)					
Expansion	75 to 101 (165 to 223)				61 to 83 (135 to 183)
Compression	35 to 53 (77 to 117)				16 to 26 (35 to 57)
Rear leaf spring	U.S.A. and Canada		Other Countries		
	Standard	*Option	Standard	Option	
Dimensions (Length x Width x Thickness-Number of leaves) mm (in)	1,200 x 60 x 6-3 5-1 13-1 (47.24 x 2.36 x 0.24-3 0.20-1 0.51-1)	1,200 x 60 x 7-2 6-1 13-2 (47.24 x 2.36 x 0.28-2 0.24-1 0.51-2)		1,200 x 60 x 7-4 13-2 (47.24 x 2.36 x 0.28-4 0.51-2)	1,200 x 60 x 6-3 5-1 12-1 (47.24 x 2.36 x 0.24-3 0.20-1 0.47-1)
Free camber mm (in)	153.5 (604)	140.0 (551)		127.0 (500)	137.5 (541)
Laden camber mm/kg (in/lb)	6/440 (0.24/970.0)	24/440 (0.94/970.0)	−2/697.5 (−0.079/1,538)	7/787.5 (0.28/1,736)	−11.5/363.5 (−0.45/801.3)
Spring constant kg/mm (lb/in)	2.17 to 5.03 (121.5 to 281.7)	2.6 to 10.0 (145.6 to 560.0)		3.9 to 11.3 (218.4 to 632.8)	2.1 to 5.0 (117.6 to 280.0)
Rear axle					
End play mm (in)	0.02 to 0.15 (0.0008 to 0.0059)				
Rear axle case end shim thickness mm (in)	0.05 (0.0020) 0.07 (0.0028) 0.10 (0.0039) 0.20 (0.0079) 0.50 (0.0197)				

*Recommended for use on heavy load under high center of gravity such as camper loading.

Tightening torque

Shock absorber upper end nut	kg-m (ft-lb)	3.1 to 4.1 (22 to 30)
Shock absorber lower end nut	kg-m (ft-lb)	1.6 to 2.2 (12 to 16)
Rear spring U-bolt (Clip)	kg-m (ft-lb)	7.3 to 9.9 (53 to 72)

REAR AXLE AND REAR SUSPENSION

Spring front pin	kg-m (ft-lb)	11.5 to 13.0 (83 to 94)
Spring shackle	kg-m (ft-lb)	11.5 to 13.0 (83 to 94)
Bearing cage fixing bolt	kg-m (ft-lb)	5.4 to 6.4 (39 to 46)
Wheel bearing lock nut	kg-m (ft-lb)	15 to 20 (108 to 145)
Air breather	kg-m (ft-lb)	0.7 to 0.9 (5.1 to 6.5)
Differential gear carrier to axle case nut	kg-m (ft-lb)	1.7 to 2.7 (12 to 20)
Propeller shaft flange bolt	kg-m (ft-lb)	2.0 to 2.7 (14 to 20)
Drain and filler plug	kg-m (ft-lb)	6 to 10 (43 to 72)
Bumper rubber fixing bolt	kg-m (ft-lb)	1.6 to 2.2 (12 to 16)
Wheel nut	kg-m (ft-lb)	8 to 9 (58 to 65)

TROUBLE DIAGNOSES AND CORRECTIONS

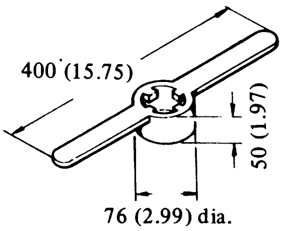
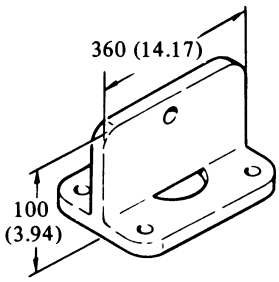
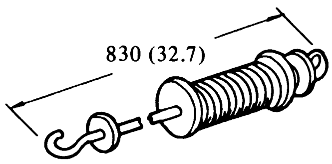
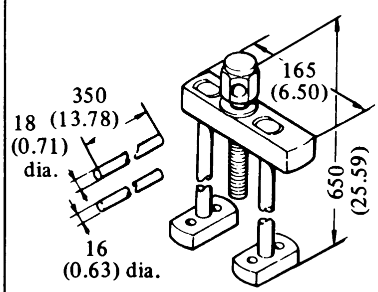
When rear axle and suspension is suspected of being noisy it is advisable to make a thorough test to determine whether the noise originates in the tires, road surface, exhaust, propeller shaft, engine, transmission, universal joint, wheel bearings or suspension.

Noise which originates in other places can not be corrected by adjustment or replacement of parts in the rear axle and rear suspension.

In case of oil leak, first check if there is any damage or restriction in breather.

Condition	Probable cause	Corrective action
Noise	Loose wheel nuts.	Tighten the wheel nuts.
	Loose one or more securing bolts.	Tighten the bolts to the specified torque.
	Lack of lubricating oil or grease.	Lubricate as required.
	Faulty shock absorber.	Replace the shock absorber.
	Incorrect adjustment of rear axle shaft end play.	Adjust the rear axle shaft end play.
	Damaged or worn wheel bearing.	Replace wheel bearing.
	Worn spline portion of rear axle shaft.	Replace if necessary.
	Broken leaf spring.	Replace leaf spring.
	Loose journal, connections or so no.	Tighten to the given torque.
	Wheel and tire unbalance.	Balance wheel and tire.
	Damaged rubber parts such as leaf spring bush, shock absorber mounting bush.	Replace the required parts.
	Faulty universal joints.	Adjust or replace.
Instability in driving	Loose wheel nuts.	Tighten to the given torque.
	Worn shock absorber.	Replace faulty shock absorber.
	Worn or broken leaf spring.	Replace leaf spring.
Oil leakage	Damaged or restricted air breather.	Clean or replace air breather.
	Damaged oil seal in rear axle case or differential carrier.	Replace the damaged oil seal.
	Oil leakage from between the differential carrier and axle case.	Tighten to the specified torque, or replace gasket.

SPECIAL SERVICE TOOLS

No.	Tool number & tool name	Description Unit: mm (in)		For use on	Reference page or figure No.
1.	ST38020000 Bearing lock nut wrench	 SE238	This tool is used to loosen and tighten rear axle bearing lock nut.	620 521	Page RA-4 Fig. RA-7
2.	ST07630000 Rear axle stand	 SE239	This tool is used to remove rear axle shaft. (Use with sliding hammer ST36230000.)	620 521	Fig. RA-5
3.	ST36230000 Sliding hammer	 SE111	This tool is used to remove rear axle shaft. (Use with rear axle stand ST07630000.)	All models	Fig. RA-5
4.	ST37140000 Bearing puller	 SE240	This tool is used to remove rear axle shaft bearing.	620 521 130	Fig. RA-8

SERVICE MANUAL

DATSUN PICK-UP
MODEL 620 SERIES

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION BR

BRAKE SYSTEM

BRAKES

CONTENTS

DESCRIPTION

The 620 series models use hydraulically operated brakes; uni-servo type brakes on the front and duo-servo type brakes on the rear.

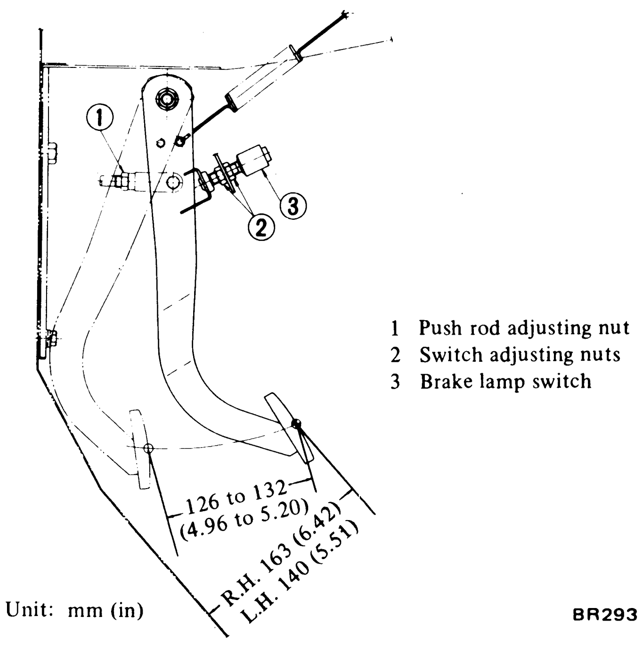
The combination of the master cylinder and Master-Vac is as described below:

1. On the vehicles equipped with the Master-Vac, the cylinder diameter of the tandem master cylinder is 19.05 mm (¾ in). This main cylinder system is established as standard equipment for the model PL620TU and optional equipment for all models except column shift L.H. drive vehicles.
2. On the vehicles equipped with only tandem master cylinder (without Master-Vac), the master cylinder diameter is 17.46 mm ($^{11}/_{16}$ in). This system is set up as standard equipment for all models except model PL620 vehicles.

The hand brake is of a mechanical type, which serves to brake the rear wheels. It is applied or released through the stick-type hand brake lever in the driver's compartment. As these brakes are applied, the brake warning lamp, located on the instrument panel, will come on to indicate that the hand brake is in "applied" condition.

ADJUSTMENT

Brake pedal



1 Push rod adjusting nut
2 Switch adjusting nuts
3 Brake lamp switch

Fig. BR-1 Adjusting brake pedal

1. Under the condition that the push rod of brake lamp, switch is pushed in, position the height of brake pedal from toeboard to be 163 mm (6.42 in) for R.H. drive and 140 mm (5.51 in) for L.H. drive vehicles, operating the switch adjusting nuts. Then, tighten nuts securely.

Tightening torque:
1.2 to 1.5 kg-m
(8.7 to 10.8 ft-lb)

2. Adjust the length of push rod with its adjusting nut so as to become 1 to 3 mm (0.039 to 0.118 in) in play when depressing brake pedal. Then, tighten nut securely.

Tightening torque:
1.9 to 2.4 kg-m
(14 to 17 ft-lb)

Note: **Take care not to allow the push rod getting into master cylinder in free condition.**

3. After completing adjustment, operate brake pedal several times to ensure that it travels over its entire stroke 126 to 132 mm (4.96 to 5.20 in) smoothly without showing squeak noise, twisting or interference.

Front brake

1. Raise vehicle until wheel clear floor.
2. Remove rubber boot from brake disc.
3. Lightly tap adjuster housing and move it forward. Turn down adjuster wheel with a screwdriver, and spread brake shoes. Stop turning adjuster wheel when a considerable drag is felt and lock up brake drum.

Note: **For both left and right brakes, brake shoes spread when adjuster wheel is turned downward.**

4. Return adjuster wheel 12 ratches to obtain correct clearance between brake drum and brake shoes. Turn brake drum, and make sure that brake drum turns without dragging when brake shoes interfere with brake drum, readjust clearance.
5. Install rubber boot.

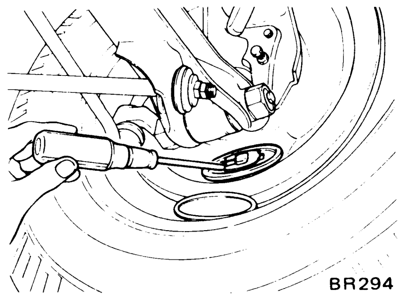


Fig. BR-2 Adjusting front brake

Rear brake

With hand brake fully released, adjust rear brake shoe clearance. For the service procedures, refer to "Front brake."

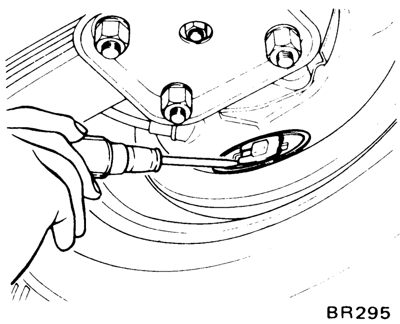


Fig. BR-3 Adjusting rear brake

Hand brake (Parking brake)

1. Raise vehicle until rear wheels are clear of the floor.
2. Apply hand brake lever, operate lock nuts to be 80 to 100 mm (3.15 to 3.94 in) in hand brake lever stroke, and tighten lock nuts securely.

Applying force to hand brake lever: 20 to 30 kg (44 to 66 lb)

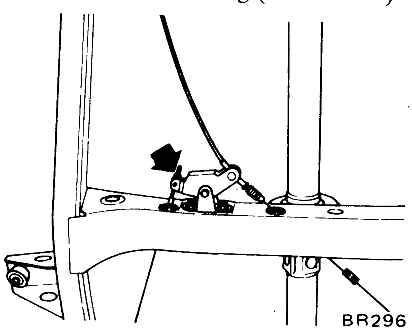


Fig. BR-4 Adjusting lock nut

3. Fully release hand brake and rotate rear wheels. No drag should be present.

Notes:

a. **Before adjusting hand brake, complete the adjustment of rear brakes.**
b. **After adjusting hand brake, operate the brake lever to make cable stable.**
c. **Hand brake must be operated smoothly while being pulled and released. Make sure that no abnormal noise, dragging, twisting or other faulty condition occurs.**

Bleeding hydraulic system

Hydraulic brake system must be bled whenever any line has been disconnected or air has in some way entered this system.

When pedal feeling is "spongy" pedal action, it is an indication that air has entered in the system.

Bleeding hydraulic system deserves much attention as it is an essential factor for regular brake service operation.

1. Clean all dirt around master cylinder reservoir, remove cylinder cover and top up reservoir with recommended brake fluid.
2. Thoroughly clean mud or dust from bleeder valve so that outlet hole is free from any foreign material. Install a bleeder hose to bleeder valve.

Dip the other end of hose in a container filled with brake fluid.

3. Depress brake pedal two or three times and keep pedal fully depressed.
4. With brake pedal fully depressed, open bleeder valve to exhaust air.

Notes:

a. **Carefully monitor brake fluid level at master cylinder during bleeding operation.**
b. **Do not re-use brake fluid drained during bleeding operation.**
c. **Bleed air in the following sequence. Rear wheel → Front wheel**
d. **Exercise care not to splash brake fluid on painted portions.**

5. Close bleeder valve quickly as brake pedal is on down stroke.
6. Allow brake pedal to return slowly with bleeder screw closed.

7. Repeat bleeding operations until no air bubbles show in hose.

Notes:

a. Brake fluid containing air is white and contains air bubbles.

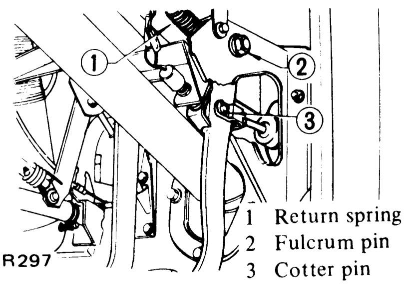
b. Brake fluid containing no air runs out of bleeder valve in a solid stream free of air bubbles.

8. Repeat above steps on the remaining brake line to expel air.

BRAKE PEDAL

Removal

1. Remove pedal return spring.



BR297

Fig. BR-5 Brake pedal mounting

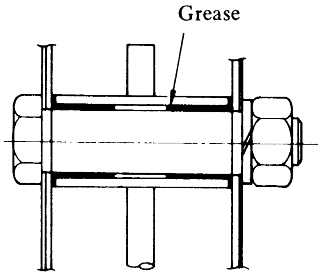
2. Remove cotter pin from clevis pin, and separate pedal from (Master-Vac) push rod.
3. Remove fulcrum pin and pedal.

Note: Loosen fulcrum pin counterclockwise on R.H. drive and clockwise on L.H. drive vehicles.

Installation

Install brake pedal in the reverse sequence to removal, paying attention to the following instructions.

1. Insert fulcrum pin from left hand side for R.H. drive and from right hand side for L.H. drive vehicle.
2. Install clevis pin from left hand side.
3. Hook return spring to brake pedal assembly from clutch pedal side on R.H. drive and operate it from reverse side on L.H. drive vehicles.
4. Apply a coating of recommended multipurpose grease to the inner and outer faces of pedal bushing, clevis pin, and hooks of return spring. Charge the clearances in bushings with grease.



BR298

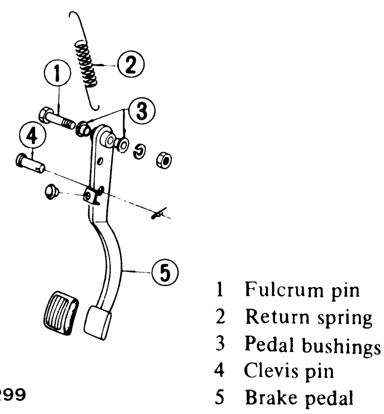
Fig. BR-6 Greasing place

5. Adjust the brake pedal after installation. (Refer to the instructions under "Adjustment.")

Tightening torque:
Fulcrum pin 1.9 to 2.4 kg-m (14 to 17 ft-lb)

Inspection

Check brake pedal for the following items, servicing as necessary.



BR299

Fig. BR-7 Brake pedal

1. Check pedal bushing for wear, deformation or damage.
2. Check pedal shaft sleeve for wear or roughness.
3. Check for bent brake pedal.
4. Check for fatigued return spring.

MASTER CYLINDER

Three different kinds of the tandem master cylinder are used on the vehicles; that is, the diameters of cylinder are 19.05 mm ($\frac{3}{4}$ in) for all models equipped with Master-Vac, and 17.46 mm ($\frac{11}{16}$ in) for L.H. drive column shift vehicles and other models without Master-Vac. The tandem master cylinder contains two fluid reservoirs which connect the front and rear brake lines independently.

Braking force is constantly maintained when failure occurs in either the front brake system or the re brake system. Failure in the front brake system will leave the rear brake still operative or failure in the rear brake system will leave the front brake system still operative.

The reservoir is equipped with a retention cap. To remove this cup, proceed as follows:

(1) Turn retention ring fully in the REMOVE direction.

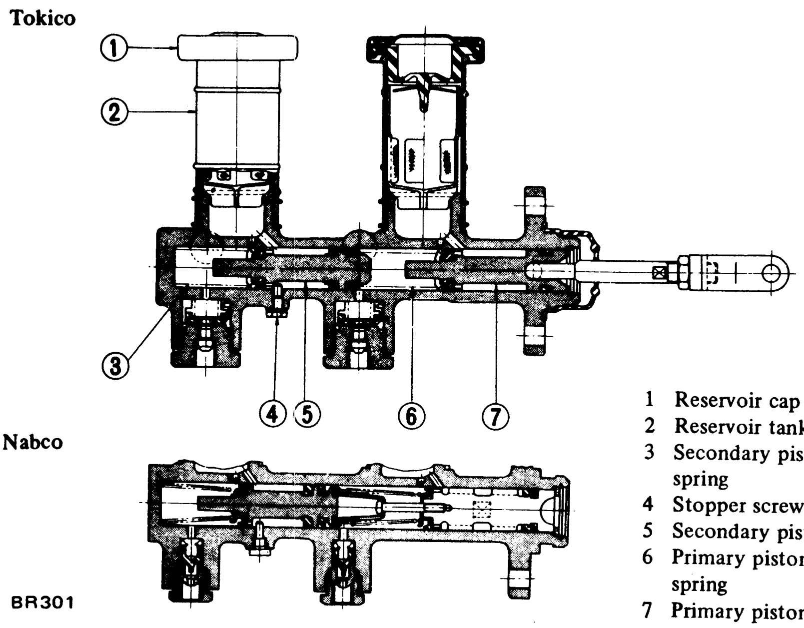
(2) Pull out retention cap.

To install it, proceed as follows:

(1) Turn retention ring (used in the retention cap) fully in the REMOVE direction.

(2) Align the projection in retention ring with the slit in the reservoir tank and push retention cap in the tank.

(3) Turn retention ring fully in the TIGHTEN direction.



1 Reservoir cap
2 Reservoir tank
3 Secondary piston return spring
4 Stopper screw
5 Secondary piston
6 Primary piston return spring
7 Primary piston

Fig. BR-8 Sectional view of tandem master cylinder

5. Bleed air out of master cylinder after it is installed in its original position.

Tightening torque:
Brake master cylinder attaching nut: 0.8 to 1.2 kg-m (5.8 to 8.7 ft-lb)
Brake tube connector: 1.5 to 1.8 kg-m (11 to 13 ft-lb)

Removal and installation

1. On the vehicle not equipped with the Master-Vac:
Pull out clevis pin, and separate brake pedal from master cylinder push rod.
2. Disconnect brake tube from master cylinder.

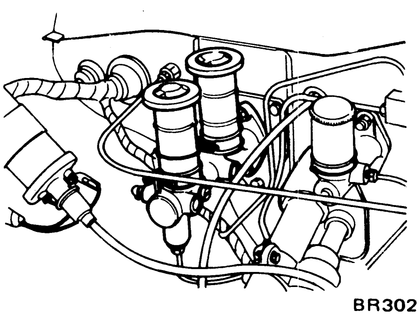


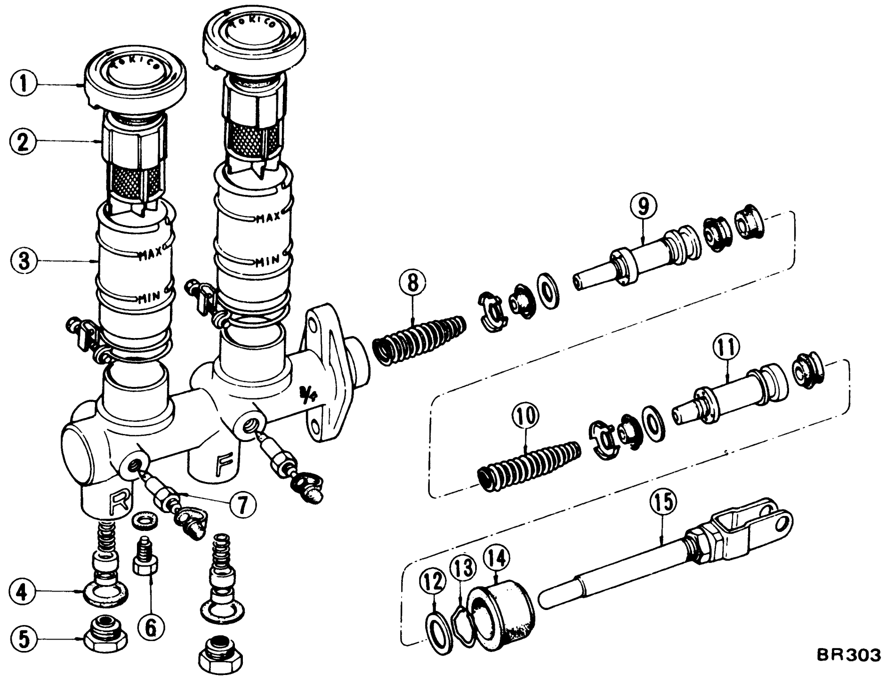
Fig. BR-9 Master cylinder

3. Remove master cylinder securing nuts, and withdraw master cylinder from engine room side.

Note: Before disconnecting brake tube, be sure to use a container that receives draining brake fluid. Use of a rag is also suggested to keep adjacent parts and place clean at all times.

4. Install master cylinder in the reverse sequence to removal.

Disassembly and assembly



1 Reservoir cap	6 Secondary piston stopper	11 Primary piston
2 Oil filter	7 Bleeder screw	12 Piston stopper
3 Oil reservoir	8 Secondary return spring	13 Piston stopper ring
4 Packing	9 Secondary piston	14 Dust cover
5 Valve cap	10 Primary return spring	15 Push rod assembly

Fig. BR-10 Master cylinder

1. Remove reservoir cap and filter and drain out brake fluid.
2. Pry off stopper ring, using a screwdriver.

3. Remove stopper screw and take out stopper, primary piston assembly, spring, and secondary piston assembly, in the order shown.

Note: Discard piston cup if it is removed from piston assembly and use a new one.

4. Unscrew plug to gain accessibility of check valve for disassembling.

Note: Never detach reservoir tank. If it is removed for any reason, discard it and install a new one.

5. Assemble master cylinder in the reverse sequence to disassembly, paying particular attention to the following notes:

Tightening torque:

Valve cap:

Tokico	8 to 9 kg-m (58 to 65 ft-lb)
Nabco	2.5 to 3.5 kg-m (18 to 25 ft-lb)
Bleeder:	0.7 to 0.9 kg-m (5.1 to 6.5 ft-lb)

Notes:

a. Replace gaskets and packings with new ones.

b. Apply brake fluid or rubber grease to sliding contact surfaces of parts to facilitate assembly of master cylinder.

Inspection

Thoroughly clean all parts in a suitable solvent, and check for worn or damaged parts. Replace any part that is faulty.

Note: Do not clean rubber parts with mineral oil since this will be the sure way of deteriorating parts. Use brake fluid or alcohol. When alcohol is used for cleaning these parts, do not immerse them in it longer than 30 seconds. After parts are cleaned, dry with compressed air.

1. Check cylinder and position for evidence of abnormal wear or damage. Replace if found faulty.
2. Check piston-to-cylinder clearance. If it is more than 0.15 mm (0.0059 in), replace either piston or cylinder.

Master cylinder inner diameter:
19.05 mm (¾ in)
17.46 mm (11/16 in)

3. Check for weakened, fatigued or damaged springs, and replace if necessary.

Piston return springs

Maker	Type		Free length mm (in)	Dia. of spring mm (in)	Installed	
					Length mm (in)	Load kg (lb)
Tokico	19.05 mm (¾ in) Tandem master cylinder (with Master-Vac)	Primary side	53 to 57 (2.087 to 2.244)	1.2 (0.047)	35.7 (1.406)	1.8 to 2.2 (4.0 to 4.9)
		Secondary side	54 to 55 (2.126 to 2.165)	1.6 (0.063)	34.5 (1.358)	3.6 to 4.4 (7.9 to 9.7)
	17.46 mm (11/16 in) Tandem master cylinder (without Master-Vac)	Primary side	52 to 53 (2.047 to 2.087)	1.2 (0.047)	31.0 (1.221)	1.8 to 2.2 (4.0 to 4.9)
		Secondary side	44 (1.732)	1.6 (0.063)	30.5 (1.201)	3.6 to 4.4 (7.9 to 9.7)
Nabco	19.05 mm (¾ in) Tandem master cylinder (with Master-Vac)	Primary side	Do not disassemble			
		Secondary side	50 to 51 (1.969 to 2.008)	1.4 (0.055)	33 (0.299)	2.5 to 3.1 (5.5 to 6.8)
	17.46 mm (11/16 in) Tandem master cylinder (without Master-Vac)	Primary side	Do not disassemble			
		Secondary side	50 to 51 (1.969 to 2.008)	1.2 (0.047)	26.5 (1.043)	2.3 to 2.7 (5.1 to 6.0)

4. When master cylinder is disassembled, be sure to discard cups and valves. Replace any other part which shows evidence of defomation, wear or otherwise damage.
5. Replace damaged oil reservoirs and caps.

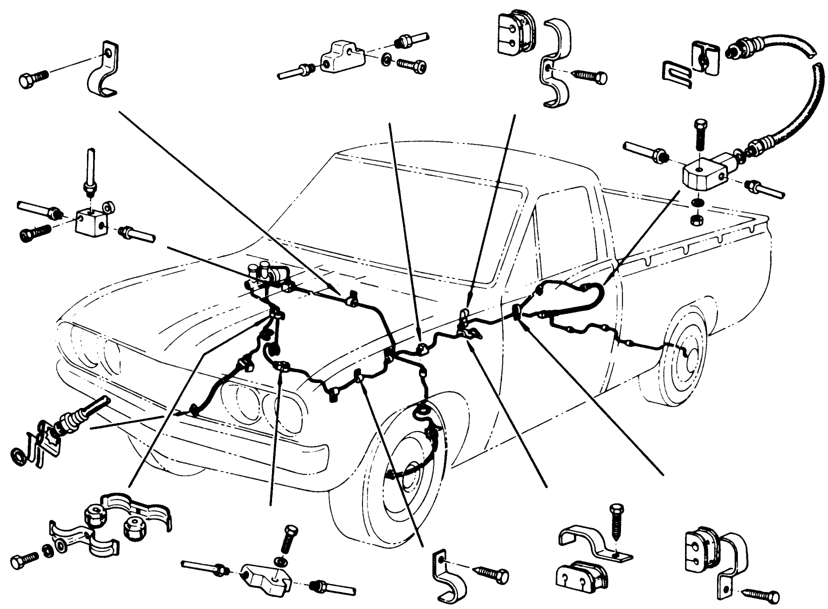
BRAKE LINE

The brake line is different from the following types of master cylinder.

Tandem master cylinder with Master-Vac
Tandem master cylinder without Master-Vac

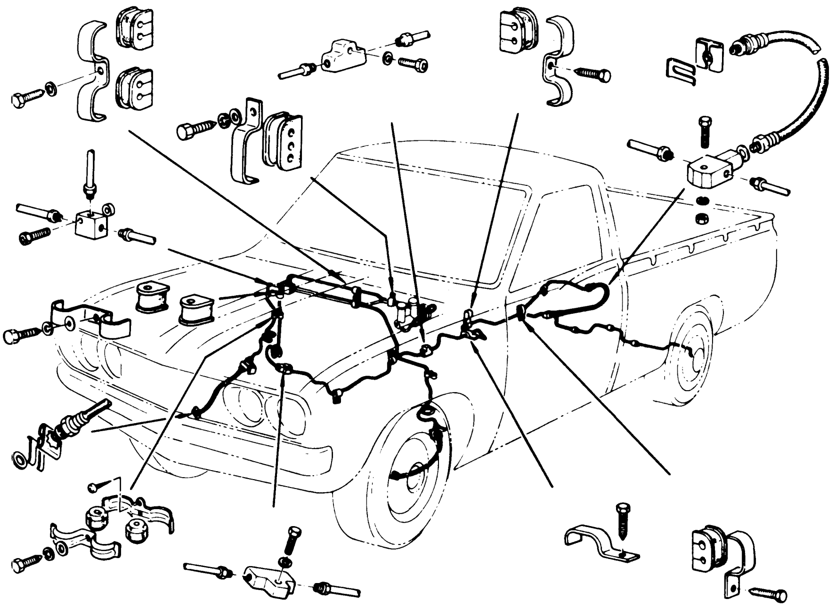
Furthermore, the classification is divided by steering column location, wheelbase, etc.

Right hand drive vehicles
Left hand drive vehicles
Standard wheelbase Pick-up
Long wheelbase Pick-up
Double Pick-up



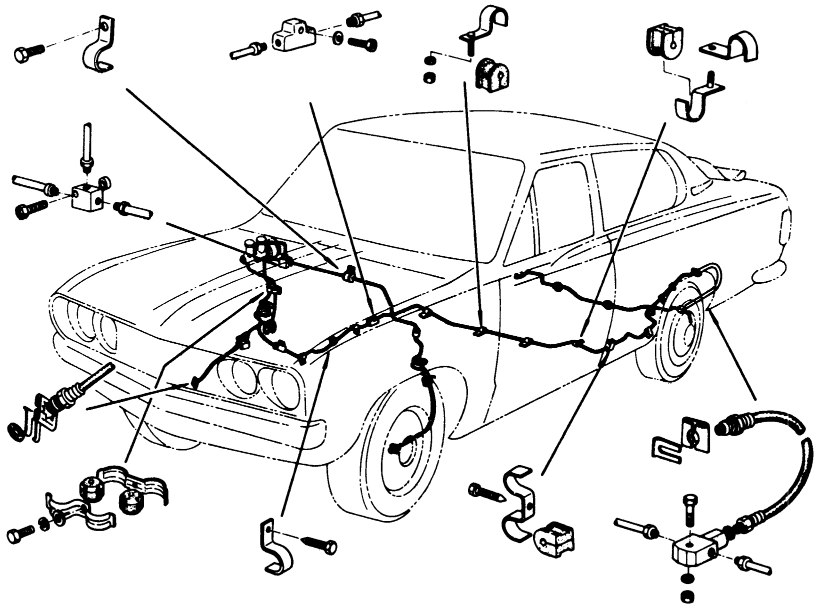
BR646

Fig. BR-11 Brake line of R.H. drive (Tandem master cylinder)



BR647

Fig. BR-12 Brake line of L.H. drive (Tandem master cylinder)



BR648

Fig. BR-13 Brake line for Double Pick-up (Tandem master cylinder)

Removal

1. Removing flare nuts on both ends and clips effects the removal of brake tube and brake hose.
2. Rear brake hose can be removed by disconnecting the tube and then turning round the hose.

Installation

Brake hose

Front brake hose

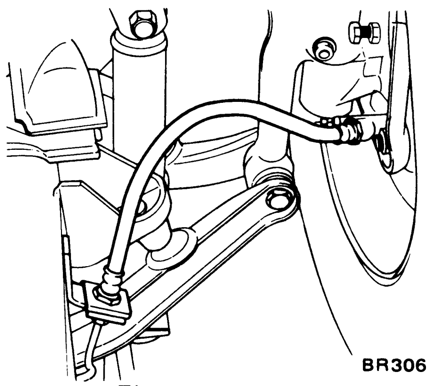
In installing brake hose, first jack up vehicle to take off the weight of vehicle from wheels so that suspension is in rebound. Steering wheel should also be kept in straight-ahead position.

To connect brake line, first connect brake hose to wheel cylinder with the specified torque.

Tightening torque:
1.7 to 2.0 kg-m
(12 to 14 ft-lb)

Then secure brake hose to the bracket with lock plate not so as to twist or abnormal bend the hose.

Note: After connecting brake hose at both ends, pay keen attention not to twist the hose when additional tightening is required.



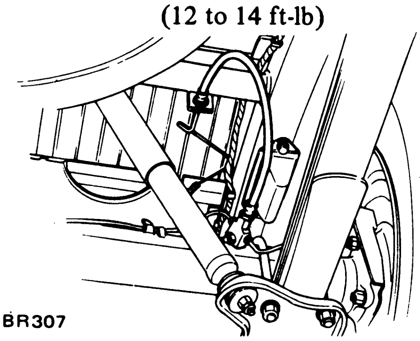
BR306

Fig. BR-14 Front brake hose

Rear brake hose

First, secure rear brake hose to 3-way connector on rear axle case to the specifications. After connecting hose, do not tighten it at 3-way connector additionally since this operation gives hose to be twisted.

Tightening torque:
1.7 to 2.0 kg-m
(12 to 14 ft-lb)



BR307

Fig. BR-15 Rear brake hose

After brake hose has been installed, check to be sure that there is enough clearance between hose and adjacent parts to avoid contact with other ones. The check should be carried out while moving wheel up and down through its full stroke and rotating steering wheel between two extreme lock positions. The above clearance must be as follows:

Hose to rotating or moving parts such as tire and rim:
40 mm (1.57 in) and more

Hose to stationary part:
25 mm (0.98 in) and more

In case that the above clearance cannot be obtained, it may be caused by the hose twisted. Accordingly, carry out the correction with hose connection again, following the above instructions.

Brake tube

In installing a brake tube, use care to locate its end squarely on mating seat, noting the fact that nut can be turned freely by a light finger twist. Then, tighten to correct torque with a Brake Pipe Torque Wrench GG94310000.

Tightening torque (Flare nut):
1.5 to 1.8 kg-m
(11 to 13 ft-lb)

In addition, care should also be exercised to avoid damaging or collapsing brake tube during operation.

Be sure to make enough clearance between all tubes and other adjacent parts to avoid contact.

In installing tube through hood ledge grommet, be sure to position it at the center of grommet.

After connecting brake tube, be sure to check the clearance to prevent from damage. The clearance at the following portions must be specified distance or more.

Tube to body panel and frame:
Over 4 mm (0.157 in)
Tube to edge of each panel:
Over 10 mm (0.39 in)
Tube to tube:
Loop pitch:
Over 5 mm (0.20 in)
Between front tube and rear tube:
Over 10 mm (0.39 in)
Tube to moving parts:
Over 10 mm (0.39 in)
Loop tube to hood ridge panel:
Over 10 mm (0.39 in)

Notes:

a. **Brake tubes are shaped at factory to secure specified clearance and may not require reshaping. Discard if they call for excessive reshaping.**
b. **In reshaping a brake tube, take care to avoid damaging galvanization or collapsing section.**

After brake lines have been assembled, check to make sure that all fittings and flare nuts are tightened to correct torques.

Tightening torque:

Brake tube to connector
1.5 to 1.8 kg-m
(11 to 13 ft-lb)
Brake tube to brake hose
1.7 to 2.0 kg-m
(12 to 14 ft-lb)
Connector and clip fixing bolt
0.35 to 0.45 kg-m
(2.5 to 3.3 ft-lb)
3-way connector fixing bolt (on rear axle case)
0.8 to 1.1 kg-m
(5.8 to 8.0 ft-lb)

Inspection

Brake hose

1. Examine all hoses for swell, rubbing marks or ozon-cracking, replacing those found with any of above badly beyond use. Also, inspect end fittings and be sure that no fluid leak through staked end has taken place; replace if necessary. Hose with badly rusted fitting should also be replaced with a new one. As to installation notes, refer to relative topic under "Installation."
2. Retighten all connection, if necessary, to assist in obtaining correct torque. In retightening at front wheel cylinder, first remove hose clamp and loosen flare nut on opposite side to avoid twisting hose.

After the above steps have been carried out, hold pedal as far downward as possible 80 kg (176 lb) or more, examining evidence as to whether fluid is leaking through brake lines or connections. Leakage in any manner cannot be permitted here. In case fluid leaks, tightening with specified torque, tighten additionally up to 2.5 kg-m (18 ft-lb). Under no circumstances should nut be tightened over 2.5 kg-m (18 ft-lb) torque since this elongates end fitting, making it impossible to reuse brake tube.

Under no circumstances should rear brake hose and 3-way connector be retightened over specified torques. Instead, replace copper washer with a new one after checking for sign of damage on seating surface. Never reuse an old copper washer.

Brake tube

Clean all tubes to remove dust and dirt with isopropyl alcohol, checking for collapse, wear, cracking, swell or rusting. Replace if found with any of above. Use care not to damage brake tubes while operation.

Check if tubes are clamped securely.

HAND BRAKE (Parking brake)

A hand operated hand brake is of stick type, which actuates rear wheel brake shoes. All the cable adjustment can be made by operating only adjusting nut at cable lever.

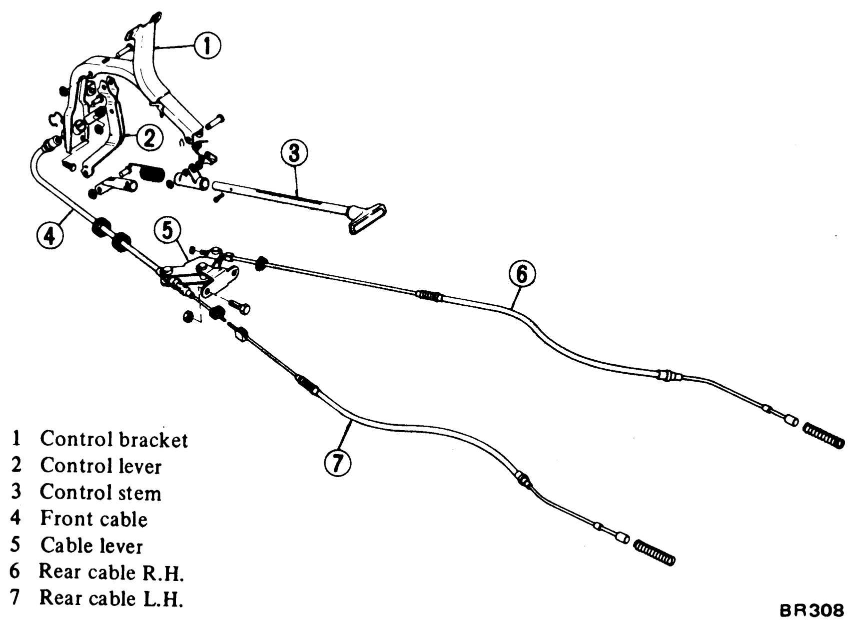
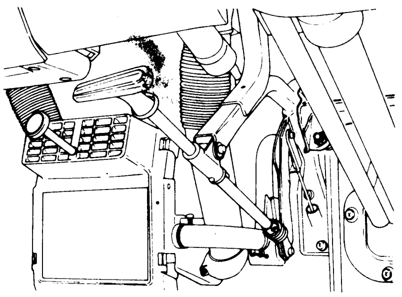


Fig. BR-16 Hand brake linkage

Removal

Control stem

1. Disconnect terminal from hand brake warning switch.
2. Remove nuts securing control bracket in place on dash panel.
3. Pull out lock pin and cotter pin, and then remove control stem assembly.

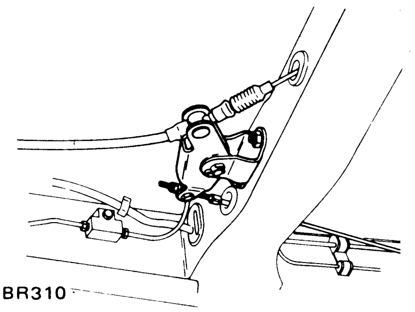


BR309

Fig. BR-17 Control stem

Cable

1. Fully release hand brake lever.
2. Loosen adjusting nut at cable lever.
3. Disconnect cable from control lever.
4. Remove both sides rear brake drums, and disconnect rear cable from toggle lever.
5. Detach lock plate, spring and clip and pull out cable to cable lever.
6. Remove cotter pin at cable lever and disconnect cable.



BR310

Fig. BR-18 Cable lever

Installation

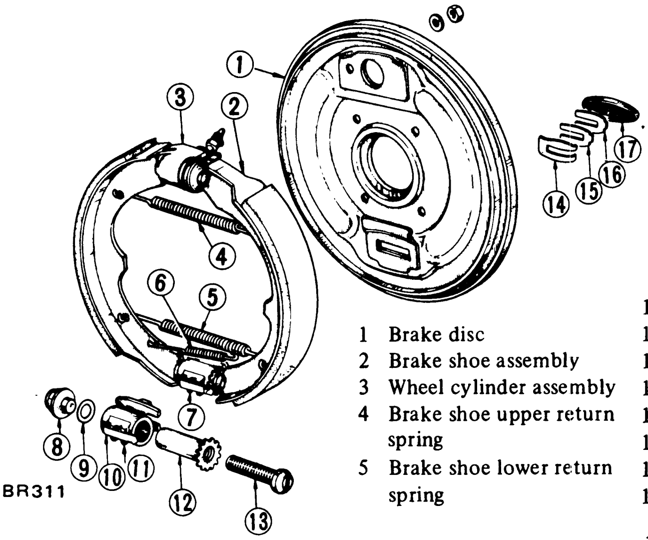
Install hand brake assembly in the reverse sequence of removal by closely observing the following instructions.

1. When installing, apply a coating of grease to sliding contact surfaces. Make sure that each sliding part functions smoothly.
2. Upon completion of installation of hand brake assembly, adjust the entire system as per instructions described under topic "ADJUSTMENT."
3. Make sure that each cable is not interfered with by any adjacent parts. Do not apply an undue stress to cables.

Inspection

1. Check control stem and ratcht for evidence of wear or other damages. Replace parts which are faulty.
2. Replace worn or fatigued springs.
3. Check wires for evidence of discontinuity or other deterioration. Replace if necessary.
4. Replace faulty warning light and/or switch.
5. Check parts at each connection and, if found deformed or damaged, replace.

FRONT BRAKE



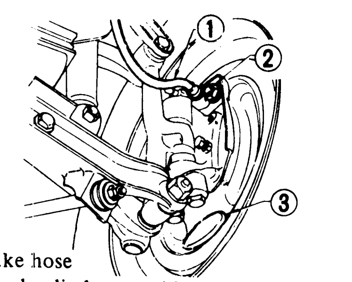
BR311

1 Brake disc
2 Brake shoe assembly
3 Wheel cylinder assembly
4 Brake shoe upper return spring
5 Brake shoe lower return spring
6 After shoe return spring
7 Adjuster assembly
8 Adjuster head
9 Adjuster head shim
10 Lock spring
11 Adjuster housing
12 Adjuster wheel
13 Adjuster screw
14 Retaining spring
15 Lock plate
16 Adjuster shim
17 Rubber boot

Fig. BR-19 Front brake

Removal

1. Jack up front of vehicle just high enough to remove tire and support it with safety stands.
2. Remove wheel and brake drum. When brake drum cannot be removed easily, return brake adjuster.
3. In order to ease operation, remove hub assembly from knuckle spindle. (Refer to "FRONT AXLE.")
4. Unhook upper, lower, and after-shoe return springs, and then remove brake shoe assemblies.
5. Disconnect brake hose from wheel cylinder.
6. Loosen securing nut and remove wheel cylinder.
7. Remove rubber boot, adjuster shim, lock plate and retaining spring, and then remove adjuster assembly from brake disc.



1 Brake hose
2 Wheel cylinder attaching bolt
3 Rubber boot

BR312

Fig. BR-20 Removing wheel cylinder

Installation

Install front brake in reverse sequence of removal, paying particular attention to the following instructions.

1. When assembling adjuster assembly, apply brake grease to adjuster housing bore, adjuster wheel and adjuster screw.

When installing adjuster assembly to brake disc, apply brake grease to disc, adjuster and retaining spring sliding surfaces to slide adjuster smoothly.

Measure adjuster sliding resistance. Adjust by adjuster shim when sliding resistance is incorrect.

Adjuster sliding resistance
5 to 12 kg (11 to 26 lb)

2. When installing wheel cylinder, be sure to secure the cylinder with "R" mark to right hand disc and the one with "L" mark to left hand disc. Otherwise, brake hoses may interfere with other adjacent parts. As to the connecting instructions of brake hose, o twist or contact is existed on brake hose, referring the related topic "BRAKE LINE."

Tightening torque:

Wheel cylinder
5.4 to 6.6 kg-m
(39 to 48 ft-lb)

Connector bolt
1.9 to 2.5 kg-m
(14 to 18 ft-lb)

Brake hose
1.7 to 2.0 kg-m
(12 to 14 ft-lb)

Air bleeder
0.7 to 0.9 kg-m
(5.1 to 6.5 ft-lb)

Brake disc
4.2 to 5.0 kg-m
(30 to 36 ft-lb)

3. Before installing brake shoe assemblies, apply brake grease to wheel cylinder and adjuster brake shoe instaling grooves, and brake disc and brake oe assembly contact faces (two places). Exercise care not to allow grease coming into contact with linings and adjuster.

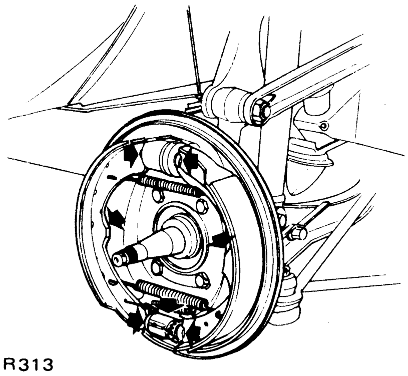


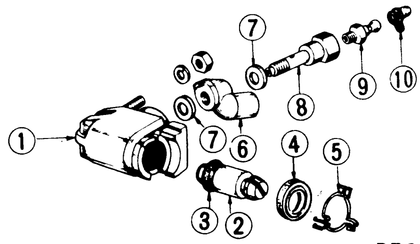
Fig. BR-21 Greasing points

4. Adjust brake shoe clearance and bleed brake system. (Refer to the instructions under topic "ADJUSTMENT" in this section.

Upon completion of the above adjustments, make sure that brake operates correctly and no brake fluid leaks.

Disassembly and assembly

Wheel cylinder



1 Wheel cylinder housing
2 Piston
3 Piston cup
4 Dust cover
5 Retainer
6 Connector
7 Packings
8 Connector bolt
9 Bleeder screw
10 Bleeder cap

Fig. BR-22 Front wheel cylinder

Wheel cylinder can be disassembled simply by the following procedures described below:

Remove retainer and dust cover, and take out piston from wheel cylinder. Be careful not to damage sliding part of piston and piston cup.

Thoroughly wash all disassembled parts in brake fluid or alcohol.

**Note: Do not wash rubber parts with mineral oil since they are deteriorated.
When alcohol is used, however, do not immerse rubber parts in alcohol longer than 30 seconds. After parts are cleaned, dry them with compressed air.**

Assemble wheel cylinder in reverse sequence to disassembly.

When securing connector bolt, insert its location tip to the hole of wheel cylinder firmly and tighten it securely.

Carry out operations carefully so that component parts are not damaged or no dust and other foreign materials enter cylinder.

Inspection

Brake drum

1. Replace brake drum whose diameter is beyond the limit of 1.5 mm (0.059 in) with respect to the standard inner diameter of 254.0 mm (10.00 in).
2. The allowable maximum "out-of-round" of brake drum is 0.02 mm (0.0008 in).

Re-condition or replace brake drum if specified limit is exceeded.

3. Measure for tapered brake drum. If specified limit of 0.02 mm (0.0008 in) is exceeded as measured at a position where the distance of 45 mm (1.77 in) is kept away from inlet, re-condition or replace brake drum.
4. Contact surface with which linings come into contact should be finished to such an extend that it is ground by a No. 120 to 150 sandpaper.
5. Using a drum racer, finish brake drum by machining if it shows any sign of score marks, partial wear or stepped wear on its contact surface.

Note: After brake drum is completely re-conditioned or renewed, check drum and shoes for proper contact pattern.

Brake assembly

1. When brake shoe linings are cracked, incompletely seated, unevenly worn, and/or deteriorated due to excessive heating or soiled with oil, grease and brake fluid, replace.
2. Replace linings if the thickness is worn down to less than 1.0 mm (0.039 in).

Note: When brake shoe lining is installed, grind brake shoe lining face to diameter equal to that of brake drum.

Lining dimension
Width x Thickness x Length
45 x 4.5 x 244 mm
(1.77 x 0.177 x 9.61 in)

3. Check adjuster for smooth operation.
4. Replace shoe return springs which are broken or fatigued.

Standard dimensions of shoe springs

Item	Free length mm (in)	Dia. of spring mm (in)	No. of coil	Installed length/load mm/kg (in/lb)
Upper	136.5 (5.374)	2 (0.079)	37	159.5/14 to 16 (6.280/31 to 25)
Lower	134.5 (5.295)	2.3 (0.091)	35	159.5/21 to 23 (6.280/46 to 51)
After shoe	83.2 (3.276)	1.4 (0.055)	27.5	99/4 to 5 (3.898/9 to 11)

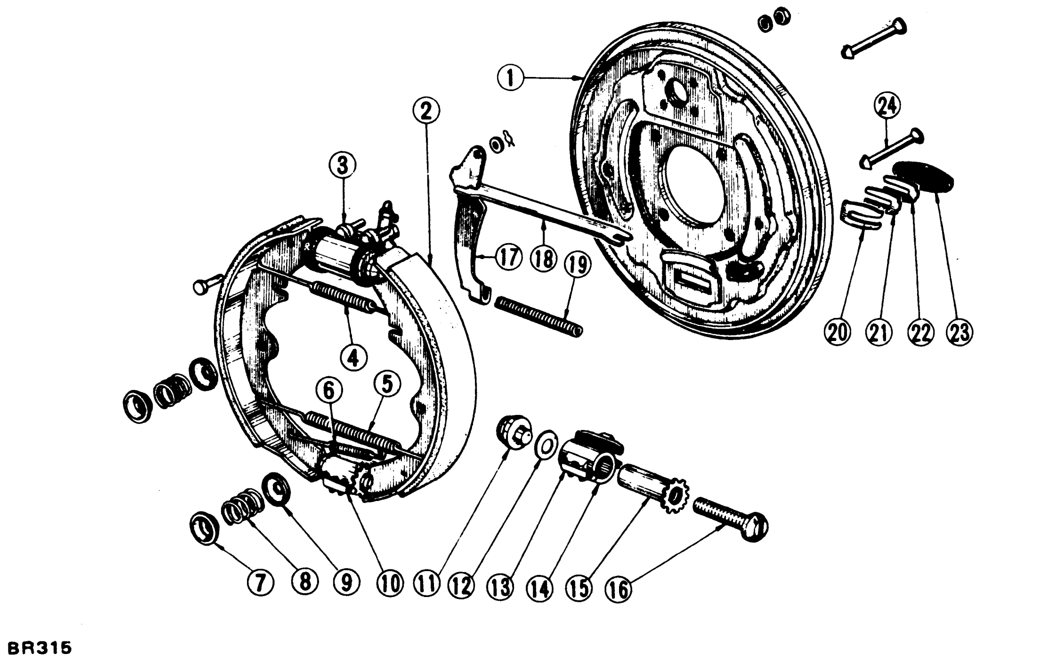
Wheel cylinder

1. Replace any cylinder or piston which is scratched, scored or worn on its sliding contact surface.
2. Replace worn parts if piston-to-cylinder clearance is beyond 0.15 mm (0.0059 in).

Wheel cylinder inner diameter
19.05 mm (¾ in)

3. Replace piston cup which is worn or otherwise damaged.
4. Replace if contacting face of cylinder and shoe is worn locally or in step.
5. Replace damaged dust cover, fatigued piston spring or faulty threaded parts.
6. Replace tube connector which is worn on its threaded portion.

REAR BRAKE



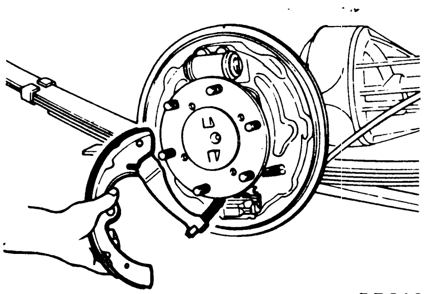
1 Brake disc
2 Brake shoe assembly
3 Wheel cylinder assembly
4 Return upper spring
5 Return lower spring
6 After shoe return spring
7 Retainer
8 Antirattle spring
9 Spring seat
10 Adjuster assembly
11 Adjuster head
12 Adjuster head shim
13 Lock spring
14 Adjuster housing
15 Adjuster wheel
16 Adjuster screw
17 Toggle lever
18 Extension link
19 Return spring
20 Adjuster spring
21 Lock plate
22 Adjuster shim
23 Rubber boot
24 Antirattle pin

Fig. BR-23 Rear brake

Removal

Jack up rear of vehicle just high enough to remove tire and support it with safety stands.

2. Remove wheel, loosen hand brake and detach brake drum.
3. Turn pin by 90°, and remove antirattle springs.
4. Open brake shoe assemblies outward against return spring, and remove extension link.
5. Remove return springs.
6. Remove brake shoe assemblies. Note that after (secondary) brake shoe assembly must be separated from toggle lever. When separating after (secondary) brake shoe assembly from toggle lever, withdraw clevis pin.
7. Disconnect toggle lever from hand brake rear cable.



BR316

Fig. BR-24 Removing toggle lever

8. Disconnect brake tube at wheel cylinder by loosening flare nut.
9. Remove wheel cylinder from brake disc by loosening installation nuts.
10. Remove rubber boot, adjuster shim, lock plate and adjuster springs and remove adjuster assembly from brake disc.

Installation

Install rear brake in reverse sequence of removal, paying particular attention to the following instructions.

1. Rear adjuster assembly is the same as front. Refer to the paragraph covering front brake installation.

   Adjuster sliding resistance:
   5 to 12 kg (11.0 to 26.5 lb)

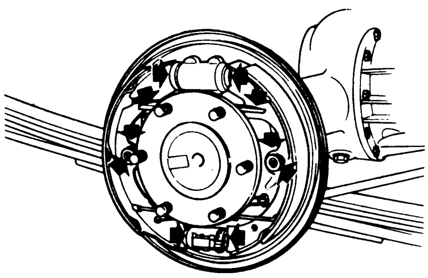
2. When assembling toggle lever and after brake shoe assembly, adjust clearance between toggle lever and after brake shoe assembly to 0 to 0.3 mm (0 to 0.0118 in) with a properly selected toggle pin washer.

Toggle pin washer

No.	Thickness mm (in)
1	2.0 (0.079)
2	2.3 (0.091)
3	2.6 (0.102)
4	2.9 (0.114)
5	3.2 (0.126)

3. Before installing brake shoe assemblies, apply brake grease to the following places:
   1) Brake shoe installing grooves of adjuster and wheel cylinder
   2) Extension link installing grooves
   3) Lower surface of spring seat
   4) Contact surfaces between brake disc and brake shoe assembly (six places)

   At this time, be sure not to coat brake grease to brake linings.



BR317

Fig. BR-25 Greasing points

4. Tightening torque:

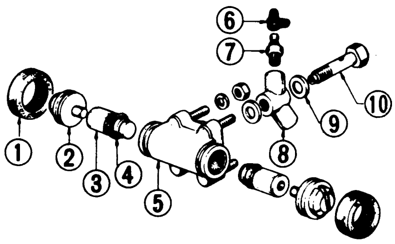
Wheel cylinder	1.5 to 1.8 kg-m (11 to 13 ft-lb)
Connector bolt	1.9 to 2.5 kg-m (14 to 18 ft-lb)
Brake tube	1.5 to 1.8 kg-m (11 to 13 ft-lb)
Air bleeder	0.7 to 0.9 kg-m (5.1 to 6.5 ft-lb)
Brake disc	5.4 to 6.4 kg-m (39 to 46 ft-lb)

5. Adjust brake shoe clearance and bleed brake system. Upon completion of the above adjustments, make sure that brake operates correctly and no brake fluid leaks.

Disassembly and assembly

Wheel cylinder

Remove dust cover, and pull out piston head and piston assembly. Refer to "Wheel cylinder of front brake."



1 Dust cover
2 Piston head
3 Piston
4 Piston cup
5 Wheel cylinder housing
6 Bleeder cap
7 Bleeder screw
8 Connector
9 Washer
10 Connector bolt

BR318

Fig. BR-26 Rear wheel cylinder

Inspection

Brake drum

1. Replace brake drum whose diameter is beyond the limit of 1.5 mm (0.059 in) with respect to the standard inner diameter of 254.0 mm (10.00 in).
2. The allowable maximum "out-of-round" of brake drum is 0.02 mm (0.0008 in). Re-condition or replace brake drum if specified limit is exceeded.
3. Measure for tapered brake drum. If specified limit of 0.02 mm (0.0008 in) is exceeded as measured at a position where the distance of 45 mm (1.77 in) is kept away from inlet, re-condition or replace brake drum.

4. Contact surface with which liniigs come into contact should be finished to such an extent that it is ground by a No. 120 to 150 sandpaper.
5. Using a drum racer, finish brake drum by machining if it shows any sign of score marks, partial or stepped wear on its contact surface.

Note: After brake drum is completely re-conditioned or replaced, check drum and shoes for proper contact pattern.

Brake assembly

1. When brake shoe linings are cracked, incompletely seated, unevenly worn, and/or deteriorated due to excessive heating or soiled with oil, grease and brake flüid, replace.
2. Replace linings if the thickness is worn down to less than 1.0 mm (0.039 in).

Note: **When brake shoe lining is installed, grind brake shoe lining face to diameter equal to that of brake drum.**

Lining dimension:
Width x Thickness x Length
45 x 4.5 x 244 mm
(1.77 x 0.177 x 9.61 in)

3. Check adjuster for smooth operation.
4. Replace shoe return springs which are broken or fatigued.

Standard dimensions of shoe springs

Item	Free length mm (in)	Dia. of spring mm (in)	No. of coil	Installed length/load mm/kg (in/lb)
Upper	175 (6.890)	2 (0.079)	32.5	184/11 to 13 (7.244/24 to 29)
Lower	158 (6.220)	2.3 (0.091)	30	176/18 to 20 (6.929/40 to 44)
After shoe	83.2 (3.276)	1.4 (0.055)	27.5	99/4 to 5 (3.898/9 to 11)
Antirattle	20.5 (0.807)	1.6 (0.063)	3.5	12/3.5 to 4.5 (0.472/8 to 10)

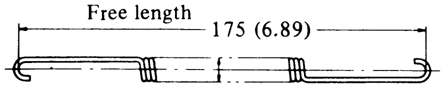


Fig. BR-27 Upper return spring

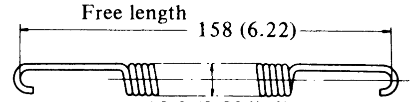


Fig. BR-28 Lower return spring

Wheel cylinder

1. Replace any cylinder or piston which is scratched, scored or worn on its sliding contact surface.
2. Replace worn parts if piston-to-cylinder clearance is beyond 0.15 m (0.0059 in).

Wheel cylinder inner diameter:
19.05 mm (¾ in)
17.46 mm ($^{11}/_{16}$ in)
(PL620TU only)

3. Replace piston cup which is worn or damaged.
4. Replace if contacting face of cylinder and shoc is worn locally or in step.
5. Replace damaged dust cover, fatigued piston spring or faulty threaded parts.
6. Replace tube connector which is worn on its threaded portion.

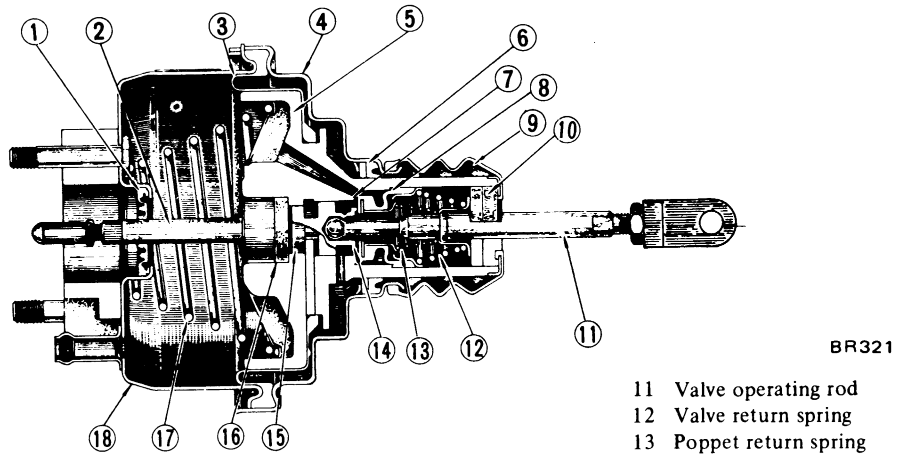
MASTER-VAC

Description

A vacuum suspended Master-Vac is installed behind the master cylinder. As the brake pedal is depressed, fluid is forced under high pressure through the brake pipes to the wheel cylinders to retard or stop the vehicle.

The Master-Vac contains a spring loaded diaphragm of 114.3 mm (4 ½ in) in diameter. It operates on negative pressure produced in the engine intake manifold.

The tandem master cylinder is capable of producing high pressure even if the Master-Vac is faulty.



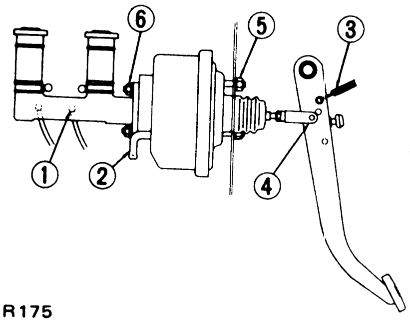
1 Plate and seal
2 Push rod
3 Diaphragm
4 Rear shell
5 Diaphragm plate
6 Seal
7 Vacuum valve
8 Poppet assembly
9 Valve body guard
10 Air silencer filter
11 Valve operating rod
12 Valve return spring
13 Poppet return spring
14 Exhaust valve
15 Valve plunger
16 Reaction disc
17 Diaphragm return spring
18 Front shell

Fig. BR-29 Sectional view of Master-Vac

Removal and ıstallation

Referring to Figure BR-30, remove parts in numerical order enumerated.

Install these parts in the reverse sequence of removal.



BR175

Fig. BR-30 Removal method of Master-Vac

Note: After Master-Vac is properly installed on vehicle, be sure to conduct an air-tight test and operation test described previously in this Section.

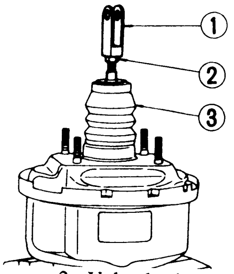
isassembly

When disassembling Master-Vac, observe the following instructions.

a) Thoroughly clean mud or dust from Master-Vac.
b) Extreme care should be taken not to allow dirt, dust, water or any other foreign matter getting into any component-parts.
   Be sure to select a clean place before disassembly or assembly.
c) Mark mating joints so that they may be installed exactly in their original positions.
d) Keep all disassembled parts arranged properly so that they may readily be assembled at any time.
e) Clean rubber parts and synthet-icresin parts in alcohol.
f) After all disassembled parts are cleaned in a suitable clean solvent, place on a clean work bench. Use care not to allow dirt and dust coming into contact these parts.

1 Install spacer on rear shell spacer ıporarily. Place Master-Vac in a vise. Use soft jaws in suggested.

2. Remove clevis and lock nut. Detach valve body guard.



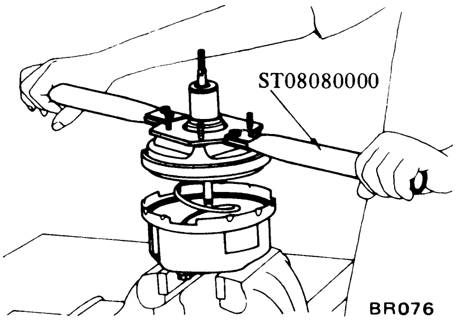
1 Clevis
2 Lock nut
3 Valve body guard

BR075

Fig. BR-31 Removing rear shell

3. Identify front shell and rear shell clearly so that they may be reassembled in their original positions from which they were withdrawn. (Bolts attached on dashboard are not the same in pitch.)

4. Using Master-Vac Wrench ST08080000, remove rear shell-seal assembly, and disassemble diaphragm plate assembly, front shell assembly, diaphragm spring and push rod assembly.



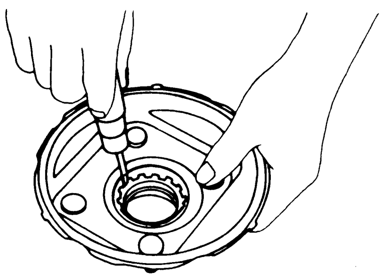
BR076

Fig. BR-32 Removing rear shell

Rear shell-seal

Pry off retainer with use of screwdriver as shown and detach bearing and seal.

Note: Do not disassemble seal assembly unless absolutely necessary. Whenever this is to be removed, use care not to damage it.

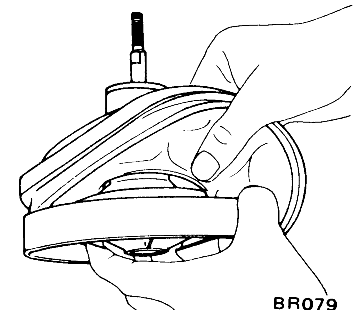


BR078

Fig. BR-33 Removing retainer

Diaphragm plate

1. Place diaphragm plate assembly on a clean work bench. Detach diaphragm from groove in plate as shown.

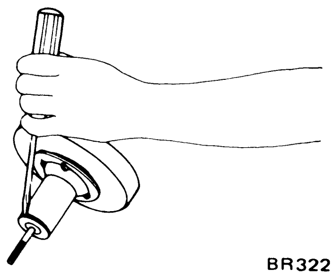


BR079

Fig. BR-34 Separating diaphragm

2. Using a screwdriver as shown, evenly pry air silencer retainer until it is detached from diaphragm plate assembly.

Note: Never use a hammer to remove this retainer since this will be the sure way of damaging it.

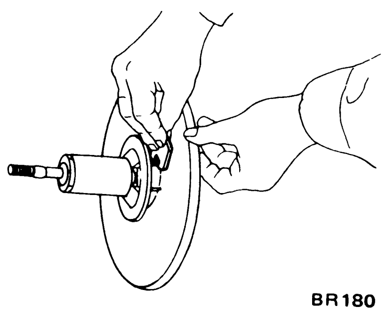


BR322

Fig. BR-35 Removing air silencer retainer

3. Pull out valve plunger stop key and withdraw silencer and plunger assembly.

Note: To remove valve plunger stop key properly, proceed as follows: With key hole facing down, lightly push valve operating rod simultaneously while applying vibration to it.



BR180

Fig. BR-36 Pulling out stop key

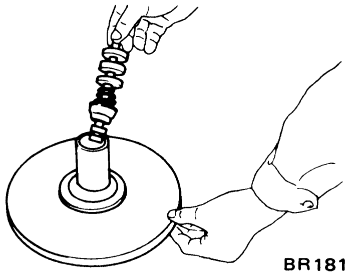


Fig. BR-37 Removing valve operating rod assembly

4. Withdraw reaction disc.

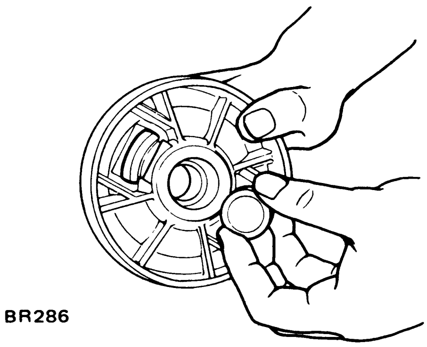


Fig. BR-38 Removing reaction disc

Front shell-seal

1. Detach flange from front shell assembly.

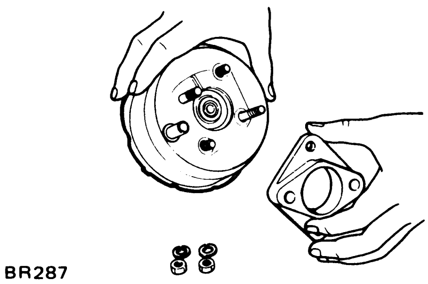


Fig. BR-39 Removing flange

2. Withdraw front seal assembly.

Assembly

Assemble in the reverse sequence of disassembly.

Rear shell-seal

1. Apply a coating of Master-Vac grease to the sealing surface and lip of seal, and install that seal in rear shell with the use of Master-Vac Oil Seal Retainer Drift ST08060000.

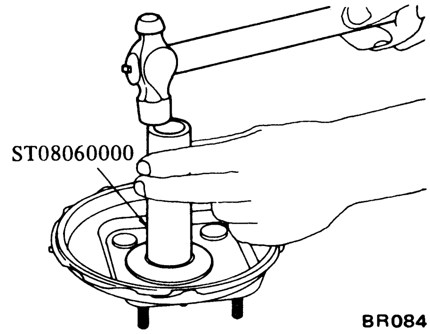


Fig. BR-40 Installing oil seal

Note: **Referring to Figure BR-41, install seal in place by properly aligning the pawl of special tool with seal hole. Adjustment is correct when specified length at "A" is obtained.**

Length "A"
6.7 to 7.0 mm
(0.264 to 0.276 in)

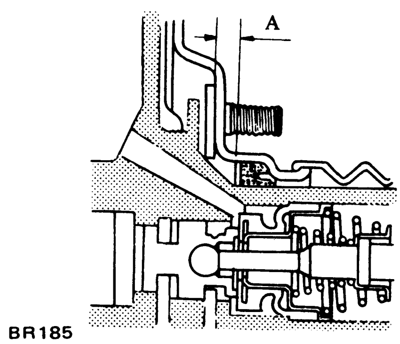


Fig. BR-41 Length at "A"

Diaphragm plate

1. Apply a thin coating of grease to the sliding contact portion on the periphery of plunger assembly.

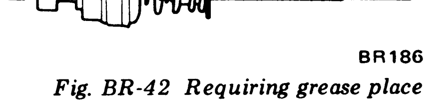


Fig. BR-42 Requiring grease place

2. Install plunger assembly and silencer in diaphragm plate, and lightly push plunger stop key in place.

Note: **Diaphragm plate is made of bakelite. Exercise care in installing plunger assembly not to damage diaphragm plate.**

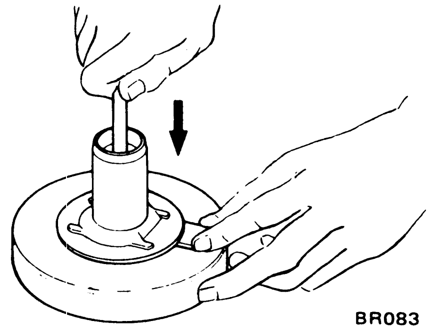


Fig. BR-43 Inserting stop key

3. Before installing diaphragm into position, apply a thin coating of mica-power to it except outer diameter and seating portion with which shell comes into contact.
4. Before installing reaction disc in place on diaphragm plate, apply a thin coating of Master-Vac grease.

Front shell-seal

Before installing front shell-seal assembly, apply a coating of Master-Vac grease to the inner wall of seal and front shell with which seal comes i· contact.

Final assembly

1. Apply a thin coating of Master-Vac grease to the outer edges of diaphragm with which rear and front shells come into contact, before installing diaphragm in position.
2. Before installing push rod assembly in place, apply a coating of Master-Vac grease to the sliding contact surfacce of diaphragm plate.
3. Align marks scribed in the rear shell and front shell. Carefully turn the Master-Vac Wrench ST08080000 clockwise until it reaches notch in shell retainer.

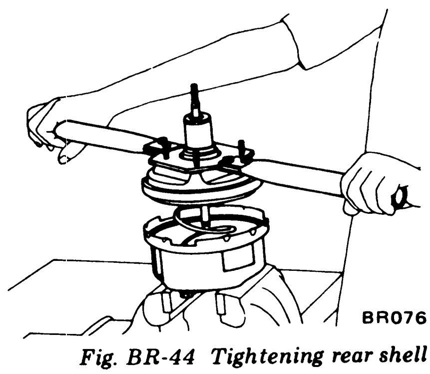


Fig. BR-44 Tightening rear shell

4. After assembly, adjust the length of push rod to less than the specified value indicated below. Length adjustment of push rod is made at the tip of push rod.

Length "B"
10 to 10.5 mm
(0.394 to 0.413 in)

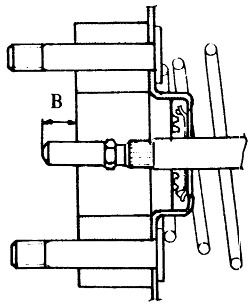


Fig. BR-45 Length at "B"

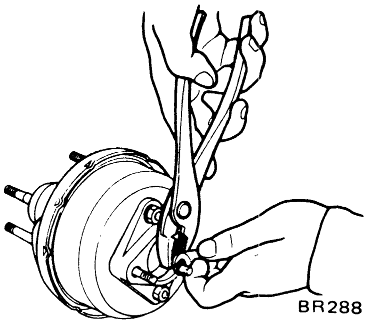


Fig. BR-46 Adjsuting push rod length

Inspection

1. Check poppet assembly for condition. If it shows evidence of wear or damage, replace it and valve operating rod assembly.
2. Check other component-parts for condition. If any part shows evidence of wear or damage, replace it with a new one.

Vacuum pressure

1. Connect a vacuum gauge, in the line, between check valve and Master-Vac, as shown in Figure BR-47.

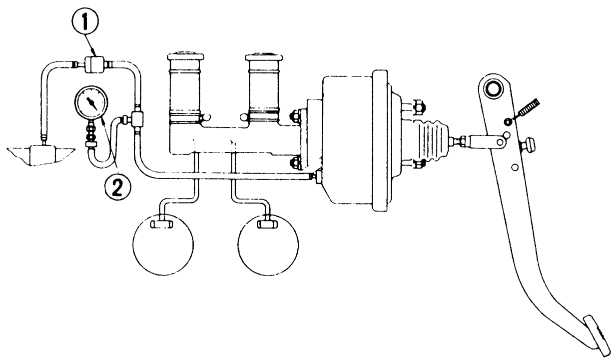


Fig. BR-47 Air-tight test set-up

2. Start engine and increase engine speed. Stop engine when vacuum gauge indicates 500 mmHg (19.69 in Hg).

Air-tight test

1. Fifteen seocnds after engine is stopped, observe the rate of drop in air pressure registered by vacuum gauge. If a pressure drop of 25 mmHg (0.98 inHg) is exceeded, refer to the following chart to determine the cause of failure.

Probable cause	Corrective action
1. Air leakage at check valve.	Replace check valve.
2. Air leakage at push rod seal.	Replace seal.
3. Air leakage between valve body and seal.	Repair or replace faulty part(s).
4. Air leakage at valve plunger seat.	Repair or replace seat.
5. Damaged piping or joints.	Repair or replace.

2. Fifteen seconds after engine is stopped and brake fully applied, observe the rate of drop in air pressure registered by vacuum gauge.

If a pressure drop of 25 mmHg (0.98 inHg) is exceeded, refer to the following chart to determine the cause of failure.

Probable cause	Corrective action
1. Air leakage at check valve.	Replace check valve.
2. Damaged diaphragm.	Replace.
3. Reaction disc dropped off.	Reinstall and check push rod for proper turn.
4. Air leakage at poppet assembly seat and valve body.	Replace faulty part(s).

Note: When replacement of any part is required, be sure to renew Master-Vac as an assembly.

Check valve

1. Remove clip and disconnect hoses at connections. The check valve can now be removed.

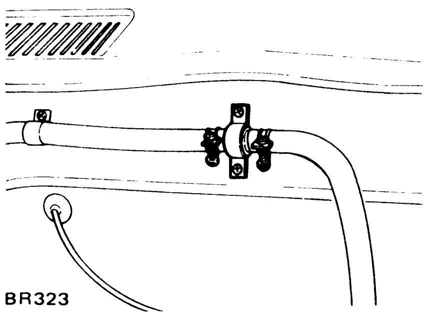
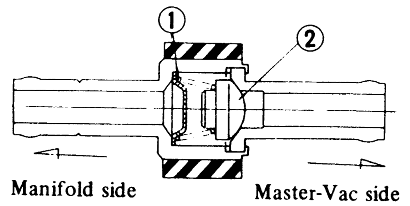


Fig. BR-48 Location of check valve

2. Using a Master-Vac tester, apply a vacuum pressure of 500 mmHg (19.69 inHg) to the port of check valve on the Master-Vac side. If a pressure drop of 10 mmHg (0.39 inHg) is exceeded in 15 seconds, replace check valve with a new one.
3. When pressure is applied to the Master-Vac side of check valve and valve does not open, replace check valve with a new one.



1 Spring 2 Valve BR289

Fig. BR-49 Sectional view of check valve

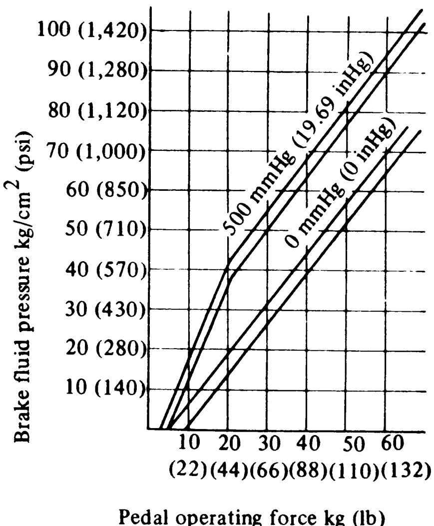
Operation test

1. Connect an oil pressure gauge, in brake line, at connection on master cylinder.
2. Install a spring scale on brake pedal.
3. Start engine, and increase engine speed until a vacuum pressure of 500 mmHg (19.69 inHg) is registered on vacuum pressure gauge. With a vacuum pressure of 500 mmHg (19.69 inHg) held, measure an oil pressure with respect to each pedal operating force.

Relationship between oil pressure and pedal operating force is illustrated in Figure BR-50. If test results are not as specified in Figure BR-50, check Master-Vac for condition in a manner as described under "Inspection," before removal of this unit.

Also check brake line for evidence of fluid leakage.

Note: Determine whether a trouble occurs in Master-Vac or in check valve. Always inspect check valve first.



BR285

Fig. BR-50 Performance curves of Master-Vac

SERVICE DATA AND SPECIFICATIONS

Brake type:		
Front		Uni-servo
Rear		Duo-servo
Hand brake		Mechanically-operated on rear wheels
Brake pedal:		
Free height	mm (in)	R.H. drive 163 (6.42) L.H. drive 140 (5.51)
Full stroke of pedal head	mm (in)	126 to 132 (4.96 to 5.20)
Brake adjustment notches:		
Front		12
Rear		12
Hand brake normal stroke:	mm (in)	80 to 100 (3.15 to 3.94)
Master cylinder:		
Inner diameter	mm (in)	17.46 ($^{11}/_{16}$) (Tandem without Master-Vac) 19.05 (¾) (Tandem with Master-Vac)
Allowable maximum clearance between cylinder and piston	mm (in)	0.15 (0.0059) maximum

Wheel cylinder:

Inner diameter	Front	mm (in)	19.05 (¾)
	Rear	mm (in)	19.05 (¾) 17.46 ($^{11}/_{16}$) (PL620TU)
Allowable maximum clearance between cylinder and piston		mm (in)	0.15 (0.0059) maximum

Brake drum:

Inner diameter	Front and Rear	mm (in)	254.0 (10.00)
Inside out-of-round		mm (in)	0.02 (0.0008) maximum
Repair limit of drum in diameter	Front and Rear	mm (in)	255.5 (10.059)

Lining:

Dimension Width x Thickness x Length	Front and Rear	mm (in)	45 x 4.5 x 244 (1.77 x 0.177 x 9.61)
Allowable maximum wear limit		mm (in)	1 (0.039)

Adjuster sliding resistance	kg (lb)	5 to 12 (11 to 26)

Tightening torque

Unit: kg-m (ft-lb)

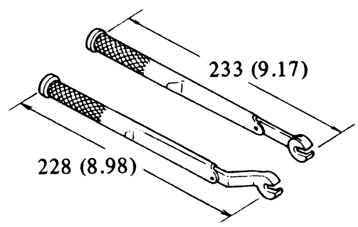
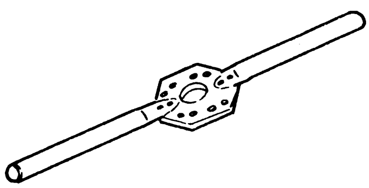
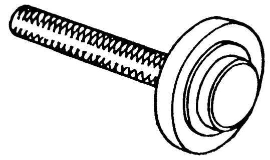
Brake master cylinder attaching nut	0.8 to 1.2	(5.8 to 8.7)
Brake tube connection	1.5 to 1.8	(11 to 13)
Brake hose connection	1.7 to 2.0	(12 to 14)
Air bleeder valve	0.7 to 0.9	(5.1 to 6.5)
Connector and clip fixing bolt	0.35 to 0.45	(2.5 to 3.3)
3-way connector fixing bolt (on rear axle case)	0.8 to 1.1	(5.8 to 8.0)
Fulcrum pin of brake pedal	1.9 to 2.4	(14 to 17)
Pedal stopper lock nut	1.2 to 1.5	(8.7 to 10.8)
Push rod adjusting nut	1.9 to 2.4	(14 to 17)
Wheel cylinder mounting bolt		
Front	5.4 to 6.6	(39 to 48)
Rear	1.5 to 1.8	(11 to 13)
Wheel cylinder connector bolt	1.9 to 2.5	(14 to 18)
Brake disc attaching bolt		
Front	4.2 to 5.0	(30 to 36)
Rear	5.4 to 6.4	(39 to 46)

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Spongy pedal.	Air in brake lines.	Bleed thoroughly.
	Swollen hose due to deterioration or use of poor quality hose.	Replace hose and bleed system.
	Use of a brake fluid of which boiling point is too low.	Change with specified brake fluid and bleed system.
	Reservoir filler cap vent hole clogged. (This promotes a vacuum in master cylinder that sucks in air through rear seal.)	Clean and bleed system.
Pedal yields under slight pressure.	Deteriorated check valve.	Replace check valve and bleed system.
	External leaks.	Check master cylinder, piping and wheel cylinder for leaks and repair.
	Leakage on master cylinder.	Overhaul master cylinder.
Excessive pedal travel.	Air in system.	Bleed system.
	Shoes out of adjustment.	Adjust shoe-to-drum clearance.
	Insufficient fluid in master cylinder.	Fill up with specified brake fluid and bleed system.
	Thermal expansion of drums because of excessive overheating.	Allow drums to cool off. Check brake shoe linings and drums. Replace damaged parts.
All brakes drag.	Insufficient shoe-to-drum clearance.	Adjust clearance.
	Weak shoe return springs.	Replace.
	No free travel of brake pedal.	Adjust pedal height.
	Seized master cylinder piston.	Disassemble master cylinder and replace piston. Bleed system.
One brake drags.	Loose or damaged wheel bearings.	Adjust or replace as required.
	Weak, broken or unhooked brake shoe return springs.	Replace.
	Insufficient clearance between brake shoe and drum.	Adjust brakes.
Unbalanced brakes.	Grease or oil on linings.	Clean brake mechanism; check cause of trouble. Replace linings.
	Seized piston in wheel cylinder.	Service wheel cylinder and bleed system.
	Improper tire inflation.	Inflate to correct pressure.
	Loose wheel bearings.	Adjust.
	Faulty front suspension.	Check and adjust all front suspension parts.

Condition	Probable cause	Corrective action
Excessive pedal pressure required, poor brakes.	Grease, mud or water on brake shoe linings. Full area or linings not contacting drums. Scored brake drums.	Remove drums and clean and dry linings or replce. Replace shoes. Reface drums and install new linings.
Brake chatter, squeak or squeal.	Dust on drums or linings. Weak shoe return springs. Drum out-of-round. Worn linings.	Remove and clean drums. Check and, if necessary, replace springs. Turn drums on lathe. Replace.

SPECIAL SERVICE TOOLS

No.	Tool number & tool name	Description Unit: mm (in)		For use on	Reference page or figure No.
1.	GG94310000 Brake pipe torque wrench	 SE227	This tool is used to tighten and untighten brake tube flared nut. A built-in torque limiting wrench is provided to assure torque accuracy.	All models	Page BR-8
2.	ST08080000 Master-Vac, wrench	 SE073	This tool is used to remove rear shell after aligning rear shell stud bolt with the opening in this tool.	620 610 510 S30 C30 230 C10 GC10	Fig. BR-32
3.	ST08060000 Master-Vac oil seal retainer drift	 SE115	This tool is used when rear shell seal is driven into position. Note: **Make sure that this tool is pushed in until rear guide of this tool touches rear shell.**	620 610 510 S30 C30 230 C10 GC10	Fig. BR-40

SERVICE MANUAL

DATSUN PICK-UP
MODEL 620 SERIES

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION WT

WHEEL AND TIRE

WT

WHEEL AND TIRE

CONTENTS

DESCRIPTION

Wheels and tires

The wheels and tires used on the model 620 series were the same as those used on the model 521 series. As a result of safety considerations, however, some changes have been made in the road wheel. Wheel size is now 4½J-14 with a 25 mm (0.98 in) offset.

There are five different kinds of tires, broken down by size and ply rating: 6.00-14-6PRLT, 6.00-14-8PRLT, 6.50-14-8PRLT (Optional), 5.50-14-6PRLT and 5.50-14-8PRLT.

For a detailed breakdown on the proper combination of tires and vehicle models, refer to the "Tire Usage" chart.

SPECIFICATIONS

Tires

Tire usage chart

Model		Tire size	Remarks
(G)(N)620 series	Front	6.00-14-6PRLT	For Common country
	Rear	6.00-14-8PRLT 6.50-14-8PRLT (Optional)	
U(N)620 series	Front	5.50-14-6PRLT	
	Rear	5.50-14-8PRLT	
PL620 series	Front	6.00-14-6PRLT	For U.S.A. and Canada
	Rear	6.00-14-6PRLT	

Recommended tire inflation pressure

Unit: kg/cm² (psi)

Model \ Car speed km/h (MPH)			Under 100 km/h (60 MPH)	Over 100 km/h (60 MPH)
(G)(N)620 series	Unloaded	Front	1.50 (21)	1.80 (26)
		Rear	2.75 (39)	3.25 (46)
	Loaded	Front	1.50 (21)	1.80 (26)
		Rear	4.25 (60)	4.75 (67)
U(N)620 series	Unloaded	Front	1.50 (21)	1.80 (26)
		Rear	1.75 (25)	2.25 (32)
	Loaded	Front	1.50 (21)	1.80 (26)
		Rear	3.75 (53)	4.25 (60)
PL620 series	Unloaded	Front	1.50 (21)	1.80 (26)
		Rear	1.75 (25)	2.25 (32)
	Loaded	Front	1.50 (21)	1.80 (26)
		Rear	3.00 (42)	3.50 (49)

Note: The tire inflation pressures should be measured when the tire is cold.

MAINTENANCE AND SERVICE

Tire inflation

Correct tire pressure is very important to ease of steering and riding comfort. This also reduces driving sound to a minimum, resulting in longer tire life; that is, overinflation or underinflation promotes wear at center tread or shoulder of tire.

If all tires are inspected frequently and maintained correct tire pressure, it is possible to detect sharp material in the tread. Also, the above check avoids abnormal wear which invites serious trouble. If tires indicate abnormal or uneven wear, the cause of trouble should be detected and eliminated.

After inflating tires, leakage in valve should be checked. Without valve caps, leakage will occur due to dirt and water, resulting in underinflation. Accordingly, whenever tire pressure is checked, be sure to secure valve caps and tighten firmly by hand.

Wheel repair

Inspect the wheel rim flange for bend or dents.

The flange should be cleaned by a wire brush when rust is found on the flange. Furthermore, if excessive pitting occurs on the rim, eliminate it with a file.

Wear

Misalignment

When the front wheels align in excessive toe-in or toe-out condition, tires scrape the tread rubber off. The wear of tread appears feathered edge.

Center

This wear is caused by overinflation of the tire. The inflation pressure must be kept within the specified limit.

Shoulder

The wear may be caused by underinflation, incorrect wheel camber, or continuous high speed driving on curves. In general, the former two are common. Because underinflation wear appears on both sides of tread, and on the other hand, camber wear causes only one tread side. For cornering tread wear, the driver must operate car slowing down on curves.

Uneven

Uneven wear is caused by incorrect camber or caster, malfunctioning suspension, unbalanced wheel, out-of-round brake drum, or other mechanical conditions. To repair this abnormal wear, correct the above faulty parts.

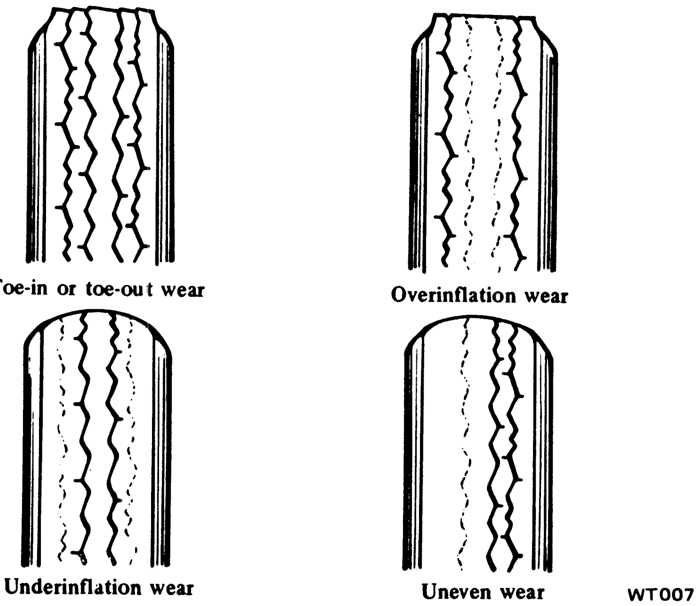


Fig. WT-1 Abnormal tire wear

Tire rotation

Tires wear unevenly and become unbalanced according to running distance. Uneven tire wear often results in tire noise which is attributed to rear axle gears, bearing, etc. Meanwhile, the front tires tend to wear unevenly because of front wheel alignment.

Accordingly, to equalize tire wear, it is necessary to rotate tires every recommended maintenance intervals.

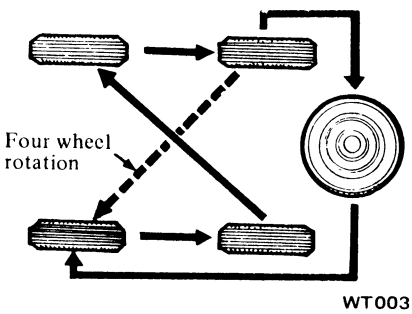


Fig. WT-2 Tire rotation for PL620

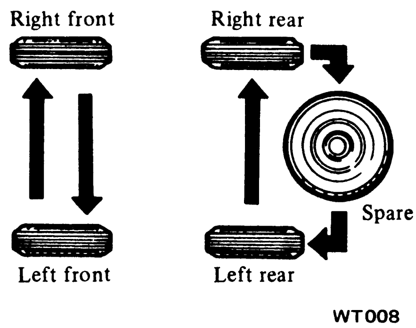


Fig. WT-3 Tire totation for (G)(N)620 or U(N)620 series

The tires should be replaced if the tread depth is less than 1.6 mm (1/16 in).

To change tire with wheel using a jack in the safe manner, observe the following procedures:

1. To remove spare tire,

insert jack rod to guide and then turn it counterclockwise. When installing, tighten a little strong after lifting up and lock.

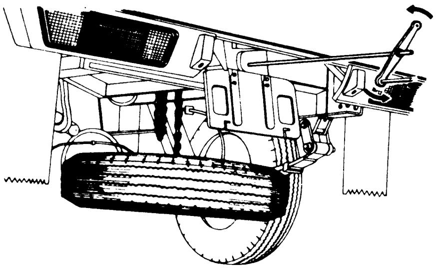

WH081

Fig. WT-4 Removing spare tire

2. To remove wheel cap and loosen wheel nuts,

it is necessary to remove wheel cap and temporarily to loosen wheel nuts before vehicle is jacked up.

3. To jack up

in changing front wheel, place jack under lower link after applying parking brake and blocking rear wheels.

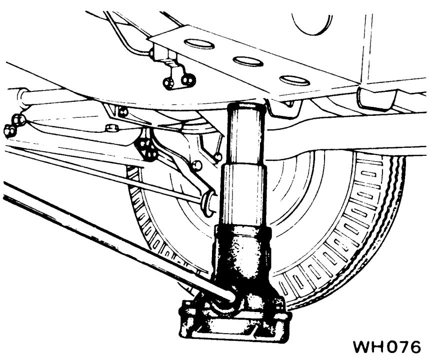

WH076

Fig. WT-5 Jacking up front side (Model Pick-up series)

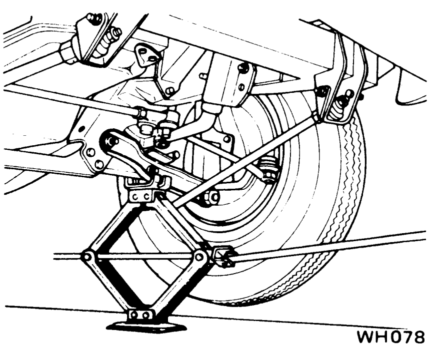

WH078

Fig. WT-6 Jacking up front side (Model Double Pick-up series)

Next to jack up

in changing rear wheel, place jack under rear spring seat after applying parking brake and blocking front wheels.

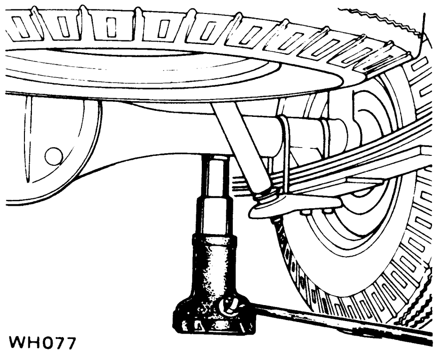

WH077

Fig. WT-7 Jacking up rear side (Model Pick-up series)

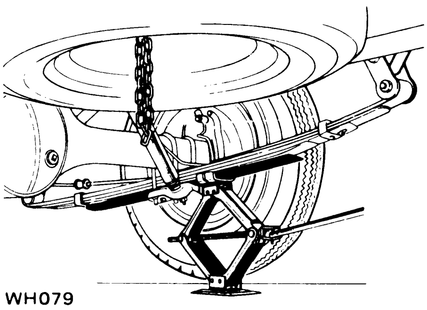

WH079

Fig. WT-8 Jacking up rear side (Model Double Pick-up series)

4. Removing wheel

Remove wheel nuts and wheel from drum.

5. Installing wheel

To install wheel, reverse the above steps.

Tighten wheel nuts in criss-cross fashion to 8.0 to 9.0 kg-m (58 to 65 ft-lb).

Note: **Never get under the car while it is supported only by the jack. Always use safety stands to support the side member of body construction when you must get beneath the car.**

INSPECTION

Wheel balance

The wheel and tire assembly should be kept balanced statically and dynamically.

Proper tire balance is necessary when driving the car at high speeds. Consequently, the wheel and tire assembly should be properly rebalanced whenever puncture is repaired.

The wheel and tire assembly becomes out of balance according to uneven tire wear. Severe acceleration and braking, or fast cornering is the cause of wear on tire, resulting in unbalance of tire and wheel assembly.

The symptom of unbalance appears as tramp, car shake and steering trouble.

To correct unbalance, use proper wheel balancer.

Maximum allowable unbalance:
177 gr-cm (2.5 in-oz)
10 gr. (0.35 oz) at rim circumferences

Balance weight:
10 to 60 gr. (0.35 to 2.12 oz)
at 10 gr. (0.35 oz) interval

Note: **Be sure to place the correct balance weights on the inner edge of rim as shown in Figure WT-9.**

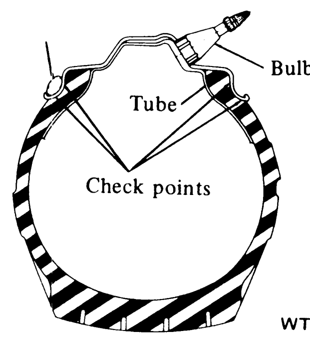
Wheel and tire

In order to ensure satisfactory steering condition as well as maximum tire life, proceed as follows:

1. Check wheel rim for rust, distortion, cracks or other faults.

Thoroughly remove rust, dust, oxidized rubber or sand from wheel rim with wire brush, emery cloth or paper. Use dial gauge to examine wheel rim for lateral run-out.

Lateral run-out limit:
Less than 4.0 mm (0.158 in) total indicator reading



WT009

Fig. WT-9 Wheel rim run-out check points

Note: In replacing tire, take extra care not to damage tire bead, rim-flange and bead seat.
Do not use tire irons to force beads away from wheel rim-flange; that is, always use tire replacement device whenever tire is removed.

2. Discard when any of the following trouble occurs:

(1) Broken or damaged bead wire.
(2) Ply or tread separation.
(3) Cracked or damaged side wall, etc.

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Wheel wobbles.	Improper tire pressure.	Measure and adjust.
	Damaged tire or distorted wheel rim.	Repair or replace.
	Unbalanced wheel.	Balance.
	Loose wheel nuts.	Tighten.
	Worn or damaged wheel bearing, or excessive play of wheel bearing.	Correct play or replace wheel bearing.
	Improper front wheel alignment.	Align.
	Worn or damaged ball joint.	Replace.
	Excessive steering linkage play or worn steering linkage.	Adjust or replace.
	Loose steering linkage connection.	Tighten nuts to rated torque, or replace worn parts if any.
	Broken suspension spring.	Replace.
	Faulty shock absorber.	Replace.
Unevenly or excessively worn tire.	Improper tire rotation.	Conduct tire rotation periodically.
	Improper tire pressure.	Measure and adjust.
	Unbalanced wheel.	Balance or replace.
	Improperly adjusted brake.	Adjust.
	Improper wheel alignment.	Align.
	Excessively distorted or improperly installed suspension link.	Repair, replace or, if necessary, reinstall.
	High speed on curves.	Reduce speed.
	Sudden start and improper speed due to rapid acceleration or improper brake application.	Follow correct and proper driving manner.
Tire squeals.	Improper tire pressure.	Measure and adjust.
	Improper front wheel alignment.	Align.
	Distorted knuckle or suspension link.	Repair or replace.

SERVICE MANUAL

DATSUN PICK-UP
MODEL 620 SERIES

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION ST

STEERING SYSTEM

ST

STEERING

CONTENTS

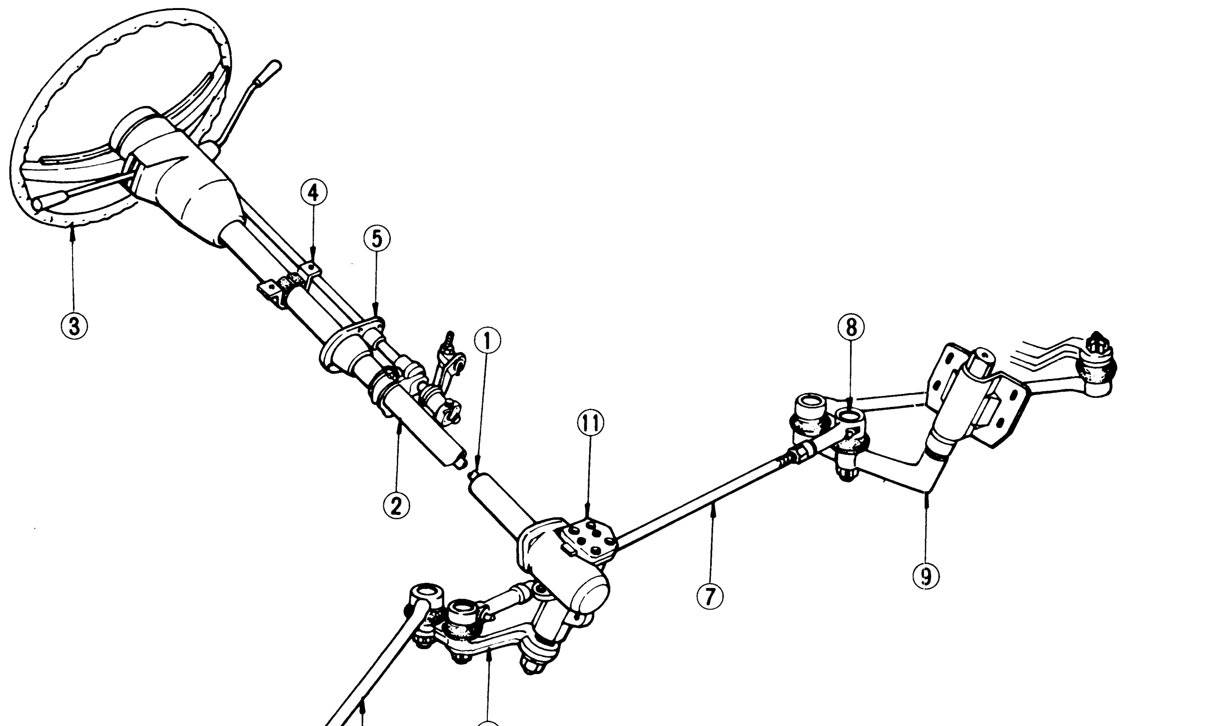
DESCRIPTION

The steering gear used on this model series vehicles is the same recirculating type as that used on model 521 series. This steering gear is designed especially for easy operation and high durability.

The steering linkage is of a relay design, of which gear arm is connected to one end of the adjustable cross rod. The other end of the cross rod is linked to the idler arm connecting with the side member located on the opposite side of the steering gear. The two side rods serve to connect the steering gear arm and idler arm to the both knuckle arms (right and left hand side).

With this construction, even if the left and/or right wheel moves vertically and independently, steering can be safely maintained.

Steering wheel rotation is converted to gear arm motion in proportion to the gear ratio by the steering gear. The gear arm motion operates the side rod on the same side. At the same time, the idler arm is moved through the cross rod, and the opposite side rod is also moved.

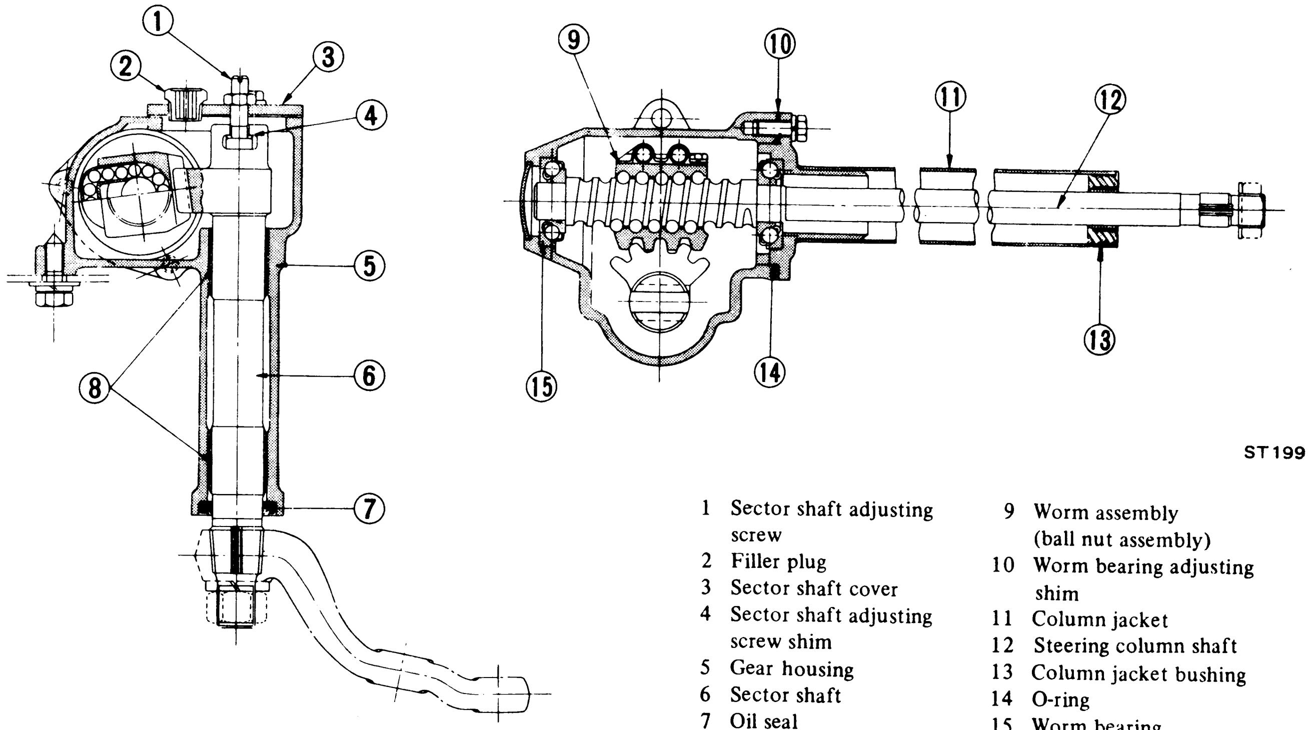


1 Steering column shaft
2 Steering column jacket
3 Steering wheel
4 Column clamp
5 Post grommet
6 Steering gear arm
7 Cross rod
8 Cross rod socket
9 Idler arm assembly
10 Side rod
11 Steering gear assembly

ST198

Fig. ST-1 Structural view of steering system

STEERING GEAR



1 Sector shaft adjusting screw
2 Filler plug
3 Sector shaft cover
4 Sector shaft adjusting screw shim
5 Gear housing
6 Sector shaft
7 Oil seal
8 Gear housing bushing
9 Worm assembly (ball nut assembly)
10 Worm bearing adjusting shim
11 Column jacket
12 Steering column shaft
13 Column jacket bushing
14 O-ring
15 Worm bearing

Fig. ST-2 Sectional view of steering gear

Removal and installation

Removal

1. Disconnect battery ground cable from the terminal.
2. Remove horn pad by unscrewing two bolts from the rear side of steering wheel bar.

Note: Be sure to punch mark with "o" on the top of steering column shaft.

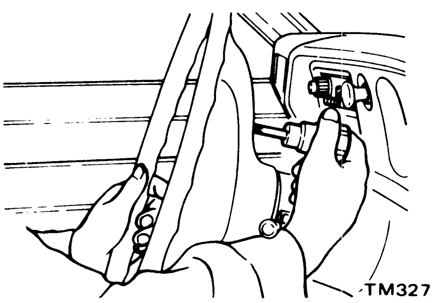


Fig. ST-3 Removing horn pad

3. Remove steering wheel with Steering Wheel Puller ST27180000 after backing off steering wheel fixing nut.

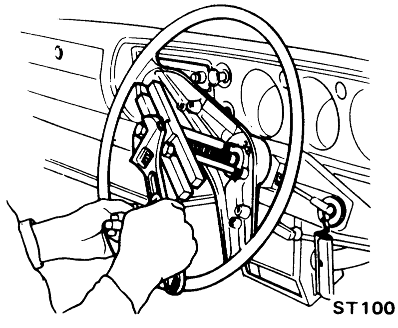


Fig. ST-4 Removing steering wheel

Note: Be sure not to hammer the special tool while removing.

4. Remove upper and lower steering column shell covers.
5. Remove turn signal switch assembly.
6. Draw out hand lever by removing snap ring and pivot pin if equipped.
7. Remove column clamp unscrewing two fixing bolts.

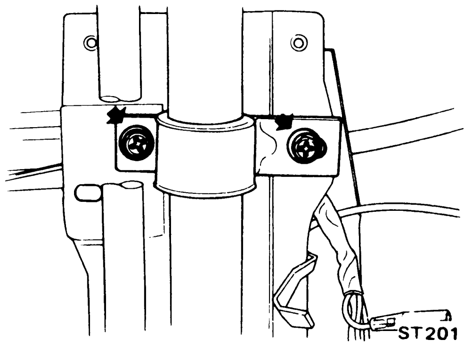


Fig. ST-5 Removing column clamp

8. Remove four bolts securing steering post grommet to dash panel.
9. Disconnect shift lever from upper shift rod and select lever from select rod at trunnions if equipped.
10. Remove nut securing gear arm to sector shaft and then withdraw gear arm with the use of Steering Gear Arm Puller ST27200000.

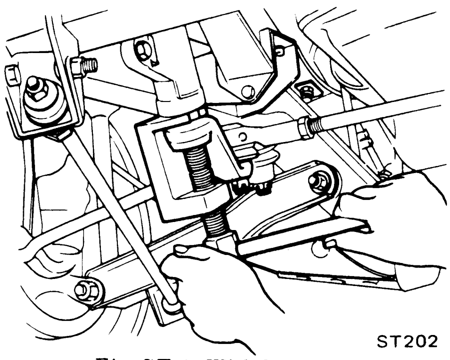


Fig. ST-6 Withdrawing gear arm

Note: Before removing steering gear arm, scribe match marks on arm and housing so that they can easily be replaced in their original positions at assembly.

11. Remove three bolts securing steering gear housing to frame.
12. Withdraw steering gear assembly toward engine compartment.
13. Detach transmission control parts from steering column jacket if equipped.

Installation

Install steering gear assembly in the reverse order of removal observing the following instructions.

1. When installing steering gear housing securing bolts, insert two bolts through gear housing to frame.
2. When installing steering gear arm, align four grooves of gear arm serrations with four projections of sector shaft serrations.
3. Tightening torque

   Steering gear housing:
   4.6 to 5.3 kg-m (33 to 38 ft-lb)

   Gear arm:
   13 to 15 kg-m (94 to 108 ft-lb)

   Steering wheel:
   7.0 to 7.5 kg-m (51 to 54 ft-lb)

4. With front wheels set in a straight ahead position, make sure that punch mark on the upper end surface of steering column shaft is at the center of the upper side in its installing portion.
5. When installing steering wheel, apply grease to sliding parts.
6. After installing, make sure that steering wheel turns smoothly.

Disassembly and assembly

Disassembly

1. Drain oil in steering gear housing by unscrewing filler plug.
2. Place steering gear assembly in a vise securely.
3. Loosen lock nut and turn sector shaft adjusting screw a few turns counterclockwise.

   Remove sector shaft cover by unscrewing four fixing bolts.

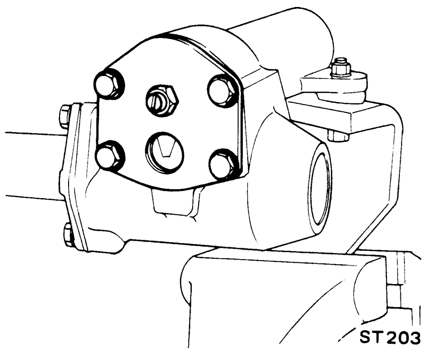


Fig. ST-7 Removing sector shaft cover

4. Turn sector shaft adjusting screw a few turns clockwise and pull sector shaft cover together with sector shaft from gear housing.

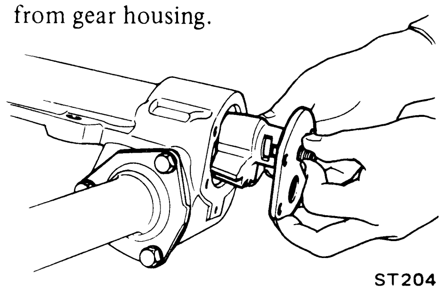


Fig. ST-8 Pulling out sector shaft

5. Separate sector shaft, adjusting screw and shim from cover.
6. Remove jacket tube by unscrewing three fixing bolts.
7. Remove steering worm assembly from gear housing.
8. Detach worm bearings and worm bearing adjusting shims from worm gear assembly and column jacket.

Note: Be careful not to allow ball nut to run down to the worm end. If ball nut rotates suddenly to the worm end, the ends of ball guides may be damaged.

9. Pry out sector shaft oil seal from gear housing and discard it.
10. Remove O-ring from the rear cover of column jacket and discard it.
11. Remove column jacket bushing.

Notes:

a. Do not remove sector shaft bushing from housing. If necessary, replace as a gear housing assembly.

b. Do not disassemble ball nut and worm gear. If necessary, replace them with new ones as a worm gear assembly.

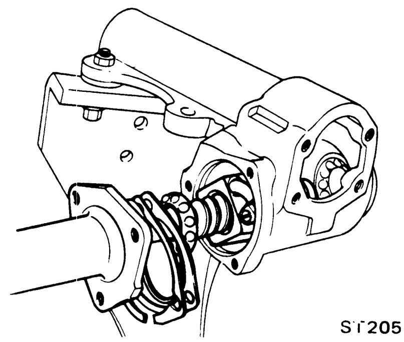


Fig. ST-9 Removing steering worm assembly

Assembly and adjustment

Apply recommended gear oil to all disassembled parts.

1. Fit column jacket bushing to column jacket in place.

Note: When fitting, apply adhesive to bushing exterior and grease to interior.

2. Fill the space between new sector shaft oil seal lips with grease, and fit it to gear housing.
3. Place steering worm assembly in position in gear housing together with worm bearings.
4. Install column jacket on gear housing with O-ring and worm bearing shims.

   Be sure to install thicker shims to the gear housing side.

   Standard shim thickness:
   1.5 mm (0.059 in)

   Tightening torque:
   1.5 to 2.5 kg-m (11 to 18 ft-lb)

Available worm bearing adjusting shim

No.	Thickness mm (in)
1	0.762 (0.0300)
2	0.254 (0.0100)
3	0.127 (0.0050)
4	0.050 (0.0020)

5. Adjust the worm bearing preload by selecting suitable bearing shims so that the initial turning torque of steering column is the specified value.

Initial turning torque of steering column shaft.

New worm bearing:
4.0 to 6.0 kg-cm (56 to 83 in-oz)
Used worm bearing:
2.4 to 4.4 kg-cm (33 to 61 in-oz)

At the circumferences of steering wheel:

New: 0.2 to 0.3 kg
(0.4 to 0.7 lb)
Used: 0.12 to 0.22 kg
(0.3 to 0.5 lb)

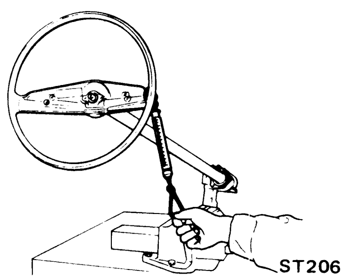


Fig. ST-10 Measuring initial turning torque

6. Insert adjusting screw into the T-shaped groove at the sector shaft head, and adjust the end play between sector shaft and adjusting screw until it is within 0.01 to 0.03 mm (0.0004 to 0.0012 in) by choosing suitable adjusting shims.

Available sector shaft adjusting screw shim

No.	Thickness mm (in)
1	1.575 (0.0620)
2	1.550 (0.0610)
3	1.525 (0.0600)
4	1.500 (0.0591)
5	1.475 (0.0581)
6	1.450 (0.0571)

7. Rotate ball nut by hand until it is in the center of its travel, then install sector shaft together with adjusting screw in gear housing, ensuring that the center gear of sector shaft engages with that of ball nut.

8. Install sector shaft cover to gear housing. Be sure to apply sealant to each face of sector shaft cover packing when installing cover.

9. By turning adjusting screw counterclockwise, attach sector shaft cover to gear houisng and then temporarily secure it with its fixing bolts.

10. Pull sector shaft toward cover approximately 2 to 3 mm (0.079 to 0.118 in) by turning adjusting screw counterclockwise and tighten sector shaft cover fixing bolts to 1.5 to 2.5 kg-m (11 to 18 ft-lb).

11. Push sector shaft against ball nut gear by gradually turning adjusting screw clockwise until sector shaft gear lightly meshes with ball nut gear and then temporarily secure adjusting screw with lock nut.

12. Install gear arm to sector shaft and move sector shaft several times from the side of gear arm and make sure that it turns smoothly.

13. Adjust the backlash at the neutral position of gear arm by turning in or out adjusting screw so that the movement of the gear arm top end is less than 0.1 mm (0.004 in).

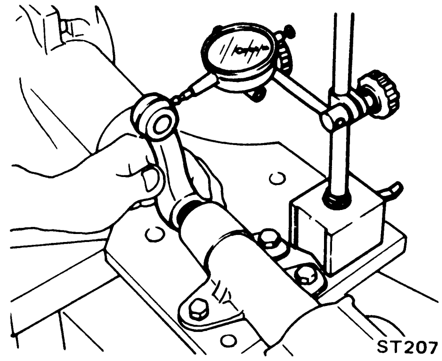


Fig. ST-11 Measuring backlash

14. Turn adjusting screw approximately 1/8 to 1/6 turn clockwise and then retighten lock nut to 3.0 to 4.0 kg-m (22 to 29 ft-lb).

15. Fill recommended gear oil approximately 0.33 liter (3/8 U.S.qt., ¼ Imper. qt.) into gear assembly through the filler hole and install filler plug.

Inspection and repair

Wash clean all the disassembled parts in solvent and check for conditions.

Sector shaft

1. Check gear tooth surface for pitting, burrs, cracks or any other damage, and replace if faulty.

2. Check sector shaft for distortion of its serration, and if necessary replace. In this case, be sure to check gear housing for deformation.

Steering column shaft assembly

1. Inspect the ball nut gear tooth surface, and replace if pitting, burrs, wear or any other damage is found.

2. Ball nut must rotate smoothly on worm gear. If found too tight, assembly should be replaced. Check as follows:

Move ball nut to either end of worm gear, and gradually stand steering column shaft assembly until ball nut moves downward on worm gear under its own weight. In the above test, if ball nut does not move freely over entire stroke, assembly may be damaged. Replace with a new one as an assembly.

Note: In this inspection, be careful not to damage ball nut guide tube.

Bearings and bushings

1. Replace worm bearings if pitting, wear or any other damage is found on them.

2. Replace column bushing which is excessive worn or deformed.

3. If sector shaft bushings in gear housing are found worn or damaged, replace as an assembly of gear housing and bushing.

Oil seal, gasket and O-ring

Do not reuse above parts which are removed once.

Be sure to use new parts at each reassembly.

STEERING LINKAGE

Removal and installation

Removal

1. Jack up the front of vehicle and support it on the safety stands.
2. Remove cotter pins and nuts fastening side rod ball stud to knuckle arms.
3. To detach side rod ball studs from knuckle arms, insert steering Ball Joint Puller ST27850000 between them and separate them by striking the top of this tool with a hammer. If this operation must be done without this tool, strike the knuckle arm boss with a hammer backing up the opposite side of it with a large hammer and ball stud is freed from knuckle arm. Must not strike the ball stud head, the ball socket of side rod and side rod with a hammer and so on in this operation.

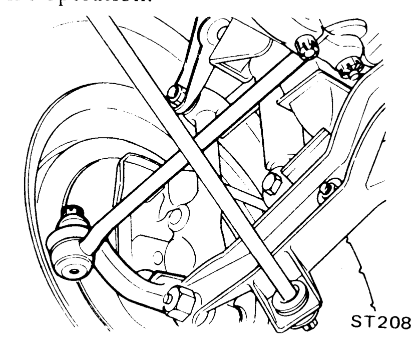


Fig. ST-12 Ball joints (gear arm side)

4. Remove nut securing gear arm on sector shaft, and remove gear arm with the use of Gear Arm Puller ST27200000. See Figure ST-6.
5. Remove idler arm assembly from frame by backing off fixing bolt and nut.

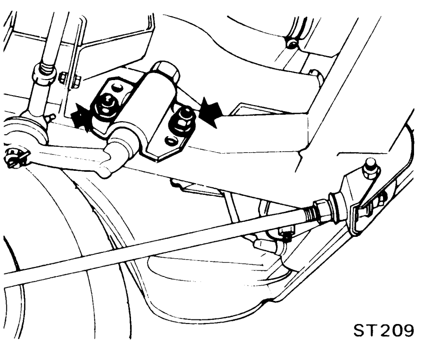


Fig. ST-13 Removing idler arm

6. Cross rod, both side rods and the adjacent parts can then be freed from the vehicle as an assembly.
7. Then separate the ball joints of steering linkage assembly following the procedure for removal of the side rods ball joints at knuckle arm sides.

Assembly

Install steering linkage in the reverse sequence of removal observing the following notes:

1. Tightening torque:

Ball stud: 5.5 to 7.6 kg-m (40 to 55 ft-lb)
Idler arm assembly: 3.2 to 3.7 kg-m (23 to 27 ft-lb)
Cross rod adjust bar lock nut: 8 to 10 kg-m (58 to 72 ft-lb)

2. When cross rod sockets and cross rod are separated, adjust cross ro length correctly.

Adjustment should be done between the centers of ball joints at the both end of cross rod assembly.

Standard cross rod length: 516 mm (20.31 in)

3. Adjust toe-in and steering angle. The procedures of toe-in and steering angle adjustments are described in SECTION "FRONT AXLE AND SUSPENSION."

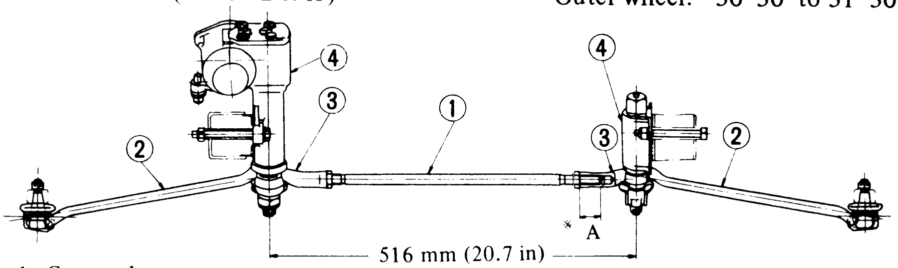
Toe-in:

Pick-up: 1 to 5 mm (0.039 to 0.197 in)

Double pick-up: 2 to 3 mm (0.079 to 0.118 in)

Steering angle:

Inner wheel: 35°30′ to 36°30′
Outer wheel: 30°30′ to 31°30′



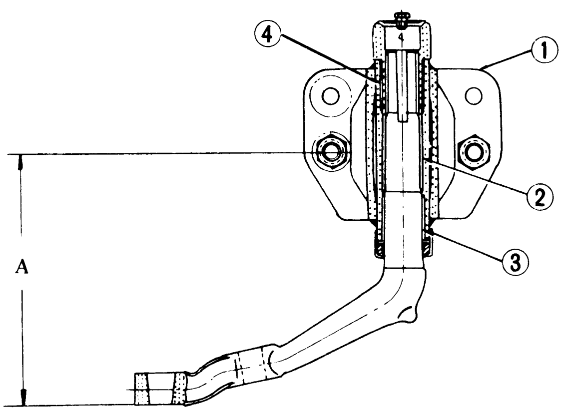
1 Cross rod
2 Side rod
3 Cross rod socket
4 Idler arm assembly
5 Gear housing assembly

* After adjustment of toe-in, be sure that dimension "A" at the both ends of cross rod is not less than 20 mm (0.79 in)

ST210

Fig. ST-14 Adjusting cross rod assembly

Idler arm assembly



1 Idler body
2 Collar (welded to idler body)
3 Plain bushing
4 Screw bushing

ST211

Fig. ST-15 Sectional view of idler arm assembly

1. Apply recommended grease to screw bushing interior, plain bushing interior, dust seal inside and bushing sliding surface of idler arm.

Screw bushing tightening torque:
12 kg-m (87 ft-lb)

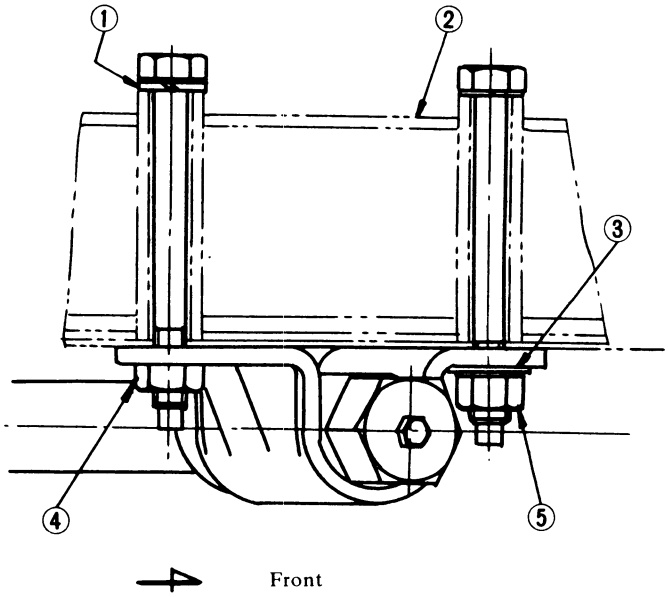
2. Before installing idler arm assembly, replace filler plug with grease nipple, and apply recommended grease to idler arm through this grease nipple until grease is forced out at the lower end of the dust seal lip. Remove grease nipple and reinstall filler plug.

3. In installing idler arm assembly, make sure that the standard dimension "A" is adjusted correctly.

Standard dimension "A":
137.8 to 139.8 mm
(5.425 to 5.504 in)

See Figure ST-15.

Furthermore, take care to install washers correctly as shown Figure ST-16.



1 Spring washer
2 Frame
3 Plain washer
4 Weld nut
5 Self locking nut

ST212

Fig. ST-16 Locations of washers

Inspection and repair

Ball joint

1. When ball stud is worn or axial play is too excessive, replace cross rod socket or side rod with a new one.
2. When dust cover is broken or deformed, be sure to replace with a new one.

Axial end play: 0.1 to 0.5 mm
(0.004 to 0.020 in)

Initial swing torque:
5 to 15 kg-cm (70 to 209 in-oz)

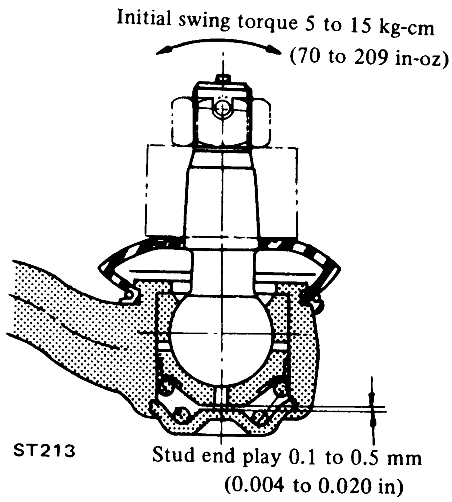


Fig. ST-17 Sectional view of ball joint

Note: At the recommended intervals, check grease and renew if necessary. To renew grease, remove grease nipple cap and apply recommended grease to ball joint through grease nipple until grease is forced out at the grease vent hole.

Idler arm assembly

Remove old grease and dirt, and check idler arm assembly for wear, deformation and damage.

Cross rod, side rod and gear arm

Check them for bending, damage and crack, and replace as necessary.

Inspecting steering system on the vehicle which comes into collision

Steering system is very important for driving a car. When the car comes into collision, especially the front of the car is damaged, special inspection should be done for the following matters.

If any component parts of steering system is found to be damaged, replace them with new ones.

1. Steering angles correctness
Inspect side rods and cross rod for bend, and sector shaft for distortion.
2. Level of steering wheel bar (with the front wheels in a straight ahead position)
If its deflection is more than about 90 degree, the bend or distortion of sector shaft and column shaft can be seen.
3. Noise during operation of steering wheel.
Inspect column shaft and jacket tube for bend.
4. Smooth operation of steering wheel
Inspect sector gear for breakage, ball nut screw for dint and column shaft for bend.
5. Gear arm breakage
6. Gear housing breakage
In addition, inspect gear housing fixing bolts for looseness.
7. Distortion of sector shaft serration
8. Sector gear breakage

9. Column shaft breakage (on the welded section)
In addition, inspect column shaft for scratch.

10. Deformation of body construction and frame
Inspect the installation portion of steering system on the body construction and frame for deformation or any other faulty conditions.

SERVICE DATA AND SPECIFICATIONS

SPECIFICATIONS

Gear type	Recirculating ball type
Gear ratio	19.8 : 1

SERVICE DATA

Standard thickness of worm bearing adjusting shims	mm (in)	1.5 (0.059)
Initial turning torque of steering column:		
New worm bearing	kg-cm (in-lb)	4.0 to 6.0 (3.5 to 5.2)
Used worm bearing	kg-cm (in-lb)	2.4 to 4.4 (2.1 to 3.8)
End clearance of sector shaft adjusting screw	mm (in)	0.01 to 0.03 (0.0004 to 0.0012)
Backlash at the gear arm top end	mm (in)	0 to 0.1 (0 to 0.004)
Oil capacity	ℓ (U.S.qt., Imper.qt.)	0.33 (3/8, 1/4)
Ball joint axial end play	mm (in)	0.1 to 0.5 (0.004 to 0.020)
Standard cross rod length	mm (in)	516 (20.31)
Toe-in	mm (in)	2 to 3 (0.079 to 0.118)
Steering angle:		
Inner wheel		35°30′ to 36°30′
Outer wheel		30°30′ to 31°30′

Tightening torque

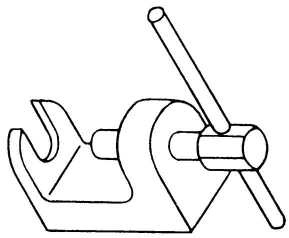
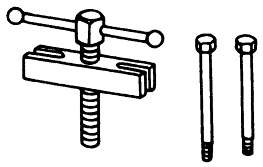
Unit: kg-m (ft-lb)

Steering column jacket to gear housing	1.5 to 2.5	(11 to 18)
Sector shaft cover	1.5 to 2.5	(11 to 18)
Sector shaft lock nut	3.0 to 4.0	(22 to 29)
Gear housing	4.6 to 5.3	(33 to 38)
Gear arm	13 to 15	(94 to 108)
Steering wheel	7 to 7.5	(51 to 54)
Ball studs of cross rod	5.5 to 7.6	(40 to 55)
Ball studs of side rod:		
Knuckle arm side	5.5 to 7.6	(40 to 55)
Gear or idler arm side	5.5 to 7.6	(40 to 55)

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Steering wheel moves heavily.	Wheel alignment out of specifications or air pressure in tires too low.	Align or inflate tires to correct pressure.
	Steering linkage out of adjustment.	Adjust and see relative topic under Front Suspension.
	Steering column out of alignment.	Repair.
Steering wheel turns but sluggishly.	Wheels out of alignment or air pressure in tires too low.	Repair or inflate tires to correct air pressure.
	Damaged steering linkage.	Replace and see relative topic under Front Suspension.
Car pulls to one side.	Wheels out of proper alignment.	Align.
	Wheel bearing out of adjustment.	Adjust.
	Damaged steering linkage.	Replace and see relative topic under Front Suspension.

SPECIAL SERVICE TOOLS

No.	Tool number & tool name	Description Unit: mm (in)		For use on	Reference page or figure No.
1.	ST27200000 Steering gear arm puller	 SE117	This tool is used to remove steering gear arm from steering sector shaft. Caution: Do not hammer on steering gear arm.	620 521 230	Page ST-3 Fig. ST-6 Page ST-6
2.	ST27180000 Steering wheel puller	 SE116	This tool is used to drive out steering wheel. Caution: Do not hammer on steering wheel.	620 610 510 B110 230 780	Fig. ST-4
3.	ST27850000 Steering ball joint puller	 SE089	This tool is used to facilitate the disengagement of ball-joint section. Caution: Do not hammer on ball stud.	620 610 510 B110 B120 E10 S30 C30 230 130 GC10 C10	

SERVICE MANUAL

DATSUN PICK-UP
MODEL 620 SERIES

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION FE

ENGINE CONTROL FUEL AND EXHAUST PIPING

FE

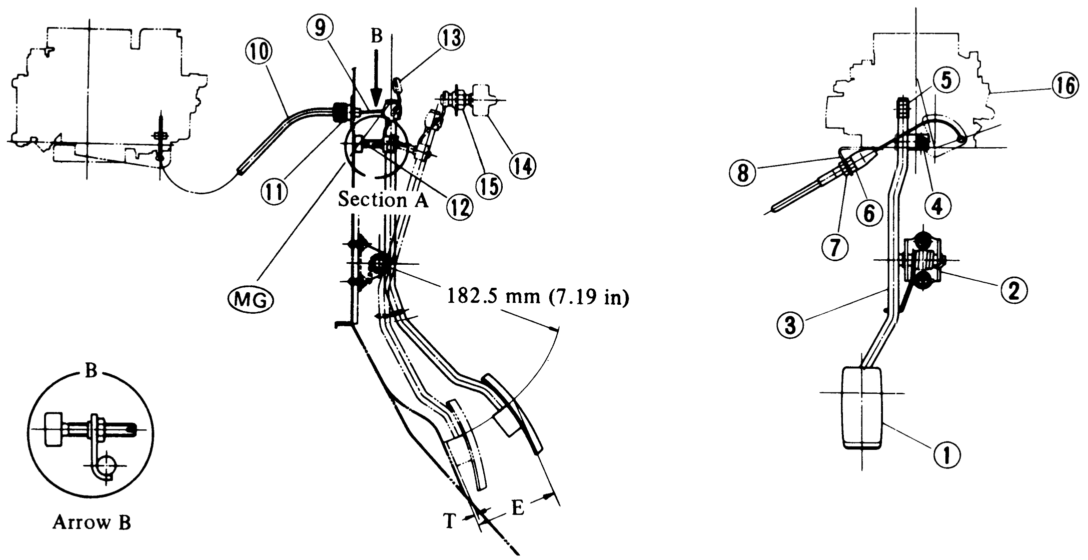
ENGINE CONTROL SYSTEM

CONTENTS

DESCRIPTION

The accelerator control system is of flexible cable type so that the linkage operates smoothly and the system is not affected by engine vibration.

The choke system is automatically controlled.



E: 79.5 mm (3.13 in)
T: 2 to 4 mm (0.079 to 0.158 in)

(MG) Multi-purpose grease

1 Accelerator pedal
2 Accelerator pedal bracket and return spring
3 Accelerator pedal arm
4 Pedal stopper lock nut
5 Spring clamp
6 Lock nut
7 Adjust nut
8 Wire holder
9 Accelerator wire
10 Accelerator wire outer case
11 Ring nut
12 Pedal stopper bolt
13 Kickdown switch striker (Automatic transmission models only)
14 Kickdown switch (Automatic transmission models only)
15 Switch stopper nut
16 Carburetor

FE183

Fig. FE-1 Accelerator control system

REMOVAL

Accelerator wire

1. Disconnect accelerator wire from carburetor.
2. Remove ring nut from dash panel. See Figure FE-1.
3. Remove spring clamp and disconnect accelerator wire from accelerator pedal arm. See Figure FE-1.
4. Remove accelerator wire from engine compartment.

Accelerator pedal assembly

1. Remove spring clamp, then disconnect accelerator wire from the tip of pedal arm.
2. Remove two screws securing accelerator pedal bracket to body.
3. Remove accelerator pedal from dash panel. See Figure FE-1.

INSPECTION

1. Check accelerator pedal return spring for rust, fatigue or damage. Replace if necessary.
2. Check accelerator wire, cases and fastening locations for rust, damage or looseness.

Repair or replace if necessary.

INSTALLATION

To install, reverse the order of removal.

Note: Check accelerator control parts for improper contact with any adjacent parts.

ADJUSTMENT

Accelerator pedal and wire

1. Adjust pedal stopper bolt (Section A) so as to obtain the specified height "E" as shown in Figure FE-1. Secure pedal stopper bolt with stopper lock nut. Refer to Figure FE-1.

Tightening torque of nut:
0.38 to 0.45 kg-m
(2.7 to 3.2 ft-lb)

2. Release automatic choke effect, since throttle lever is opened by fast idle cam until engine warms up.

Note: **Automatic choke effect releasing operations.**

(1) Keep choke valve fully open with fingers.
(2) Pull throttle lever up by hand, then automatic choke effect will be released.

3. Set throttle valve to completely closed position and, with wire sufficiently slackened, tighten adjust nut until throttle lever is about to move. Accelerator pedal play is zero at this time. See Figure FE-2.
4. Unscrew adjust nut approximately four turns so that accelerator pedal play is 4 to 5 mm (0.158 to 0.197 in). Tighten lock nut securely. See Figure FE-2.
5. After completing the adjustment as previously explained, check the following:

(1) Make sure that accelerator system functions smoothly and quietly without disturbing any adjacent parts.
(2) Depress accelerator pedal down until throttle valve fully opens. Make sure that the clearance "T" between accelerator pedal reverse side and dash floor is 2 to 4 mm (0.079 to 0.158 in) without floor mat. Adjust pedal stopper bolt and lock nut if beyond limits.
(3) Check throttle lever if it returns to the original position as soon as accelerator pedal is released.
(4) Apply recommended multi-purpose grease slightly on the portion as shown in Figure FE-1. Also refer to the periodical maintenance schedule.

Kickdown switch (Automatic transmission models only)

The kickdown switch adjustment is correct if it is actuated by kickdown switch striker when accelerator pedal is fully depressed.

Always tighten switch stopper nut securely after proper adjustment is obtained.

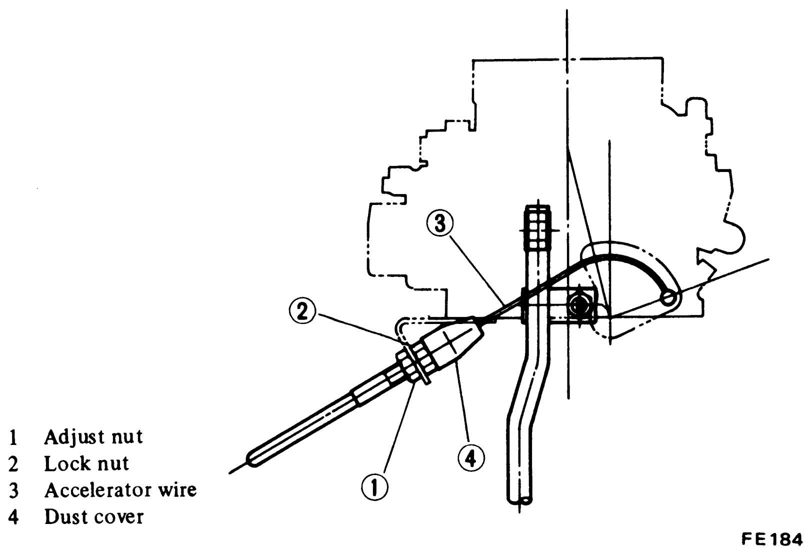


Fig. FE-2 Adjusting accelerator wire play

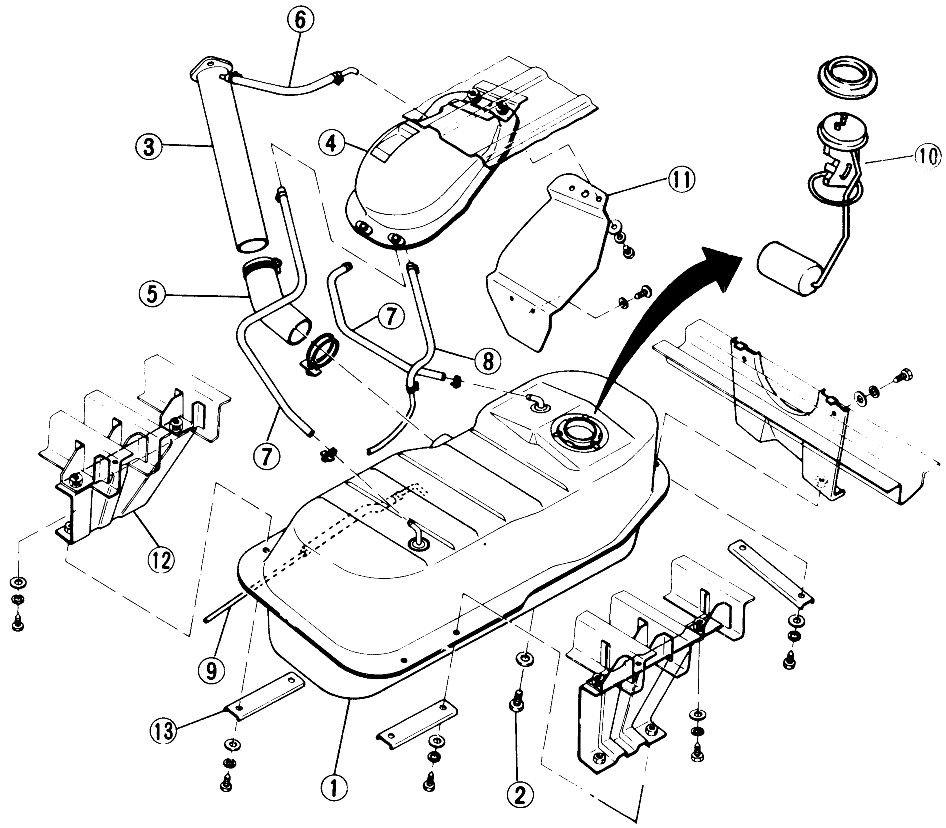
FUEL SYSTEM

CONTENTS

DESCRIPTION

The fuel tank is 45 liters (11⅞ U.S. gal., 9⅞ Imper. gal.) in capacity. The tank unit is mounted to the right side of the rear floor.

1 Fuel tank
2 Drain plug
3 Filler tube
4 Reservoir tank
5 Filler hose
6 Breather hose
7 Ventilation hose
8 Evaporation hose
9 Fuel outlet hose and tube
10 Fuel tank gauge unit
11 Protector
12 Bracket
13 Retainer



FE194

Fig. FE-3 Fuel tank

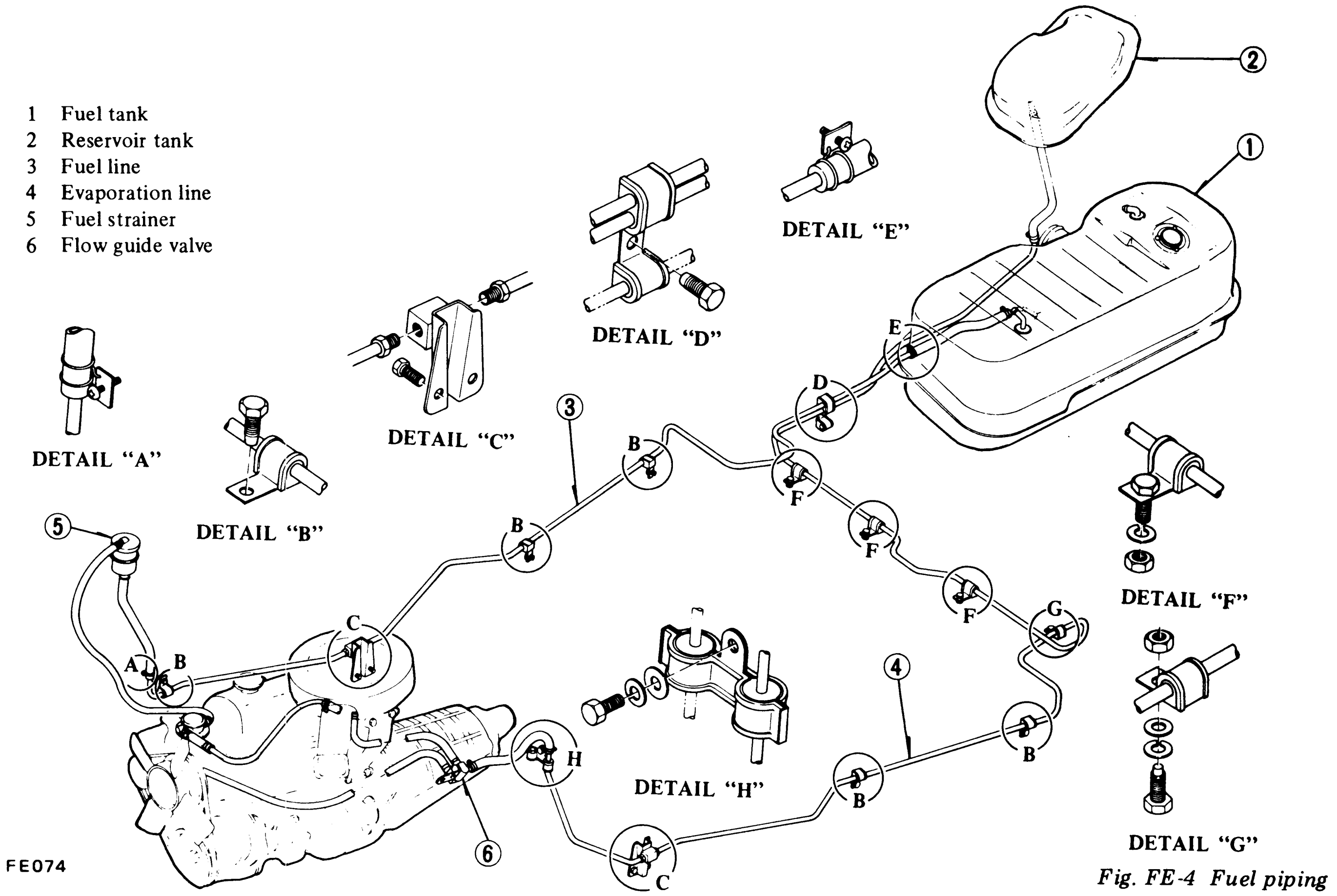


Fig. FE-4 Fuel piping

REMOVAL

Fuel tank (See Figure FE-3)

1. Disconnect battery ground cable.
2. Remove drain plug and receive the remaining fuel into a suitable container.
3. Disconnect filler tube from filler hose.
4. Remove fuel tank securing bolts.
5. Disconnect two ventilation hoses and fuel outlet hose from fuel tank.
6. Disconnect fuel tank gauge unit wires at connector.
7. Remove fuel tank.

Note: **Plug hose and tube openings to prevent entry of dust or dirt while removing.**

Reservoir tank

1. Disconnect battery ground cable.
2. Disconnect two ventilation hoses, evaporation hose and breather hose.
3. Remove reservoir tank securing bolts, and remove tank with protector.

Note: **Plug hose and tube openings to prevent entry of dust or dirt while removing.**

Fuel tank gauge unit

1. Disconnect battery ground cable.
2. Disconnect wires from fuel tank gauge unit.
3. Remove fuel tank. For details, refer to fuel tank removal.
4. Unit gauge is a bayonet type and can be removed by turning it counterclockwise with screwdriver.

Fuel piping (See Figure FE-4)

Fuel tubes are serviced as an assembly, so that replacement of fuel tube can be easily done. However, do not disconnect any fuel line unless absolutely necessary.

1. Drain fuel from fuel tank.
2. Loosen fuel hose clamps and disconnect fuel tubes on each end.

Note: **Plug hose and tube openings to prevent entry of dust or dirt while removing.**

3. Unfasten clips that hold tube on under body and remove tube from the car.

Fuel strainer

1. Disconnect fuel hoses from fuel strainer by removing clamps. See Figure FE-5.

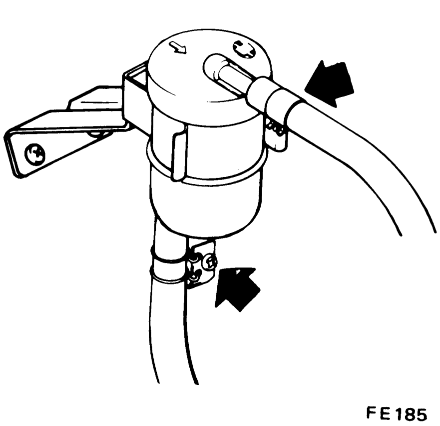


Fig. FE-5 Removing fuel strainer clamps

2. Remove fuel strainer.

INSPECTION

1. Fuel tank.
Check fuel tank for cracks or deformation. If necessary, replace.
2. Fuel hose
Inspect all hoses for cracks, fatigue, sweating or deterioration. Replace any hose that is damaged.
3. Fuel tube
Replace any fuel tube that is cracked, rusted, collapsed or deformed.

Note: **Inspect hoses and tubes according to the periodical maintenance schedule.**

4. Fuel strainer
Replace fuel strainer according to the periodical maintenance schedule or when it is clogged or restricted.

Fuel strainer is of a cartridge type and cannot be cleaned. Always replace with a new one.

5. Fuel tank gauge unit
Check gauge unit for rust, deformation or deterioration. If necessary, replace.

INSTALLATION

To install, reverse the order of removal. Observe the following:

1. Install hose clamps securely. Do not tighten excessively to avoid damaging hoses.
2. Fasten clips holding fuel tube on under body securely. Failure to follow this caution could result in damage to the surface of fuel tube.
3. Do not kink or twist hose and tube when they are routed.
4. Install filler hose after fuel tank has been mounted in place. Failure to follow this caution could result in leakage from around hose connections.
5. When installing fuel tank gauge unit, align the projection of tank gauge unit with the notch in fuel tank and tighten it securely. Be sure to install gauge unit with O-ring in place.
6. Run engine and check for leaks at connections.

Tightening torque:
Drain plug:
5.0 to 6.0 kg-m
(36 to 43 ft-lb)
Fuel tank securing bolt:
0.8 to 1.1 kg-m
(5.8 to 8.0 ft-lb)
Reservoir tank securing bolt:
0.32 to 0.44 kg-m
(2.3 to 3.2 ft-lb)

EXHAUST SYSTEM

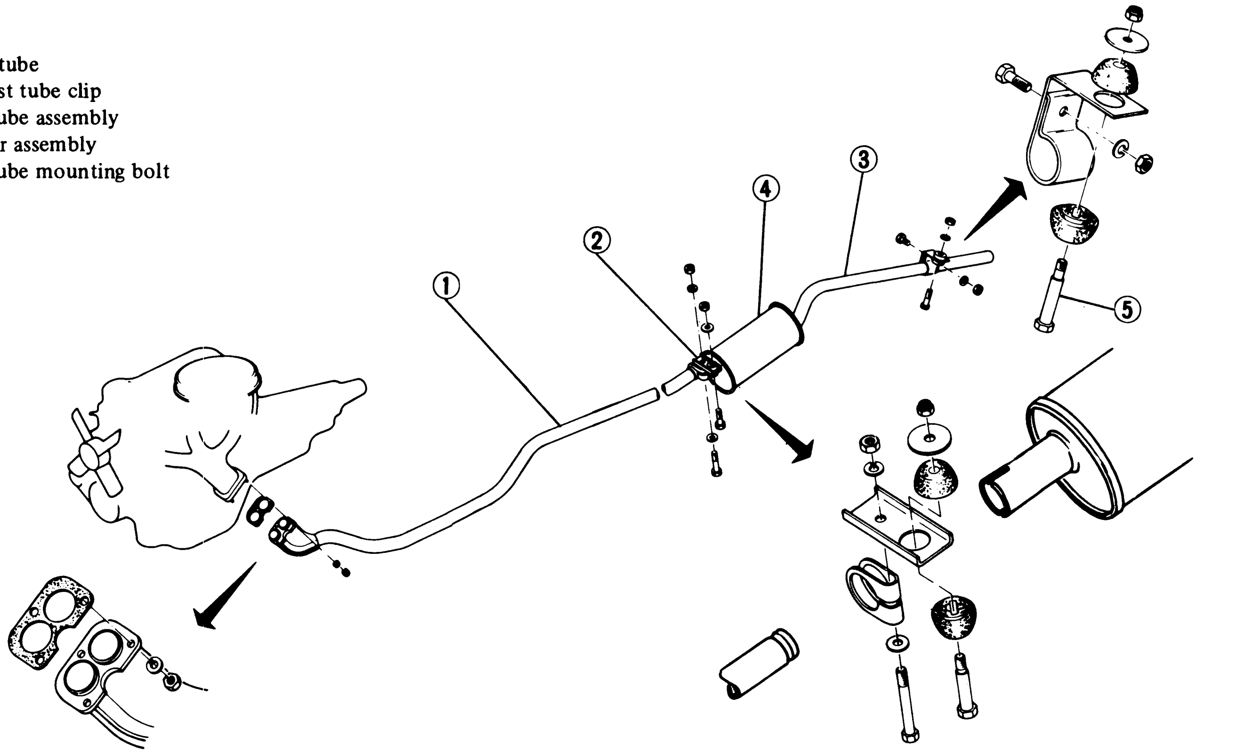
CONTENTS

DESCRIPTION

The exhaust system consists of front, rear tube, main muffler assembly, mounting hangers and brackets.

The component parts are separated mainly into the front tube and muffler with rear tube, and they are coupled with exhaust tube clip and a special sealant at the muffler inlet. Use of this sealant eliminates the possible leakage of exhaust gases. Therefore, when replacing muffler or disconnecting exhaust tubes in two pieces, special service procedures are required. The exhaust unit is suspended from the body hanger bracket.

1 Front tube
2 Exhaust tube clip
3 Rear tube assembly
4 Muffler assembly
5 Rear tube mounting bolt



FE186

Fig. FE-6 Exhaust system

REMOVAL

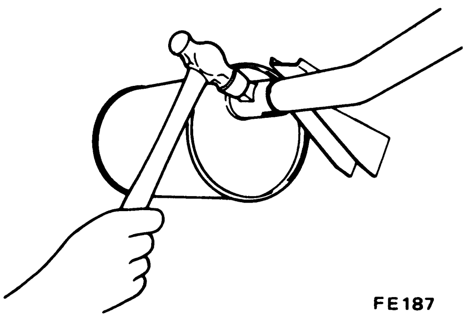
1. Remove exhaust tube clip.
2. Break sealant off at the front tube-to-rear tube connection.

Note: A sealant is applied to the tube connections to eliminate the leakage of exhaust gases. Observe the procedures outlined later in this section as a guide.

3. Hang front tube end with a suitable thread or a wire to prevent tube from falling.
4. Remove rear tube mounting bolt, then remove muffler assembly with rear tube.
5. Remove nuts securing front tube to exhaust manifold, and front tube assembly.

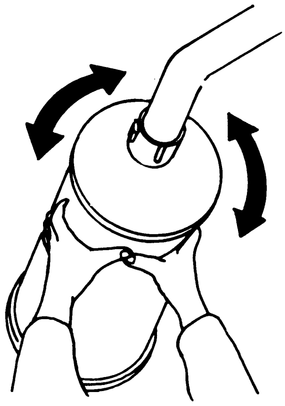
When disconnecting the exhaust tube connections, pay attention to the following points.

1) Break old sealant off at the connection by lightly tapping around the tube with a hammer and twisting muffler. See Figures FE-8 and FE-9.



FE187

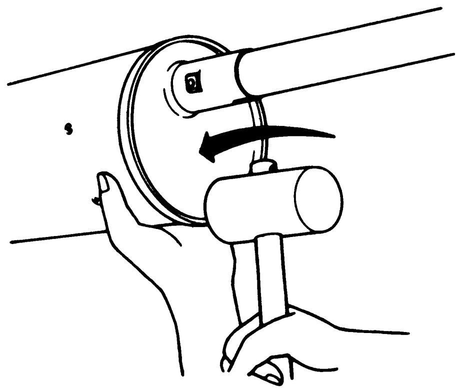
Fig. FE-7 Breaking sealant



FE188

Fig. FE-8 Twisting muffler

(2) Using a rubber hammer, tap on the front end of muffler while pushing it toward rear. The muffler assembly can then be taken out. See Figure FE-10.



FE189

Fig. FE-9 Tapping muffler with a rubber hammer

INSPECTION

1. Check muffler and tubes for cracks or damage.

Replace any part that is damaged beyond limits.

2. Replace bracket and mounting rubber parts that are cracked, fatigued, or sweated.

INSTALLATION

Install the exhaust system assembly in reverse order of removal. Observe the following:

Notes:

a. **Muffler front tube inserting depth is approximately 70 mm (2.76 in).**
b. **When there is no clearance between front tube and floor or propeller shaft, turn tube along center line of tube in the manifold connecting unit, and obtain proper clearance.**
c. **Check all tube connections for exhaust gas leaks, and entire system for unusual noises, with engine running.**
d. **After installation, check that mounting brackets and mounting rubbers are free from undue stress. If any of the above parts is not installed properly, excessive noises or vibrations may be transmitted to the vehicle body.**
e. **Tightening torque:**
   - **Exhaust manifold to front tube nut:**
     1.6 to 2.1 kg-m
     (12 to 15 ft-lb)
   - **Front tube (male) and muffler (female) securing nut:**
     1.0 to 1.2 kg-m
     (7.2 to 8.7 ft-lb)
   - **Rear tube mounting bolt:**
     1.0 to 1.2 kg-m
     (7.2 to 8.7 ft-lb)
   - **Rear mounting securing nut:**
     2.0 to 2.7 kg-m
     (14 to 20 ft-lb)

If exhaust tubes are separated at connection to renew muffler assembly, etc., use the Genuine Nissan Sealant "Exhaust Sealant Kit 20720-N2225" (See Figure FE-11) to eliminate gas leakage at the joint. Be sure to observe the following.

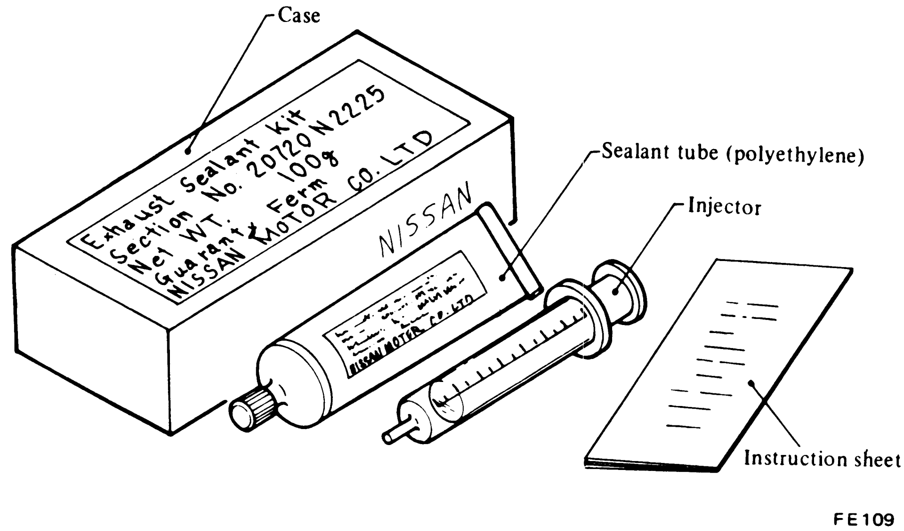


Fig. FE-10 Exhaust sealant kit

1. Wipe clean all the contact portions of tube joints; allow them to dry thoroughly.
2. Temporarily mount in place muffler assembly as an assembled unit on the vehicle.
3. Insert male tube into female tube approximately 70 mm (2.76 in). See Figure FE-11.

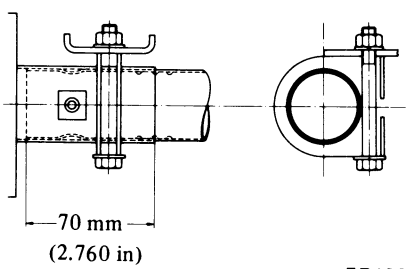


Fig. FE-11 Exhaust tube connection

4. Torque nut securing the male and female tubes at the connection. Tightening torque is 1.0 to 1.2 kg-m (7.2 to 8.7 ft-lb).
5. Squeeze approximately 5 cc (0.31 cu in) of sealant into injection from sealant tube. See Figure FE-12.

Be sure to place cap back to sealant tube since sealant will dry.

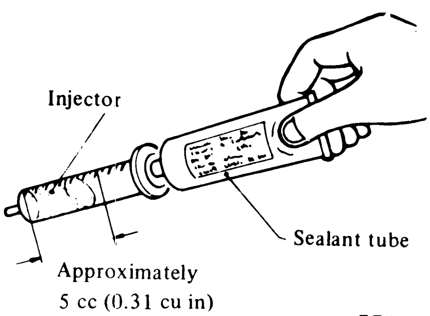


Fig. FE-12 Squeezing sealant to injector

6. Position nozzle of injector to the guide and press it there firmly. Inject sealant slowly until sealant begins to flow out of the slit of tube. This indicates that the bead requires no further sealant. Excessive sealant can cause a clogged tube. See Figure FE-13.

After injecting, wash injector thoroughly in clean water to remove all traces of sealant.

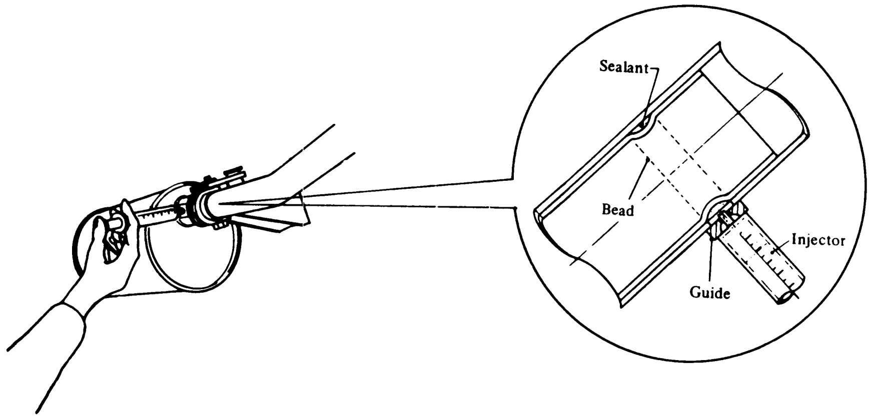


Fig. FE-13 Injecting sealant

7 Start engine and let it idle slowly for ten minutes (minimum) to harden sealant with the heat of exhaust gas.

8. Check the condition of sealant before driving the car. It is also essential that the car should not be accelerated sharply for 20 to 30 minutes subsequent to this operation.

Notes:

a. The sealant should be used within guaranty term indicated on the kit case.

b. Exposure of sealant to the skin may cause a rash. Wash sealant off the skin with water.

c. Do not keep the sealant tube in a place where the ambient temperature is above 40°C (104°F). A sealant hardened above 40°C (104°F) cannot be used. The most suitable storage temperature is from 15 to 35°C (59 to 95°F). If sealant becomes hardened because of low temperatures, warm the sealant tube with lukewarm water until the sealant is softened. Do not warm tube at a temperature over 40°C (104°F) for a long time.

d. Thoroughly read the instruction sheet furnished with the kit before using the sealant.

SERVICE MANUAL

DATSUN PICK-UP
MODEL 620 SERIES

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION BF

BODY AND FRAME

BF

GENERAL DESCRIPTION

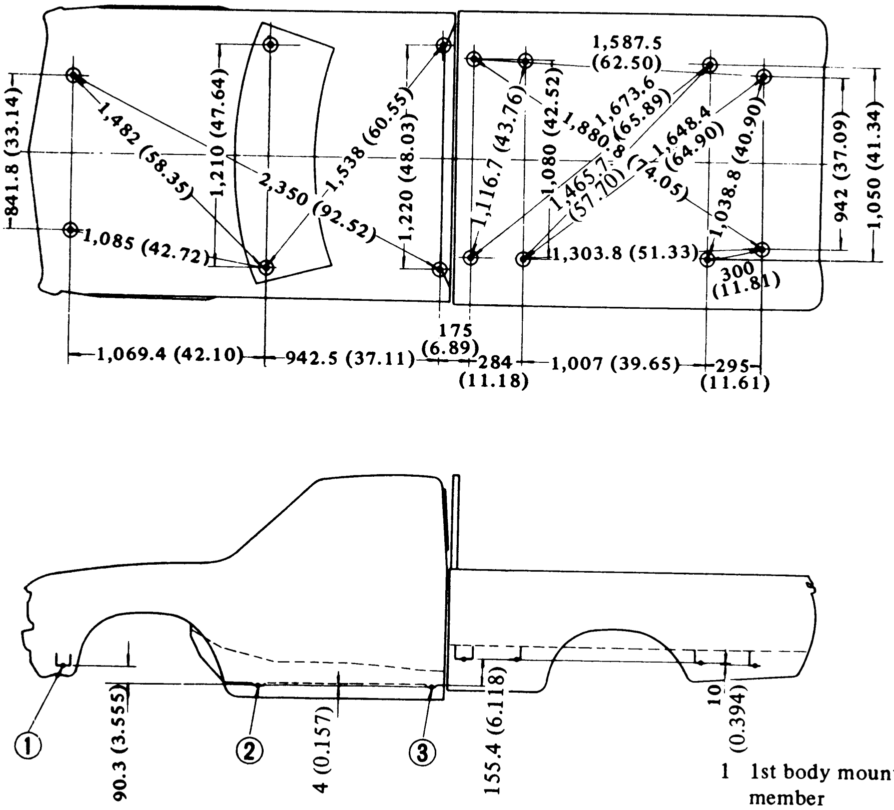
CONTENTS

There are three chassis frames; one for the standard wheelbase, another for the long wheelbase of the Pick-up and the other for the Double Pick-up version.

The Double Pick-up uses the same body structure as the Pick-up model for the front half from the front pillar to the front end.

The frame consists of a right and left side members that are linked together with crossmembers to form a rigid structure to withstand load to be encountered. The second crossmember is located somewhat backward to permit individual replacement of the transmission.

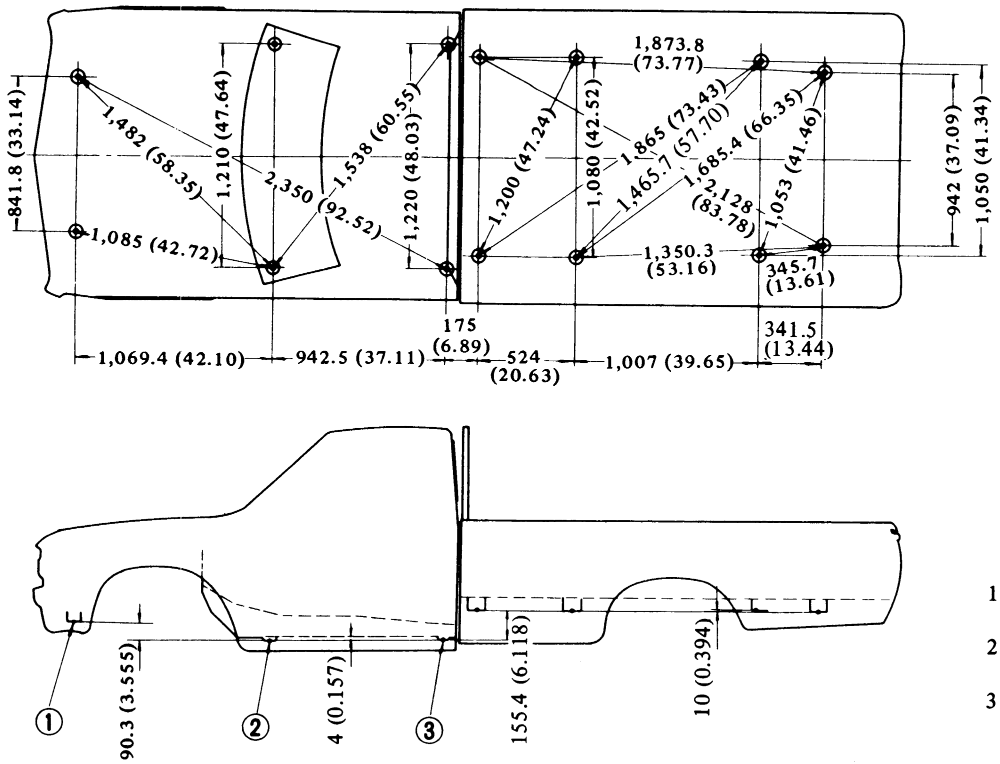
PICK-UP



1 1st body mounting member
2 2nd body mounting member
3 3rd body mounting member

BF625

Fig. BF-1 Underbody dimensions (Standard wheelbase)

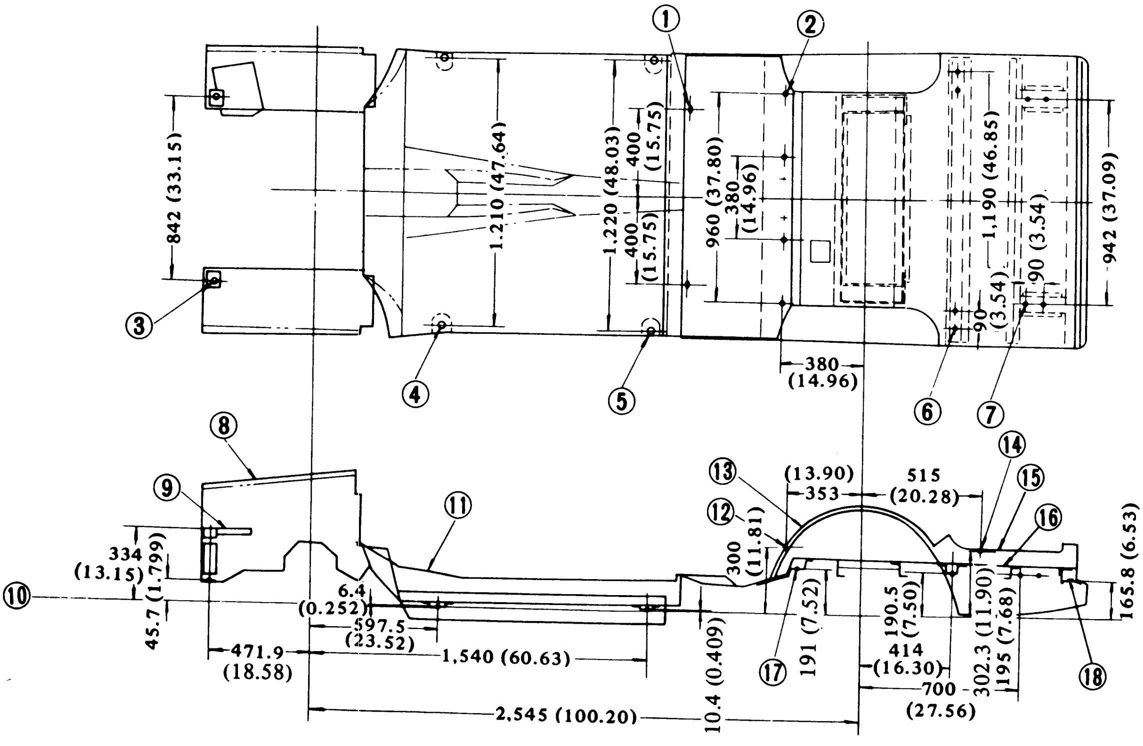


BF626

1 1st body mounting member
2 2nd body mounting member
3 3rd body mounting member

Fig. BF-2 Underbody dimensions (Long wheelbase)

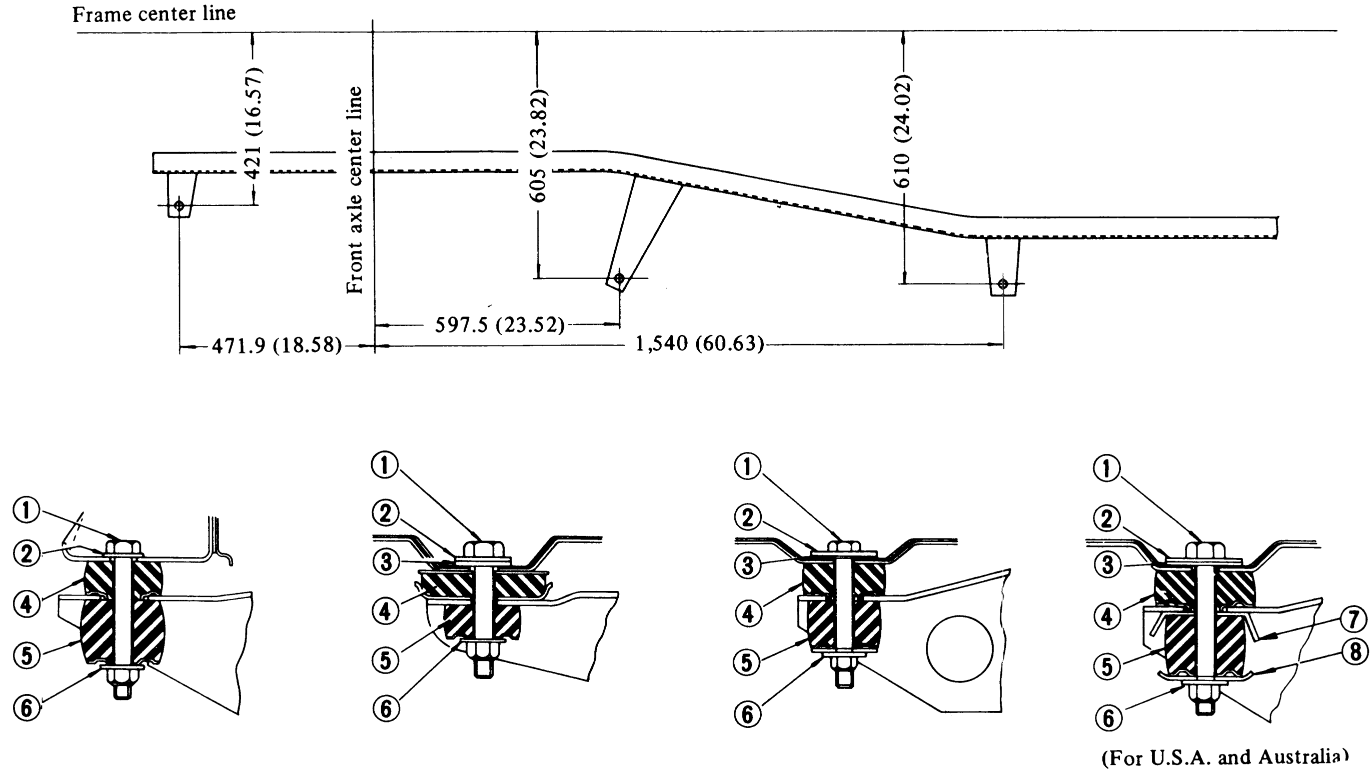
DOUBLE PICK-UP



1 Rear seat mounting
2 Seat belt anchorage hole
3 1st body mounting member
4 2nd body mounting member
5 3rd body mounting member
6 5th body mounting member
7 6th body mounting member
8 Hood ledge
9 Battery mounting
10 Datum line
11 Front floor
12 Location hole
13 Rear wheel house
14 Location hole
15 Rear side panel
16 Rear floor
17 4th body mounting member
BF627 18 Tail bolster

Fig. BF-3 Underbody dimensions

CAB BODY



1st mounting | 2nd mounting | 3rd mounting

1 Bolt
2 Plain washer
3 Rubber washer
4 Upper rubber
5 Bottom rubber
6 Plain washer
7 Upper washer
8 Lower washer

BF628

Unit: mm (in)

Fig. BF-4 Cab body mountings

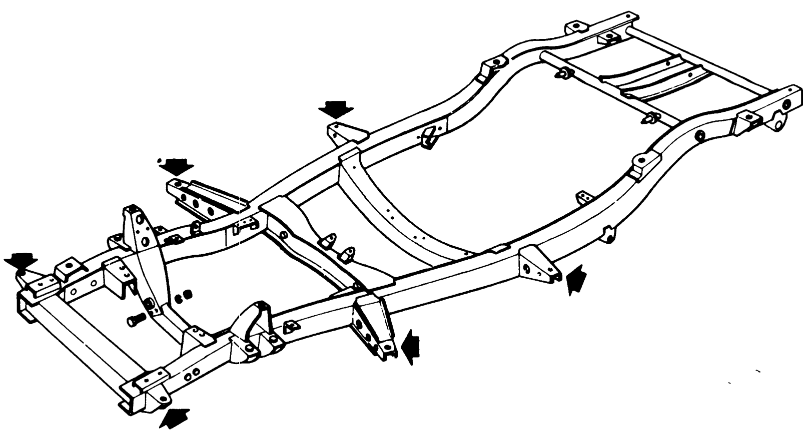
REMOVAL AND INSTALLATION

1. Remove battery from engine compartment.
2. Drain water from cooling system completely and remove radiator.
3. Remove engine hood from hood hinges after scribing hood for reinstallation.
4. Remove bumper stays from frame and take out front bumper.
5. Remove radiator grille.
6. With the aid of Steering Wheel Puller ST27180000, remove steering wheel from steering shaft.
7. Remove steering gear arm from steering sector shaft. To do this, use Steering Gear Arm Puller ST27140000.
8. Disconnect select and shift rods at sector lever and gear change lever.
9. Free gear shift lever from control rod.
10. Remove screws securing steering shaft dust seat and insulator in position.
11. Remove steering gear housing from frame and pull it out into engine compartment.
12. Disconnect speedometer cable at transmission.
13. Disconnect front brake rubber hose from brake tube.

    On tandem brake master cylinder equipped models, it is necessary to disconnect rear brake tube at front master cylinder.
14. Disconnect fuel tube at fuel pump inlet.
15. Loosen hand brake control cable at brake control lever. Then disconnect cable from dash panel.

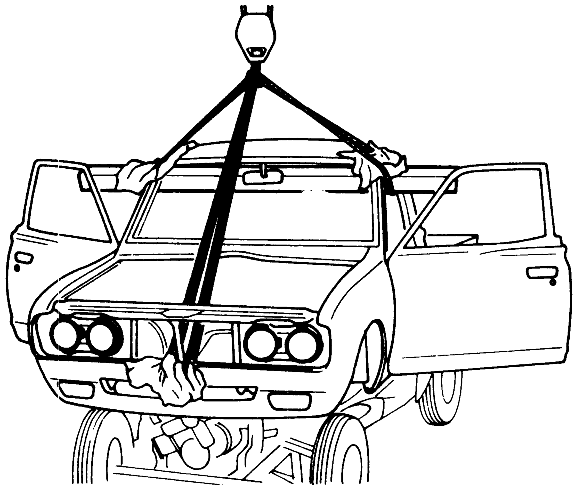
Note: Place blocks against front and rear wheels to prevent car from rolling off accidentally.

16. Free choke wire and accelerator linkage from carburetor.
17. Disconnect heater hoses at engine side.
18. Disconnect wire harnesses from related engine electrical parts.
19. Disconnect engine and chassis harnesses at their connection on right sidemember near rear engine mounting member.
20. Remove six bolts securing body to frame.



BF629

Fig. BF-5 Cab body mountings



BF630

Fig. BF-6 Lifting up cab body

21. With the use of suitable ropes and an overhead hoist, lift cab body straight up slowly, place it on a level surface.

Note: In lifting up cab body, use care not to dash it against enigne or rear body. Cab body weighs approximately 220 kg (485 lb).

22. For installation, reverse above steps. However, observe the following instructions.

(1) If the cab body is to be replaced, note position and location of insulators and washers used. See Figure BF-4.

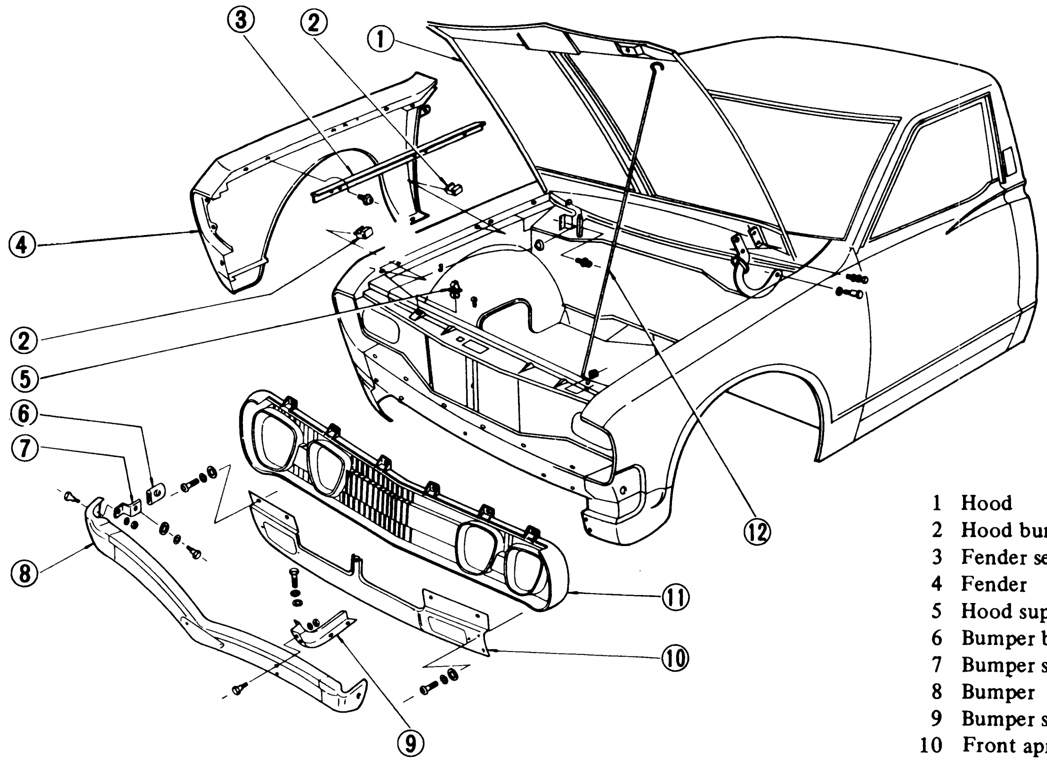
(2) Adjust hand brake stroke properly.

(3) Air bleed brake and clutch system thoroughly.

Cab body to frame mounting bolt torque:
1.6 to 2.2 kg-m
(12 to 16 ft-lb)

BODY FRONT END

CONTENTS



1 Hood
2 Hood bumper
3 Fender seal rubber
4 Fender
5 Hood support rod clamp
6 Bumper bracket shim
7 Bumper side bracket
8 Bumper
9 Bumper stay
10 Front apron
11 Radiator grille
12 Hood support rod

Fig. BF-7 Body front end

FRONT BUMPER

Removal and installation

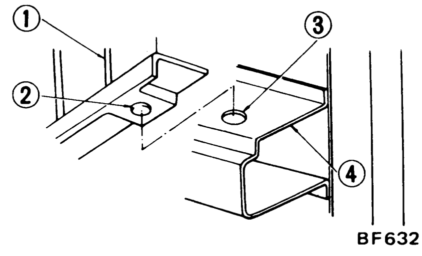
1. Remove bumper to fender attaching bolts.
2. Remove four bumper stay to side frame front attaching bolts. Pull bumper assembly straight forward.
3. For installation, reverse steps. Align bumper with front fender and apron; then tighten them up.

RADIATOR GRILLE

Removal and installation

1. Remove radiator grille by removing attaching screws, six on top and two on both ends.
2. Remove ornament on radiator grille by removing nuts from behind radiator grille.
3. For installation, reverse steps, observing the following:

(1) Check to be certain that six guide studs enter holes in radiator support lower frame before tightening top screws.



1 Radiator grille
2 Guide stud
3 Guide stud hole
4 Radiator support lower frame

Fig. BF-8 Radiator grille guide studs

(2) Align grille with head lamps and fenders.

FRONT APRON

Removal and installation

1. Remove front bumper.
2. Remove radiator grille.
3. Disconnect front turn signal wire harness at connector.
4. Remove front apron by removing attaching bolts.
5. For installation, reverse steps.

COWL TOP GRILLE

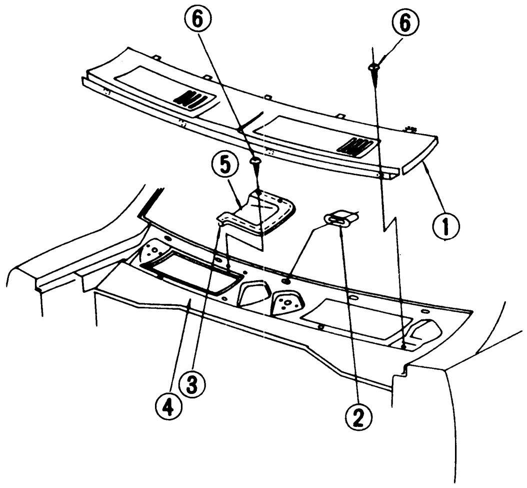


Fig. BF-9 Cowl top grille

Removal and installation

1. Open engine hood.
2. Remove two windshield wiper blades.
3. Remove cowl top grille attaching screws. Pull grille straight forward to remove.
4. Remove air box drain.
5. To install, reverse steps. However, observe the following items:

(1) When installing air box drain, apply adhesive to its lower end.
(2) Align cowl top grille with fenders.

FRONT FENDER

Removal and installation

1. Remove front bumper.
2. Remove radiator grille.
3. Remove front apron.
4. Remove cowl top grille.
5. Remove hood bumpers (two on each side).
6. Remove nine screws attaching front fender to hood ledge. See Figure BF-7.
7. Remove front fender rubber seals.
8. To install, reverse steps.

HOOD

CONTENTS

REMOVAL AND INSTALLATION

1. Place protective covers over front fender and cowl top grille.
2. Open engine hood. Mark hinge locations on hood and loosen off four bolts securing hood to hood hinge. Use extra caution to avoid damaging painted surfaces of fender and cowl top grille.
3. Remove cowl top grille.
4. Pry off pin from hood hinge and remove hinge.
5. To install, reverse above procedures.

ADJUSTMENT

Four slotted holes in hood hinge provide for fore-aft and side adjustment to correct space between hood and fender, and hood and cowl top grille.

Loosen four bolts just enough to move engine hood and move hood to desired position if necessary to correct space.

To make vertical adjustment, adjust height of dove-tail bolt at hood lock male until hood is flush with fender.

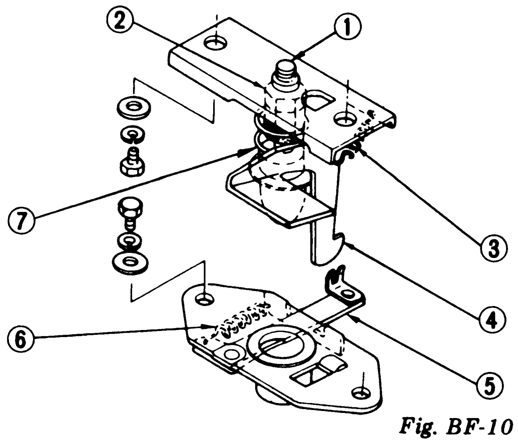


Fig. BF-10 Hood lock male and female

1. Loosen hood to hinge bolts just far enough to permit movement of hood.
2. Shift hood in elongated hole until parallel space is reached between hood and fender or cowl top grille. Tighten bolts securely.

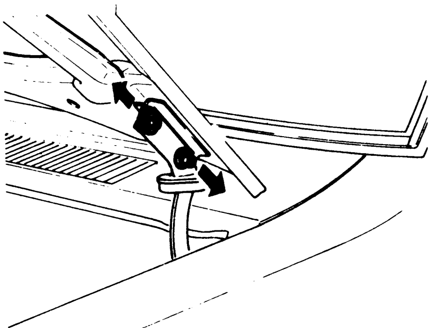


Fig. BF-11 Engine hood alignment

Note: Vertical adjustment should be carried out after hood lock male and female adjustment has been completed.

3. To correct hood lock alignment, loosen two hood lock male attaching bolts and move hood lock male and female in the lateral and fore-and-aft directions as required.

Tightening torque:
Male and female attaching bolts
0.45 to 0.60 kg-m
(3.3 to 4.3 ft-lb)

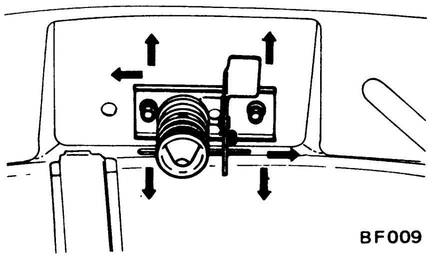
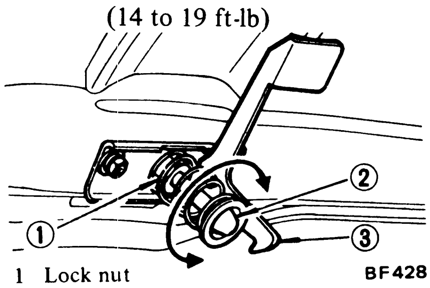


Fig. BF-12 Adjusting hood lock male

4. Dove-tail bolt at hood lock male provide for vertical adjustment to align hood to make it flush with fender. To correct, loosen lock nut on dove-tail bolt and turn dove-tail bolt in or out as necessary to obtain a correct height.
5. Tighten lock nut firmly while holding dove-tail bolt with a screw-driver to secure adjustment.

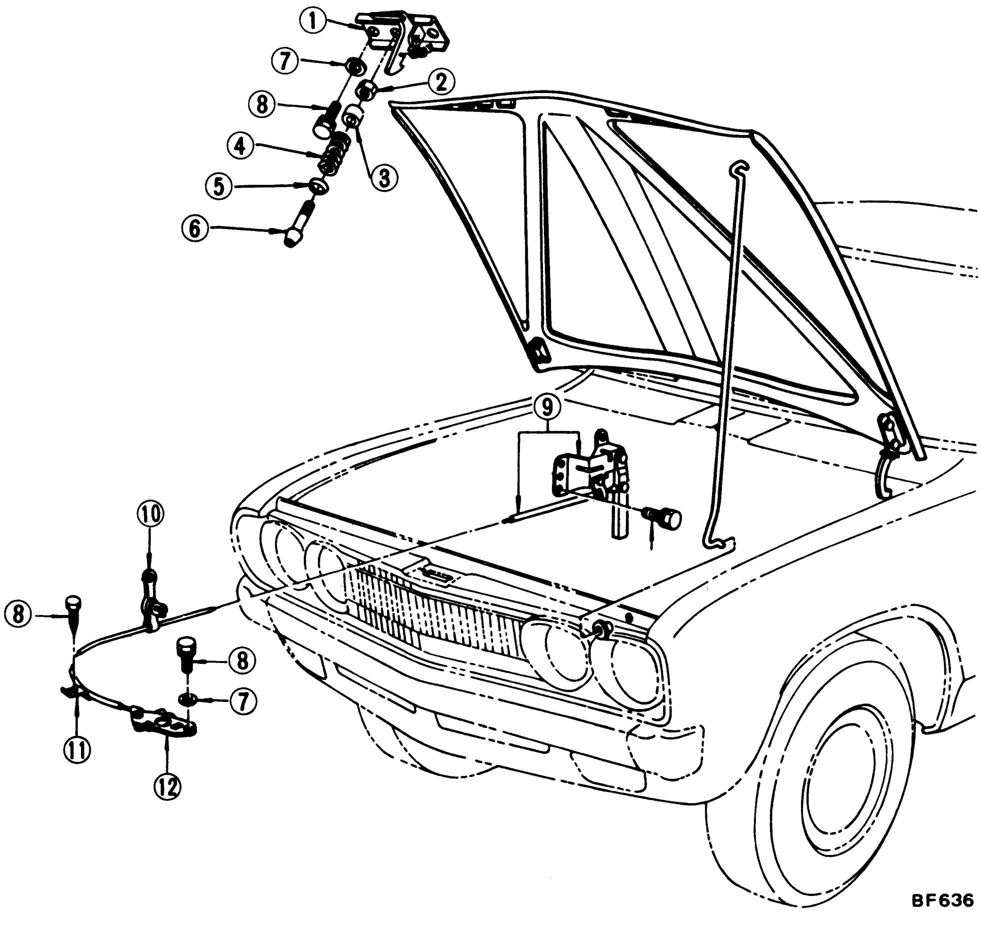
Tightening torque:
Lock nut of dove-tail
1.9 to 2.6 kg-m
(14 to 19 ft-lb)



1 Lock nut
2 Hood lock male
3 Safety catch

Fig. BF-13 Dove-tail bolt height adjustment

HOOD LOCK AND CONTROL CABLE



1 Dove-tail bolt seat
2 Lock nut
3 Cushion rubber
4 Spring
5 Spring retainer
6 Dove-tail bolt
7 Lock washer
8 Bolt
9 Control cable assembly
10 Clamp
11 Clamp
12 Hood lock female

Fig. BF-14 Hood lock and control cable

Removal and stallation

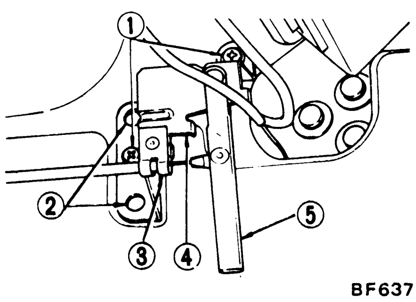
1. Remove hood lock male by removing two attaching bolts.
2. To remove hood lock female, first remove radiator grille. Back off two bolts securing hood lock female in position. Hood lock female can now be taken out.
3. Remove two bolts attaching hood lock handle assembly to dash side panel.

Disconnect cable at hood lock female and remove cable clamps. Pull cable out into cab.

4. To install hood lock male and female, reverse removal procedure. After installation, check to insure that they are properly aligned.
5. To install hood lock handle assembly, reverse steps, observing the following notes:

(1) Check to be certain that cable clamps are tight and secure.

(2) Install hood lock handle bracket in place by using two of four holes. ɘ Figure BF-15.



1 Attaching bolt
2 Hole
3 Clamp
4 Hood lock handle bracket
5 Hood lock handle

Fig. BF-15 Installing hood lock handle bracket

Adjustment and inspection

1. If hood lock handle is heavy, then turn dove-tail bolt of hood lock male counterclockwise to reduce tension of hood lock spring.

Lock nut of dove-tail bolt should first be loosened.

If looseness is noticed, hood is not tight and will vibrate. To correct this, turn bolt clockwise and recheck.

2. Check hood lock mechanism as follows:

(1) Check safety catch lever and spring for deformation, fatigue or rusting.

(2) Check female lever and return spring for deformation, fatigue or rusting. Improper operation of female lever may cause disengagement between female lever and dove-tail bolt.

(3) Make sure that safety catch hooks engine hood properly when hood latch has been disengaged.

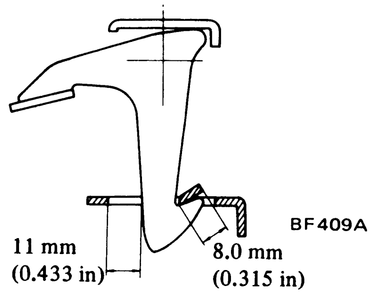


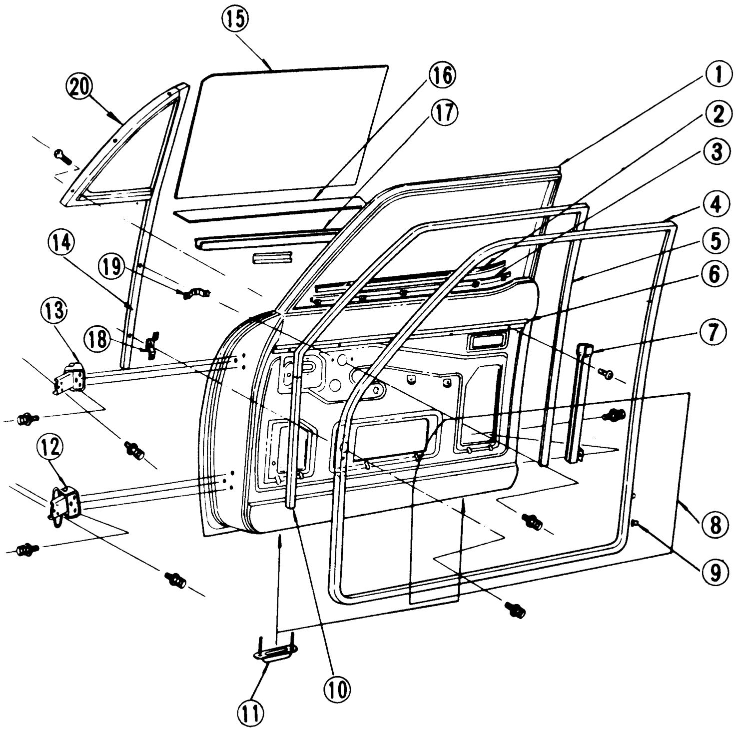
Fig. BF-16 Safety catch lever to radiator upper support adjustment

Lubrication

When checking or adjusting the hood lock, lubricate the pivot, catcher and return spring of secondary latch throughly. Also, lubricate the lever of the hood lock female for smooth and correct operation.

DOOR

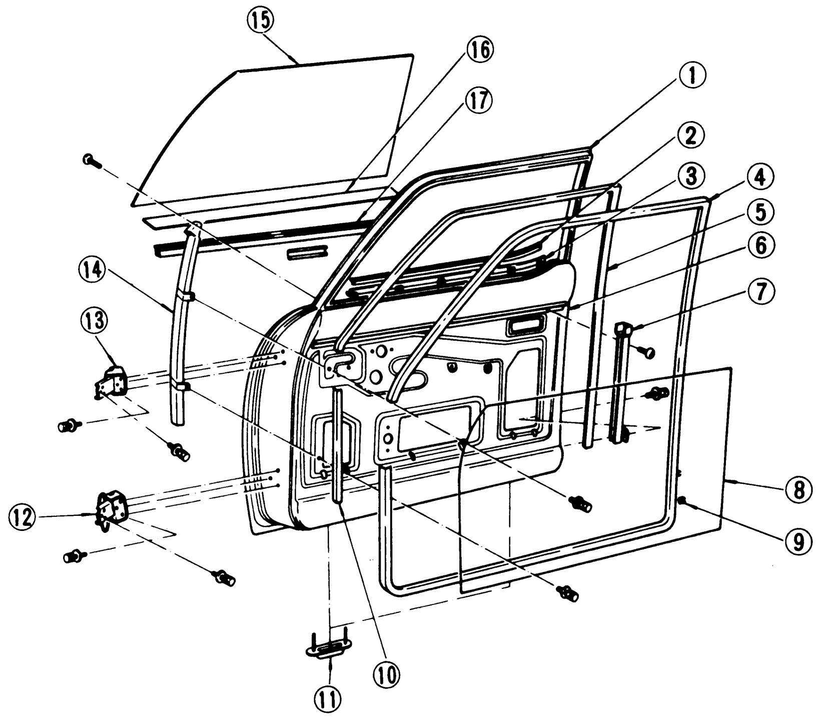
CONTENTS



1 Door sash
2 Door outside weatherstrip
3 Door inside weatherstrip
4 Door weatherstrip
5 Rear glass run rubber
6 Door finish holder
7 Rear lower sash
8 Seal screen
9 Door weatherstrip clip
10 Front glass run rubber
11 Drain hole cover
12 Lower door hinge
13 Upper door hinge
14 Front lower sash
15 Door glass
16 Glazing rubber
17 Door glass bottom channel
18 Lower support
19 Upper support
20 Door ventilator assembly

BF638

Fig. BF-17-1 Door with ventilator window



1 Door sash
2 Door outside weatherstrip
3 Door inside weatherstrip
4 Door weatherstrip
5 Rear glass run rubber
6 Door finish holder
7 Rear lower sash
8 Seal screen
9 Door weatherstrip clip
10 Front glass run rubber
11 Drain hole cover
12 Lower door hinge
13 Upper door hinge
14 Front lower sash
15 Door glass
16 Glazing rubber
17 Door glass bottom channel

BF639

Fig. BF-17-2 Door without ventilator window

DESCRIPTION

The door consists of one piece inner and outer panels welded together to form a rigid structure.

The curved glass provides more room for shoulders. On the L18 engine equipped cars (destined for U.S.A. and Canada), the door uses a one piece glass without ventilator.

A door that incorporates a ventilator window is also avaialble as production optional.

On cars equipped with the J13 or J15 engine, the door incorporates a ventilator window.

The single-check door hinge is the same unit as that introduced in the Nissan Junior (Model 140).

The weatherstrip is inserted into groove on the door sash side and is attached by clips on the door side.

REMOVAL AND INSTALLATION

With door in full open position, place a garage jack or stand beneath door to support its weight when bolts are removed. Place rag between door and jack or stand to avoid damaging painted surface.

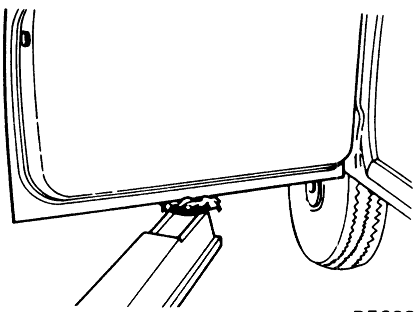


Fig. BF-18 Supporting door

2. Separate lower door hinge hole cover from dash side trim.
3. While supporting door as above, back off body to upper and lower hinge attaching bolts accessible from inside cab (three each). Door can now be taken out from cab body.

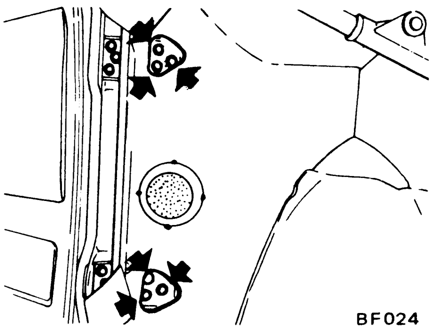


Fig. BF-19 Removing door hinge bolts

4. To install, reverse removal procedure.

DOOR ALIGNMENT

Elongated holes (three each) in door hinge and door lock striker provide for up and down, forward and backward, and/or sideways adjustment to assure proper door fit to door opening.

To adjust door alignment, loosen bolts and move door to desired position to obtain a parallel space between door sides and door opening. Also check to be certain that weatherstrip contacts body opening evenly to prevent entry of mud and water.

DOOR TRIM AND SEAL

Removal and installation

1. Remove screw securing inside door handle escutcheon; remove escutcheon.
2. Remove screws which hold pull handle and arm rest in position. Handle and arm rest can then be taken out.
3. Pull retaining spring off regulator handle. Take out regulator handle and seat washer.

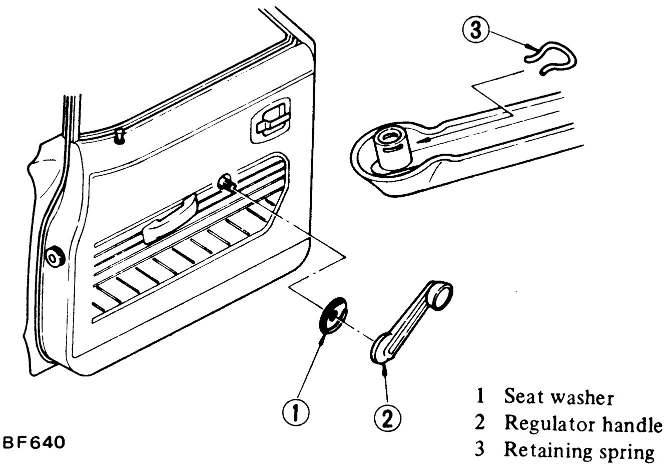


Fig. BF-20 Removing regulator handle

4. When removing door finish, it is important that door inside panel and door finish are not damaged.

Use a Phillips screwdriver or similar flat-bladed tool and pry off retaining clips, exercising care not to damage clips.

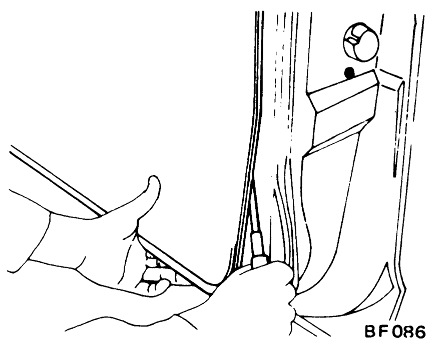


Fig. BF-21 Removing door finish

5. Separate water seal screeen from door inside panel.
6. To install, reverse removal procedure. However, observe the following installation notes:
(1) When water seal screen is to be replaced, be sure to cement it back into position securely to ensure a water sealed door. This can be done by applying adhesive to grooves in door inside panel evenly.

Broken or suspect water leak screen must be replaced with a new one.

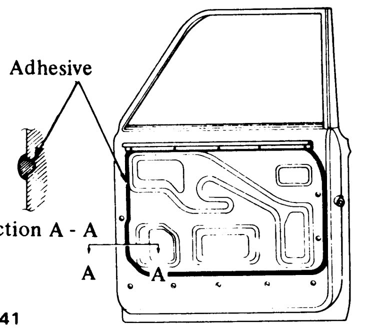


Fig. BF-22 Adhesive for seal screen

(2) With door glass up, set regulator handle at an angle shown in Figure BF-23.

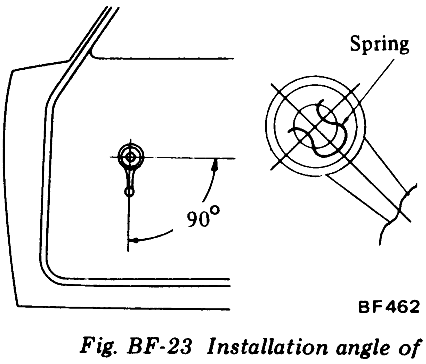


Fig. BF-23 Installation angle of regulator handle

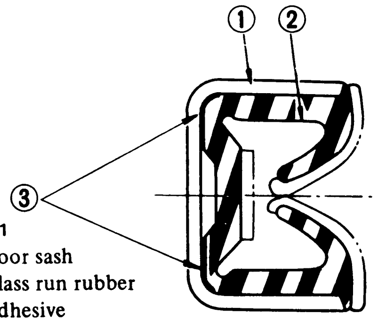
GLASS RUN

Removal and installation

1. With door in full out position, lower glass all the way.
2. Remove pull handle, arm rest and regulator handle.
3. Remove door finish and water seal screen.
4. Remove outer and inner weatherstrips from door.
5. Remove door glass.
6. Remove glass run rubbers from front and rear lower sashes, and from those of fixed door.

Use caution to avoid damaging rubbers during removal operation.

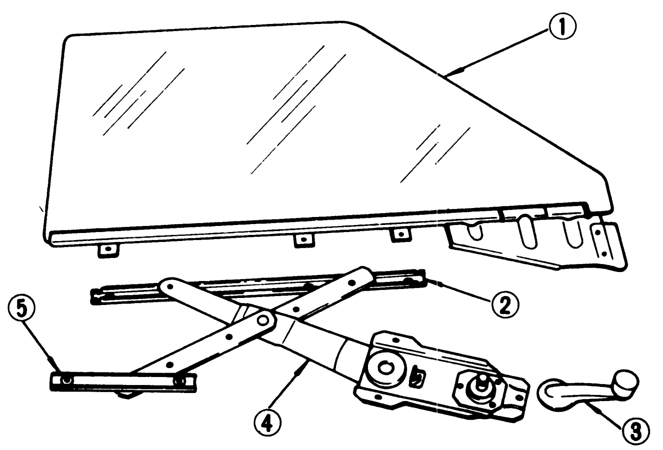
7. Remove front and rear lower door sashes (when ventilator window is not provided).
8. On cars equipped with ventilator window, remove ventilator window frame and rear lower door sash.
9. To install, reverse removal procedure. However, observe the following notes:
(1) Before applying adhesive, clean the inside of door sash.
(2) Apply adhesive to glass run rubber on door sash contacting face and fit it correctly. Particularly, care should be taken at corners and contact face to assure a good fit.



1 Door sash
2 Glass run rubber
3 Adhesive

Fig. BF-24 Applying adhesive to glass run rubber

DOOR GLASS AND REGULATOR



1 Door glass
2 Bottom channel
3 Regulator handle
4 Regulator arm
5 Guide channel

Fig. BF-25 Door glass and regulator

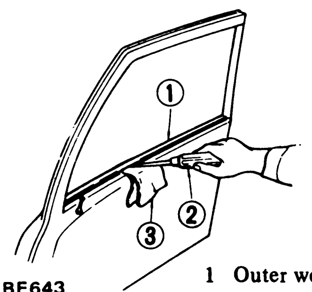
DOOR VENTILATOR WINDOW

Removal and installation

1. Remove five ventilator window frame attaching bolts. Lift frame out of door. For detailed procedure, refer to relative topic under "Door Glass and Regulator."
2. Remove nuts and spring securing lower end of ventilator window to frame.
3. Work off rivets which hold upper end of ventilator window to frame; take out window.
4. To install, reverse removal procedure.

Removal and nstallation

1. Open door; lower glass all the way.
2. Remove inside door handle escutcheon.
3. Remove pull handle.
4. Remove arm rest.
5. Remove regulator handle.
6. Remove door finish.
7. Peel off water seal screen.
8. Work off outer and inner weatherstrips from door, being sure not to scratch door paint during operation. Use a suitable plain screwdriver or similar flat-bladed tool to remove and place a piece of rag between screwdriver and door panel.



1 Outer weatherstrip
2 Screwdriver
3 Piece of rag

Fig. BF-26 Removing outer weatherstrip

9. On ventless doors, remove three door glass bottom channel attaching bolts. Remove door glass by lifting it straight-up.

Fig. BF-27 Removing door glass

0. On doors equipped with ventilator, remove three bolts securing door glass bottom channel in place, then let glass go to the bottom of door.

11. Remove five ventilator frame attaching bolts. Lift frame straight-up out of door.

Prior to removing frame, it is necessary to remove glass run rubber from frame.

On doors equipped with ventilator, three screws are used to retain ventilator frame at top area. These screws must be removed after door weatherstrip has been removed from door sash.

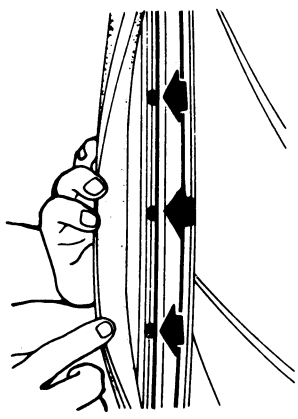


Fig. BF-28 Removing ventilator frame

12. On doors equipped with ventilator, lift door glass straight-up to remove.
13. Loose off five guide channels to regulator base attaching screws. Take out regulator assembly through large access hole in door inside panel.
14. To install, reverse removal procedure.

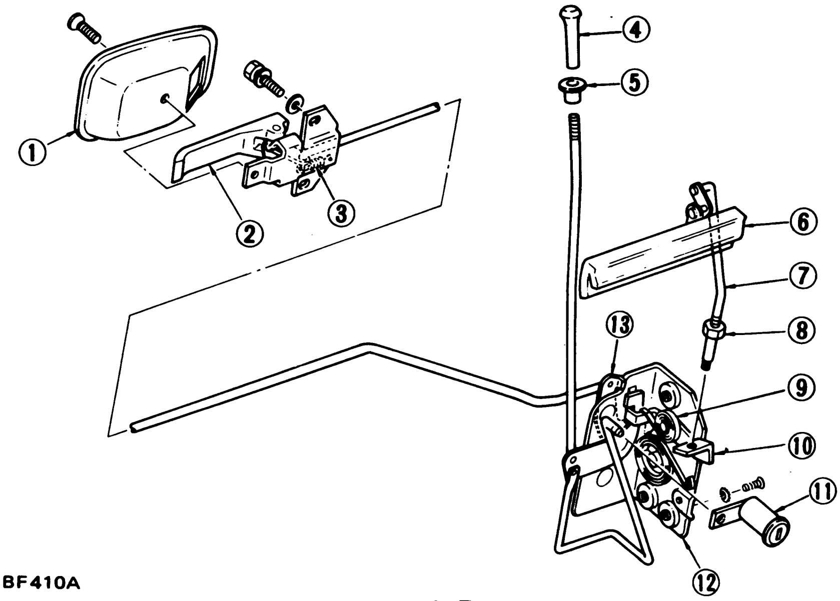
Adjustment

1. In-and-out and fore-and-aft adjustment can be made by moving front- or rear-sash and guide channel as required.

Ease with which window assembly raises and lowers depends on adjustment of rear lower sash. Rear lower sash should be in parallel with front lower sash.

2. Fore-and-aft adjustment is determined by position of guide channel and front lower sash. Moving front lower sash backward reduces play in window assembly.

DOOR LOCK



1	Escutcheon	8	Nylon nut
2	Inside handle	9	Locking plate spring
3	Spring	10	Locking plate
4	Door lock knob	11	Door lock cylinder
5	Knob grommet	12	Door lock
6	Outside handle	13	Stopper
7	Outside handle rod		

Fig. BF-29 Door lock mechanism

Removal and installation

1. Open door.
2. Remove inside door handle escutcheon.
3. Remove pull handle.
4. Remove arm rest.
5. Remove regulator handle.
6. Remove door finish.
7. Peel off water seal screen.
8. Raise door glass to full-up position.
9. Remove inside door lock knob.
10. Remove rear lower sash attaching bolts.
11. Disconnect remote control rod from key cylinder and outside door handle.
12. Remove three door lock assembly attaching screws.
13. Remove two inside door handle attaching screws.
14. Take out door lock as an assembled unit through large access hole in door panel together with inside door handle.
15. Remove two outside door handle attaching nuts. Outside door handle can then be taken out.
16. Remove lock plate from key cylinder and detach key cylinder.
17. To install door lock assembly, outside and inside door handles and key cylinder, reverse removal procedure.
18. Lubricate door lock with grease which meets the requirements of MIL-G-10924B or equivalent as listed below:

ALVANIA GREASE RA (SHELL)
BEACON 325 (ESSO)
MOBILE GREASE 22 (MOBIL)

Adjustment

Outside door handle:

Adjustment of play in outside door handle is controlled by play adjustment available at nylon nut on threaded end of outside door handle rod.

Correct play is 1.0 mm (0.039 in) or below as measured between nylon nut and locking plate.

Inside door handle:

Elongated hole in inside door handle provides for play adjustment of inside door handle.

Correct play is 1.0 mm (0.039 in) or below as measured at control rod.

DOOR LOCK STRIKER

Adjustment of door lock striker should be made after door hinge has been adjusted correctly.

Elongated holes (three) provide for up-and-down or fore-and-aft adjustment to establish proper engagement between door lock striker and door lock latch.

WEATHERSTRIP

Description

The weatherstrip is retained by clamp to the door sash and by 19 clips to the door panel. No adhesive is used to retain the weatherstrip to door.

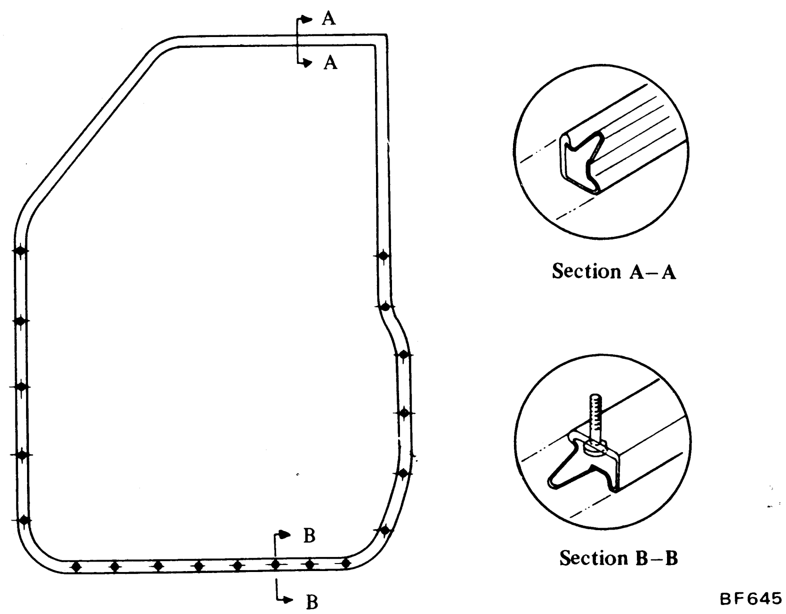


Fig. BF-30 Door weatherstrip

Removal and installation

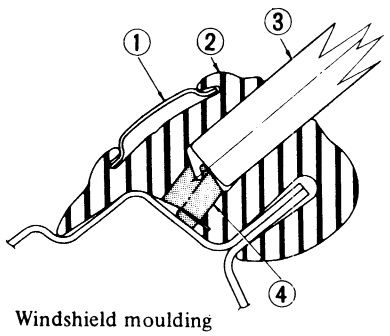
1. Open door.
2. Free weatherstrip from door sash clamp.
3. Pry off clips from door panel; remove weatherstrip.
4. To install, reverse removal procedure.

WINDSHIELD GLASS AND WEATHERSTRIP

CONTENTS

DESCRIPTION

The general design and layout of the windshield glass is essentially the same as that used in the 521 model. It is retained in the body glass opening through the weatherstrip. There are twelve water drain holes; one on each side of the bottom of the glass opening, and ten along the length of the weatherstrip. The back window weatherstrip has four water drain holes.



1 Windshield moulding
2 Weatherstrip
3 Windshield glass
4 Water drain hole

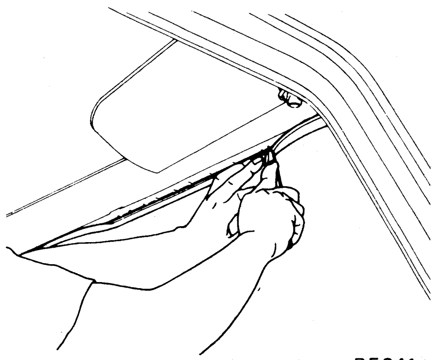
BF646

Fig. BF-31 Front windshield glass and weatherstrip

REMOVAL

1. Place protective covers over engine hood, front fender, seat and instrument panel.
2. Remove inside rearview mirror and sun visor.
3. Remove windshield mouldings.
4. Using a putty knife or similar flat-bladed tool, pry lips of weatherstrip out of place from top and side ınges of body opening.

If weatherstrip is to be reused, it is important that it is not damaged during operation.



BF041

Fig. BF-32 Removing weatherstrip

5. Working from inside car, push by hand windshield glass out of body opening starting at right and left upper corners toward ends.
6. After removing weatherstrip from top and sides of body opening, lift glass up sufficiently to permit removal of weatherstrip from bottom flange; pry weatherstrip out of position.

This operation requires two men.

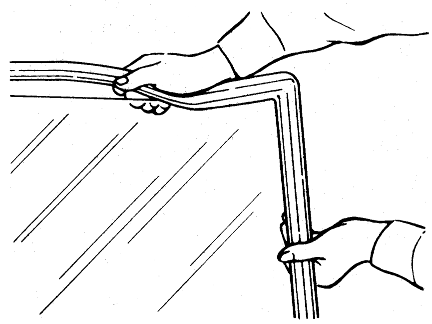
INSPECTION

Prior to installing windshield glass, make the following checks on body glass opening and weatherstrips:

1. Clean weatherstrip channels, replacing those found with cracks or sign of deterioration.
2. Clean body openings noting if these are not distorted or corroded.

INSTALLATION

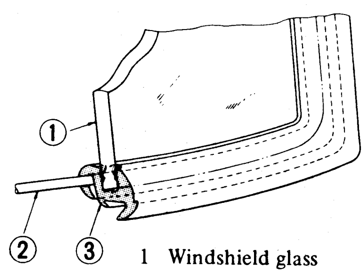
1. Fit weatherstrip on glass, making sure it is properly seated and positioned. Adhesive need not be applied.



BF647

Fig. BF-33 Fitting weatherstrip on glass

2. Insert a draw-cord completely around weatherstrip outer channel.



1 Windshield glass
2 Draw-cord
3 Weatherstrip

BF648

Fig. BF-34 Inserting draw-cord around weatherstrip outer channel

3. With aid of a helper, press windshield assembly against body opening from outside, being sure weatherstrip lip aligns with body opening flange.
4. Slowly pull cord ends from inside to overlap weatherstrip channel on body opening flange starting at center top toward ends. The operation should be made while one man pushes glass against body opening from outside.

The same technique should be applied to right, left and bottom weatherstrips.

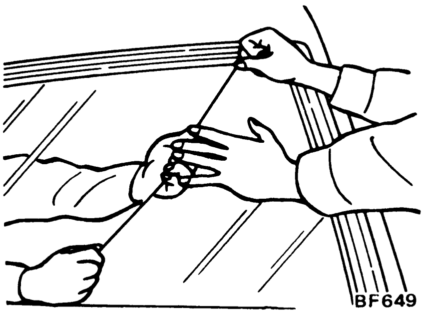


Fig. BF-35 Fitting weatherstrip (top)

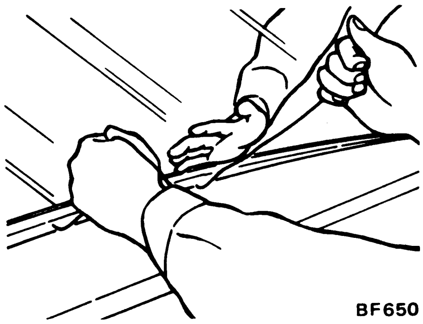


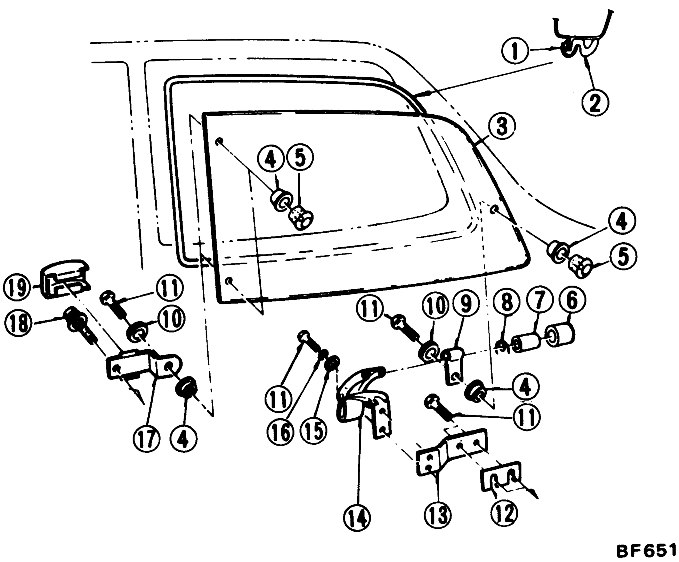
Fig. BF-36 Fitting weatherstrip (bottom)

5. Install windshield mouldings on weatherstrip.
6. Install inside rearview mirror and sun visor.

BACK WINDOW GLASS AND WEATHERSTRIP

Refer to relative topics under "Removal," "Inspection" and "Installation" of windshield glass.

SIDE WINDOW AND WEATHERSTRIP (Double Pick-up)



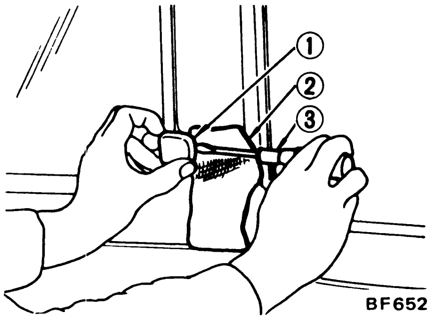
1 Welt
2 Weatherstrip
3 Side window glass
4 Rubber washer
5 Finisher nut
6 Spring cover
7 Roll pin
8 Spring
9 Bracket
10 Pivot washer
11 Screw
12 Shim
13 Catch handle bracket
14 Handle
15 Plain washer
16 Spring washer
17 Hinge
18 Screw
19 Hinge cover

Fig. BF-37 Exploded view of side window and weatherstrip

Removal and installation

1. Remove two catch handle bracket to rear pillar attaching screws.
2. Remove hinge covers (two) with aid of a suitable plain screwdriver.

Place a piece of rag between screwdriver and cover to prevent damage to painted surfaces.



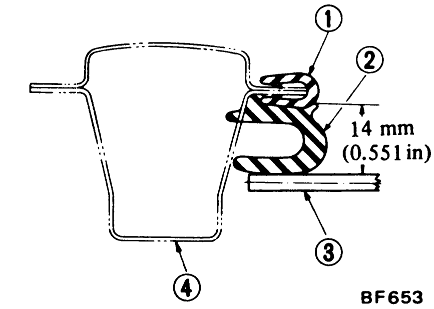
1 Hinge cover
2 Rag
3 Screwdriver

Fig. BF-38 Removing hinge cover

3. Remove screws securing hinge in place; take out side window.
4. Remove welt from glass opening and remove weatherstrip.
5. To install, reverse removal procedure.

Adjustment

1. With glass fully closed, adjust clearance between welt and glass to 14 mm (0.551 in). If necessary, add shi between catch handle bracket and rear pillar to establish required clearance.



1 Welt
2 Weatherstrip
3 Side window glass
4 Center pillar

Fig. BF-39 Adjusting welt to glass clearance

2. Align side window glass with glass opening by moving it up and down in elongated holes on hinge.

SEAT

CONTENTS

DESCRIPTION

All Pick-up models except PL620 models use a full width bench seat. PL620 models use a semi separate bench seat. On Double Pick-up models, a bench seat with separate seat back is used for the front, and a bench seat for the rear.

The manual seat adjuster provides a 140 mm (5.51 in) fore-aft travel to suit the driver.

Provisions are also made for the attachment of the 3-point seat belt. The rear seat provides anchorage for the 2-point seat belt. On Double Pick-up models, the front seat incorporates eparate seat backs with individual seat back latches to let rear passenger step in and out with ease.

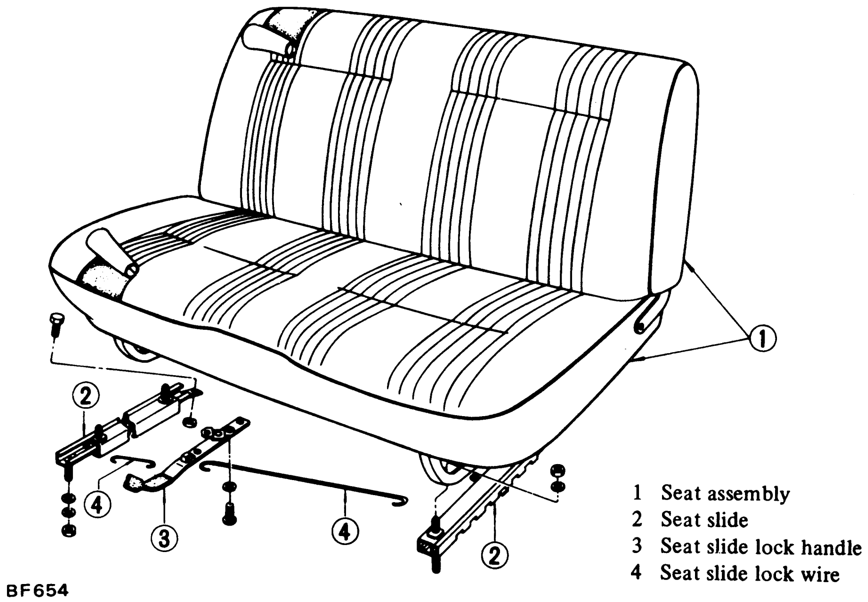


Fig. BF-40 Front seat (Pick-up)

CAUTION:
In conformity with M.V.S.S. No. 302, be sure to remove the thin polyethylene covers from seat cushion, seat back and seat belts at:

a. **Pre-delivery service**
b. **Parts replacements**

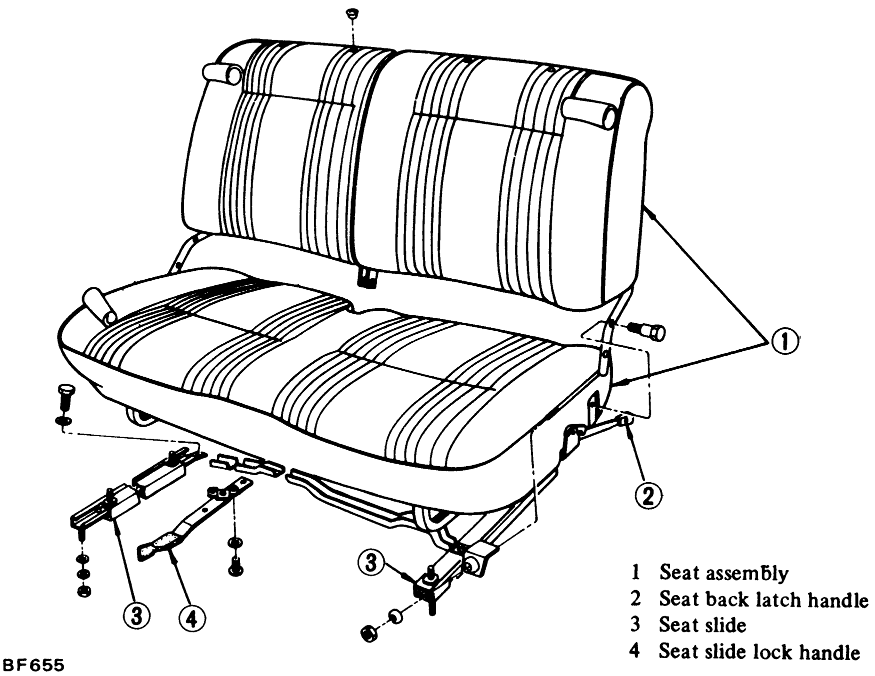


Fig. BF-41 Front seat (Double Pick-up)

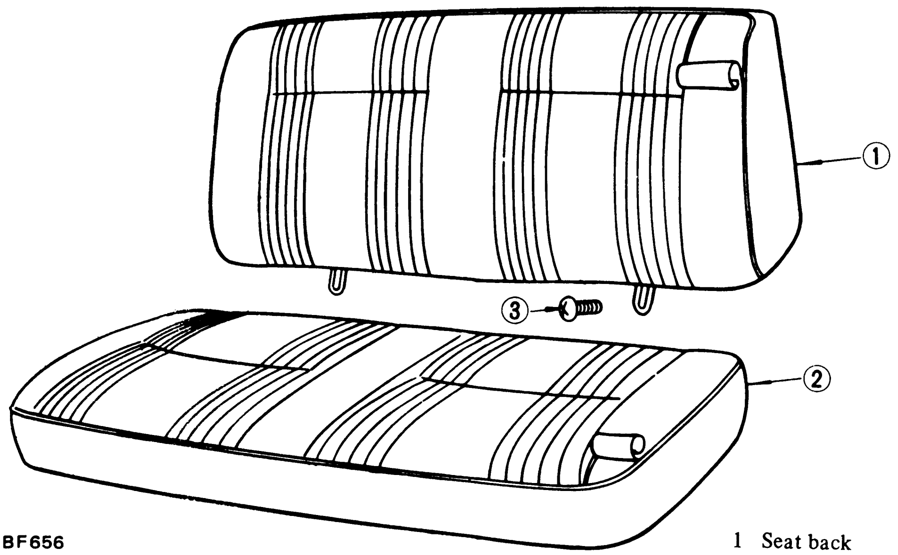


Fig. BF-42 Rear seat (Double Pick-up)

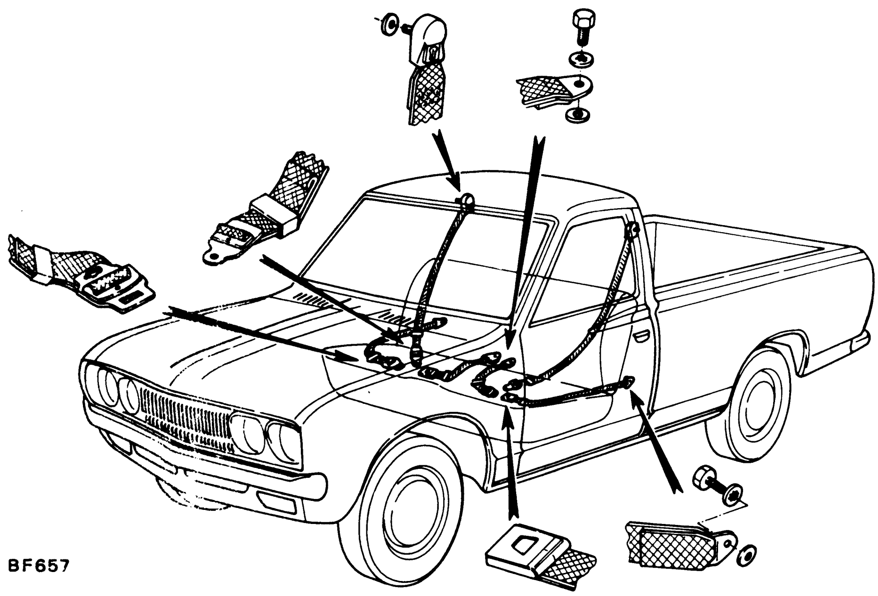


Fig. BF-43 Seat belt anchorages (Pick-up)

REMOVAL AND INSTALLATION

Front

1. Turn off four bolts retaining seat slide assembly to floor; take out seat assembly.
2. To install seat, reverse above removal procedure.

Rear (Double Pick-up)

1. Lift front end of rear seat cushion sufficiently to permit removal of seat cushion.
2. Loosen off two bolts securing bottom of rear seat back to floor. Remove seat back by lifting it up by hand.

SEAT BELT ANCHORAGES

Seat belt attaching nuts are welded to the positions shown in Figur BF-43.

Always use Nissan/Datsun genuine seat belt at its proper location.

INSTRUMENT PANEL

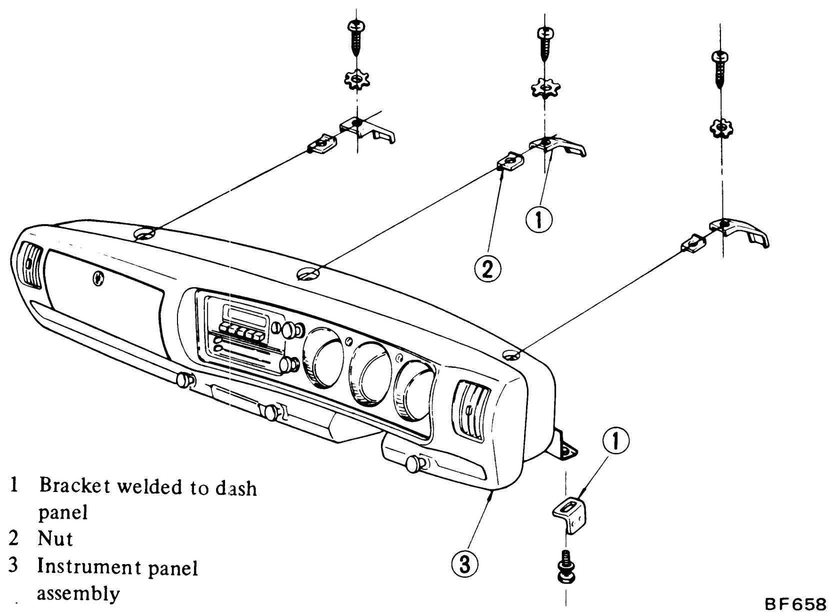


Fig. BF-44 Instrument panel assembly

REMOVAL AND INSTALLATION

1. Disconnect battery cables.
2. Disconnect heater control cables from heater assembly.
3. Disconnect speedometer cable on the back of speedometer.
4. Disconnect antenna and speaker wiring harnesses at connectors.
5. Disconnect relative wiring harnesses from instrument panel at connectors.
6. Remove steering column shell. Removal of steering wheel at this stage facilitates further removal of instrument panel.
7. Remove two side ventilator knobs. Remove package tray attaching bolt and detach package tray.

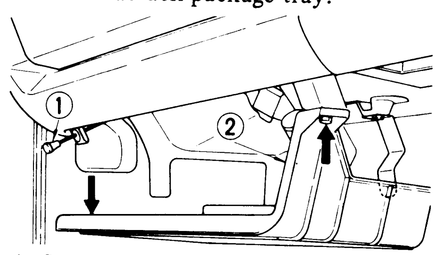


Fig. BF-45 Package tray

8. Support instrument panel assembly and remove five attaching bolts from it.
9. Withdraw instrument panel assembly while lifting it slightly.
10. To install, reverse the order of removal.

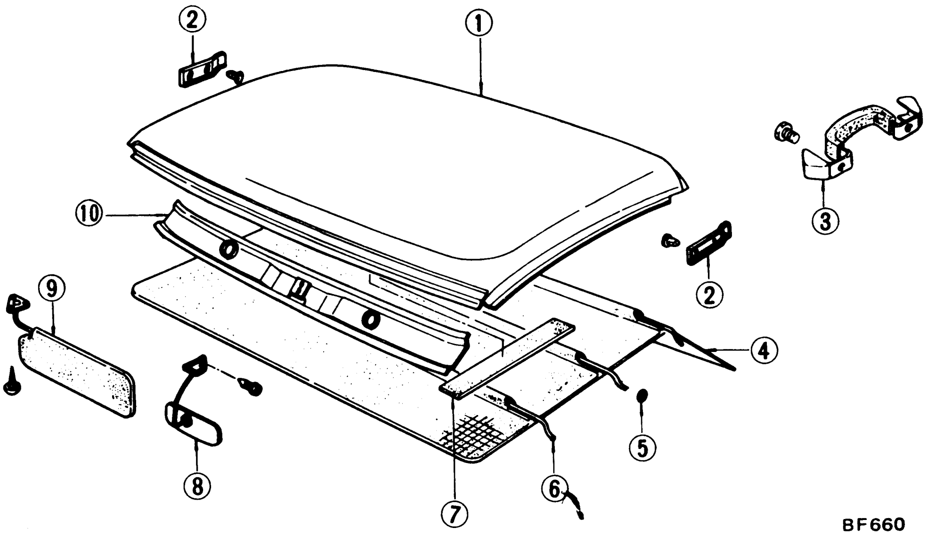
INTERIOR TRIM AND CENTER CONSOLE

CONTENTS

HEADLINING

Description

The headlining assembly is of a suspension type, which is held in place by listing wires. The design is quite similar to that used in a passenger car. The Pick-up uses three listing wires, and the Double Pick-up uses five.

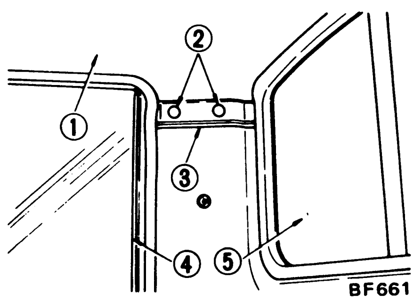


1 Roof panel
2 Retainer
3 Assist rail
4 Headlining cloth
5 Listing wire hook
6 Listing wire
7 Roof insulator
8 Inside rearview mirror
9 Sun visor
10 Front roof rail panel

Fig. BF-46 Headlining (Pick-up)

Removal

1. Remove two inside rearview mirror attaching screws and detach rearview mirror.
2. Remove three sun visor attaching screws and detach sun visor.
3. Remove two assist rail attaching screws and detach assist rail.
4. Remove room lamp.
5. Open doors and remove body side welts on each side.
6. Remove windshield glass and weatherstrip.
7. Remove back window and weatherstrip.
8. Remove garnish securing the end of headlining to rear pillar. (Pick-up only)



1 Headlining cloth
2 Clip
3 Garnish
4 Door glass
5 Back window glass

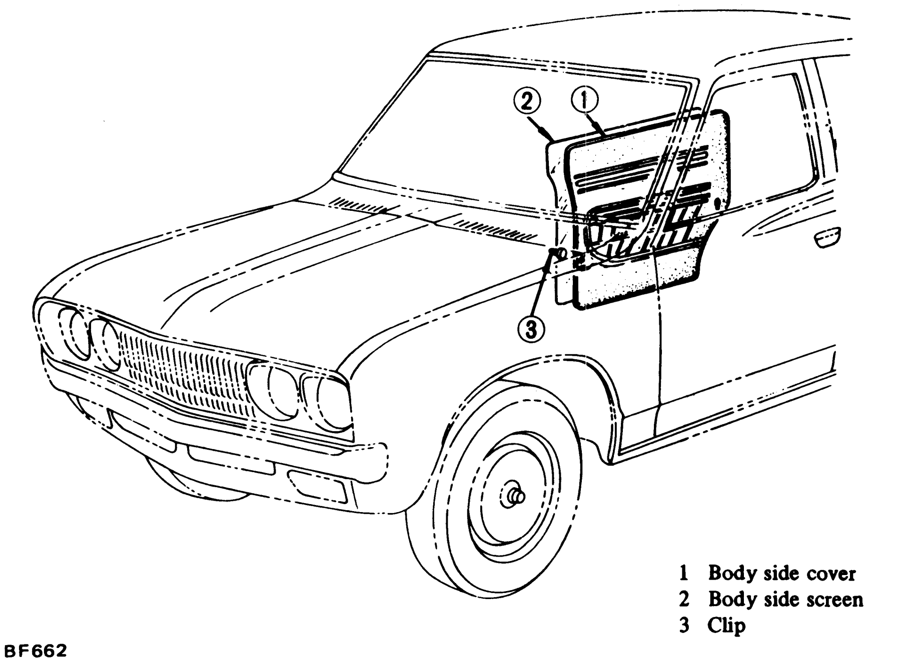
Fig. BF-47 Removing garnish

9. Detach all cemented edges of headlining from flanged portion of roof rail.
10. Disengage listing wires from roof rail, and detach headlining.

Installation

1. Apply adhesive cement to the outer surface of flange and headlining attaching surface evenly.
2. Install listing wires in place on roof rail.
3. First, attach front headlining to the flanged portion of roof rail. Secondly, attach the rear edges of headlining in place while pulling the headlining material to avoid wrinkles.
4. Attach the right and left edges of headlining material to the flanged portions, using care to avoid wrinkles.
5. Cut excess headlining material except for that (at the upper areas of front, center and rear pillars) not covered by body side welt. The edges of headlining material at these areas should be so cut that it can be folded properly in place.
6. Install garnish on the extreme end of headlining at rear pillar. (Pick-up)
7. Drill a hole in headlining where room lamp is located. Install room lamp.
8. Install body side welts.
9. Install windshield glass.
10. Install back window glass.
11. Install assist rail, sun visor and inside rearview mirror.

BODY SIDE COVER



1 Body side cover
2 Body side screen
3 Clip

Fig. BF-48 Body side cover

Removal and installation

1. Using a screwdriver, pry off two clips on body side cover.
2. Allow body side cover to curve, and detach this cover from upper and lower retainers.
3. Detach body side screen.
4. To install body side cover, reverse the order of removal. The body side screen should be attached in place with adhesive cement.

CENTER CONSOLE

Removal and installation

1. Remove two bolts from the rear of center console.

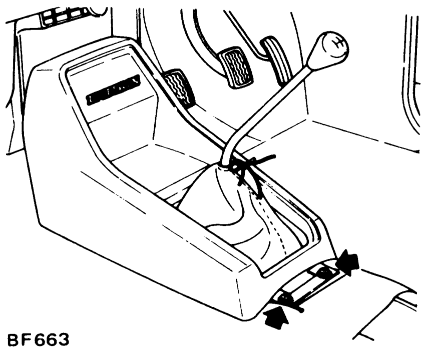


Fig. BF-49 Removing center console

2. Remove center console by pulling it back.
3. To install center console properly, insert the front portion of center console into bracket on the floor, and install and tighten rear attaching bolts.

REAR BODY

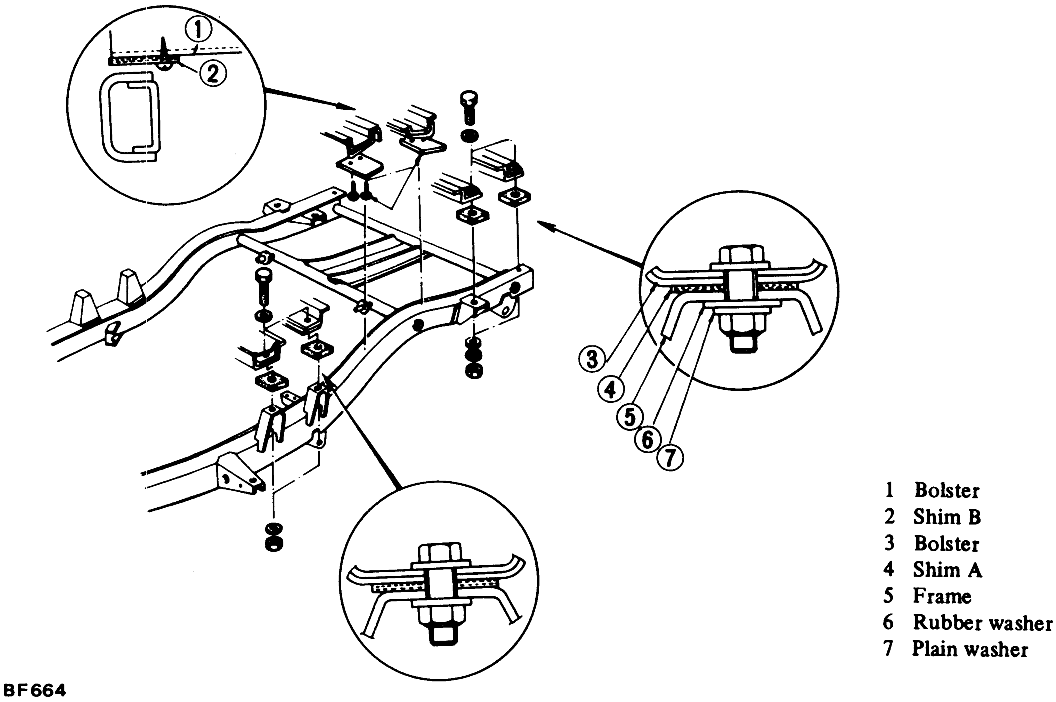


Fig. BF-50 Rear body mountings

REMOVAL AND INSTALLATION

The rear body is securely fastened to the frame at eight places. It should be hoisted after the fuel tank is removed from the rear body.

Use the following procedures as a guide when removal or installation of rear body is necessary.

1. Apply parking brake.
2. Disconnect cables from battery.
3. Disconnect rear combination lamp wiring harness at connectors.
4. Disconnect fuel hoses from fuel tank. Remove fuel tank from rear body.
5. Remove eight rear body attaching bolts.

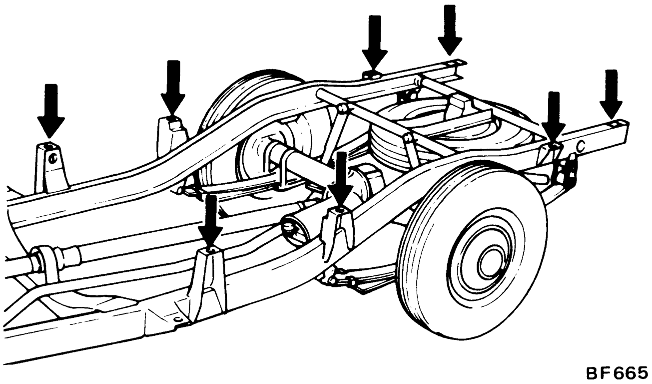


Fig. BF-51 Rear body mountings

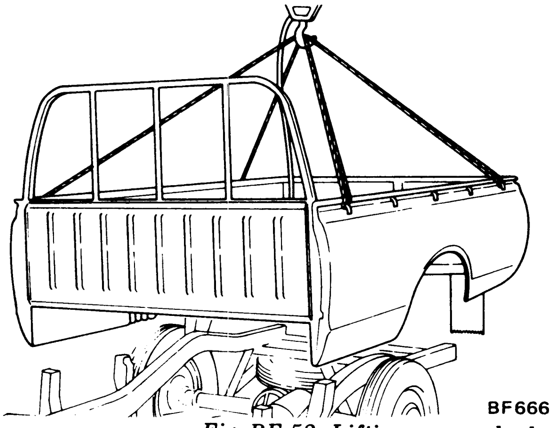


Fig. BF-52 Lifting up rear body

6. Attach lifting ropes to hooks in rear body as shown in Figure BF-52, and lift up rear body slowly and carefully.

Notes:

a. **When lifting rear body, make sure that it is in a good balanced condition.**
b. **Use care while lifting not to allow rear body hitting against cab body or any adjacent parts.**
c. **The rear body weighs approximately 130 kg (286 lb).**

7. To install rear body, reverse the order of removal. Carefully observe the following instructions.

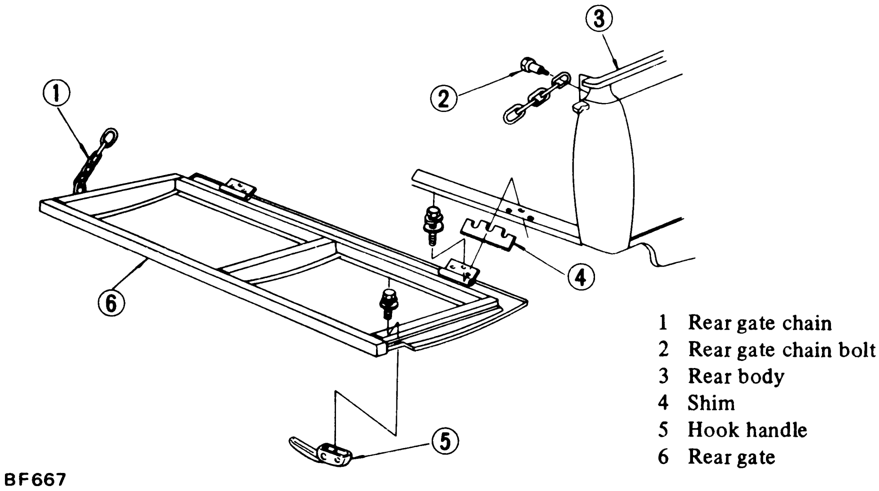
Make sure that spacers and shims (used with bolts) are properly placed in their original positions. Refer to Figure BF-50 for the location of these parts.

The rear body-to-frame attaching bolts should be torqued to 3.3 to 4.2 kg-m (24 to 30 ft-lb).

REAR GATE AND REAR BUMPER

CONTENTS

REMOVAL AND INSTALLATION



1 Rear gate chain
2 Rear gate chain bolt
3 Rear body
4 Shim
5 Hook handle
6 Rear gate

Fig. BF-53 Rear gate (Pick-up)

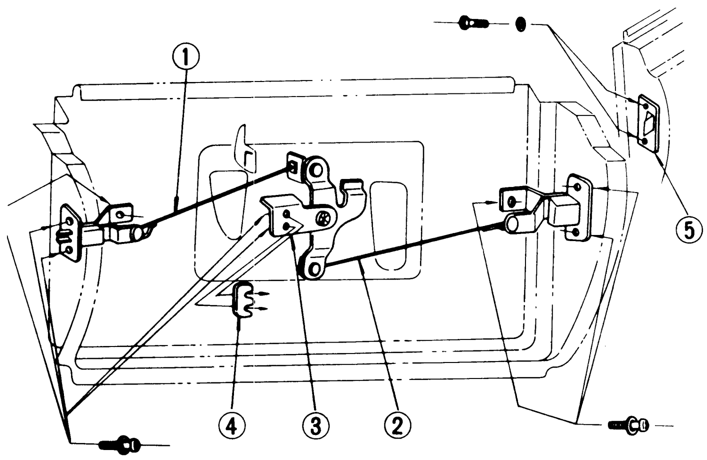
1. Open rear gate.
2. Remove rear gate chain from rear gate. (Pick-up)
3. Remove rear gate stay from rear gate. (Double Pick-up)
4. Remove rear gate hinge attaching bolts and take out rear gate and rear gate hinge shims.
5. To install rear gate, reverse the order of removal.

ALIGNMENT

The rear gate should be adjusted so that there exists an equal clearance between body and the periphery of rear gate. There should be no stepped portion at any points.

1. To adjust the height of rear gate, add or remove shims at rear gate hinge. Two sizes of shim are available in thickness – 1.6 mm (0.0630 in) and 0.8 mm (0.0315 in).
2. To adjust rear gate in the left and right directions, loosen rear gate hinge attaching bolts, and move rear gate as required.
3. To adjust rear gate hook, loosen two attaching bolts and move rear gate hook up-down or left-right in elongated holes as required. (Pick-up)
4. To adjust the length of rear gate stays, loosen bolts and adjust stays until they are of an equal length. (Double Pick-up)
5. Remove three side lock assembly attaching screws and detach side lock assembly.
6. Remove two rear gate lock handle attaching nuts from the inside of rear gate and detach lock handle.
7. To install rear gate lock, reverse the order of removal.

REAR GATE LOCK (Double Pick-up)



1 Remote control rod
2 Remote control rod
3 Remote control lever assembly
4 Shim
5 Striker

Fig. BF-54 Rear gate lock assembly

Removal and installation

1. Open rear gate.
2. Remove four rear gate inside cover attaching screws and detach rear gate inside cover.
3. Disengage two remote control rods from remote control lever assembly.
4. Remove two remote control lever assembly attaching screws and detach remote control lever assembly and shim.

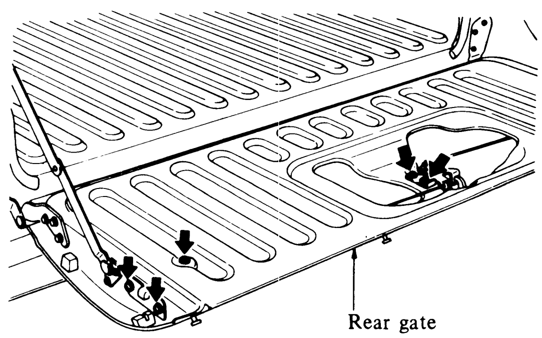
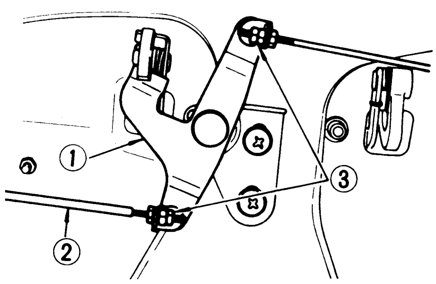


Fig. BF-55 Removing remote control lever and side lock assembly

Adjustment

1. Turn adjusting nut on remote control rod as required until spindle of side lock assembly is properly meshed with striker.



1 Remote control lever
2 Remote control rod
3 Adjusting nut

Fig. BF-56 Adjusting rear gate lock

2. To adjust striker properly, loosen two striker attaching bolts and move striker in the fore-aft direction until correct adjustment is made.

WEATHERSTRIP (Double Pick-up)

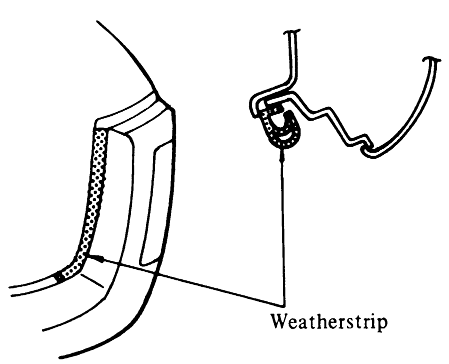


Fig. BF-57 Rear gate weatherstrip

Removal and installation

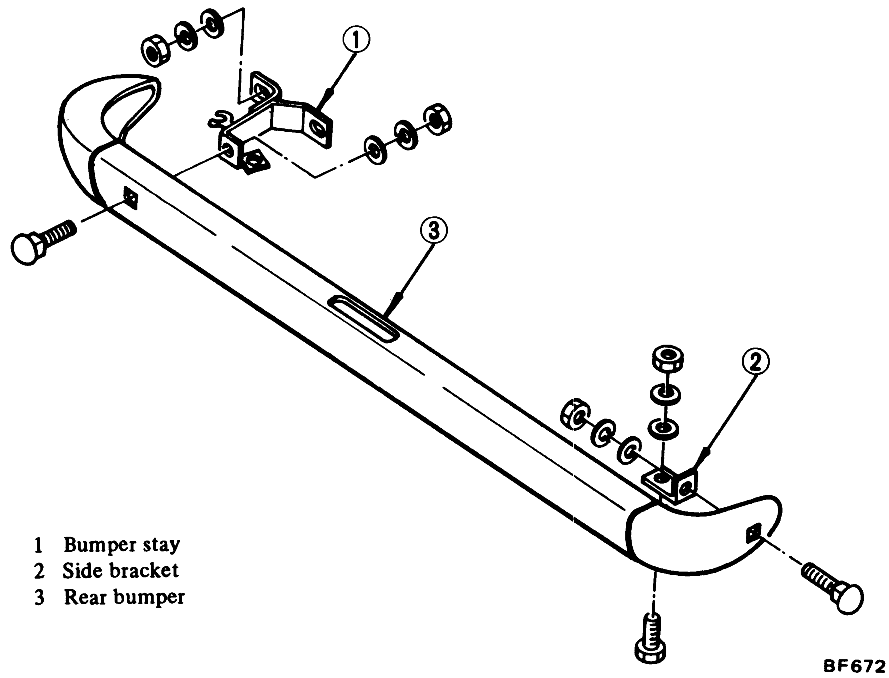
1. Detach weatherstrip from body.
2. Clean adhesive cement from the weatherstrip contact surfaces, using an non-lead gasoline. Wipe these surfaces clean with a clean cloth wet with water.
3. Apply adhesive cement to the contact surfaces of body and weatherstrip.
4. Leave the contact surfaces unattended until adhesive cement is dry, and then attach weatherstrip in position securely.

REAR BUMPER (Double Pick-up)

Removal and installation

1. Remove rear bumper attaching bolts and nuts and detach rear bumper.
2. To install, reverse the order of removal.

Make sure that the rear fender to bumper clearance is equal on each side.



1 Bumper stay
2 Side bracket
3 Rear bumper

Fig. BF-58 Removing rear bumper

GUARD FRAME (Pick-up)

Removal and installation

The guard frame is furnished as an optional equipment.

1. Remove nine guard frame attaching bolts and detach guard frame.
2. To install optional guard frame, reverse the order of removal.

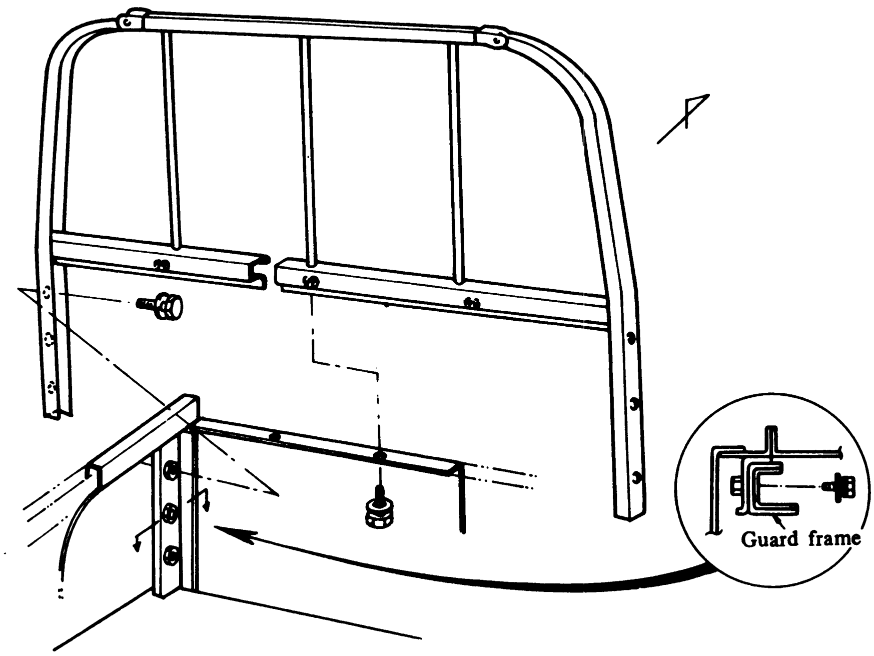
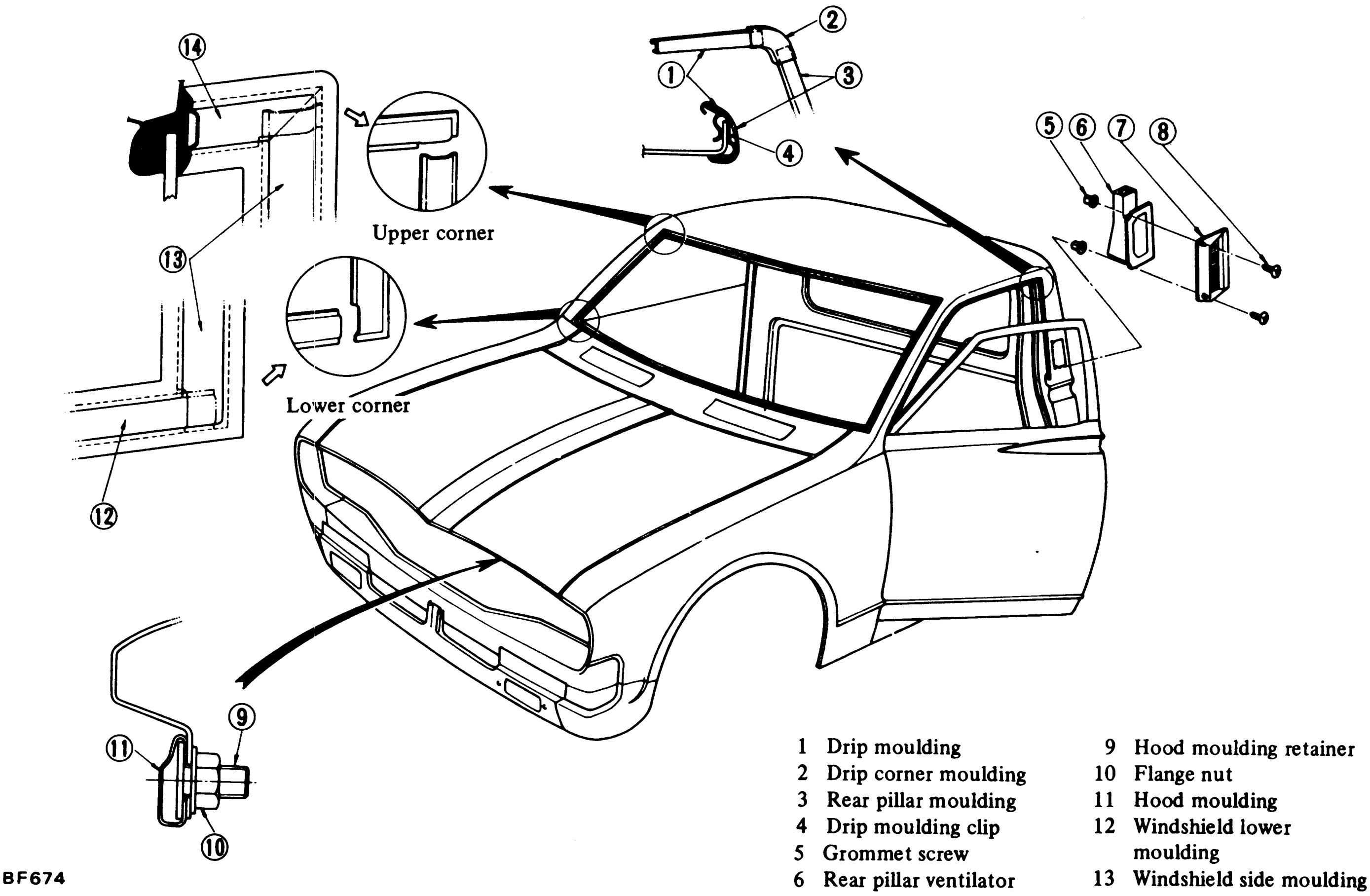


Fig. BF-59 Guard frame

MOULDING

CONTENTS



1 Drip moulding
2 Drip corner moulding
3 Rear pillar moulding
4 Drip moulding clip
5 Grommet screw
6 Rear pillar ventilator duct
7 Rear pillar grille
8 Screw
9 Hood moulding retainer
10 Flange nut
11 Hood moulding
12 Windshield lower moulding
13 Windshield side moulding
14 Windshield upper moulding

Fig. BF-60 Mouldings

HOOD MOULDING

Removal and installation

1. Open engine hood.
2. Remove engine hood moulding by loosening six nuts from behind engine hood.
3. To install, reverse removal procedure.

WINDSHIELD MOULDING

Removal and installation

1. Detach the upper windshield moulding.
2. Detach the right and left windshield mouldings.
3. Detach bottom windshield moulding.
4. To install, reverse removal procedure. For details, refer to Figure BF-60.

DRIP MOULDING

Removal and installation

1. Detach corner moulding.

2. Detach drip mouldings.
3. To install, reverse removal procedure.

AIR VENTILATOR GRILLE

Removal and installation

1. Loosen air ventilator grille attaching screws and remove grille and duct.
2. To install, reverse removal procedure.

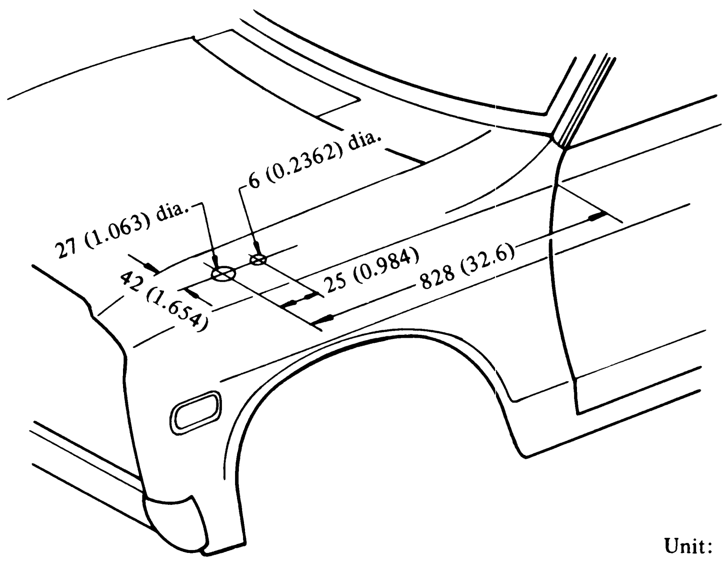
OUTSIDE MIRROR

CONTENTS

INSTALLATION

Fender mirror

Drill holes at the position shown in Figure BF-61, and fix fender mirror into position.

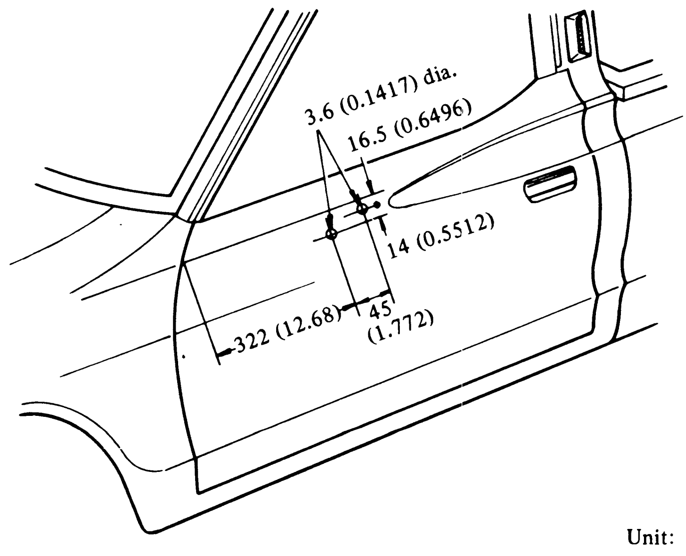


BF675

Fig. BF-61 Position of fender mirror holes

Door mirror

To install door mirror, attach a template of mirror to driver side door and drill holes through template into door. For details, refer to the instructions shown in template.



BF676

Fig. BF-62 Position of door mirror holes

SERVICE MANUAL

DATSUN PICK-UP
MODEL 620 SERIES

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION BE

BODY ELECTRICAL SYSTEM

BE

BODY ELECTRICAL WIRING

CONTENTS

DESCRIPTION

Cables used for body electrical wiring are low tension cables. Their conductors are covered with vinyl of various colors. These various colors are intended to represent use of respective cables. In wiring diagram, these colors are indicated by one or two alphabetical letters. With different colors thus used, such cables gathered together in wiring harness easily reveal their origins and destinations. Basic colors included standard colors and supplementary colors to standard ones are established for cables of respective systems such as starting and ignition system, lighting system and signal system. By designated colors, therefore, you can easily tell circuit systems and starting points of respective cables.

Colors of cables

The system of colors applied to the covering of cable conductors is as shown in the following table:

Circuit system	Standard color	Supplementary color	Supplementary color to standard color
Starting and ignition system	B (Black)	W, Y, R	
Charging system	W (White)	B, R, L	Y
Lighting system	R (Red)	W, B, G, Y, L	
Signal system	G (Green)	W, B, R, Y, L	W, Br (Brown)
Instrument system	Y (Yellow)	W, B, G, R, L	
Others	L (Blue)	W, R, Y	Y, Br Lg (Light green)
Grounding system	B (Black)		

To covering of individual main cable of each system, standard color or supplementary color to standard color is generally applied. Colors are represented respectively by such letters as G, W and Br. Applied to minor item of each circuit's terminal is two-tone color which is composed of standard and supplementary colors. Each of such two-tone colors is indicated with combination of two letters like RW or GY; and the first letter of each combination stands for standard color, and the second supplementary color.

WIRING HARNESS

Inspection

Referring to wiring diagrams or circuit diagrams, inspect entire electrical wiring and connections and insure:

1. That each electrical component part or cable is securely fastened to its connector or terminal.
2. That each connection is tight in place and free from rust and dirt.
3. That each cable covering shows no evidence of cracks, deterioration or otherwise damage.
4. That each terminal is securel kept away from any adjacent metal parts.
5. That each cable is fastened to its proper connector or terminal.
6. That each grounding bolt is planted tight.
7. That wiring is securely kept away from any adjacent sharp edges of parts or parts (such as exhaust pipe) having high temperature.
8. That wiring is kept away from any rotating or working parts such as fan pulley, fan belts, etc.
9. That cables between fixed portions and resiliently mounted equipment are long enough to withstand shocks and vibratory forces.

Maintenance instructions

1. Before starting to inspect and repair any part of electrical system or other parts which may lead to a short circuit, be sure to disconnect cables battery terminals.

Disconnect cables at battery terminals in the following manner:

Disconnect cable at negative ⊖, terminal, and then disconnect the other cable at positive ⊕ terminal.

Before connecting cables at battery terminals, be sure to clean terminals with a rag. Fasten cable at positive ⊕ terminal, and then the other cable at negative ⊖ terminal. Apply grease to top of these terminals to prevent rust from developing on them.

2. Never use a screwdriver or service tool to conduct a continuity test. **Use test leads to conduct this check.**

3. Never ground an open circuit or circuits under no load. **Use a test lamp (12-3W) or circuit tester as a load.**

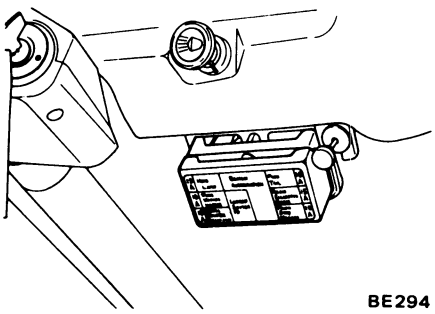
4. Never disconnect cables by pulling them. Be sure to loosen terminals before disconnecting them.

FUSE AND FUSIBLE LINK

CONTENTS

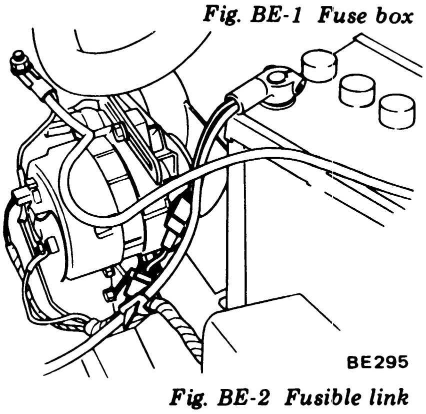
DESCRIPTION

The fuse and fusible link are protective device used in an electric circuit. When current increases beyond rated amperage, fusible metal melts and circuit is broken, and thus, cable and electrical equipment are protected from burning. Whenever fuse is melted for one reason or another, use systemactic procedure to check and eliminate cause of trouble before installing new fuse in position.



BE294

Fig. BE-1 Fuse box



BE295

Fig. BE-2 Fusible link

MAINTENANCE INSTRUCTION

Fuse

In nearly all cases, visual inspection can reveal faulty fuse. If condition of fuse is questionable, conduct continuity test with use of circuit tester or test lamp.

Notes:

a. **If fuse is blown off, be sure to eliminate the cause before installing new fuse in position.**

b. **Use fuse of specified rating. Do not use fuse of more than specified rating.**

c. **Check fuse holders for conditions. If much rust or dirt is found thereon, clean metal parts with fine-grained sandpaper until proper metal-to-metal contact is made. Poor contact of any fuse holder will often lead to voltage drop or heating in the circuit and, in the worst case, may result in improper operation of circuit.**

Fusible link

Color	Size mm² (sq in)	Continuous current	Max. current (fuse melts within 5 sec.)
Green	0.5 (0.008)	20A	Approx. 200A

Melted fusible link can be detected by either visual inspection or finger-tip feeling. If its condition is questionable, use circuit tester or test lamp, as required, to conduct continuity test. This continuity test can be performed in the same manner as for any conventional fuse.

Notes:

a. **Fusible link carries current as large as 200 amperes when it melts in period of less than five seconds. Under no circumstances should any larger fusible link than that specified be used.**

b. **Should melting of fusible link occur, it is possible that critical circuit (power supply or large current carrying circuit) is shorted. In such case, carefully check and eliminate the cause of trouble.**

c. **Never wrap periphery of fusible link with vinyl tape. Extreme care should be taken of this link so that it does not come into contact with any other wiring harness or vinyl- or rubber-parts.**

LIGHTING AND SIGNAL LAMP SYSTEM

CONTENTS

DESCRIPTION

Circuit diagram of lighting system

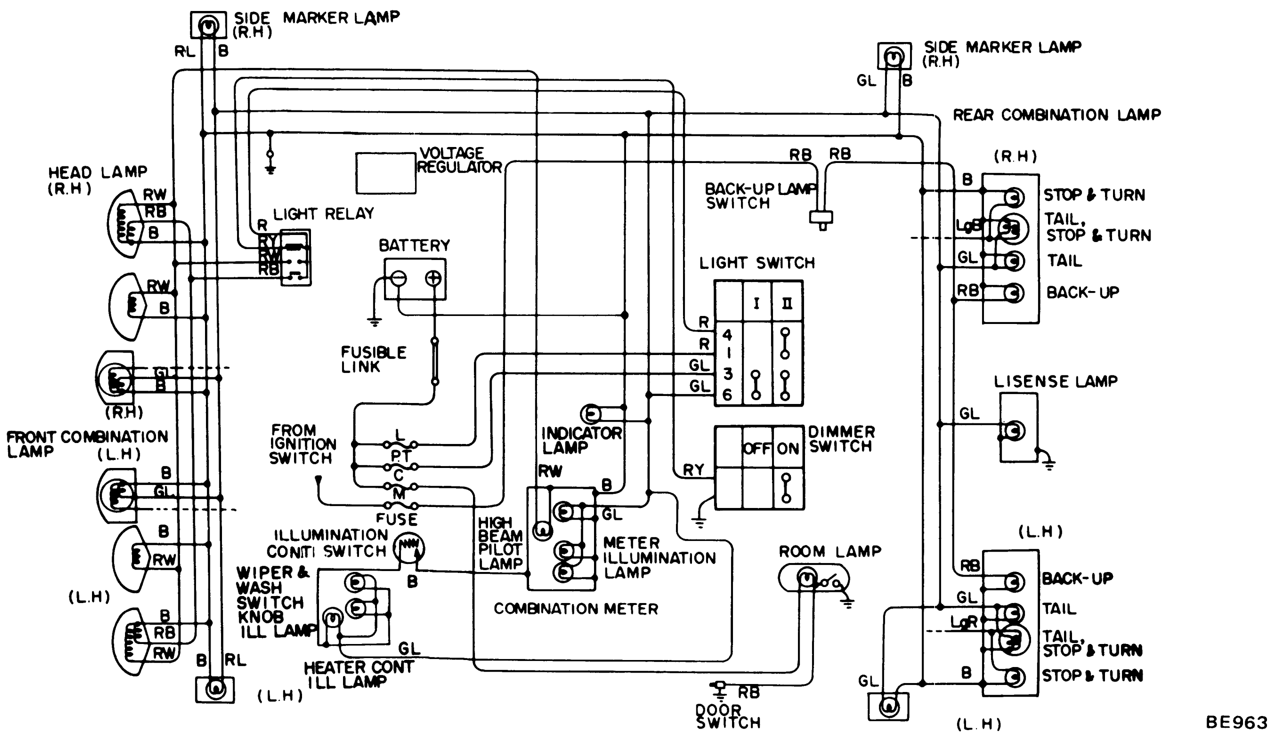


Fig. BE-3 Lighting system (U.S.A. and Canada)

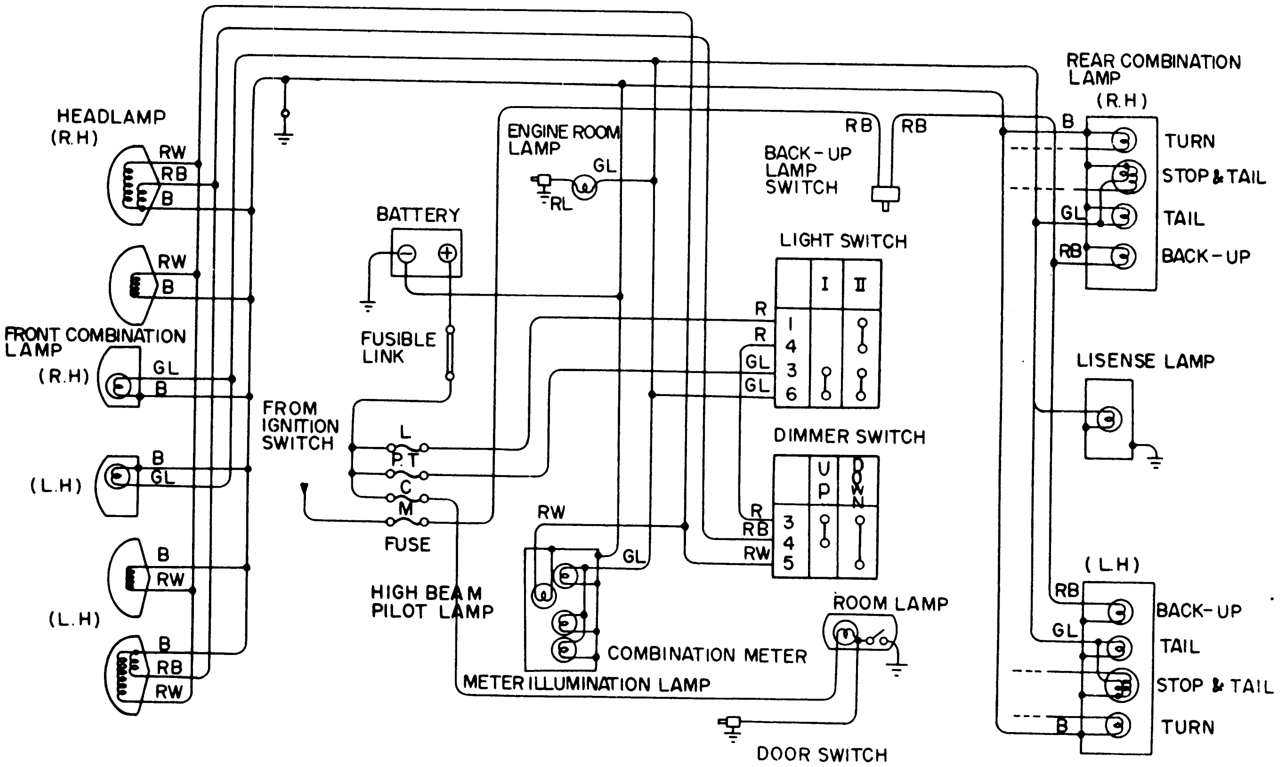


Fig. BE-4 Lighting system (General areas)

Circuit diagram of signal lamp system

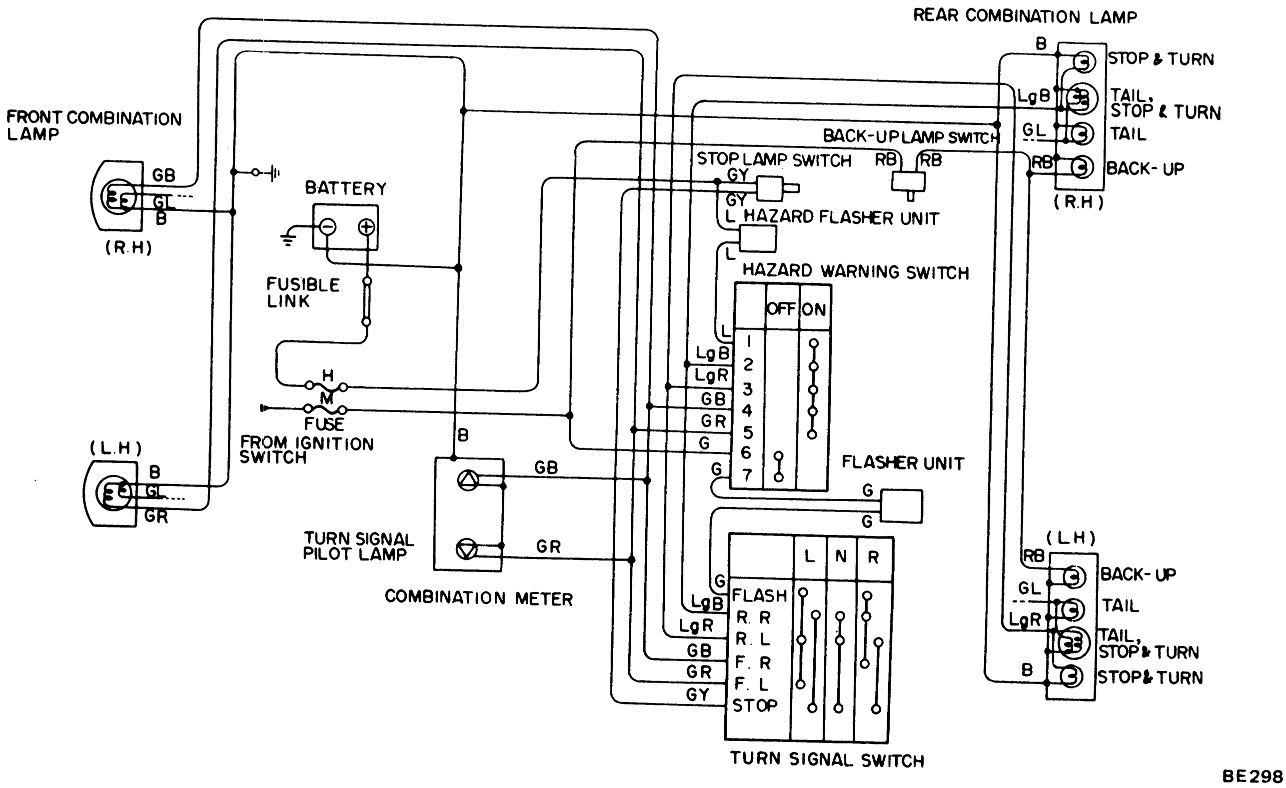
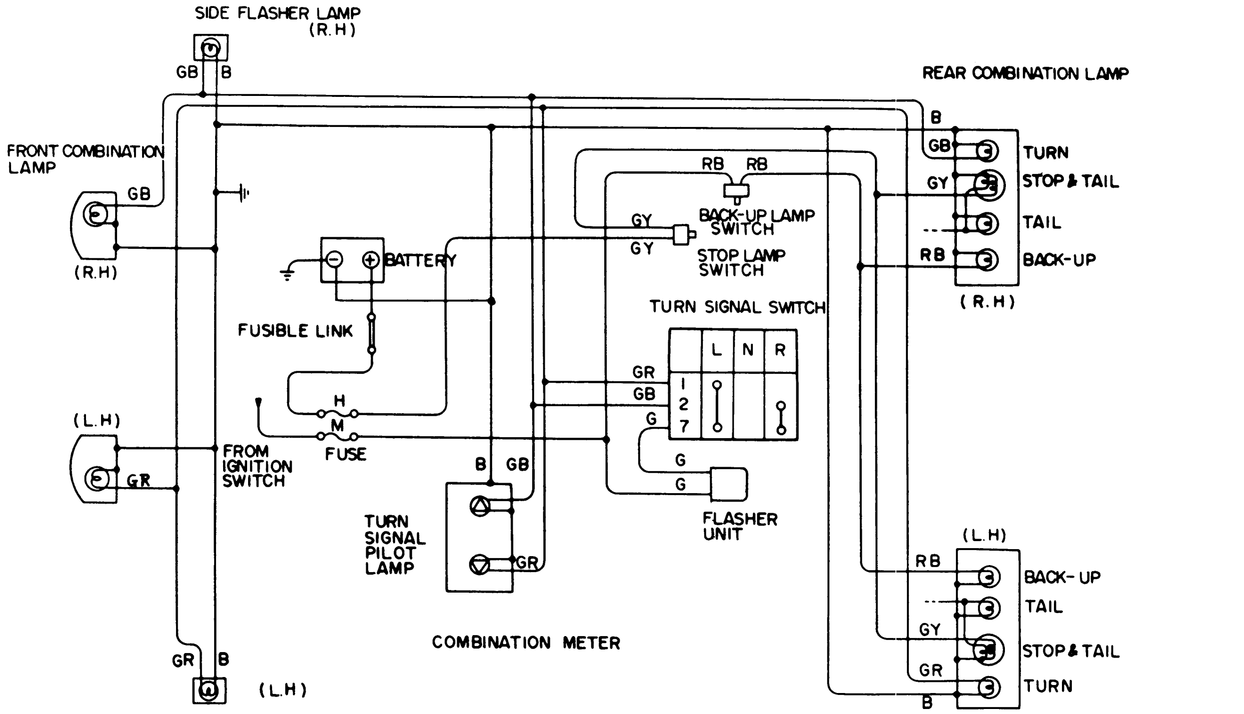


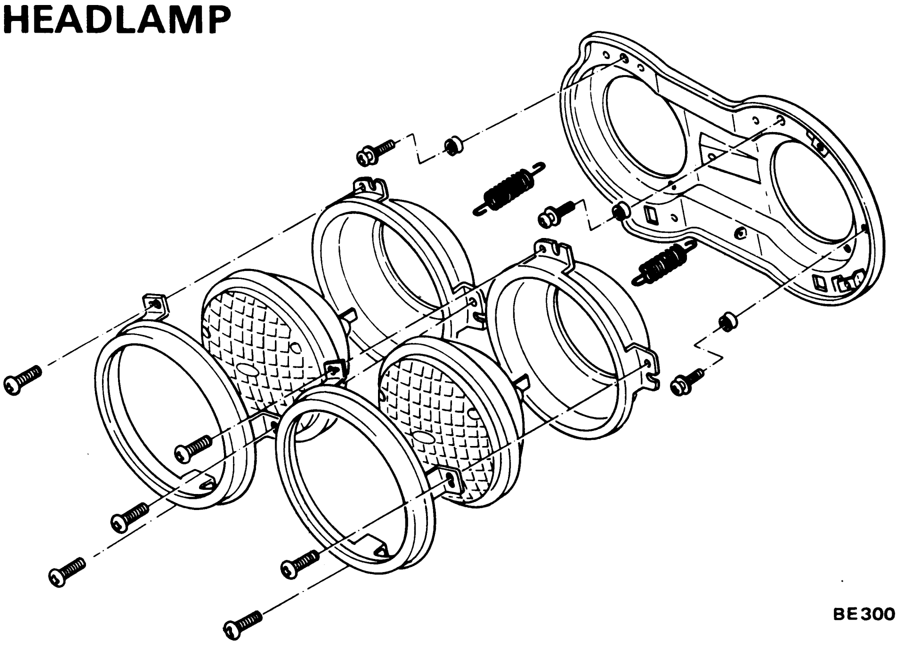
Fig. BE-5 Signal lamp system (U.S.A. and Canada)



BE299

Fig. BE-6 Signal lamp system (General areas)

HEADLAMP



BE300

Fig. BE-7 Headlamp

Headlamp beam replacement

1. Remove radiator grille retaining screws and remove radiator grille.
2. Loosen three headlamp retaining ring screws. It may be unnecessary to remove screws.

Note: Do not disturb aiming adjust screws.

3. Remove retaining ring by rotating it clockwise.
4. Remove headlamp beam from moutning ring and disconnect wiri. connector from behind beam.

Note: Rubber cover is installed at back of headlamp beam. The connector is located in the cover.

5. Change headlamp beam and connect wiring connector to new beam.
6. Place headlamp beam in position so that three location tabs behind beam fit in with three hollows on mounting ring. Make sure that sign "Top" of beam lens is on upper side.
7. Install headlamp retaining ring and tighten retaining screws.
8. Place radiator grille in position and tighten retaining screws.

Aiming adjustment

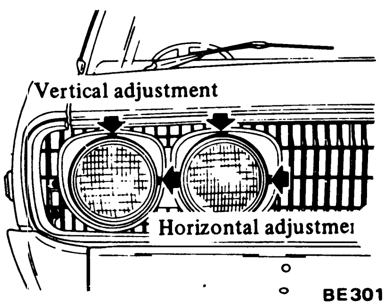


Fig. BE-8 Aiming adjustment

To adjust vertical aim, use adjusting screw on upper side of headlamp; and to adjust horizontal aim, use adjusting screw on side of headlamp.

Notes:

Before making headlamp aiming adjustment, observe the following instructions.

a. Keep all tires inflated to correct pressures.

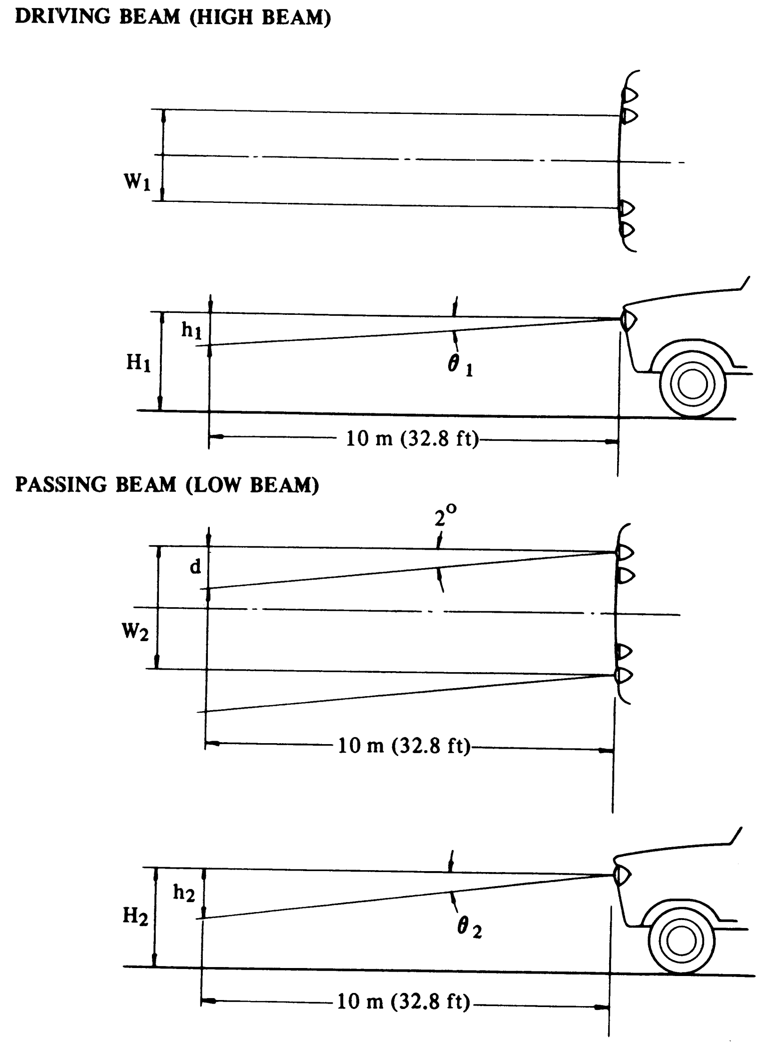
b. Place car and tester on the same flat surface.

c. See that there is no load in vehicle.

1) Gasoline, radiator and engine oil pan filled up to correct levels.

2) Without passenger

When performing headlamp aiming adjustment, use an aiming device, aiming wall screen or headlamp tester. For operating instructions of any aimer, refer to respective operation manuals supplied with the unit.



Model \ Item	Driving beam (High beam) H_1 mm (in)	W_1 mm (in)	θ_1 (°)	h_1 mm (in)	Passing beam (Low beam) H_2 mm (in)	W_2 mm (in)	θ_2 (°)	h_2 mm (in)	d mm (in)
Pick-up	715 (28.15)	780 (30.71)	48′	140 (5.51)	715 (28.15)	1,160 (45.67)	2°18′	392 (15.43)	349 (13.74)
Double Pick-up	680 (26.77)	780 (30.71)	42′	122 (4.80)	680 (26.77)	1,160 (45.67)	1°32′	268 (10.55)	349 (13.74)

BE302

Fig. BE-9 Aiming adjustment

FRONT COMBINATION LAMP

Bulb replacement

1. Remove two retaining screws and lens.
2. Push in on bulb, turn it counterclockwise and remove it from socket.
3. Insert new bulb into socket, press it inward and rotate it clockwise. Make sure that bulb is locked in its socket.
4. Place packing to lamp body in position and install lamp body (with packing), lens and two retaining screws.

Removal and installation

To remove lamp body, disconnect wiring at connector and remove wire grommet from panel. Remove two retaining screws and lens and withdraw lamp body from vehicle.

Install new lamp assembly in the reverse sequence of removal.

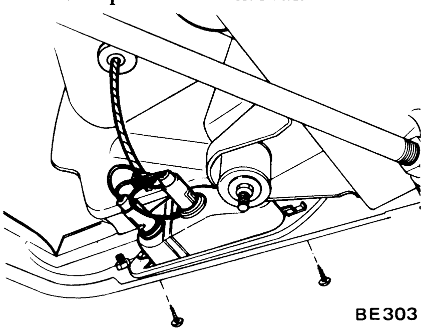


Fig. BE-10 Front combination lamp

SIDE FLASHER LAMP

Bulb replacement

1. Remove two retaining screws, lens and rim.
2. Pull bulb forward to remove it from socket.
3. Push new bulb into socket.
4. Place packing to lamp body in position and install lamp body (with packing), lens and two retaining screws.

Removal and installation

To remove lamp body, disconnect two lead wires at connectors and remove wire grommet from panel. Remove two retaining screws, lens and rim and withdraw lamp body and wire assembly from vehicle.

Install new lamp assembly in the reverse sequence of removal.

SIDE MARKER LAMP

Bulb replacement

1. Remove two retaining screws, lens and rim.
2. Push in on bulb, turn it counterclockwise and remove it from socket.
3. Insert new bulb into socket, press it inward and rotate it clockwise. Make sure that bulb is locked in its socket.
4. Place packing to lamp body in position and install lamp body (with packing), lens and two retaining screws.

Removal and installation

To remove lamp body, disconnect two lead wires at connectors and remove wire grommet (if so equipped) from panel.

Remove two retaining screws, lens and rim and withdraw lamp body from vehicle.

Install new lamp assembly in the reverse sequence of removal.

ROOM LAMP

Bulb replacement

1. Remove lens from lamp housing.
2. Pull bulb forward and remove it from socket.
3. Push new bulb into socket.
4. Install lens.

Removal and installation

To remove lamp assembly, disconnect battery ground cable, remove two retaining screws with lens removed from lamp housing, dismount lamp housing from roof rail and disconnect two wires at connectors.

Install new lamp assembly in the reverse sequence of removal.

REAR COMBINATION LAMP

Bulb replacement

Pick-up series

1. Remove six lens retaining screws and lens.
2. Push in on bulb and turn it counterclockwise to remove it from socket.
3. Insert new bulb into socket, press it inward, and rotate it clockwise. Make sure that bulb is locked in its socket.
4. Place lens into position and install retaining screws.

Double Pick-up series

1. Remove tail lamp cover. See Figure BE-12.
2. Turn bulb socket counerclockwise and remove socket from lamp body.
3. Push in on bulb, turn it counterclockwise and remove it from socket.
4. Insert new bulb into socket, making certain that locking pins in base of bulb are in position. Press bulb inward, rotate it clockwise and lock it in socket.
5. Insert socket into lamp houisng with locking tab in proper position. Rotate socket clockwise to lock it in lamp body.

Removal and installation

1. Remove tail lamp cover (Double Pick-up series only).
2. Disconnect wiring assembly at connector.
3. Remove two nuts from combination lamp mounting studs.
4. Dismount combination lamp assembly from vehicle.
5. Replace lamp assembly with a new one.
6. Install new lamp assembly in the reverse sequence of removal.

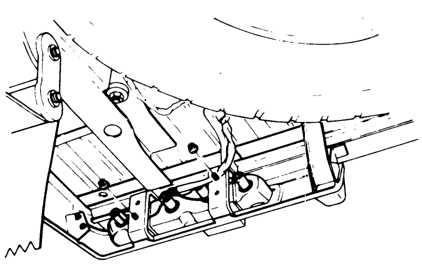


Fig. BE-11 Rear combination lamp (Pick-up series)

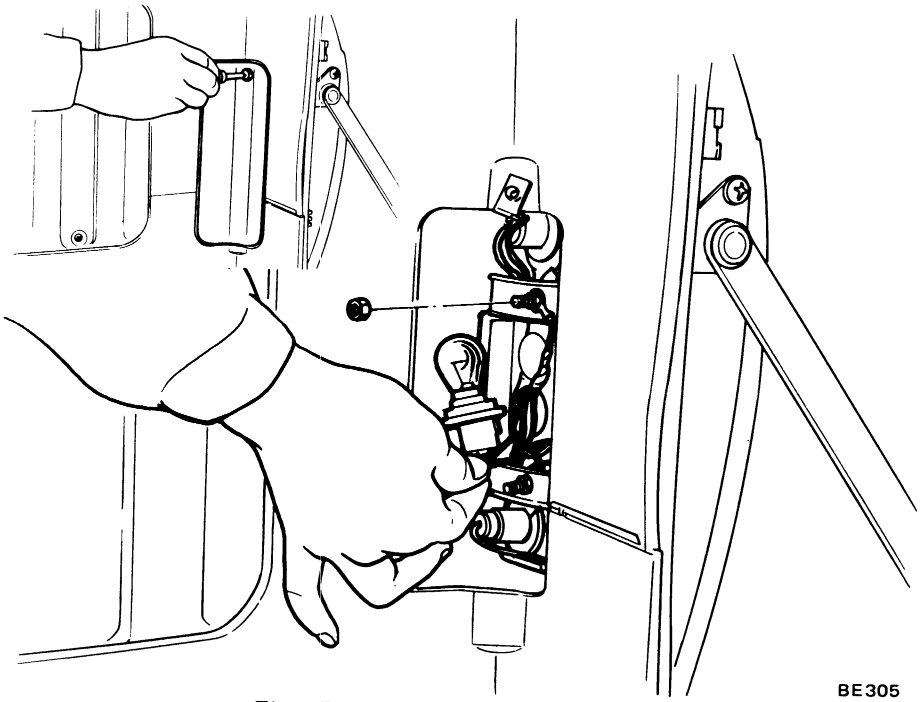


Fig. BE-12 Rear combination lamp (Double Pick-up series)

LICENSE LAMP

Bulb replacement

Pick-up series

1. Remove lens retaining screw, if so equipped, and remove lens.
2. Pull out bulb and replace it with a new one.
3. Install lens.

Double Pick-up series

1. Remove two retaining screws and remove rim, lens and packing.
2. Push in on bulb and turn it counterclockwise to remove it from socket.
3. Insert new bulb into socket, press it inward, and rotate it clockwise. Make sure that bulb is locked in its socket.
4. Place packing, lens and rim and install retaining screws.

Removal and installation

Pick-up series

1. Disconnect lead wire at connector.
2. Remove lamp bracket retaining screws and lamp assembly.
3. Install new lamp assembly in the reverse sequence of removal.

Double Pick-up series

1. Disconnect lead wire at connector.
2. Remove two flange nuts from mounting studs at the back side of rear bumper.
3. Pull lamp assembly out of rear bumper.
4. Install new lamp assembly in the reverse sequence of removal.

ENGINE ROOM LAMP

Bulb can be replaced by pushing in on bulb and turning it counterclockwise.

To replace engine room lamp assembly, remove one screw retaining lamp bracket to lower dash panel and disconnect wires at connectors.

Engine room lamp switch can be replaced by disconnecting lead wire at connector and pulling switch assembly out of its bracket. To install switch assembly to bracket, clean dirt, dust and rust from the opening groove of bracket and press down on switch head until it fits in with bracket.

LIGHTING SWITCH

Removal and installation

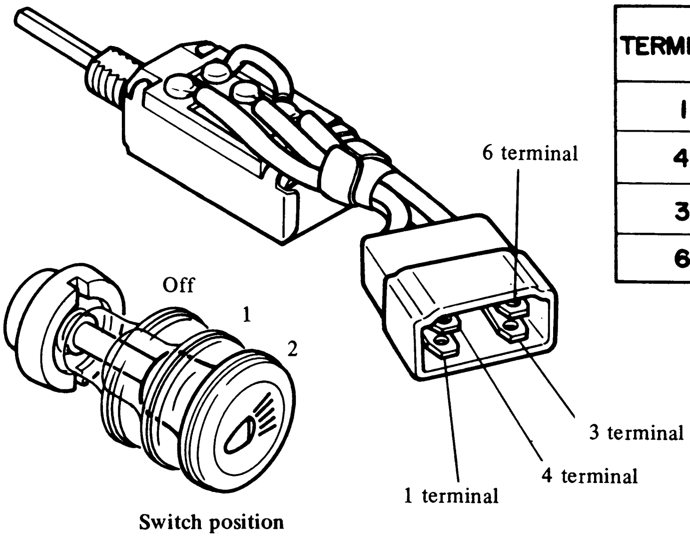
1. Disconnect battery ground cable.
2. Press in switch knob, turn it counterclockwise and pull it out of switch.
3. Unscrew escutcheon and remove escutcheon and spacer.
4. Reach up from underneath instrument panel, disconnect lighting switch multiple connector from instrument harness wiring assembly and remove spacer and lighting switch.
5. Install new switch in the reverse sequence of removal.

Inspection

Continuity test

Remove lighting switch from vehicle, following the procedures given in "Removal and Installation."

Test continuity through lighting switch by using test lamp or ohmmeter.



TERMINAL	SWITCH POSITION OFF	1	2
1			O
4			O
3		O	O
6		O	O

BE306

Fig. BE-13 Lighting switch

ILLUMINATION CONTROL SWITCH

The illumination control switch is used only on PL620 series models. This switch utilizes a variable resistor installed in the switch to control the brightness of the heater control illumination lamp and the wiper switch illumination lamp.

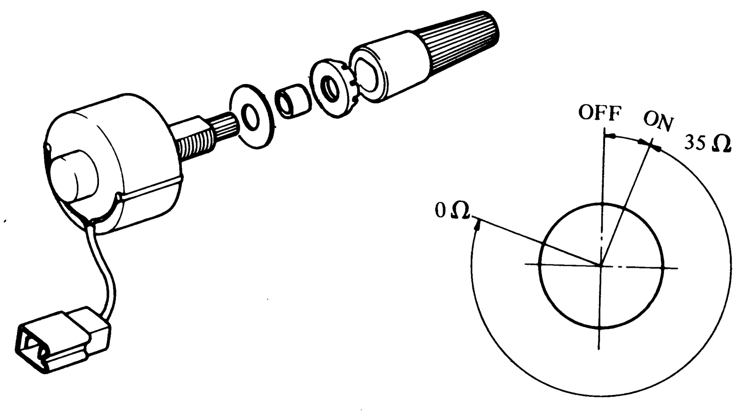
Removal and installation

1. Remove switch knob.
2. Unscrew escutcheon and remove escutcheon and spacer.
3. Disconnect switch lead wires at connectors.
4. Remove switch assembly from behind instrument panel.
5. Install switch assembly in the reverse sequence of removal.

Inspection

Continuity test

Test continuity between two lead wires with a test lamp or an ohmmeter. When switch is in the OFF position, continuity must not exist. In the ON position, resistance between the two lead wires must be between 0 and 35Ω.



BE964

Fig. BE-14 Illumination control switch

TURN SIGNAL AND DIMMER SWITCH

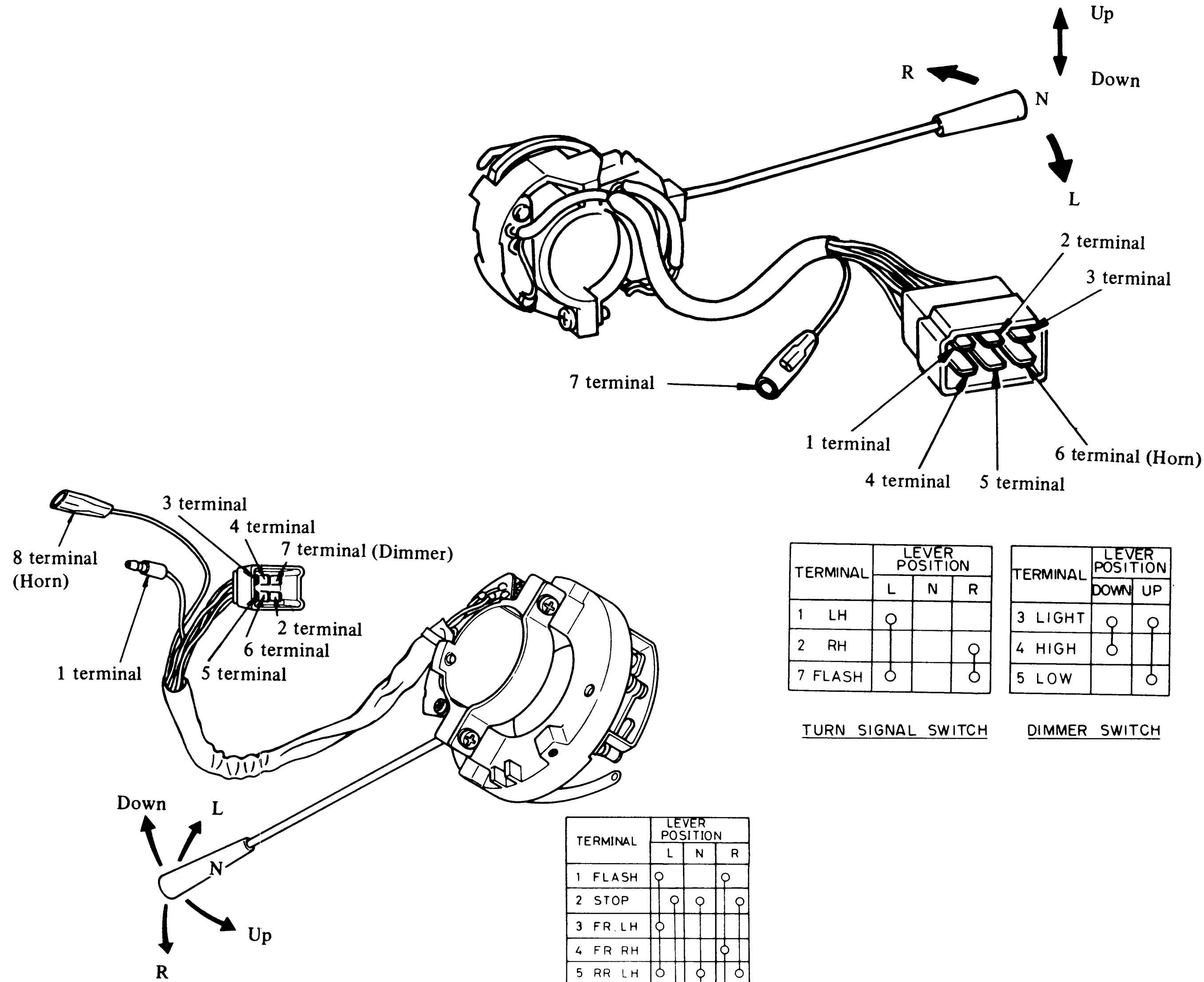
Removal and installation

1. Remove steering wheel.
   Refer to the related section "Steering."
2. Unhook wiring assembly from clip that retains wiring assembly to lower instrument panel.
3. Disconnect multiple connector and lead wire from instrument harness wiring.
4. Remove shell covers (Upper and Lower).
5. Loosen two screws attaching switch assembly to steering column jacket and remove switch assembly.
6. Position switch assembly to steering column jacket. Make sure that a location tab (or screw) fits in with hole of steering column jacket.
7. Tighten two attaching screws.
8. Install shell covers.
9. Connect multiple connector and lead wire to instrument harness wiring.
10. Clip wiring assembly at lower instrument panel.
11. Install steering wheel.

Inspection

Continuity test

Test continuity through lighting switch by using test lamp or ohmmeter.



TERMINAL	LEVER POSITION L	N	R
1 LH	o		
2 RH			o
7 FLASH	o		o

TURN SIGNAL SWITCH

TERMINAL	LEVER POSITION DOWN	UP
3 LIGHT	o	o
4 HIGH	o	
5 LOW		o

DIMMER SWITCH

TERMINAL	LEVER POSITION L	N	R
1 FLASH	o		o
2 STOP	o	o	o
3 FR LH	o		
4 FR RH			o
5 RR LH	o	o	o
6 RR RH	o	o	o

BE307

Fig. BE-15 Turn signal and dimmer switch

STOP LAMP SWITCH

Removal and installation

Stop lamp switch is mounted at the bottom of (pedal and steering post) bracket.

1. Disconnect battery ground cable.
2. Disconnect lead wires at connectors.
3. Loosen lock nut, unscrew switch assembly and remove switch assembly.
4. Install switch assembly as described under "Brake pedal" in Section "BR."

Inspection

Continuity test

When plunger is pressed into switch assembly (when brake pedal is released), stop lamp switch contacts are open. On the contrary, contacts are closed with plunger projected.

DOOR SWITCH

Door switch can be replaced by pulling switch assembly out of lower pillar, withdrawing switch and wiring assembly and disconnecting lead wire at connector. Prior to performing operations of removal, be sure to disconnect battery ground cable.

HAZARD SWITCH

Removal and installation

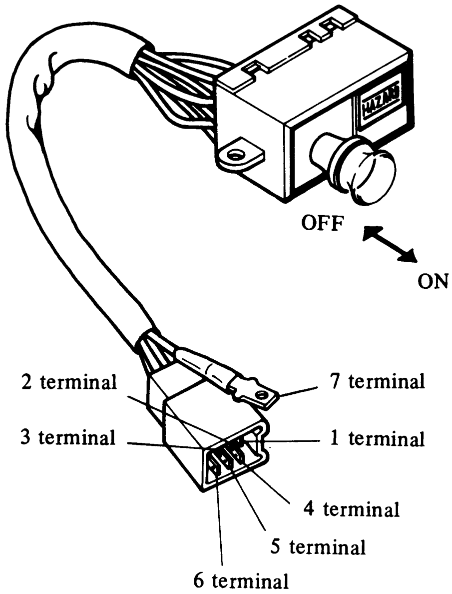
1. Disconnect multiple connector and lead wire from instrument harness wiring.
2. Remove shell covers (Upper and lower).
3. Remove two screws attaching switch to lower shell cover and remove switch.

4. Install hazard switch in the reverse sequence of removal.

Inspection

Continuity test

Test continuity through hazard switch by using test lamp or ohmmeter.



TERMINAL	SWITCH POSITION OFF	SWITCH POSITION ON
1		O
2		O
3		O
4		O
5		O
6	O	
7	O	

BE308

Fig. BE-16 Hazard switch

BULB SPECIFICATIONS

Item	U.S.A. and Canada SAE trade number	U.S.A. and Canada Wattage (Candle power)	General areas Wattage
Headlamp			
Inner–High beam	4001	37.5	37.5
Outer–Low - High beam	4002	37.5-50	37.5-50
Front combination lamp			
Turn signal lamp	1034	8-23 (3-32)	21
Parking lamp			5
Side flasher lamp	–	–	5
Side marker lamp	67	8 (4)	–
License plate illumination lamp	89	7.5 (6)	10
Rear combination lamp			
Pick-up: Turn signal	–	–	21
Pick-up: Turn signal and stop	1073	23 (32)	–
Pick-up: Tail/Stop	–	–	5-21
Pick-up: Tail/Turn signal and stop	1034	8-23 (3-32)	–
Pick-up: Tail	67	8 (4)	5
Pick-up: Back-up	1073	23 (32)	21
Double Pick-up: Turn signal	–	–	21
Double Pick-up: Tail/Stop	–	–	5-21
Double Pick-up: Back-up	–	–	21
Room lamp	–	5	5
Engine room lamp	–	6	6
Wiper/washer illumination lamp	158	3.4 (2)	–
Heater control illumination lamp	57	3.4 (2)	–

TROUBLE DIAGNOSES AND CORRECTIONS

Headlamp

Condition	Probable cause	Corrective action
Headlamps do not light for both high and low beams.	Burnt fuse.	Correct cause and replace fuse.
	Loose connection or open circuit.	Check wiring and/or repair connection.
	Faulty lighting switch. Faulty dimmer switch.	Conduct continuity test and replace if necessary.
	Faulty light relay.	Check light relay for proper operation and replace if necessary.
	No ground.	Clean and tighten ground terminal.
High beam cannot be switched to low beam or vice versa.	Faulty dimmer switch.	Conduct continuity test and replace if necessary.
	Faulty light relay.	Check light relay for proper operation and replace if necessary.
Headlamps dim.	Partly discharged or faulty battery.	Measure specific gravity of electrolyte and recharge or replace battery if necessary.
	Faulty charging system.	Measure voltage at headlamp terminals. If it is less than 12.8V, check charging system for proper operation.
	Poor ground or loose connection.	Clean and/or tighten.
	Burnt sealed beams.	Replace.
Headlmap in only one side lights.	Loose headlamp connection.	Repair.
	Damaged sealed beam.	Replace.

Turn signal lamp

Condition	Probable cause	Corrective action
Turn signals do not operate.	Burnt fuse.	Correct cause and replace.
	Loose connection or open circuit.	Check wiring and/or repair connection.
	Faulty flasher unit.	Replace.
	Faulty turn signal switch.	Conduct continuity test and replace if necessary.
Flashing cycle is too slow. (Pilot lamp does not go out.) or too fast.	Bulbs having wattage other than specified wattage are used.	Replace with specified one.
	Burnt bulbs.	Replace.
	Loose connection.	Repair.
	Inoperative flasher unit.	Replace.
Flashing cycle is irregular.	Burnt bulb.	Replace.
	Loose connection.	Repair.
	Bulb having wattage other than specified wattage is used.	Replace with specified one.

Tail lamp, stop lamp and back-up lamp

Condition	Probable cause	Corrective action
Both left and right lamps do not light.	Burnt fuse.	Correct cause and replace.
	Inoperative stop lamp switch.	Conduct continuity test and replace if necessary.
	Faulty back-up lamp switch.	Conduct continuity test and replace if necessary.
	Loose connection or open circuit.	Check wiring and/or repair connection.
Lamp in only one side lights.	Burnt bulb.	Replace.
	Loose bulb.	Repair lamp socket.

METER AND GAUGES

CONTENTS

COMBINATION METER

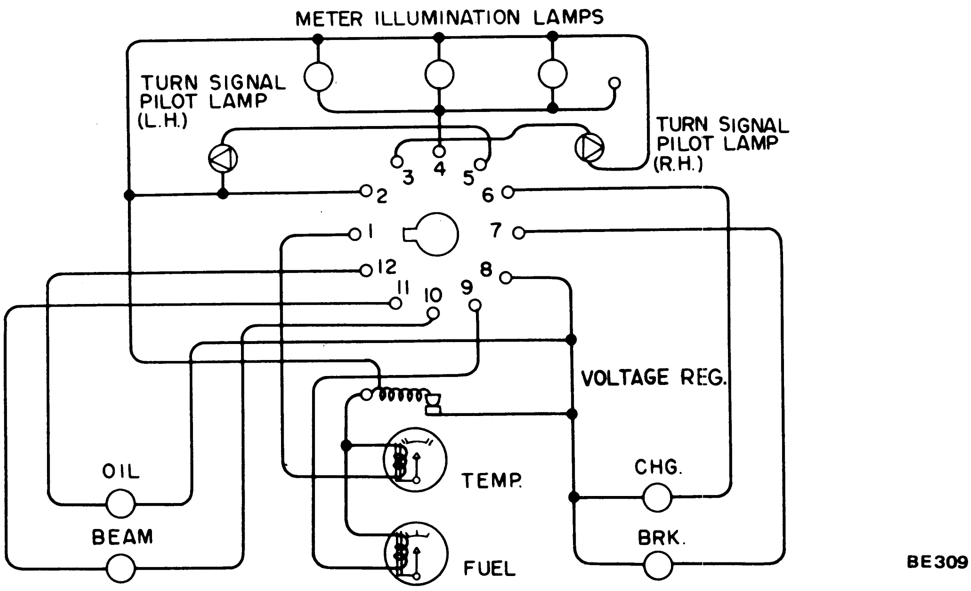
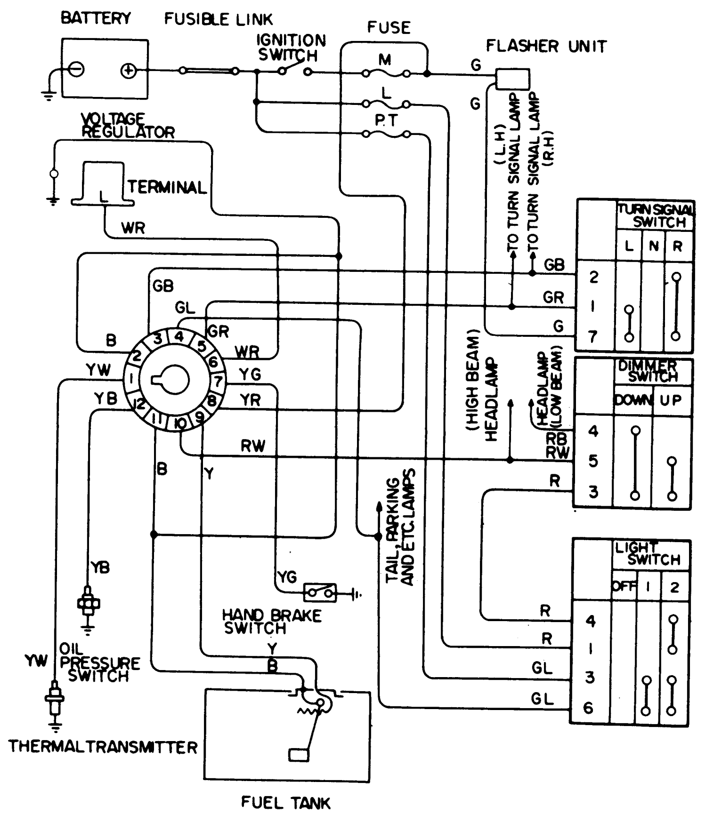


Fig. BE-17 Circuit diagram for combination meter



BE310

Fig. BE-18 Circuit diagram for combination meter system (General areas)

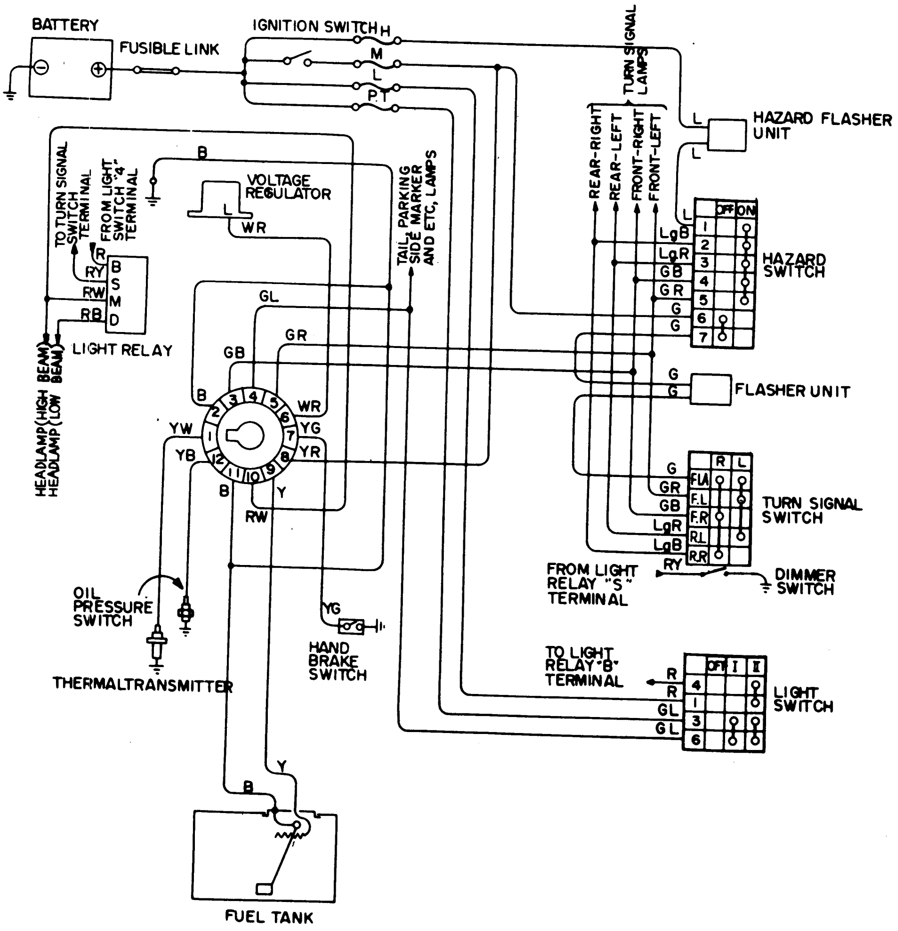


Fig. BE-19 Circuit diagram for combination meter system (U.S.A. and Canada)

Removal and installation

L.H. drive vehicle

1. Disconnect battery ground cable.
2. Working through meter openings of cluster lid, remove three screws retaining cluster lid to instrument panel.
3. From underneath instrument panel, remove one screw retaining meter assembly to lower panel of instrument.
4. Withdraw cluster lid slightly. For access to switches, knobs, etc., follow the procedures given in each section.
5. From behind combination meter disconnect speedometer cable at speedometer head and multiple connector (instrument wire assembly) from printed circuit.
6. On vehicle with clock, disconnect wires at each connection on meter printed circuit.
7. Remove four screws retaining meter assembly to cluster lid.
8. Remove combination meter assembly.
9. When installing combination meter assembly, follow the reverse sequence of removal.

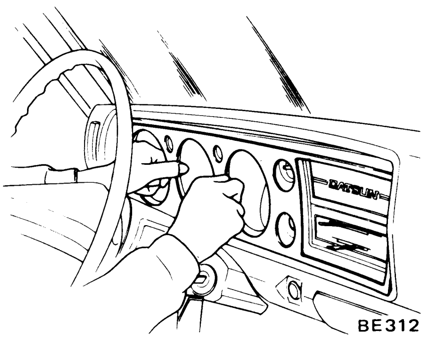


Fig. BE-20 Removing cluster lid

R.H. drive vehicle

1. Disconnect battery ground cable.
2. From behind combination meter assembly, disconnect speedometer cable at speedometer head and multiple connector (instrument wire assembly) from printed circuit.
3. On vehicle with clock, disconnect two wires at each connection on meter printed circuit.

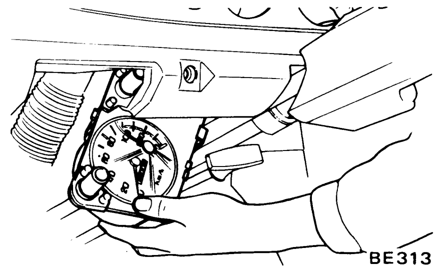


Fig. BE-21 Removing combination meter

4. Working through meter (center and right) openings of instrument panel, remove two screws retaining combination meter assembly to instrument panel.
5. From underneath instrument panel, remove one screw retaining meter assembly to lower instrument panel.
6. Dismount combination meter assembly as shown in Figure BE-21.
7. When installing combination meter assembly, follow the reverse sequence of removal.

SPEEDOMETER

Removal and installation

1. Remove combination meter assembly. Follow the procedures under "Removal and installation" in "COMBINATION METER."
2. Remove meter front cover and shadow plate by removing clips and screws.
3. Remove screws retaining speedometer to printed circuit housing and remove speedometer.
4. Install speedometer in the reverse sequence of removal.

FUEL METER AND WATER TEMPERATURE METER

Description

The fuel meter consists of a tank unit located in the fuel tank and fuel meter. The tank unit detects fuel level with its float, converts fuel level variation to a resistance of slide resistor installed on the float base, and thus, controls current flowing to the fuel meter.

The water temperature meter consists of a meter and thermaltransmitter located in the engine block. The thermaltransmitter is equipped with a thermistor element which converts cooling water temperature variation to a resistance, and thus, the thermaltransmitter controls current flowing to the meter.

The fuel meter and water temperature meter are provided with a bimetal arm and heater coil. When the ignition switch is set to "ON," current flows to the heat coil, and the heat coils is heated. With this heat, the bimetal arm is bent, and thus, the pointer connected to the bimetal arm is operated. The characteristics of both meters are the same.

A tolerance may occur on the water temperature meter or fuel meter due to source voltage fluctuation. The voltage regulator is used to supply a constant voltage so that the water temperature meter and fuel meter operate correctly.

The operating part of the regulator consists of a bimetal arm and a heater coil. When the ignition switch is turned on, the bimetal arm is heated and bent by the coil, opening the contact. Consequently, current to the coil is interrupted. As the bimetal cools, the contact closes. The repetition of this operation produces a pulsating voltage of 8 volts which is applied to the temperature and fuel gauges.

If both the water temperature meter and fuel meter become faulty at the same time. This may be attributable to problem in the voltage regulator.

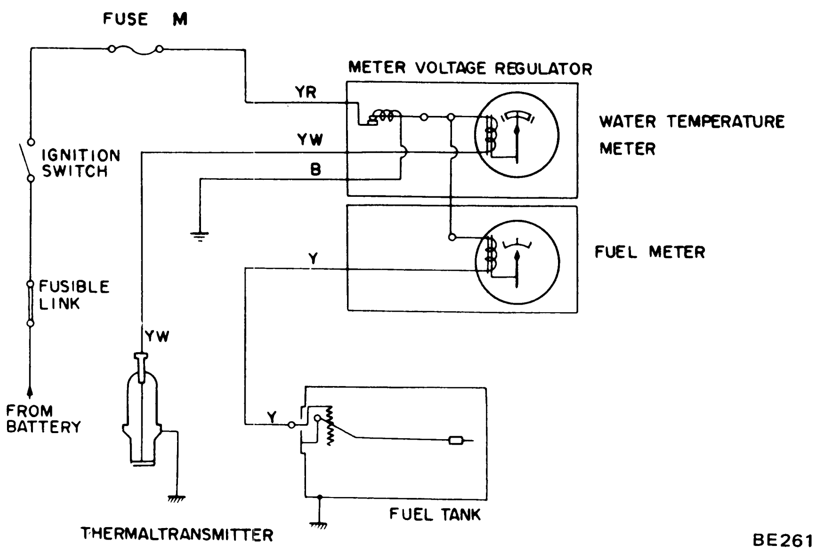


Fig. BE-22 Circuit diagram for fuel meter and water temperature meter

Removal and installation

1. Remove combination meter assembly. Follow the procedures under "Removal and installation" in "COMBINATION METER."
. Remove meter front cover and shadow plate by removing clips and screws.
3. Remove retaining nuts at the back side of combination meter assembly and remove meter.
4. Install meter in the reverse sequence of removal.

OIL PRESSURE WARNING LAMP

Description

The engine lubricating system incorporates an oil pressure warning lamp which glows whenever engine oil pressure falls below 0.4 to 0.6 kg/cm^2 (5.7 to 8.5 psi). Under normal operation, when the engine is stationary, the light glows with the ignition switch turned on. When the engine is running and oil pressure reaches the above range, the circuit opens and the light goes out.

Oil pressure switch

To replace oil pressure switch, disconnect lead wire from switch terminal and unscrew switch from engine cylinder block.

Prior to installing switch to cylinder block, be sure to apply conductive sealer to threads of new switch.

CHARGE WARNING LAMP

Description

The charge warning lamp glows when the ignition switch is set to "ON" with the engine shut down, or when the generator falls to charge with the engine operated.

When the ignition switch is set to "ON," the charge warning circuit is closed and current flows from the ignition switch to the warning lamp and grounds through the regulator (Fig. BE-24-1). When the engine is started and the generator comes into operation, the generator output current (N) opposes the current flowing from the warning lamp; as the current (N) increases, the solenoid is more energized and the pilot lamp relay contacts are open, in effect it breaks the warning circuit ground connection, and the lamp goes out (Fig. BE-24-2).

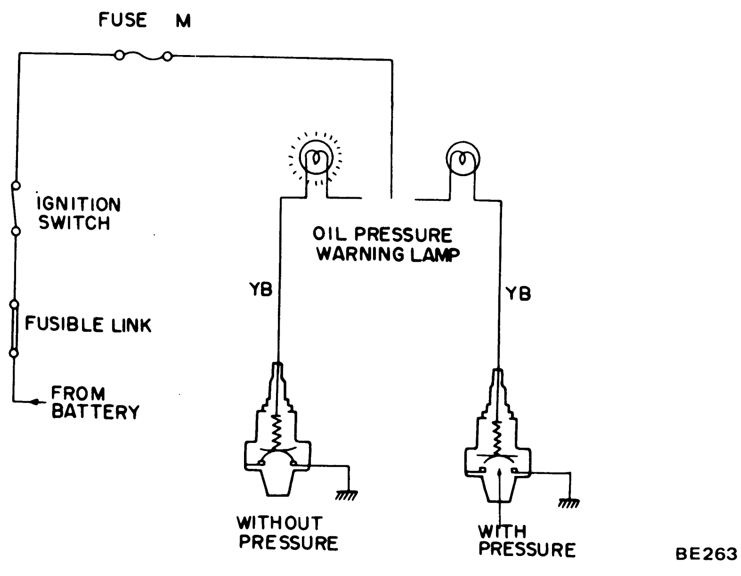
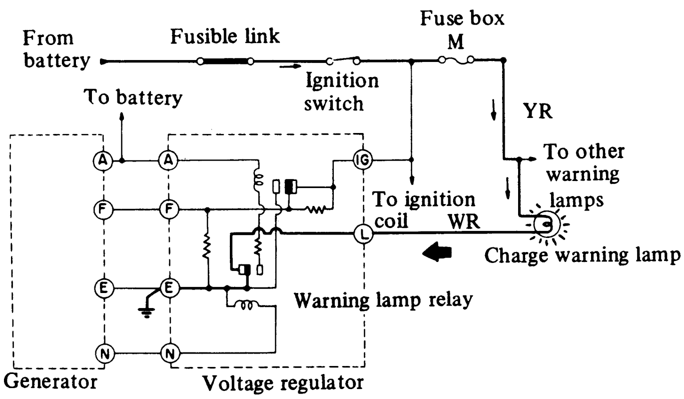


Fig. BE-23 Circuit of oil pressure warning system



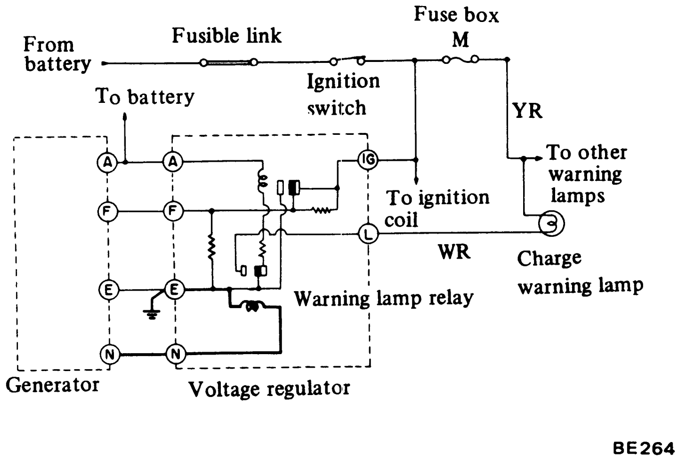


Fig. BE-24-1

Fig. BE-24-2

Circuit of charge warning system

HAND BRAKE WARNING LAMP

Description

The hand brake warning lamp glows when the hand brake is applied.

When the ignition switch is set to "ON," current flows from the ignition switch to the warning lamp. When the hand brake is applied, hand brake warning switch is closed and warning lamp glows.

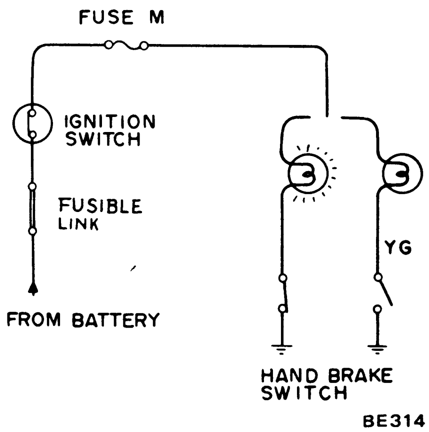


Fig. BE-25 Circuit for hand brake warning lamp

Hand brake switch

To remove hand brake switch, disconnect lead wire, pull switch out of hand brake control bracket and withdraw switch and wiring assembly.

Bulb specifications

Item	SAE Trade Bulb No.	Wattage (Candle power) W (C)
Meter illumination lamp	161	1.7 (1)
Turn signal indicator lamp	161	1.7 (1)
High beam indicator lamp	161	1.7 (1)
Oil pressure warning lamp	161	1.7 (1)
Charge warning lamp	161	1.7 (1)
Hand brake warning lamp	161	1.7 (1)
Clock illumination lamp	161	(1.7) (1)

METER ILLUMINATION, INDICATOR AND WARNING BULBS

Removal and installation

To replace bulb, turn bulb socket counterclockwise to dismount it from combination meter (if necessary, disconnect lead wire connector from printed circuit) and remove bulb from socket.

TROUBLE DIAGNOSES AND CORRECTIONS

Speedometer

Condition	Probable cause	Corrective action
Speedometer pointer and odometer do not operate.	Loose speedometer cable union nut.	Retighten.
	Broken speedometer cable.	Replace.
	Damaged speedometer drive pinion gear (Transmission side).	Replace.
	Inoperative speedometer.	Replace.
Unstable speedometer pointer.	Improperly tightened or loose speedometer cable union nut.	Retighten.
	Faulty speedometer cable.	Replace.
	Inoperative speedometer.	Replace.
Unusual sound occurs in response to increase of driving speed.	Excessively bent or twisted speedometer cable inner wire or lack of lubrication.	Replace or lubricate.
	Inoperative speedometer.	Replace.
Inaccurate speedometer indication.	Inoperative speedometer.	Replace.
Inaccurate odometer operation.	Improperly meshed second and third gear worn gears.	Replace speedometer.
	Faulty feeding due to deformed odometer and pinion carrier.	Replace speedometer.

Water temperature and fuel meters

Condition	Probable cause	Corrective action
Both water temperature meter and fuel meter do not operate.	Burnt fuse.	Correct cause and replace fuse.
	Inoperative meter voltage regulator.	Replace water temperature meter.
Both water temperature meter and fuel meter indicate inaccurately.	Inoperative meter voltage regulator (Meter pointer fluctuates excessively).	Replace water temperature meter.
	Loose or poor connection (Meter pointer fluctuates slightly).	Correct connector contact.
Water temperature meter		
Water temperature meter does not operate.	Faulty thermal transmitter or loose terminal connection. (When thermaltransmitter yellow/white wire is grounded, meter pointer fluctuates).	Replace thermaltransmitter or correct terminal connection.
	Faulty water temperature meter.	Replace water temperature meter.
	Open circuit.	
Meter indicates only maximum temperature.	Faulty thermaltransmitter. (Meter pointer returns to original position when ignition switch is turned off).	Replace thermaltransmitter.
	Faulty water temperature meter. (Meter pointer indicates maximum temperature even after ignition switch is turned off).	Replace water temperature meter.
Water temperature meter does not operate accurately.	Faulty water temperature meter. Faulty thermaltransmitter.	[Connect a 115Ω resistance between thermaltransmitter yellow/white wire and ground. When meter indicates approximately 50°C (122°F), meter is serviceable].
	Loose or poor connection.	Correct connector terminal contact.
Fuel meter		
Fuel meter does not operate.	Faulty tank unit or loose unit terminal connection. (Pointer deflects when tank unit yellow wire is grounded.)	Replace tank unit or correct terminal connection.
	Faulty fuel meter.	Replace fuel meter.
	Open circuit.	
Pointer indicates only "F" position.	Faulty tank unit. (Pointer lowers below "E" mark when ignition switch is turned off.)	Replace tank unit.
	Faulty fuel meter. (Pointer still indicates "F" position when ignition switch is turned off.)	Replace fuel meter.

Condition	Probable cause	Corrective action
Fuel meter does not operate accurately.	Faulty tank unit. (Pointer indicates a half level when a 35Ω resistance is connected between tank unit yellow wire and ground.)	Replace tank unit.
	Faulty fuel meter.	Replace fuel meter.
	Poor or loose connection.	Correct connector terminal contact.

Oil pressure and charge warning lamps

Condition	Probable cause	Corrective action
Oil pressure warning lamp		
Lamp does not light when ignition switch is set to "ON."	Inoperative oil pressure switch or loose switch terminal connection. (When switch yellow/black wire is grounded, warning lamp lights.)	Replace switch or correct terminal connection.
	Burnt bulb or loose bulb.	Replace bulb or correct bulb socket.
	Open circuit.	
Lamp does not go out while engine is being operated.	Lack of engine oil.	Check oil level and add oil as required.
	Oil pressure too low.	Inpect engine oil pressure system.
	Inoperative oil pressure switch.	Replace oil pressure switch.
Charge warning lamp		
Lamp does not light when ignition switch is set to "ON."	Burnt bulb or loose bulb. (Warning lamp does not light when voltage regulator white/red wire is grounded.)	Replace bulb or correct bulb socket.
	Open circuit.	
Lamp does not go out when engine is started.	Faulty charging system.	Inspect charging system.

HORN

CONTENTS

ESCRIPTION

The horn circuit includes a horn relay. Current from the battery flows through the fusible link and fuse to the horn relay (terminal B), where it is shunted by the two circuits. In one circuit (terminal S), the current flow is supplied through the solenoid and horn button to the ground. In the other circuit (terminal H), the current flow is supplied through the relay contacts and horn. (Horn bracket serves as a grounding.)

When the horn button is pressed, current from the battery energizes the solenoid. As the solenoid is energized, the relay contacts are closed. This allows the current to flow to the horn.

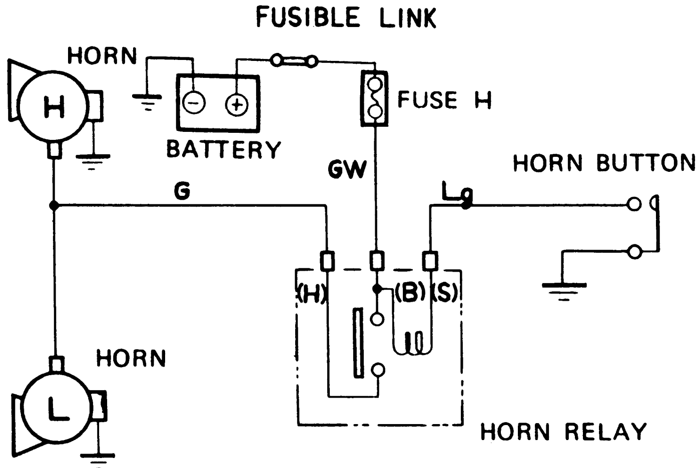


Fig. BE-26 Circuit diagram for horn system

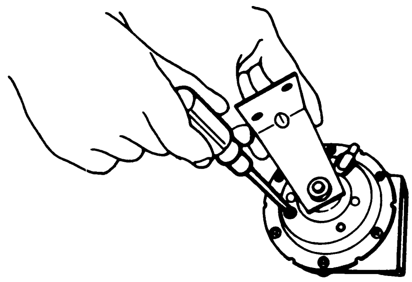


Fig. BE-27 Adjusting horn sound

Sound	Consumed current at 12 volts (Amperes)
Low pitch (330Hz)	3A to 5A
High pitch (415Hz)	3A to 5A

REMOVAL AND INSTALLATION

Horn

Disconnect horn wire at terminal on horn body and remove retaining bolts that hold bracket and horn assembly to hood ledge. Install horn and bracket assembly in reverse sequence of removal.

Horn relay

Horn relay is mounted to radiator core support.

Disconnect battery ground cable. Disconnect three lead wires at terminals on horn relay and remove retaining screw.

Install horn relay in the reverse sequence of removal.

Horn switch

The horn switch is integral with the turn signal and dimmer switch assembly. Remove switch assembly as outlined in "TURN SIGNAL AND DIMMER SWITCH."

ADJUSTMENT

1. Secure horn in a vise. Using a voltmeter, battery and ammeter, connect horn as shown in Figure BE-28.
2. Set switch to "ON," and make sure that voltmeter indicates between 12 and 12.5 volts.
3. Listening horn for sound level, volume and tone, adjust ammeter reading to consumed current of at or below specifications. Make sure that horn sounds clear.

Notes:

a. Adjustment is made by turning adjusting screw, after loosening lock nut.

b. When adjusting screw is turned;
clockwise: Current increases
counterclockwise: Current decreases

4. After tone adjustment has been made as outlined above, check sound again at an alternator voltage (14 to 15 volts). If sound is clear through this check, then tighten lock nut securely.

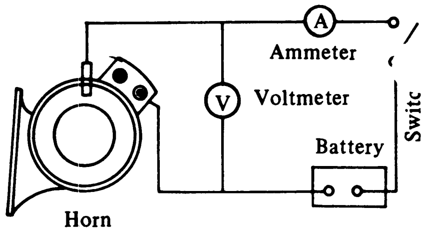


Fig. BE-28 Circuit for horn adjustment

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Horn does not operate.	Discharged battery. (Measure specific gravity of electrolyte.)	Recharge or replace battery.
	Burnt fuse.	Correct cause and replace fuse.
	Faulty horn button contact. (Horn sounds when horn relay terminal(s) is grounded.)	Repair horn button.
	Inoperative horn relay. (Horn sounds when (B) and (H) horn relay terminals are connected with a test lead).	Replace horn relay.
	Damaged horn or loose horn terminal connection.	Correct horn terminal connection or replace horn.
Horn sounds continuously.	Short-circuited horn button and/or horn button lead wire. (When light green lead wire is disconnected from horn relay terminal(s), horn stops to sound.)	Repair horn button or its wiring.
	Inoperative horn relay.	Replace horn relay.
Reduced volume and/or tone quality.	Loose or poor connector contact. (Fuse, relay, horn and/or horn button)	Repair.
	Damaged horn.	Replace.

IGNITION SWITCH AND STEERING LOCK

CONTENTS

REMOVAL AND INSTALLATION

Standard ignition switch

1. Disconnect battery ground cable from battery.
2. Unscrew and remove escutcheon from the front of ignition switch.
3. Withdraw ignition switch and wiring assembly (with spacer), from shell cover as shown in Figure BE-29.
4. Disconnect wiring connector from the back of ignition switch.
5. Replace ignition switch with new one.
6. Connect ignition switch to wiring connector.
7. Position ignition switch to shell cover opening, install and tighten escutcheon and secure ignition switch to shell cover.

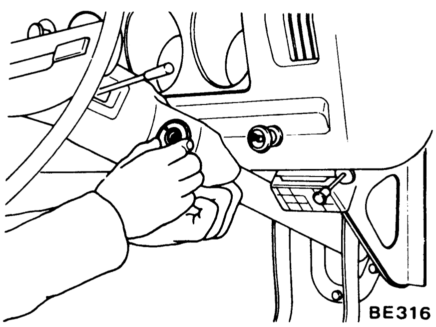


Fig. BE-29 Removing ignition switch

Optional ignition switch with steering lock (Except model PL620 series)

The ignition switch is interchangeable and built-in the steering lock.

To remove ignition switch from steering lock, remove two retaining screws and remove switch assembly from the back of steering lock cylinder (Figure BE-30).

Steering lock replacement

For the purpose of tamper-proof, the self-shear type screws are used, and their heads are sheared off when installed so that the steering lock system cannot be removed easily. Replace the steering lock in accordance with the following instructions.

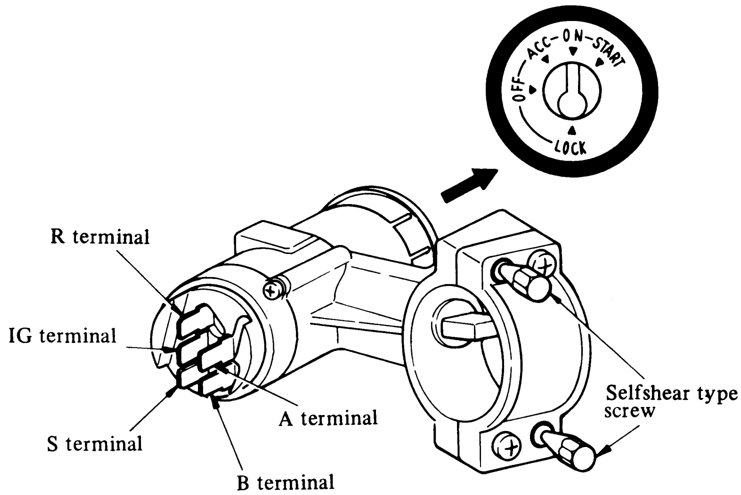
Break two self-shear type screws with a drill or other proper tool. Remove two screws and dismount the steering lock from the steering jacket tube.

When installing a new steering lock, be sure to tighten two new self-shear type screws to shear off their heads.

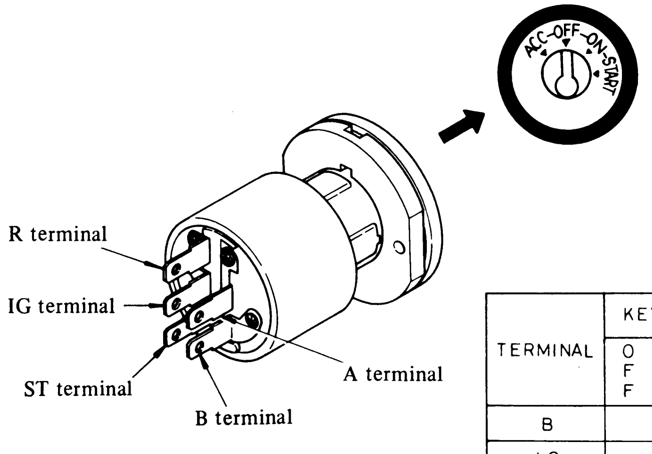
INSPECTION

Continuity test

Test continuity through ignition switch by using test lamp or ohmmeter.



TERMINAL	KEY POSITION LOCK	OFF	ACC	ON	START
B			O	O	O
IG				O	O
S					O
A			O	O	
R					O



TERMINAL	KEY POSITION OFF	ACC	ON	START
B		O	O	O
IG			O	O
ST				O
A		O	O	
R				O

BE31

Fig. BE-30 Ignition switch

WINDSHIELD WIPER AND WASHER

CONTENTS

REMOVAL AND INSTALLATION

Wiper linkage

1. Remove wiper blade and arm assembly from pivot.
2. Remove cowl top grille. See section "BF."
3. Remove two flange nuts retaining pivot (wiper linkage) to cowl top.
4. Remove stop ring that retains connecting rod to wiper motor arm.
5. Remove wiper motor linkage assembly.
6. Install wiper motor linkage in the reverse sequence of removal.

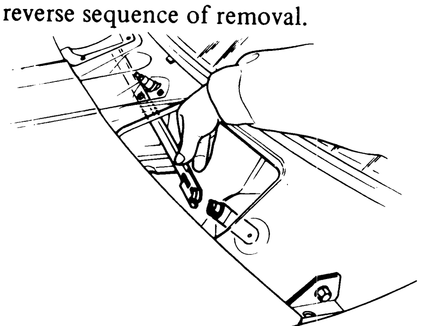


Fig. BE-31 Removing wiper linkage

7. Install wiper arm and blade assembly in correct sweeping angle. See Figure BE-31 for correct installing dimensions.

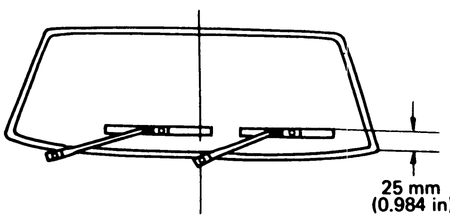


Fig. BE-32 Wiper arm installation

Wiper motor

1. Remove cowl top grille.
3. Remove stop ring that connects wiper motor arm to connecting rod.
3. From under instrument panel, disconnect wiper motor harness at connector on wiper motor body.
4. Remove three retaining screws and pull out wiper motor forward.
5. Install wiper motor in the reverse sequence of removal.

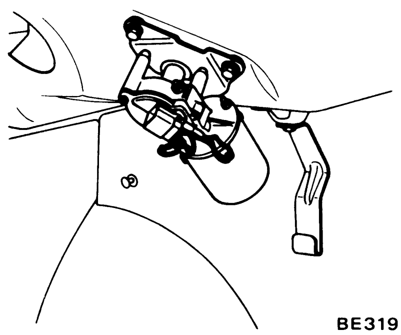


Fig. BE-33 Removing wiper motor

Wiper and washer switch

1. Press in switch knob, turn it counterclockwise and pull it out of switch.
2. Unscrew escutcheon and remove escutcheon and spacer.
3. Reach up from underneath instrument panel, disconnect wiper switch multiple connector from instrument harness wiring assembly and remove spacer and switch.
4. Install new switch in the reverse sequence of removal.

Washer pump

The washer pump and washer fluid tank are integral parts and are serviced as an assembly.

Caution for windshield washer operation

1. Be sure to use only washing solution.

Never use mix powder soap or detergent with solution.

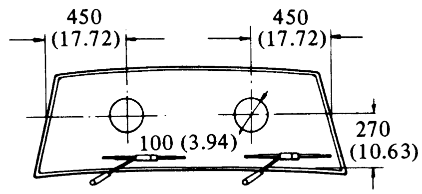
2. Do not operate windshield washer continuously more than 30 seconds or without washer fluid. This often causes improper windshield washer operation. Normally, windshield washer should be operated 10 seconds or less at one time.

1. Disconnect two washer pump lead wires at connectors.
2. Remove hose from washer pump and drain washer fluid.
3. Pull out washer tank and motor assembly from tank bracket.
4. Install washer tank and motor assembly in the reverse sequence of removal.

Washer nozzle

Access for washer nozzle removal is obtained by disconnecting vinyl tube and removing washer nozzle retaining screw from cowl top.

When washer nozzle is installed or when washer fluid is not sprayed properly, adjust nozzle direction by bending nozzle tube so that washer fluid is sprayed in range indicated in Figure BE-34.



BE320

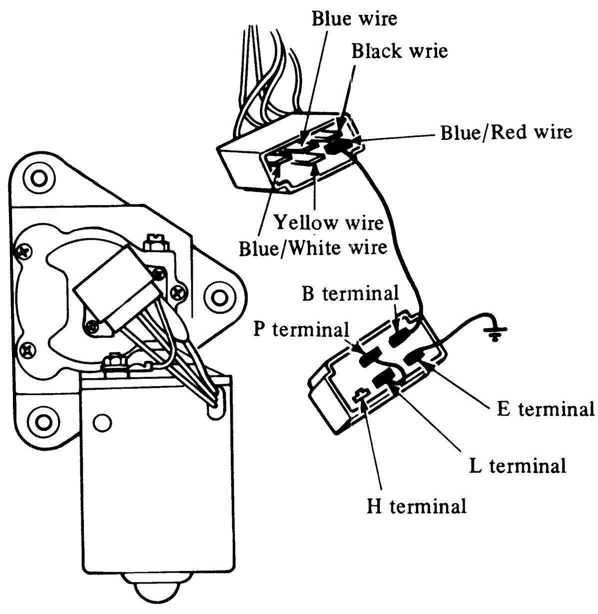
Unit: mm (in)

Fig. BE-34 Washer nozzle adjustment

INSPECTION

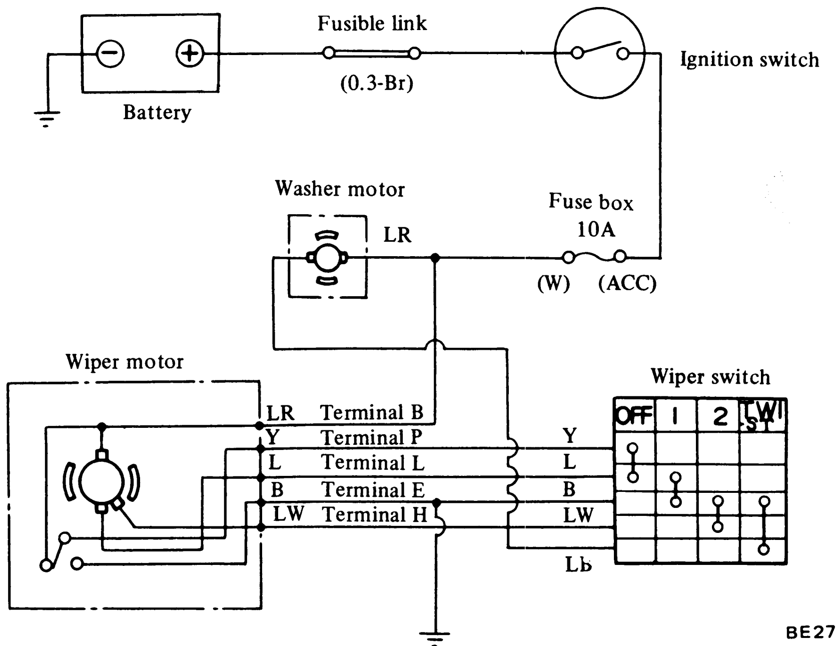
Wiper motor

1. Disconnect wiring connector from wiper motor.
2. Connect test lead between B terminal on motor side and battery positive terminal (or B terminal and blue/red wire terminal in wiring connector plug).
3. To check wiper low speed operation, connect L terminal to ground with ground cable (or connect L terminal to black wire terminal), make sure that wipers sweep at low speed.
4. To check wiper high speed operation, connect ground cable to H terminal in the same manner as in step 3; make sure that wipers sweep fast.
5. During low speed operation, connect E terminal to ground and connect P terminal and L terminal with lead wire as shown in Figure BE-35. At this time, make sure that auto-stop mechanism actuates to stop wiper blade at the specified position.
6. Wiper is in good condition if above tests are made as indicated.



BE321

Fig. BE-35 Wiper motor



BE271

Fig. BE-36 Circuit diagram for windshield wiper—washer system

Wiper and washer switch

Continuity test

Remove wiper switch from vehicle as outlined in "Wiper switch."

Test continuity through wiper switch by using test lamp or ohmmeter.

TERMINAL	SWITCH POSITION			
	OFF	1	2	TWIST
1	O			
2	O	O		
3		O	O	O
4			O	
5				O

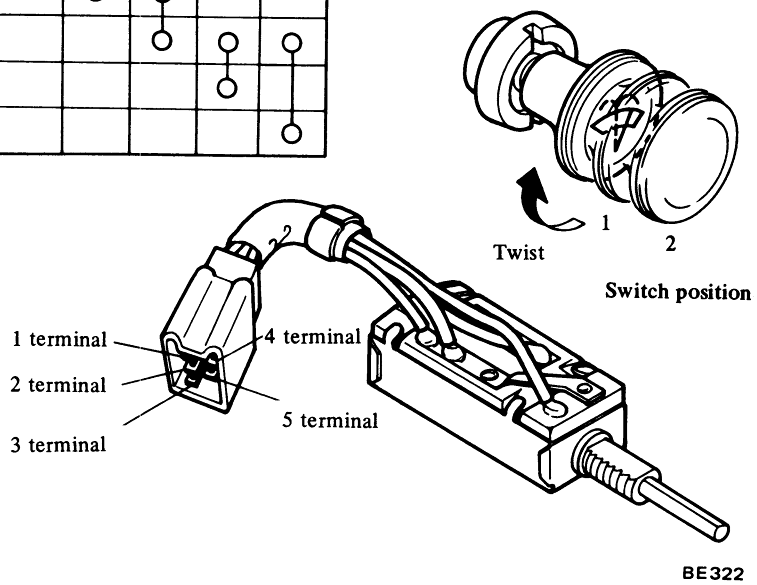


Fig. BE-37 Wiper switch

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Windshield wiper motor does not operate.	Burnt fuse.	Correct cause and replace fuse.
	Damaged motor. (Check wiper motor as outlined in "INSPECTION.")	Replace wiper motor.
	Loose connection.	Repair.
	Faulty wiper and washer switch. (Test continuity through switch as outlined in "INSPECTION.")	Replace.
	Open power circuit or ground circuit.	Repair.
Wiper operating speed is too slow.	Damaged motor.	Replace motor.
	Loose or poor connection.	Repair.
	Seized or rusted wiper linkage. (Humming occurs on motor in wiper blade operating cycle.)	Lubricate or replace.
	Wiper blades stick on windshield glass. (Raise arm and operate wiper without load.)	Clean windshield glass and/or replace wiper blade.
Wiper speed cannot be changed correctly.	Faulty wiper switch.	Replace.
	Damaged motor.	Replace.

Condition	Probable cause	Corrective action
Wiper motor continues to run after switch is turned off or wiper blades do not return to correct position.	Faulty auto-stop operation.	Remove auto-stop device cover, and check relay contacts. Clean dirty contacts or repair relay plate bending if necessary.
	Poor connection.	Repair.
	Faulty switch.	Replace.

RADIO

CONTENTS

REMOVAL AND INSTALLATION

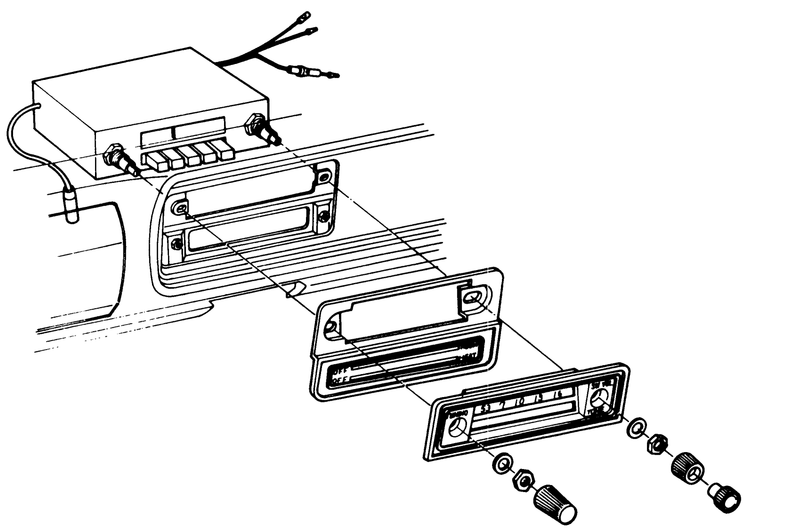
Radio

Removal

1. Pull radio knobs off radio control shafts.
2. Remove radio holding nuts and washer from radio control shafts.
3. Remove radio bezel from the front of radio.
4. From under instrument panel, disconnect antenna cable and lead wires (power lead and speaker lead).
5. Remove radio from instrument panel.

Installation

1. From behind instrument panel position radio to instrument panel.
2. Install radio bezel to the front of radio.
3. Install washers and nuts on radio control shafts and tighten them securely. Then install control knobs.
4. Connect antenna cable and lead wires (power lead and speaker lead).



BE323

Fig. BE-38 Radio

Antenna and antenna cable

Removal

1. From behind instrument panel disconnect antenna cable at connector.
2. Remove plug on antenna base and remove antenna base retaining screw.
3. Remove antenna and cable assembly from front pillar.
4. Unscrew antenna clip from front pillar if necessary.

Installation

1. Remove rubber plugs that cover antenna mounting opening in front pillar (when installing radio antenna to vehicle that is not equipped with radio).
2. Thread mounting stud of antenna clip into (upper) antenna mounting opening.
3. Insert antenna cable into (lower) antenna mounting opening and place antenna base in position.
4. Install antenna base retaining screw.
5. Route antenna cable along upper dash panel to radio.
5. Connect antenna cable at connector.

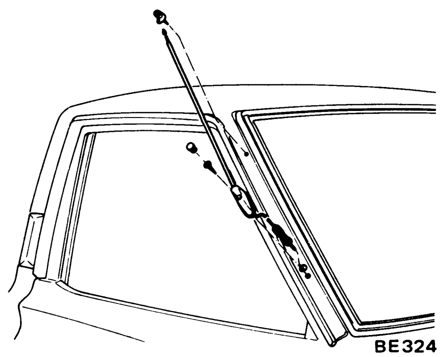


Fig. BE-39 Radio antenna

ADJUSTMENT

Antenna trimmer

When a new radio receiver, antenna or antenna feeder is installed, antenna trimmer should be adjusted.

1. Extend antenna completely.
2. Tune in the weakest station between 12 and 16 (1,200 to 1,600KC) on dial.

   Noise may be generated but disregard it.
3. Turn antenna trimmer to left and right slowly and set it at a position where receiving sensitivity is highest.

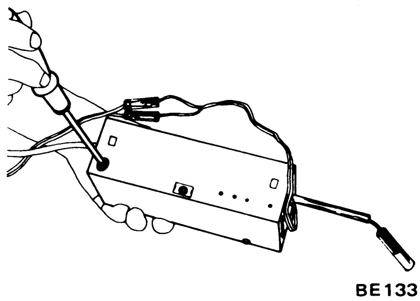


Fig. BE-40 Adjusting antenna trimmer

TROUBLE DIAGNOSES AND CORRECTIONS

Noise prevention chart

Position vehicle in an open area away from steel buildings, run engine, extend antenna to its maximum length, set volume control to maximum and set dial at a medium point without catching broadcasting wave.

Condition	Probable cause	Corrective action
Ignition system		
Noise occurs when engine is operated.	High tension cable.	Install new high tension cable.
	Ignition coil.	Install a 0.5μF capacitor to primary side + terminal of ignition coil. **Note: Be careful not to install capacitor to secondary or primary breaker side, otherwise engine becomes improper.** Install bond strap.
	Distributor.	Secure contact of carbon electric pole and rotor. Eliminate sharp tip on rotor pole or cap pole by scrubbing with a screwdriver. Check stagger between rotor and stator.

Condition	Probable cause	Corrective action
Charging system. Sound of alternating current presents.	Alternator.	Install a 0.5μF capacitor to charging terminal A. **Note: Do not use a larger capacitor. If capacitor is installed to terminal F, alternator coil will be damaged.**
When accelerator pedal is depressed or released, noise presents.	Regulator.	Install a 0.5μF capacitor to "IGN" terminal of voltage regulator.
Supplement equipment When engine starts, noise presents. Noise still presents even after stopping engine.	Operative noise of water temperature and fuel meters.	Install 0.1μF capacitor between terminal and ground wire. **Note: If a capacitor having a larger capacity is used, indication of meter will be deviated.**

Notes:

a. **Be sure to locate capacitor as close as to noise source and connect in parallel.**

b. **Cut lead wire as short as possible.**

c. **Ground wire should be attached on the body completely.**

d. **Make installation and connection securely.**

e. **Carefully identify "+," "–," "IN" or "OUT" marks.**

CLOCK

CONTENTS

REMOVAL

R. H. drive vehicle

1. Remove battery ground cable.
2. Disconnect three wire connectors of clock, two from combination meter printed circuit, one from instrument harness wiring.
3. Remove one retaining screw from clock opening of instrument panel.
4. Remove one screw retaining clock to lower panel of instrument.
5. Remove clock from instrument panel.

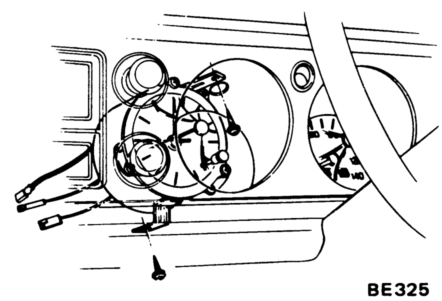


Fig. BE-41 Removing clock

L. H. drive vehicle

1. Remove battery ground cable.
2. Remove cluster lid as per instruction in step 1 to 4 of "Removal" in "COMBINATION METER."
3. Disconnect three wire connectors of clock from combination meter printed circuit and instrument harness wiring.
4. Remove three screws and remove clock from cluster lid.

INSTALLATION

R. H. drive vehicle

1. From behind instrument panel, position clock to instrument panel and install two retaining screws.

2. Connect three wire connectors of clock to each connection, two to combination meter printed circuit, one to instrument harness wiring as shown in Figure BE-42.
3. Connect battery ground cable.

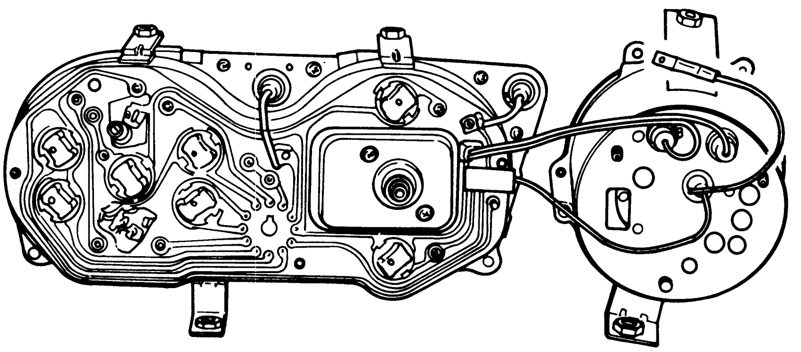


Fig. BE-42 Clock

L. H. drive vehicle

1. Position clock to cluster lid and install three screws.
2. Connect three wire connectors of clock to each connection, two to combination meter printed circuit, one to instrument harness wiring.
3. Install cluster lid to instrument panel.
4. Connect battery ground cable.

HEATER

CONTENTS

DESCRIPTION

Operation of the heater is controlled by two control levers located on the instrument panel and a hand operated knob on the center of the heater unit.

The AIR LEVER controls the air intake valve and/or room valve by its lever positions (OFF, DEFROST and ROOM) through the control cables. The air intake valve draws the fresh outside air from the cowl top grille and supplies the air into the heater unit. The room valve is located at the bottom of the heater unit. The air coming through the air intake valve opening is forced through the heater core to the room valve, where the air is distributed to the floor outlet and/or defroster outlets, depending on the position of the room valve.

The VENT KNOB is directly linked to the vent valve which provides fresh air for the passenger. Push the knob all the way in to open the valve. The fresh ventilating air comes out of the heater center outlet.

The TEMP LEVER is a dual purpose control; one is for regulating the flow of engine coolant flowing into the heater unit and the other is for the operation of the fan motor. When the lever is in the OFF position, the water cock is closed and the circulation of engine coolant through the heater core stops. When the lever is slided to any other position than OFF, the water cock opens in proportion to the lever setting and allow engine coolant to flow into heater core.

To control the fan motor operation, push or pull the lever knob. Two speeds are provided for the fan motor by means of a three position switch.

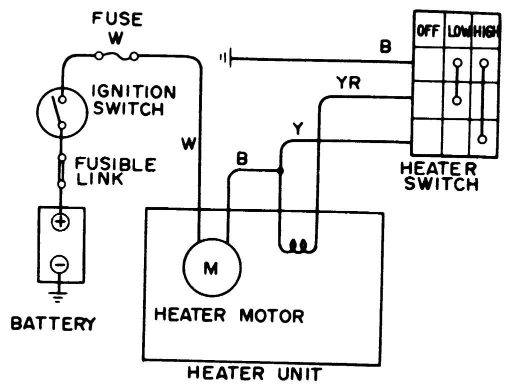


Fig. BE-43 Circuit diagram of heater

Air flow

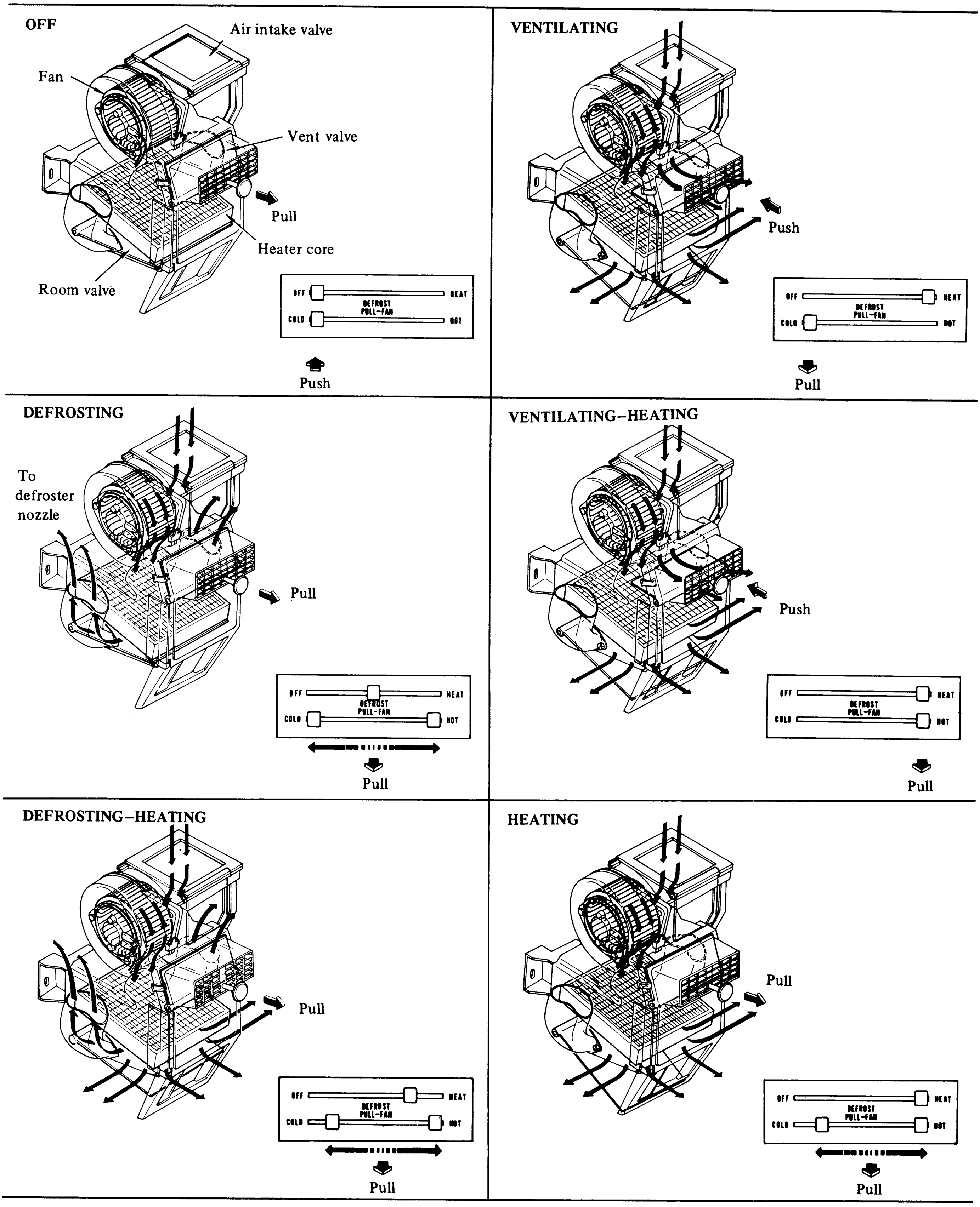


Fig. BE-44 Air flow

HEATER UNIT ASSEMBLY

Removal

1. Disconnect battery ground cable.
2. Drain engine coolant.
3. Remove defroster hoses.
4. Remove three cable retaining clips and disconnect control cables from valves and water cock.
5. Disconnect two fan motor lead wires from each connector.
6. Disconnect two resistor lead wires from each connector.
7. Disconnect water hoses from core and water cock.
8. Remove three heater housing mounting bolts and dismount heater unit from vehicle.

Installation

1. Position heater unit under instrument panel and install three heater unit securing bolts.
2. Install water hoses.

   Position heater control cables to room valve, air intake valve and water cock.
4. Adjust control cable length for proper operation as outlined in "ADJUSTMENT."
5. Connect fan motor wires and resistance wires to each connector plug.
6. Install defroster hoses.
7. Connect battery ground cable.
8. Fill cooling system.
9. Run engine at 2,000 rpm with air lever in the "HOT" position. Make sure that engine coolant is filled up to correct level.

HEATER CORE

Removal and installation

1. Drain engine coolant.
2. Remove defroster hoses.

   Disconnect water hoses from inlet and outlet pipes of heater core.
4. Remove four clips and front cover.

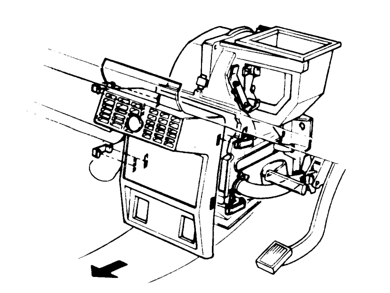

BE329

Fig. BE-45 Removing front cover

5. Withdraw heater core from heater housing.

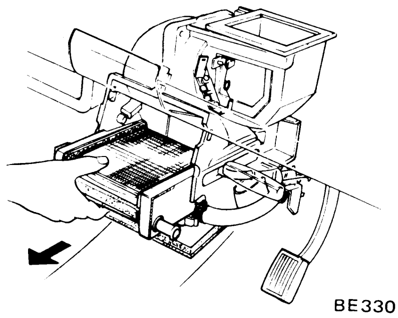

BE330

Fig. BE-46 Removing heater core

6. Install heater core in the reverse sequence of removal.

FAN MOTOR

Removal and installation

1. Dismount heater unit assembly from vehicle as outlined in "Removal" of "HEATER UNIT ASSEMBLY."
2. Remove nine spring clips and disassembly heater housing.
3. Remove fan from fan motor.
4. Remove fan motor retaining screws and fan motor.
5. Assembly heater housing and install heater unit to vehicle in the reverse sequence of removal as outlined in "Installation" of "HEATER UNIT ASSEMBLY."

CONTROL ASSEMBLY

Removal and installation

1. Remove three cable retaining clips and disconnect control cables from valves and cock.
2. Disconnect three lead wires from each connector plug.
3. Remove radio bezel from the front of radio as per instructions in step 1 through 3 in "Removal" of "RADIO."
4. Remove heater control knobs and heater bezel.
5. Remove two retaining bolts and heater control assembly.
6. Install control assembly in the reverse sequence of removal. When connecting control cables to valves and cock, adjust control cable length as outlined in "ADJUSTMENT."

ADJUSTMENT

AIR lever

1. Move AIR lever to the "DEF" position.
2. Open air intake valve and connect control cable to air intake valve.
3. Clip control cable with cable retaininig clip.

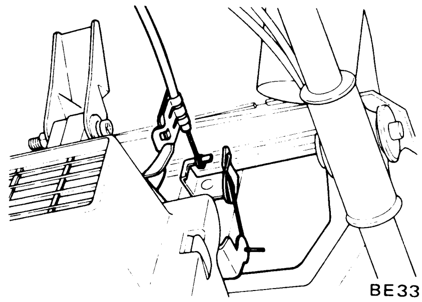

BE331

Fig. BE-47 Air intake valve

4. Pull room valve upward and connect control cable to room valve.
5. Clip control cable with cable retaining clip.

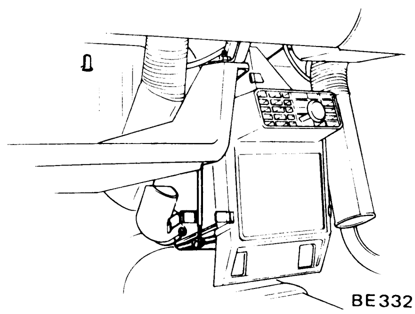
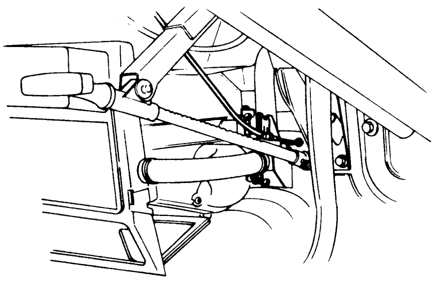

BE332

Fig. BE-48 Room valve

TEMP lever

1. Move TEMP lever to the "OFF" position.
2. Connect control cable to the lever of water cock when water cock lever is pulled forward (fully closed).
3. Install control cable on water cock bracket with cable retaining clip.



BE333

Fig. BE-49 Water cock

SPECIFICATIONS

Item	General use	Extremely cold weather use
FAN MOTOR		
Rated power consumption	12V less than 36W	12V less than 55W
Revolution rpm	3,600	2,800
Fan dia. mm (in)	110 (4.33)	110 (4.33)

TACHOMETER

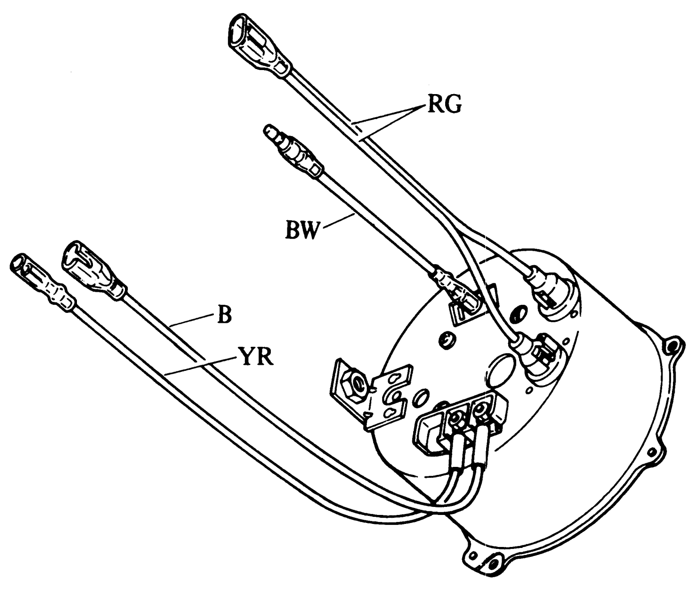
The tachometer is optional on model PL620. It is an integral part of the ignition system. It counts the pulses entering the ignition coil and indicates the number of engine revolutions.

REPLACEMENT

1. Remove battery ground cable.
2. Remove cluster lid as per instructions in steps 1 to 4 of "Removal" in "COMBINATION METER".
3. Disconnect four tachometer lead wire connectors. They are connected to combination meter and tachometer cable.
4. Remove three screws and then remove tachometer from cluster lid.
5. Install in reverse sequence of removal. When connecting lead wire, note the following.

Note: Tachometer has four wires which must be connected to specified positions.

1. **BW .. The black with white striped lead wire must be connected to identically colored tachometer cable coming from engine compartment.**
2. **RG .. The red with green stripe lead wire must be connected to flat plate terminal at back of combination meter.**
3. **B .... The black lead wire must be connected to "T" shaped terminal at back of combination meter.**
4. **YR .. The yellow with red stripe lead wire must be connected to pole terminal at back of combination meter.**



BE965

Fig. BE-50 Tachometer

6. To properly connect tachometer cables, proceed as follows:

Pass tachometer cables through grommet on hood lock control wire, and connect to negative terminal of ignition coil.

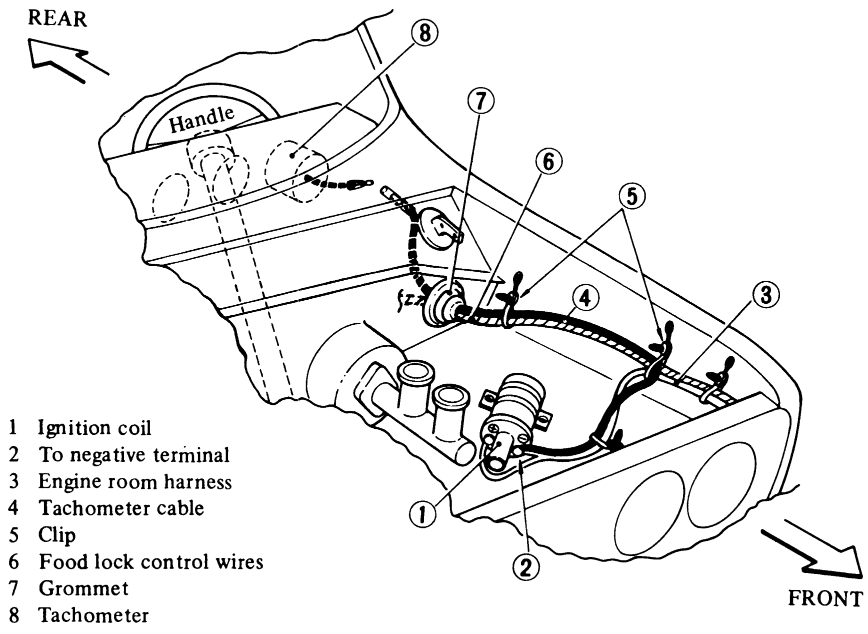


Fig. BE-51 Tachometer cable

Notes:

a. **Fix grommet with an adhesive tape or a sealing compound to prevent water leakage.**

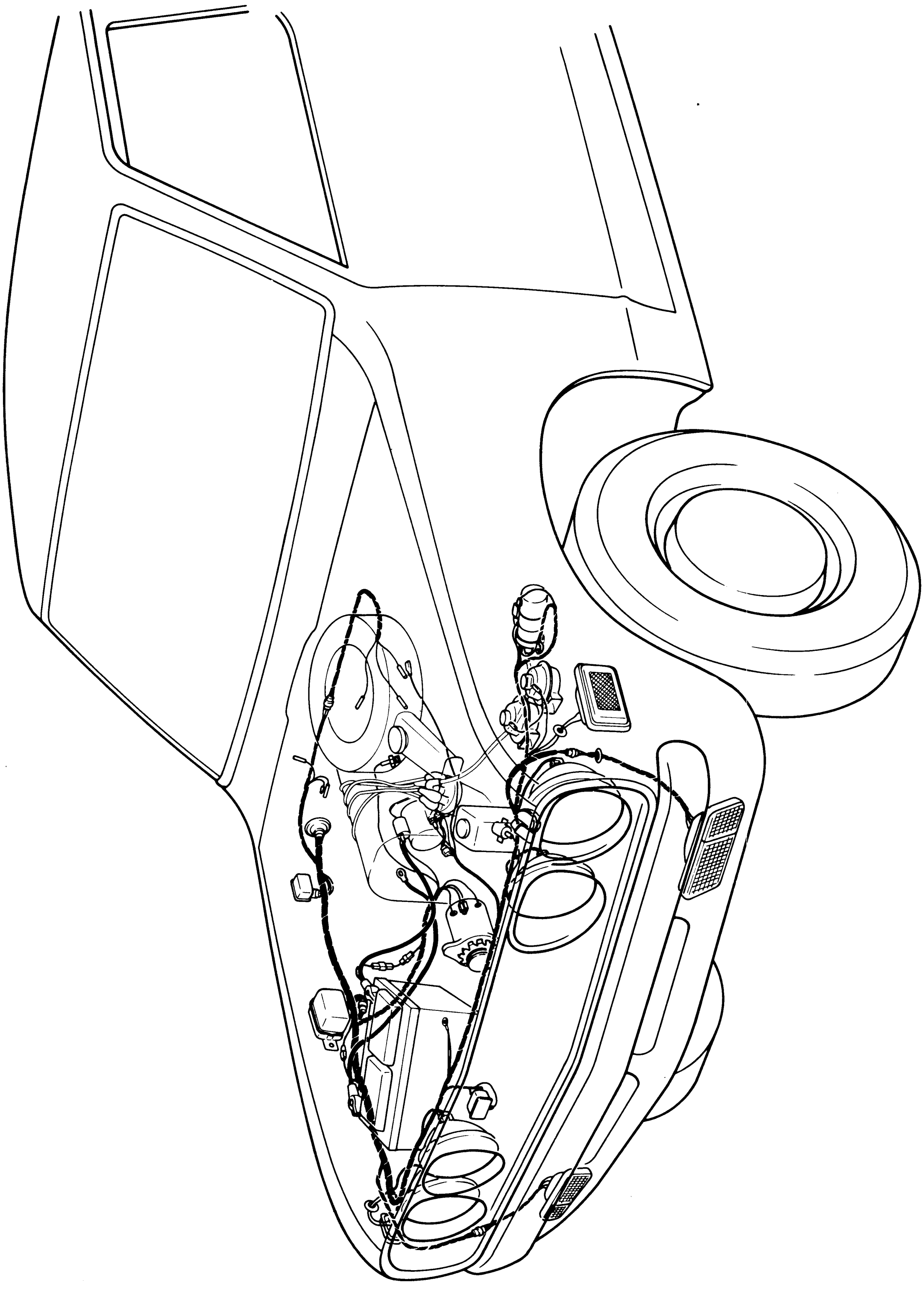
b. **Attach tachometer cables to hood lock control wire with an adhesive tape.**

BULB REPLACEMENT

1. Remove tachometer as previously described.
2. Twist illumination bulb socket at back of tachometer. Bulb with socket can then be easily removed.
3. Remove bulb.
4. Install new bulb in reverse sequence of removal.

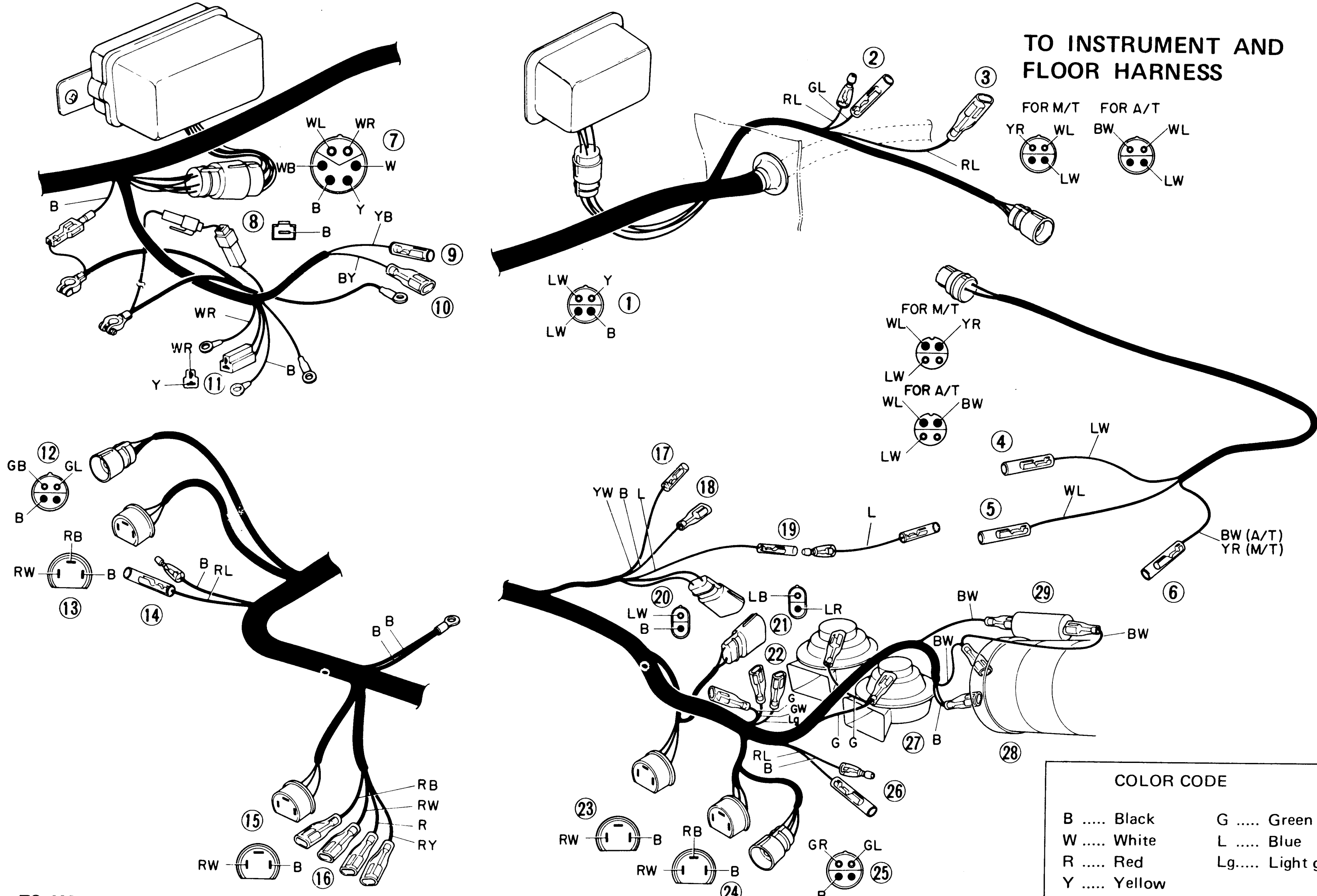
Bulb wattage:
Tachometer illumination lamp: 3.4W

USA & Canada



BE398

Fig. BE-52 Engine compartment



TO. NO.	PART NAME	TO. NO.	PART NAME
①	Heater relay	⑨	Oil pressure switch
②	Engine room lamp	⑩	Starter motor
③	Hood switch	⑪	Alternator
④	Auto choke heater	⑫	Front combination lamp R.H.
⑤	Anti-dieseling solenoid	⑬	Headlamp R.H. type 2
⑥	B.C.D.D. cut solenoid	⑭	Side marker lamp R.H.
⑦	Voltage regulator	⑮	Headlamp R.H. type 1
⑧	Fusible link	⑯	Light (Lamp) relay

TO. NO.	PART NAME	TO. NO.	PART NAME
⑰	Thermal transmitter	㉕	Front combination lamp L.H.
⑱	Distributor	㉖	Side marker lamp L.H.
⑲	E.G.R. solenoid	㉗	Horn high & low
⑳	Water temperature switch	㉘	Ignition coil
㉑	Washer motor	㉙	Resister
㉒	Horn relay		
㉓	Headlamp L.H. type 1		
㉔	Headlamp L.H. type 2		

COLOR CODE

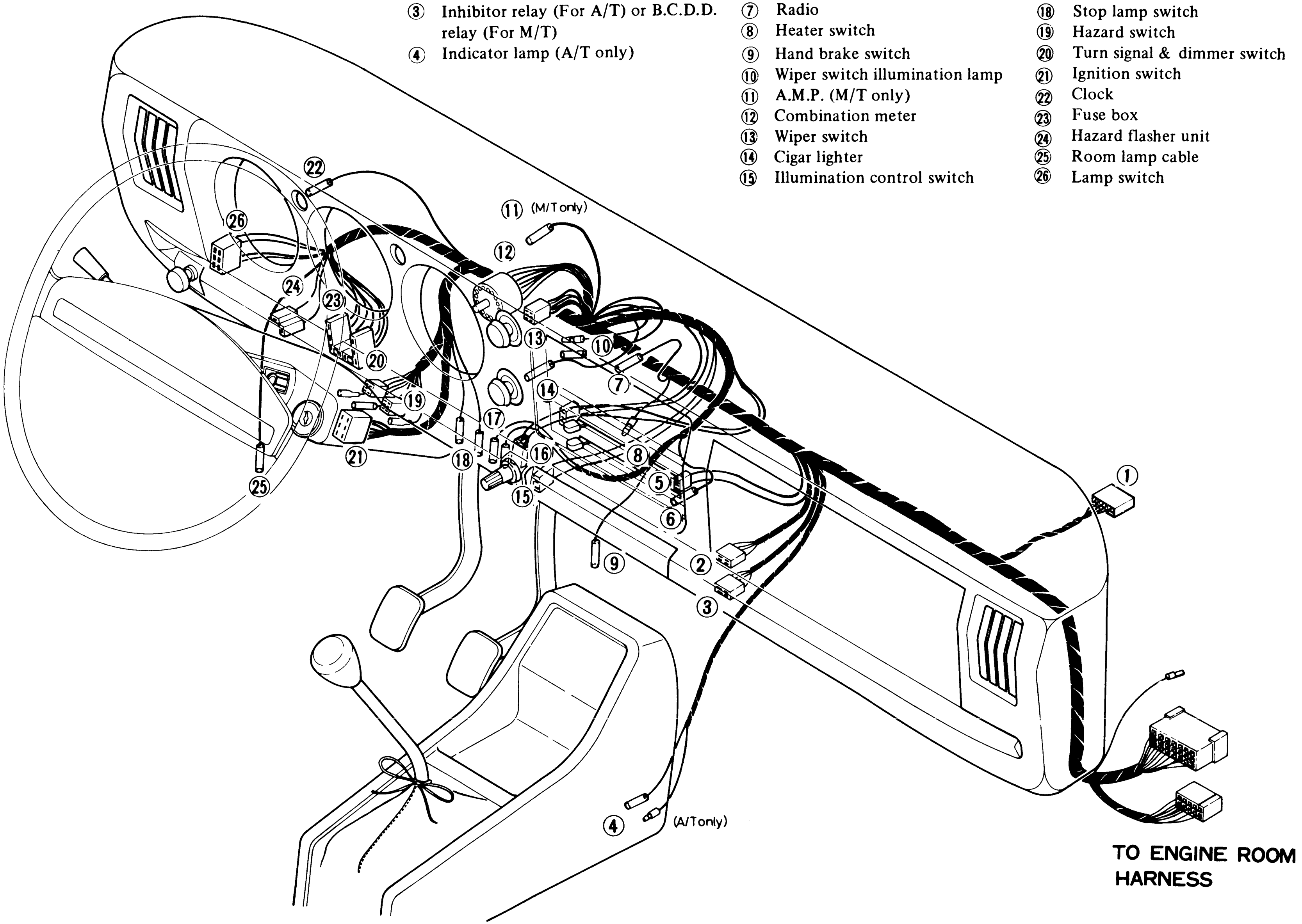
B	Black	G	Green
W	White	L	Blue
R	Red	Lg.....	Light green
Y	Yellow		

BE399

Fig. BE-53 Engine compartment

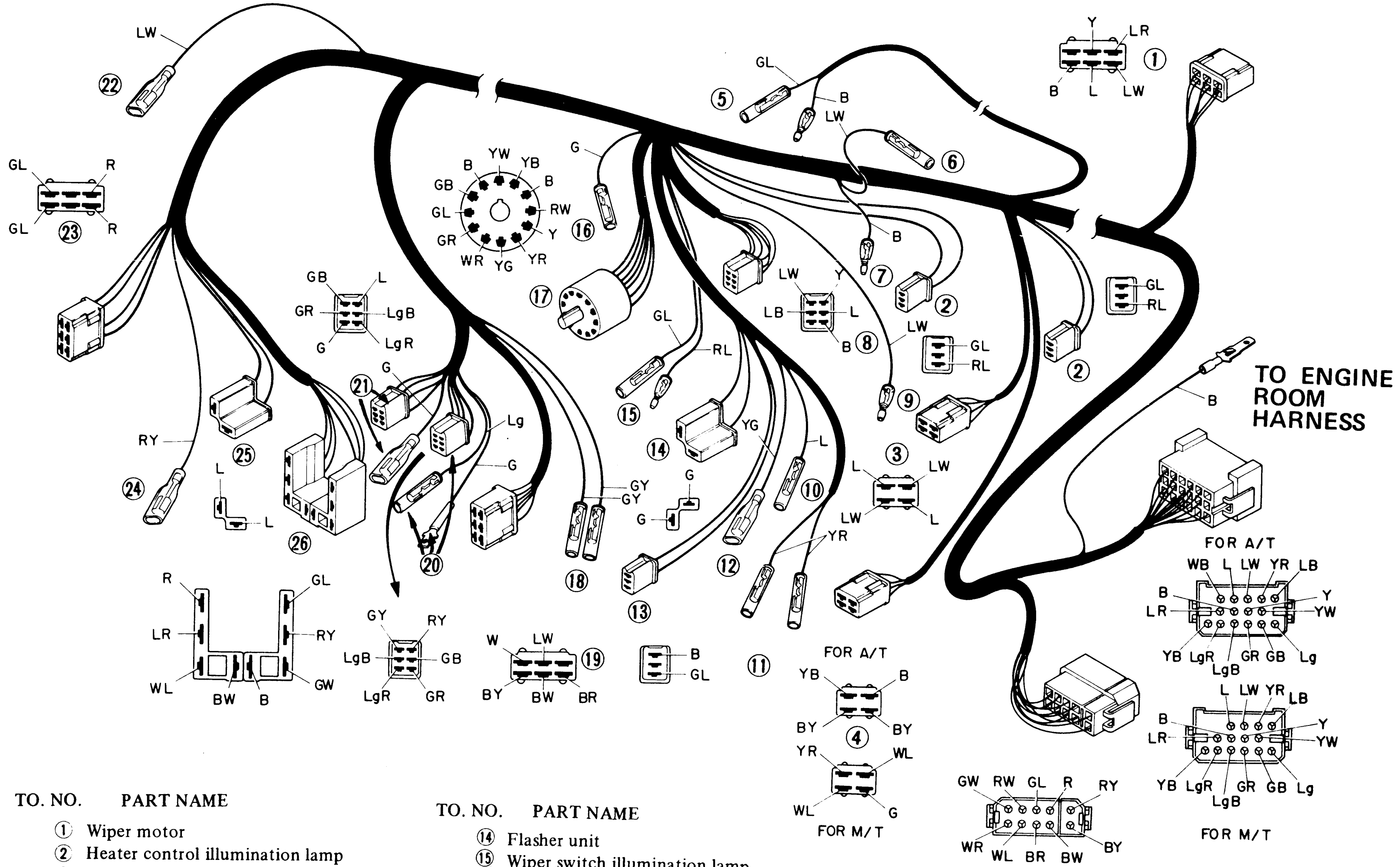
USA & Canada

TO. NO.	PART NAME	TO. NO.	PART NAME	TO. NO.	PART NAME
1	Wiper motor	5	Heater control illumination lamp	16	Flasher unit
2	E.G.R. cut relay	6	Heater motor	17	Kickdown switch (A/T only)
3	Inhibitor relay (For A/T) or B.C.D.D. relay (For M/T)	7	Radio	18	Stop lamp switch
		8	Heater switch	19	Hazard switch
4	Indicator lamp (A/T only)	9	Hand brake switch	20	Turn signal & dimmer switch
		10	Wiper switch illumination lamp	21	Ignition switch
		11	A.M.P. (M/T only)	22	Clock
		12	Combination meter	23	Fuse box
		13	Wiper switch	24	Hazard flasher unit
		14	Cigar lighter	25	Room lamp cable
		15	Illumination control switch	26	Lamp switch



BE400

Fig. BE-54 Instrument



TO. NO.	PART NAME
①	Wiper motor
②	Heater control illumination lamp
③	E.G.R. cut relay
④	Inhibitor relay (For A/T) or B.C.D.D. relay (For M/T)
⑤	Indicator lamp (A/T only)
⑥	Radio
⑦	Heater switch
⑧	Wiper switch
⑨	Cigar lighter
⑩	Heater motor
⑪	Kickdown switch (A/T only)
⑫	Hand brake switch
⑬	Illumination control switch
⑭	Flasher unit
⑮	Wiper switch illumination lamp
⑯	A.M.P. (M/T only)
⑰	Combination meter
⑱	Stop lamp switch
⑲	Ignition switch
⑳	Turn & dimmer switch
㉑	Hazard switch
㉒	Clock
㉓	Light (Lamp) switch
㉔	Room lamp cable
㉕	Hazard flasher unit
㉖	Fuse box

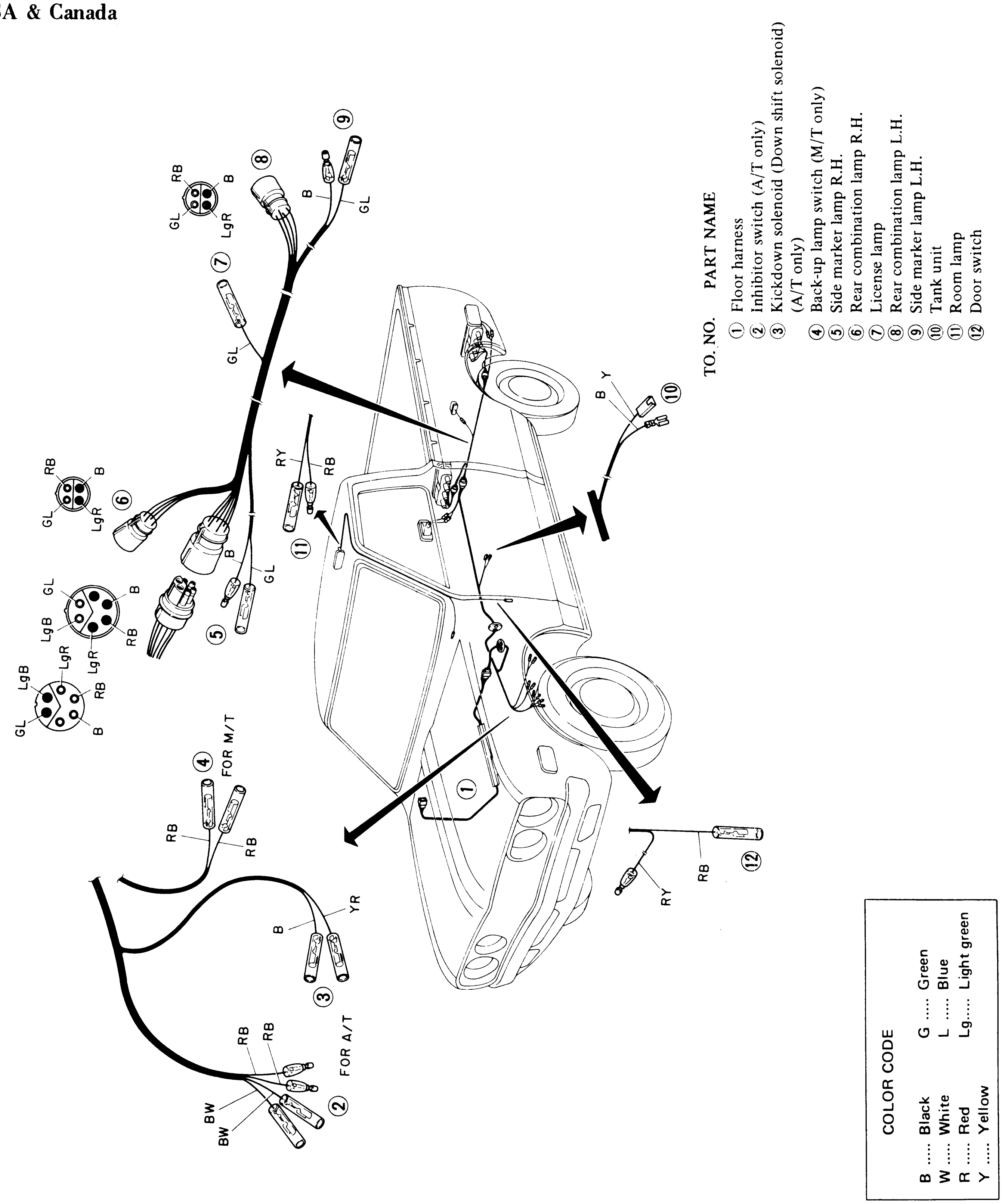
COLOR CODE

B ..... Black	G ..... Green
W ..... White	L ..... Blue
R ..... Red	Lg..... Light green
Y ..... Yellow	

BE401

Fig. BE-55 Instrument

USA & Canada



BE402

Fig. BE-56 Body

SERVICE MANUAL

DATSUN PICK-UP
MODEL 620 SERIES

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION SE

SERVICE EQUIPMENT

SE

SERVICE EQUIPMENT

CONTENTS

GENERAL DESCRIPTION

1. Special tool "Grease Seal Drift ST35390000" is newly set up for the 620 model.
2. Special tool "Gear Carrier Stand Assembly ST0732S000" and "Gear Carrier Attachment ST06310000" are used for the purpose of setting gear carrier. This operation can be carried out if either of tools is provided.
3. Two kinds of tools are prepared for adjusting differential pinion height.

"Drive Pinion Height Gauge Assembly ST3110S000" has been provided for special tool "Height Gauge ST31101000" (Former tool number ST31100000).

Notes:

a. Former tool set, No. ST31100000, was composed of "Height Gauge ST31101000" and "Spacer ST31102000."

b. For service dealers who have only the special tool sets (Set No. ST31100000) for the 521 models, "Dummy Shaft ST31942000" is necessary.

"Drive Pinion Height Gauge Assembly ST3194S000" is newly set up for new service shop.

4. Special tool "Drive Pinion Rear Bearing Inner Race Replacer ST3003S000" is available to both the transmission and differential.

SPECIAL TOOL SETS (SEE ATTACHED TOOL LIST)

The special tool sets are classified into two major categories:

Set "A"-ST09020000

This tools including in Set "A" are offered for the 620 models without regard to their destination.

The set is available for new and other dealers who must go through initial preparation.

Set "B"-ST09030000

This set is designed for the 620 models without regard to their destination.

The set is prepared for dealers who already have the special tool sets for the 610 or 510 models, but have not for the 521 models.

SPECIAL TOOLS FOR 1974 MODEL 620

Special tools used on the manual transmission and differential carrier for the 1974 620 series models have been changed extensively.

However, these tools are the same as those for the model 260Z manual transmission and those for the W610 series model differential carrier, respectively. They are not exclusively for use on the 620 series models. For details, refer to the Tool List.

CLASSIFICATION OF SPECIAL TOOL

	Classification	
	Important	General
I. Inspection and minor repairs	1	4
II. General disassembly and assembly	2	5
III. Special disassembly and assembly	3	3

A. Important
- a. Exclusive with no alternative
- b. Parts likely will be damaged if repaired without special tool.
- c. Gauges

B. General
To facilitate servicing

I. Inspection and minor repairs
- a. Inspection and maintenance
- b. Unit replacement
- c. Minor unit disassembly

II. General disassembly and assembly
General disassembly such as engine, transmission and differential.

III. Special disassembly and assembly
- a. Disassembly of exclusive parts such as automatic transmission and electrical accessories
- b. Special work such as boring and welding
- c. Work very rarely required

TOOL LIST

X: Included in each set or model.

No.	Tool Number	Tool Name	Class	Application: 1973 Model	Application: 1974 Model	Remarks
1.	Engine					
	ST0501S000	Engine stand assembly	5	X	X	
	— ST05011000	Engine stand				
	— ST05012000	Base				
	ST05260001	Engine attachment	5	X	X	
	ST10120000	Cylinder head bolt wrench	2	X	X	
	ST10640001	Pivot adjuster	1	X	X	
	ST1103S000	Valve guide reamer	3	X	X	
	— ST11031000	Reamer [12.2 mm (0.480 in) dia.]				
	— ST11032000	Reamer [8.0 mm (0.315 in) dia.]				
	— ST11033000	Drift				
	ST11650001	Valve seat cutter set	2	X	X	
	ST12070000	Valve lifter	5	X	X	
	ST13030001	Piston pin press stand	2	X	X	
	ST15310000	Crankshaft rear oil seal drift	2	X	X	
	ST1651S000	Crankshaft main bearing cap puller	2	X	X	
	— ST16511000	Body				
	— ST16512001	Adapter				
	ST16610001	Pilot bushing puller	3	X	X	
	ST17420001	Chain stopper	2	X	X	
	ST19150000	Anti-dieseling solenoid spanner	4	X		Discontinued
	ST19320000	Oil filter wrench	1	X	X	
	EM03470000	Piston ring compressor	2	X	X	

X: Included in each set or model.

No.	Tool Number	Tool Name	ST0902 0000 Set A	ST0903 0000 Set B	Class	Application 1973 Model	Application 1974 Model	Remarks
2.	Clutch							
	ST16610001	Pilot bush puller			3		X	Newly added
	ST20630000	Clutch aligning bar	X	X	2	X	X	
	ST20050010	Base plate	X		4	X	X	
	ST20050100	Distance piece	X		4	X	X	
	ST20050240	Diaphragm adjust wrench	X		4	X	X	
3.	Transmission							
	ST22130000	Synchronizer hub puller	X	X	2	X		Discontinued
	ST22360001	Drift C			2		X	Newly added
	ST23100000	Counter shaft guide	X		2	X		Discontinued
	ST23540000	Fork rod punch	X		2	X	X	
	ST23800000	Transmission adapter	X		2	X	X	
	ST23810001	Setting plate adapter			5		X	Newly added
	ST23840000	Expander			2		X	Newly added
	ST23860000	Counter gear drift			2		X	Newly added
	ST23870000	Transmission press stand			2		X	Newly added
	ST3003S000	Drive pinion rear bearing inner race replacer			2	X	X	
	— ST30031000	Puller						
	— ST30032000	Base						
4.	Automatic transmission							
	ST07870000	Transmission case stand			3	X	X	
	ST25050001	Oil pressure gauge set			1	X	X	
	ST25160000	Torque driver			3	X	X	
	ST25320001	Snap ring remover			3	X	X	
	ST25420001	Clutch spring compressor			3	X	X	
	ST25512001	Socket extension			3	X	X	

X: Included in each set oı lel.

No.	Tool Number	Tool Name	ST0902 0000 Set A	ST0903 0000 Set B	Class	Application 1973 Model	Application 1974 Model	Remarks
	ST25570000	Hex-head extension			3	X	X	
	ST25580000	Oil pump assembling gauge			3	X	X	
	ST25850000	Sliding hammers			3	X	X	
	GG93010000	Torque wrench			3	X	X	
	HT61000800	Hexagon wrench			3	X	X	
	HT62350000	Spinner handle			6	X	X	
	HT69860000	Snap ring remover			3	X	X	
5.	Differential							
	ST0732S000	Gear carrier stand ass'y			5	X	X	
	ST07321000	Stand						
	ST07311000	Attachment						
	ST06310000	Gear carrier attachment			5	X	X	
	ST3306S001	Diff. side bearing puller	X		2	X	X	
	ST33061000	Body						
	ST33051001	Adapter						
	ST31530000	Drive pinion flange wrench	X		2	X	X	
	ST3003S000	Drive pinion rear bearing inner race replacer	X		2	X		Discontinued
	ST30031000	Puller						
	ST30032000	Base						
	ST3090S000	Drive pinion rear bearing inner race replacer			2		X	Newly added
	ST30031000	Puller						
	ST30901000	Base						
	ST33230000	Diff. side bearing drift	X		2	X	X	
	ST3110S000	Drive pinion height gauge ass'y			2	X	X	
	ST31101000	Height gauge						
	ST31102000	Spacer						
	ST31942000	Dummy shaft						

X: Included in each set or model.

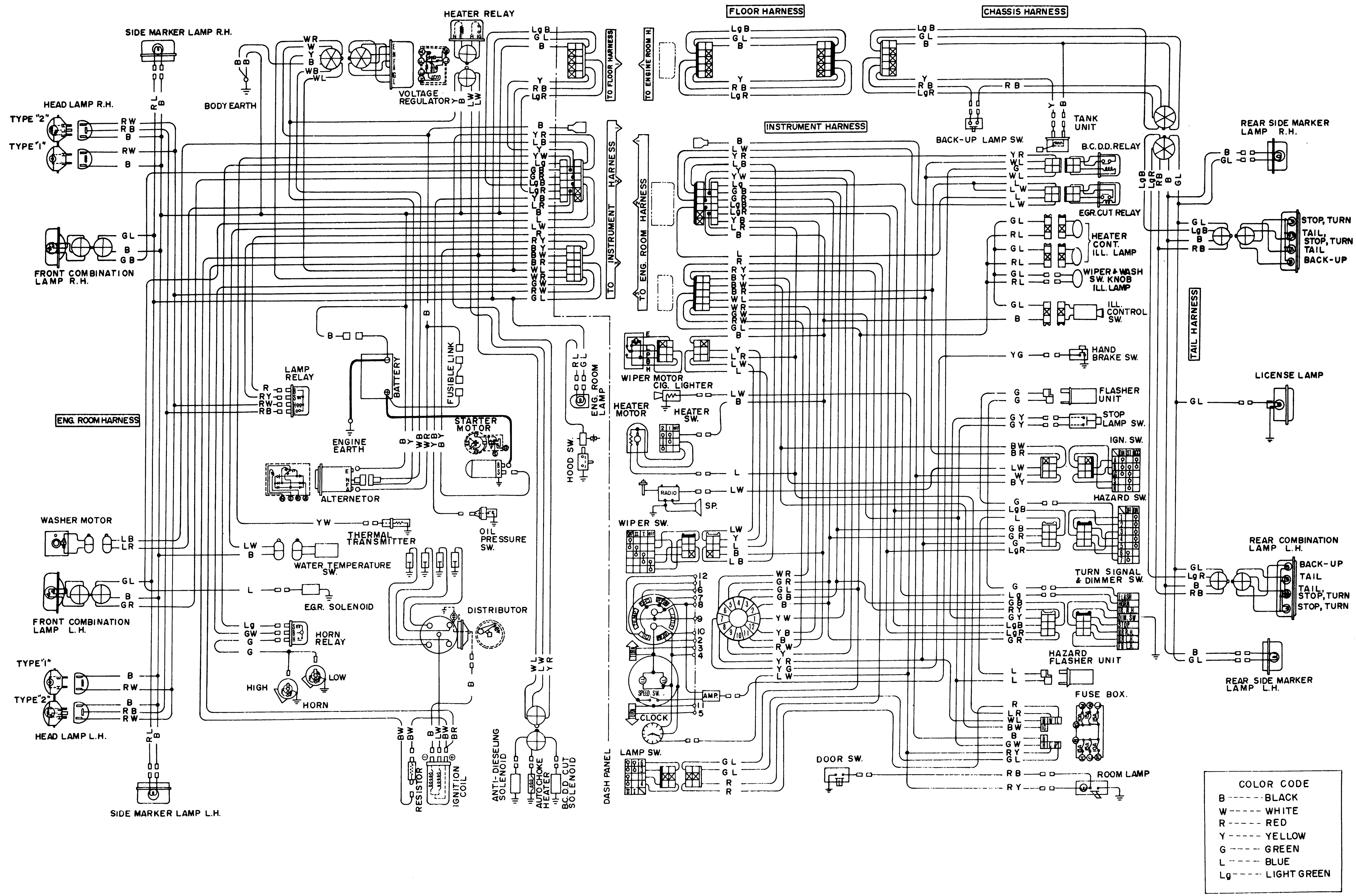
No.	Tool Number	Tool Name	ST0902 0000 Set A	ST0903 0000 Set B	Class	Application 1973 Model	Application 1974 Model	Remarks
	ST3194S000	Drive pinion height gauge ass'y	X		2	X	X	
	ST31941000	Height gauge						
	ST31942000	Dummy shaft						
	ST31970000	Collar			2		X	Newly added
	ST32110001	Side bearing cap gauge	X		5	X	X	
	ST30611000	Drive pinion outer race drift bar	X		2	X	X	
	ST30612000	Drive pinion outer race drift adapter	X		2	X		Discontinued
	ST30613000	Drive pinion outer race drift adapter	X		2	X	X	
	ST30621000	Drive pinion outer race drift adapter			2		X	Newly added
	ST23510001	Solid punch	X		2	X	X	Former tool No. ST23510000
	ST3127S000	Preload gauge			2		X	Newly added
	ST30720000	Gear carrier front oil seal drift			2		X	Newly added
	ST33290001	Gear carrier oil seal puller			5		X	Newly added
6.	Front Axle							
	ST35380000	Kingpin bushing drift	X	X	2	X	X	
	HT56802000	Kingpin bushing reamer	X	X	2	X	X	
	ST36070000	Lower link bushing drift	X	X	2	X	X	
	ST35390000	Grease seal drift	X	X	2	X	X	
7.	Rear Axle							
	ST38020000	Bearing lock nut wrench	X	X	2	X	X	
	ST07630000	Rear axle stand	X	X	2	X	X	
	ST36230000	Sliding hammer	X		5	X	X	
	ST37140000	Bearing puller	X	X	2	X	X	

X: Included in each set o del.

No.	Tool Number	Tool Name	ST0902 0000 Set A	ST0903 0000 Set B	Class	Application 1973 Model	Application 1974 Model	Remarks
8.	Steering							
	ST2720000	Steering gear arm puller	X		2	X	X	
	ST27180000	Steering wheel puller	X		2	X	X	
	ST27850000	Steering ball joint puller	X		2	X	X	
9.	Brake							
	GG94310000	Brake pipe torque wrench			2	X	X	
	ST08060000	Master-Vac oil seal press-fit tool			3	X	X	
	ST08080000	Master-Vac wrench			3	X	X	

WIRING DIAGRAM

Manual Transmission



10^{00}