SERVICE MANUAL

MODEL
L20A, L24 & L26 SERIES
ENGINES

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

QUICK REFERENCE INDEX

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FOREWORD

This service manual has been prepared for the purpose of assisting service personnel of our distributors and dealers for effective service and maintenance of model L20A, L24 and L26 series engines.

Since proper maintenance and service are most essential to satisfy our customers by keeping their cars in the best condition, this manual should be read carefully. The following should be noted for effective utilization of this manual.

1. Please for complete detail of the car refer to this and SERVICE MANUAL DATSUN 260Z MODEL S30 SERIES, DATSUN 240C, 220C, 200C MODEL 230 SERIES, DATSUN 240KGT, 180K, 160K MODEL C110 SERIES of the chassis and body, because this manual describes information concerning the engine.
2. All part names in this manual conform to PARTS CATALOG DATSUN 260Z, 240Z, DATSUN 260C, 240C, 200C, DATSUN 240KGT, 180K, 160K, and only the genuine service parts listed in these parts catalogs should be used for replacement.
3. All information, illustration and specifications contained in this manual are based on the product information available as of August, 1973.
4. It is emphasized that those who use this manual revise the contents according to the SERVICE JOURNAL and SERVICE DATA AND SPECIFICATIONS issued by the factory, which carry the latest factory approved servicing method.
5. Rights for alteration in specifications and others at any time are reserved.

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

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SERVICE MANUAL

MODEL

L20A, L24 & L26 SERIES

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SECTION EG

EG

ENGINE GENERAL

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SPECIFICATIONS

Engine model			L20A	L24	L26	L26 (Twin carb.)
Type			In-line			
Number of cylinders			6			
Valve of arrangement			O.H.C.			
Bore x Stroke		mm (in)	78 x 69.7 (3.071 x 2.749)	83 x 73.7 (3.27 x 2.902)	83 x 79 (3.271 x 3.110)	83 x 79 (3.271 x 3.110)
Displacement		cc (cu in)	1,998 (121.9)	2,393 (146.0)	2,565 (156.5)	2,565 (156.5)
Compression ratio			8.6	8.5	8.6	8.3
Firing order			1-5-3-6-2-4			
Number of piston rings		Compression	2			
		Oil control	1			
Number of main bearings			7			
Capacities liters (US gal, Imp gal)	Engine oil	Oil pan	4.1 (1 1/8, 7/8)	5.0 (1 3/8, 1 1/8)	4.1 (1 1/8, 7/8)	4.0 (1 1/2, 7/8)
		With oil filter	4.7 (1 1/4, 1 3/8)	5.7 (1 1/2, 1 1/4)	4.7 (1 1/4, 1 3/8)	4.7 (1 1/4, 1 3/8)
	Engine coolant	Without heater	8.0 (2 1/8, 1 3/4)	8.5 (2 1/4, 1 7/8)	8.0 (2 1/8, 1 3/4)	–
		With heater	9.0 (2 3/8, 2)	9.5 (2 1/2, 2 7/8)	9.0 (2 3/8, 2)	9.4 (2 1/4, 2 3/4)

CAR REFERENCE

Information described herein is about engine only. Please, refer to both this and each chassis and body manual for complete details about the car. The cars on which L20A, L24 and L26 engines are mounted as follows.

Engine		Car		
Model	Displacement	Car name	Current model	Remarks
L20A	1,998 cc (121.9 cu in)	DATSUN 200C	230QU	R.H. drive, 4-door Sedan with manual T/M (Column shift)
			L230QT	L.H. drive, 4-door Sedan with manual T/M (Floor shift)
			L230Q	L.H. drive, 4-door Sedan with manual T/M (Column shift)
			L230QA	L.H. drive, 4-door Sedan with automatic T/M (Column shift)
L24	2,393 cc (146.0 cu in)	*1	HGC110UT	R.H. drive, 4-door Sedan with manual T/M (Floor shift)
			HGC110UAT	R.H. drive, 4-door Sedan with automatic T/M (Floor shift)
			HLGC110T	L.H. drive, 4-door Sedan with manual T/M (Floor shift)
			HLGC110AT	L.H. drive, 4-door Sedan with automatic T/M (Floor shift)
			KHGC110UT	R.H. drive, Hardtop with manual T/M (Floor shift)
			KHGC110UAT	R.H. drive, Hardtop with automatic T/M (Floor shift)
			KHLGC110T	L.H. drive, Hardtop with manual T/M (Floor shift)
			KHLGC110AT	L.H. drive, Hardtop with automatic T/M (Floor shift)
		*2	HGC110UQ	R.H. drive, 4-door Sedan with manual T/M (Floor shift)
			HGC110UAQ	R.H. drive, 4-door Sedan with automatic T/M (Floor shift)
			HLGC110Q	L.H. drive, 4-door Sedan with manual T/M (Floor shift)
			HLGC110AQ	L.H. drive, 4-door Sedan with automatic T/M (Floor shift)
			KHGC110UQ	R.H. drive, Hardtop with manual T/M (Floor shift)
			KHGC110UAQ	R.H. drive, Hardtop with automatic T/M (Floor shift)
			KHLGC110Q	L.H. drive, Hardtop with manual T/M (Floor shift)
			KHLGC110AQ	L.H. drive, Hardtop with automatic T/M (Floor shift)
		*3	HGC110UR	R.H. drive, 4-door Sedan with manual T/M (Floor shift)
			HGC110UAR	R.H. drive, 4-door Sedan with automatic T/M (Floor shift)
			KHGC110UR	R.H. drive, Hardtop with manual T/M (Floor shift)
			KHGC110UAR	R.H. drive, Hardtop with automatic T/M (Floor shift)

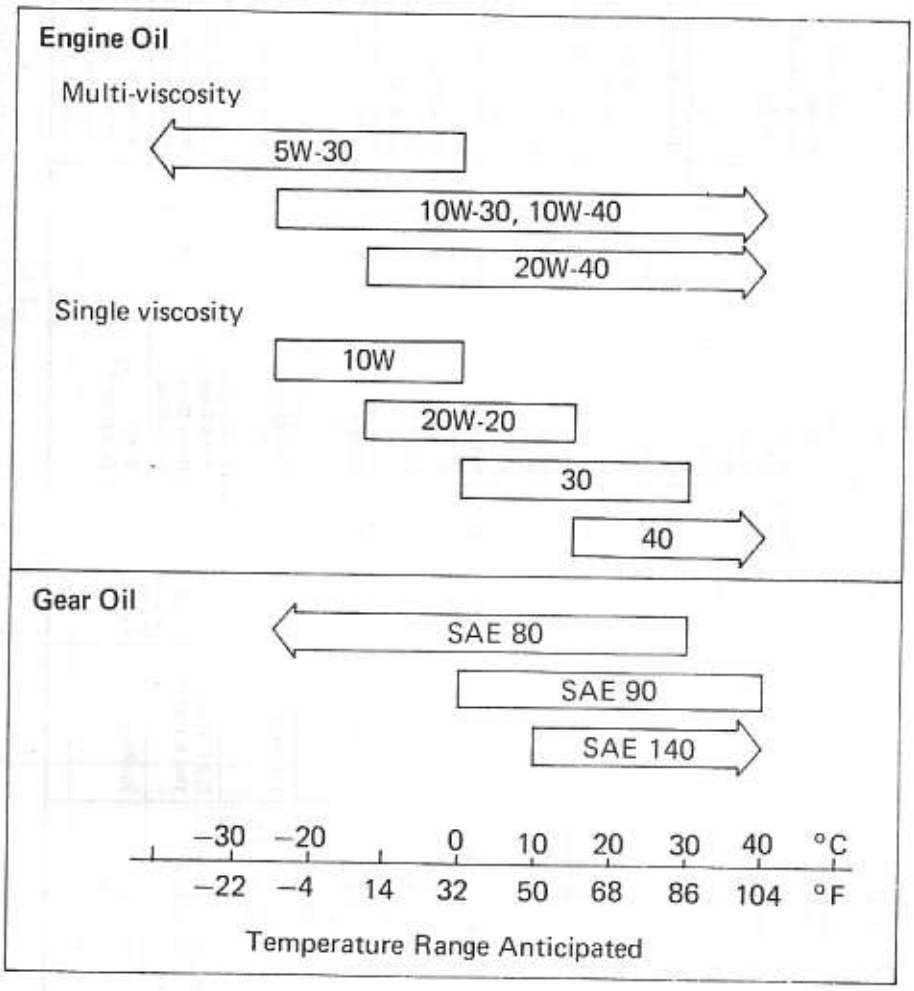
*1: For common countries
*2: For Europe
*3: For Australia

Engine		Car		
Model	Displacement	Car name	Current model	Remarks
L26	2,565 cc (156.5 cu in)	DATSUN 260C (Hardtop)	KH230QTU	R.H. drive, Hardtop with manual T/M (Floor shift)
			KH230QTUA	R.H. drive, Hardtop with automatic T/M (Floor shift)
			KHL230QT	L.H. drive, Hardtop with manual T/M (Floor shift)
			KHL230QTA	L.H. drive, Hardtop with automatic T/M (Floor shift)
		DATSUN 260C (Custom Deluxe)	H230VU	R.H. drive, 4-door Sedan with manual T/M (Column shift)
			H230VTU	R.H. drive, 4-door Sedan with manual T/M (Floor shift)
			H230VUA	R.H. drive, 4-door Sedan with automatic T/M (Column shift)
			H230VTUA	R.H. drive, 4-door Sedan with automatic T/M (Floor shift)
			HL230V	L.H. drive, 4-door Sedan with manual T/M (Column shift)
			HL230VT	L.H. drive, 4-door Sedan with manual T/M (Floor shift)
			HL230VA	L.H. drive, 4-door Sedan with automatic T/M (Column shift)
			HL230VTA	L.H. drive, 4-door Sedan with automatic T/M (Floor shift)
		DATSUN 260C (Deluxe)	H230QU	R.H. drive, 4-door Sedan with manual T/M (Column shift)
			H230QTU	R.H. drive, 4-door Sedan with manual T/M (Floor shift)
			H230QUA	R.H. drive, 4-door Sedan with automatic T/M (Column shift)
			H230QTUA	R.H. drive, 4-door Sedan with automatic T/M (Floor shift)
			HL230Q	L.H. drive, 4-door Sedan with manual T/M (Column shift)
			HL230QT	L.H. drive, 4-door Sedan with manual T/M (Floor shift)
			HL230QA	L.H. drive, 4-door Sedan with automatic T/M (Column shift)
		DATSUN 260C (Station Wagon)	WH230U	R.H. drive, Station Wagon with manual T/M (Column shift)
			WH230UT	R.H. drive, Station Wagon with manual T/M (Floor shift)
			WHL230U	L.H. drive, Station Wagon with manual T/M (Column shift)
			WHL230T	L.H. drive, Station Wagon with manual T/M (Floor shift)
			VH230U	R.H. drive, Van with manual T/M (Column shift)
			VHL230	L.H. drive, Van with manual T/M (Column shift)
L26 (Twin carb.)	2,565 cc (156.5 cu in)	DATSUN 260Z *4	RS30U	R.H. drive, 2-door Sport with manual T/M (Floor shift)
			RS30AU	R.H. drive, 2-door Sport with automatic T/M (Floor shift)
			RLS30	L.H. drive, 2-door Sport with manual T/M (Floor shift)
			RLS30A	L.H. drive, 2-door Sport with automatic T/M (Floor shift)
		DATSUN 260Z *5	RS30Q	R.H. drive, 2-door Sport with manual T/M (Floor shift)
			RS30AQ	R.H. drive, 2-door Sport with automatic T/M (Floor shift)
			RLS30Q	L.H. drive, 2-door Sport with manual T/M (Floor shift)
			RLS30AQ	L.H. drive, 2-door Sport with automatic T/M (Floor shift)

*4: All countries except Europe
*5: For Europe

RECOMMENDED LUBRICANTS, PETROL (FUEL) AND COOLANT

Use the following grades of oil, gasoline and coolant.



RECOMMENDED LUBRICANTS

SPECIFICATIONS			AGIP	BP	CALTEX	CASTROL	ESSO	MOBIL	SHELL	TEXACO	TOTAL
ENGINE OIL	Gasoline	Multigrade SD or SE MIL-L-2104B	AGIP F.1 Woom 10W-40, 20W-50	Super Viscostatic 5W-20, 10W-40, 20W-50	Custom Five Star Motor Oil 10W-30, 10W-40, 20W-40, 20W-50	GTX 20W-50 Castrolite 10W-30 XL 20W-40	Uniflo 5W-30, 10W-40 Esso Extra Motor Oil 5W-20, 10W-30, 20W-40	Mobiloil Super 5W-30, 5W-40, 10W-40, 10W-50, 20W-50 Mobiloil Special 5W-20, 10W-30, 20W-40, 20W-50	Shell Super Motor Oil Shell Rotella TX Oil 20W-50	Havoline Super Premium 5W-30, 10W-40, 20W-50	GTS 10W-30, 20W-40, 20W-50
		Monograde SD MIL-L-2104B	AGIP F.1 Woom 10W-20, 30, 40/50	Energol HD Oil 10W, 20W, 30, 40	——	5HD, 10HD, 20HD, 30HD, 40HD, 50HD	Esso Motor Oil 10W, 20W, 30, 40, 50	Mobiloil 10W, 20W-20, 30, 40, 50	Shell Rotella TX Oil 10W, 20W-20, 30, 40, 50	Havoline Motor Oil 10W, 20W-20, 30, 40, 50	Super HD 10W, 20W-20, 30, 40, 50
GEAR OIL	Transmission and steering	API GL-4 MIL-L-2105	AGIP F.1 Rotra Hypoid 80, 90, 140	BP Gear Oil EP 80, 90, 140	Universal Thuban 80, 90, 140	CASTROL HYPOY 80, 90	Esso Gear Oil GP 90, 140	Mobilube GX or EP Series 80, 90, 140, 80-90	Spirax EP 80, 90, 140	Universal Gear Lub. EP 80, 90, 140	Extreme Pression 80, 90, 140
	Differential I.R.S. or Rigid	API GL-5 MIL-L-2105B	AGIP F.1 Rotra MP 80, 90, 140	BP Hypogear Oil EP 80, 90, 140	3450 Gear Oil 90 Multipurpose Thuban EP 80, 90, 140	CASTROL HYPOY B80, B90	Esso Gear Oil GX 90, 140	Mobilube HD Series 75, 80, 90, 140, 80-90	Spirax 80, 90, 140	3450 Gear Oil 90 Multigear Lub. EP 80, 90, 140	Extreme Pression Type B 80, 90, 140
Automatic T/M & Power steering fluid		Type DEXRON (3N71B A/T)	AGIP F.1 ATF DEXRON	Autran DX	Texamatic Fluid DEXRON	TQ DEXRON	Esso Automatic Transmission Fluid	Mobil ATF 220	ATF DEXRON	Texamatic Fluid DEXRON	DEXRON
Multi-purpose grease		Lithium soap NLGI2	AGIP F.1 Grease 30	Energrease L-2	Marfak Multipurpose 2 *	LM Grease *	Esso Multi-purpose Grease *	Mobilgrease MP *	Retinax A	Marfak Multipurpose 2 *	Multis *
Brake and clutch fluid		DOT3 (M.V.S.S. No. 116)	AGIP F.1 Brake Fluid Super HD	Disc Brake Fluid	Caltex Heavy Duty Brake Fluid	G.B.F. Green Disc Brake Fluid	Atlas Brake Fluid S.H.D. 450, 550	Mobil Super Heavy Duty Brake Fluid	Brake Fluid Heavy Duty	Super Heavy Duty Motor Vehicle Brake Fluid	Brake Fluid
Antifreeze (Ethylene glycol base)			——	Antifrost	Startex Antifreeze Coolant	Antifreeze	Esso-Rad *	Mobil Permazone *	Glycoshell *	Antifreeze Coolant * Startex Antifreeze Coolant *	Antigel *

In case the above brand oils are not available, it is permissible to use oils marked "*".

PETROL (FUEL)

Engine model	Compression ratio	Octane number of petrol
L20A	8.6 : 1	More than 85
L24	8.5 : 1	More than 95
L26	8.6 : 1	More than 85
L26 (Twin carb.)	8.3 : 1	For Europe More than 85
		For except Europe More than 95

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

NISSAN L.L.C. is an ethylene glycol base product containing chemical inhibitors to protect the cooling system against rusting and corrosion. L.L.C. does not contain any glycerine, ethyl or methyl alcohol. It will not evaporate or boil away and can be used with either high or low temperature thermostat. It flows freely, transfers heat efficiently, and will not clog the passages in the cooling system.

L.L.C. must not be mixed with any other products. This coolant can be used throughout the seasons of the year and exchange period is two years or total running mileage of 40,000 km (24,000 miles).

Percent concentration	Boiling point		Freeze protection
	Sea level	0.9 kg/cm^2 (13 psi) cooling system pressure	
30%	106°C (223°F)	124°C (255°F)	−15°C (5°F)
50%	109°C (228°F)	127°C (261°F)	−35°C (−31°F)

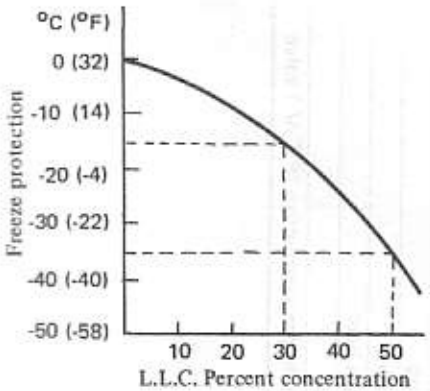


Fig. EG-1 Protection concentration

UNIT SERIAL NUMBER LOCATION

There are two serial numbers for unit identification: engine and chassis. These numbers are indicated in the car identification plate located in an easy-to-read position.

ENGINE SERIAL NUMBER

The engine serial number is stamped on the rear left side of cylinder block, at cylinder head contacting face.

The number is preceded by the engine model, L20, L24 or L26.

L26 XXX
L24 XXX
L20 XXX

Serial number

Engine model

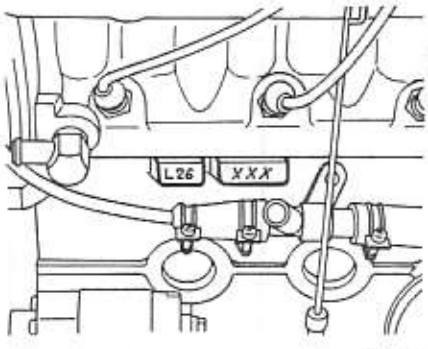


Fig. EG-2 Engine serial number location

PERIODICAL MAINTENANCE SCHEDULE

MAINTENANCE OPERATION	Number of thousands of kilometers	MAINTENANCE INTERVAL											
		1	5	10	15 55	20 60	25 65	30 70	35 75	40 80	45 85	50	90
	Number of thousands of miles	0.6	3	6	9 33	12 36	15 39	18 42	21 45	24 48	27 51	30	54
Adjust intake & exhaust valve clearances		X		X		X		X		X		X	X
Check drive belt tension		X		X		X		X		X		X	X
Retighten cylinder head bolts & manifold nuts		X											
Replace oil filter		R		R		R		R		R		R	R
Check engine oil for leaks		X		X		X		X		X		X	X
Change engine oil		R	R	R	R	R	R	R	R	R	R	R	R
Change engine coolant				R		R		R		R		R	R
Change engine long life coolant										R			
Check cooling system hoses & connections						X				X			
Lubricate accelerator linkage				X		X		X		X		X	X
Replace carburetor air cleaner filter (Viscous type)										R			
Clean or replace carburetor air cleaner filter (Dry type)			X	X	X	X	X	X	X	R	X	X	X
Check SU-carburetor damper oil level, top up if necessary			X	X	X	X	X	X	X	X	X	X	X
Adjust carburetor-idle rpm, mixture ratio		X	X	X	X	X	X	X	X	X	X	X	X
Replace fuel filter						R				R			
Check fuel line (hoses, pipings, connections, etc.) for leaks		X	X	X	X	X	X	X	X	X	X	X	X
Check & adjust ignition timing		X		X		X		X		X		X	X
Check distributor breaker point			X	X	X	X	X	X	X	X	X	X	X
Grease distributor shaft & cam heel				X		X		X		X		X	X
Check or replace spark plugs				X		R		X		R		X	X
Check or replace positive crankcase ventilation (P.C.V.) valve						X				R			

R: Replacement

SERVICE MANUAL

MODEL

L20A, L24 & L26 SERIES

ENGINES



NISSAN MOTOR CO., LTD.

TOKYO, JAPAN

SECTION ET

ENGINE TUNE-UP

ET

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ENGINE TUNE-UP

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DESCRIPTION

It may be needless to say, however, to restore power and performance that has been lost through wear, corrosion, or deterioration, periodical maintenance (engine tune-up) is necessary.

It is even more important that the engine tune-up be done accurately according to the maintenance schedule shown in the applicable Owner's Manual.

This chapter describes actual operating procedures for the maintenance operation of items to be inspected.

BASIC MECHANICAL SYSTEM

ADJUSTING INTAKE AND EXHAUST VALVE CLEARANCE

Valve clearance adjustment should be made while engine is stationary.

To adjust, proceed as follows:

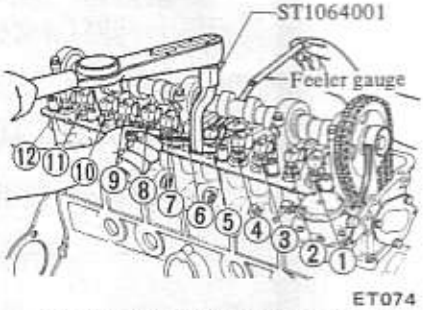


Fig. ET-1 Adjusting valve clearance

1. Loosen pivot lock nut and turn pivot screw until the specified clearance is obtained with engine cold. Using Pivot Adjuster ST10640001, tighten pivot locking nut securely after adjustment, and recheck the clearance.
2. Adjusting order

Valve adjusting can be done by four times rotating the crankshaft.

Note: If Crankshaft is rotated by starter, you must take off the high tension wire from ignition coil. Then the engine turn without ignition.

The first time, the position of ① cam lobe is upward, ③ ⑦ ⑪ cam adjustment is possible.

The second time, ④ cam lobe is upward, ⑤ ⑩ ⑫ is possible.

The third time, ② cam lobe is just upward, ⑥ is possible.

The fourth time, ⑧ cam lobe is just upward, ⑨ is possible.

Note: Numbers in parenthesis agree with those in accompanying sketch (See Figure ET-1).

3. Start engine and run it until it is heated to operating temperature, or at least, more than 80°C (176°F) of engine oil temperature; then stop engine.

Measure the warm engine valve clearance in the same manner as above. If it deviates from the given warm engine valve setting value, make necessary adjustment.

Tightening torque:
Pivot lock nut
5.0 to 6.0 kg-m
(11 to 13 ft-lb)

Valve clearance

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)

CHECKING AND ADJUSTING FAN BELT

With the engine switched off and the hood up, push the belt gently downward. You should be able to depress it about 10 mm (1/2 in). Midway between fan pulley and alternator pulley by a force 10 kg (22.0 lb). If the fan belt has become slack through wear, loosen the fixing and adjusting bolts, and move the alternator away from the engine. This will eliminate the slack. Tighten the bolts again, and make sure that the belt has been tightened correctly. If tightened excessively it will wear rapidly and also overload the water pump and alternator bearings.

Fan belt deflection:
8 to 12 mm
(0.3150 to 0.4724 in)

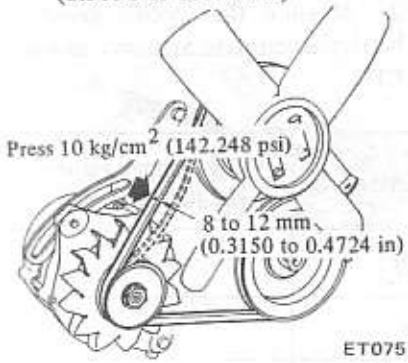


Fig. ET-2 Adjusting fan belt tension

RETIGHTENING CYLINDER HEAD BOLTS, MANIFOLD BOLTS & NUTS AND CARBURETOR SECURING NUTS

Cylinder head bolts:

When the engine is cold, tightening should be made in several steps and in the sequence shown in Figure ET-3, starting with the center and moving toward the ends.

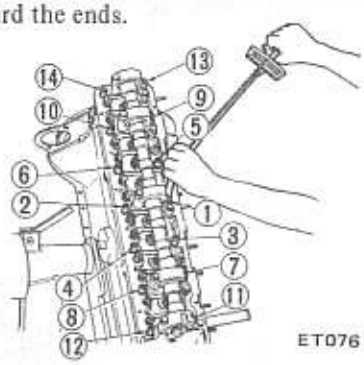


Fig. ET-3 Tightening sequence

Tightening torque (cold)
1st turn:
4.0 kg-m (30 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)

Next warm up the engine and retighten the bolts to the specification of hot condition.

Tightening torque (hot)
7.0 to 9.0 kg-m
(51 to 65 ft-lb)

Manifold nuts:

Intake and exhaust manifold bolts and nuts should be tightened to the specified torque.

Tightening torque:
Intake and exhaust manifold:
1.2 to 1.6 kg-m
(9 to 12 ft-lb)

Carburetor nuts:

Carburetor installation nuts should be tightened securely. Leaks at this area may cause rough idle, surging, deceleration popping or deceleration whistle.

Tightening torque:
Carburetor nuts
0.8 to 1.2 kg-m
(6 to 9 ft-lb)

CHECKING ENGINE COMPRESSION

Note: If this test is to be performed, it should be done when plugs are removed for service during basic tune-up procedure.

Unless checking for worn rings or for the cause of low speed miss, compression check should not be necessary.

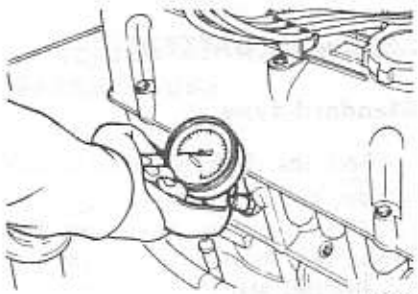


Fig. ET-4 Testing compression pressure

Test compression with engine warm, all spark plugs removed and throttle and choke opened. No cylinder compression should be less than

80% of highest cylinder's. Excessive variation between cylinders, accompanied by low speed missing of the cylinder or cylinders which are low, usually indicates a valve not properly seating or a broken piston ring. Low pressures, even though uniform, may indicate worn rings. This may be accompanied by excessive oil consumption.

Test conclusion

If one or more cylinders read low, inject about one tablespoon of engine oil on top of the pistons in low reading cylinders through spark plug port. Repeat compression check on these cylinders.

1. If compression improves considerably, piston rings are defective.
2. If compression does not improve, valves are sticking or not seating properly.
3. If two adjacent cylinders indicate low compression and injecting oil on pistons does not increase compression, the cause may be a cylinder head gasket leak between the cylinders. Engine oil and coolant in cylinder could result from this problem.

Compression pressure kg/cm^2 (psi) at rpm

	L20A	L24	L26	
	Single carb.	Single carb.	Single carb.	Twin carb.
Standard	12.0 (171)/350	12.0 (171)/350	12.0 (171)/350	12.5 (178)/350
Minimum	9.0 (128)/350	9.0 (128)/350	9.0 (128)/350	9.0 (128)/350

LUBRICATING ACCELERATOR LINKAGE

Apply a light coat of multipurpose grease to all sliding or friction surfaces except ball joints. The entire linkage should be inspected whether or not foot rest returns to normal height smoothly when releasing foot from it. This test should be made with engine running. Added care should be taken in checking items that affect proper linkage function.

IGNITION SYSTEM

CHECKING BATTERY

Standard type

Check the 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 (0.394 to 0.787 in) above the plates. Do not overfill.
2. Measure the specific gravity of battery electrolyte.

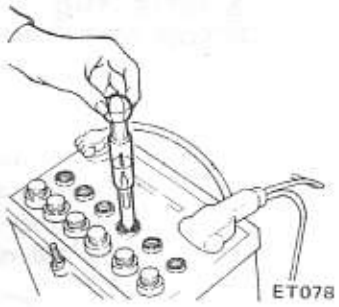


Fig. ET-5 Checking the specific gravity of battery electrolyte

Self-filling battery

In case of self-filling battery.

1. Remove filler cap and inspect the float position. If the float is lower than the normal condition, add distilled water into case attached on battery upper face. The fluid will be equally self-filled for each cell.

After replenishing, install filler cap. Do not overfill over the projections.

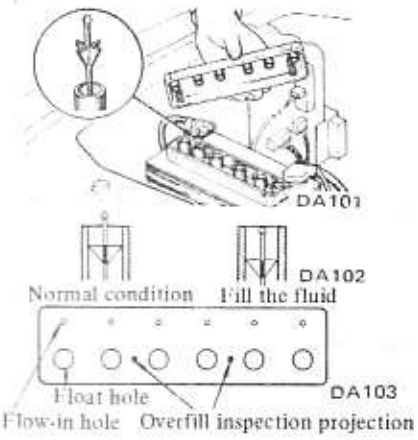


Fig. ET-6 Checking electrolyte level

2. Measure the specific gravity of battery electrolyte as shown in Figure ET-5.

	Permissible value	Fully charged 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 the top of battery and terminals with a solution of baking soda and water. Rinse off and dry with compressed air. The 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 the top of battery may cause corrosion of straps. After tightening terminals, coat them with petrolatum (vaseline) to protect them from corrosion.

CHECKING AND ADJUSTING IGNITION TIMING

With distributor vacuum line disconnected and vehicle operating at normal idle speed or below, set ignition timing.

The timing can be observed by the stationary pointer at front cover and the grooves on crankshaft pulley with a device called a stroboscopic light (also referred to as a timing light).

Note that the pulley groove is graduated 5° per scale division in terms of the crank angle. The top dead center is located to the second from left side as viewed from the inspector's side.

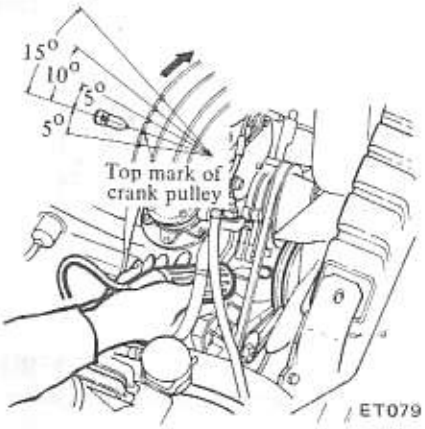


Fig. ET-7 Checking ignition timing

Adjust the timing to the specifications, turning distributor body loosened securing bolts.

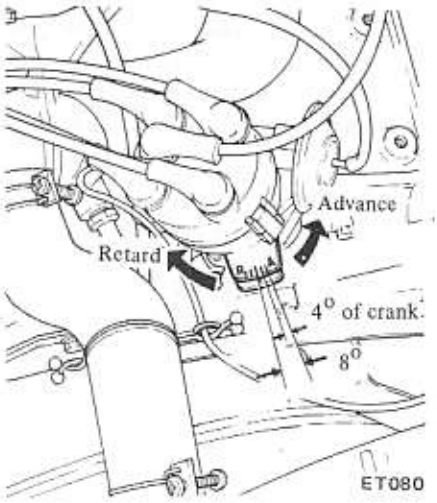


Fig. ET-8 Adjusting ignition timing

Ignition timing (B.T.D.C./rpm)

		L20A	L24	L26	
		Single carb.	Single carb.	Single carb.	Twin carb.
Manual transmission		10°/550	17°/550	10°/550	17°/650
Automatic transmission		10°/650	17°/650	10°/650	17°/700
*	Manual transmission	–	10°/650	10°/650	10°/650
*	Automatic transmission	–	10°/650	10°/650	10°/700

* : For cars equipped with device required by E.C.E. air pollution regulations.

Note: On the car equipped with air conditioner, increase engine speed by 150 rpm higher than that indicated in the chart while F.I.C.D. (First Idle Control Device) is in operation.

CHECKING DISTRIBUTOR BREAKER POINT

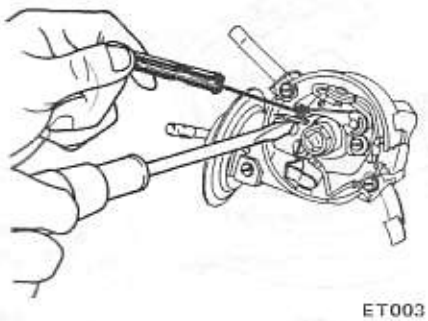


Fig. ET-9 Checking distributor point gap

Remove distributor cap and inspect points for excessive burning or pitting. Replace points if necessary. Use a point file to clean contact area and remove scale from points. Adjust distributor point gap. Filing is for cleaning purposes only. Do not attempt to remove all roughness. Adjust distributor dwell angle on all engines.

Distributor point gap:
0.45 to 0.55 mm
(0.0177 to 0.0217 in)
Dwell angle:
35° to 41°

CHECKING OR REPLACING SPARK PLUGS

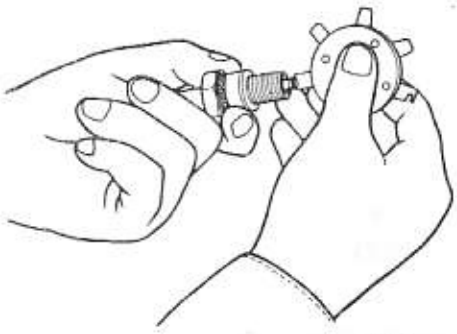


Fig. ET-10 Checking spark plug gap

See that correct spark plugs are used. Spark plug insulators should be thoroughly cleaned to prevent possible flash-over.

Thoroughly clean lower insulator and cavity by blast type cleaner. File both electrodes flat (rounded surfaces increase voltage required to fire plugs) and set gap. Tighten plugs to torque.

Spark plug gap:
0.8 to 0.9 mm
(0.0315 to 0.0354 in)
Tightening torque:
1.5 to 2.0 kg-m
(11 to 14 ft-lb)

CHECKING AND CLEANING HIGH TENSION WIRES, DISTRIBUTOR CAP AND ROTOR

Note: This operation is to be performed while checking distributor points.

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 were 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.

GREASING DISTRIBUTOR SHAFT AND CAM HEEL

Clean and apply multi-purpose grease to cam and wick.

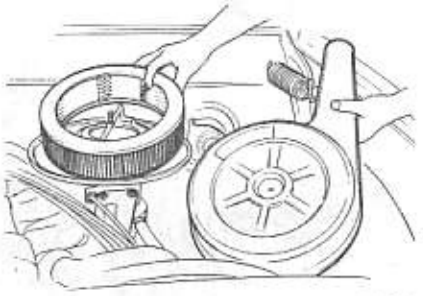
Note: Do not apply grease excessively.

FUEL SYSTEM

REPLACING AIR CLEANER FILTER (VISCOUS TYPE)

The air cleaner uses a wet paper type cleaner element (viscous type). As this element has been manufactured under special treatment, there is no need of cleaning until it is replaced with a new one. Although the cleaner element looks dirty, do not attempt to clean. The cleaning performance in constantly maintained although it looks contaminated. Care must be taken not to injure cleaner element.

Replace element with a new one at recommended interval, more often under dusty driving conditions.



ET081

Fig. ET-11 Replacing air cleaner filter

CLEANING OR REPLACING AIR CLEANER FILTER (DRY TYPE)

It is necessary to clean the element or replace it at the recommended interval, more often under dusty driving conditions.

AUTOMATIC TEMPERATURE CONTROL AIR CLEANER (L26(T) ENGINE MODEL ONLY)

RELACING CARBURETOR AIR CLEANER FILTER

Paper element (viscous type) has been specially treated to eliminate cleaning until replacement. It should be replaced at regular intervals, or more often according to operating conditions.

CHECKING HOT AIR CONTROL VALVE

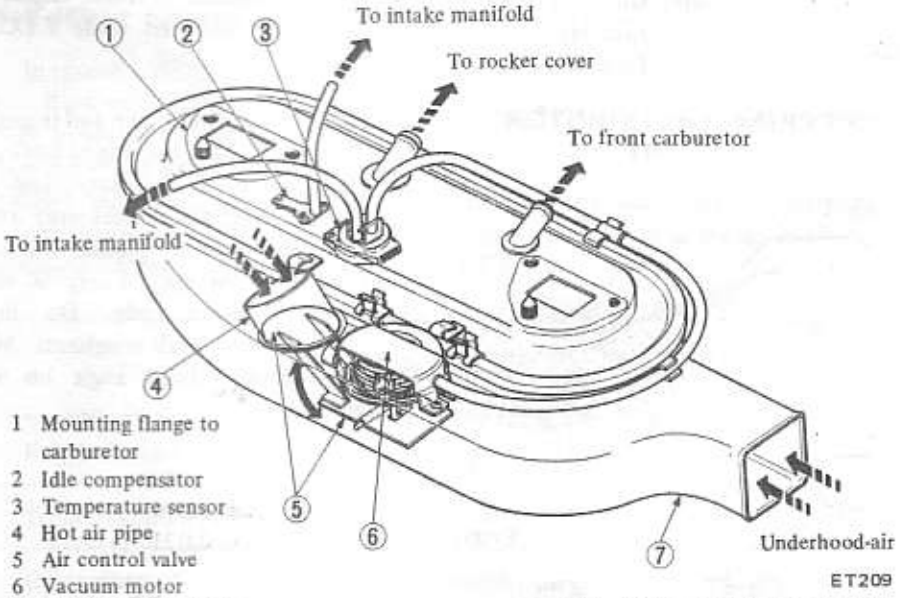
Inspection

Among the possible malfunctions of this device, the most probable is permanent opening of the valve.

This malfunction is not noticeable in warm weather, but in cold weather appears as poor engine performance; tardy acceleration, hesitation or engine stalling. In such a case, first inspect this device before checking the carburetor.

Another possible malfunction is that the underhood-air is kept closely by the valve regardless of the temperature of suction air around the sensor while the engine is running. This malfunction appears in the form of extremely excessive fuel consumption or a decrease in power.

Inspection of this device should proceed as follows:



1 Mounting flange to carburetor
2 Idle compensator
3 Temperature sensor
4 Hot air pipe
5 Air control valve
6 Vacuum motor
7 Underhood-air inlet

ET209

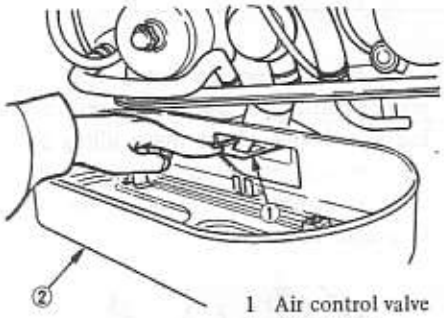
Fig. ET-12 A.T.C. Air cleaner

Appearance

1. First check that vacuum hoses are connected to correct positions.
2. Inspect hoses for cracks, distortion or plugging.

Checking vacuum motor

1. With engine shut down, remove air cleaner cover. Do not lift cover upward.
2. Inspect position of air control valve. The valve is correct if it keeps underhood-air inlet open and hot air inlet closed. Otherwise, inspect the valve linkage.

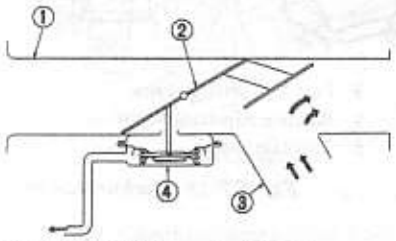


1 Air control valve
2 Air cleaner

ET067

Fig. ET-13 Inspecting valve position

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



Connect directly to balance tube connector

1 Air inlet
2 Air control valve
3 Hot air pipe
4 Vacuum motor

ET068

Fig. ET-14 Checking vacuum motor

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

Checking temperature sensor

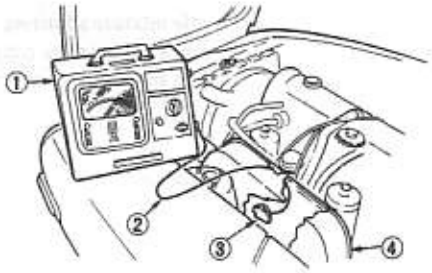
1. Perform engine test with temperature around the sensor maintained below 30°C (86°F). Make sure that the engine is cooled down before test is conducted.
2. Before starting engine, open air cleaner cover and make certain that valve on underhood-air side is fully open.
3. Start engine and operate at idling speed. The valve is in good condition if underhood-air side fully closes immediately after starting.

Note: It is good practice not to leave air cleaner open. Open it only when checking.

4. Carefully watch valve to ascertain that it gradually begins to open as the engine warms up. When ambient temperature is low, it takes considerable time for valve to begin to open, or in some cases it hardly opens. This should not, however, be regarded as failure.

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

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



ET070

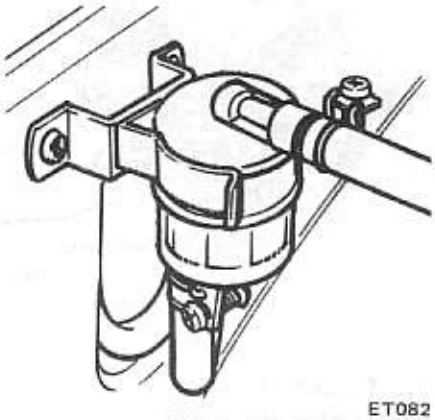
1 Thermister
2 Cord
3 Temperature sensor
4 Air cleaner

Fig. ET-15 Checking temperature 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 (100°F) and 55°C (131°F). If the reading is erroneous, replace sensor.

REPLACING FUEL FILTER

Check for a contaminated element, and water deposit.

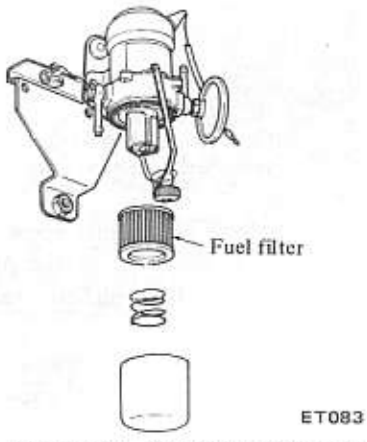


ET082

Fig. ET-16 Fuel strainer

All engines use a cartridge type strainer, so if a malfunction is detected, replace as an assembly.

CLEANING FUEL FILTER COUPLED WITH ELECTRIC PUMP



ET083

Fig. ET-17 Replacing fuel pump filter

Check for a contaminated filter and water deposit. If filter is faulty, replace it with a new one.

Also check packings and O-rings, if they are faulty, replace with new parts.

ADJUSTING CARBURETOR-IDLE RPM MIXTURE RATIO

o SINGLE CARBURETOR

Idle adjustment is made by throttle adjust screw and idle adjust screw after engine is warmed up. See Figure ET-14.

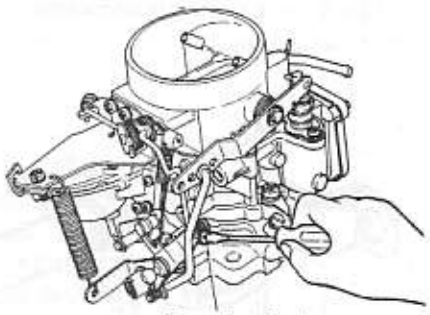


Fig. ET-18 Idling adjustment

1. Check to be sure that float level is correct while engine is at idle speed.
2. Using a suitable screwdriver, turn out idle adjust screw approximately two or three turns, starting from fully closed position. Turn in throttle adjust screw two or three turns and start engine.
3. Turn out throttle adjust screw gently until specified engine idle speed is approximately obtained.
4. Turn in or out idle adjust screw until engine runs smoothly at the highest speed.
5. Turn out throttle adjust screw until specified engine speed is obtained.
6. Readjust idle adjust screw until engine runs smoothly at the highest speed (with the highest vacuum reading).

Repeat these operations until smooth and specified engine speed has been obtained.

Note: Do not attempt to screw down the idle adjust screw completely. If damage to the tip may result which will tend to cause malfunctions.

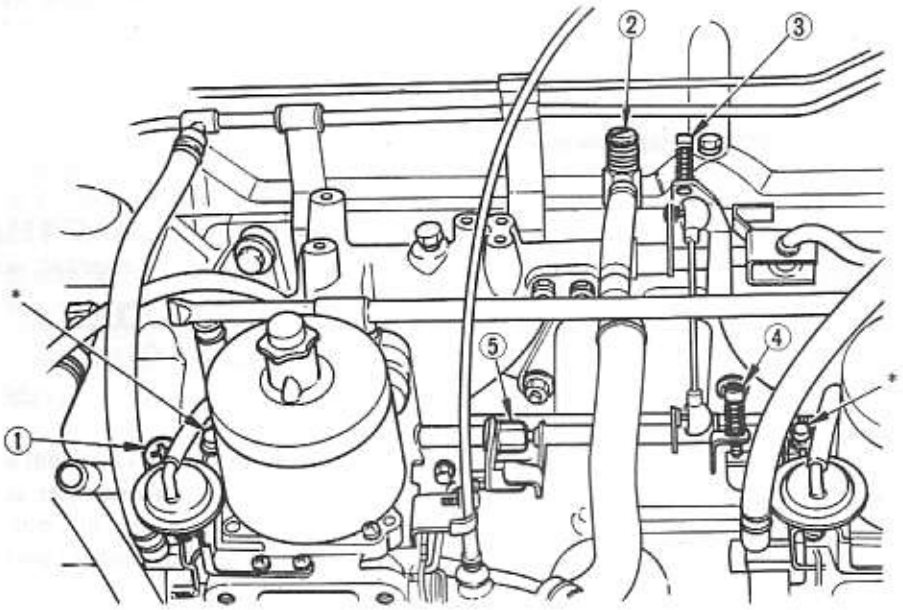
Transmission \ Engine		L20A	L24	L26	
		Single carb.	Single carb.	Single carb.	Twin carb.
Manual transmission		550	550	550	650
Automatic transmission		650	650	650	700
*	Manual transmission	–	650	650	650
*	Automatic transmission	–	650	650	700

* : For cars equipped with device required by E.C.E. air pollution regulations.

TWIN CARBURETOR

The procedure for idling adjustment is described herein. Proper idling adjustment of these two carburetors is extremely important in obtaining peak car performance and in effectively reducing fuel consumption.

It should also be noted that improper carburetor adjustment not only has an adverse effect upon idling but also upon acceleration, engine output, fuel consumption, and other car performance factors.



1 Idle mixture adjusting screw (idle limiter cap)
2 Idle speed adjusting screw
3 Fast idle setting screw
4 Balance adjusting screw
5 Throttle shaft

Fig. ET-19 Carburetor linkage

Notes:

a. **Idle limiter cap equipped with idle mixture adjusting screw must not be removed.**
b. **Screws marked "*" are properly adjusted at factory and required no further adjustment.**

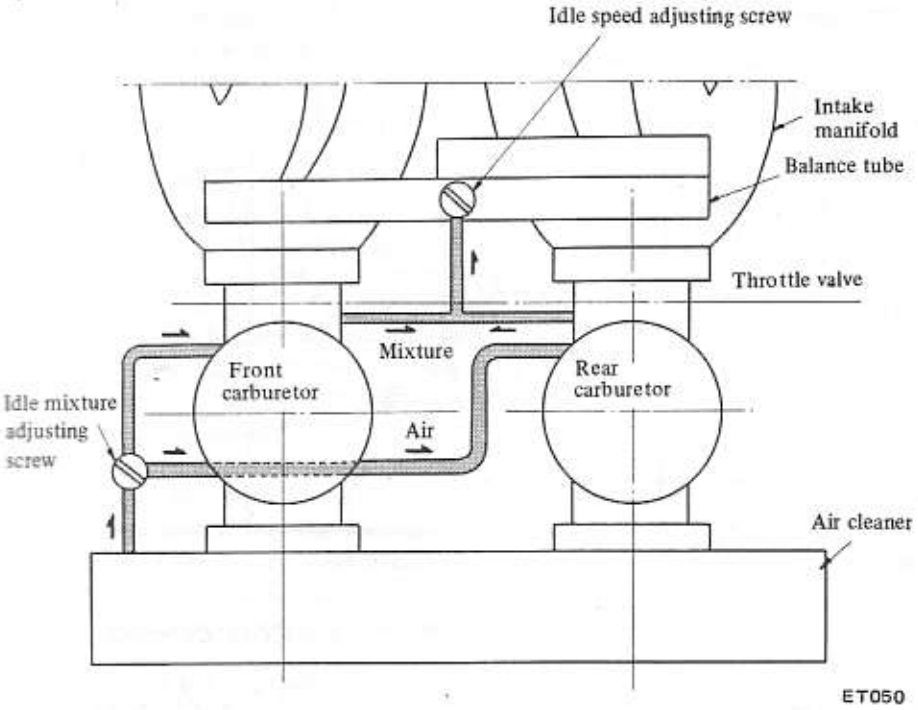


Fig. ET-20 Adjusting idle speed adjusting screw

1. Warm up engine by driving car for more than 20 minutes at a speed of about 48 km/h (30 MPH).
2. Remove air cleaner cover and oil damper cap, raise suction piston with a suitable soft bar. Make sure that suction piston rises smoothly.
3. Check damper oil level and add oil (MS #20 or 10W-30) if necessary.

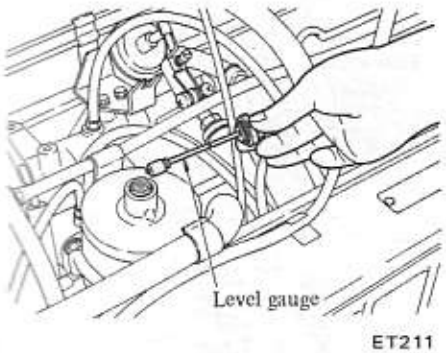


Fig. ET-21 Checking damper oil level

4. Loosen balance adjusting screw and fast idle setting screw.

Note: Make sure operation of front carburetor is separated from rear one.

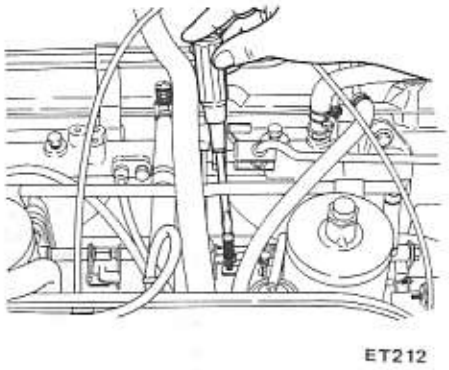


Fig. ET-22 Loosening balance adjusting screw

5. Connect engine tachometer and timing light in proper position.
6. Adjust idling speed by turning idle speed adjusting screw.

L26 (Twin carb.)

Manual transmission ..... 650 rpm

Automatic transmission ..... 700 rpm

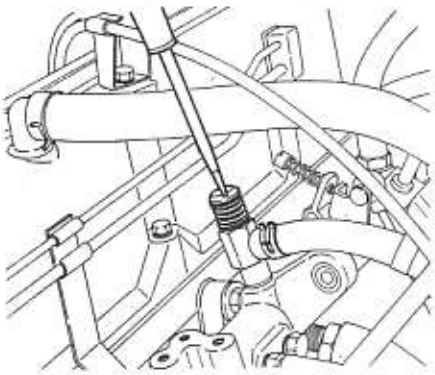


Fig. ET-23 Adjusting idle speed adjusting screw

Notes:

a. When idle speed adjusting screw is turned clockwise, idling speed decreases; it increases when the screw is turned counterclockwise.
b. When idle speed adjusting screw is turned fully clockwise during the above adjustment and engine speed cannot be reduced below 700 rpm, the accelerator linkage is incorrectly adjusted. Under normal conditions, the auxiliary throttle shaft and throttle shaft should have a slight play at idling speed. In other words, the auxiliary throttle shaft should be provided with a play " " which corresponds to the clearance Ta = Tb shown in Figure ET-24.
c. When adjusting in idling condition for 1 to 2 minutes or more, be sure to race the engine beforehand.

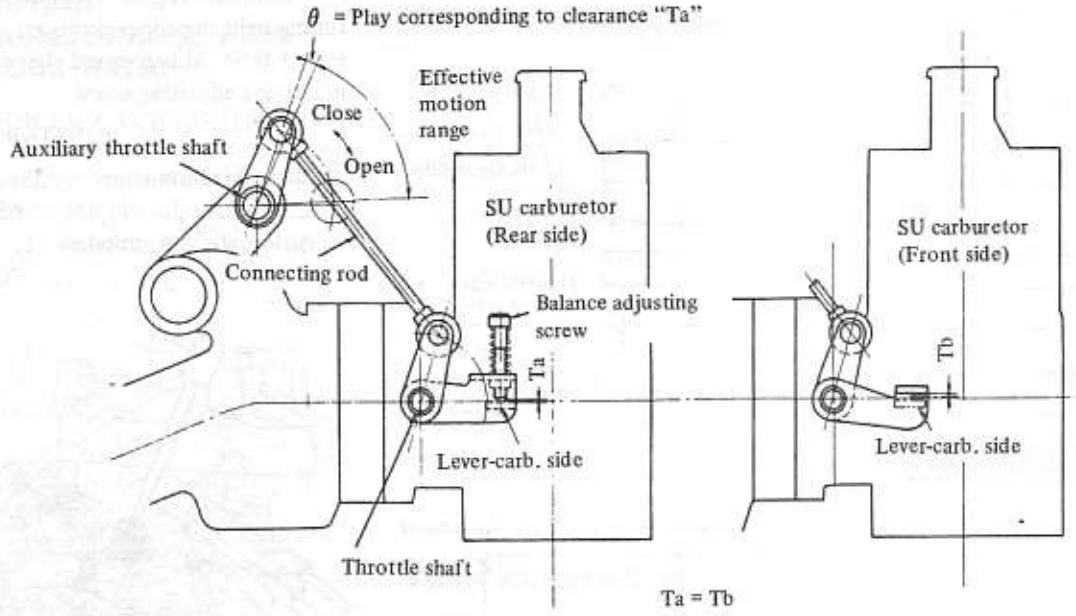


Fig. ET-24 Carburetor linkage

7. Turn idle mixture adjusting screw clockwise or counterclockwise until proper air-fuel mixture ratio is obtained.

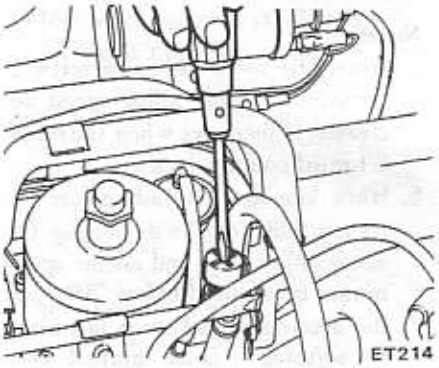


Fig. ET-25 Adjusting idle mixture adjusting screw

Note: Engine speed varies as idle mixture adjusting screw is turned. Optimum air-fuel mixture ratio can be told by the highest engine speed within adjusting range.

8. Turn idle adjust screw until engine runs at specified idle speed.
9. Set ignition timing to specifications by adjusting distributor as shown below.

Ignition timing of the L26 (Twin carb.) engine (B.T.D.C./rpm)

Manual transmission	17/650 (10/650)
Automatic transmission	17/700 (10/700)

Note: ( ) for E.C.E.

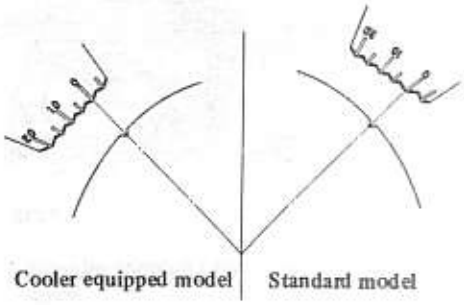


Fig. ET-26 Checking ignition timing

10. If engine speed changes after ignition timing has been adjusted, repeat steps 6, 7 and 8 above.
11. Adjust fast idle setting screw until engine runs at about 1,400 rpm.

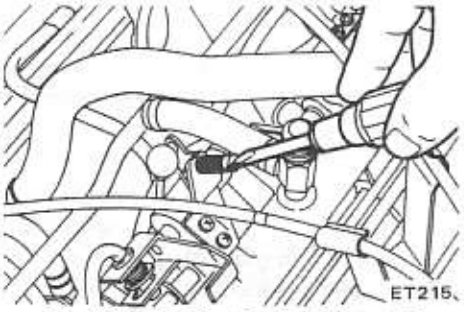


Fig. ET-27 Adjusting fast idle setting screw

12. Using a flow meter, adjust balance adjusting screw so that front and rear carburetor intake air volumes are balanced.

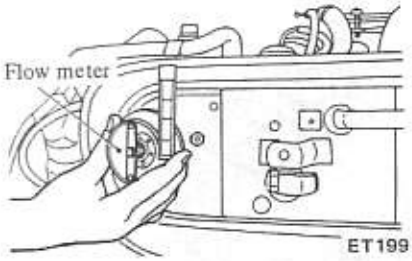


Fig. ET-28 Setting flow meter

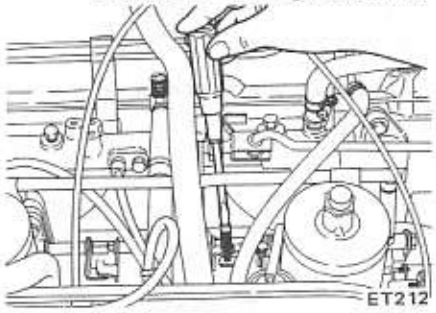


Fig. ET-29 Adjusting balance adjusting screw

Notes:

a. **Attach flow meter to the front side air horn of air cleaner, turn air flow adjusting screw of flow meter, and align the upper end of float in glass tube with scale.**
   Then attach flow meter to the rear side air horn of air cleaner. (Do not adjust air flow adjusting screw of flow meter.) If flow meter float is not aligned with front carburetor scale, turn balance adjusting screw and align float with front carburetor scale.
b. **Stand flow meter float vertically.**
c. **The flow meter is used to hinder engine air intake, it is therefore recommended that the flow meter be used for a very short period of time (one to two seconds).**
   It should not be used continuously.

12. Turn fast idle setting screw out completely until engine runs at the specified idle speed. If necessary, adjust idle speed with idle speed adjusting screw. After adjustment, race engine two or three times to ensure that specified idle speed is obtained each time.

Note: **Make sure that there is a clearance of 2 mm (0.078 in) between lever and tip of screw when fast idle setting screw is turned out.**
To prevent it from falling do not turn fast idle setting screw excessively.

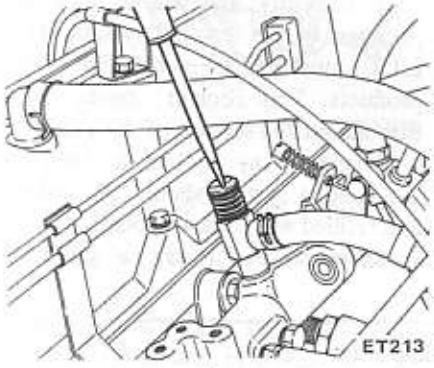


Fig. ET-30 Adjusting idle speed adjusting screw

CHECKING AND ADJUSTING DASH POT

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 the dash pot just touches the stopper lever.
3. Adjust the position of the dash pot by turning the nut until the engine speed is in the range from 2,300 to 2,500 rpm.
4. Make sure that the engine speed is smoothly reduced from 3,000 to 1,000 rpm within a few seconds.

Dash pots are also used on manual transmission equipped models shipped to ECE teritories where Air Pollution Regulation No. 15 is in effect.

Under no circumstances should these dash pot be adjusted in the field.

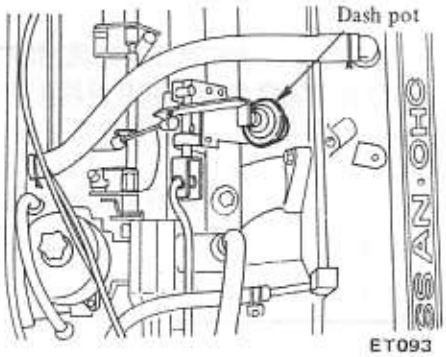


Fig. ET-31 Adjusting dash pot (Twin carb.)

CHECKING TWIN CARBURETOR DAMPER OIL LEVEL

When there is not a sufficient amount of damper oil acceleration and other operating performance features become sluggish. When new carburetors are installed on the engine, or when overhaul is performed, damper oil must be added without fail. Use engine oil MS #20 or SAE 10W-30 for damper oil. Do not use lower or higher weight oils.

To check damper oil level, remove oil cap nut and check oil level marking on the two grooves on plunger rod. No difficulty will be encountered and there is no damper until the oil level reaches the lower line. If the oil level drops below the lower line, add oil. Slowly fill damper oil to upper line.

When removing and replacing oil cap nut, be careful not to bend rod. If oil cap nut is loose, it may fall off. Be sure that it is sufficiently tightened by hand.

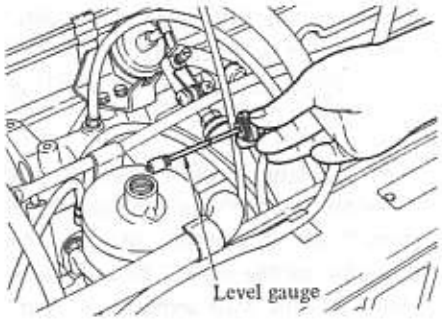


Fig. ET-32 Checking damper oil level

CHECKING FUEL LINES (HOSES, PIPINGS, CONNECTIONS, etc.) FOR LEAKS

Check fuel lines for loose connections, cracks and deterioration. Retighten loose connections; if necessary, replace any damaged or defective parts.

LUBRICANT AND COOLING SYSTEM

REPLACING OIL FILTER

The oil filter is of a full-flow cartridge type. The oil filter element is sealed in the container as a unit.

1. Check for oil leaks at packing flange. If any leakage is discovered, tighten a little, or replace oil filter assembly using Oil Filter Wrench ST1932000. When installing an oil filter, fasten it on cylinder block by hand.
2. The oil filter element should be replaced at recommended intervals.

Notes:

a. **Do not overtighten filter, or oil leakage may occur.**
b. **When assembling oil the seal ring lightly.**

CHANGING ENGINE OIL

1. Check if engine oil has been deteriorated by invading cooling water or gasoline. Drain and refill oil, if necessary.
2. Draining is best done after a good run, when the oil, being thoroughly warm, will flow readily and freely and any foreign matter will be held in suspension.

Place a large bowl or other shallow container under the engine. Then remove the oil pan drain plug. Do this carefully, as the oil will be hot and it will spurt out with some force. After completely draining the dirty oil off securely replace the oil drain plug and finally refill the engine in the usual way up to the "H" mark on the dipstick. Make sure that the car is on a level surface while draining and filling the engine.

Notes:

a. **A milky oil indicates the presence of cooling water.**
   Discover the cause for necessary correction.
b. **An oil with extremely low viscosity suggests dilution with gasoline.**

3. Check oil level, and if it is below the specified level, replenish oil of the same grade up to the H level.

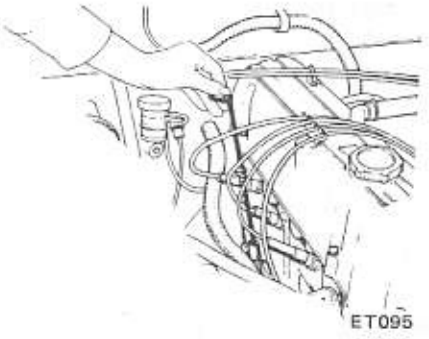


Fig. ET-33 Checking engine oil level

Oil capacity of engine (including oil filter)

			L20A	L24	L26	L26 (Twin carb.)
Capacities liters (US gal, Imp gal)	Engine oil	Oil pan	4.1 (1 3/8, 3 58)	5.0 (1 3/8, 1 1/8)	4.1 (1 7/8, 7/8)	4.0 (1 5/8, 7/8)
		With oil filter	4.7 (1 1/4, 1 3/8)	5.7 (1 1/2, 1 1/4)	4.7 (1 1/4, 1)	4.7 (1 1/4, 1)

CHECKING ENGINE OIL FOR LEAKS

Check cylinder head, front chain cover, oil pan, oil pump rocker cover, oil filter gasket, etc. or other parts for sign of leaks past their gasketed surfaces. If necessary, replace gaskets or damaged parts. After maintenance has been done, check the replaced parts to see if any leaks occur.

CHANGING ENGINE COOLANT

Scale or sediment accumulated in water jacket or radiator harms heat radiation. Thoroughly flush the system after opening two drain plugs, (one at the bottom of the radiator and the other at the left side of the cylinder block,) until clean water comes out.

Always use clean soft water in the radiator. When cold season arrives, the cooling system should be protected against freezing by a good anti-freeze solution such as NISSAN LONG LIFE COOLANT.

To allow for expansion when hot, the level, when cold, should be visible just below the filler neck. Do not overfill the system. This coolant (L.L.C.) should be changed every recommended interval.

CHANGING ENGINE COOLANT (L.L.C.)

Nissan long life coolant

L.L.C. is an ethylene glycol base product containing chemical inhibitors to protect the cooling system from rusting and corrosion. The L.L.C. does not contain any glycerine, ethyl or methyl alcohol. It will not evaporate or boil away and can be used with either high or low temperature thermostat. 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 products. This coolant can be used throughout the seasons of the year.

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

Check the level.

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°C)

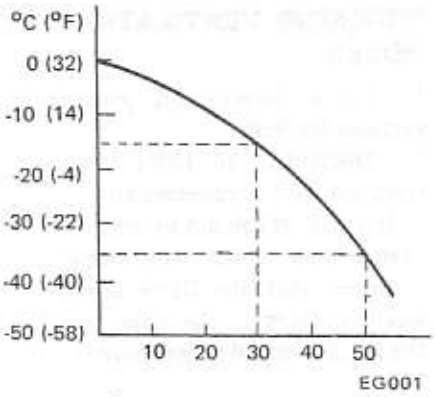


Fig. ET-34 Protection concentration

CHECKING COOLING SYSTEM HOSES AND CONNECTIONS FOR LEAKS

Check cooling system hoses and fittings for loose connections and deterioration. Retighten or replace as necessary.

Inspection of radiator cap

Apply reference pressure [0.9 kg/cm^2 (13 psi)] to radiator cap (not equipped with reservoir tank) or the reservoir tank cap by means of a cap tester to see if it is in good condition. Replace cap assembly if necessary.

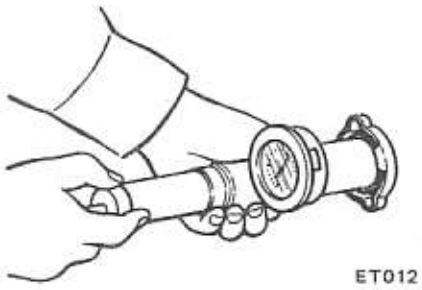


Fig. ET-35 Testing radiator cap

Cooling system pressure test

With radiator cap removed, apply reference pressure [1.6 kg/cm^2 (23 psi)] to the cooling system by means of a tester to check for leaks at the system components.

Water capacity:
with heater:
9.0 ℓ (Except model S30)
(9 ½ US qt, 7 ⅞ Imp qt),
9.4 ℓ (Model S30)
(10 US qt, 8 ¼ Imp qt)
without heater:
8.0 ℓ
(8 ½ US qt, 7 Imp qt)

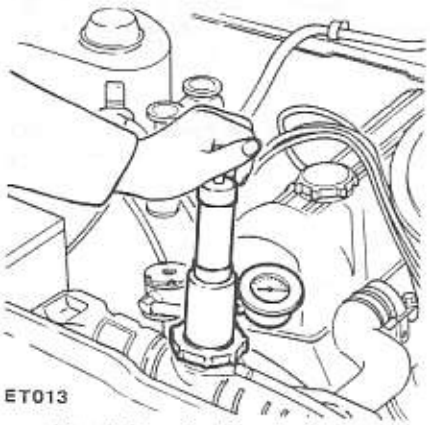


Fig. ET-36 Testing cooling system pressure

CRANKCASE EMISSION CONTROL SYSTEM

DESCRIPTION

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.

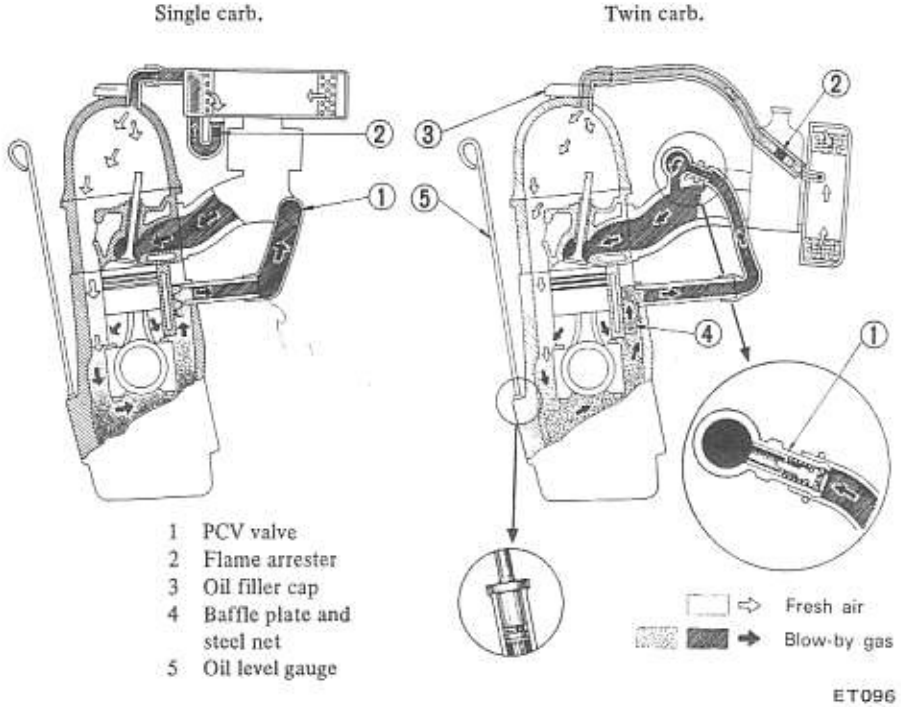


Fig. ET-37 Closed type positive crankcase ventilation system

CHECKING AND REPLACING POSITIVE CRANKCASE VENTILATION (P.C.V.) VALVE

Test PCV valve in accordance with the following method.

With engine running at idle, remove the ventilator hose from PCV 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 the valve inlet. If the valve is plugged, replace with a new one. Check for deposit plugging in the hose. Clean if necessary.

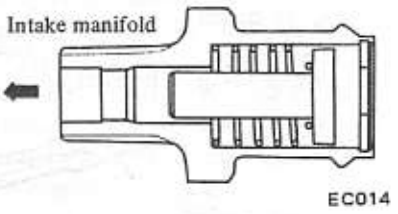


Fig. ET-38 Cross-sectional view of PCV valve

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 made free of obstructions, replace with a new one.

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

SERVICE DATA AND 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)

Fan belt deflection mm/kg (in/lb) ..... 8 to 12/10 (0.31 to 0.47/22)

Compression pressure kg/cm^2 (psi) at rpm

	L20A	L24	L26	
	Single carb.	Single carb.	Single carb.	Twin carb.
Standard	12.0 (171)/350	12.0 (171)/350	12.0 (171)/350	12.5 (178)/350
Minimum	9.0 (128)/350	9.0 (128)/350	9.0 (128)/350	9.0 (128)/350

Battery specific gravity

	Permissible value	Fully charged 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

Ignition timing (B.T.D.C./rpm)

		L20A	L24	L26	
		Single carb.	Single carb.	Single carb.	Twin carb.
Manual transmission		10°/550	17°/550	10°/550	17°/650
Automatic transmission		10°/650	17°/650	10°/650	17°/700
*	Manual transmission	–	10°/650	10°/650	10°/650
	Automatic transmission	–	10°/650	10°/650	10°/700

* : For cars equipped with device required by E.C.E. air pollution regulations.

Distributor point gap	mm (in)	0.45 to 0.55 (0.0177 to 0.0217)
Dwell angle	degree	35 to 41
Spark plug gap	mm (in)	0.8 to 0.9 (0.032 to 0.035)
Twin carb. damper oil		
grade		10W-30
capacity	cc (cu in)	3 (0.183)
Dash pot touching speed	rpm	2,300 to 2,500

Engine oil and engine coolant capacities

			L20A	L24	L26	L26 (Twin carb.)
Capacities liters (US gal, Imp gal)	Engine oil	Oil pan	4.1 (1 1/8, 7/8)	5.0 (1 3/8, 1 1/8)	4.1 (1 1/8, 7/8)	4.0 (1 5/8, 7/8)
		With oil filter	4.7 (1 1/4, 1 3/8)	5.7 (1 1/2, 1 1/4)	4.7 (1 1/4, 1 3/8)	4.7 (1 1/4, 1 3/8)
	Engine coolant	Without heater	8.0 (2 1/8, 1 3/4)	8.5 (2 1/4, 1 7/8)	8.0 (2 1/8, 1 3/4)	–
		With heater	9.0 (2 3/8, 2)	9.5 (2 1/2, 2 3/8)	9.0 (2 3/8, 2)	9.4 (2 1/4, 2 3/4)

Tightening torque

Pivot lock nut	kg-m (ft-lb)	5.0 to 6.0 (36 to 43)
Cylinder head bolt (cold)	kg-m (ft-lb)	6.5 to 8.5 (47 to 61)
Manifold nuts		
Intake and Exhaust	kg-m (ft-lb)	1.2 to 1.6 (9 to 12)
Carburetor securing nuts	kg-m (ft-lb)	0.8 to 1.2 (6 to 9)
Spark plug	kg-m (ft-lb)	1.5 to 2.0 (11 to 14)

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.
	Damaged battery.	Replace.
	Loose fan belt.	Adjust.
	Trouble in charge system.	Inspect.
	Wiring connection trouble in starting circuit.	Correct.
	Faulty starter 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 starter 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 trouble
Fuel system trouble
Valve mechanism does not work properly
Low compression

(Trouble-shooting procedure)
Check spark plug first by following procedure.
Disconnect high tension cable from one spark plug and hold it about 10 mm (0.3937 in) from the engine metal part and crank the engine.

If good spark occurs.

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

If 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 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.
	Damaged ignition coil.	Replace.
	Disconnection of high tension cable.	Replace.
	Loose connection or disconnection in primary circuit.	Repair or replace.
Fuel system 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.
	Faulty suction piston (Twin carb.).	Repair or replace.
Low compression	Incorrect spark plug tightening or defective gasket.	Tighten to normal torque or replace gasket.
	Improper grade engine oil or low viscosity.	Replace with proper grade oil.
	Incorrect valve clearance.	Adjust.
	Compression leak from valve seat.	Remove cylinder head and lap valves.
	Sticky valve stem.	Correct or replace valve and valve guide.
	Weak or defective valve springs.	Replace valve springs.
	Compression leak at cylinder head gasket.	Replace gasket.
	Sticking or defective piston ring.	Replace piston rings.
	Worn piston ring or cylinder.	Overhaul engine.
(Trouble shooting procedure) Pour engine oil into plug hole, and then measure cylinder compression.		
	Compression increases.	Trouble in cylinder or piston ring.
	Compression does not change.	Compression leaks from valve, cylinder head or head gasket.

Condition	Probable cause	Corrective action
IMPROPER ENGINE IDLING		
Fuel system trouble	Clogged or damaged carburetor jets.	Clean or replace.
	Incorrect idle adjustment.	Adjust.
	Clogged air cleaner.	Replace element.
	Damaged manifold gaskets or carburetor insulator.	Replace gasket or insulator.
	Improper float level adjustment.	Adjust.
	Faulty suction piston operation (Twin carb.).	Repair or replace.
	Faulty nozzle return (Twin carb.).	Readjust.
	Worn jet needle (Twin carb.).	Replace.
	Worn throttle valve shaft (Twin carb.).	Replace.
	Improper throttle valve interlock adjustment (Twin carb.).	Readjust.
	Loose throttle lever interlock link (Twin carb.).	Readjust or repair.
Low compression		Previously mentioned.
Others	Incorrect valve clearance.	Adjust.
	Extremely low revolution.	Adjust.
	Trouble in PCV valve.	Replace PCV valve.
	Poor acceleration above 1,000 rpm (Twin carb.).	Loosen idling adjusting nuts about a half turn.
ENGINE POWER NOT UP TO NORMAL		
Low compression		Previously mentioned.
Ignition system trouble	Incorrect ignition timing.	Adjust.
	Damaged spark plugs.	Clean, adjust or replace plugs.
	Damaged distributor points.	Dress, or replace points. Also check condenser.
Fuel system 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.
	Throttle valve does not open fully.	Readjust.
	Faulty suction piston operation (Twin carb.).	Repair or replace.
	Faulty nozzle return (Twin carb.).	Readjust.
	Clogged nozzle (Twin carb.).	Clean.
	Jet needle not properly installed (Twin carb.).	Readjust.

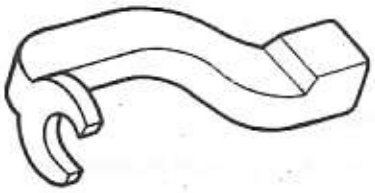
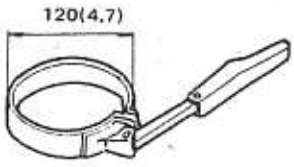
Condition	Probable cause	Corrective action
	Clogged needle valve (Twin carb.).	Clean.
	Fuel pump out of adjustment.	Readjust.
Air intake system trouble	Clogged air cleaner.	Replace element.
	Air inhaling from manifold gasket or carburetor gasket.	Replace gasket.
	Trouble in PCV valve.	Replace PCV valve.
Overheating	Insufficient coolant.	Replenish.
	Loose fan belt.	Adjust fan belt.
	Worn or defective fan belt.	Replace.
	Faulty thermostat.	Replace.
	Faulty water pump.	Replace.
	Clogged or leaky radiator.	Flush, repair or replace.
	Faulty 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.
	Faulty carburetor (lean mixture).	Overhaul carburetor.
Overcooling	Faulty thermostat.	Replace.
Others	Improper octane fuel.	Replace with specified octane fuel.
	Improper tire pressure.	Inflate to specified pressure.
	Dragging brake.	Adjust.
	Clutch slipping.	Adjust.
NOISY ENGINE		
Car knocking	Overloaded engine.	Use right gear in driving.
	Carbon knocking.	Disassemble cylinder head and remove carbon.
	Timing knocking.	Adjust ignition timing.
	Fuel knocking.	Use specified octane fuel.
	Preignition (misusing of spark plug).	Use specified spark plug.
Mechanical knocking		
Crankshaft bearing knocking.	This strong dull noise increases when engine is accelerated. To locate the place, cause a misfire on each cylinder. If the noise stops by the misfire, this cylinder generates the noise.	This is caused by worn or damaged bearings, or unevenly worn crankshaft. Renew bearings and adjust or change crankshaft. Check lubrication system.

Condition	Probable cause	Corrective action
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 diminishes 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 heard at each highest and lowest dead end of piston. To locate the place, causes a misfire on each cylinder.	This may cause a wear on piston pin, or piston pin hole. Renew piston and piston pin assembly.
Water pump noise.	This noise may be caused by worn or damaged bearings, or by the uneven surface of sliding parts.	Replace water pump with a new one.
Others.	An improper adjustment of valve clearance.	Adjust.
	Noise of timing chain.	Adjust the tension of chain.
	An excessive end-play on crankshaft.	Disassemble engine and renew main bearing.
	Note: This noise will be heard when clutch is disengaged.	
	Wear on clutch pilot bushing.	Renew bush and adjust drive shaft.
	Note: This noise will be heard when clutch is disengaged.	
ABNORMAL COMBUSTION (back fire, after fire run-on etc.)		
Improper ignition timing	Improper ignition timing.	Adjust ignition timing.
	Improper heat range of spark plugs.	Use specified spark plugs.
Fuel system trouble	Damaged carburetor or manifold gasket. (back fire, after fire).	Replace them with new parts.
	Faulty carburetor jet.	Disassemble carburetor and check it.
	Improper function of the float.	Adjust the level, and check needle valve.
	Uneven idling. (Run on)	Adjust.
Defective cylinder head, etc.	Improperly adjusted valve clearance.	Adjust.
	Excess carbon in combustion chamber.	Remove head and get rid of carbon.
	Damaged valve spring (back fire, after fire).	Replace it with a new one.

Condition	Probable cause	Corrective action
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.
	Damaged 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.
POOR FUEL ECONOMY		
See the explanation of the power decrease		
Others	Exceeding idling revolution.	Adjust it to the designated rpm.
	Faulty acceleration recovery.	Adjust it.
	Fuel leakage.	Repair or tighten the connection of fuel pipes.
	Poor fuel economy (Twin carb.).	Tighten idling adjusting nuts a quarter to a half turn.
Excessive fuel consumption	Faulty suction piston operation (Twin carb.).	Repair or replace.
	Faulty nozzle return (Twin carb.).	Readjust.
	Worn jet needle (Twin carb.).	Replace.
	Worn nozzle jet (Twin carb.).	Replace.
	Jet needle not properly installed (Twin carb.).	Readjust.
	Improper throttle valve interlock adjustment (Twin carb.).	Readjust.

Condition	Probable cause	Corrective action
TROUBLE IN OTHER FUNCTIONS		
Decreased oil pressure	Inadequate oil quality.	Use the designated oil.
	Overheat.	Previously mentioned.
	Defective function of oil pump regulator valve.	Disassemble oil pump and repair or renew it.
	Functional deterioration of oil pump.	Repair or replace it with a new one.
	Blocked oil filter.	Renew it.
	Increased clearance in various sliding parts.	Disassemble and replace the worn parts with new ones.
	Blocked oil strainer.	Clean it.
	Troubles in oil gauge pressure switch.	Replace it with a new one.
Excessive wear on the sliding parts	Oil pressure decreases.	Previously mentioned.
	Faulty quality or contamination of oil.	Exhange the oil with porper one and change element.
	Defective air cleaner.	Chae element.
	Overheat or overcool.	Previously mentioned.
	Improper fuel mixture.	Check the fuel system.
Scuffing of sliding parts	Decrease in oil pressure.	Previously mentioned.
	Insufficient clearances.	Readjust to the designated clearances.
	Overheat.	Previously mentioned.
	Improper fuel mixture.	Check the fuel system.
Engine operation is irregular or erratic	Worn suction piston (Twin carb.).	Repair or replace.
	Insufficient damper oil, or improper oil used (Twin carb.).	Replenish or replace.
	Improper idling adjustment (Twin carb.).	Readjust.
	Jet needle not properly installed (Twin carb.).	Readjust.

SPECIAL SERVICE TOOLS

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or figure No.
1.	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.ET-1
2.	EG16700000 Flow meter	This tool is used to bring an Twin carburetor into functional synchronization. Synchronization is properly made by keeping equal float (or fuel) levels in this unit.  SE198	Twin car-buretor	Fig.ET-21
3.	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 ET-11

SERVICE MANUAL

MODEL

L20A, L24 & L26 SERIES

ENGINES

NISSAN

NISSAN MOTOR CO., LTD.

TOKYO, JAPAN

SECTION EM

ENGINE MECHANICAL

EM

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GENERAL DESCRIPTION

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L20A, L24 AND L26 ENGINES

The 230 series models are powered either by the L20A or L26 engines. The L24 engine with a single carburetor is used on the HGC110 series models and the twin carburetor of L26(T) engine is on the S30 series models.

These engines feature O.H.C. valves, wedge-shaped combustion chamber, aluminum heads and fully balanced 7-bearing crankshaft to turn out smooth, dependable power. The cylinder block is cast in a single unit, featuring deep skirting.

The twin carburetor provides proper air-fuel mixture for L26(T) engine. This is also equipped with a single, 2-barrel, downdraft carburetor.

The L20A and L24 engines use only the same single, 2-barrel carburetor that is used on the L26 engine.

Main specifications

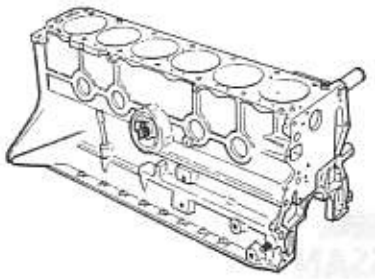
	L20A	L24	L26	
	Single carb.	Single carb.	Single carb.	Twin carb.
Displacement cc (cu in)	1,998 (121.9)	2,393 (146.0)	2,565 (156.5)	2,565 (156.5)
Bore x stroke mm (in)	78 x 69.7 (3.071 x 2.749)	83 x 73.7 (3.071 x 2.902)	83 x 79 (3.271 x 3.110)	83 x 79 (3.271 x 3.110)
Compression ratio	8.6	8.5	8.6	8.3
Ignition timing for M/T B.T.D.C. (for A/T)	10°/550 (650)	17°/550 (650)	10°/550 (650)	10°/650 (700)

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

Note: On vehicles equipped with an air conditioner, increase engine speed by 150 rpm higher than that indicated above while F.I.C.D. is in operation.

CYLINDER BLOCK

The cylinder block, which is of a monoblock special casting structure, adopts the seven bearing-support system, for quietness and higher durability. Of a highly rigid deep-skirt design, it requires no complicated tappet chamber because of the OHC engine system and thus is light-weight.

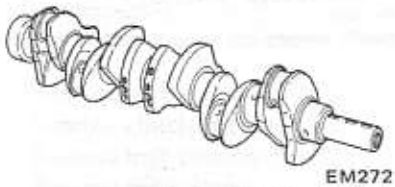


EM271

Fig. EM-1 Cylinder block

CRANKSHAFT

The crankshaft is fabricated of special forged steel. Provided with a high capacity balance weight, it shows quietness and high durability at high speed operation. Main bearings are lubricated from oil holes which intersect the main oil gallery which runs parallel to the cylinder bores.



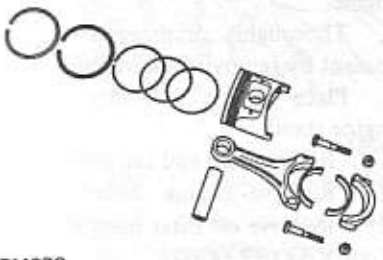
EM272

Fig. EM-2 Crankshaft

PISTONS AND CONNECTING RODS

New-design light-weight pistons are of cast aluminum slipper-skirt type with invar-strut. The piston pin is of a special steel hollow type and is connected to the piston in a full floating fit, and is press-fitted onto the connecting rod.

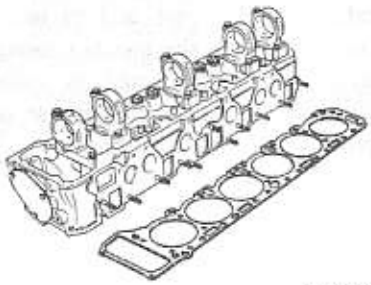
Connecting rods are made of forged steel. Full pressure lubrication is directed to the connecting rods by drilled oil passages from the adjacent main bearing journal. Oil holes at the connecting rod journals are located so that oil is supplied to give maximum lubrication just proper to full bearing load.



EM273

Fig. EM-3 Piston and connecting rod

CYLINDER HEAD



EM274

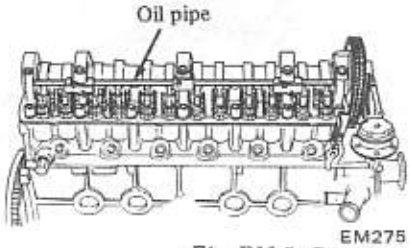
Fig. EM-4 Cylinder head

The cylinder head is made of light and strong aluminum alloy with good cooling efficiency. A brass cast 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.

CAMSHAFT

Camshaft is made of special cast iron and located inside the rocker cover. In this engine five aluminum alloy brackets support the camshaft.



EM275

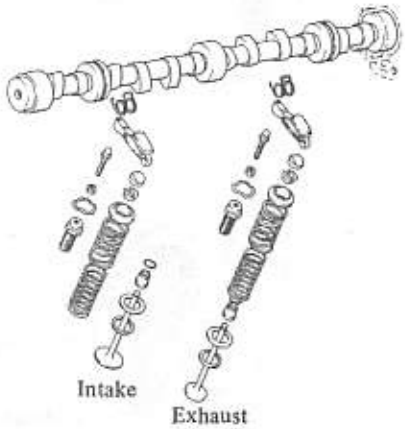
Fig. EM-5 Camshaft

Camshaft bearings are lubricated from oil holes which intersect the main oil gallery of the cylinder head.

There is no oil gallery in the camshaft and to lubricate the cam pad surface of the rocker arm an oil pipe with many oil holes is provided along the camshaft. This oil pipe provided is supported by No. 1, 3 and 5 camshaft brackets and from No. 3 brackets lubrication is supplied to this oil pipe.

VALVE MECHANISM

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

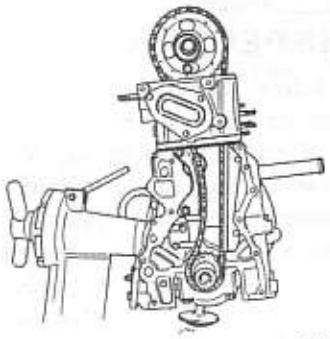


EM276

Fig. EM-6 Valve mechanism

CAMSHAFT DRIVE

Camshaft is driven by a double row roller chains driven by crankshaft. The tension of the chain is controlled by a chain tensioner which is operated by spring and oil pressure.



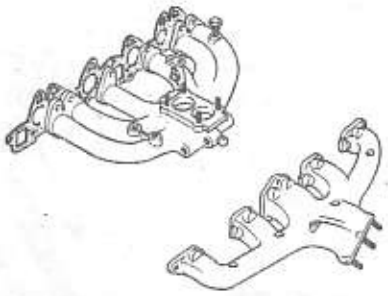
EM277

Fig. EM-7 Camshaft driving chain

MANIFOLDS

The intake manifold is aluminum cast.

The exhaust manifold types, is a dual exhaust system intended to prevent decline in output due to exhaust interference and to increase output through the inertia scavenging action. It is connected to exhaust pipes by flanges, which insure complete absence of exhaust leaks.



L20A, L24 & L26 (Single carb.)

Fig. EM-8 Exhaust and intake manifolds

ENGINE DISASSEMBLY

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DISASSEMBLY EM-4
PISTON AND CONNECTING ROD EM-6
CYLINDER HEAD EM-6

PRELIMINARY CLEANING AND INSPECTING

Before disassembling engine, observe the following items:

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 sign of leak past their gasketed surfaces.
2. Check carburetor and fuel pump for condition; fuel hoses for deterioration, cracks or otherwise 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 parts for visual defects and broken or missing 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 vehicle, refer to relative 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 the engine stand.
   (1) Remove fan and fan pulley.
   (2) Remove engine mounting R.H.
   (3) 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 engine mounting.
   (6) Set engine on the stand.

Engine Attachment ST05340000
Engine Stand ST0501S000

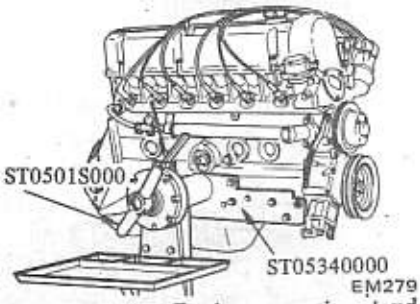


Fig. EM-9 Engine on engine stand

4. Remove oil level gauge.
5. Remove clutch assembly.
6. Remove high tension cable.
7. Remove spark plugs.
8. Remove fuel lines and heater hoses.
9. Remove fuel pump.

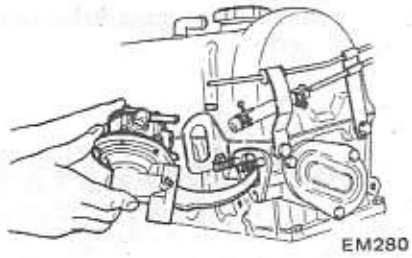


Fig. EM-10 Removing fuel pump

10. Remove thermostat housing.
11. Remove engine mounting L.H.
12. Remove intake manifolds with carburetor.
13. Remove exhaust manifold.

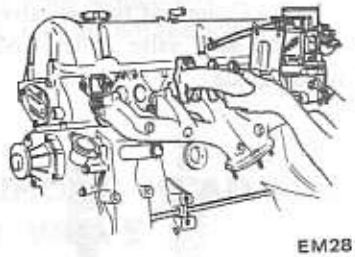


Fig. EM-11 Removing manifolds

14. Remove crank pulley using Puller Crank Pulley ST16540000.

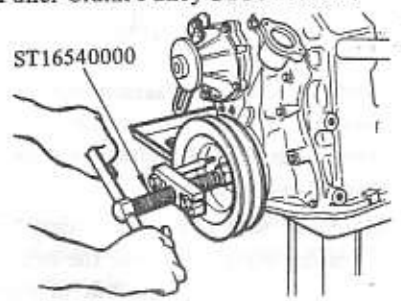


Fig. EM-12 Removing crank pulley

15. Remove water pump.
16. Remove rocker cover.
17. Remove fuel pump.
18. Remove fuel pump drive cam.
19. Remove camshaft sprocket using Chain Stopper ST17420001.

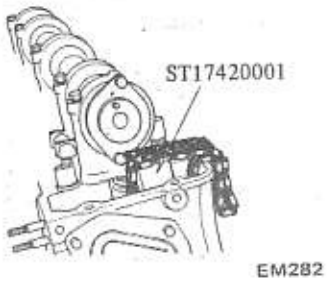


Fig. EM-13 Removing camshaft sprocket

20. Remove oil pipe.
21. Remove cylinder head assembly. Use Cylinder Head Bolt Wrench ST10120000 to remove cylinder head bolts. Loosen bolts from ① to ⑭ as shown in Figure EM-14.

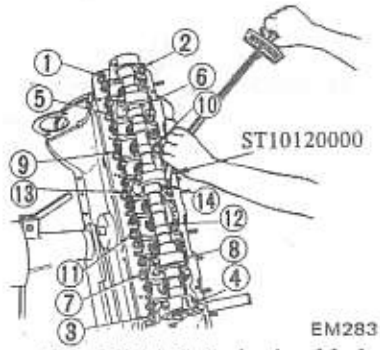


Fig. EM-14 Cylinder head bolt loosening sequence

Note: For the convenience of cylinder head replacement, Chain Stopper ST17420001 is prepared to support timing chain during the service operation. By using this tool, timing marks on crankshaft sprocket and timing chain will be unchanged. So the work for aligning timing marks will be saved so much.

22. Invert engine.
23. Remove oil pan and oil strainer.
24. Remove oil pump and its drive spindle.
25. Remove front cover.

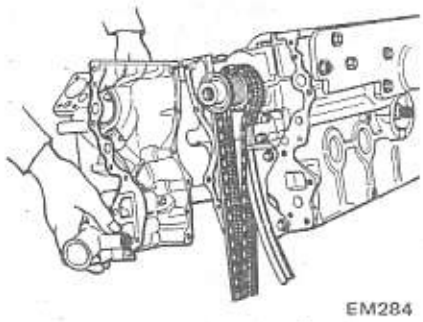


Fig. EM-15 Removing front cover

26. Remove chain tensioner and chain guides.

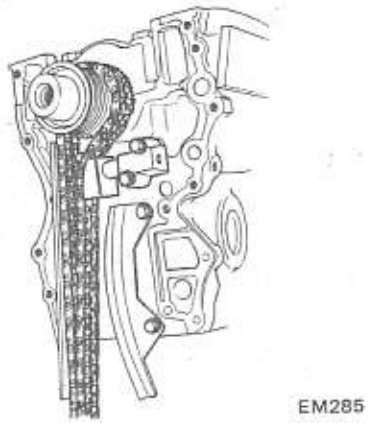


Fig. EM-16 Removing chain tensioner and timing chain

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

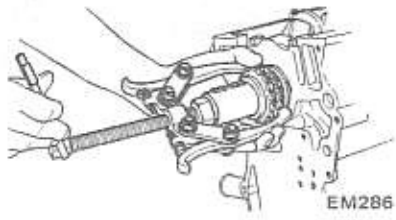


Fig. EM-17 Removing chain drive sprocket

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

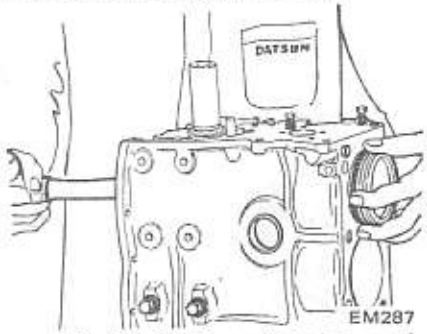


Fig. EM-18 Removing piston and connecting rod assembly

30. Remove flywheel and end plate. Be careful not to drop it.

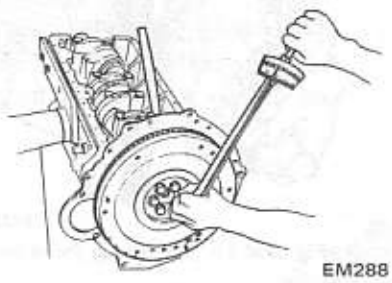


Fig. EM-19 Removing flywheel

31. Remove main bearing caps.

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

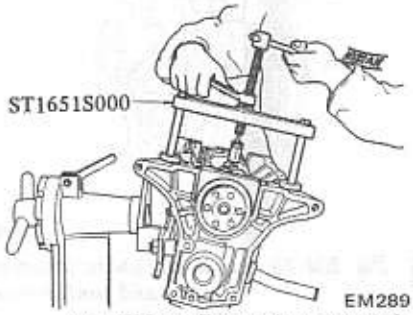


Fig. EM-20 Removing rear main bearing cap

32. Remove rear oil seal.

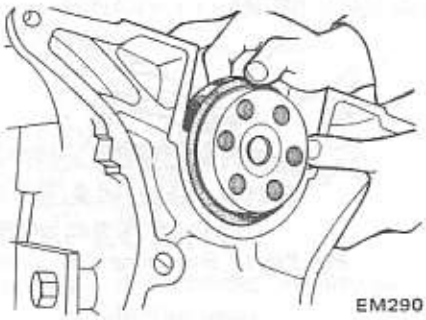


Fig. EM-21 Removing rear oil seal

33. Remove crankshaft.

34. Remove buffle plate and cylinder block net.

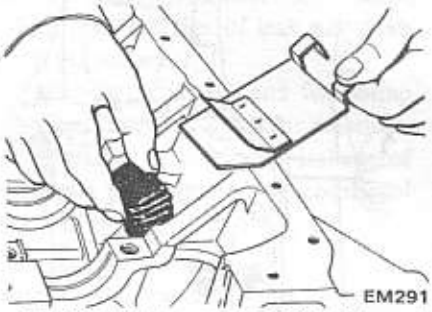


Fig. EM-22 Removing buffle plate and net

PISTON AND CONNECTING ROD

1. Remove piston rings with a ring remover.

Note: Avoid damaging piston rings by spreading excessively, which otherwise would make them unfit for further service due to breakage or weakened tension.

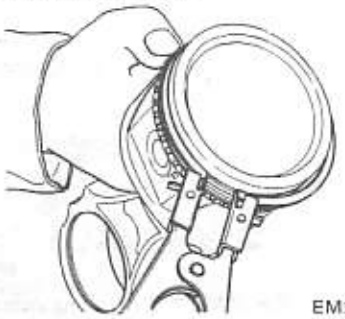


Fig. EM-23 Removing piston ring

2. Press out piston pin with Piston Pin Press Stand ST13060001.

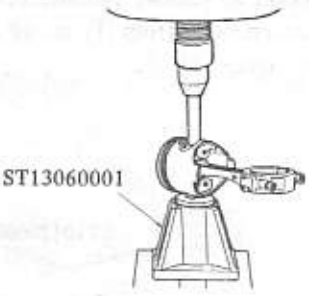


Fig. EM-24 Remvoing piston pin

3. Keep the disassembled parts in order.

CYLINDER HEAD

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

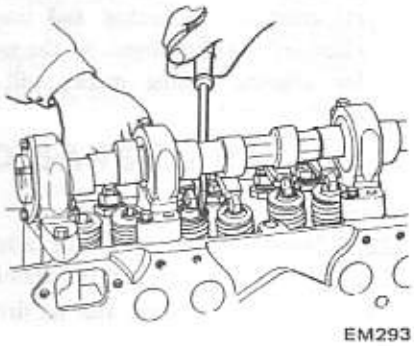


Fig. EM-25 Removing rocker arm

Note: Take care not to lose valve rocker guide.

2. Remove camshaft.

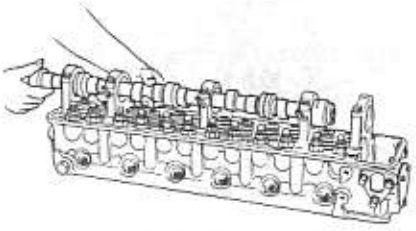


Fig. EM-26 Removing camshaft

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

3. Remove valves using Valve Lifter ST12070000.

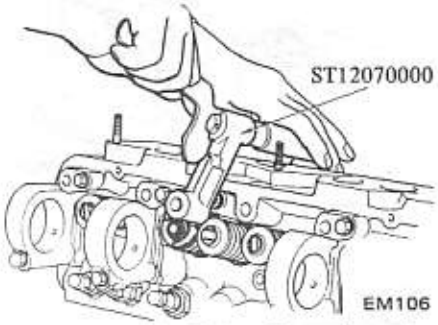


Fig. EM-27 Removing valve

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

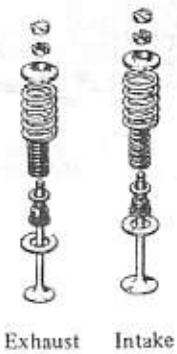


Fig. EM-28 Valve components

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

INSPECTION AND REPAIR

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PREPARATION FOR INSPECTION

1. Before cleaning, check for sign of water and oil leaks in cylinder block and head.
2. Clean oil and carbon deposits from all parts. They should be clean from gasket or sealant.
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 be out of alignment and 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.

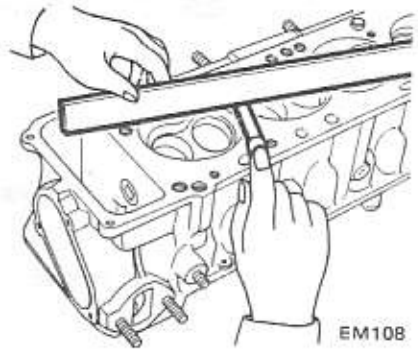


Fig. EM-29 Checking cylinder head surface

Head surface flatness

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

Surface grinding limit

The grinding limit of cylinder head is available by the cylinder block grinding in an engine.

Depth of cylinder head grinding is "A"

Depth of cylinder block grinding is "B"

The limit is following;

A + B = 0.2 mm (0.0079 in)

VALVE ASSEMBLY

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

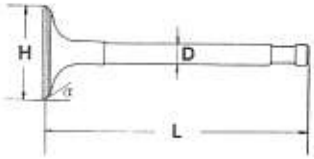


Fig. EM-30 Intake and exhaust valve dimensions

H	Valve head diameter mm (in)	L20A L24	In.	38.0 to 38.2 (1.496 to 1.504)
			Ex.	33.0 to 33.2 (1.299 to 1.307)
		L26 L26 (Twin carb.)	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)	L20A L24	In.	115.6 to 115.9 (4.551 to 4.563)
			Ex.	115.7 to 116.0 (4.555 to 4.567)
		L26 L26 (Twin carb.)	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)	L20A L24 L26 L26 (Twin carb.)	In.	7.965 to 7.980 (0.3136 to 0.3142)
			Ex.	7.945 to 7.960 (0.3128 to 0.3134)
α	Valve seat angle In. & Ex.			45°30'

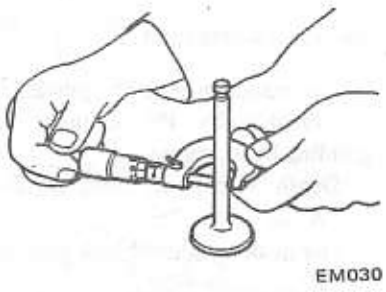


Fig. EM-31 Checking valve stem diameter

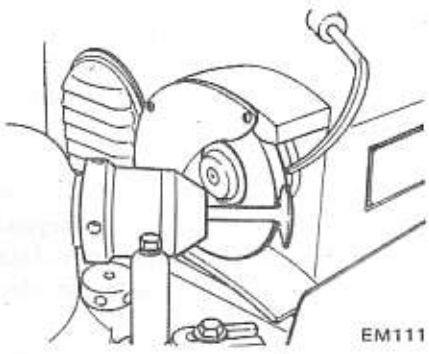


Fig. EM-32 Regrinding valve face

Note: When valve head has been worn down to 0.5 mm (0.0197 in) in thickness, replace the valve.
Grinding allowance for the 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 "S" in Figure EM-33. more than specified limit, replace with new ones.
2. Measure the free length and the tension of each spring. If the measured value exceeds the specified limit, replace spring.

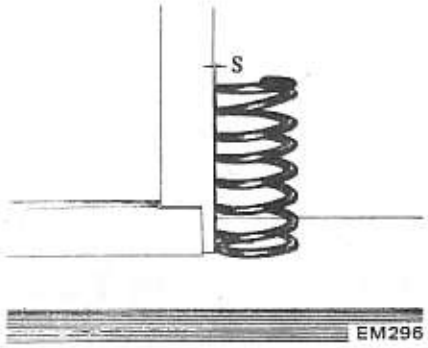


Fig. EM-33 Measuring spring squareness



Fig. EM-34 Measuring spring tension

Valve spring specifications

		L20A and L24 (Single carb.)	L26	L26 (Twin carb.)
Valve spring free length mm (in)				
	Outer	47.75 (1.88)	49.98 (1.968)	
	Inner	44.68 (1.76)	44.85 (1.766)	
Valve spring pressured length (valve open) mm/kg (in/lb)				
Intake	Outer	30.0/43.0 (1.181/94.8)	30.0/47.7 (1.181/105.2)	
	Inner	25.0/19.6 (0.984/43.2)	25.0/24.9 (0.984/54.9)	
Exhaust	Outer	30.0/43.0 (1.181/94.8)	29.5/49.0 (1.161/108)	
	Inner	25.0/19.6 (0.984/43.2)	24.5/25.5 (0.965/56.2)	
Valve spring assembled height (valve close) mm/kg (in/lb)				
	Outer	40.0/16.6 (1.575/36.6)	40.0/21.3 (1.575/47.0)	
	Inner	35.0/9.6 (1.378/21.2)	35.0/12.3 (1.378/27.1)	
Out of square ("S") mm (in)				
	Outer		2.2 (0.866)	
	Inner		1.2 (0.047)	

ROCKER ARM AND VALVE ROCKER PIVOT

Check pivot head and cam contact and pivot contact surfaces of rocker arm for damage or wear. If necessary, replace parts. A faulty pivot necessitates its replacement together with the corresponding rocker arm.

VALVE GUIDE

Measure the clearance between valve guide and valve stem. If the clearance exceeds the designated limit, replace the 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.

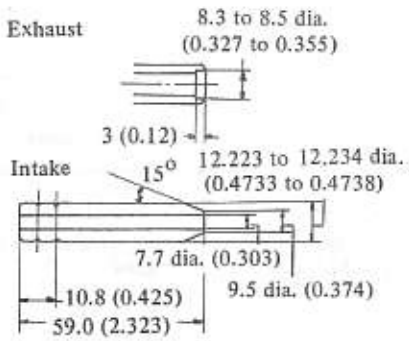


Fig. EM-35 Service valve guide

Determining clearance

Precise measurement of clearance between valve stem and valve guide needs the aid of a micrometer and a telescope hole gauge. By using these gauges, check the diameter of valve stem in three places; top, center and bottom. Insert telescope hole gauge in valve guide bore, measuring at center. Subtract the highest reading of valve stem diameter from valve guide bore to obtain the stem to guide clearance.

	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 is pushed in valve guide and moved to the left and the right and which point if its tip deflects about 0.2 mm (0.0079 in) or more, it will be known 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.)

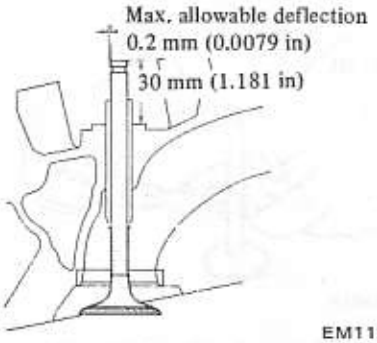


Fig. EM-36 Measuring clearance between valve stem and valve guide

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.

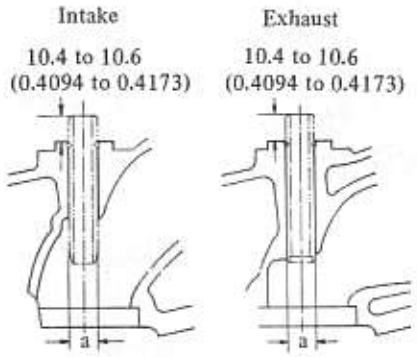


Fig. EM-37 Valve guide hole for service

		L20A, L24, L26, L26 (Twin carb.)
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. Press new valve guide into head carefully 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. See Figure EM-35.

	L20A, L24, L26, L26 (Twin carb.)
Interference fit of valve guide to guide hole mm (in)	0.027 to 0.049 (0.0011 to 0.0019)

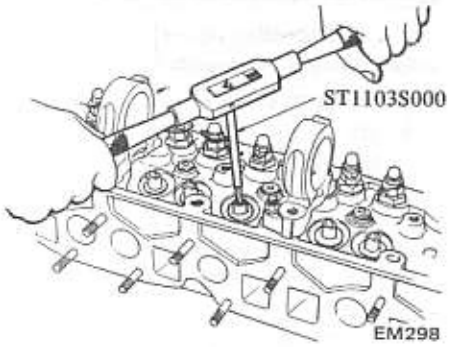


Fig. EM-38 Reaming valve guide

4. Ream the 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)

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 out excessively.

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

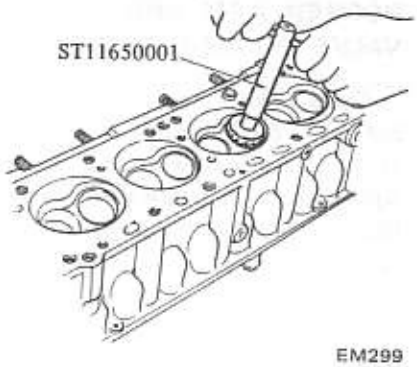
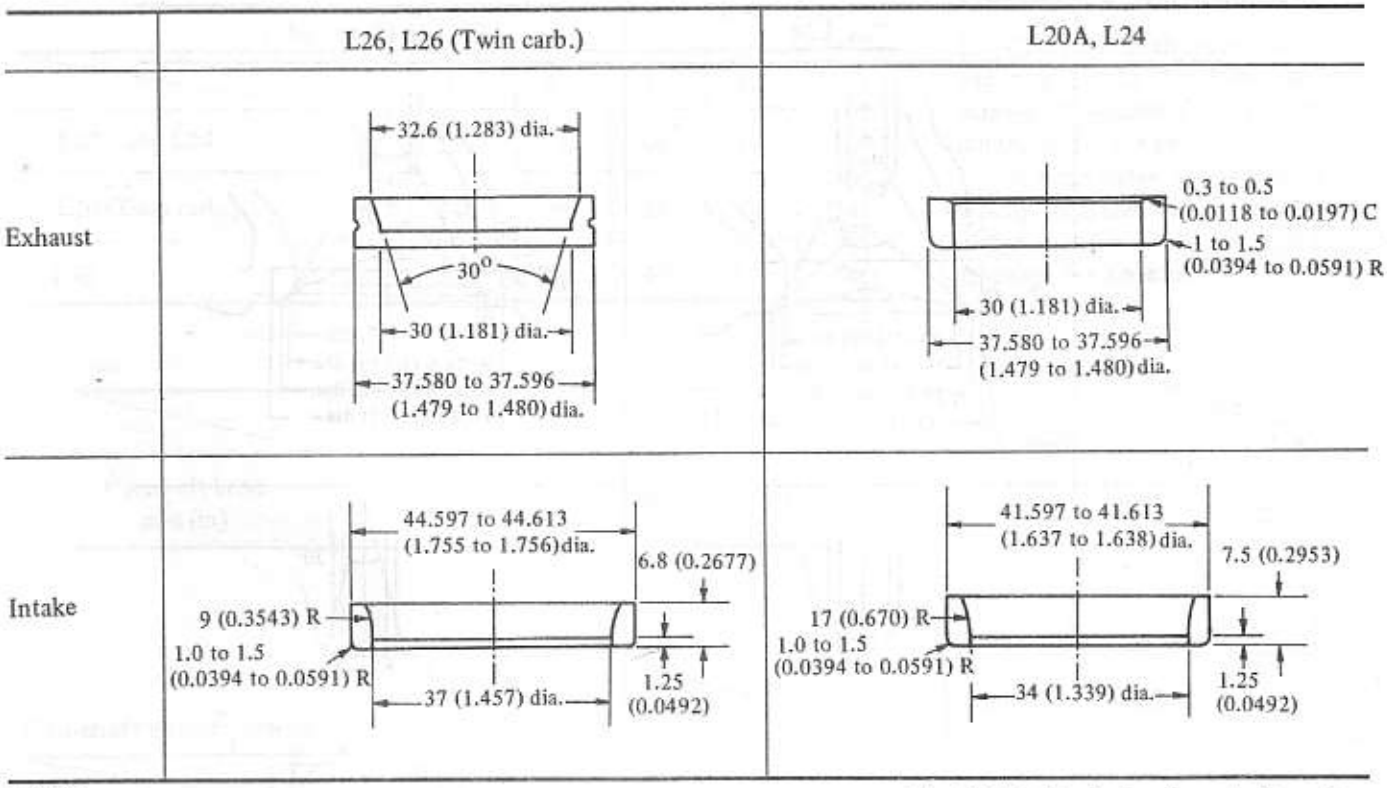


Fig. EM-39 Correcting valve seat



EM300

Fig. EM-40 Standard valve seat dimensions

Cylinder head recess diameter

Unit: mm (in)

		L20A, L24	L26, L26 (Twin carb.)
Intake	For standard insert	41.000 to 41.016 (1.6142 to 1.6148)	44.000 to 44.016 (1.7323 to 1.7329)
	For service insert	41.500 to 41.516 (1.6339 to 1.6345)	44.500 to 44.516 (1.7520 to 1.7526)
		L20A, L24, L26, L26 (Twin carb.)	
Exhaust	For 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 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 to valve guide center so that insert will have the correct fit.
4. Ream the cylinder head recess at room temperature.
5. Heat cylinder head to a temperature of 150° to 200°C (302° to 392°F).
6. Fit insert ensuring that it beds on the bottom face of its recess, and caulk more than 4 points.
7. Valve seats newly fitted should be cut or ground using Cutter Set Valve Seat ST11650001 at the specified dimensions as shown in Figure EM-41.
8. Apply small amount of fine griding 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.

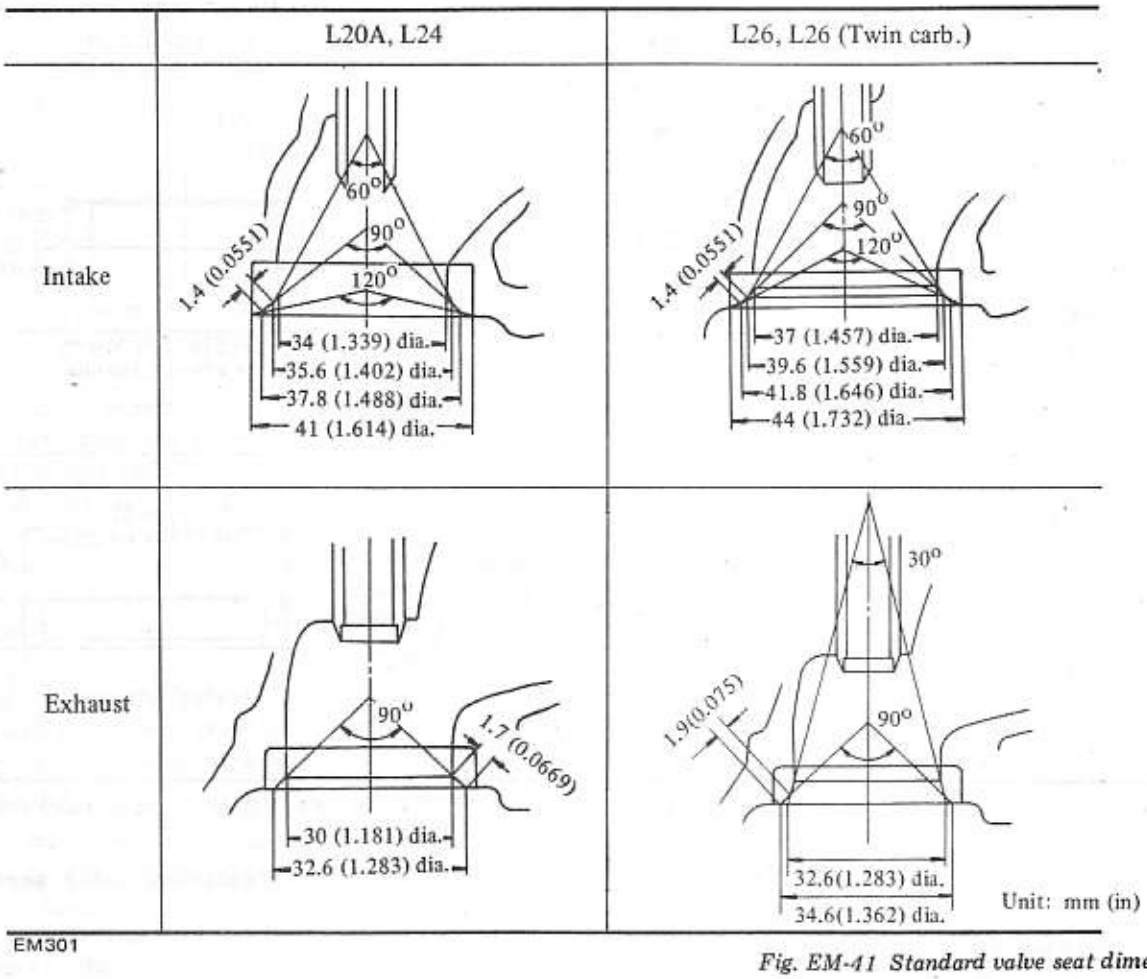


Fig. EM-41 Standard valve seat dimensions

CAMSHAFT AND CAMSHAFT BEARING

CAMSHAFT BEARING CLEARANCE

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

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)	———

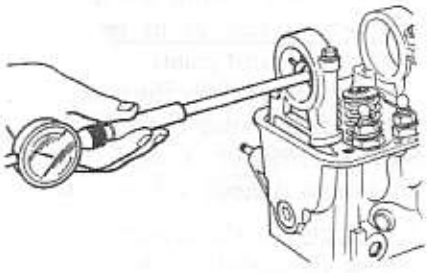


Fig. EM-42 Checking camshaft bearing

VALVE TIMING

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

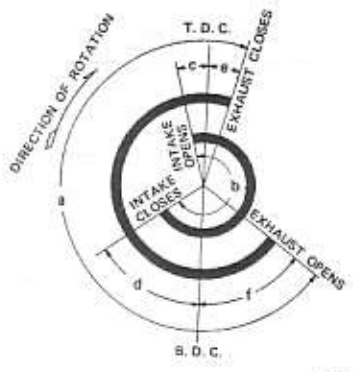


Fig. EM-43 Valve timing diagram

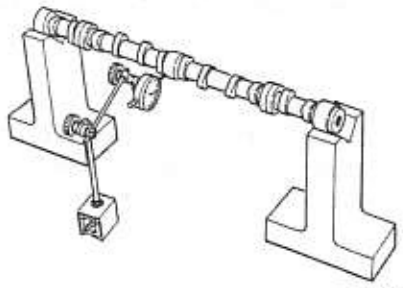
Unit: degree

	a	b	c	d	e	f
L20A and L24	240	232	8	44	10	50
L26 (Twin carb.)	248	248	16	52	14	54
L26	248	240	12	48	14	54

	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 problems are beyond the limits, replace the parts.
2. A bend valve is one-half of the reading obtained when camshaft is turned one full revolution with a dial gauge applied to the center journal.



EM302

Fig. EM-44 Checking camshaft bend

Camshaft specifications

		L20A, L24	L26, L26 (Twin carb.)
Standard height of cam mm (in)	Intake	39.95 to 40.00 (1.5728 to 1.3748)	39.95 to 40.00 (1.5728 to 1.5748)
	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 the top of cylinder block (cylinder head mating face) for warpage. If warpage exceeds the limit, correct it.

Surface grinding limit;

The grinding limit of cylinder block is available by the cylinder head grinding in an engine.

Detpth of cylinder head grinding is "A"

Depth of cylinder block grinding is "B"

The limit is following:

A + B = 0.2 mm (0.0079 in)

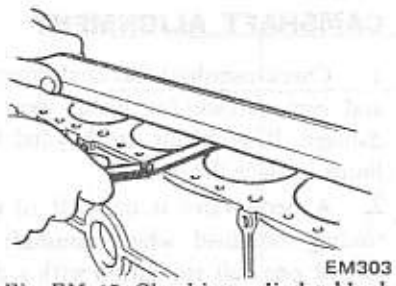


Fig. EM-45 Checking cylinder block surface

3. Using a bore gauge, measure cylinder bore for out-of-round or taper. If, out-of-round or taper is excessive, rebore the cylinder walls by means of a boring machine. Measurement should be taken along bores for taper and around bores for out-of-round. See Figure EM-47.

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

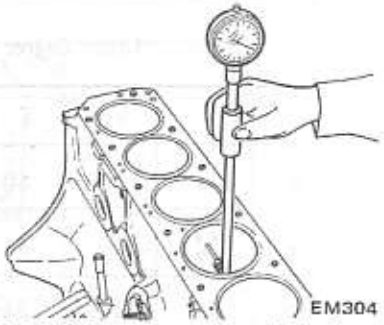


Fig. EM-46 Measuring cylinder bore diameter

4. When wear, taper or out-of-round is minor and within the limit, remove the step at the 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-47 and record the measured values.

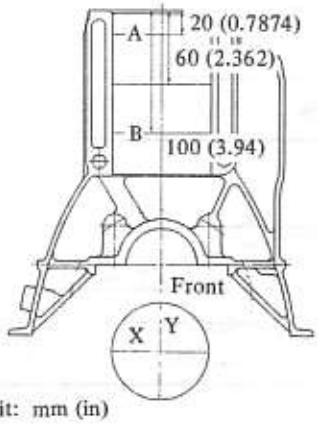


Fig. EM-47 Cylinder bore measuring positions

		Standard		Wear limit
		L20A	L24, L26 L26 (Twin carb.)	
Cylinder bore mm (in)	Inner diameter	78.000 to 78.050 (3.0709 to 3.0728)	83.000 to 83.050 (3.2677 to 3.2697)	0.2 (0.0079)
	Out-of-round	0.020 (0.0008)	0.015 (0.0006)	
	Taper	0.015 (0.0006)		
Difference cylinder bore mm (in)		0.05 (0.0020)		0.2 (0.0079)

Oversize pistons (with pin) specifications

	L20A	L24, L26, L26 (Twin carb.)
Piston diameter mm (in)		
Standard	77.935 to 77.985 (3.0683 to 3.0703)	82.985 to 83.035 (3.2671 to 3.2691)
0.25 (0.0098) Oversize	78.165 to 78.215 (3.0774 to 3.0793)	
0.50 (0.0197) Oversize	78.415 to 78.465 (3.0872 to 3.0892)	83.465 to 83.515 (3.2860 to 3.2880)
0.75 (0.0295) Oversize	78.665 to 78.715 (3.0970 to 3.0990)	
1.00 (0.0394) Oversize	78.915 to 78.965 (3.1069 to 3.1089)	83.965 to 84.015 (3.3057 to 3.3077)
1.50 (0.0591) Oversize	79.415 to 79.465 (3.1266 to 3.1285)	

CYLINDER BORING

1. When any of cylinders needs boring, all other cylinders must also be bored at the same time.
2. Determine piston oversize according to the amount of wear of cylinder.

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

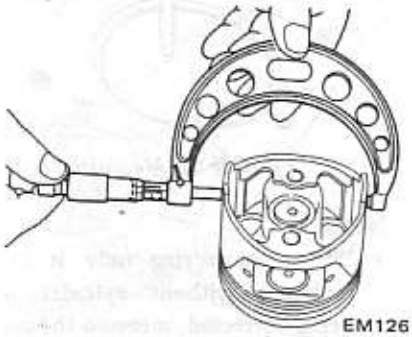


Fig. EM-48 Measuring piston diameter

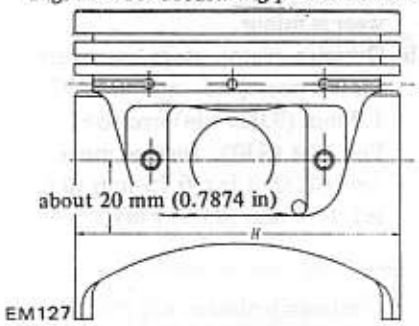


Fig. EM-49 Measuring piston skirt diameter

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)]

Note: To prevent strain due to cutting heat, bore the cylinders in the order of 1-5-3-6-2-4.

4. Do not cut too much out of cylinder bore at a time, but cut 0.05 mm (0.0020 in) or so at a time.
5. Measurement of cylinder bore just machined requires the 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 out gauge from between piston and cylinder.

Notes:

a. When measuring the clearance, slowly pull the feeler gauge straight upward.
b. It is recommended that piston and cylinder be heated to 20°C (68°F).

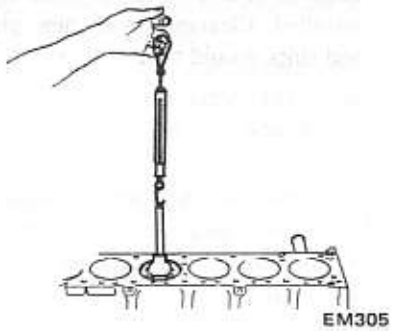


Fig. EM-50 Measuring piston fit in cylinder

		L20A, L24, L26, L26 (Twin carb.)
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)

Note: If cylinder bore has worn beyond the wear limit, use-cylinder liner.
Undersize cylinder liners are available for service.
Interference fit of cylinder liner in cylinder block should be 0.08 to 0.09 mm (0.0031 to 0.0035 in).

Cylinder liner for service

Unit: mm (in)

	L20A		L24, L26, L26 (Twin carb.)	
	Outside diameter	Inner diameter	Outside diameter	Inner diameter
4.0 (0.1575) Undersize	81.95 to 82.00 (3.2264 to 3.2283)	77.45 to 77.55 (3.0492 to 3.0531)	87.00 to 87.05 (3.4252 to 3.4272)	82.50 to 82.60 (3.2480 to 3.2520)
4.5 (0.1772) Undersize	82.45 to 82.50 (3.2461 to 3.2480)		87.50 to 87.55 (3.4449 to 3.4468)	
5.0 (0.1969) Undersize	82.95 to 83.00 (3.2657 to 3.2677)		88.00 to 88.05 (3.4646 to 3.4665)	

PISTONS, PISTON PINS AND PISTON RINGS

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

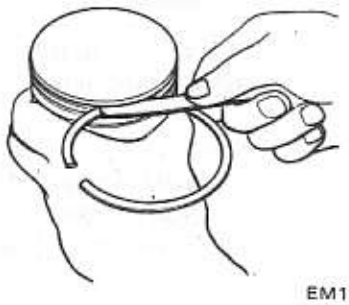


Fig. EM-51 Measuring piston ring side clearance

4. Push ring into cylinder with a 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.

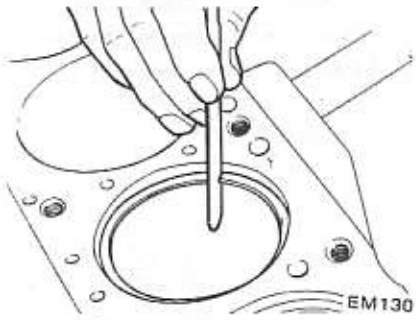


Fig. EM-52 Measuring ring gap

Notes:

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

b. **Oversize piston rings are available for service. [0.5 mm (0.0197 in), 1.0 mm (0.0394 in) oversize].**
For L24 (S30): further move 0.25 mm (0.0098 in), 0.75 mm (0.0295 in), 1.50 mm (0.0591 in).

Side clearance Unit: mm (in)

	Standard		Wear limit
	L20A	L24, L26, L26 (Twin carb.)	
Top ring	0.040 to 0.080 (0.0016 to 0.0031)	0.045 to 0.08 (0.0018 to 0.0031)	0.1 (0.0039)
Second ring	0.030 to 0.070 (0.0012 to 0.0028)	0.030 to 0.070 (0.0012 to 0.0028)	

Ring gap Unit: mm (in)

	Standard		Wear limit
	L20A	L24, L26, L26 (Twin carb.)	
Top ring	0.20 to 0.35 (0.0079 to 0.0138)	0.23 to 0.38 (0.0091 to 0.0150)	1.0 (0.0394)
Second ring	0.14 to 0.29 (0.0055 to 0.0114)	0.15 to 0.30 (0.0059 to 0.0118)	
Oil ring	0.30 to 0.90 (0.0118 to 0.0354)	0.3 to 0.9 (0.0118 to 0.0354)	

5. Measure piston pin hole in relation to the outer diameter of pin. If wear exceeds the limit, replace such piston pin together with 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.

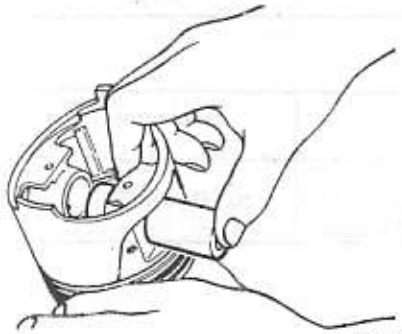


Fig. EM-53 Piston pin fitting

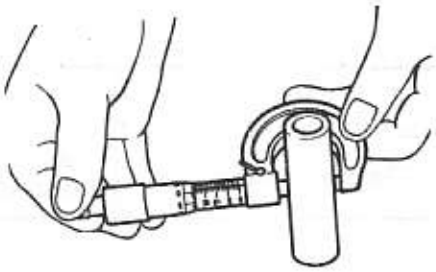


Fig. EM-54 Measuring piston pin diameter

Unit: mm (in)

	L20A, L24, L26, L26 (Twin carb.)
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	0.006 to 0.013 (0.00024 to 0.0005)
Interference fit of piston pin to connecting rod	0.015 to 0.033 (0.00059 to 0.00130)

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

L20A, L24, L26, L26 (Twin carb.)	Standard	Maximum
Big end play mm (in)	0.2 to 0.3 (0.0079 to 0.0118)	0.6 (0.0240)

CONNECTING ROD

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

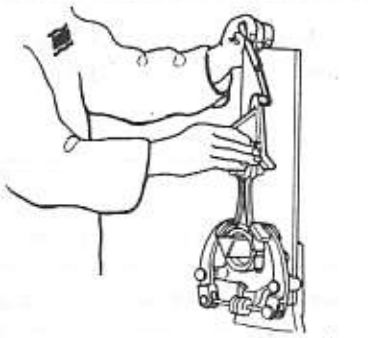


Fig. EM-55 Checking rod alignment

2. Check connecting rod for bend or torsion using a connnecting rod aligner. If bend or torsion exceeds the limit, correct or replace.
3. When replacing connecting rod, select rod so that weight difference between new and old ones is with in 7 gr (0.247 oz).
4. Install connecting rods with bearings on to corresponding crank pins and measure the thrust clearance. If the measured value exceeds the limit, replace such connecting rod.

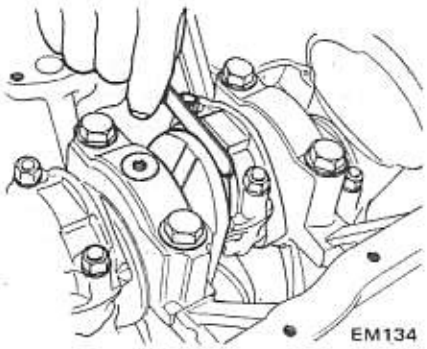


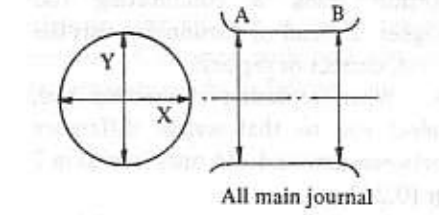
Fig. EM-56 Checking big end play

CRANKSHAFT

1. Whenever crankshaft is removed from engine, it should be cleaned toroughly in a suitable solvent. After cleaning check crankshaft journal and crank pin for score, bias wear or cracks. Repair or replace as required. If defects are minor, dress with fine crocus cloth.
2. Check with a micrometer journals and crank pins for taper and out-of-round. Measurement should be taken along journals for taper and around journals for out-of-round. See Figure EM-57 for detail information.

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

	S
L20A	34.85 mm (1.372 in)
L24	36.85 mm (1.451 in)
L26	39.50 mm (1.555 in)



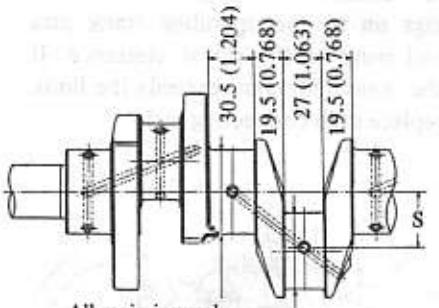


Fig. EM-57 Crankshaft and journal dimensions

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

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

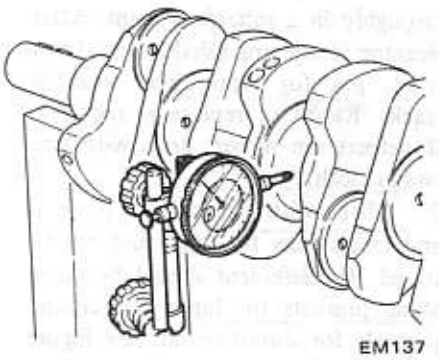


Fig. EM-58 Checking crankshaft bend

L20A, L24, L26, L26 (Twin carb.)	Standard	Maximum
Taper and out-of-round of journal and crank pin mm (in)	less than 0.01 (0.0004)	0.03 (0.0012)

L20A, L24, L26, L26 (Twin carb.)	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 a 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 in the list on page EM-20 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.

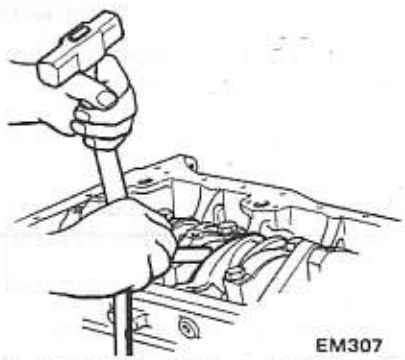


Fig. EM-59 Checking crankshaft end play

	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 defect is detected.

To replace crankshaft rear pilot bushing proceed as follows:

(1) Pull out bushing using Pilot Bushing Puller ST16610001.

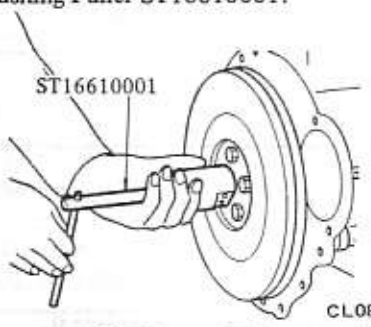


Fig. EM-60 Pulling out pilot bushing

(2) Before installing a new bushing, thoroughly clean bushing hole. Press fit bushing so that its height above flange end is 6.5 to 7.0 mm (0.26 to 0.28 in). Do not oil bushing.

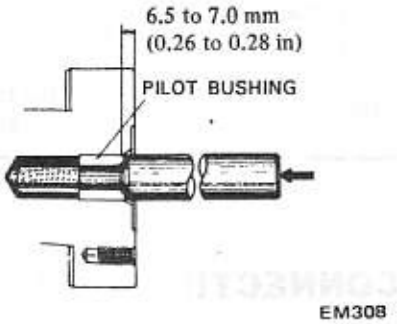


Fig. EM-61 Press-fitting new pilot bushing

BUSHING AND BEARING

MEASUREMENT OF MAIN BEARING CLEARANCE

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

Replace bearings, if any defect is detected.

2. Crankshaft journals and bearings should be clean and free from dust and dirt before oil clearance is measured.

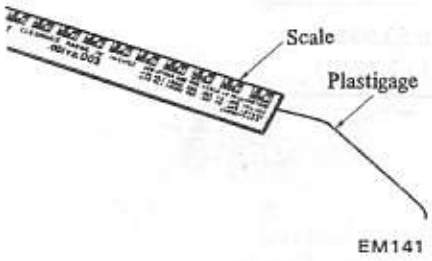


Fig. EM-62 Plastigage

3. Set main bearing on cap block.
4. Cut a plastigage to the 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)

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

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

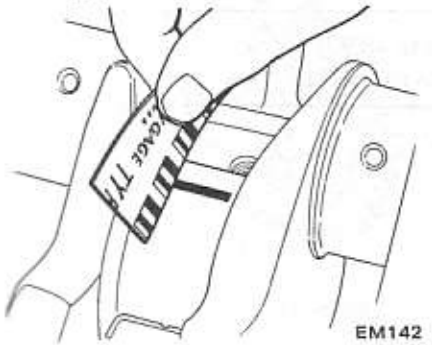


Fig. EM-63 Measuring bearing clearance

MEASUREMENT OF CONNECTING ROD BEARING

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

L20A, L24, L26, L26 (Twin carb.)	Standard	Wear limit
Main bearing clearance mm (in)	0.020 to 0.072 (0.0008 to 0.0028)	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 the specified valve, replace bearing with an under-size bearing and grind the crankshaft journal adequately.

FITTING BEARINGS

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

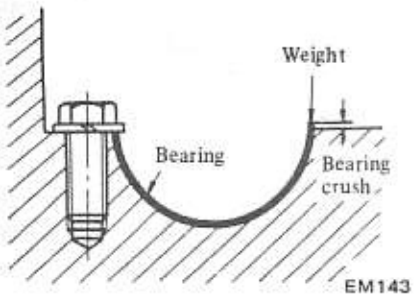


Fig. EM-64 Checking bearing crush

1. Set main bearing in main bearing cap recess or cylinder block bearing recess correctly.
2. Lock the one side end of bearing and press the other side until the bearing back surface touches the recess.
3. Then, measure bearing crush "H" with a feeler gauge. See Figure EM-64. The standard bearing crush value is listed below.
4. Handle connecting rod bearing in the same manner as above.

Bearing crush

	L20A, L24, L26, L26 (Twin carb.)
All main bearing mm (in)	0 to 0.03 (0 to 0.0012)
All connecting rod bearing mm (in)	0.015 to 0.045 (0.0006 to 0.0018)

Main bearing undersize

Unit: mm (in)

L20A, L24, L26, L26 (Twin carb.)	Bearing top thickness	Crank journal diameter
STD	1.822 to 1.835 (0.0717 to 0.0722)	54.942 to 54.955 (2.1631 to 2.1636)
0.25 (0.0098) Undersize	1.947 to 1.960 (0.0767 to 0.0772)	54.692 to 54.705 (2.1532 to 2.1537)
0.50 (0.0197) Undersize	2.072 to 2.085 (0.0816 to 0.0821)	54.442 to 54.455 (2.1434 to 2.1439)
0.75 (0.0295) Undersize	2.197 to 2.210 (0.0865 to 0.0870)	54.192 to 54.205 (2.1335 to 2.1341)
1.00 (0.0394) Undersize	2.322 to 2.335 (0.0914 to 0.0919)	53.942 to 53.955 (2.1237 to 2.1242)

Connecting rod bearing undersize

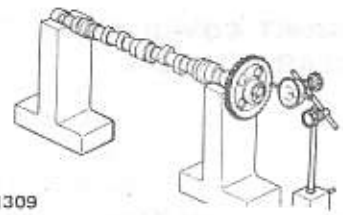
Unit: mm (in)

	Bearing top thickness	Crank pin diameter
	L20A, L24, L26, L26 (Twin carb.)	L20A, L24, L26, L26 (Twin carb.)
STD	1.493 to 1.506 (0.0588 to 0.0593)	49.961 to 49.974 (1.9670 to 1.9675)
0.6 (0.0236) 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 (0.00735 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

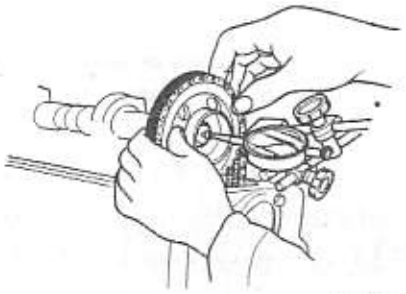
1. Check tooth surface for flaws or wear. Replace sprocket if any fault is found.
2. Install camshaft sprocket in position and check for runout. If it exceeds 0.1 mm (0.00393 in) total indicator reading, replace camshaft sprocket. Also check for end play.



EM309

Fig. EM-65 Checking camshaft sprocket runout

	L20A, L24, L26, L26 (Twin carb.)
Camshaft end play mm (in)	0.08 to 0.38 (0.0031 to 0.0150)



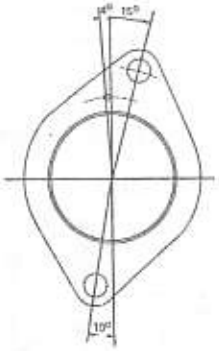
EM310

Fig. EM-66 Checking camshaft end play

3. Check chain for damage, excessive wear or stretch at its roller links. Replace a faulty chain.
4. When chain stretches excessively, the valve timing goes out of order. Two location (camshaft set) holes are provided in camshaft sprocket to correct the valve timing.

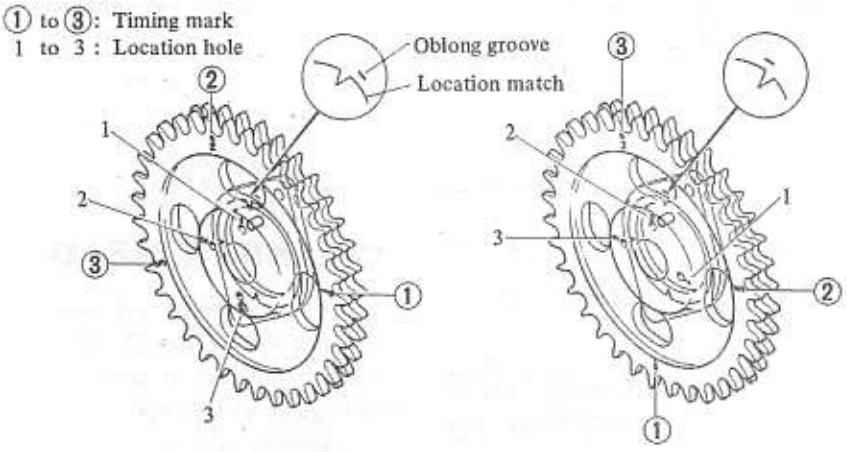
Adjust camshaft sprocket location. If the stretch of chain roller links is excessive, adjust the camshaft sprocket location by transferring the camshaft set position of camshaft sprocket to No. 2 or No. 3 holes.

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



EM146

Fig. EM-67 Camshaft locate plate



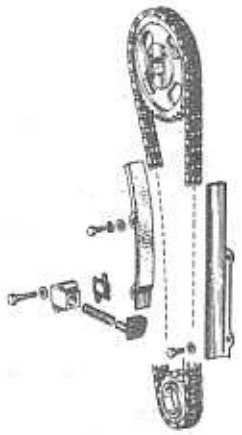
EM311

Fig. EM-68 Adjusting camshaft sprocket location

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. Then this No. 2 notch should be on the right end of the oblong groove. When No. 2 hole is used, also No. 2 timing mark have to be used. The amount of the modification is 4° by the rotation of crankshaft.
3. If the valve timing cannot be corrected by using No. 2 hole, use No. 3 hole in the same procedure as mentioned above. The amount of the modification by using No. 3 hole is 8° by the rotation of crankshaft.
4. When the modification becomes impossible even by transferring the camshaft location hole, replace chain assembly.

CHAIN TENSIONER AND CHAIN GUIDE

Check for wear and breakage. Replace if necessary.



EM147

Fig. EM-69 Comshaft drive mechanism

FLYWHEEL

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

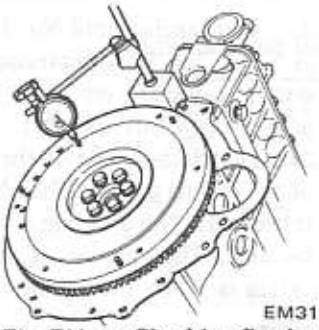

EM312

Fig. EM-70 Checking flywheel deviation

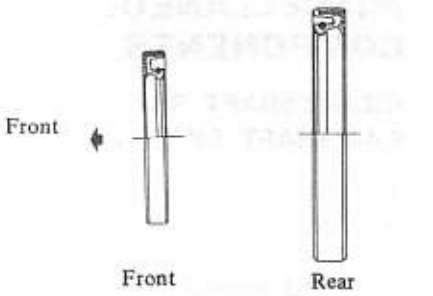
3. Check tooth surfaces of ring gear for flaws or wear.
   Replace if necessary.

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, replace with a new seal. When installing a new seal, pay attention to its mounting direction.

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



EM150

Fig. EM-71 Oil seal of crankshaft

ENGINE ASSEMBLY

CONTENTS

PRECAUTIONS EM-22
CYLINDER HEAD EM-22
PISTON AND CONNECTING ROD EM-23
ENGINE ASSEMBLY EM-24

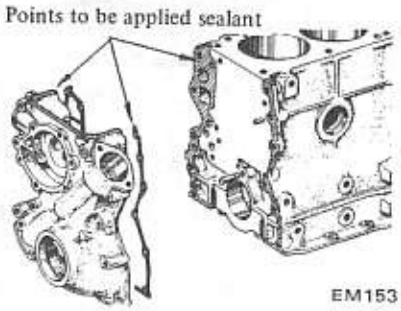
PRECAUTIONS

1. Use thoroughly cleaned parts. Particularly, 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 that have been removed.
5. Keep tools and work benches clean.
6. Keep the necessary parts and tools ready 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:

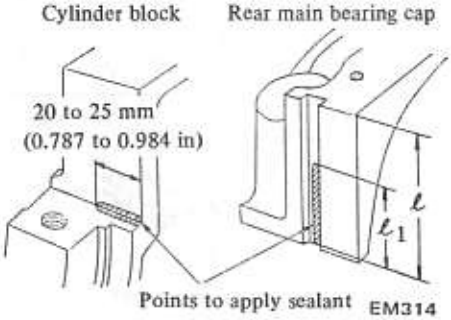
(1) Front cover gasket: Front side of cylinder block and cover gasket. See Figure EM-72.
(2) Front cover: Top of front cover, see Figure EM-72.
(3) Main bearing cap and cylinder block: Each side of rear main bearing cap and each corner of cylinder block. See Figure EM-73.
(4) Cylinder block: Step portions at four mating surfaces (cylinder block to front chain cover and cylinder block to rear main bearing cap). See Figure EM-74.

Note: Do not apply sealant too much.



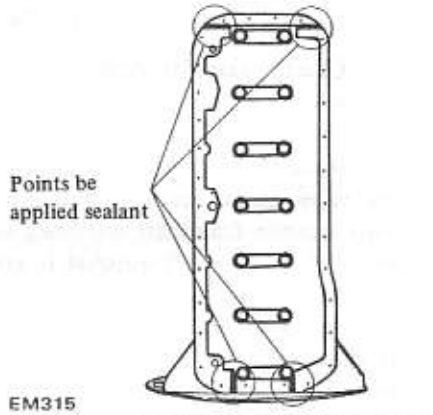
EM153

Fig. EM-72 Applying sealant (Front over and gasket)



EM314

Fig. EM-73 Applying sealant (Main bearing cap and cylinder block)



EM315

Fig. EM-74 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: valve, inner and outer valve springs, spring retainer, valve collet and valve rocker guide.

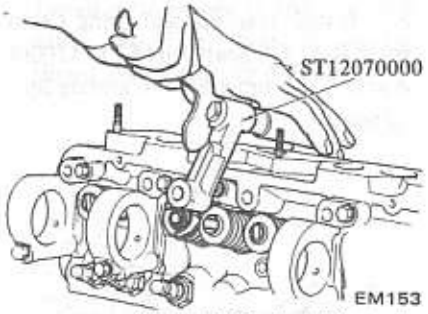


Fig. EM-75 Installing valve

Notes:

a. **Check whether the valve face is free from foreign matters.**
b. **Outer valve spring is of an uneven pitch type. Install spring facing painted side to cylinder head surface.**

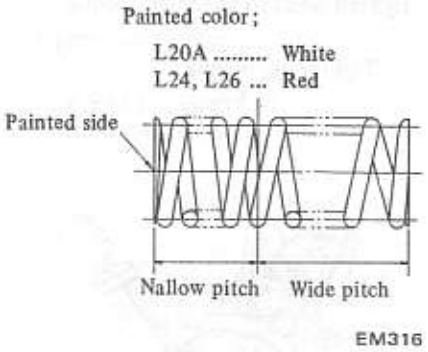


Fig. EM-76 Installing valve spring

2. Valve rocker pivot assembly

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

3. Camshaft assembly

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

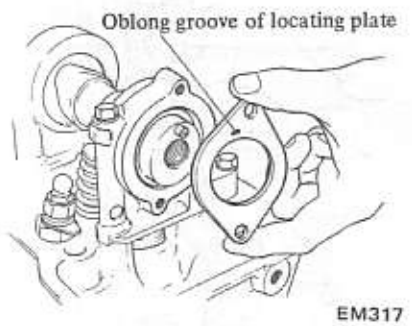


Fig. EM-77 Installing camshaft locating plate

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

Tightening torque:
13 to 15 kg-m
(94 to 108 ft-lb)

At this time, check camshaft end play.

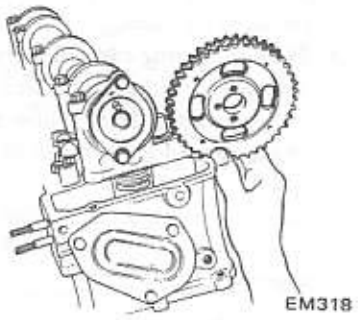


Fig. EM-78 Installing camshaft sprocket

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

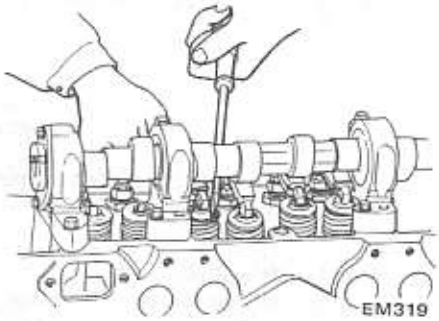


Fig. EM-79 Installing rocker arm

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.

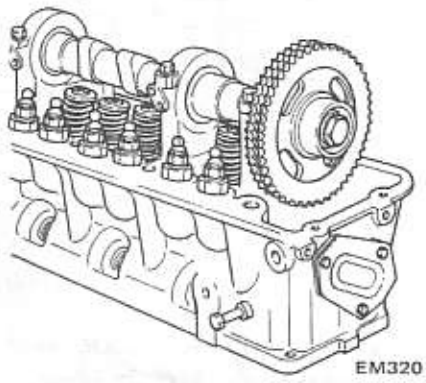


Fig. EM-80 Assembling cylinder head

PISTON AND CONNECTING ROD

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

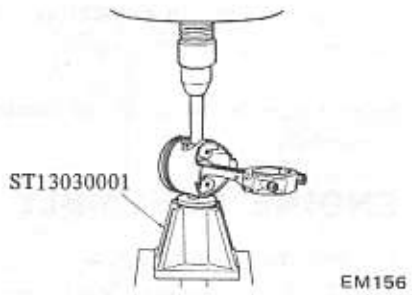


Fig. EM-81 Installing piston pin

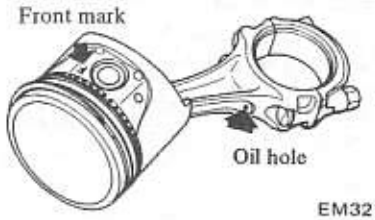


Fig. EM-82 Assembling piston and connecting rod

Notes:

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

2. Install piston rings

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

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 the same as lower one.**

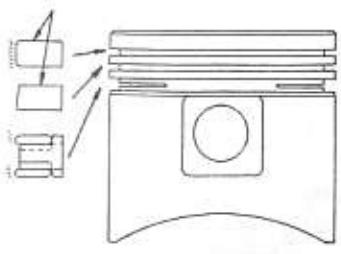


Fig. EM-83 Installing piston ring

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

Note: Clean the back side of bearing carefully.

ENGINE ASSEMBLY

1. The first step in engine assembly is to bolt Engine Attachment ST05340000 to right hand side of cylinder block. In succession, install block in Engine Stand ST0501S000 with engine bottom up.

2. Set main bearings at the proper portion of cylinder block.

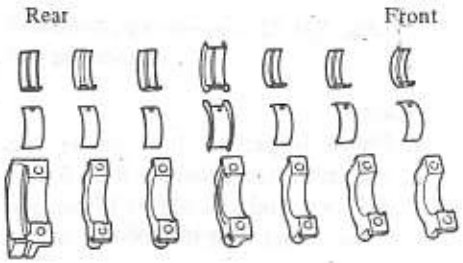


Fig. EM-84 Main bearings

3. Install baffle plate including cylinder block net.

Notes:

a. Only center bearing (No. 4) is a flanged type.
b. All inter-bearings are the same type.
c. Front bearing (No. 1) is also the same type as rear bearing (No. 7).
d. All bearings have an interchangeability between upper and lower bearings.

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
(32.5 to 39.8 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-73.
b. Arrange the parts so that the arrow mark on bearing cap faces toward the 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 separating two to three stages and outwardly from center bearing in the sequence as shown in Figure EM-85.
e. After securing bearing cap bolts, ascertain that crankshaft turn smoothly.

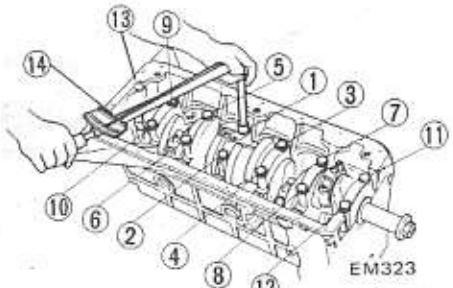


Fig. EM-85 Torque sequence of cap bolts

6. Make sure that there exists proper end play at crankshaft.

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

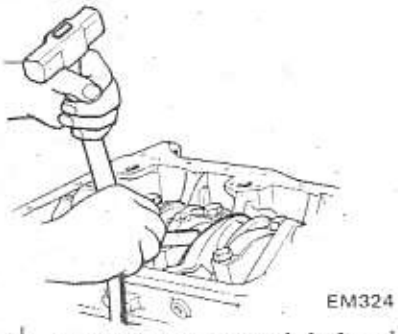


Fig. EM-86 Checking crankshaft end play

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

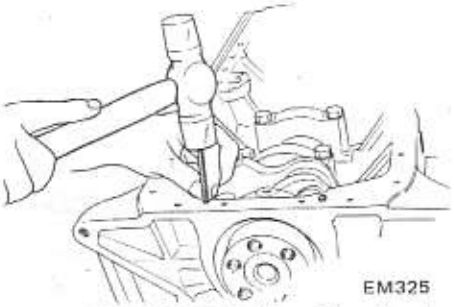


Fig. EM-87 Driving side oil seal

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

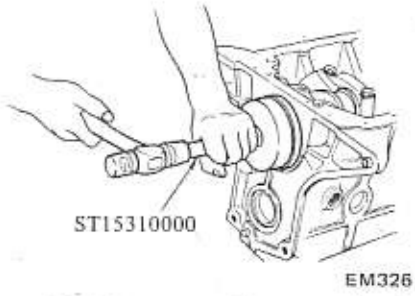


Fig. EM-88 Installing rear oil seal

9. Install rear end plate.

10. Install flywheel securely, and tighten bolts to specified torque.

Tightening torque:
13 to 15 kg-m
(94 to 108 ft-lb)

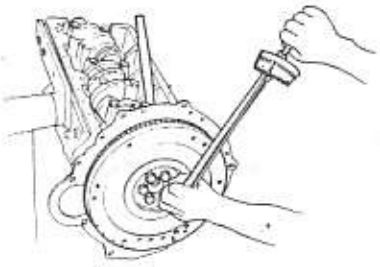


Fig. EM-89 Installing flywheel

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

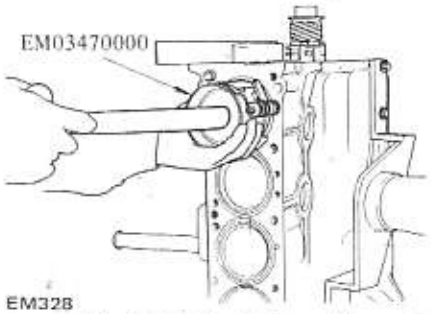


Fig. EM-90 Installing piston-rod assembly

Notes:

a. Apply engine oil to sliding parts.
b. Arrange so that the notch mark on piston head faces to the front of engine.

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

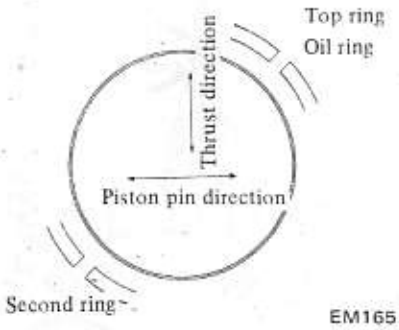


Fig. EM-91 Piston ring direction

12. Install connecting rod caps.

Tightening torque:

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

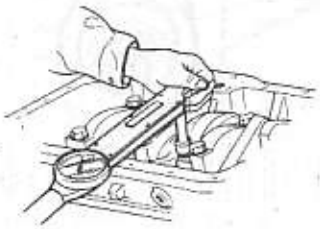


Fig. EM-92 Installing connecting rod cap

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

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

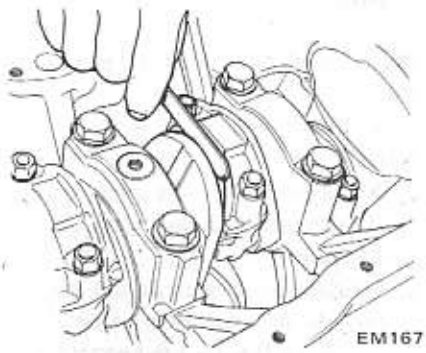


Fig. EM-93 Checking big end play

Big end play:
0.2 to 0.3 mm
(0.0079 to 0.0118 in)

14. Install cylinder head assembly.

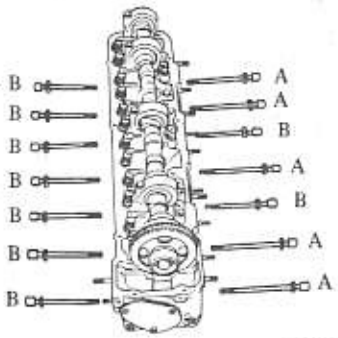


Fig. EM-94 Cylinder head bolts

(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 head of pistons.

(5) Do not rotate crankshaft and camshaft separately, because valves will hit head of pistons.

(6) Temporarily tighten two bolts ①, ② shown in Figure EM-100.

Tightening torque:
2 kg-m (14.5 ft-lb)

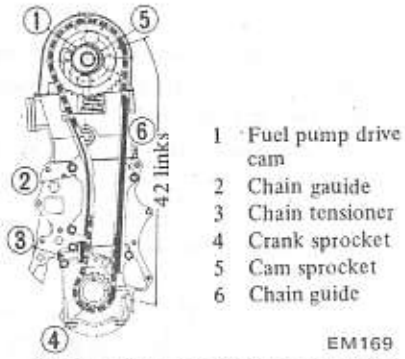
15. Install crankshaft sprocket and distributor drive gear and fit oil thrower.

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

16. Install timing chain.

Notes:

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



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

Fig. EM-95 Installing timing chain

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

c. **No. 1 hole is factory adjusted. When chain stretches excessively, adjust camshaft sprocket at No. 2 or No. 3 hole.**

d. **Use a set of timing marks and location hole numbers.**

17. Install chain guide to cylinder block.

18. Install chain tensioner.

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

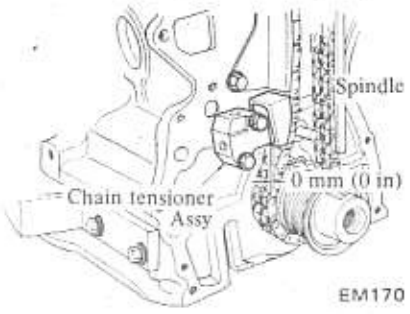


Fig. EM-96 Installing chain tensioner

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

20. Install front cover with gasket in place.

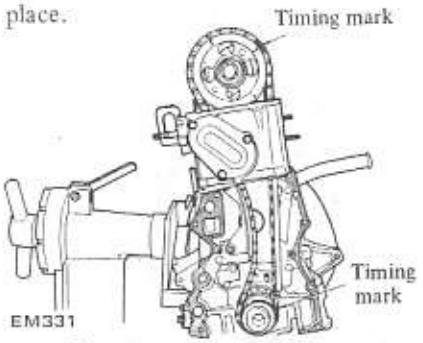
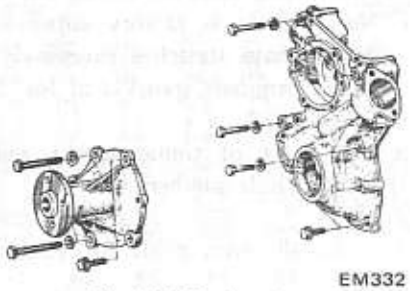


Fig. EM-97 Installing front cover

Notes:

a. Apply sealant to front side of cylinder block and front cover gasket as shown in Figure EM-72.
b. Apply sealant only to the top of front cover as shown in Figure EM-72.
c. Install front cover with head gasket in place.
d. Check the height difference between cylinder block upper face and front cover upper face. Its difference must be less than 0.15 mm (0.0059 in).
e. Note that different types of bolts are used.
f. Apply a lithium grease to sealing lip of oil seal.



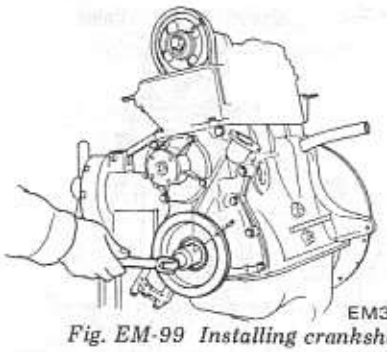
EM332

Fig. EM-98 Front cover bolts

Tightening torque:
Size M8
(0.315 in)
1.0 to 1.6 kg-m
(7.2 to 11.6 ft-lb)
Size M6
(0.236 in)
0.4 to 0.8 kg-m
(2.9 to 5.8 ft-lb)

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

Crankshaft pulley nut tightening torque:
12 to 16 kg-m
(86.8 to 115.7 ft-lb)



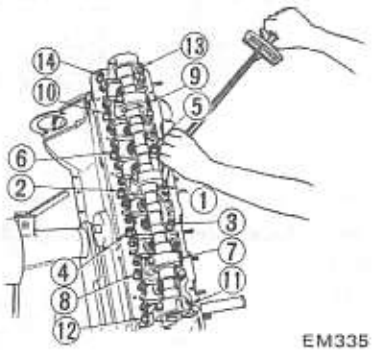
EM334

Fig. EM-99 Installing crankshaft pulley

22. Finally tighten head bolts to the specified torque in three steps according to the tightening sequence as shown in Figure EM-100.

Note that two types of bolts are used.

Special tool Cylinder Head Bolt Wrench ST1012000.
Tightening torque:
1st turn
4.0 kg-m (28.9 ft-lb)
2nd turn
6.0 kg-m (43.4 ft-lb)
3rd turn
6.5 to 8.5 kg-m
(47.0 to 61.5 ft-lb)



EM335

Fig. EM-100 Tightening sequence

Notes:

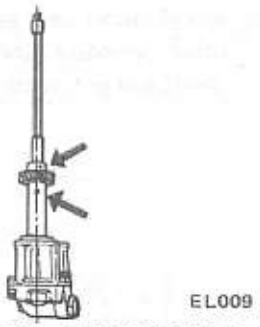
a. Be sure to tighten two small bolts.
b. After engine has been operated for several minutes; if necessary, retighten.

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

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

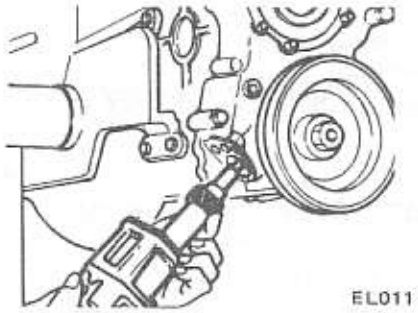
Notes:

a. Assemble oil pump and drive spindle, making driving spindle mark face to oil pump hole, and then move by one notch as shown in Figure EM-101.
b. Install oil pump together with drive spindle 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.
c. Do not forget to install gasket.



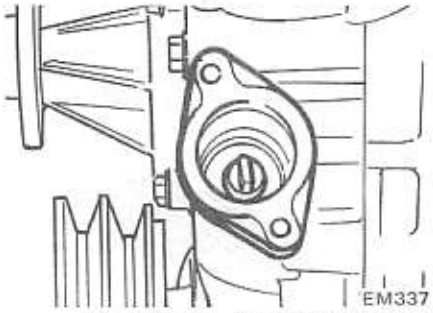
EL009

Fig. EM-101 Setting distributor driving spindle



EL011

Fig. EM-102 Installing oil pump



EM337

Fig. EM-103 Setting distributor drive spindle

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 packings inserted between spacer and block, 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-74.
b. Tightening oil pan should be performed in criss-cross pattern and finally to 0.6 to 1.0 kg-m (4.3 to 7.2 ft-lb) torque.

26. Adjust valve clearance to the specified dimensions.

Special tool Pivot Adjuster
ST10640001.
Tightening torque:
5.0 to 6.0 kg-m
(36.2 to 43.4 ft-lb)

Notes:

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

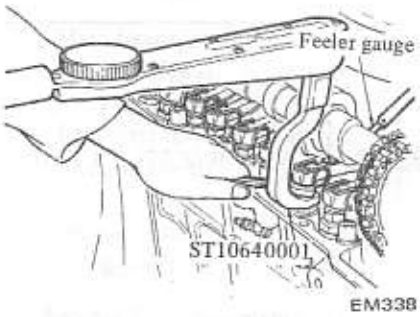


Fig. EM-104 Adjusting valve clearance

			L20A, L24, L26, L26 (Twin carb.)
Valve clearance mm (in)	Cold	Intake	0.2 (0.0079)
		Exhaust	0.25 (0.0098)
	Hot	Intake	0.25 (0.0098)
		Exhaust	0.30 (0.0118)

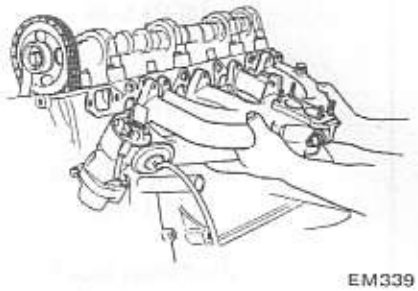


Fig. EM-105 Installing manifolds

28. Install distributor assembly.
29. Install carburetor assembly and carburetor insulator with stamp facing upward. Tightening torque 0.8 to 1.2 kg-m (5.8 to 8.7 ft-lb).

For L24 (Twin carb.) Install heat shield plate at the same time.

b. **After engine has been assembled, run it for at least several minutes, finally adjust the clearance to the warm specifications.**
For details, refer to "Adjusting intake and exhaust valve clearance" in ET section.

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

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

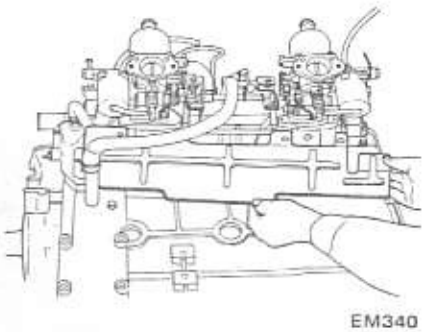


Fig. EM-106 Installing heat shield plate

30. Install fuel pipes and vacuum hose.

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

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

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

33. Install spark plugs.
34. Connect distributor to plug high tension lead wire.
35. Install engine mount bracket on left hand side.
36. Install clutch assembly.

Special tool Clutch Aligning Bar
ST20630000.
Tightening torque:
1.2 to 2.2 kg-m
(8.7 to 16.0 ft-lb)

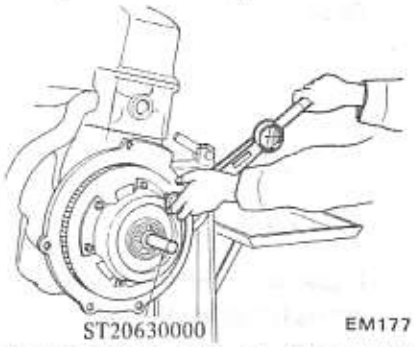


Fig. EM-107 Installing clutch assembly

37. Using an overhead hoist and lifting cable, hoist engine up a way from engine stand and then down onto engine carrier. Install alternator bracket, adjusting bar, alternator, fan pulley, fan and fan belt in this order. Then, check to be sure that deflection of fan belt is held within 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)].

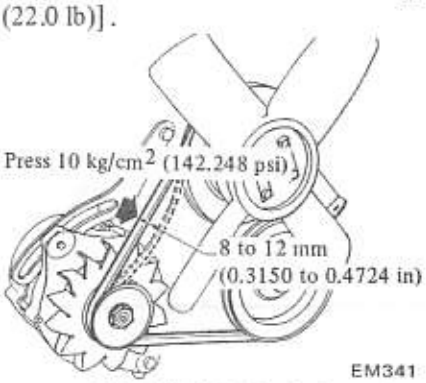


Fig. EM-108 Fan belt tension

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

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

39. Power engine oil up to specified level.

SERVICE DATA AND SPECIFICATIONS

GENERAL SPECIFICATION

Model	L20A	L24	L26	
Cylinder arrangement	6, in line			
Displacement cc (cu in)	1,998 (121.92)	2,393 (146.02)	2,565 (156.52)	
Bore and stroke mm (in)	78 x 69.7 (3.071 x 2.749)	83 x 73.7 (3.271 x 2.902)	83 x 79 (3.271 x 3.110)	
Valve arrangement	O.H.C.			
Firing order	1-5-3-6-2-4			
	Single carb.	Single carb.	Single carb.	Twin carb.
Engine idle rpm				
M/T	550	550	550	650
A/T	650	650	650	700
Engine idle manifold mmHg (inHg) at idle rpm	450 (17.7)	450 (17.7)	450 (17.7)	430 (16.9)
Oil pressure (Warm at 2,000 rpm) kg/cm^2 (psi)	3.5 to 4.0 (49.8 to 56.9)			

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

TIGHTENING TORQUE

Model	L20A	L24	L26	
			Single carb.	Twin carb.
Cylinder head bolts kg-m (ft-lb)	1st Turn 4.0 (28.9)	2nd Turn 6.0 (43.4)	3rd Turn 7.5 to 8.5 (54.2 to 61.5)	
Connecting rod big end nuts kg-m (ft-lb)		3.7 to 4.3 (26.8 to 31.1)		
Flywheel fixing bolts kg-m (ft-lb)		13 to 15 (94 to 108)		
Main bearing cap bolts kg-m (ft-lb)		4.5 to 5.5 (33 to 40)		
Camshaft sprocket bolt kg-m (ft-lb)		13 to 15 (94 to 108)		
Oil pan bolts kg-m (ft-lb)		0.6 to 1.0 (4.3 to 7.2)		
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 (145. to 21.7)		
Rocker pivot lock nuts kg-m (ft-lb)		5.0 to 6.0 (36.2 to 43.4)		
Camshaft locating plate bolts kg-m (ft-lb)		0.5 to 0.8 (3.6 to 5.8)		
Carburetor nuts kg-m (ft-lb)		3.6 to 7.2 (26 to 52)		
Manifold nuts kg-m (ft-lb)		0.8 to 1.2 (5.8 to 8.7)		
Fuel pump nuts kg-m (ft-lb)		1.2 to 1.8 (8.7 to 13.0)		
Crank pulley bolt kg-m (ft-lb)		13.0 to 15.0 (94 to 108)		
Front cover bolts kg-m (ft-lb)				
6M		0.4 to 0.8 (2.9 to 5.8)		
8M		1.0 to 1.6 (7.2 to 11.6)		
Oil strainer kg-m (ft-lb)		0.4 to 0.6 (2.9 to 4.3)		

SPECIFICATIONS

Model		L20A	L24	L26	
				Single carb.	Twin carb.
a) Valve mechanism					
Valve clearance (Hot) mm (in)		In. 0.25 (0.0098)		Ex. 0.30 (0.0118)	
Valve clearance (Cold) mm (in)		In. 0.20 (0.0079)		Ex. 0.25 (0.0098)	
Valve head dia. mm (in)					
	–Intake	38 (1.5000)		42 (1.6535)	
	–Exhaust	33 (1.3102)		35 (1.3779)	
Valve stem dia. 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	115.6 to 115.9 (4.551 to 4.562)		114.9 to 115.2 (4.524 to 4.535)	
	–Exhaust	115.7 to 116.0 (4.555 to 4.567)		115.7 to 116.0 (4.555 to 4.567)	
Vlave lift mm (in)					
	–Intake	10.0 (0.394)		11 (0.433)	
	–Exhaust	10.0 (0.394)		11 (0.433)	
Valve spring free length mm (in)					
	–Outer	47.75 (1.88)		49.98 (1.968)	
	–Inner	44.68 (1.76)		44.85 (1.766)	
Valve spring pressured length (valve open) mm (in)/kg (lb)					
Intake	–Outer	30.0/43.0 (1.181/94.8)		30.0/47.7 (1.181/105.2)	
	–Inner	25.0/19.6 (0.984/43.2)		25.0/24.7 (0.984/54.5)	
Exhaust	–Outer	30.0/43.0 (1.181/94.8)		29.5/49.0 (1.161/108.0)	
	–Inner	25.0/19.6 (0.984/43.2)		24.5/25.5 (0.965/56.2)	

Model		L20A	L24	L26	
				Single carb.	Twin carb.
Valve spring assembled height (valve close) mm/kg (in/lb)					
	–Outer	40.0/16.6 (1.575/36.6)		40.0/21.3 (1.575/47.0)	
	–Inner	35.0/9.6 (1.378/21.2)		35/12.3 (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 dia. mm (in)					
Intake	–Outer	4.0 (0.1575)		4.0 (0.1575)	
	–Inner	2.7 (0.106)		2.9 (0.1142)	
Exhaust	–Outer		4.0 (0.1575)		
	–Inner		2.9 (0.1142)		
Valve spring coil dia. mm (in)					
	–Outer	33.2 (1.307)		33.2 (1.307)	
	–Inner	24.2 (0.953)		24.9 (0.980)	
Valve guide length mm (in)					
	–Intake		59.0 (2.323)		
	–Exhaust		59.0 (2.323)		
Valve guide height from head surface mm (in)			10.4 to 10.6 (0.410 to 0.417)		
Valve guide inner dia. mm (in)					
	–Intake		8.000 to 8.018 (0.3150 to 0.3157)		
	–Exhaust		8.000 to 8.018 (0.3150 to 0.3157)		

Model	L20A	L24	L26	
			Single carb.	Twin carb.
Valve guide outer dia. (standard) 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 clearnace mm (in)				
–Intake	0.020 to 0.053 (0.0008 to 0.0021)			
–Exhaust	0.040 to 0.073 (0.0016 to 0.0029)			
Valve seat width mm (in)				
–Intake	1.4 to 1.6 (0.055 to 0.063)			
–Exhaust	1.8 to 2.2 (0.071 to 0.087)			
Valve seat angle				
–Intake	45°			
–Exhaust	45°			
Valve seat 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)			
Valve guide interference fit mm (in)	0.027 to 0.049 (0.011 to 0.0019)			
b) Camshaft and timing chain				
Camshaft end play mm (in)	0.08 to 0.38 (0.0031 to 0.0150)			
Camshaft robe lift mm (in)				
–Intake	6.65 (0.2618)			7.00 (0.2756)
–Exhaust				7.00 (0.2756)

Model	L20A	L24	L26	
			Single carb.	Twin carb.
Camshaft journal dia. mm (in)				
—1st		47.949 to 47.962 (1.8877 to 1.8883)		
—2nd		47.949 to 47.962 (1.8877 to 1.8883)		
—3rd		47.949 to 47.962 (1.8877 to 1.8883)		
—4th		47.949 to 47.962 (1.8877 to 1.8883)		
—5th		47.949 to 47.962 (1.8877 to 1.8883)		
Camshaft bend mm (in)		0.02 (0.0007)		
Camshaft journal to bearing clearance mm (in)		0.038 to 0.067 (0.0015 to 0.0026)		
Camshaft bearing inner dia. 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)	133.0 (5.24)	133.0 (5.24)	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 (0.0012)		

Model	L20A	L24	L26	
			Single carb.	Twin carb.
e) Crankshaft and main bearing				
Journal dia. mm (in)	54.942 to 54.955 (2.1631 to 2.1636)			
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 dia. 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.)	1.822 to 1.835 (0.0717 to 0.0722)			
Main bearing clearance mm (in)	0.020 to 0.072 (0.0008 to 0.0028)			
Wear limit of dittoted clearance mm (in)	0.12 (0.0047)			
Crankshaft bend mm (in)	0.05 (0.0019)			
f) Piston				
Piston dia. –S.T.D. mm (in)	77.915 to 77.965 (3.0675 to 3.0695)	82.985 to 83.035 (3.2671 to 3.2691)	82.985 to 83.035 (3.2671 to 3.2691)	
0.25 (0.0098) Oversize	77.935 to 77.985 (3.0683 to 3.0703)	83.215 to 83.265 (3.2762 to 3.2781)	83.215 to 83.265 (3.2762 to 3.2781)	
0.50 (0.0197) Oversize	78.165 to 78.215 (3.0774 to 3.0793)	83.465 to 83.515 (3.2860 to 3.2880)	83.465 to 83.515 (3.2860 to 3.2880)	
0.75 (0.0295) Oversize	78.415 to 78.465 (3.0872 to 3.0892)	83.715 to 83.765 (3.2959 to 3.2978)	83.715 to 83.765 (3.2959 to 3.2978)	
1.00 (0.0394) Oversize	78.665 to 78.715 (3.0970 to 3.0990)	83.965 to 84.015 (3.3057 to 3.3077)	83.965 to 84.015 (3.3057 to 3.3077)	
1.50 (0.0590) Oversize	78.915 to 78.965 (3.1069 to 3.1089)	84.465 to 84.515 (3.3254 to 3.3274)	84.465 to 84.515 (3.3254 to 3.3274)	

Model	L20A	L24	L26	
			Single carb.	Twin carb.
Ellipse difference mm (in)	0.29 to 0.33 (0.0114 to 0.0130)	0.32 to 0.35 (0.0126 to 0.0138)		
Ring groove width				
—Top		2.0 (0.0787)		
—Second		2.0 (0.0787)		
—Oil		4.0 (0.1575)		
Piston to bore clearance mm (in)		0.025 to 0.045 (0.0010 to 0.0018)		
Piston pin hole off-set mm (in)		0.95 to 1.05 (0.0374 to 0.0413)		
Piston pin hole diameter mm (in)		21.001 to 21.008 (0.8268 to 0.8271)		
g) Piston pin				
Pin dia. mm (in)		20.993 to 20.998 (0.8265 to 0.8267)		
Pin length mm (in)	66.40 to 66.65 (2.6142 to 2.6240)	72.00 to 72.25 (2.8346 to 2.8445)		
Piston pin to piston clearance mm (in)		0.006 to 0.013 (0.00623 to 0.00051)		
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 (0.0778)		
—Second		1.977 (0.0778)		
Side clearance mm (in)				
—Top	0.040 to 0.080 (0.0016 to 0.0031)	0.045 to 0.080 (0.0018 to 0.0031)		
—Second		0.030 to 0.070 (0.0012 to 0.0028)		

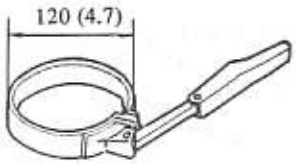
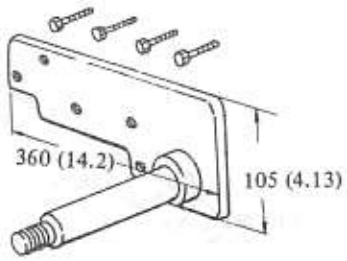
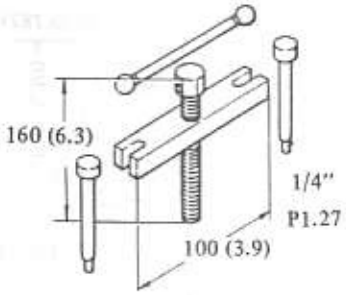
Model		L20A	L24	L26	
				Single carb.	Twin carb.
Ring gap mm (in)					
	–Top	0.20 to 0.35 (0.0079 to 0.0138)	0.23 to 0.38 (0.0091 to 0.0150)		
	–Second	0.14 to 0.29 (0.0055 to 0.0114)	0.15 to 0.30 (0.0059 to 0.0118)		
	–Oil	0.30 to 0.90 (0.0118 to 0.0354)	0.15 to 0.30 (0.0059 to 0.0118)		

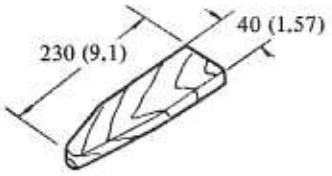
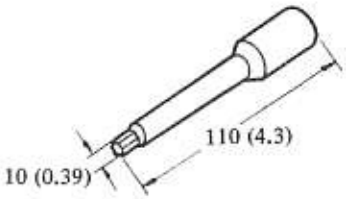
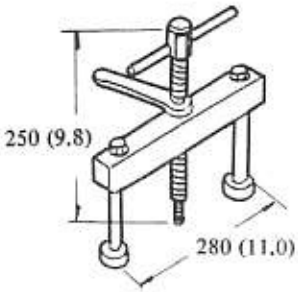
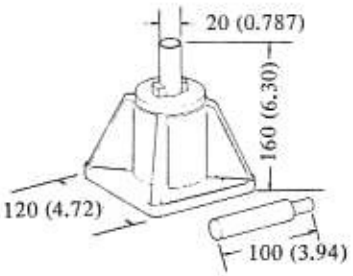
TROUBLE DIAGNOSES AND CORRECTIONS

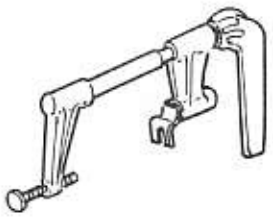
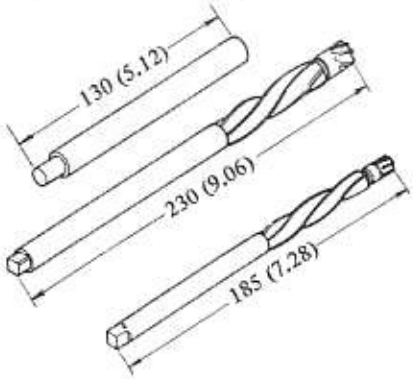
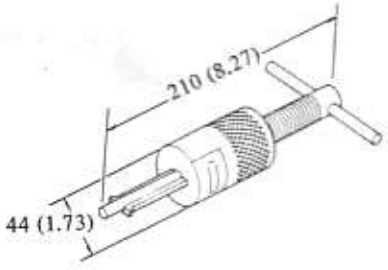
Condition	Probable cause	Corrective action
I. Noisy engine		
Knocking of crankshaft and bearing.	Loose main bearing.	Replace.
	Seized bearing.	Replace.
	Bent crankshaft.	Repair or replace.
	Uneven wear of journal.	Correct.
	Excessive crankshaft end play.	Replace center bearing.
Piston and connecting rod knocking.	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. Othermechanical troubles		
Sticked valve.	Improper valve clearance.	Adjust.
	Insufficient clearance between valve stem and guide.	Clean stem or ream guide.
	Weakned or broken valve spring.	Replace.
	Seized or damage of valve stem.	Replace or clean.
	Poor quality of fuel.	Use good fuel.

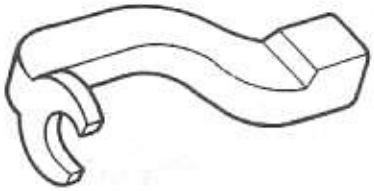
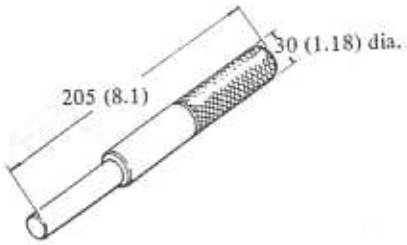
Condition	Probable cause	Corrective action
Seized valve seat.	Improper valve clearnce.	Adjust.
	Weakned valve spring.	Replace.
	Thin valve head edge.	Replace valve.
	Narrow valve seat.	Reface.
	Overheat.	Repair or replace.
	Over speeding.	Drive under proper speed.
	Sticked valve guide.	Repair.
Excessively 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.
	Overheat.	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.
	Sticked choke valve.	Clean and adjust.
	Overchoking.	Start correct way.
Defective connecting rod.	Shortage of engine oil.	Add oil.
	Low oil pressure.	Correct.
	Poor quality of engine oil.	Use right oil.
	Rough surface of crankshaft.	Grind and replace bearing.
	Clogged oil passage.	Clean.
	Wear or eccentricity of bearing.	Replace.
	Wrong assembly of bearing.	Correct.
	Loose bearing.	Replace.
	Connecting rod alignment incorrect.	Repair or replace.
Defective crankshaft bearing.	Shortage of engine oil.	Add or replace.
	Low oil pressure.	Correct.
	Poor quality of engine oil.	Use specified oil.
	Crankshaft journal worn or out-of-round.	Repair.
	Clogged oil passage in crankshaft.	Clean.
	Wear or eccentricity of bearing.	Replace.
	Wrong assembly of bearing.	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.	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-4
2.	ST05340000 Engine attachment	Attachment for setting the engine on the engine stand.  SE292	L20A L24 L26	Fig. EM-9 Page EM-24
3.	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-9 Page EM-24
4.	ST16540000 Puller crank pulley	For removing the crank pulley with damper.  SE293	L20A L24 L26	Fig. EM-12

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or figure No.
5.	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-13 Page EM-5
6.	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-14 Page EM-26
7.	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.  SE190	All L-series	Fig. EM-20
8.	ST13030001 Piston pin press stand	This tool is used with a press to drive pin into, or out of, connecting rod.  SE188	All L-series	Fig. EM-81

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or figure No.
9.	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	Page EM-22 Fig. EM-75 Fig. EM-27
10.	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-38
11.	ST11650001 Cutter set valve seat	For correcting the valve seat insert.  SE295	L24 L20A L16 L13	Fig. EM-39 Page EM-11
12.	ST16610001 Pilot bush puller	This tool is used to push pilot bush out of place.  SE191	All L-Series	Fig. EM-60

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or figure No.
13.	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.  SE189	All L-series	Fig. EM-88
14.	EM03470000 Piston ring compressor	This tool is used to compress piston rings while piston is being inserted into cylinder.  SE199	All models	Fig. EM-90
15.	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
16.	ST20630000 Clatch aligning	For centering the clutch disc.  SE294	130 230 S30 HGC110 A30	Fig. EM-107

SERVICE MANUAL

MODEL

L20A, L24 & L26 SERIES

ENGINES

NISSAN

NISSAN MOTOR CO., LTD.

TOKYO, JAPAN

SECTION EL

ENGINE LUBRICATION SYSTEM

EL

ENGINE LUBRICATION SYSTEM ..... EL- 2

SERVICE DATA AND SPECIFICATIONS ..... EL- 5

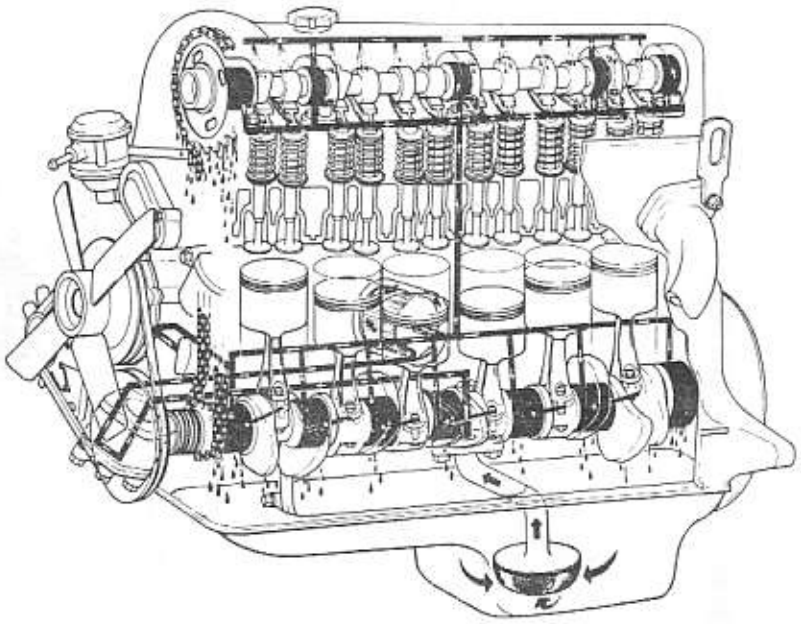
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ENGINE LUBRICATION SYSTEM

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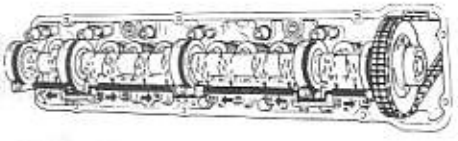


EL030

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 the 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, the chain tensioner and the timing chain. Oil supplied to the crankshaft bearings is fed to the connecting rod bearings through the drilled passages in the crankshaft. Oil injected from jet holes on the 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.



EL031

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. 4 camshaft bearings is then fed to the rocker arm, valve and cam lobe through the oil cam tube.

OIL PUMP

The oil pump is located in the bottom of the front cover attached by four 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.

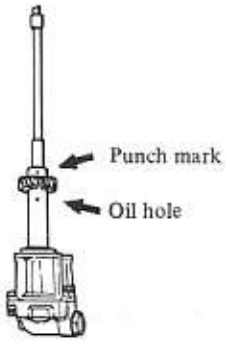
The spring-loaded oil pressure regulator valve limits the oil pressure to a maximum of 5.6 kg/cm^2 (80 lb/sq in) at 3,000 rpm.

REMOVAL

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

INSTALLATION

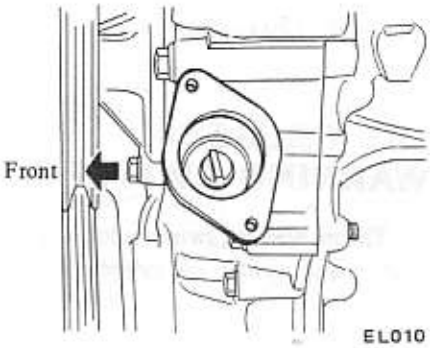
1. Before installing oil pump in engine, turn crankshaft so that No. 1 piston is at T.D.C.
2. Fill pump housing with engine oil, then align punch mark of drive spindle with hole in oil pump as shown in Figure EL-3.



EL009

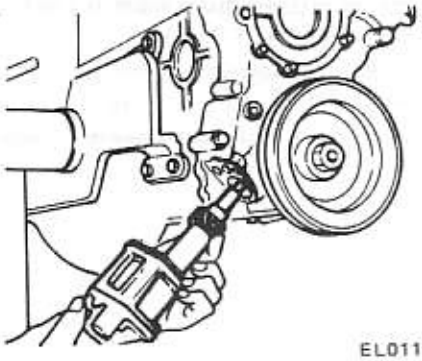
Fig. EL-3 Aligning punch mark and oil hole

3. Using a new gasket, install oil pump and drive spindle assembly so that the projection on its top is located in an 11 : 25 a.m. position. At this time, the smaller bow-shape will be placed toward the front as shown in Figure EL-4.



EL010

Fig. EL-4 Setting drive spindle



EL011

Fig. EL-5 Installing oil pump

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

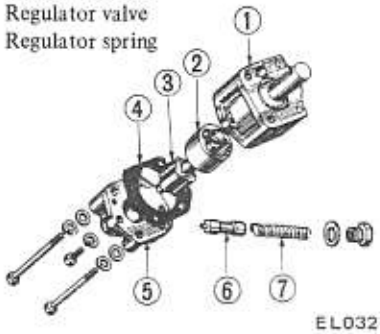
4. Tighten bolts securing oil pump to front cover.

DISASSEMBLY AND ASSEMBLY

1. Remove pump cover attaching bolts, pump cover and oil pump gasket, and slide out pump rotors.
2. Remove regulator cap, regulator valve and spring.
3. Assemble oil pump in reverse order of disassembly.

Note: The mark dotted on outer and inner rotor should face to oil pump body.

1 Oil pump body
2 Outer rotor
3 Inner rotor and shaft
4 Gasket
5 Oil pump cover
6 Regulator valve
7 Regulator spring



EL032

Fig. EL-6 Oil pump

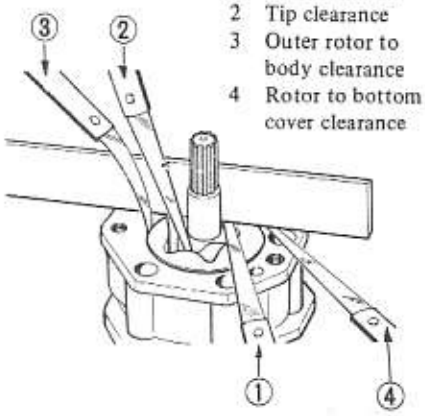
INSPECTION

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

Use a brush to clean the inside of pump housing and pressure regulator valve chamber. Be sure all dirt and metal particles are removed.

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. Check regulator valve free operation in the bore.
7. 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



EL013

Fig. EL-7 Checking rotor clearances

8. 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.

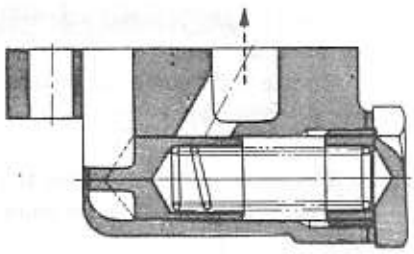
		Standard	Wear limit
Rotor side clearance (outer to inner rotor)	mm (in)	0.04 to 0.08 (0.0016 to 0.0031)	0.20 (0.0079)
Rotor tip clearance	mm (in)	Less than 0.12 (0.0047)	0.20 (0.0079)
Outer rotor to body clearance	mm (in)	0.15 to 0.21 (0.0059 to 0.0083)	0.5 (0.0197)
Rotor to bottom cover clearance	mm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

Note: The outer and inner rotor are not serviced separately. If the oil pump body is damaged or worn, replace the entire oil pump assembly.

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

Specifications

Oil pressure at idling	kg/cm^2 (lb/sq in)	0.8 to 2.8 (11 to 40)
Regulator valve spring		
Free length	mm (in)	52.5 (2.067)
Installed length/load	mm/kg (in/lb)	34.8/7.9 to 8.7 (1.370/17.4 to 19.2)
Regulator valve opening pressure	kg/cm^2 (lb/sq in)	3.5 to 4.3 (50 to 61)

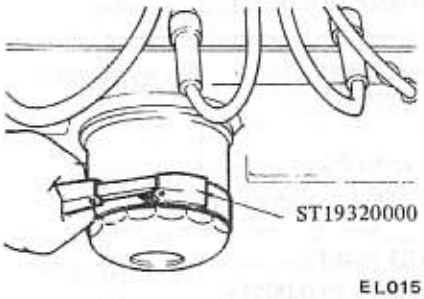
OIL FILTER

The oil filter is of a cartridge type. The oil filter element should be replaced every 10,000 km (6,000 miles) of operation, with the use of Oil Filter Wrench ST19320000. See Figure EL-9.

When removing an oil filter, loosen it after stopping engine about several minutes to drain out the oil from oil filter to oil pan.

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

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



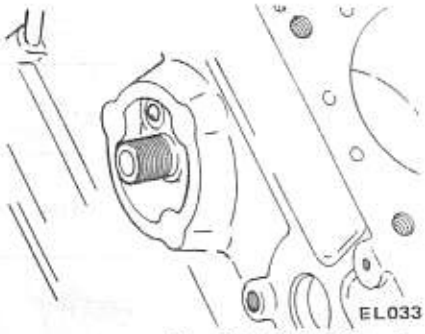
EL015

Fig. EL-9 Removing oil filter

OIL PRESSURE RELIEF VALVE

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

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 in.



EL033

Fig. EL-10 Relief valve

OIL PRESSURE WARNING SWITCH

The oil warning switch is located on right hand center of cylinder block and wired to an indicator lamp in the instrument cluster.

The warning light glows whenever the oil pressure drops below 0.2 to 0.4 kg/cm^2 (2.8 to 5.7 psi).

Prior to installing a switch to cylinder block, be sure to apply a conductive sealer to threads of new switch.

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 (lb/sq in)	0.8 to 2.8 (11 to 40)
Regulator valve spring:		
Free length	mm (in)	52.5 (2.067)
Installed length/load	mm/kg (in/lb)	34.8/7.9 to 8.7 (1.370/17.4 to 19.2)
Regulator valve opening pressure	kg/cm^2 (lb/psi)	3.5 to 4.3 (50 to 61)

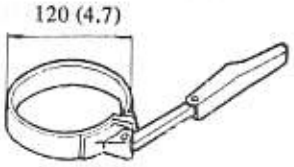
Tightening torque:

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)
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.
	Inoperative 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	Fig. EL-9

SERVICE MANUAL

MODEL

L20A, L24 & L26 SERIES

ENGINES

NISSAN

NISSAN MOTOR CO., LTD.

TOKYO, JAPAN

SECTION CO

COOLING SYSTEM

CO

COOLING SYSTEM ..... CO- 2

SPECIFICATIONS ..... CO- 7

TROUBLE DIAGNOSES AND CORRECTIONS ..... CO- 8

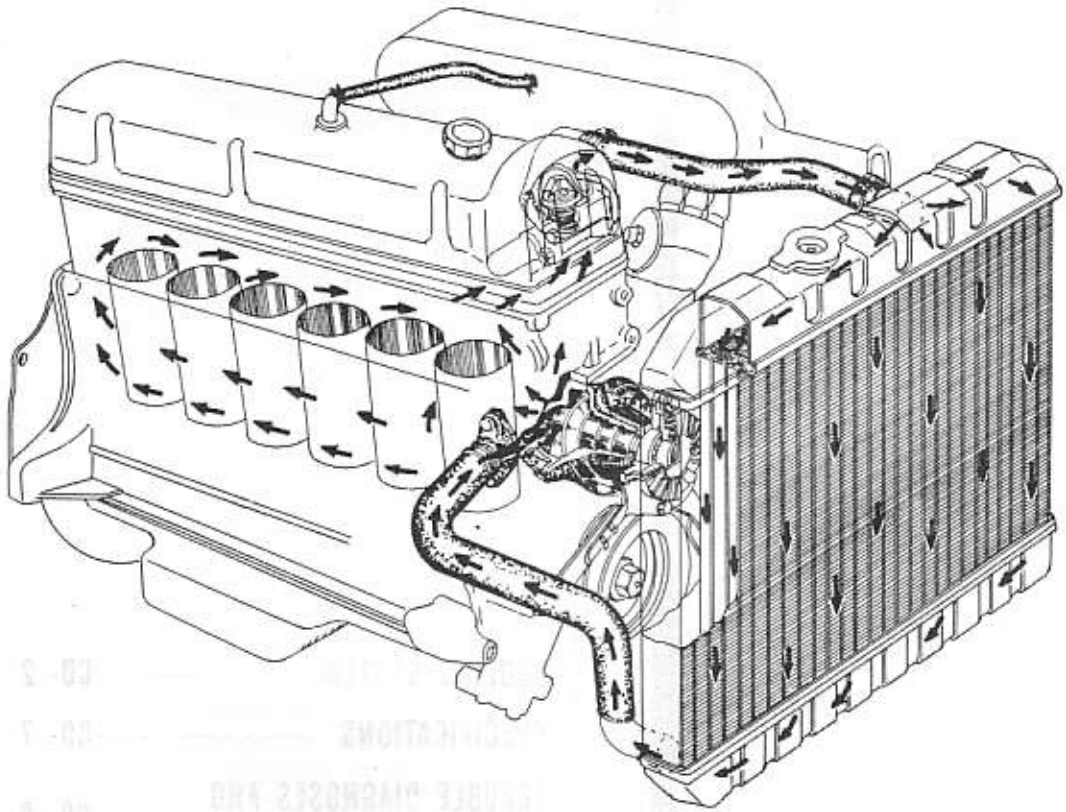
COOLING SYSTEM

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DESCRIPTION CO-2
COOLANT LEVEL CO-3
DRAINING AND FLUSHING THE COOLING SYSTEM CO-3
WATER PUMP CO-3
REMOVAL AND INSTALLATION CO-3
DISASSEMBLY CO-3
INSPECTION AND ADJUSTMENT CO-3
TEM-COUPLING CO-4
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THERMOSTAT CO-5
REMOVAL AND INSTALLATION CO-5
INSPECTION CO-5
RADIATOR CO-5
REMOVAL AND INSTALLATION CO-6
INSPECTION CO-6

DESCRIPTION

The cooling system is of the conventional pressure type. A centrifugal pump built in the front cover of the engine serves to circulate the coolant. The pressure type radiator filler cap installed on the radiator operates 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 swift warming up of the engine. After it reaches the normal operating temperature, the coolant circulates through the radiator.



CO027

Fig. CO-1 Cooling system

COOLANT LEVEL

The coolant level should be checked and maintained as follows:

1. 230: In the specified range indicated on reservoir tank after filling up radiator.
2. HGC110: Over the baffle plate of the radiator's upper tank.
3. S30: About 40 mm (1.575 in) below the bottom of filler neck.

CAUTION: To avoid serious personal injury, never remove radiator cap quickly when engine is hot. Sudden release of cooling system pressure is very dangerous.
If it is necessary to remove radiator cap when radiator is hot, turn cap slowly counterclockwise to the first stop. After all pressure in the cooling system is released, turn cap passing 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 the side of cylinder block. If heater system is installed, set heater temperature control valve to open position. After the coolant is drained completely, close drain cock and plug and refill the system with clean soft water.

WATER PUMP

The water pump is of a centrifugal type, which is mounted on the engine front cover. The fan and pulley are bolted at the pulley hub. The pump shaft is supported by a double row of ball bearings press fit in an aluminum die cast pump body. The bearings are permanently lubricated and sealed to prevent loss of lubricant and entry of dirt.

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

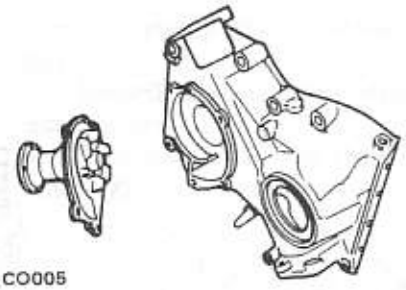


Fig. CO-2 Water pump and front cover

REMOVAL AND INSTALLATION

Removal

1. Drain coolant into a clean container.
2. Loosen bolts retaining fan shroud to radiator and remove shroud.
3. Loosen belt, then remove fan blade and pulley from hub.
4. Remove pump assembly and gasket from front cover.

Note: Prior to removing water pump, clean the cooling system with NISSAN CSC (Cooling System Cleaner).

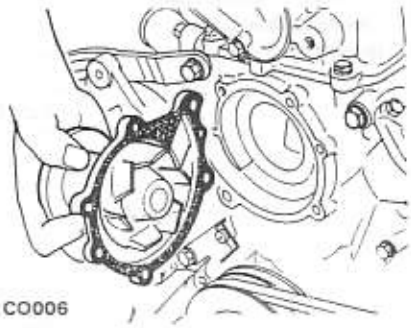


Fig. CO-3 Removing water pump

Installation

1. Be sure to clean the gasket surfaces in contact with pump and front cover. Always use new gaskets when installing pump assembly. Be sure to tighten bolts.
2. Fill cooling system and check for leaks at pump.
3. Install fan pulley and fan blade, and tighten fixing bolts securely. Install belt and adjust for proper tension.

DISASSEMBLY

Water pump is made of aluminum and its bearing outer race is of a press fit type. For this reason, water pump should not be disassembled.

INSPECTION AND ADJUSTMENT

Inspection

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

1. Badly rusted or corroded body assembly and vane.
2. Excessive end play or roughness of bearings in operation.

Note: If excessive mechanical seal squeak occurs when engine is running, use NPSL (Nissan water pump seal lubricant) to prevent squeak.

Adjustment

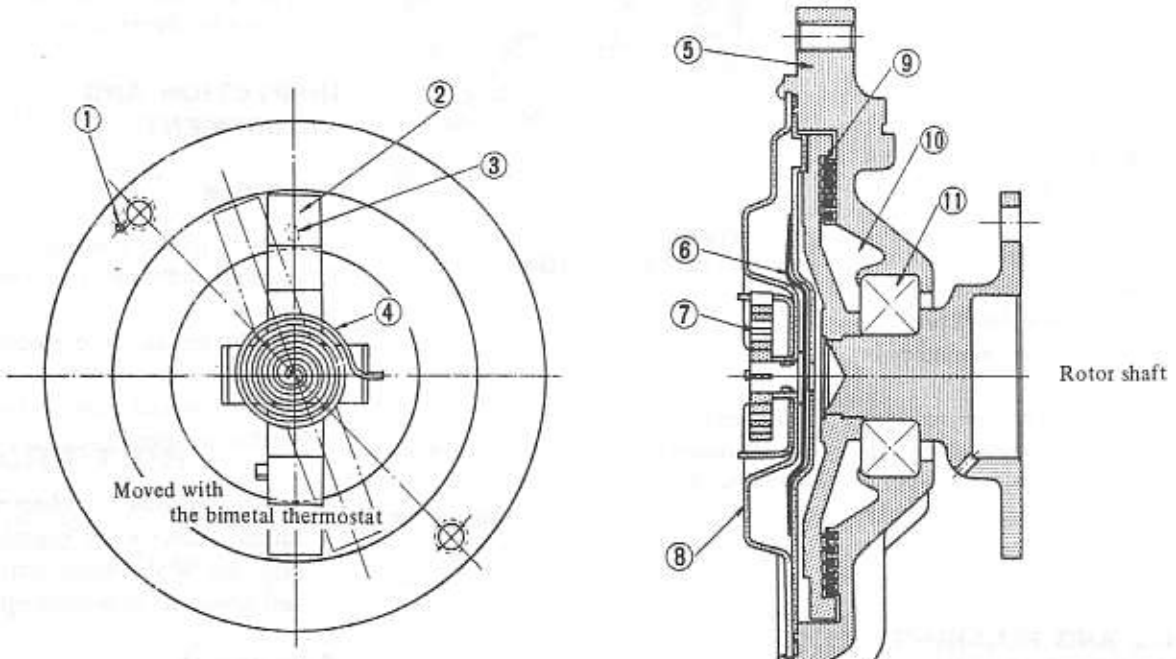
Fan belt should be properly adjusted at all times. A tight belt causes wear of alternator and water pump bearings. A loose belt brings about improper cooling fan, water pump, and alternator operation.

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

Slackness of fan belt:
8 to 12 mm
(0.315 to 0.472 in)

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

TEM-COUPLING



1 Pump unit oil outlet
2 Slide valve
3 Oil inlet
4 Bimetal thermostat
5 Driven part
6 Slide valve
7 Bimetal thermostat
8 Reserve chamber for "OFF" condition
9 Coupling part (labyrinth)
10 Driving chamber
11 Bearing

CO028

Fig. CO-4 Cross-sectional view of Tem-coupling

Tem-coupling is a type of fan coupling which is provided with a temperature control system.

The conventional coupling always slips the fan at a high speed under a constant ratio regardless of the engine cooling requirement.

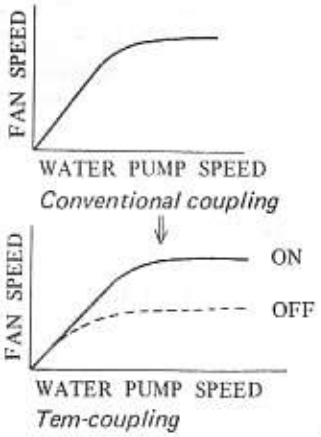
The slipping ratio of the Tem-coupling, however, is properly changed with the cooling requirement.

"ON" denotes that cooling is required and the fan operates up to about 2,500 rpm. When high cooling is not required (during cold season, with the engine warmed up, etc.), the operation is placed under "OFF" condition and the fan slips at about 1,600 rpm.

The coiled bimetal thermostat installed on the front center portion of the Tem-coupling detects temperature of air passing through the radiator (The air temperature is directly relative to the engine coolant temperature.) and the inside slide valve is opened or closed as required, and thus, the ON-OFF control is performed. When the air temperature rises, the bimetal is expanded, and the valve is opened, silicon oil is forwarded to the groove that transmits torque, and the system is placed under "ON" condition.

When the valve closes, silicon oil is not supplied to he groove, oil in the groove is accumulated on the Tem-coupling periphery due to the centrifugal force, and led into the reserve chamber. Now, oil is eliminated from the groove, and the system is placed under "OFF" condition.

With this system, when fan cooling is not required, the output loss is minimized and noise can be far reduced.



CO029

Fig. CO-5 Characteristic of Tem-coupling

INSPECTION

Check Tem-coupling for oil leakage or bend of bimetal.

If the above symptoms are found, replace it with a new one as an assembly.

THERMOSTAT

A wax pellet type thermostat is mounted in the thermostat housing at the cylinder head water outlet.

The founction of the thermostat is to control the flow of coolant, facilitating fast engine warm up and regulating coolant temperature. The thermostat is designed to open and close at predetermined temperatures and if not operating properly should be removed and tested as described below.

REMOVAL AND INSTALLATION

1. Drain coolant partially.
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.

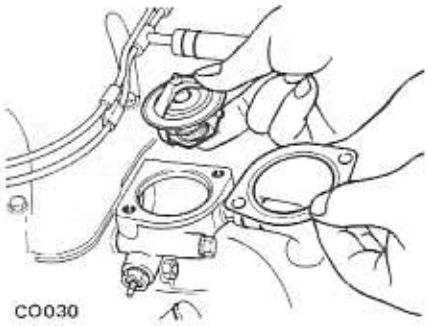


Fig. CO-6 Removing thermostat

INSPECTION

A sticking thermostat will prevent the cooling system from functioning properly. If the thermostat sticks in the open position, the engine warms up very slowly. If the thermostat sticks in the closed position, overheating will result. Therefore, the thermostat should be inspected to make sure that it is in good condition.

1. Submerge thermostat in hot water 5°C (31°F) above the temperature specified in the following table.
2. After preparing for the marked screwdriver at about 8 mm (0.315 in) from the tip, inspect the lift height of valve by inserting it.
3. Now, place thermostat in water 5°C (31°F) below the specified temperature.

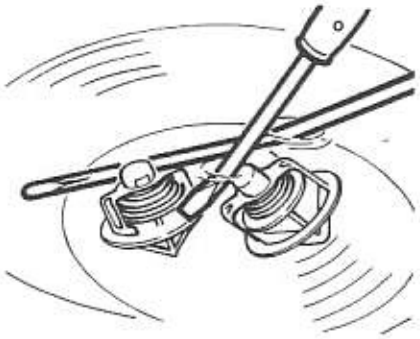


Fig. CO-7 Inspecting thermostat

If thermostat does not operate at the above specified temperature, it must be replaced because it cannot be repaired.

	Standard	For cold areas	For tropical areas
Valve opening temperature	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 the engine.

RADIATOR

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

The radiator filler cap is designed to maintain a pre-set pressure (0.9 kg/cm^2, 13 psi) above atmospheric pressure.

The relief valve consisting of a blow-off valve and a vacuum valve, helps to prevent the coolant from boiling by giving pressure to it. However, when the pressure is reduced below atmospheric pressure, the vacuum valve allows air to re-enter the radiator preventing the formation of a vacuum in the cooling system. The bottom tank on cars equipped with automatic transmission incorporates an oil cooler for the transmission fluid.

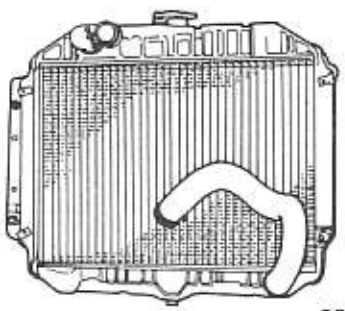


Fig. CO-8 Radiator for manual transmission

REMOVAL AND INSTALLATION

1. Drain coolant into a clean container.
2. Remove front grille. (except for the model S30 series)
3. Disconnect radiator's upper and lower hoses.
4. Remove hose connecting radiator to reservoir tank. (The reservoir tank is provided with only the model 230 series.)
5. On a vehicle with automatic transmission (except for the model HGC110 series), disconnect cooler inlet and outlet lines from radiator.
6. Remove radiator retaining bolts and then remove radiator upward.
7. Install radiator in the reverse sequence of removal.

INSPECTION

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

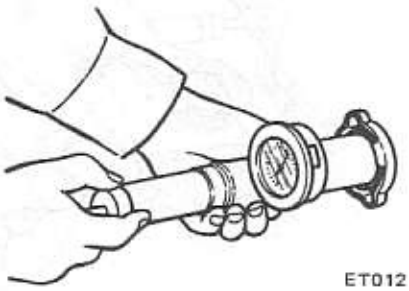


Fig. CO-9 Testing radiator cap

Also, inspect radiator for water leakage using cap tester and applying a pressure of 1.6 kg/cm^2 (22.8 psi).

If a defect is detected, repair or replace radiator.

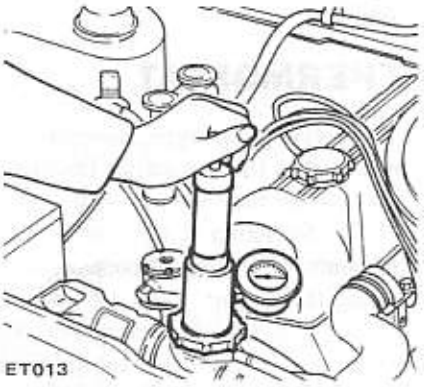
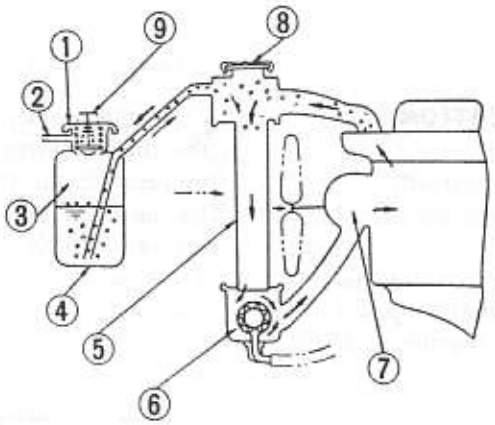


Fig. CO-10 Testing cooling system pressure



1	Pressure valve	6	Oil cooler
2	Overflow pipe	7	Water pump
3	Expanded part	8	Cap for water supply
4	Reservoir tank	9	Push button
5	Radiator		

CO031

Fig. CO-11 Structural view of cooling system with reservoir tank

SPECIFICATIONS

	Model	230		HGC110	S30
	Engine	L20A	L26	L24	L26 (Twin carb.)
Radiator	Dimension of core (Height x Width x Thickness) mm (in)	395 x 558 x 32 (15.6 x 22.0 x 1.3)	410 x 614 x 32 (16.1 x 24.2 x 1.3)	376 x 474 x 38 (14.8 x 18.7 x 1.5)	350 x 600 x 49 (13.8 x 23.6 x 1.9)
	Type	Corrugated fin and tube			
	Fin pitch mm (in)	2.3 (0.09)		1.8 (0.07)	2.9 (0.114)
	Cap working pressure kg/cm^2 (psi)	0.9 (13)			
	Testing pressure kg/cm^2 (psi)	1.6 (23)			
	Water capacity (including engine) ℓ (U.S. qt., Imp. qt.)	9.0 (9½, 7⅞)		10.0 (10⅝, 8¾)	9.4 (10, 8 ¼)
	Reservoir tank	Installed		Not installed	
Fan	Tem-patrol	Not installed			Installed
	No. of blade x outer dia. mm (in)	4 x 350 (13.8)			8 x 450 (17.72)

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Loss of water	Damaged radiator seams.	Repair.
	Leaks at heater connections or plugs.	Repair.
	Leak at water temperature gauge.	Tighten.
	Loose joints.	Tighten.
	Defective cylinder head gasket.	Replace. Check engine oil for contamination and refill as necessary.
	Cracked cylinder block.	Replace. Check engine oil in crankcase for mixing with water by pulling oil level gauge.
	Cracked cylinder head.	Replace.
	Loose cylinder head bolts.	Tighten.
Poor circulation	Restriction in system.	Check hoses for crimps, and clear the system of rust and sludge by flushing radiator.
	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. Permanent antifreeze (Ethylene glycol base) can be used throughout the seasons of a year, and exchange every 40,000 km (24,000 miles).
Overheating	Faulty thermostat.	Replace.
	Radiator fin choked with mud, chaff, etc.	Clean out air passage thoroughly by using air pressure from engine side of radiator.
	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.
Overcooling	Faulty thermostat.	Replace.
	Inaccurate temperature gauge.	Replace.

SERVICE MANUAL

MODEL

L20A, L24 & L26 SERIES

ENGINES

NISSAN

NISSAN MOTOR CO., LTD.

TOKYO, JAPAN

SECTION EF

ENGINE FUEL

EF

AIR CLEANER ..... EF- 2
FUEL STRAINER ..... EF- 4
FUEL PUMP ..... EF- 4
TWO-BARREL CARBURETOR ..... EF- 7
SU TYPE TWIN CARBURETOR EF-19

AIR CLEANER

CONTENTS

DESCRIPTION EF-2
AIR CLEANER ELEMENT EF-2
AUTOMATIC TEMPERATURE CONTROL AIR CLEANER EF-2
REMOVAL AND INSTALLATION EF-3
TEMPERATURE SENSOR EF-3
REMOVAL AND INSTALLATION EF-3

DESCRIPTION

The air cleaner element is a viscous paper type and does not require cleaning service between renewals.

Note: Never attempt to clean this element with a brush or air blast.

AIR CLEANER ELEMENT

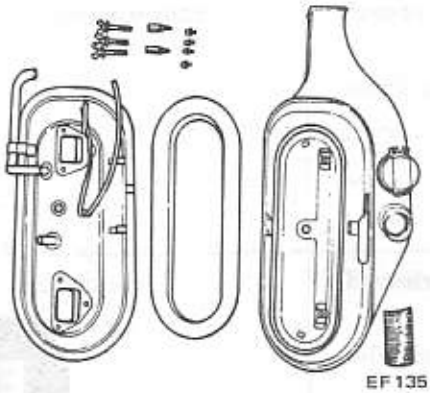


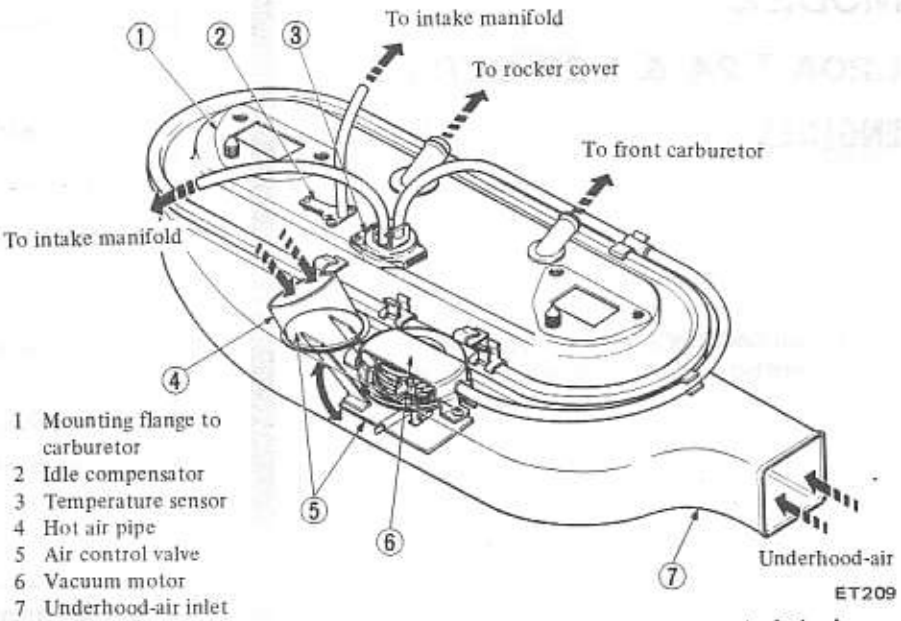
Fig. EF-1 Air cleaner for twin carburetor



Fig. EF-2 Air cleaner for single carburetor

AUTOMATIC TEMPERATURE CONTROL AIR CLEANER

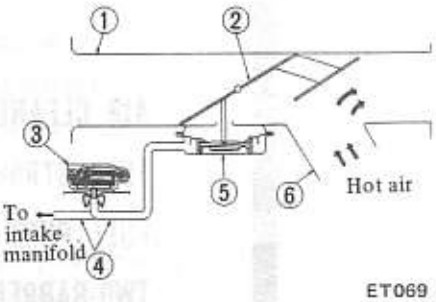
The automatic temperature control air cleaner is a special type equipped with a temperature sensor and vacuum-operated valve. The vacuum acting upon the air control valve is controlled by the sensor (See Figure EF-3.).



1 Mounting flange to carburetor
2 Idle compensator
3 Temperature sensor
4 Hot air pipe
5 Air control valve
6 Vacuum motor
7 Underhood-air inlet

Fig. EF-3 Automatic temperature control air cleaner

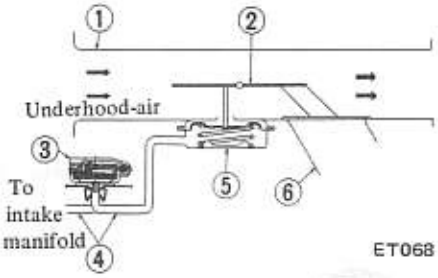
If the temperature of suction air is low when the engine is running. The valve closes the underhood-air inlet, and introduces hot air through the cover which is installed on the exhaust manifold (See Figure EF-4.).



1 Air intake pipe
2 Air control valve
3 Temperature sensor
4 Vacuum hoses
5 Vacuum motor
6 Hot air pipe

Fig. EF-4 Hot-air delivery mode (during cold engine operation

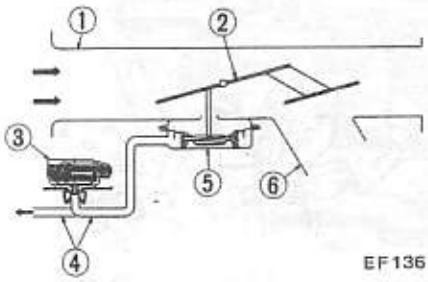
When the temperature of suction air around the sensor reaches 38°C (100°F) or above, sensor activates to open the valve. When the temperature of suction air around the sensor rises further to above 55°C (130°F), the valve opens completely to prevent entrance of hot air, and allows underhood-air alone to be introduced into carburetor (See Figure EF-5.).



1 Air inlet pipe
2 Air control valve
3 Temperature sensor
4 Vacuum hoses
5 Vacuum motor
6 Hot air pipe

Fig. EF-5 Underhood-air delivery mode (during hot engine operation)

Due to the operation of the valve as described above, the temperature of suction air around the sensor is always kept at about 46°C (115°F) (See Figure EF-6.).



1 Air inlet pipe
2 Air control valve
3 Temperature sensor
4 Vacuum hoses
5 Vacuum motor
6 Hot air pipe

Fig. EF-6 Regulating air delivery mode

When the engine is operating under heavy load, the valve opens the under-hood-air inlet completely to obtain full power regardless of the temperature around sensor.

This kind of control over carburetor air temperatures makes possible a leaner carburetor calibration than conventional control, thus allowing reduced emissions and elimination of carburetor icing.

REMOVAL AND INSTALLATION

1. Remove three thumbscrews and detach air cleaner cover.
2. Disconnect various hoses.

- o Slow air bypass hose (to front carburetor)
- o Idle compensator hose (to intake manifold)
- o Temperature sensor hose (to intake manifold)
- o Blow-by gas hose (to rocker cover)
- o Hot air duct hose (to exhaust manifold)

3. Remove six screws securing air cleaner flange to carburetor, and detach air cleaner flange.

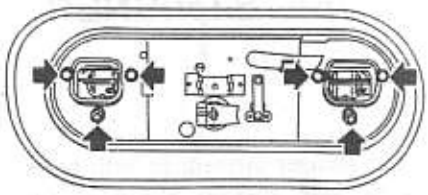


Fig. EF-7 Removing air cleaner flange

4. Install air cleaner assembly in the reverse order of removal.

Note: Be careful not to deform air duct when installing.

TEMPERATURE SENSOR

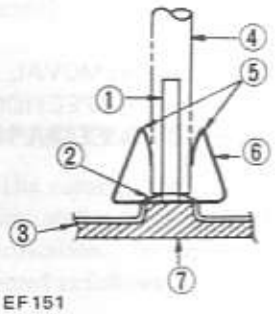
REMOVAL AND INSTALLATION

Removal

1. Flatten the tabs of clip with pliers.
2. Pull out hoses.

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

3. Pry off the tab of clip with a screwdriver.
4. Remove sensor and clip.



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

Fig. EF-8 Removing sensor

Installation

1. Install sensor and gasket assembly in their proper positions.

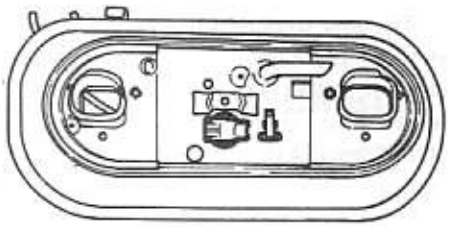


Fig. EF-9 Installing sensor

2. Insert clip. Be sure to hold sensor at the correct position to avoid damage.
3. Connect hoses to their proper positions.

Note: Exercise caution so as not to damage sensor.

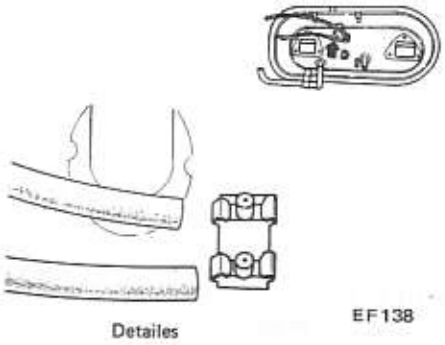
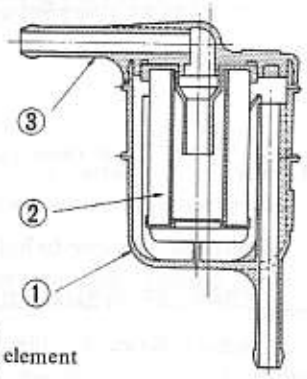


Fig. EF-10 Inserting clip

FUEL STRAINER

DESCRIPTION

The fuel strainer is a cartridge type strainer, and paper is used as a strainer element. This strainer should be replaced at intervals not to exceed 40,000 km (24,000 miles).



1 Body
2 Paper element
3 Cover

EF005

Fig. EF-11 Sectional view of cartridge type fuel strainer

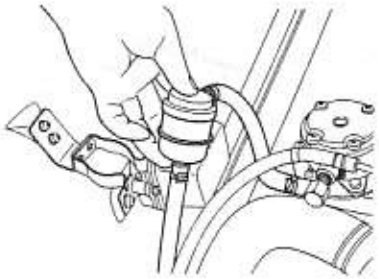
The strainer element in both types can be seen through the bowl for convenience in checking the element's condition without removal.

REMOVAL

Disconnect the inlet and outlet fuel pipes, and the fuel strainer assembly is easily removed.

SERVICE REFERENCE

This fuel strainer has no pet cocks, therefore the strainer, carburetor lines, and fuel pump should not be removed or cleaned when the tank is full, unless absolutely necessary. If required, place the tube, at the rear of the strainer, above the top of the fuel tank.



EF162

Fig. EF-12 Cartridge type fuel strainer

FUEL PUMP

CONTENTS

DESCRIPTION EF-4
FUEL PUMP TESTING EF-4
STATIC PRESSURE TEST EF-5
CAPACITY TEST EF-5
REMOVAL AND DISASSEMBLY EF-5
INSPECTION EF-6
ASSEMBLY EF-6

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.

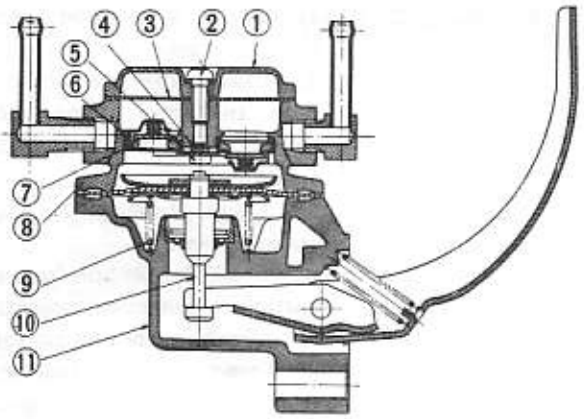
The fuel pump is of a pulsating type designed for easy maintenance. It consists of a body, rocker arm assembly, fuel diaphragm, fuel diaphragm spring, seal inlet- and outlet-valve. Figure EF-13 shows a cross-sectional view of the pump.

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 used in the L20A, L24 and L26 engines.

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.



EF163

1	Cover upper body	7	Valve assembly
2	Screw cover set	8	Body upper
3	Gasket cover	9	Spring diaphragm
4	Retainer valve	10	Diaphragm assembly
5	Screw retainer set	11	Body comp lower
6	Gasket valve		

Fig. EF-13 Sectional view of fuel pump

STATIC PRESSURE TEST

The static pressure test should be conducted 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 the hose between carburetor and T-connector securely with a clip.
4. Start and 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.

   0.24 to 0.30 kg/cm^2
   (3.41 to 4.27 psi)

Note: If the fuel in the 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 gummed 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 conducted only when static pressure is within the specification. To conduct this test, proceed as follows:

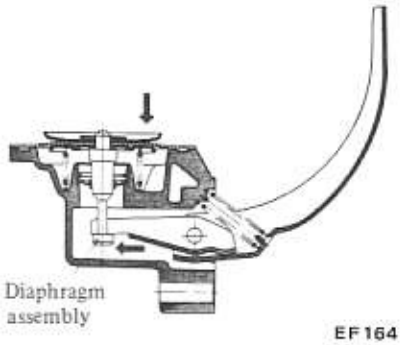
1. Disconnect pressure gauge from T-connector and, in its vacant place, install a suitable container as a fuel sump.
2. Start engine and run at 1,000 rpm.
3. The pump should deliver 1,600 cc (3⅜ U.S. pt.) of fuel in one minute or less.

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.

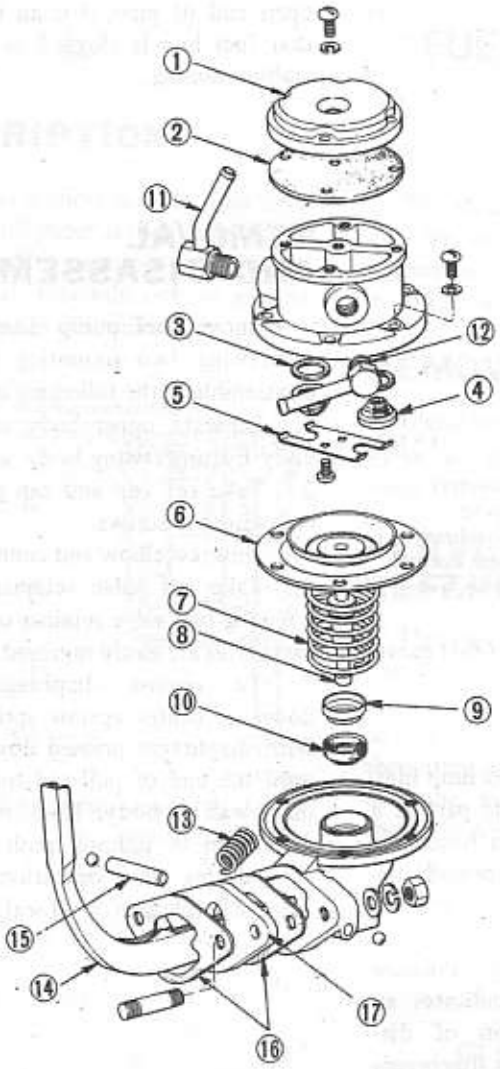
1. Separate upper body and lower body by unscrewing body set screws.
2. Take off cap and cap gasket by removing cap screws.
3. Unscrew elbow and connector.
4. Take off valve retainer by unscrewing two valve retainer screws and two valves are easily removed.
5. To remove diaphragm, press down its center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



EF164

Fig. EF-14 Removing pull rod

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



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

EF008

Fig. EF-15 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.
3. Check diaphragm for small holes, cracks or wear.
4. Check rocker arm for wear at the portion in contact 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 with new parts 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.

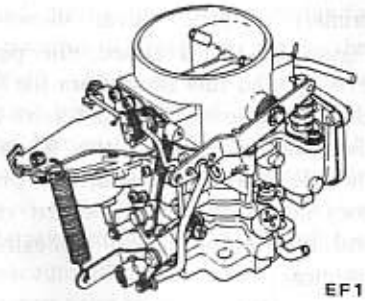
TWO-BARREL CARBURETOR

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SECONDARY SYSTEM ..... EF- 9
FLOAT SYSTEM EF-10
ADJUSTMENT EF-10
IDLING ADJUSTMENT EF-10
FUEL LEVEL ADJUSTMENT EF-10
ADJUSTMENT OF FAST IDLE OPENING EF-11
ADJUSTMENT OF INTERLOCK OPENING OF PRIMARY AND SECONDARY THROTTLE VALVES EF-12
MAJOR SERVICE OPERATION EF-12
REMOVAL EF-12
DISASSEMBLY EF-12
JETS EF-16
SPECIFICATIONS AND SERVICE DATA EF-17
TROUBLE DIAGNOSES AND CORRECTIONS EF-18

DESCRIPTION

Carburetor type	Applied engine and model
DAF342-9A	L20A on model 230
DAF342-12	L24 on model (K)HGC110
DAF342-11	L26 on model 230



EF165

Fig. EF-16 External view for two barrel carburetor

Almost all the mechanisms of these carburetors are quite similar, therefore the general explanation applies for all except for some variations.

These are downdraft type and are designed to increase power and fuel economy.

These carburetors present several distinct features of importance to the vehicle owners.

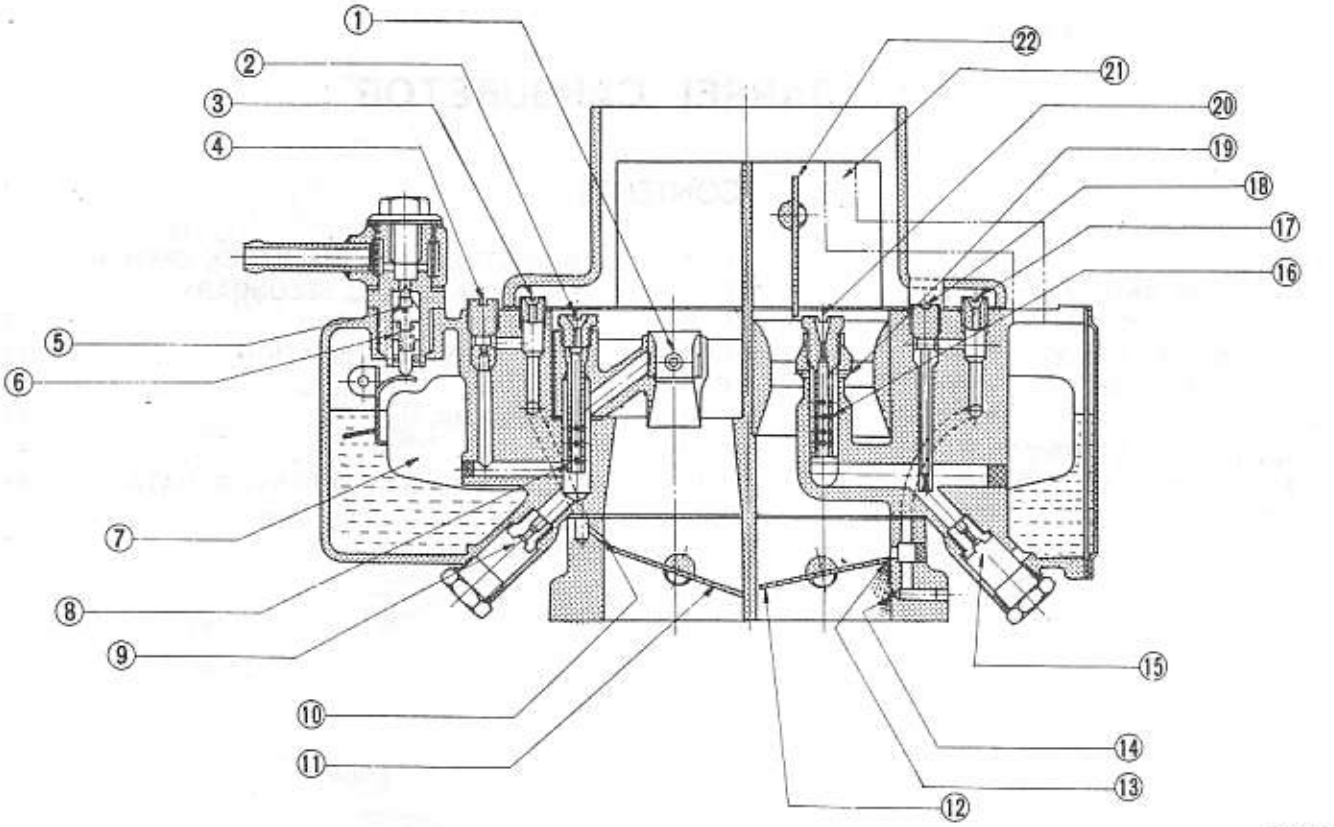
A summary of features is as follows:

1. Secondary throttle valve is operated by the diaphragm which is actuated by the vacuum so that higher power and better acceleration are achieved as compared with the mechanical throttle valve type.
2. The power valve mechanism, so-called vacuum piston type, affords high speed performance.
3. Accelerating pump gives excellent acceleration.

STRUCTURE AND OPERATION

These carburetors consist of a primary system for normal running and a secondary system for full load running.

The float system which is commonly used by primary and secondary systems, a secondary switchover mechanism, a starting mechanism, accelerating mechanism, etc. are also attached.



1	S Main nozzle	9	S Main jet	17	P Slow air bleed
2	S Main air bleed	10	By-pass hole	18	P Slow jet
3	S Slow air bleed	11	S Throttle valve	19	P Main nozzle
4	S Slow jet	12	P Throttle valve	20	P Main air bleed
5	Needle valve	13	By-pass hole	21	Air vent
6	Needle valve spring	14	Idle hole	22	Choke valve
7	Float	15	P Main jet		
8	S Emulsion tube	16	P Emulsion tube		

Fig. EF-17 Sectional view of two-barrel carburetor

PRIMARY SYSTEM

1. Primary main system

The primary main system is of solex 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 immediately behind the main jet, mixing with air coming from the 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 vehicle.

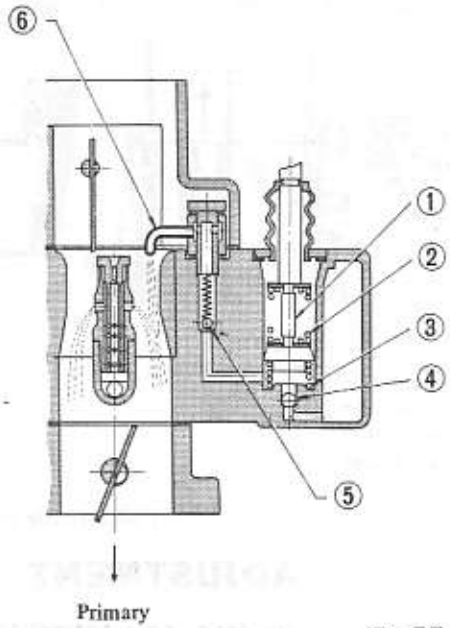
Small opening of the throttle valve in idling or partial load creates a large negative pressure in the intake manifold.

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

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-18, 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.



1 Piston
2 Damper spring
3 Piston return spring
4 Inlet valve
5 Outlet valve
6 Pump injector

EF166

Fig. EF-18 Acceleration mechanism

4. Starting mechanism

Pull the choke button to close the choke valve fully, then start the engine. This provides a rich mixture, making it possible to start the engine quickly. When the engine is started, the choke valve is opened at an adequate angle automatically, which prevents overchoking and ensures smooth engine performance. While the engine is being warmed up, it increases in speed at steps, and by releasing the choke button an optimum engine speed can be obtained. With the choke valve closed fully, the primary throttle valve is caused to open at an angle best suited for starting through a link mechanism.

5. 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.

6. Dash pot device

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.

When the primary throttle valve is closed near full angle (1,800 to 2,000 rpm in engine speed), a throttle lever strikes the dash pot stem making the primary throttle valve gradually open, and keeping the engine running.

SECONDARY SYSTEM

1. Secondary main system

The secondary main system is of 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.

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 (by-pass hole) is located near the secondary throttle valve edge in its fully closed state.

3. Secondary switchover mechanism.

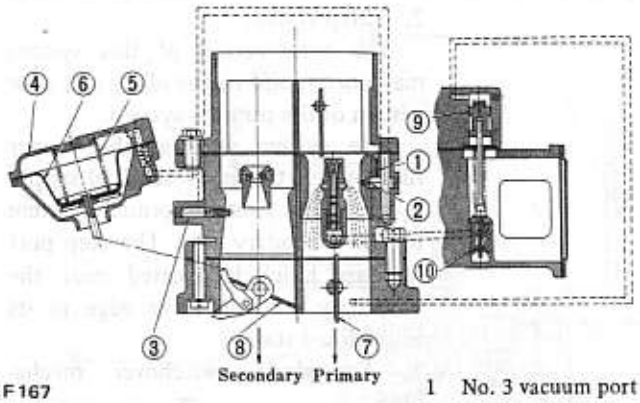
The secondary throttle valve is linked to the diaphragm which is actuated by the vacuum created in the venturi. A vacuum jet is provided at each of the primary and secondary venturies, and the composite vacuum of these jets actuates the diaphragm.

As the linkage, shown in Figure EF-11, causes the secondary throttle valve not to open until the primary throttle valve opening reaches approximately (–11A model; 55°, the others; 50°), fuel consumption during normal operation is not excessive.

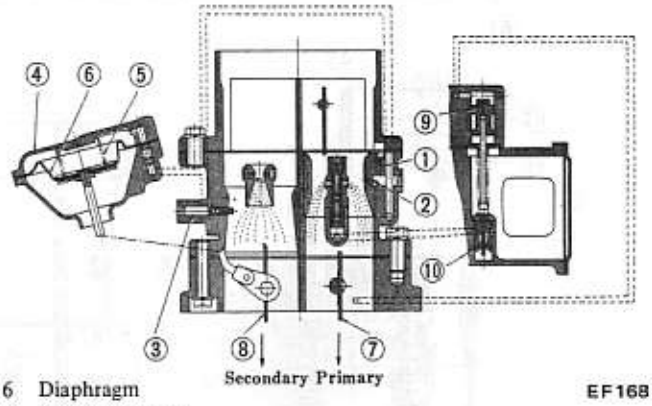
During high speed running, as shown in Figure EF-12, as the vacuum at the venturi is increased, the diaphragm is pulled against the diaphragm spring force, and then secondary throttle valve is opened.

The other side, during low speed running (as the primary throttle valve opening does not reach 50° or 55°), 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 position wider than 50° or 55°, the secondary throttle valve is ready to open, because the locking arm revolves and leaves from the secondary throttle arm.



EF167



EF168

1 No. 3 vacuum port
2 P. vacuum port
3 S. vacuum port
4 Diaphragm chamber
5 Diaphragm spring
6 Diaphragm
7 P. throttle valve
8 S. throttle valve
9 Vacuum piston
10 Power jet

Fig. EF-19 Full throttle at low speed

Fig. EF-20 Full throttle at high speed

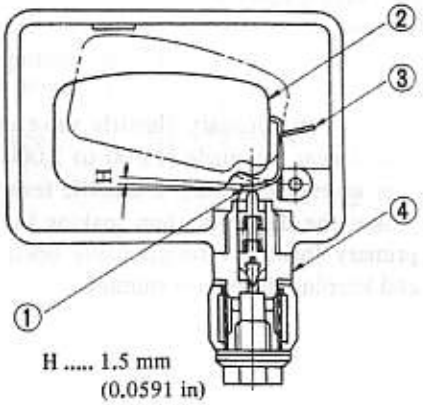
FLOAT SYSTEM

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 a special hard steel ball and will not wear under considerably long use. Besides, the insertion of a spring will prevent flooding under rough road running.

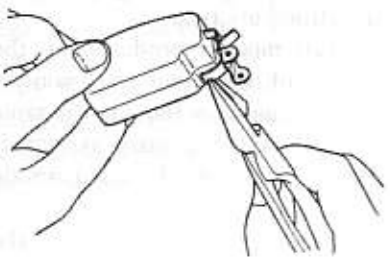


EF169

1 Float seat
2 Float
3 Float stopper
4 Needle valve

Fig. EF-21 Adjusting fuel level

If the fuel level is in accord with the level gauge line, the float level is properly set. If the float level is not correct, adjust it by bending the float seat as shown in Figure EF-22. Approximately *H mm is required as the effective stroke of the needle valve. So adjust the gap between the valve stem and the float seat to *H mm with the float fully lifted up by bending the float stopper.



EF170

Fig. EF-22 Adjusting float seat

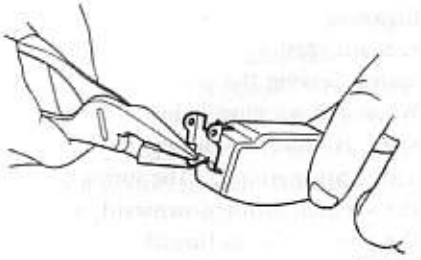
ADJUSTMENT

IDLING ADJUSTMENT

Refer to Engine Tune-up section concerning the details of idling adjustment.

FUEL LEVEL ADJUSTMENT

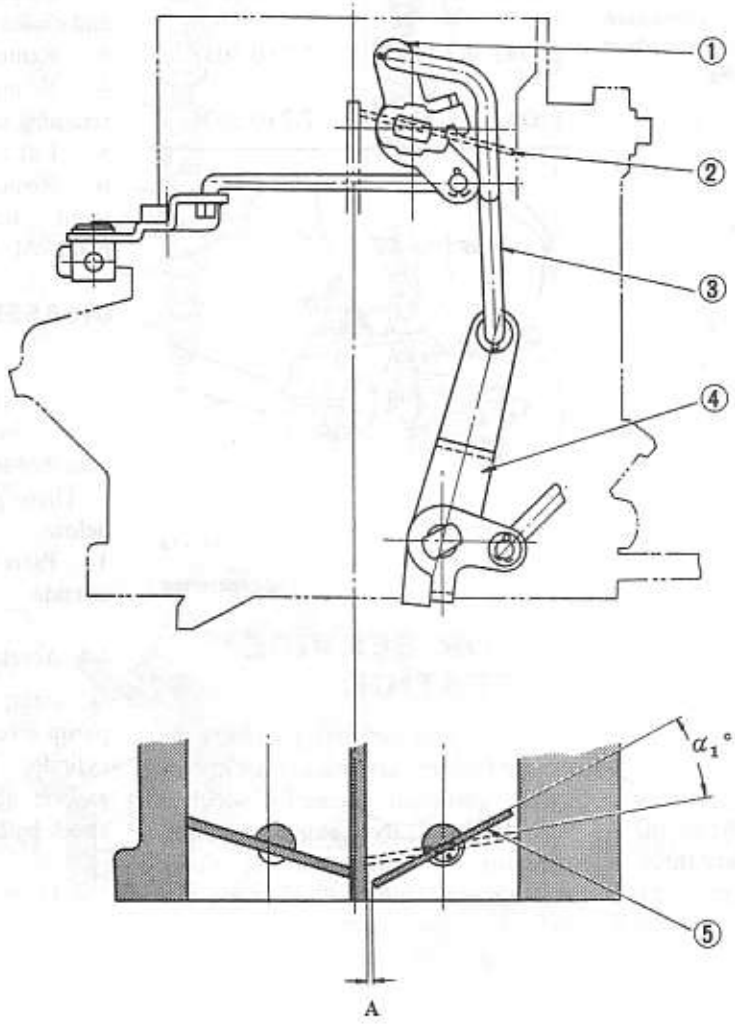
A constant fuel level is maintained by the float and needle valve.



EF171

Fig. EF-23 Adjusting float stopper

ADJUSTMENT OF FAST IDLE OPENING



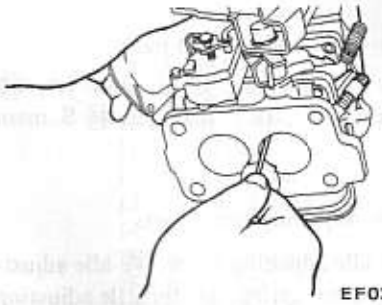
1 Choke lever
2 Choke valve
3 Choke connecting rod
4 Choke connecting lever
5 P. throttle valve

EF172

Fig. EF-24 Adjusting fast idle opening

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

After reassembly, or in a check on interlock opening angle, bend choke connecting rod for adjustment so that a fully closed choke valve will bring clearance A shown in Figure EF-24.

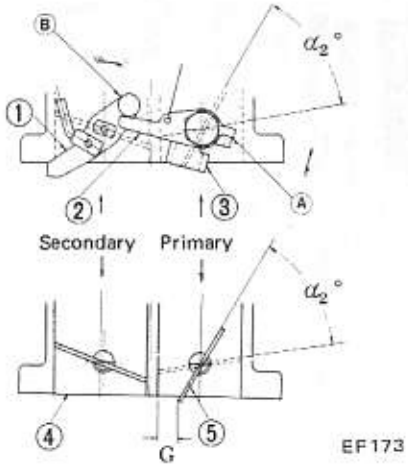


EF020

Fig. EF-25 Measuring fast idle opening

Carburetor type	Approximate fast idle opening ($\alpha_1°$)	Dimension "A" mm (in)
DAF342-9A	17°	1.44 (0.0567)
DAF342-11A	19°	1.6 (0.0630)
DAF342-14	18°	1.48 (0.0583)

ADJUSTMENT OF INTERLOCK OPENING OF PRIMARY AND SECONDARY THROTTLE VALVES



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

Fig. EF-26 Adjusting interlock opening of throttle valve

Figure EF-18 shows the primary throttle valve opened $*\alpha_2°$. When the adjust plate fixed to the primary throttle valve is open $*\alpha_2°$, it comes into contact with the connecting lever at (A). When the throttle valve is further opened, the point (B), where the connecting lever is in contact with the stopper, is detached, permitting the secondary system to start actuating.

The linkage between the primary and secondary throttles operates properly if the distance between the throttle valve and inner wall of the throttle chamber, G , amounts to specifications as shown below. The adjustment is made by bending the point (A) of the adjusting plate.

Type	G mm (in)
DAF342-9A	7.7 (0.303)
DAF342-11A	7.7 (0.303)
DAF342-14	7.7 (0.303)

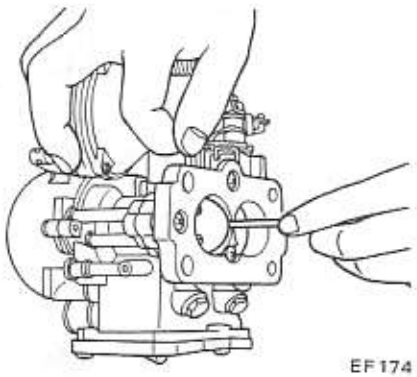


Fig. EF-27 Measuring clearance

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 discharge 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 line, vacuum line and choke wire 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

Some of the carburetor component-parts cannot be removed before choke chamber and throttle chamber are detached.

These parts are listed under item 2 below.

1. Parts which can be removed from outside.

1-1 Accelerating mechanism parts

④ pump rod, ⑧ pump lever, ⑨ pump lever spring ⑩ pump cover, ⑫ cylinder plate, ⑬ cylinder cover gasket, ⑮ piston return spring, ⑯ check ball

1-2 Float system parts

⑱ level gauge cover, ⑲ float chamber gasket, ⑳ level gauge, ㉑ rubber seal, ㉓ collar, ㉒ float

1-3 Fuel nipple and needle valve parts

㉔ lock lever, ㉕ filter set screw, ㉗ filter, ㉘ fuel nipple ㉙ retaining plate, ㉛ needle valve

1-4 Diaphragm chamber parts

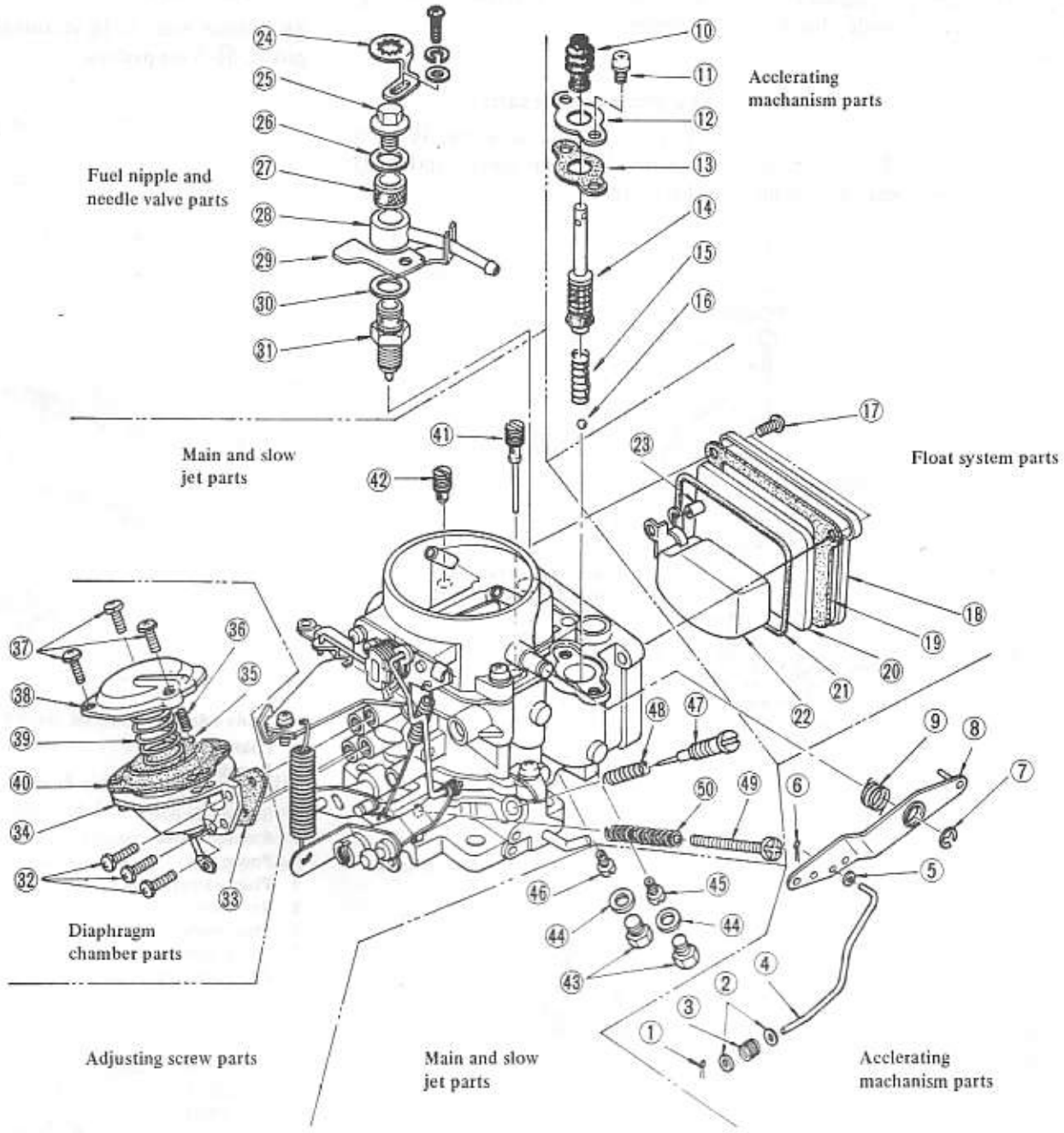
㉝ diaphragm chamber gasket, ㉞ diaphragm chamber, ㊳ diaphragm chamber cover, ㊴ diaphragm spring, ㊵ diaphragm

1-5 Main and slow jet parts

㊶ P. slow jet, ㊷ S. slow jet, ㊸ drain plugs, ㊺ P. main jet, ㊻ S. main jet

1-6 Adjusting screw parts

㊼ idle adjusting screw, ㊽ idle adjusting screw spring, ㊾ throttle adjusting screw, ㊿ throttle adjusting screw spring



1 Cotter pin (1 dia.)
2 Plain washer (4 dia.)
3 Rod spring
4 Pump rod
5 Prain washer (4 dia.)
6 Cotter pin (1 dia.)
7 E-ring (# 22)
8 Pump lever
9 Pump lever spring
10 Pump cover
11 Screw (M4)
12 Cylinder cover
13 Cylinder cover gasket
14 Piston
15 Return spring
16 Ball (5/32)
17 Screw
18 Level gauge cover
19 Float chamber gasket
20 Level gauge
21 Rubber seal
22 Float
23 Collar
24 Lock lever
25 Filter set screw
26 Plain washer (8 dia.)
27 Filter
28 Fuel nipple
29 Stopping plate
30 Plain washer (12 dia.)
31 Needle valve
32 Screw (M4)
33 Diaphragm chamber gasket
34 Diaphragm chamber
35 Check ball
36 Spring
37 Screw (M5)
38 Diaphragm chamber cover
39 Diaphragm spring
40 Diaphragm
41 P. slow jet
42 S. slow jet
43 Drain plug
44 Plain washer (8 dia.)
45 P. main jet
46 S. main jet
47 Idle adjusting screw
48 Idle adjusting screw spring
49 Throttle adjusting screw
50 Throttle adjusting screw spring.

EF175

Fig. EF-28 Disassembling two barrel carburetor (parts which can be removed from outside)

2. Parts which can be removed after choke chamber and throttle chamber are detached.

2-1 Air bleed, emulsion tube and power jet parts

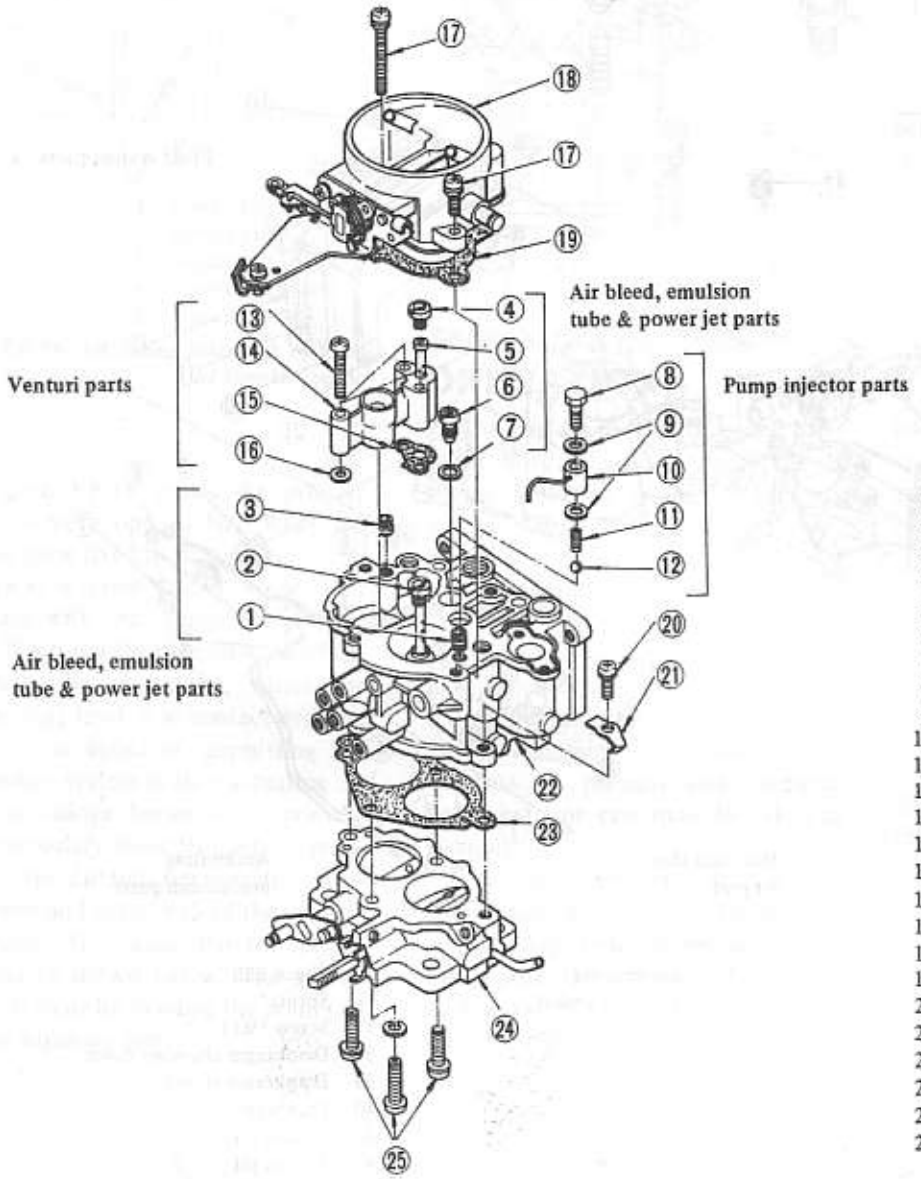
① P. slow air bleed, ② P. main air bleed, ③ S. slow air bleed, ④ S. main air bleed, ⑤ Emulsion tube, ⑥ power jet

2-2 Pump injector parts

⑧ pump injector set screw, ⑩ pump injector, ⑪ pump injector spring, ⑫ check ball

2-3 Venturi parts

⑭ S. small venturi, ⑮ venturi holder gasket, ⑯ 5 dia packing



1 P.slow air bleed
2 P. main air bleed
3 S. slow air bleed
4 S. main air bleed
5 Emulsion tube
6 Power jet
7 Plain washer (8 dia.)
8 Set screw
9 Plain washer
10 Pump injector
11 Pump injector spring
12 Check ball
13 Screw (M4)
14 S. small venturi
15 Venturi holder gasket
16 Packing (5 dia.)
17 Screw (M5)
18 Choke chamber
19 Choke chamber gasket
20 Screw (M6)
21 Lock plate
22 Float chamber
23 Throttle chamber gasket
24 Throttle chamber
25 Screw (M6)

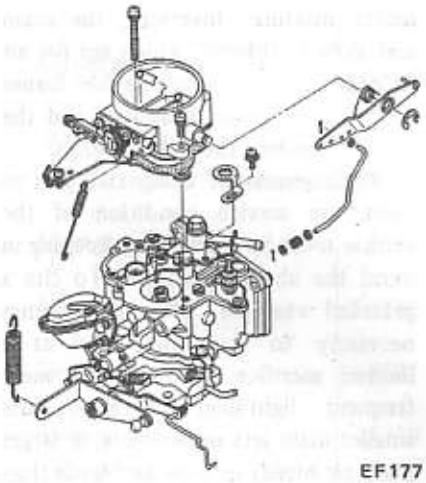
EF176

Fig. EF-29 Disassembling two barrel carburetor (Parts which can be removed after removal of choke chamber and throttle chamber)

3. Disassembling procedure

3-1 Disassembly of carburetor assembly

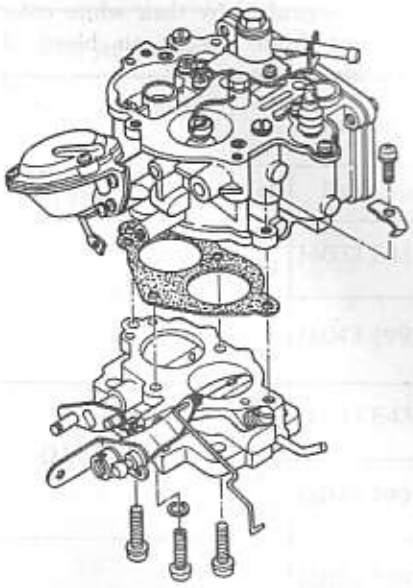
- Remove P throttle return spring, pump lever, pump rod, choke connecting rod and S throttle return spring. Loosen four choke chamber setscrews and remove choke chamber from float chamber.



EF177

Fig. EF-30 Removing choke chamber

- Remove E-ring, and separate diaphragm rod from throttle chamber assembly. Loosen four setscrews and seperate float chamber and throttle chamber.

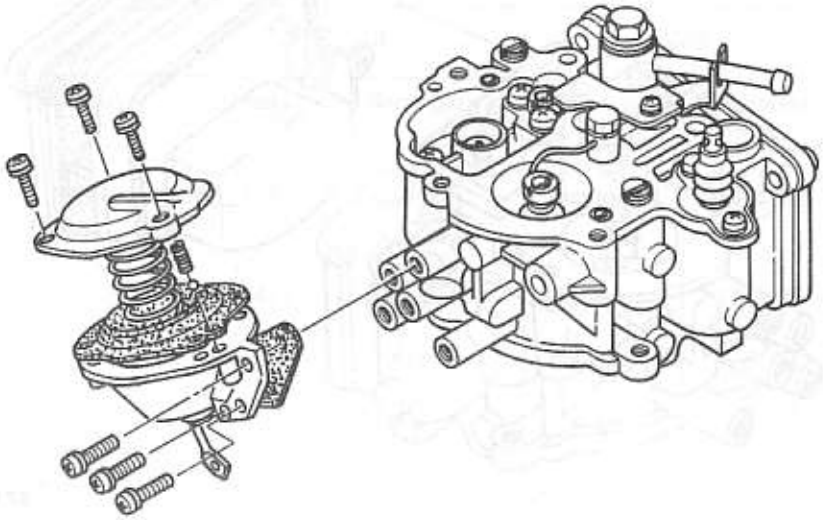


EF178

Fig. EF-31 Removing throttle chamber

3-2 Disassembly of float chamber

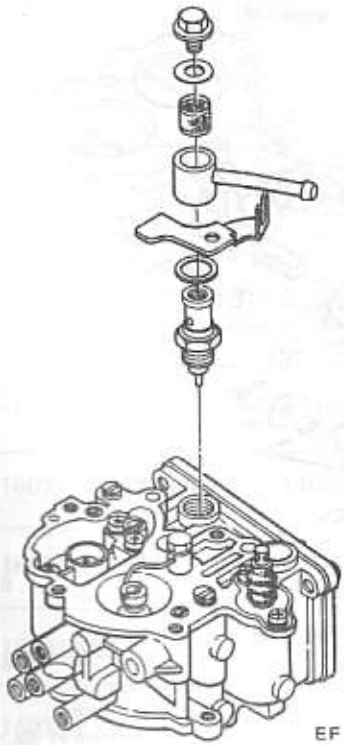
- Disassembly of diaphragm chamber
  Loosen three setscrews and remove diaphragm chamber assembly and diaphragm chamber gasket. Remove three set screws securing diaphragm chamber cover in place, and remove diaphragm chamber, diaphragm, diaphragm spring and diaphragm chamber cover.



EF179

Fig. EF-32 Disassembling diaphragm chamber

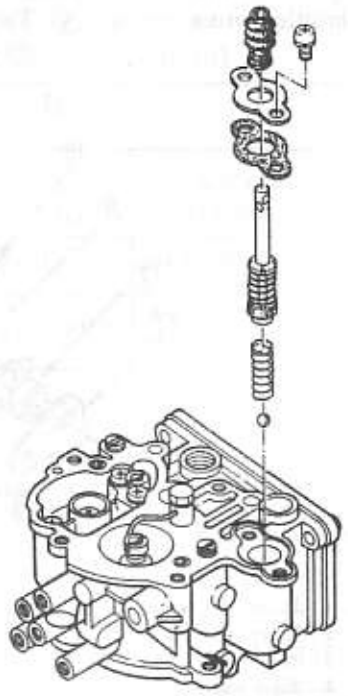
- Disassembly of fuel nipple and needle valve
  Loosen filter set screws and remove fuel nipple, filter and needle valve.



EF180

Fig. EF-33 Removing fuel nipple

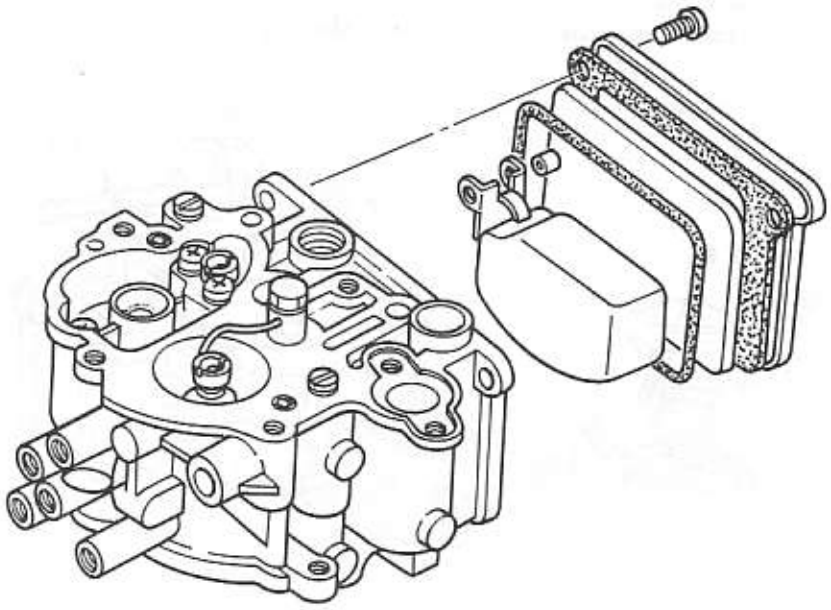
- Removal of accelerator pump
  Loosen two set screws and remove pump cover, cylinder plate, cylinder cover gasket, piston, return spring and check ball.



EF181

Fig. EF-34 Removing accelerator pump

o Removal of float
Loosen three set screws and remove level gauge set screws, float chamber cover, level gauge, rubber seal, collar and float.



EF182

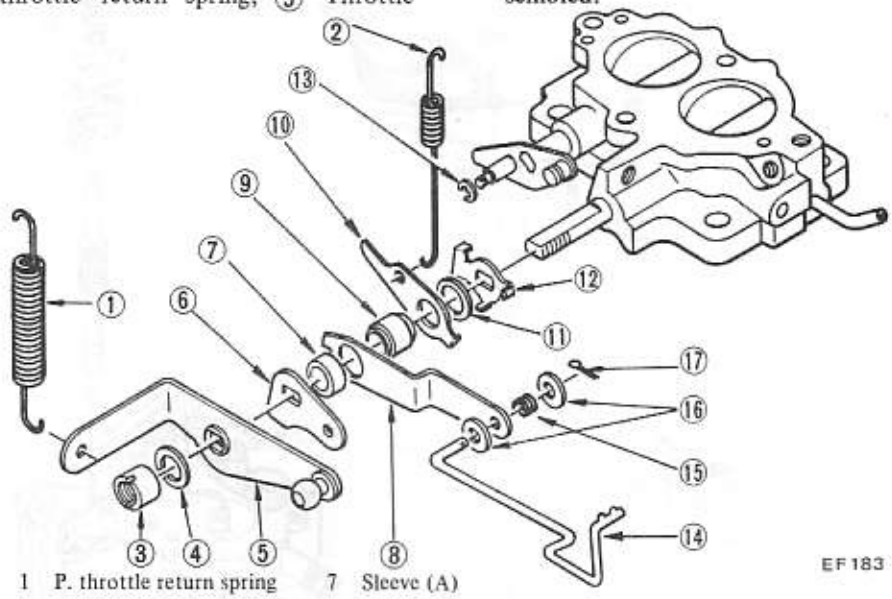
Fig. EF-35 Removing float

3-3 Disassembly of throttle linkage

When it is necessary to disassemble throttle linkage, disconnect pump rod linkage and remove parts in the order listed below:

① P throttle return spring, ② S throttle return spring, ⑤ Throttle lever, ⑥ Pump lever T, ⑦ Sleeve A, ⑧ Choke connecting lever, ⑨ Sleeve B, ⑩ Return plate

Note: Adjusting plate ⑫ is pressed in its place and cannot be disassembled.



EF183

1	P. throttle return spring	7	Sleeve (A)		
2	S. throttle return spring	8	Choke connecting lever	13	E-ring
3	Nut	9	Sleeve (B)	14	Choke connecting rod
4	Plain washer	10	Return plate	15	Rod spring
5	Throttle lever	11	Plain washer	16	Plain washer
6	Pump lever (T)	12	Adjusting plate	17	Cotter pin (1 dia.)

Fig. EF-36 Removing throttle linkage

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.

Replacement of designated jets to meet the service condition of the vehicle must be carried out keeping in mind the above directions. To cite a practical example, when it becomes necessary to economize fuel at a limited sacrifice of output to meet frequent light-load operation, use smaller main jets or slow jets, or larger main air bleeds or slow air bleeds than regularly specified. This should meet the purpose. Inversely, when increase in output is desired at the limited sacrifice of fuel consumption, use larger main jets or slow jets, or smaller main air bleeds or slow air bleeds, and that should bring a satisfactory result.

Carburetor secondary jets such as secondary main jet, secondary main air bleed, step jet and step air bleed could be distinguished by their white color painting from jets or air bleed of primary system.

SPECIFICATIONS AND SERVICE DATA

Item \ Carburetor model		DAF342-11 Manual choke		DAF342-14 Manual choke		DAF342-9A Manual choke	
Applied engine		L26		L24		L20A	
Applied model		230		HGC110		230	
		Primary	Secondary	Primary	Secondary	Primary	Secondary
Outlet diameter	mm (in)	32 (1.2598)	34 (1.3386)	32 (1.2598)	34 (1.3386)	32 (1.2598)	34 (1.3386)
Venturi diameter	mm (in)	24 (0.9449)	28 x 9 (1.1024 x 0.3543)	25 (0.9843)	28 x 9 (1.1024 x 0.3543)	24 (0.9449)	28 (1.1024)
Main jet		#132	#210	#129	#160	#119	#160
Main air bleed		#240	#50	#240	#70	#240	#70
Slow jet		#50	#100	#48	#90	#45	#90
Slow air bleed		#230	#50	#210	#50	#210	#50
Power jet		#90		#70		#65	
Float level	mm (in)	22 to 24 (0.8661 to 0.9449)		22 to 24 (0.8661 to 0.9449)		22 to 24 (0.8661 to 0.9449)	
Fuel pressure	kg/cm^2 (psi)	0.24 (3.4)		0.24 (3.4)		0.24 (3.4)	
Weight	kg (lb)	2.8 (6.20)		2.8 (6.20)		2.8 (6.20)	

Main jet variation

CARBURETOR TYPE \ ALTITUDE		Sea level		1,000 m (3,300 ft)		2,000 m (6,600 ft)		3,000 m (10,000 ft)		4,000 m (13,300 ft)	
		Jet	Parts No.	Jet	Parts No.	Jet	Parts No.	Jet	Parts No.	Jet	Parts No.
DAF342-9A	P	# 119	16033 E4110	# 115	16033 23015	# 112	16033 23016	# 108	16033 23017	# 105	16033 23018
	S	# 160	16043 19915	# 155	16054 23015	# 150	16034 21615	# 145	16054 21054	# 140	16043 25715
DAF342-14	P	# 129	16033 E4310	# 125	16054 18016	# 121	16033 E4313	# 118	16033 E4311	# 114	16033 E4312
	S	# 160	16043 19915	# 155	16054 23015	# 150	16034 21615	# 145	16054 21015	# 140	16043 25715
DAF342-11	p	# 119	16033 P3010	# 128	16033 S2210	# 125	16054 18016	# 121	16033 E4313	# 117	16033 23115
	S	# 160	16033 P3011	# 205	16033 P3012	# 200	16033 P3010	# 195	16033 P3014	# 190	16033 F0810

P ..... primary S ..... secondary

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 a carburetor which has no defect seems apparently to have some troubles, when in fact the electrical system is defective. Therefore, whenever the engine has troubles, electrical system must be checked first before making 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.
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 above item.
Engine hesitation	Main jet or slow jet clogged.	Clean.
	By pass hole, idle passage clogged.	Clean tube.
	Emulsion tube clogged.	Clean.
	Idling adjustment incorrect.	Correct adjustment.
	Secondary throttle valve operated improperly.	Overhaul and clean.

Condition	Probable cause	Corrective action
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 incoreect.	Adjust.

SU TYPE TWIN CARBURETOR

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DESCRIPTION

The model HMB46W-1C carburetor is a horizontal, variable venturi type. This carburetor is designed to keep constant flow of intake air through the venturi under all engine speeds. That is the venturi opening is automatically adjusted by sliding the suction piston in accordance with changes in the volume of intake air.

Metering calibration of main system is accomplished by the jet needle fixed into the suction piston. Then, the related situation between the taper jet needle and nozzle gives the correct air-fuel mixture. A power valve is provided to improve performance during acceleration from medium speed.

When starting the engine, choke valve is closed by pulling the choke knob and excess fuel is drawn from auxiliary nozzle at the intake side of each carburetor. Consequently, an enriched air-fuel mixture is obtained. Under normal running, a proper mixture is supplied by sliding the jet needle, and vacuum in the suction chamber operates the suction piston.

This carburetor has the following characteristics:

1. Air flows fast in the venturi even when engine runs at low speeds. Therefore, fuel is fully turned into spring, ensuring good driveability.
2. Since the venturi opens wide at high speed running, with the use of two carburetors, high output can be provided to reduce air intake resistance.
3. Idle control system assures stable idling. And two adjusting screws (idle speed adjusting screw on the balance tube and idle mixture adjusting screw at the front carburetor) permit easy access for servicing.
4. Float chamber just beneath the nozzle ensures better starting, stopping and turning.

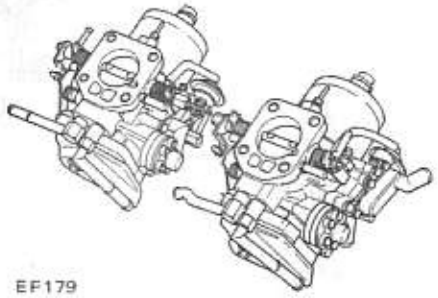


Fig. EF-37 HMB46W-1C carburetor

CONSTRUCTION AND OPERATION

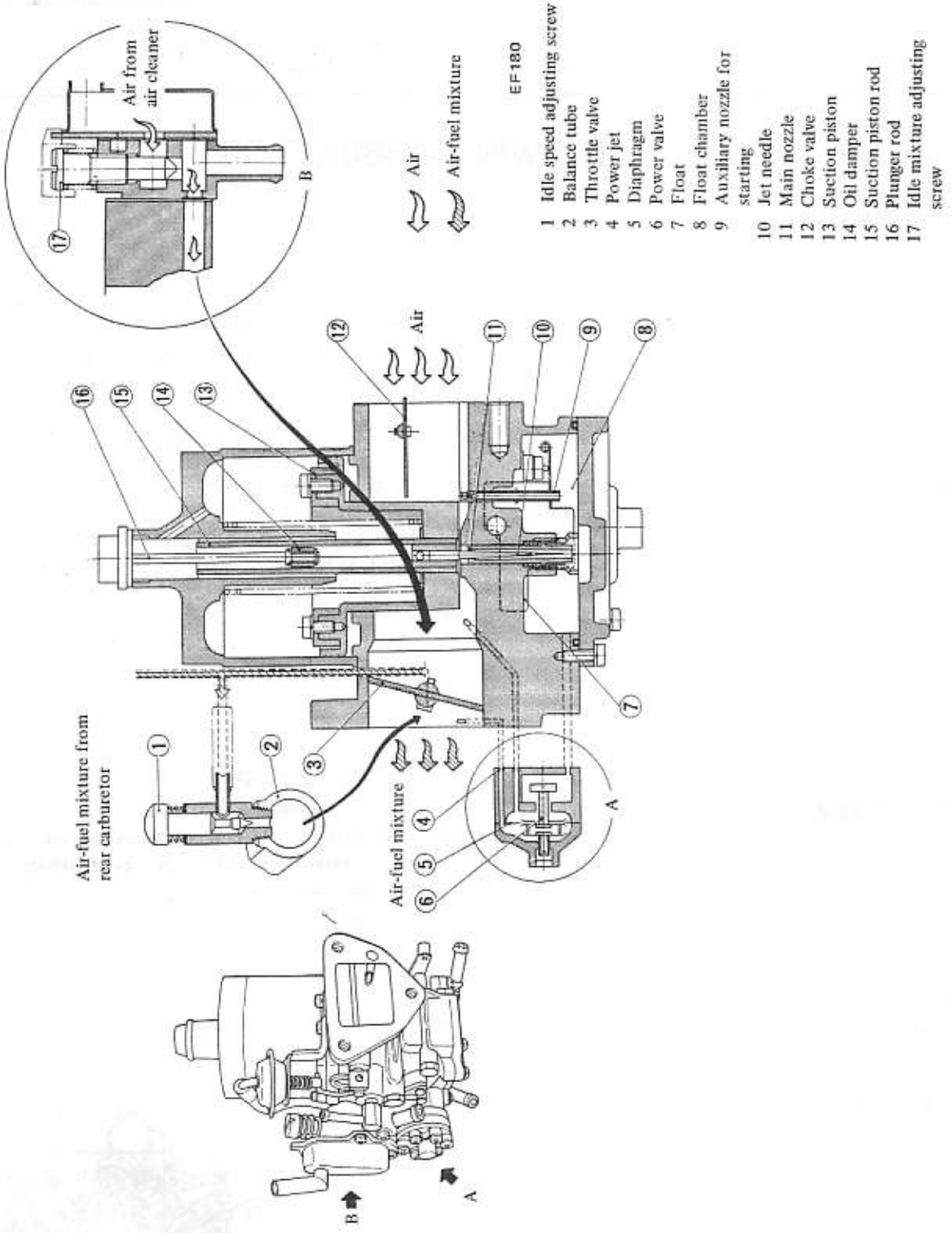


Fig. EF-38 Sectional view of front carburetor

FLOAT SYSTEM

The float circuit is a dual float construction where two floats are symmetrically arranged around the nozzle. The float bowl is positioned just beneath the nozzle so that the level of fuel in the float bowl is kept constant when the car is accelerated or decelerated, or when it is turning a corner. See Figure EF-38.

VENTURI CONTROL SYSTEM

The suction chamber is mounted above the venturi, and the suction piston slides vertically within the suction chamber, changing the venturi opening area.

Venturi vacuum pressure operates on the upper surface of the suction piston through the suction port, and atmospheric pressure is applied to the bottom of the suction piston through the air hole from the air cleaner. The difference between the upper vacuum pressure and lower atmospheric pressure moves the suction piston up and down. The suction piston stops when a balanced condition exists between the pressure difference and the piston weight plus spring tension. The vacuum pressure is produced by the air flow velocity. For instance, when the throttle valve is opened by depressing the accelerator pedal, the flow velocity of the intake air increases. This also increases vacuum pressure in the venturi, and the suction piston is lifted until the piston is balanced, and the venturi opening area enlarges.

When the throttle valve is closed by releasing the accelerator pedal, the flow velocity of the engine intake air in the venturi is reversely decreased. The piston goes down and the venturi opening area becomes small. The intake air flow velocity recovers as the venturi opening decreases. The piston stops going down because of a balance between the upper and the lower forces operating the suction piston.

Thus, the opening area is adjusted automatically to keep the flow of intake air at constant velocity in the venturi. Consequently, the venturi opening is optimum for any engine operating condition. In addition, the suction piston rod is equipped with an oil damper to prevent the piston coming up quickly as a result of sharp throttle opening. Since the plunger rod positioned in an oil well operates on a fluid brake on rapid rising stroke but exerts no restriction on its fall, it provides an approximate degree of enrichment for acceleration.

FUEL SYSTEM

Air velocity through the venturi (vacuum pressure) causes fuel to be sprayed from the float chamber, through the opening between the nozzle and jet needle into the venturi.

The jet needle below the suction piston moves up and down in the nozzle according to the motion of the suction piston. Fuel flow changes automatically due to the tapered shape of the jet needle.

Operating conditions under various driving conditions from idling to fully-opened maximum speed are shown in Figures EF-39 and EF-42.

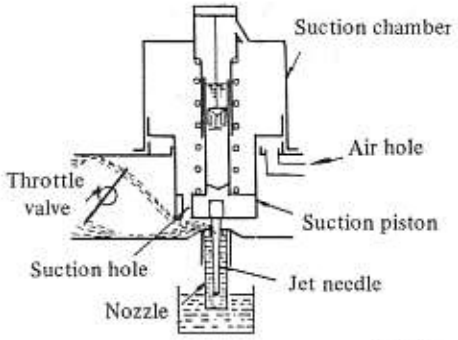


Fig. EF-39 Idling

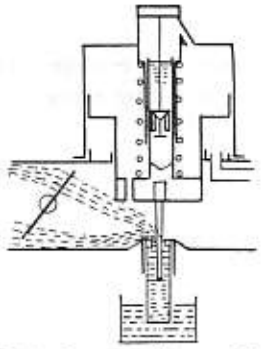


Fig. EF-40 Intermediate and low speed

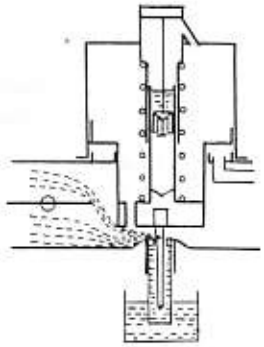


Fig. EF-41 Fully-opened low speed

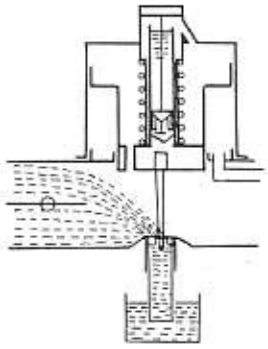
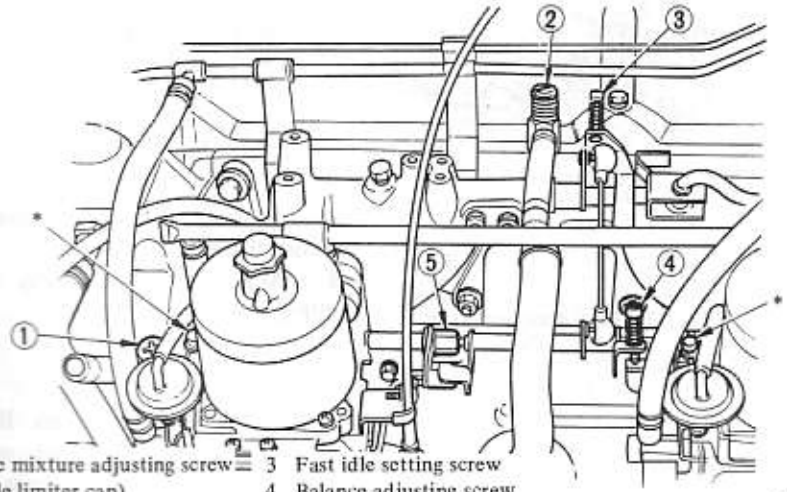


Fig. EF-42 Fully-opened high speed

CONTROL AND ADJUSTMENT

ADJUSTING ENGINE IDLE R.P.M, MIXTURE RATIO AND IGNITION TIMING



1 Idle mixture adjusting screw (idle limiter cap)
2 Idle speed adjusting screw
3 Fast idle setting screw
4 Balance adjusting screw
5 Throttle shaft

Fig. EF-43 Carburetor linkage

Notes:

a. Idle limiter cap equipped with idle mixture adjusting screw must not be removed.

b. Screws marked "*" are properly adjusted at factory and require no further adjustment.

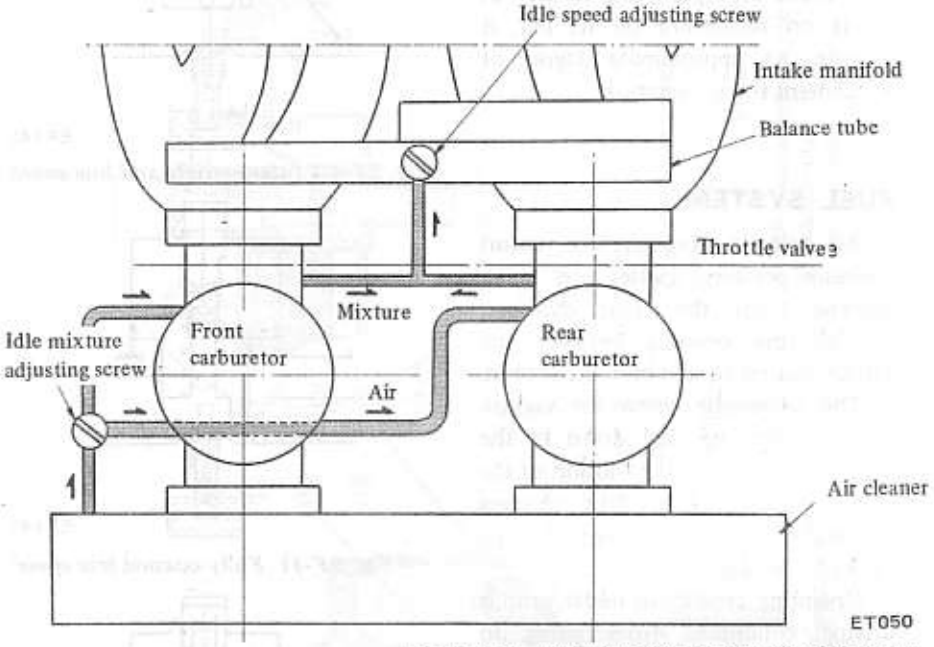


Fig. EF-44 Adjusting idle speed adjusting screw

1. Warm up engine by driving car for more than 20 minutes at a speed of about 48 km/h (30 MPH).
2. Remove cleaner cover and oil damper cap, raise suction piston with a suitable soft bar. Make sure that suction piston rises smoothly.
3. Check damper oil level and add oil (MS #20 or 10W-30) if necessary.

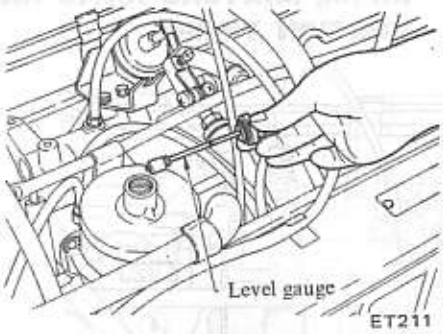


Fig. EF-45 Checking damper oil level

4. Loosen balance adjusting screw.

Note: Make sure operation of front carburetor is separated from rear one.

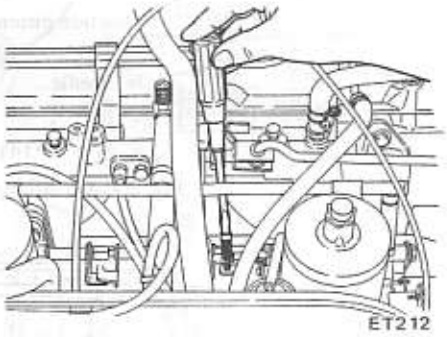


Fig. EF-46 Adjusting balance adjusting screw

5. Connect engine tachometer and timing light in proper position.
6. Adjust idling speed by turning idle speed adjusting screw.

L26 (Twin carb.)

Manual transmission ..... 650 rpm

Automatic transmission ..... 700 rpm

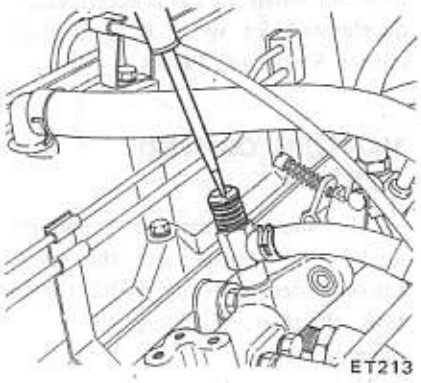


Fig. EF-47 Adjusting idle speed adjusting screw

Notes:

a. When idle speed adjusting screw is turned clockwise, idling speed decreases; it increases when the screw is turned counterclockwise.

b. When idle speed adjusting screw is turned fully clockwise during the above adjustment and engine speed cannot be reduced below 700 rpm, the accelerator linkage is incorrectly adjusted. Under normal conditions, the auxiliary throttle shaft and throttle shaft should have a slight play at idling speed. In other words, the auxiliary throttle shaft should be provided with a play "θ" which corresponds to the clearance Ta = Tb shown in Figure EF-48.

c. When adjusting in idling condition for 1 to 2 minutes or more, be sure to race the engine beforehand.

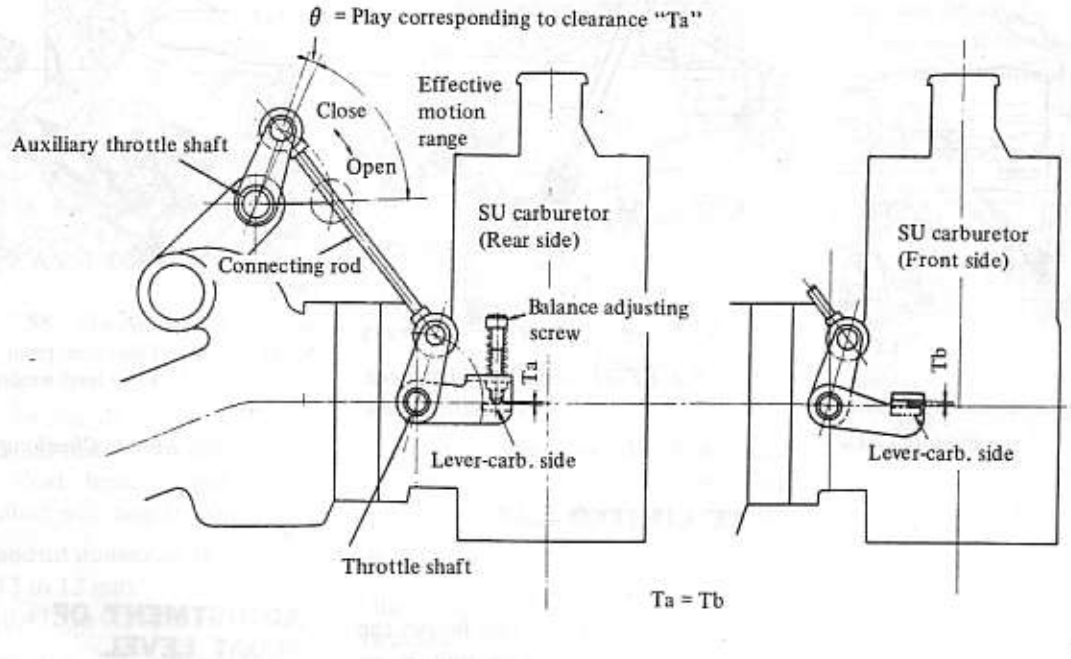


Fig. EF-48 Carburetor linkage

7. Turn idle mixture adjusting screw clockwise or counterclockwise until proper air-fuel mixture ratio is obtained.

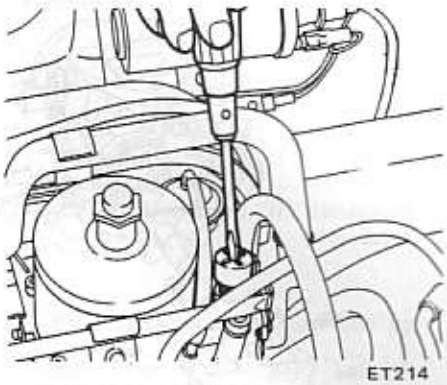


Fig. EF-49 Adjusting idle mixture adjusting screw

Note: Engine speed varies as idle mixture adjusting screw is turned. Optimum air-fuel mixture ratio can be told by the highest engine speed within adjusting range.

8. Turn idle adjust screw until engine runs at specified idle speed.
9. Set ignition timing to specifications by adjusting distributor as shown below.

Ignition timing of the L26 (Twin carb.) engine (B.T.D.C./rpm)

Manual transmission	17/650 (10/650)
Automatic transmission	17/700 (10/700)

Note: ( ) for E.C.E.

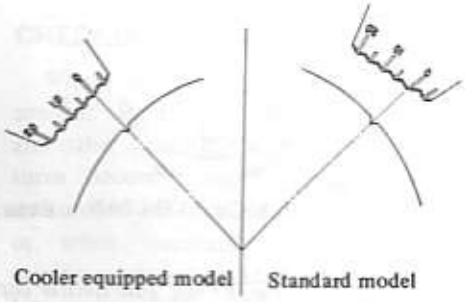


Fig. EF-50 Checking ignition timing

10. If engine speed changes after ignition timing has been adjusted, repeat steps 6, 7 and 8 above.
11. Adjust fast idle setting screw until engine runs at about 1,400 rpm.

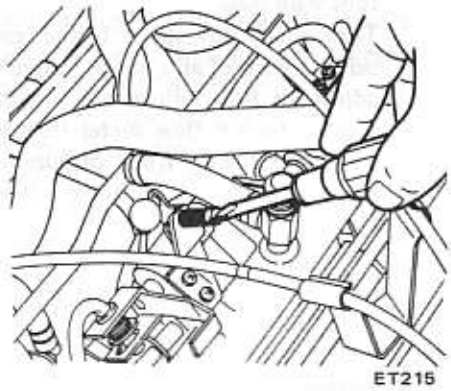


Fig. EF-51 Adjusting fast idle setting screw

12. Using a flow meter, adjust balance adjusting screw so that front and rear carburetor intake air volumes are balanced.

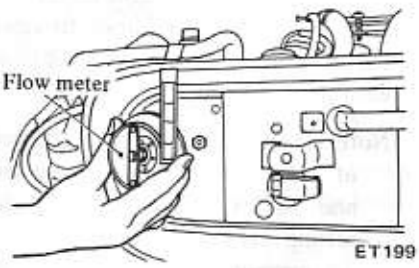


Fig. EF-52 Setting flow meter

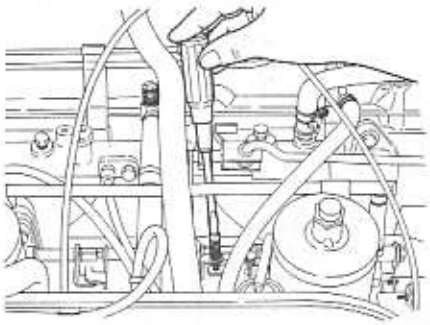


Fig. EF-53 Adjusting balance adjusting screw

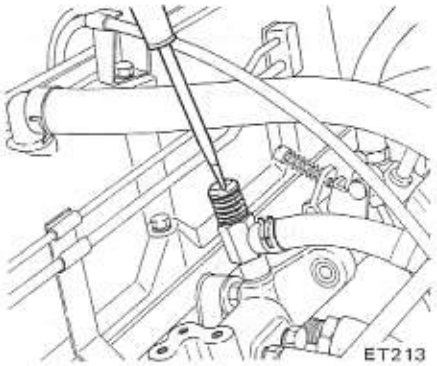
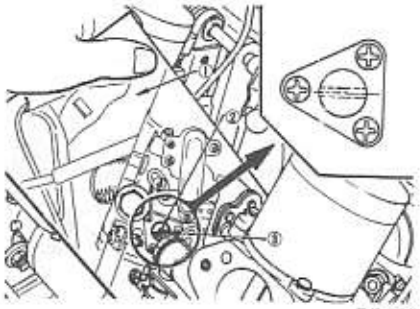


Fig. EF-54 Adjusting idle speed adjusting screw



1 Mirror
2 Float level point
3 Float level window

Fig. EF-56 Checking float level

Notes:

a. Attach flow meter to the front side air horn of air cleaner, turn air flow adjusting screw of flow meter, and align the upper end of float in glass tube with scale.
   Then attach flow meter to the rear side air horn of air cleaner. (Do not adjust air flow adjusting screw of flow meter.) if flow meter float is not aligned with front carburetor scale, turn balance adjusting screw and align float with front carburetor scale.
b. Stand flow meter float vertically.
c. The flow meter is used to hinder engine air intake, it is therefore recommended that the flow meter be used for a very short period of time (one to two seconds).
   It should not be used continuously.

13. Turn fast idle setting screw out completely until engine runs at the specified idle speed. If necessary, adjust idle speed with idle speed adjusting screw. After adjustment, race engine two or three times to ensure that specified idle speed is obtained each time.

Note: Make sure there is a clearance of 2 mm (0.078 in) between lever and tip of screw when fast idle setting screw is turned out.
To prevent it from falling do not turn fast idle setting screw excessively.

IDLE LIMITER CAP

Idle limiter cap is attached to idle mixture adjusting screw.

Do not remove this idle limiter cap unless necessary. If this unit is removed, it must be readjusted at time of installation.

To adjust, proceed as follows:

1. Make sure that the "CO" content percentage meets specifications (CO: 1.5%).
2. Install idle limiter cap in position, making sure that adjusting screw is able to turn another 1/8 rotation in the "CO-RICH" direction.

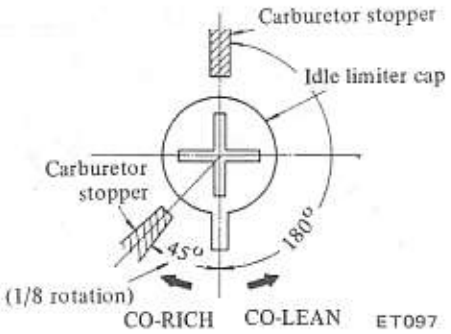


Fig. EF-55 Idle limiter cap

ADJUSTMENT OF FLOAT LEVEL

If it is necessary to adjust the float level, float lever should be bent as required.

1. Remove carburetor assembly from intake manifold, and remove float chamber cover from carburetor.

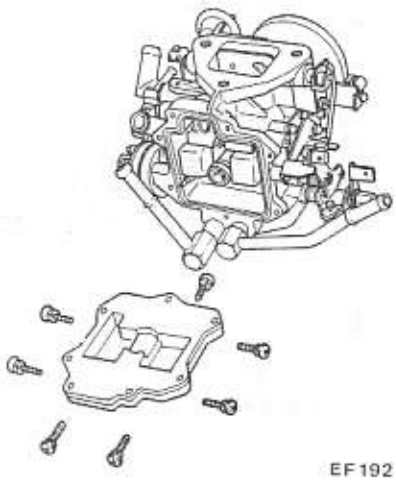


Fig. EF-57 Removing float chamber cover

INSPECTION OF FLOAT LEVEL

The level of fuel in the float chamber can be checked through the circular window located behind carburetor.

It is necessary to use a mirror to inspect the fuel level.

2. Place the carburetor top side down to check the position of float lever.

Refer to Figure EF-50. Ensure that both floats touch the inner wall of carburetor when carburetor is turned upside down on float surface.

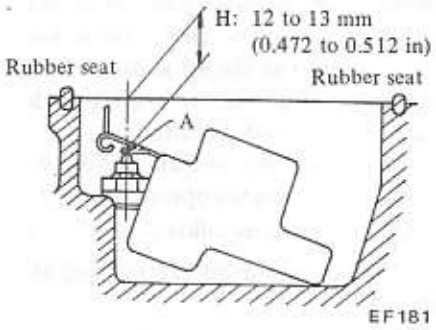


Fig. EF-58 "H" dimension of float lever

3. Measure the dimension "H" between the end face of the float chamber and float lever tongue which makes contact with needle valve.

The standard dimension is
12 to 13 mm
(0.472 to 0.512 in).

Measure the "H" dimension at point "A" of float lever. If it is not within the specified value, adjust the tongue by bending its root as required.

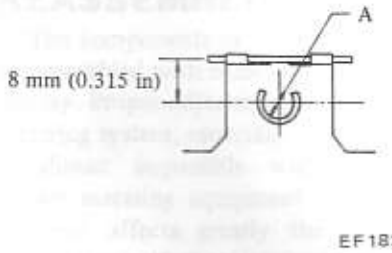


Fig. EF-59 Measuring "H" dimension at point A

4. Place the carburetor top side up

Then, measure the gap "G" between the power valve nozzle and float.

The standard gap is between 0.5 mm (0.020 in) and 2 mm (0.079 in). If the gap is not within the specified range, adjust by bending the stopper as required. The above adjustment is particularly necessary to prevent mutual interference between the float and power valve.

Note: Whenever the stopper is bent for adjustment, check the dimension "H" to ensure that it remains within the specified range.

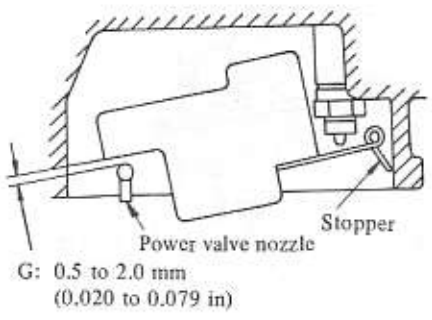


Fig. EF-60 "G" dimension of float

5. After adjusting the float lever tongue, install float chamber cover on carburetor float chamber and install carburetor on engine.

The normal fuel level is even with the center line of the float level window.

Float level adjustment should be made only when erratic engine operation due to incorrect fuel level is noted.

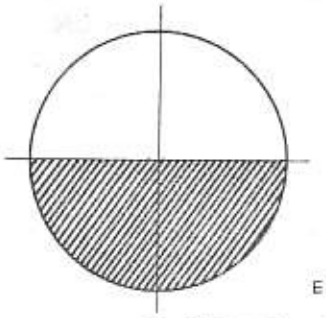


Fig. EF-61 Float level

CHECKING DAMPER OIL

When there is not a sufficient amount of damper oil, acceleration and other operating performance features become sluggish. When new carburetors are installed on the engine, or when overhaul is performed, damper oil must be added without fail. Use engine oil MS #20 or SAE 10W-30 for damper oil. Do not use lower or higher weight oils.

To check damper oil level, remove oil cap nut and check oil level marking on the two grooves on plunger rod. No difficulty will be encountered and there is no damper until the oil level reaches the lower line. If the oil level drops below the lower line, add oil. Slowly fill damper oil to upper line.

When removing and replacing oil cap nut, be careful not to bend rod. If oil cap nut is loose, it may fall off. Be sure that it is sufficiently tightened.

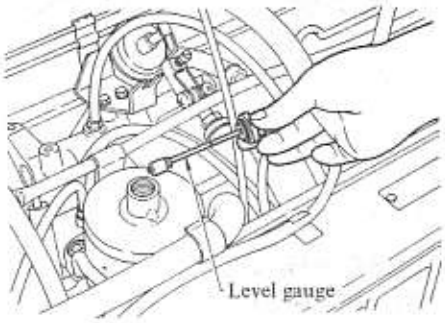
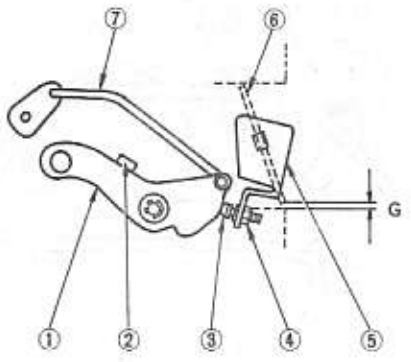


Fig. EF-62 Checking damper oil level

FAST IDLE ADJUSTMENT

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

After reassembly, or during a check of interlock opening angle, place upper side of fast idle screw on the first step of choke lever. Then adjust fast idle adjusting screw in such a way that the clearance of throttle valve (shown at "G" in Figure EF-63) is held within 0.59 to 0.64 mm (0.023 to 0.025 in). When it is not correct, adjust by turning fast idle screw in or out as necessary.



1 Choke lever
2 Choke lever stopper
3 Fast idle screw
4 Lock nut
5 Fast idle lever
6 Throttle valve
7 Connecting rod

Fig. EF-63 Adjusting fast idle opening

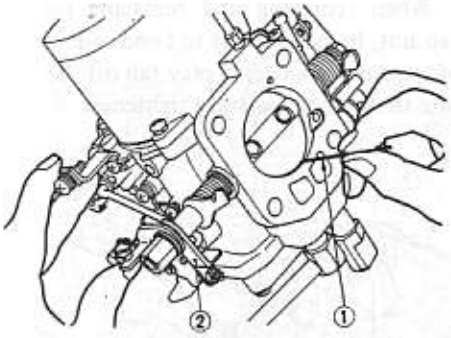


Fig. EF-64 Measuring fast idle opening

CHOKE PISTON ADJUSTMENT

1. Close choke valve completely.
2. Valve can be closed by stretching a suitable rubber band between choke lever which is connected to choke wire, and stationary part of carburetor.
3. Grip diaphragm rod with pliers, and pull completely straight.
4. Under this condition, adjust the gap between choke valve and carburetor body to 1.65 mm (0.065 in) by bending choke piston rod. See Figure EF-65.

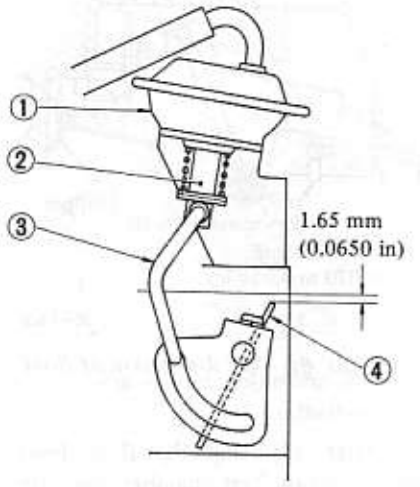


Fig. EF-65 Choke piston adjustment

PERIODIC INSPECTION OF SUCTION CHAMBER AND SUCTION PISTON

Periodic inspection is required to consistently maintain the suction chamber and suction piston in proper operating condition. This is due to the fact that dust in the air is drawn into chamber and accumulates on the sliding portion of suction piston.

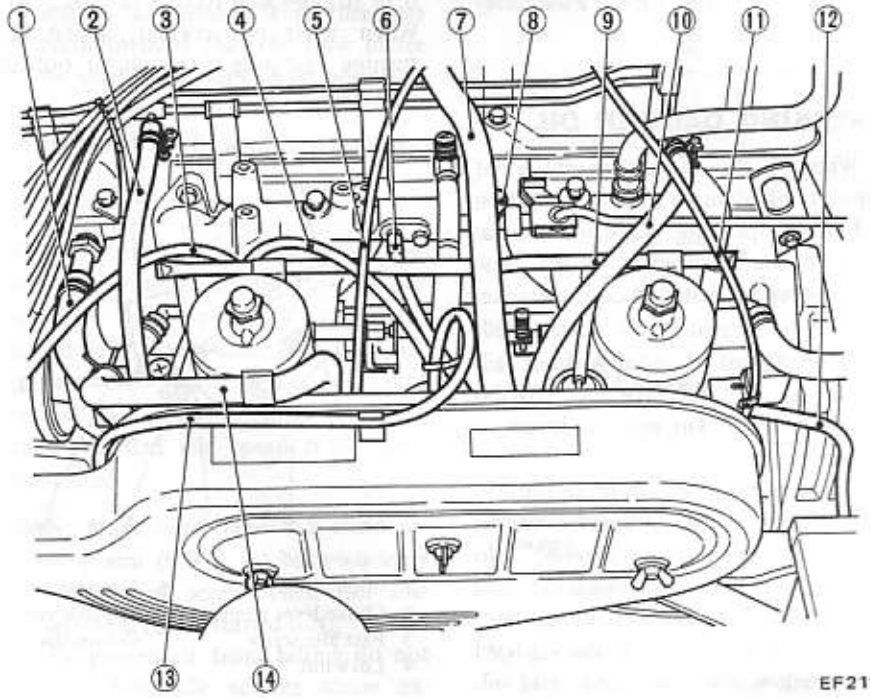
Make sure that suction piston installed on the engine operates smoothly by proceeding as follows:

1. First, remove oil cap nut and air cleaner.
2. Gradually raise suction piston with a suitable bar.
3. Release your finger from suction piston. Suction piston will drop, and the sound of suction running against venturi will be heard.

Piston and chamber conditions are satisfactory if suction piston rises smoothly.

To check for bend of plunger rod, raise suction piston with your fingertip with oil cap nut attached to the assembly, and let piston drop freely. Suction piston will offer strong resistance when lifted since oil damper is activated. Under satisfactory conditions, piston will drop smoothly when your finger is removed from suction piston.

REMOVAL AND INSTALLATION



1 Coolant inlet hose (from cylinder head to front carburetor)
2 Fuel inlet hose (Front)
3 Distributor vacuum signal hose
4 Temperature sensor hose (from temperature sensor to intake manifold)
5 Throttle wire (Front)
6 Idle compensator hose
7 Crankcase ventilation hose
8 Throttle link
9 Idle speed adjusting screw tube (I.S.S. tube)
10 Fuel inlet hose (Rear)
11 Throttle wire
12 Hot water outlet pipe
13 Temperature sensor hose (from temperature sensor to vacuum motor)
14 Air bypass hose

Fig. EF-66 Carburetor and air cleaner components piping

1. Refer to the instructions under air cleaner.
2. Drain cooling water.
3. Remove coolant inlet hose from front carburetor.

Remove coolant outlet hose from rear carburetor.

4. Remove fuel inlet hoses and I.S.S. hoses from front and rear carburetors, and remove air bypass hose from front carburetor.
5. Remove vacuum hose for distributor from front carburetor.
6. Remove throttle link.
7. Remove choke wire from front and rear carburetor.
8. Remove four carburetor attaching nuts, and detach front and rear carburetors as an assembly from intake manifold.

To remove these carburetors separately, it is necessary to remove air bypass hose and coolant hose between front and rear carburetors.

DISASSEMBLY AND REASSEMBLY

The components of this carburetor are assembled with utmost care at the factory. Proper adjustment of the fuel metering system, especially jet needle, is almost impossible without the proper metering equipment. This adjustment affects greatly the proper performance of the emission control system.

Therefore, disassembly of the carburetor should be strictly prohibited. Only the following may be disassembled and adjusted. Otherwise, replace the whole carburetor assembly.

FLOAT CHAMBER COVER

1. Remove seven screws securing float chamber cover, and remove it.

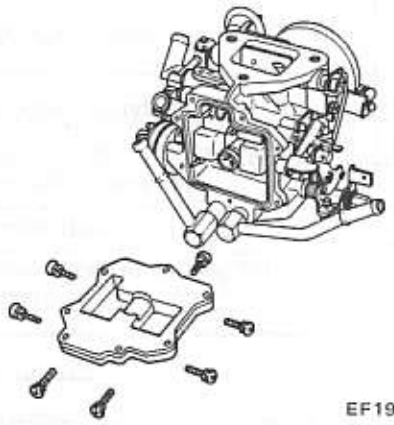


Fig. EF-67 Disassembling float chamber cover

2. Assemble float chamber cover in reverse order of disassembly.

Note: Float and needle valve parts cannot be removed.

POWER VALVE

If exhaust "CO" is abnormally rich at idling and no other cause is found in the carburetor adjustment, check the power valve for proper functioning.

Six fixing screws are used for this valve, three for assembling the valve and three for fixing the valve to carburetor.

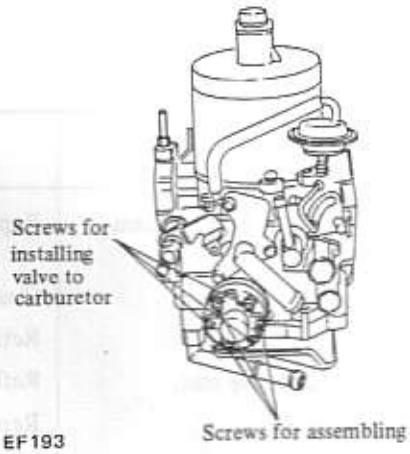


Fig. EF-68 Power valve unit

Remove power valve from carburetor and disassemble valve to check diaphragm. If any abnormality is found in diaphragm, replace valve unit.

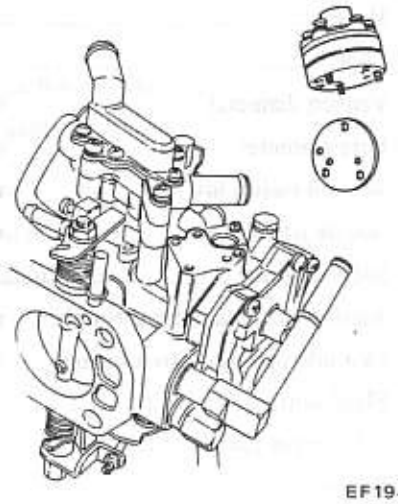


Fig. EF-69 Removing power valve

LINK AND RELATED COMPONENTS

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

Before disassembly, mark links and levers so that they can be replaced in their original positions.

After assembly, check to be sure that they operate smoothly.

SPECIFICATIONS

Carburetor model		HMB46W-1C
Make		HITACHI
Type		SU type side draft
Venturi diameter	mm (in)	41.6 (1.64)
Bore diameter	mm (in)	46 (1.81)
Suction piston lift	mm (in)	34 (1.34)
Nozzle jet diameter	mm (in)	2.54 (0.100)
Suction spring		#50
Suction hole diameter x Number	mm (in)	8.0 x 2 (3.15 x 2)
Fast idle throttle valve opening	mm (in)	0.59 to 0.64 (0.0232 to 0.0252)
Float venting		Inner vent type
Oil damper plunger diameter	mm (in)	8.86 (0.349)
Power jet		#40
Fuel pressure	kg/cm² (psi)	0.32 (4.6)

TROUBLE DIAGNOSES AND CORRECTIONS

The causes of failure and appropriate corrective actions are shown in the table to permit immediate carburetor repair in event of carburetor malfunction.

Improper engine operation can be attributed to many different causes. Although carburetor may be normal, if the electrical system is inoperative, the cause sometimes may appear to be in carburetor. If engine does not operate satisfactorily, first check electrical system before attempting to adjust carburetor.

Condition	Probable cause	Corrective action
Overflow	Leakage from float, or float bent or damaged.	Replace carburetor assembly.
	Dirty needle valve seat.	Clean valve seat.
	Loose needle valve.	Retighten.
	Scratches or wear on needle valve seat.	Refit or replace.
	Excessive fuel pump pressure.	Repair pump.
	Fuel pump drawing in air.	Repair pump.
Excessive fuel consumption	Overflow.	Described above.
	Faulty suction piston operation.	Described below.
	Leakage from power valve.	Replace valve assembly.
	Improper idling adjustment.	Readjust.
Insufficient output	Throttle valve does not open fully.	Readjust.
	Faulty suction piston operation.	Described below.

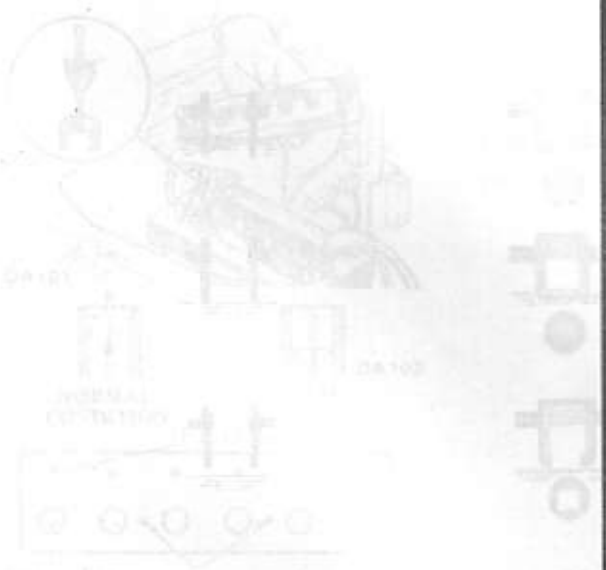
Condition	Probable cause	Corrective action
Improper idling	Faulty suction piston operation.	Described below.
	Improper adjustment of idle adjusting screw and idle mixture adjusting screw.	Readjust.
	Worn throttle valve shaft.	Replace carburetor assembly.
	Air leakage due to damaged packing between manifold and carburetor.	Replace gasket.
Engine operation is irregular or erratic.	Malfunction of suction piston.	Described below.
	Insufficient damper oil, or improper oil used.	Replenish or replace.
	Improper idling adjustment.	Readjust.
Engine does not start.	Overflow.	Described above.
	No fuel fed to the engine.	Check pump, fuel line, and needle valve.
	Improper idling adjustment.	Readjust.
	Malfunction of suction piston.	Described below.
Faulty suction piston operation.	Sticking due to deformation (bulging or caving) of suction chamber or suction piston.	Replace carburetor assembly.
	Bent jet needle.	Replace carburetor assembly.
	Bent plunger rod.	Replace.

SERVICE MANUAL

MODEL

L20A, L24 & L26 SERIES

ENGINES



NISSAN

NISSAN MOTOR CO., LTD.

TOKYO, JAPAN

SECTION EE

ENGINE ELECTRICAL SYSTEM

STARTING CIRCUIT ..... EE- 2

BATTERY ..... EE- 2

STARTING MOTOR ..... EE- 6

CHARGING EE-14

ALTERNATOR EE-15

REGULATOR EE-23

IGNITION CIRCUIT EE-29

DISTRIBUTOR EE-30

IGNITION COIL EE-36

SPARK PLUG EE-37

EE

STARTING CIRCUIT

The electrical system is a 12 volt system. This section is subdivided into the following subsections for electrical parts which are required for engine operation.

- Battery
- Starting motor
- Alternator
- Regulator
- Distributor
- Ignition coil
- Spark plugs

Information on body electrical systems such as lighting, instrument, and windshield wipers is described in section BODY ELECTRICAL in CHASSIS AND BODY.

BATTERY

CONTENTS

REMOVAL AND INSTALLATION EE-2
REMOVAL EE-2
INSTALLATION EE-2
ELECTROLYTE LEVEL CHECK EE-2
SPECIFIC GRAVITY CHECK EE-3
BATTERY FREEZING EE-4
ADJUSTING SPECIFIC GRAVITY EE-4
CHARGING CIRCUIT EE-4
TROUBLE DIAGNOSES AND CORRECTIONS EE-5

REMOVAL AND INSTALLATION

REMOVAL

1. Disconnect negative and positive terminals.
2. Remove nuts from battery clamp; take out clamps.
3. Remove 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.

ELECTROLYTE LEVEL CHECK

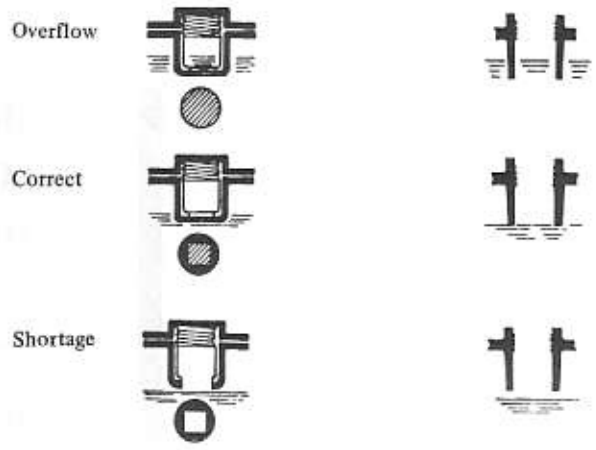
There are two types of batteries; standard and self-filling.

In case of standard type

Check the electrolyte level in each battery cell once a month.

1. Unscrew each filler cap and inspect fluid level, which can be determined by glancing into the cap openings. See Figure EE-1

Determine as shown below:



EE087

Fig. EE-1 Inspecting electrolyte level

In case of battery with fluid level lines, check to see that the level is between the upper and the lower level lines.

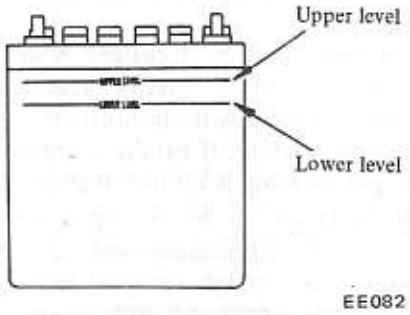


Fig. EE-2 Inspecting electrolyte level (with level lines)

If the fluid level is low, and distilled water for each cell to raise the level approximately 10 to 20 mm (0.394 to 0.787 in) above the plates. In case of battery with level lines, add distilled water to the upper level. Do not overfill.

In case of self-filling type

1. Remove filler cap and inspect the float position. If the position of float is lower than the normal level, add distilled water to case attached on battery upper face. The fluid will equally fill each cell.

After replenishing, install filler cap. Do not overfill over the projections.

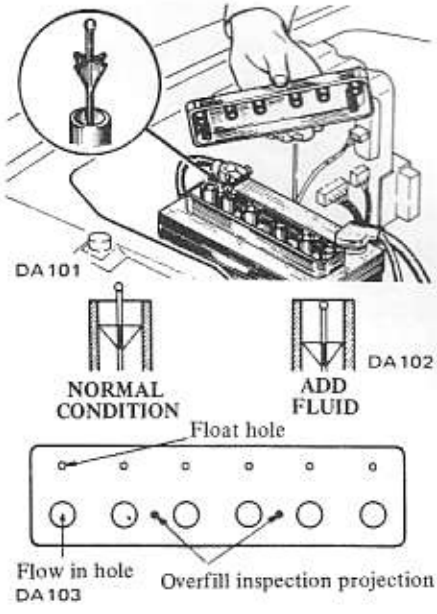


Fig. EE-3 Inspecting electrolyte level (for self-filling type)

SPECIFIC GRAVITY CHECK

Specific gravity of battery electrolyte is tested by a hydrometer.

1. When measuring specific gravity, place your eyes in line with scale to read highest level (electrolyte rises at edge due to surface tension) of electrolyte. See Figure EE-4.

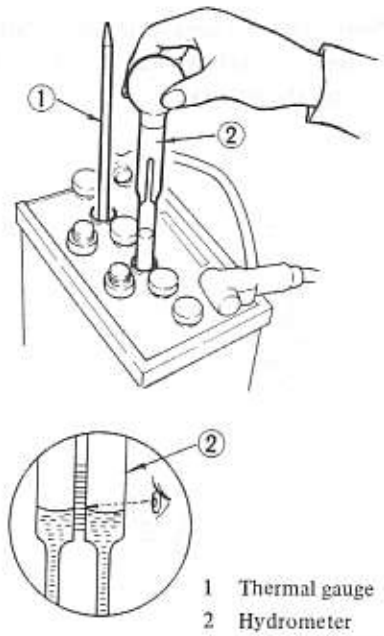


Fig. EE-4 Checking specific gravity

2. If the state of charge of battery is 60% full, or specific-gravity reading is below 1.20 [as corrected at 20°C (68°F)], battery must be recharged or battery-electrolyte concentration must be 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 (33.8°F) temperature.

A correction can then be made by using the following formula:

$S_{20} = St + 0.0007\ (t - 20)$

Where

S_{20}: Specific gravity of electrolyte corrected at 20°C (68°F)

St: Specific gravity of electrolyte at t°C

t: Electrolyte temperature

For example; A hydrometer reading of 1.260 at 30°C (86°F) would be 1.267 when corrected at 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 when corrected at 20°C (68°F), indicating a partially charged battery.

The state of charge of battery can be determined by the following tables if the specific gravity of electrolyte is known. Before checking, check to be sure that cells are filled to correct level.

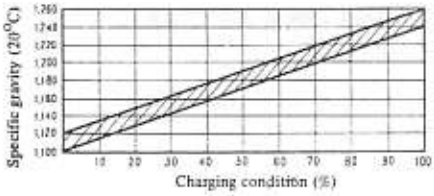


Fig. EE-5 Relation between specific gravity and charging condition

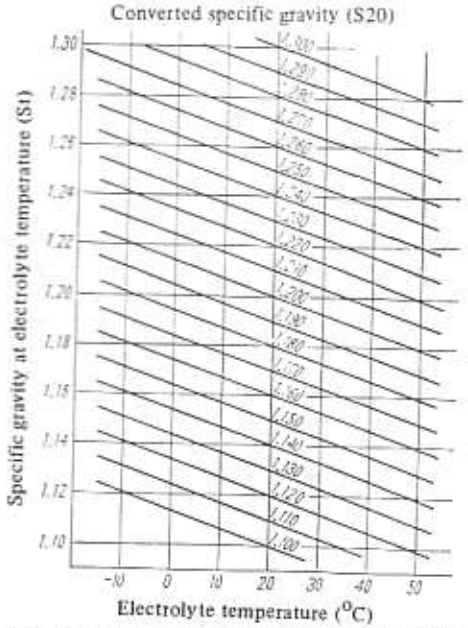


Fig. EE-6 Changes of specific gravity in response to electrolyte temperature change (°C)

BATTERY FREEZING

Temperatures at which battery electrolyte freezes vary with acid concentration or its specific gravity. A battery with an insufficient state of charge will freeze at low temperatures. If specific gravity of a battery falls below 1.100, the indication is that the battery is completely discharged and will freeze readily when temperatures fall below freezing point. See Figure EE-7.

Note: Use extreme caution to avoid freezing battery since it will usually ruin the battery.

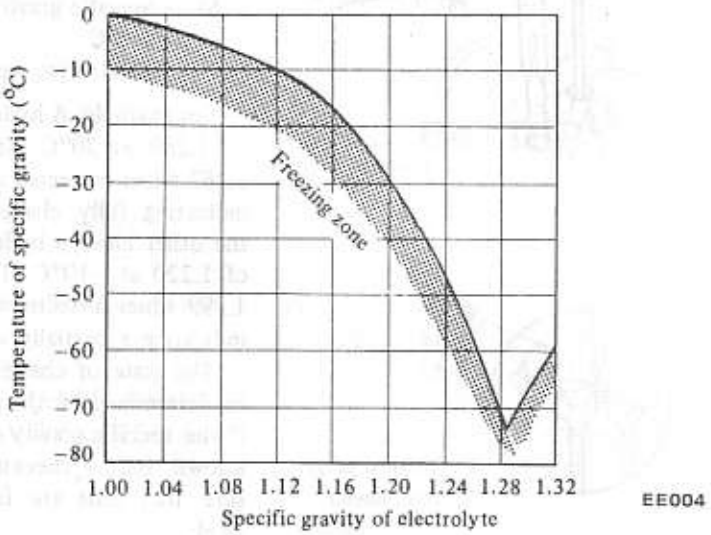


Fig. EE-7 Freezing point of electrolyte

ADJUSTING SPECIFIC GRAVITY

Be sure to check electrolyte specific gravity after fully charging battery. Standard specific gravity is 1.260 at 20°C (68°F).

When specific gravity is higher than the standard value, add distilled water. When lower, add diluted sulphuric acid [specific gravity of which is 1.400 at 20°C (68°F)].

When adjusting specific gravity, be sure to convert measured specific gravity to standard specific gravity at 20°C (68°F).

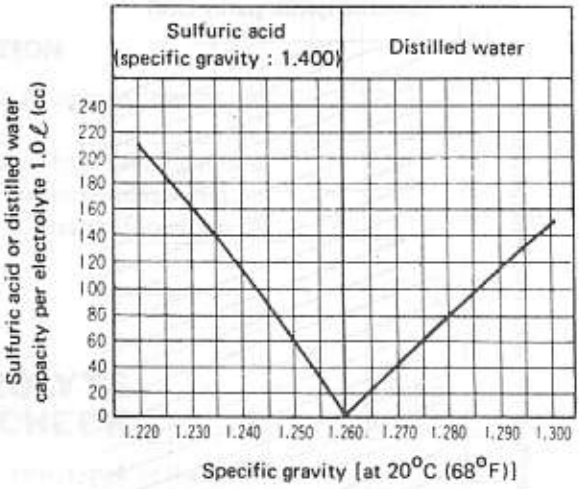


Fig. EE-8 Adjusting specific gravity

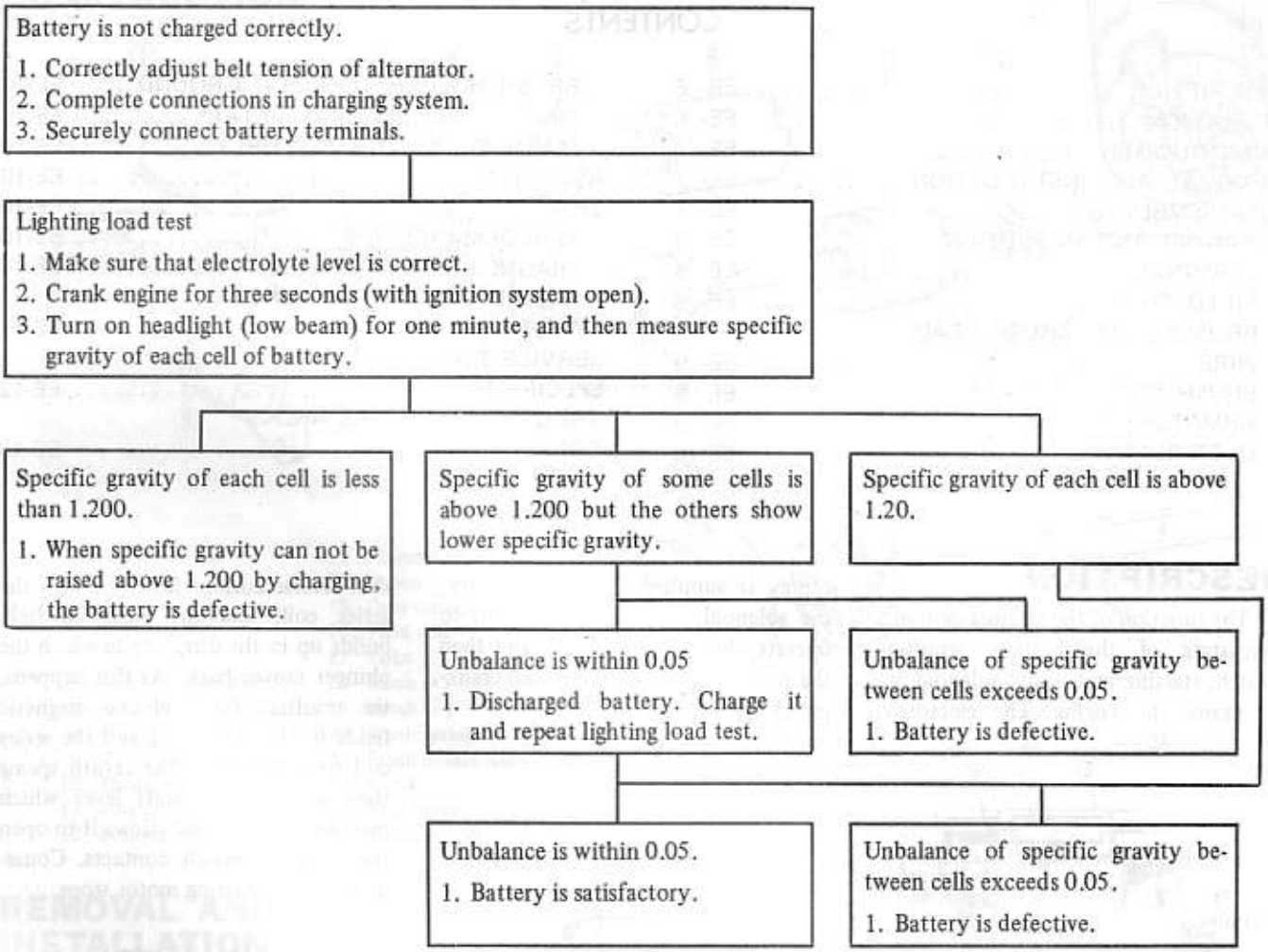
CHARGING CIRCUIT

Battery must be recharged when standard electrolyte-gravity reading falls below 1.200 with electrolyte level being satisfactory. 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, the following items should be observed during recharging battery:

1. Be sure that electrolyte level is above top of each plate.
2. Keep removed plugs in a safe location.
3. Do not allow electrolyte temperature to go over 45°C (113°F).
4. After recharging, check to be certain that standard specific gravity does not exceed 1.260 [at 20°C (68°F)]. Correction can be made by adding distilled water to cells as necessary.
5. Keep battery away from open flame while it is being recharged.
6. After all vent plugs have been tightened, clean upper face of battery.

TROUBLE DIAGNOSES AND CORRECTIONS



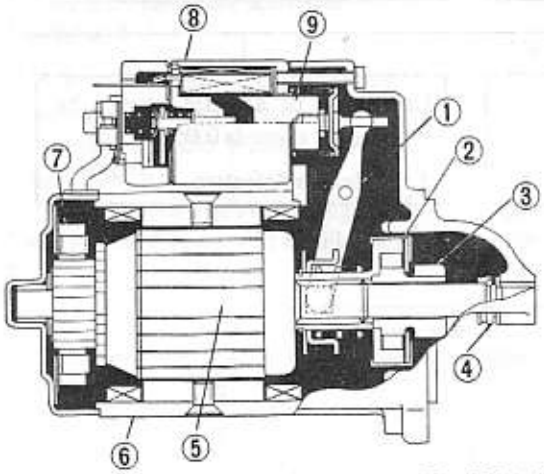
STARTING MOTOR

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DESCRIPTION

The function of the starting system, consisting 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.



1 Shift lever
2 Over-running clutch
3 Pinion
4 Pinion stopper
5 Armature
6 Yoke
7 Brush
8 Magnetic switch ass'y
9 Plunger

Fig. EE-9 Sectional view of starting motor

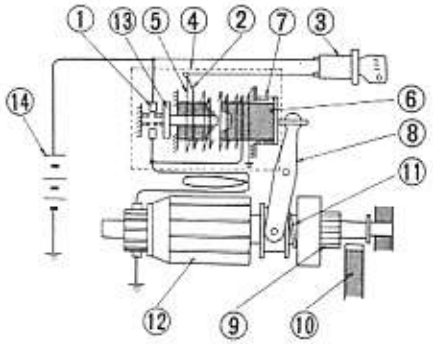
OPERATION

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 which pulls the plunger, and allows it to open the solenoid switch contacts. Consequently, the starting motor stops.



EE118

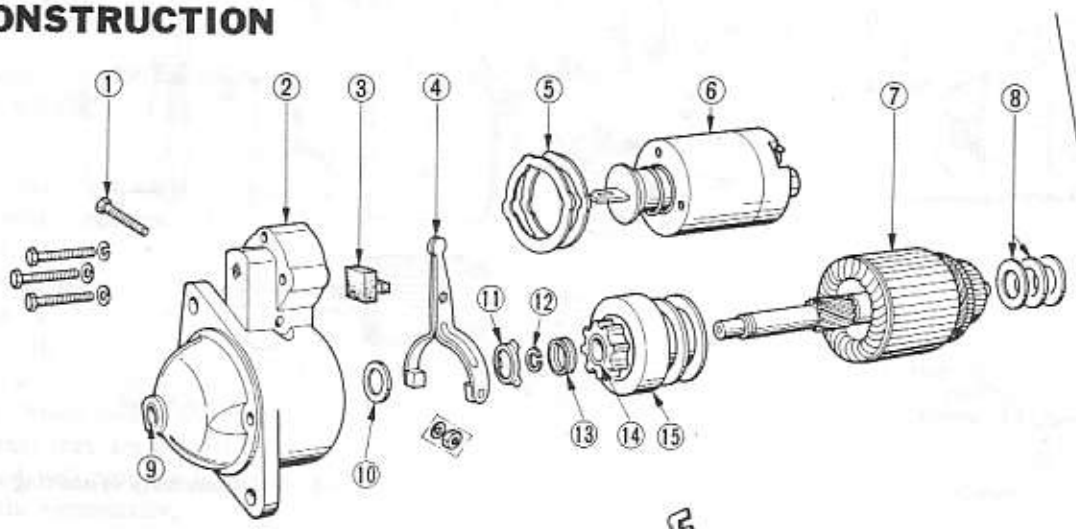
1 Stationary contact
2 Series coil
3 Ignition switch
4 Solenoid
5 Shunt coil
6 Plunger
7 Return spring
8 Shift lever
9 Drive pinion
10 Ring gear
11 Pinion sleeve spring
12 Armature
13 Movable contactor
14 Battery

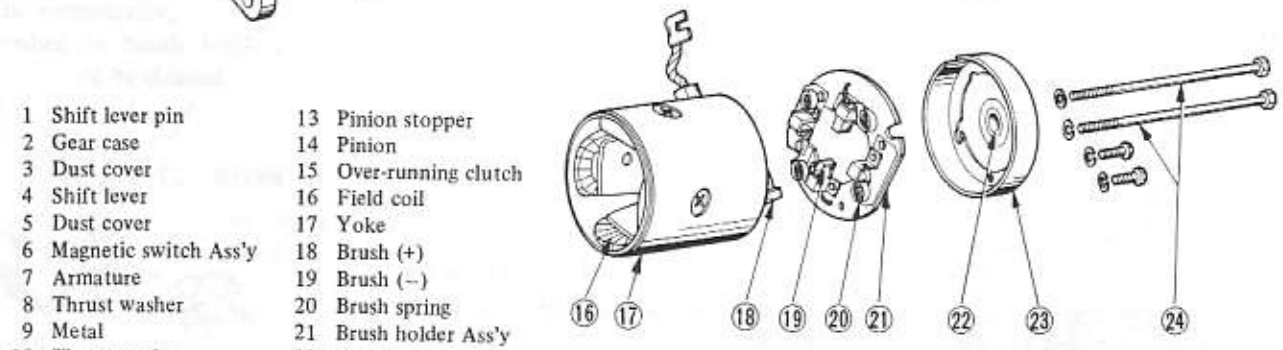
Fig. EE-10 Starting motor circuit

More positive meshing and demeshing of the pinion and the ring gear teeth are secured by means of the over-running clutch. The over-running

clutch employs a shift lever to slide the pinion along the armature shaft, into or out of mesh with the ring gear teeth. The over-running clutch is designed to transmit driving torque from the motor armature to the ring gear, but permit the pinion to over-run the armature after the engine has started.

CONSTRUCTION





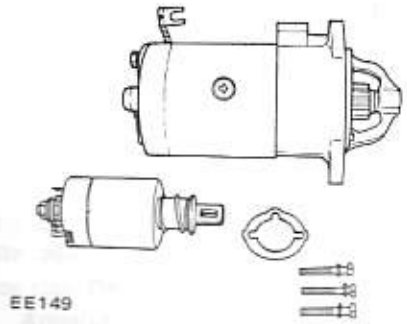
1 Shift lever pin
2 Gear case
3 Dust cover
4 Shift lever
5 Dust cover
6 Magnetic switch Ass'y
7 Armature
8 Thrust washer
9 Metal
10 Thrust washer
11 Stopper washer
12 Stopper clip
13 Pinion stopper
14 Pinion
15 Over-running clutch
16 Field coil
17 Yoke
18 Brush (+)
19 Brush (−)
20 Brush spring
21 Brush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

EE007

Fig. EE-11 Exploded view of starting motor

REMOVAL AND INSTALLATION

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.
3. Install starting motor in reverse order of removal.

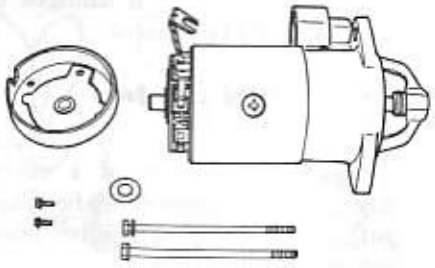


EE149

Fig. EE-12 Removing magnetic switch assembly

DISASSEMBLY

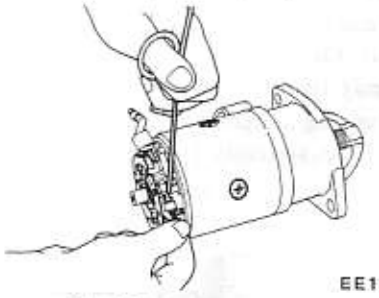
1. Loosen nut securing connecting plate to magnetic switch "M" terminal. Remove three screws securing magnetic switch and remove magnetic switch assembly.
2. Remove two through bolts and brush cover assembly.



EE009

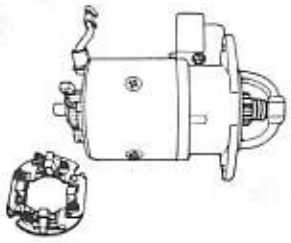
Fig. EE-13 Removing brush cover

3. Set free brushes from commutator by lifting up brush springs.



EE150

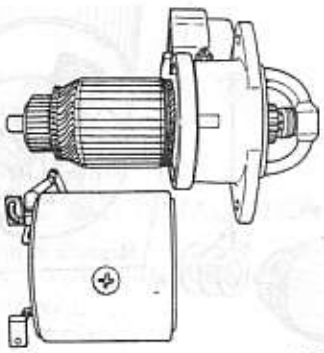
Fig. EE-14 Setting free brushes



EE151

Fig. EE-15 Removing brush holder

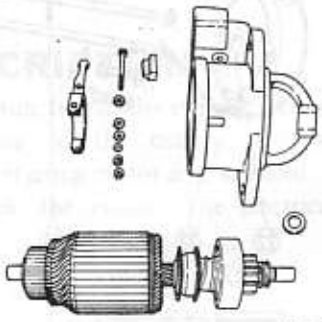
4. Remove yoke assembly by hitting lightly with a wooden hammer.



EE152

Fig. EE-16 Removing yoke assembly

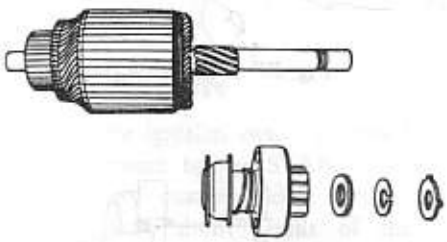
5. Withdraw armature assembly and shift lever.



EE153

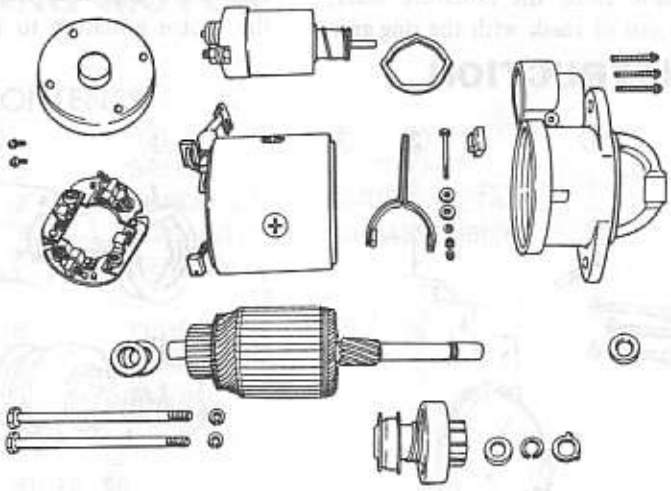
Fig. EE-17 Removing armature assembly and shift lever

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 over-running clutch. Withdraw over-running clutch assembly from armature shaft.



EE012

Fig. EE-18 Removing over-running clutch assembly



EE154

Fig. EE-19 Disassembly of starting motor

CLEANING AND INSPECTION

Clean all disassembled parts, but do not use grease dissolving solvents for cleaning over-running 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.

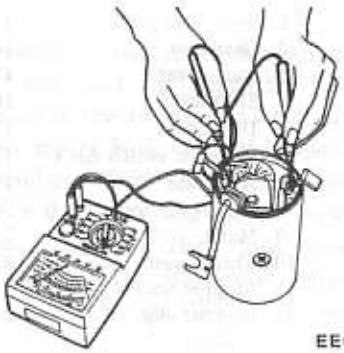
FIELD COIL

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.



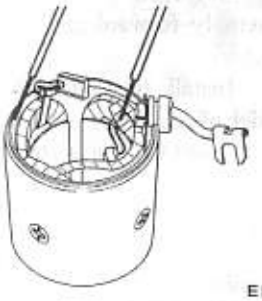
EE016

Fig. EE-20 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-21 Testing field coil for ground

Field coil tester for short:

Unsolder the connected portion of each coil and proceed as mentioned above.

If a faulty coil is found, it should be replaced.

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 and its length is less than 12.5 mm (0.492 in), replace.

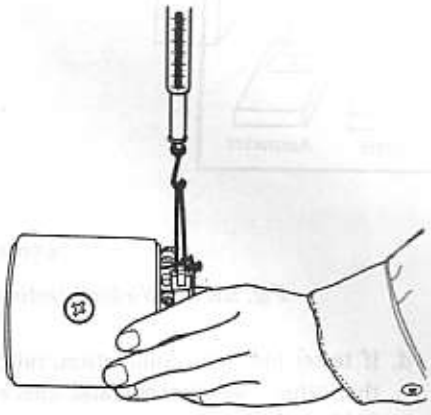
Check the connection of lead clip and lead wire.

Check brush holders and spring clip to see that 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-22. The reading should be 1.6 kg (3.53 lb). Replace spring if tension is lower than 1.4 kg (3.09 lb).



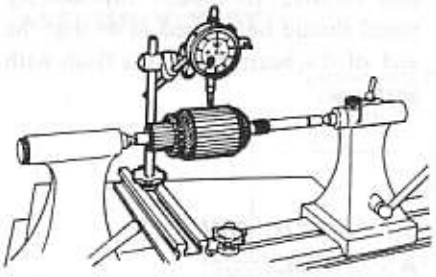
EE018

Fig. EE-22 Inspecting brush spring tension

ARMATURE ASSEMBLY

Check external appearance of armature and commutator.

1. Measure armature shaft for bend by a dial gauge. Replace armature shaft if the bend exceeds 0.08 mm (0.0031 in).



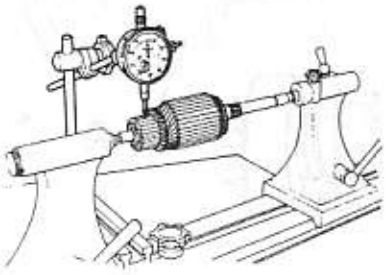
EE019

Fig. EE-23 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 be checked also 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 on a lathe, so that 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).

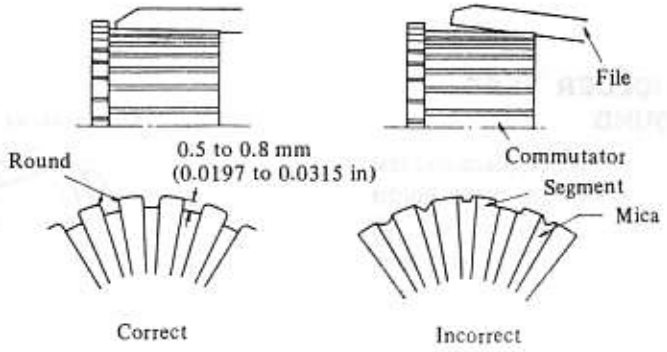
The wear limit of commutator diameter is 2 mm (0.0787 in). If commutator is beyond repair, replace.

Note: It is recommended to replace commutator as an assembly if worn or damaged.



EE020

Fig. EE-24 Inspecting commutator



EE021

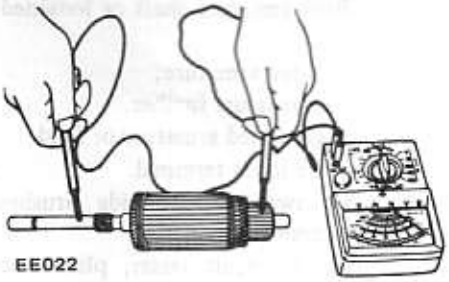
Fig. EE-25 Undercutting insulating mica

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 other onto each commutator bar.

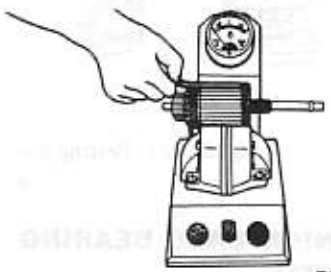
If tester shows conductive, armature is grounded and must be replaced.



EE022

Fig. EE-26 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.



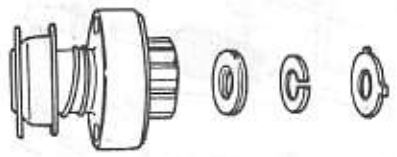
EE023

Fig. EE-27 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.

OVER-RUNNING 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, it should be replaced. Flywheel ring gear also must be inspected.

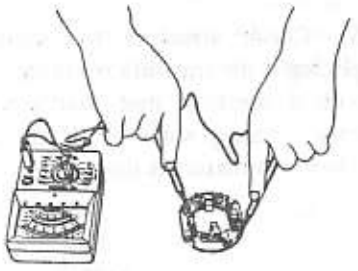


EE024

Fig. EE-28 Over-running clutch assembly

BRUSH HOLDER TEST FOR GROUND

Using a circuit tester, place one test probe onto negative side brush holder and another onto positive side. If tester shows conduction, brush holder is shorted to ground. Replace an insulator or brush holder.



EE025

Fig. EE-29 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 the bearing metal is flush with gear case.

MAGNETIC SWITCH 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 to pinion slightly.

TEST

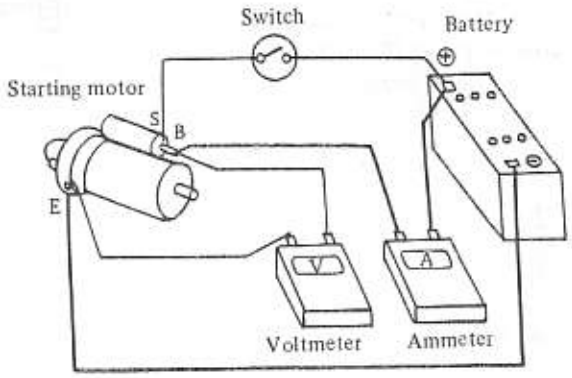
PERFORMANCE TEST

Starting motor should be subjected to a "no-load" test whenever it has been overhauled to ensure that its performance will be satisfactory when installed on engine. Starting motor should also be subjected to 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 this test is shown in "specification."



EE026

Fig. EE-30 No-load testing

DIAGNOSIS OF TEST

1. Low speed with no-load and high current draw may result from the following causes.
(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 result from the following items.
(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 defective 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 burned-out commutator bar.

3. Low current draw and low no-load speed would cause high internal resistance due to loose connections, defective leads, dirty commutator and causes listed on item 2-(3).

MAGNETIC SWITCH ASSEMBLY TEST

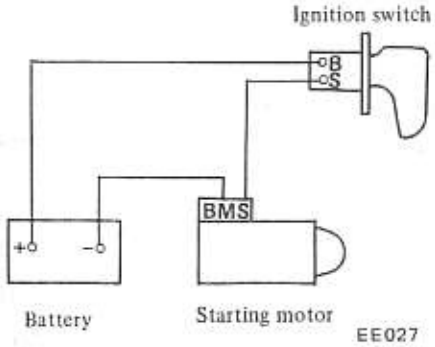


Fig. EE-31 Circuit of magnetic switch assembly test

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-31.

With ignition switch on, measure the gap "ℓ" between pinion front edge and pinion stopper.

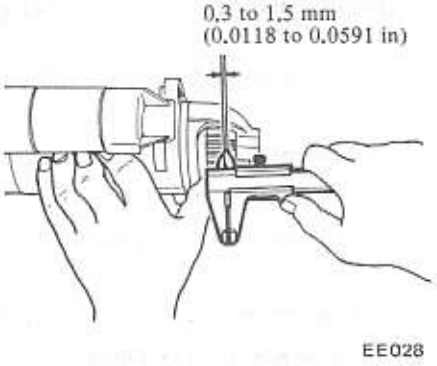


Fig. EE-32 Measuring gap "ℓ"

SERVICE DATA AND SPECIFICATIONS

SERVICE DATA

Model		S114-122N	S114-182
Armature shaft diameter (pinion side)	mm (in)	12.950 to 12.968 (0.5098 to 0.5111)	12.450 to 12.468 (0.4902 to 0.4911)
Armature shaft diameter (rear end)	mm (in)	11.450 to 11.468 (0.4511 to 0.4515)	12.450 to 12.468 (0.4902 to 0.4911)
Amendment limit of shaft diameter	mm (in)	0.10 (0.0039)	0.10 (0.0039)
Amendment limit of shaft bent	mm (in)	0.08 (0.0031)	0.08 (0.0031)
Clearance between shaft and bushing	mm (in)	0.03 to 0.10 (0.0019 to 0.0039)	0.03 to 0.10 (0.0019 to 0.0039)
Amendment limit of dittoed clearance	mm (in)	0.20 (0.0079)	0.20 (0.0079)
Outer diameter of commutator	mm (in)	35.0 (1.378)	40.0 (1.575)
Wear limit of commutator diameter	mm (in)	1.0 (0.39)	1.0 (0.39)
Brush length	mm (in)	18.5 (0.728)	16.0 (0.631)
Wear limit of dittoed length	mm (in)	6.0 (0.24)	4.0 (0.16)
(remaining brush should be more than)	mm (in)	12.5 (0.492)	12.0 (0.472)
Brush spring tension	kg (lb)	1.6 (3.5)	1.6 (3.5)
Front bracket metal inner diameter	mm (in)	13.000 to 13.018 (0.5118 to 0.5125)	12.500 to 12.527 (0.4921 to 0.4932)
Rear cover metal inner-diameter	mm (in)	11.500 to 11.521 (0.4528 to 0.4536)	12.500 to 12.521 (0.4921 to 0.4930)
Center bearing metal inner diameter	mm (in)	17.650 to 17.675 (0.6949 to 0.6959)	17.650 to 17.675 (0.6949 to 0.6959)

SPECIFICATIONS

Type		HITACHI S114-122N (For manual transmission)	HITACHI S114-182 (For automatic transmission)
Voltage	V	12	12
Output	KW	1.0	1.2
Starting current (Voltage)	A (V)	Less than 460 (6)	Less than 500 (5)
No load current (Voltage)	A (V)	Less than 60 (12)	Less than 60 (12)
No load starter revolution	rpm	More than 5,000	More than 6,000
Shift type of pinion gear		Magnetic shift	Magnetic shift
Number of teeth on pinion gear		9	9
Number of teeth on ring gear		120	120

TROUBLE DIAGNOSES AND CORRECTIONS

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

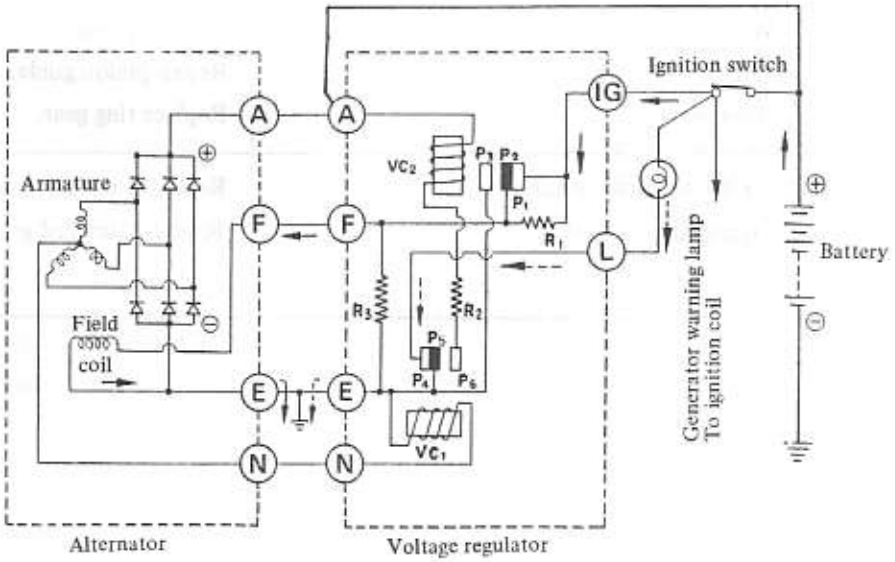
When the ignition switch is set to "ON," current flows from the battery to ground through the ignition switch, voltage regulator IG terminal, primary side contact point "P1," movable contact point "P2," voltage regulator "F" terminal, alternator "F" terminal, field coil and alternator "E" terminal, as shown in Figure EE-33 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-34 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 turns off the warning lamp and completes the voltage winding circuit, as shown by the full line arrow marks.

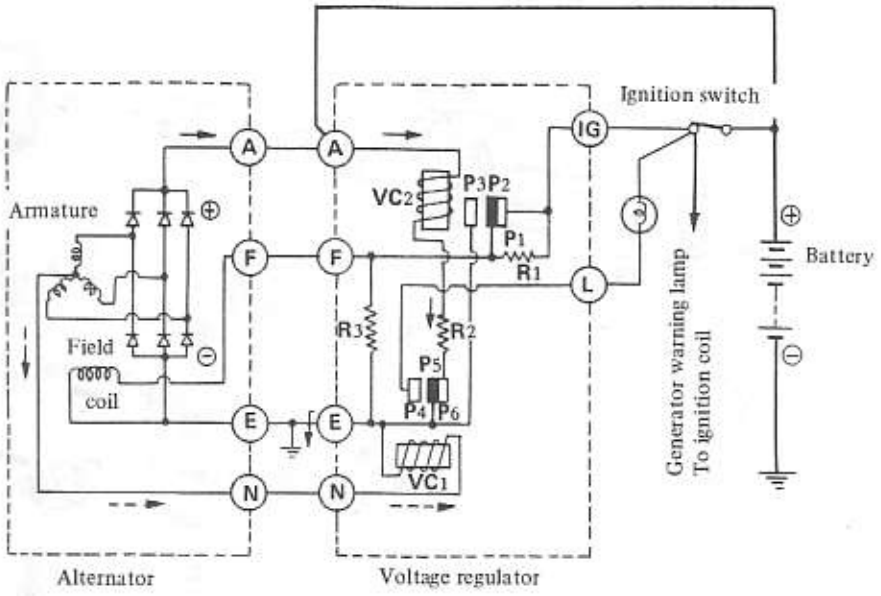
When the alternator speed is increased or the voltage starts to rise excessively, the movable contact point "P2" is separated from the primary side contact "P1" by the magnetic force of coil "VC2." Therefore, register "R1" is applied into the rotor circuit and output voltage is decreased. As the output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

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 separates movable contact "P2" from secondary contact "P3." Thus, the rapid vibration of the movable contact point "P2" or breaking and completing the rotor circuit maintains constant alternator output voltage.



EE029

Fig. EE-33 Charging circuit (I)



EE030

Fig. EE-34 Charging circuit (II)

ALTERNATOR

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DESCRIPTION

Alternator model	Applied engine
LT150-10	L20A, L24, L26
LT160-20 (Option)	

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 LT150-10 pack type silicon diodes are used.

Six diodes (three negatives and three positives), are installed in positive and negative plates as an assembly.

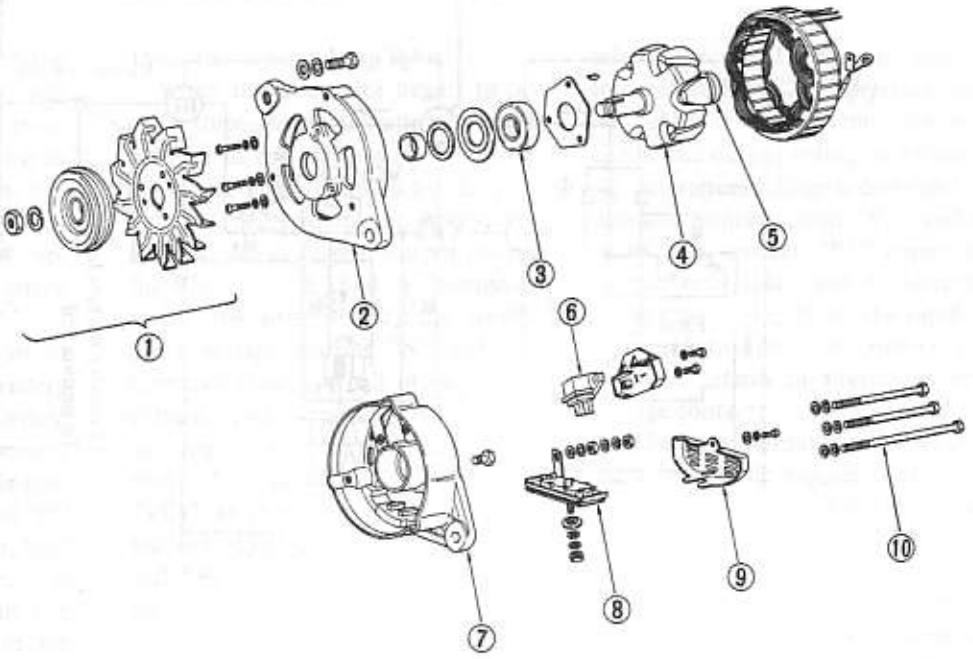
These diodes are direct-soldered at their tips, and constructed with positive and negative conjunction.

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 LT160-20, conventional type diodes are used.

Three of each diodes (three negatives and three positives) are installed in positive and negative side rear cover.

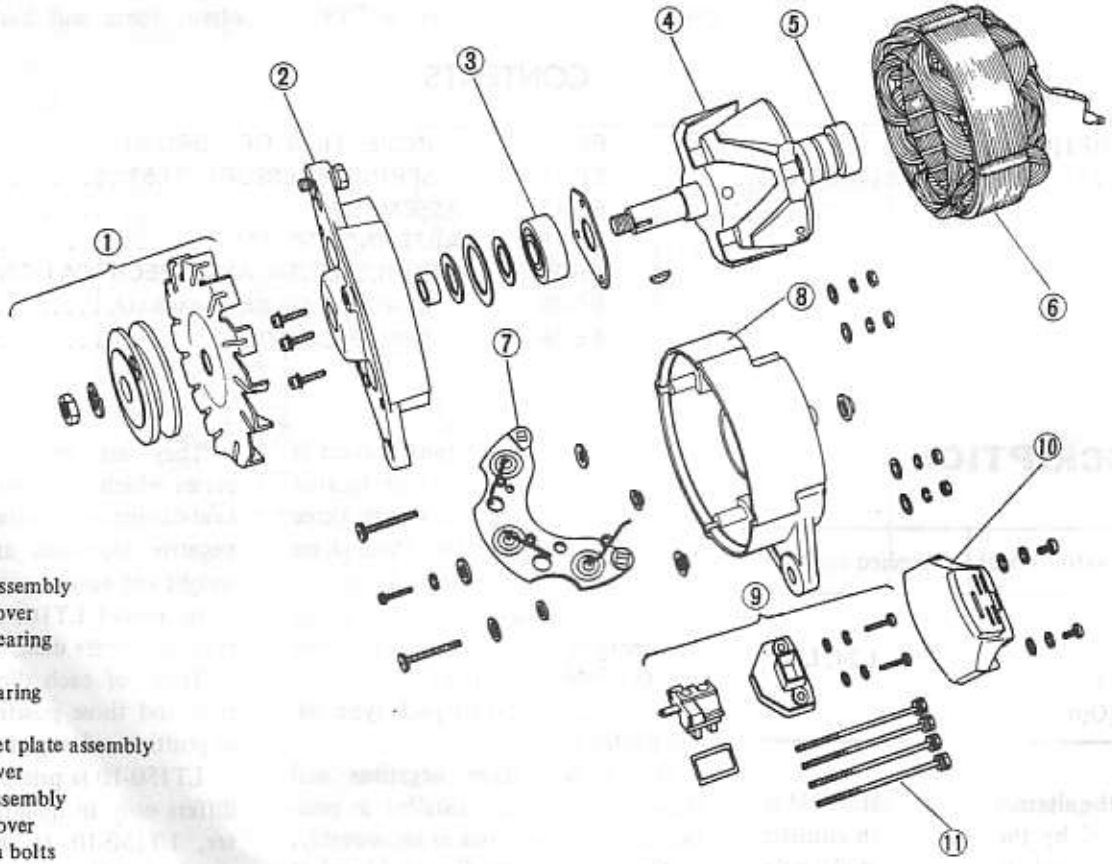
LT150-10 is primarily the same but differs only in quantity. In this chapter, LT150-10 is described as the standard and other explanations are added when the other models differ from it in instruction procedure.



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

EE155

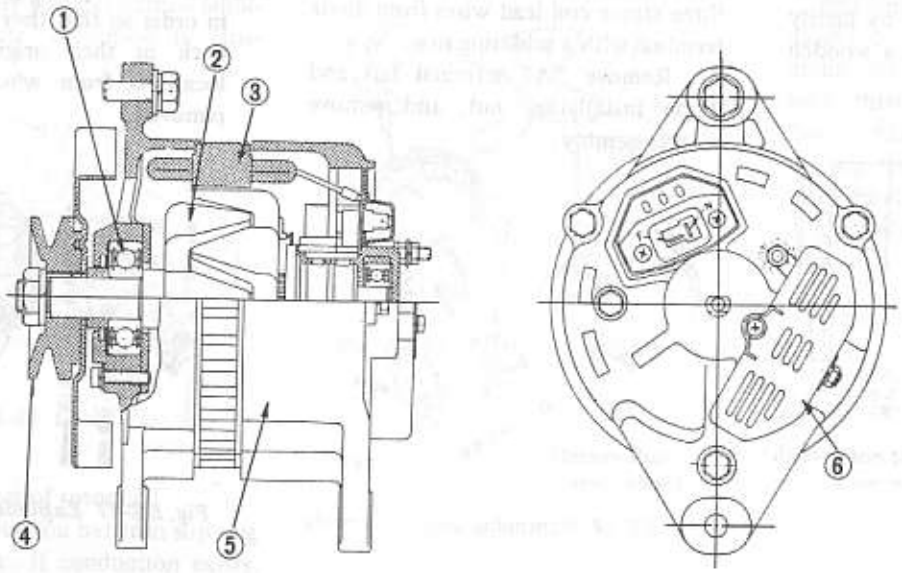
Fig. EE-35 Exploded view of LT150-10



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

EE120

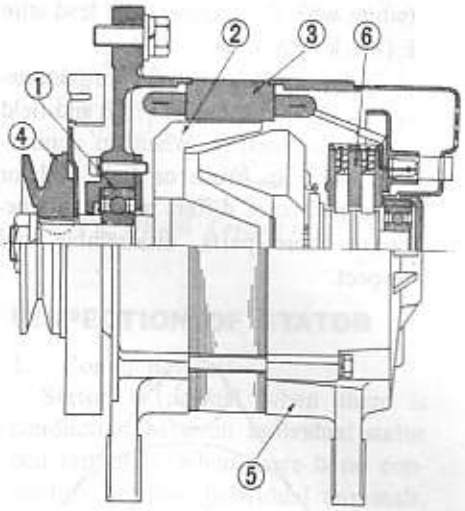
Fig. EE-36 Exploded view of LT160-20



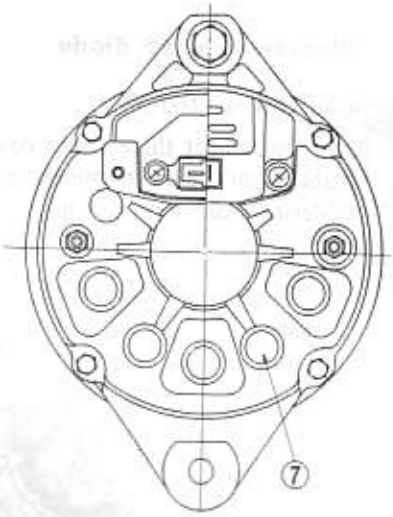
1 Front bearing
2 Rotor
3 Stator
4 Pulley
5 Rear cover
6 Encased diode

EE032

Fig. EE-37 Sectional view of LT150-10



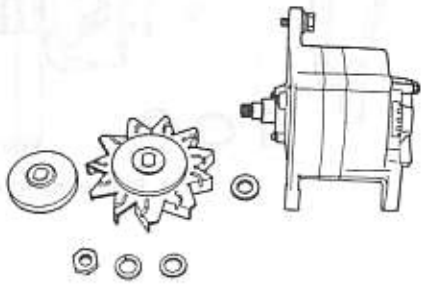
1 Front bearing
2 Rotor
3 Stator
4 Pulley



5 Rear cover
6 Brush holder assembly
7 Diode

EE121

Fig. EE-38 Sectional view of LT160-20



EE033

Fig. EE-39 Removing pulley and fan

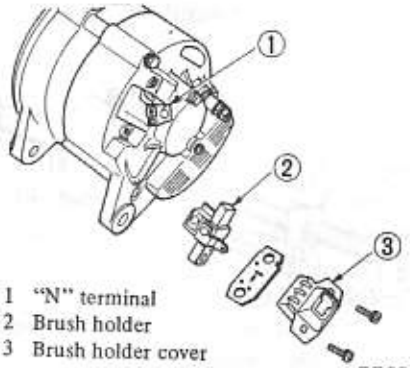
REMOVAL AND INSTALLATION

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 vehicle.
7. Install alternator in reverse order of removal.

DISASSEMBLY

1. Remove pulley nut, pulley rim, fan and spacer.
2. Remove brush holder fixing screws, and remove brush holder cover. Remove 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-40 Removing brush

3. Loosen and remove through bolts. Separate front cover with rotor from rear cover with stator by lightly tapping front bracket with a wooden mallet.

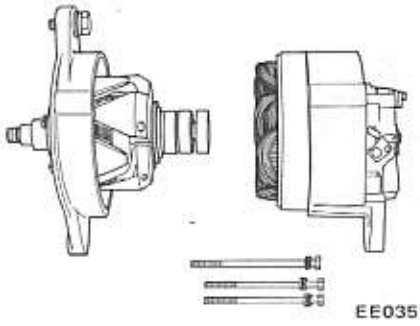


Fig. EE-41 Separating front cover with rotor from rear cover

4. Remove three set screws from bearing retainer, and separate rotor from front cover.

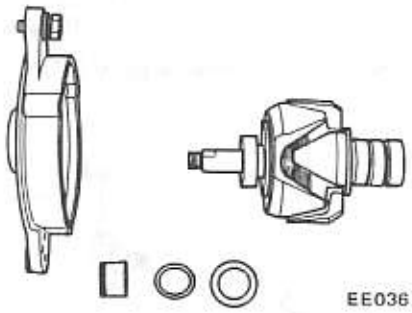
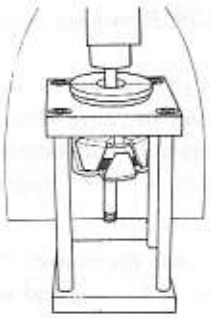


Fig. EE-42 Removing rotor

5. Pull out rear bearing from rotor assembly with a press or bearing puller.



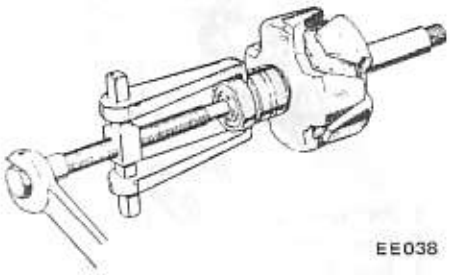
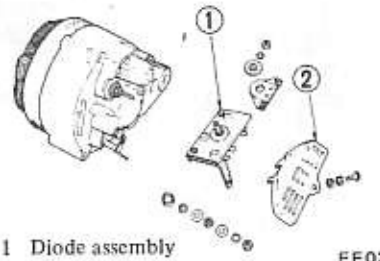


Fig. EE-43 Pulling out rear bearing

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

Fig. EE-44 Removing diode assembly

Note: Use care in handling diode assembly to prevent an undue stress on it.

Disassembly of diode

≪MODEL LT160-20≫

1. Disconnect three stator coil lead wires from diode terminals with a soldering iron. It is also necessary to disconnect jumper wires between diodes.

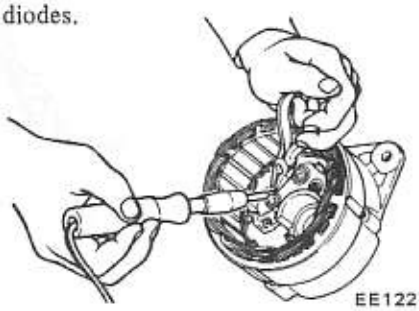


Fig. EE-45 Removing soldered connection of stator coil and diode

2. Pull stator coils out of rear cover.

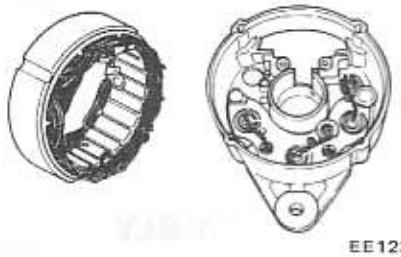


Fig. EE-46 Separating stator coil from rear cover

3. Remove diode from rear cover.

Caution: Place packings and insulators in order so that they can be placed back in their original places or locations from which they were removed.

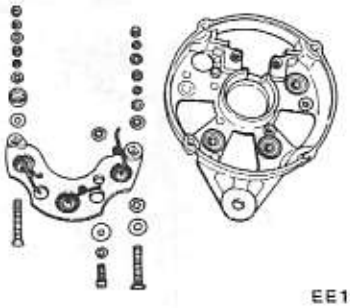


Fig. EE-47 Exploded view of diode

INSPECTION AND REPAIR

Remove alternator from vehicle 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 remarkably between those parts, disassemble and inspect.

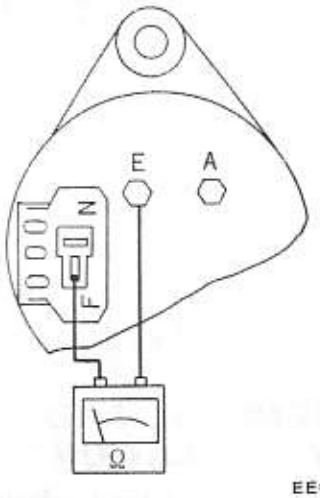


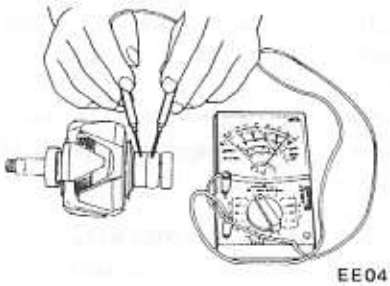
Fig. EE-48 Inspecting alternator

ROTOR INSPECTION

1. Conduction test of rotor coil

Apply tester between slip rings of rotor as shown in Figure EE-49. If

there is no conduction, discontinuity of field coil may exist. When resistance is approximately 4.4Ω at normal ambient temperature, condition is satisfactory.

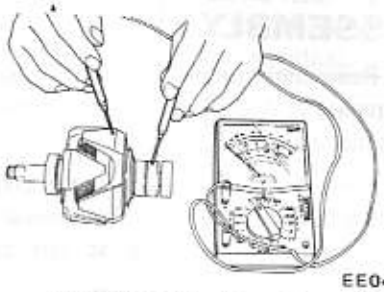


EE041

Fig. EE-49 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

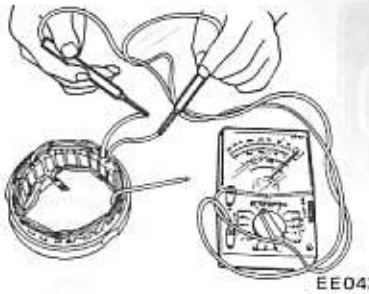
Fig. EE-50 Testing rotor coil for ground

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-51 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.

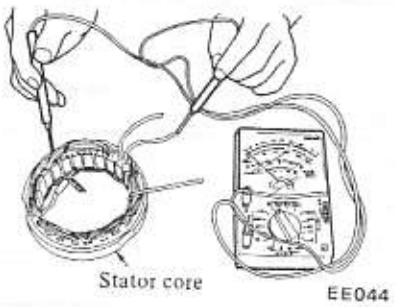


Fig. EE-52 Testing stator for ground

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.

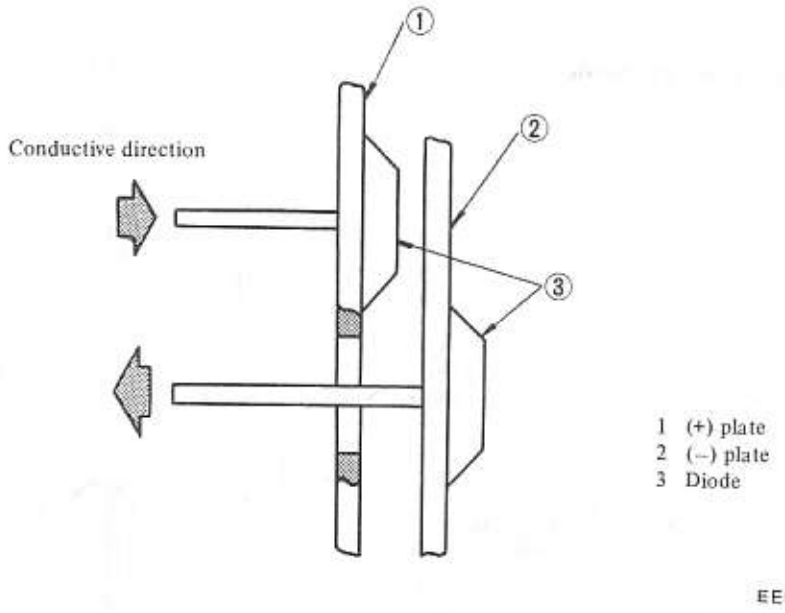


Fig. EE-53 Conduction direction of diode

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.

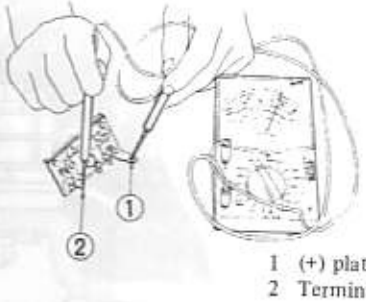


Fig. EE-54 Inspecting positive diode

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.

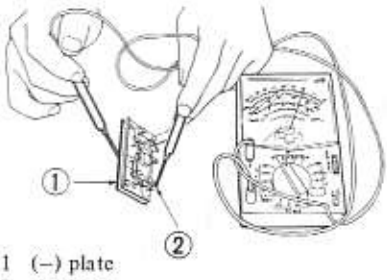


Fig. EE-55 Inspecting negative diode

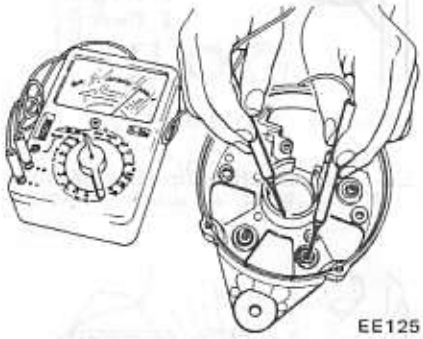
If current flows toward both positive and negative directions, diode is short-circuited. If current flows in the same direction only, diode is in good condition. If there is a defective diode, replace all diodes (six diodes) as an assembly. (See below table.) These diodes are unserviceable.

Test probe of a circuit tester		Conduction
⊖	⊕	
terminal	⊕ plate	O
⊕ plate	terminal	–
terminal	⊖ plate	–
⊖ plate	terminal	O
⊖ plate	⊕ plate	O
⊕ plate	⊖ plate	–

Inspection of diode

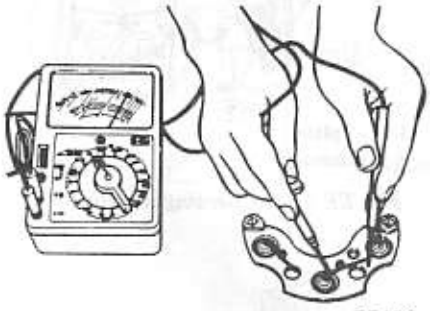
≪MODEL LT160-20≫

Use a tester to check diodes. Three diodes are placed between aluminum plate and rear cover. Testing consists of checking conduction between diode terminal and aluminum plate, and between diode terminal and rear cover. Measurements should then be evaluated as per the instructions given under LT150-10.



EE125

Fig. EE-56 Conduction test of diode (I)



EE126

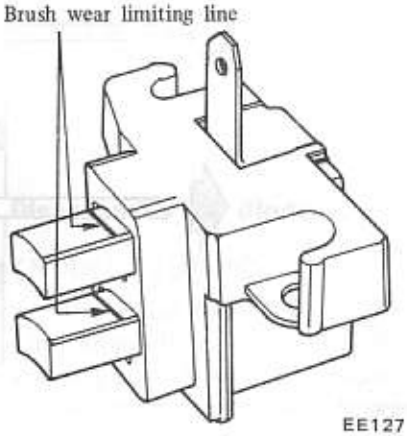
Fig. EE-57 Conduction test of diode (II)

INSPECTION OF BRUSH

Check movement of brush and if movement is unsmooth, check brush holder and clean it.

Check brush for wear. If it is worn down to less than the specified limit, replace brush assembly.

Check brush pig tail and, if found defective, replace.



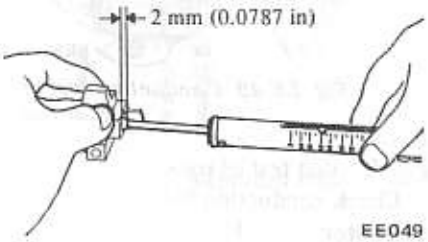
EE127

Fig. EE-58 Brush wear limit

SPRING PRESSURE TEST

With brush projected approximately 2 mm (0.0787 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.



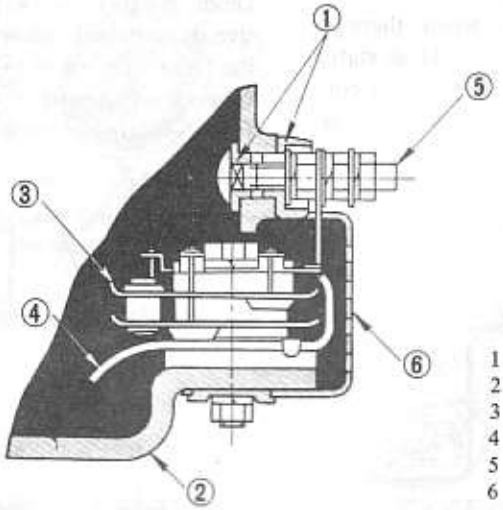
EE049

Fig. EE-59 Measuring spring pressure

ASSEMBLY

Reassemble alternator in the reverse sequence of disassembly noting following matters:

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.



1 Insulating bush
2 Rear cover
3 Diode assembly
4 Stator coil lead wire
5 A terminal bolt
6 Diode cover

EE161

Fig. EE-60 Sectional view of diode and "A" terminal

3. Tighten pulley nut with tightening torque of 350 to 400 kg-cm (301 to 344 in-lb). When pulley is tightened, make sure that deflection of V-groove is less than 0.3 mm (0.0118 in).

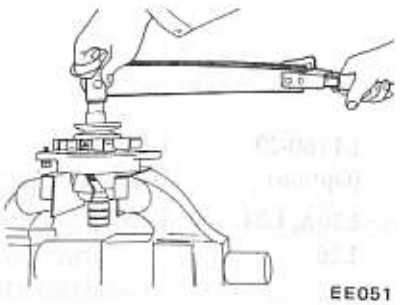


Fig. EE-61 Tightening pulley nut

ALTERNATOR TEST

Before conducting an alternator test, make sure that the battery is fully charged.

To conduct a test, it is necessary to use a 30-volt voltmeter and suitable test probes.

Set up a test circuit as shown in Figure EE-62 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 approximately 1,100 rpm, and take the voltmeter reading.

Measured value: Below 12.5 volts
Alternator is defective. Remove and check it for condition.

Measured value: Over 12.5 volts
Alternator is in good condition.

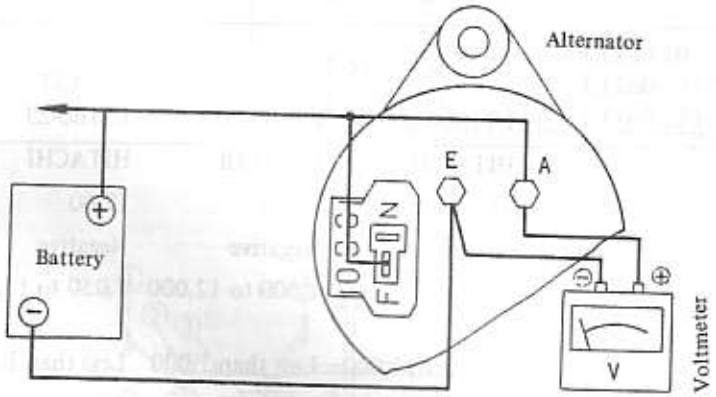


Fig. EE-62 Testing alternator

Notes:

a. Do not run engine at more than 1,100 rpm while test is being conducted on alternator.

b. Do not race engine.

SERVICE DATA AND SPECIFICATIONS

SERVICE DATA

Model		LT150-10	LT160-20 (Option)	LT160-23 (Option)
Applied engine		L20A, L24, L26, L26(T)	L20A, L24, L26	L26(T)
Starter coil				
Resistance per a phase [at 20°C (68°F)]	Ω	0.17	0.052	0.052
Rotor coil				
Resistance [at 20°C (68°F)]	Ω	4.4	3.96	3.97
Brush				
Brush length	mm (in)	14.5 (0.571)	14.5 (0.571)	14.5 (0.571)
Wear limit	mm (in)	7 (0.2756)	7 (0.2756)	7 (0.2756)
Spring pressure	kg (lb)	0.25 to 0.35 (0.55 to 0.77)	0.25 to 0.35 (0.55 to 0.77)	0.25 to 0.35 (0.55 to 0.77)
Slip ring				
Outer diameter	mm (in)	31 (1.220)	31 (1.220)	31 (1.220)
Reduction limit	mm (in)	1 (0.0394)	1 (0.0394)	1 (0.0394)
Repair accuracy	mm (in)	0.05 (0.0197)	0.05 (0.0197)	0.05 (0.0197)

SPECIFICATIONS

Model		LT150-10	LT160-20	LT160-23
Maker		HITACHI	HITACHI	HITACHI
Nominal rating	V-A	12-50	12-60	12-60
Grohnd porality		Negative	Negative	Negative
Revolution	rpm	1,000 to 13,500	1,000 to 12,000	1,050 to 13,500
Minimum revolution				
Under no load	rpm	Less than 1,000	Less than 1,000	Less than 1,000
Output current		37.5A (14V, 2,500 rpm)	45A (14V, 2,500 rpm)	45A (14V, 2,500 rpm)
Pulley ratio		2.09	2.09	2.09

REGULATOR

CONTENTS

DESCRIPTION EE-23
MEASUREMENT OF REGULATOR VOLTAGE EE-24
ADJUSTMENT EE-25
VOLTAGE REGULATOR EE-25
CHARGING RELAY EE-25
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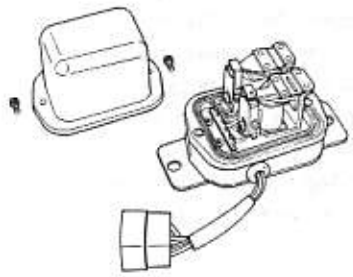
DESCRIPTION

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

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

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

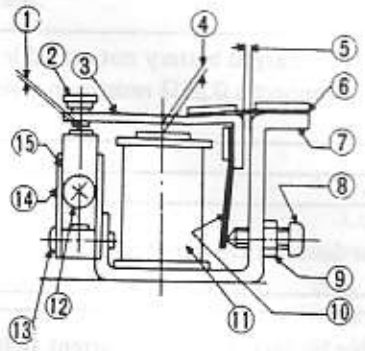
Regulator model	Applied engine	Applied alternator
TL1Z-57	L20A, L24, L26, L26(T)	LT150-10 LT160-20 (Option) LT160-23 (Option)



EE145

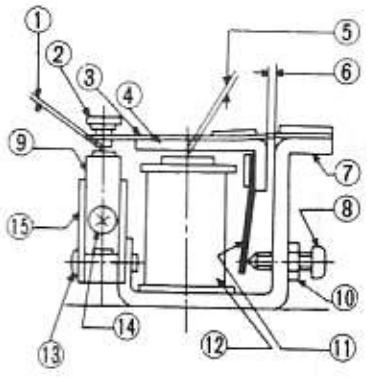
Fig. EE-63 View of removing cover

As for construction, the voltage regulator is very similar to the charge relay as shown in Figure EE-64.



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

(a) Construction of voltage regulator



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

EE054

(b) Construction of charge relay

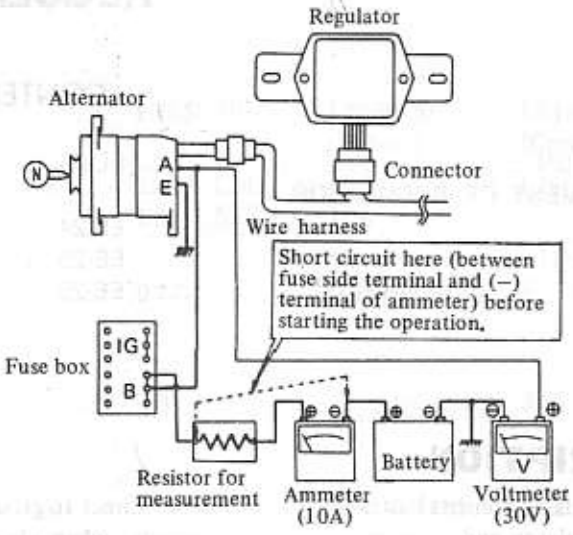
Fig. EE-64 Structural view of relay

MEASUREMENT OF REGULATOR VOLTAGE

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

Connect DC voltmeter (15-30V), DC ammeter (15-30A), battery and resistor (0.25Ω) 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 caution causes needle of ammeter to swing violently and reversely, resulting in a damaged ammeter.



EE055

Fig. EE-65 Measuring regulator voltage with regulator on vehicle

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

1. Start engine.
2. Rotate engine at 2,500 rpm for several minutes.

After racing for several minutes, ammeter reading – below 5A.

Fully charged battery available.
1. Replace with fully charged battery.
2. Check to see if current falls below 5A.

Current falls below 5A.

After racing for several minutes, ammeter reading – over 5A.

Fully charged battery not available.
1. Connect a 0.25Ω resistor in series.

Current does not fall below 5A.

Recharge battery and see if current falls below 5A.

Reduce engine speed to idling and then raise it to 2,500 rpm while observing needle of voltmeter.

Needle of voltmeter held within limits shown in the table below.
Regulator functioning properly.

Needle of voltmeter out of limits shown in the following chart.
Regulator out of order. Have it repaired at authorized shop.

Regulator model TL1Z-57 (HITACHI)

Temperature °C (°F)	Voltage V
−10 (14)	14.75 to 15.25
0 (32)	14.60 to 15.10
10 (50)	14.45 to 14.95
20 (68)	14.30 to 14.80
30 (86)	14.15 to 14.65
40 (104)	14.00 to 14.50

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 0.3V higher than the rated for two to three minutes after engine is started, or more specifically, when regulator becomes self-heated. Measurements should then be made within one minute after starting engine, or when regulator is cold.
d. The regulator is of a temperature-compensating type. Before measuring voltage, be sure to measure surrounding temperature and correct measurements according to the table on the left.

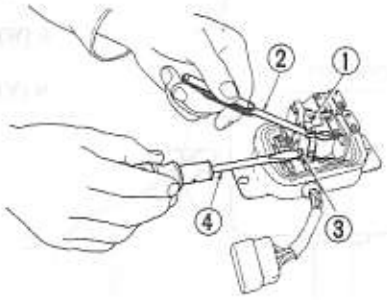
ADJUSTMENT

VOLTAGE REGULATOR

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

1. Inspect contact surface, and if rough, lightly polish surface with fine emery paper (#500 or 600).
2. Measure each gap, and adjust if necessary. Adjust core gap and point gap in that order. No adjustment is required for yoke gap.
3. Adjusting core gap

Loosen screw [4 mm (0.1575 in) diameter] which is used to secure contact set on yoke, and move contact upward or downward properly. See Figure EE-66.

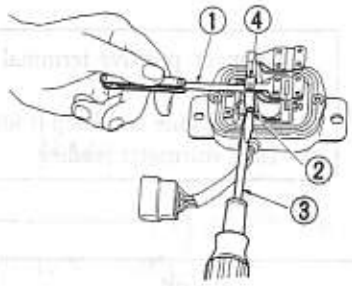


1 Contact set
2 Thickness gauge
3 4 mm (0.1575 in) dia. screw
4 Crosshead screwdriver EE056

Fig. EE-66 Adjusting core gap

4. Adjusting point gap

Loosen screw [3 mm (0.1181 in) diameter] used to secure upper contact, and move upper contact upward or downward adequately. See Figure EE-67.



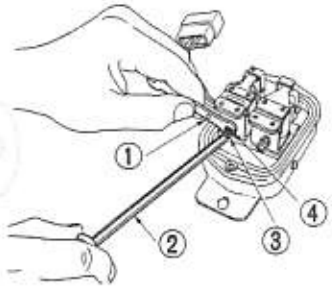
1 Thickness gauge
2 3 mm (0.1181 in) dia. screw
3 Crosshead screwdriver
4 Upper contact EE057

Fig. EE-67 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-68.



1 Wrench
2 Crosshead screwdriver
3 Adjusting screw
4 Lock nut EE058

Fig. EE-68 Adjusting regulating voltage

CHARGING RELAY

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

Use a DC voltmeter, and set up a circuit as shown in Figure EE-69.

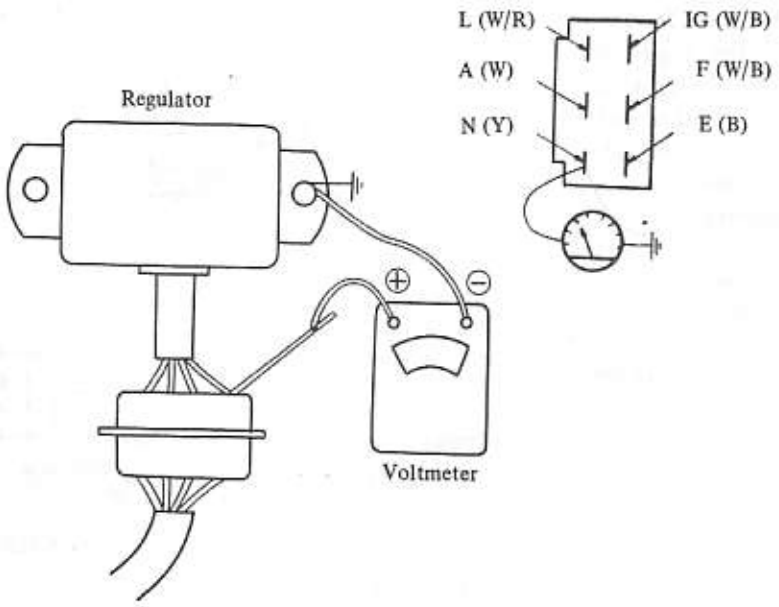
1. Connect positive terminal of voltmeter to regulator lead connector "N" terminal with negative terminal grounded.
2. Start engine and keep it idle.
3. Take voltmeter reading.

0 Volt
1. Check for continuity between "N" terminals of regulator and alternator.
2. Alternator circuit defective if continuity exists.

Below 5.2 Volts
(Pilot lamp remains lit.)
1. Check fan belt tension.
2. If correct, remove regulator and adjust as necessary.

Over 5.2 Volts
(Pilot lamp remains lit.)
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.



EE059

Fig. EE-69 Testing charging relay

SERVICE DATA AND SPECIFICATIONS

Voltage regulator		
Model		TL1Z-57
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 (0.0236 to 0.0394)
Point gap	mm (in)	0.3 to 0.4 (0.0118 to 0.0157)
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 (0.0315 to 0.0394)
Point gap	mm (in)	0.4 to 0.6 (0.0157 to 0.0236)

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

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.

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 cylinders. 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.

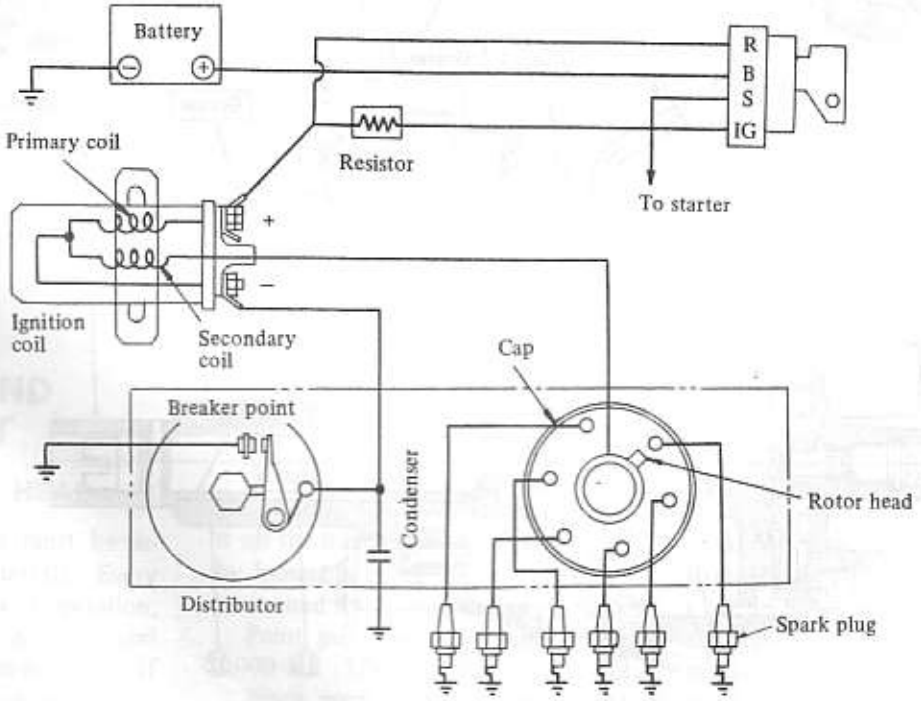
When the contact points are opened by the revolving distributor cam, the magnetic field built up in the primary winding of the coil moves through the secondary winding of the coil inducing high voltage. The high voltage is produced every time the contact points open. The high voltage current flows through 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.

The spark is obtained when 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 every 10,000 km (6,000 miles). Spark plugs should be removed, inspected and maintained to obtain good firing.

The remainder of the ignition component parts should be inspected for their operation, tightness of electrical terminals, and wiring condition.

The ignition circuit is shown below:



EE060

Fig. EE-70 Ignition system circuit diagram

DISTRIBUTOR

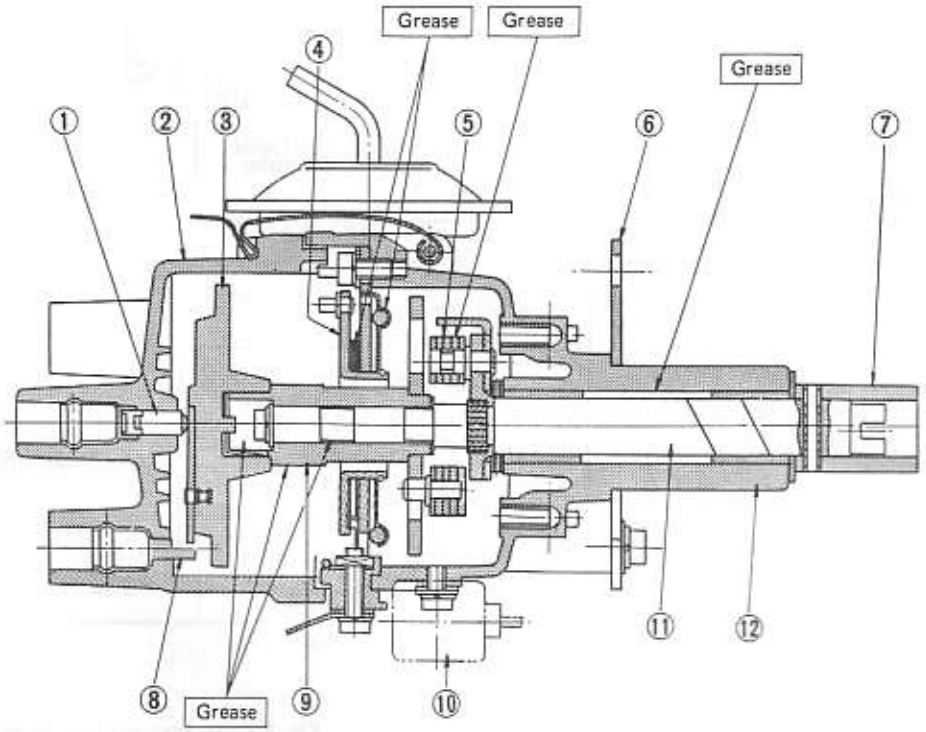
CONTENTS

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DISASSEMBLY AND ASSEMBLY EE-33
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SERVICE DATA EE-35
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CONSTRUCTION

Distributor model	Applied engine
D606-52	L24
D609-56	L20A, L26
D609-56A	L24, L26 equipped with emission control system

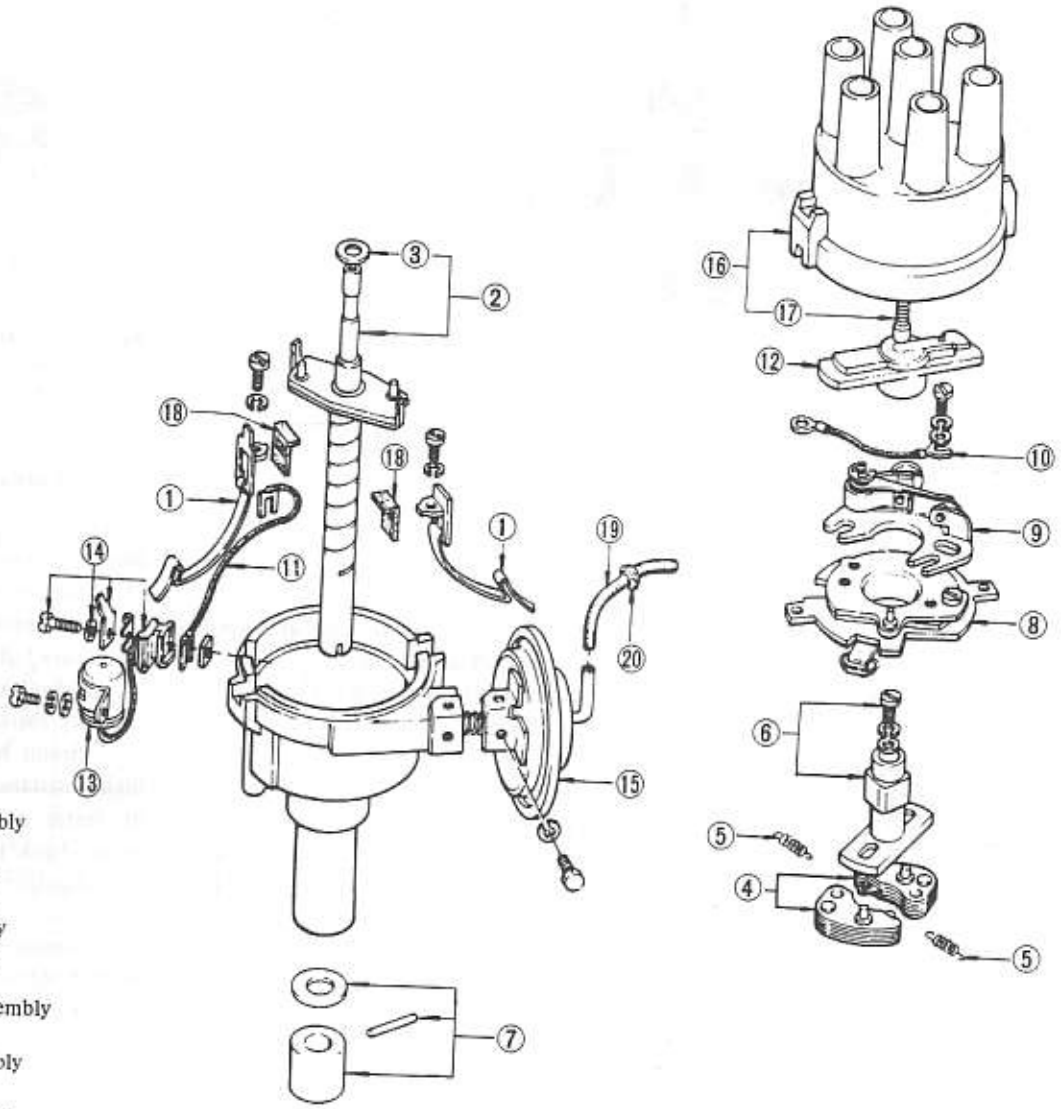
The distributor consists of breaker plate with contact points, centrifugal advance mechanism, vacuum unit, drive shaft, and rotor. Figure EE-71 and 72 show a sectional view of the unit.



1 Center carbon
2 Cap
3 Rotor head
4 Breaker point
5 Governor weight
6 Fixing plate
7 Coupling
8 Side plug
9 Cam
10 Condenser
11 Shaft
12 Housing

EE156

Fig. EE-71 Sectional view of distributor



1 Clamp
2 Shaft assembly
3 Thrust washer
4 Governor weight
5 Governor spring
6 Cam assembly
7 Collar set
8 Breaker plate assembly
9 Contact set
10 Earth wire assembly
11 Lead wire assembly
12 Rotor head assembly
13 Condenser assembly
14 Terminal assembly
15 Vacuum control assembly
16 Cap assembly
17 Carbon point assembly
18 Dust seal
19 Vacuum control tube
20 Vacuum tube grommet

EE157

Fig. EE-72 Exploded view of distributor (Model D606-52)

CHECKING AND ADJUSTMENT

CAP AND ROTOR HEAD

Cap and rotor head must be inspected at regular intervals. Every 5,000 km (3,000 miles) of operation, remove cap and clean all dust and carbon deposits from cap and rotor. If cap is cracked or is leaking, replace with a new one.

POINT

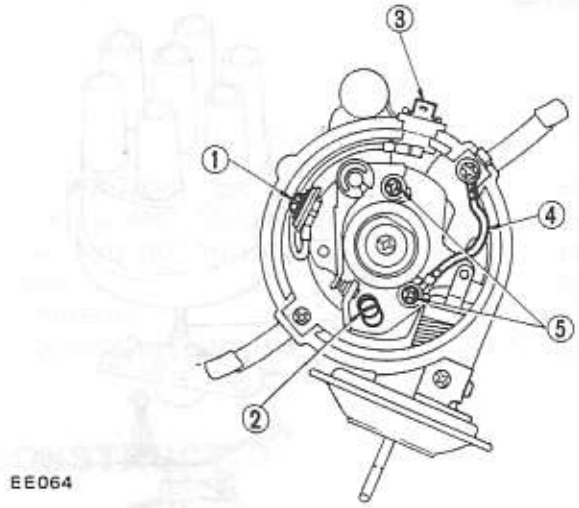
Standard point gap is 0.45 to 0.55 mm (0.0177 to 0.0217 in). In case size is off the standard, adjustment is made by loosening point screws. Gap gauge is required for adjustment.

Point gap must be checked every 5,000 km (3,000 miles) of operation.

When point surface is rough, take off any irregularities with fine sandpaper (No. 500 or 600) or with oil stone.

At this time, grease must be applied 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 Screw
2 Adjuster
3 Primary lead terminal
4 Ground lead wire
5 Set screw

Fig. EE-73 Breaker

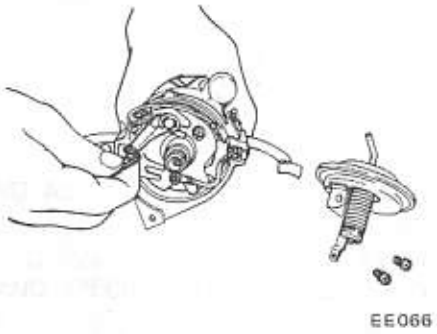


Fig. EE-75 Disassembling contact arm and contact point

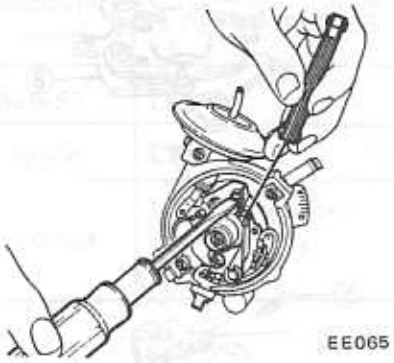


Fig. EE-74 Measuring point gap

First turn out set screws 1 to 1.5 turns at contact arm and primary lead wire connection just far enough to pull out primary lead terminal.

Referring to Figure EE-73, 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 MECHANISM

≪Performances≫

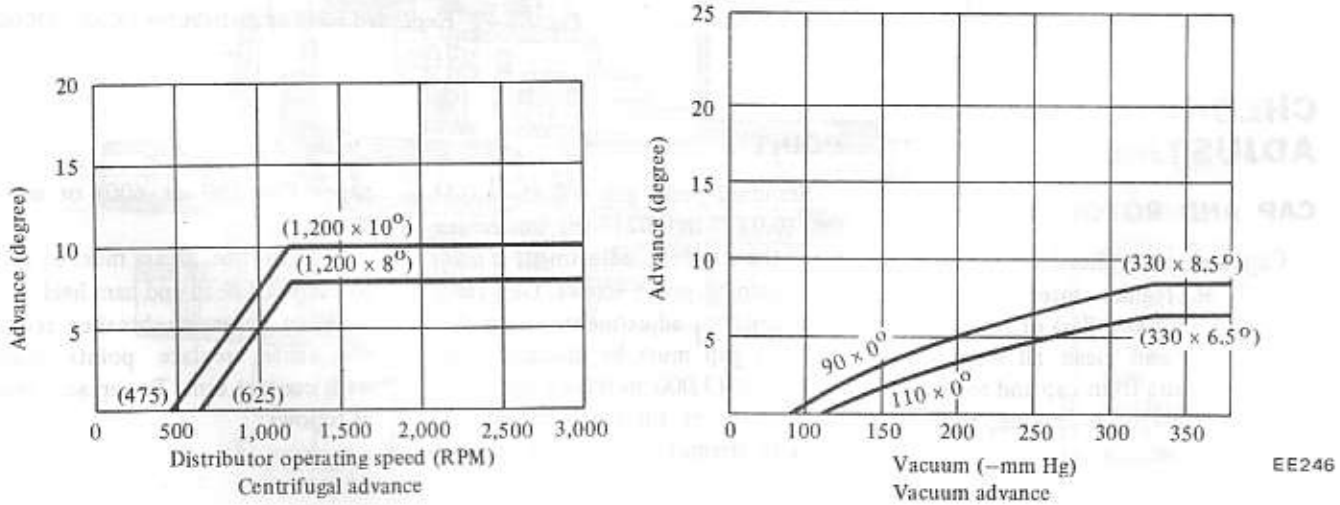
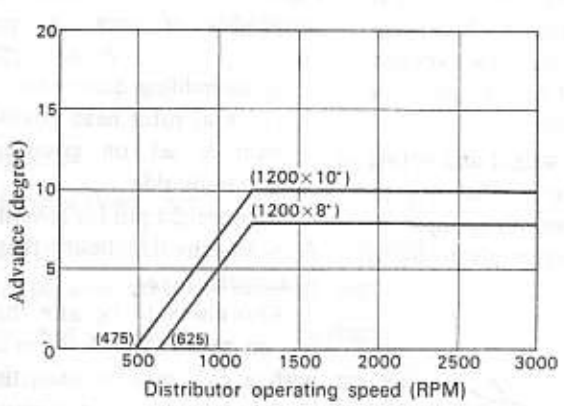
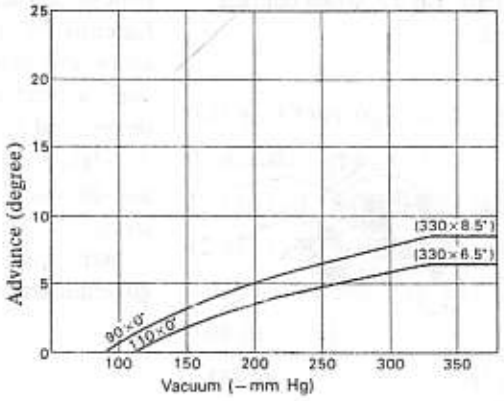


Fig. EE-76 Performance curve (Model D606-52)



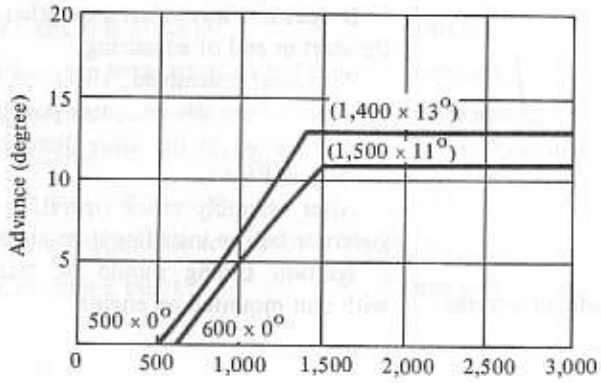
Centrifugal advance



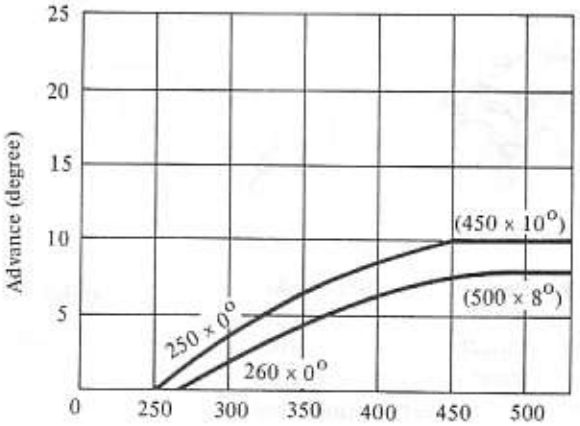
Vacuum advance

EE158

Fig. EE-77 Performance curve (Model D609-56)



Centrifugal advance



Vacuum advance

EE247

Fig. EE-78 Performance curve (Model D609-56A)

≪Vacuum advance mechanism mechanical parts≫

If vacuum advance mechanism fails to operate properly, check for the following items and correct the trouble 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 diaphragm with a new one.

3. Inspect breaker plate for smooth movement.

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 trouble is traced to centrifugal advance mechanical part, use distributor tester to check its characteristic.

When nothing is wrong with its characteristic, conceivable causes are defectiveness or abnormal wearing-out of driving part or other part.

Do not disassemble it. In case of improper characteristic, remove on-off switch part and check closely cam assembly, governor weight, shaft and governor spring, etc.

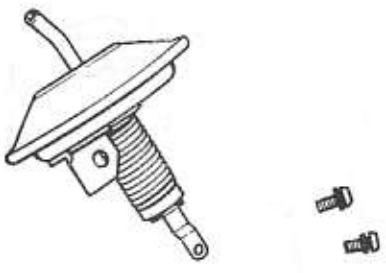
When centrifugal advance mechanical part is reassembled, be sure to check advance characteristic by distributor tester.

DISASSEMBLY AND ASSEMBLY

DISASSEMBLY

To disassemble, follow the procedure below.

1. Take off cap and disconnect rotor head.
2. Remove vacuum controller.

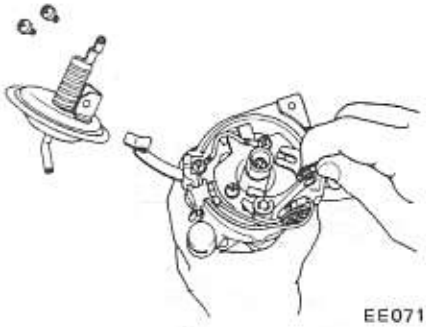


EE070

Fig. EE-79 Disassembling vacuum controller

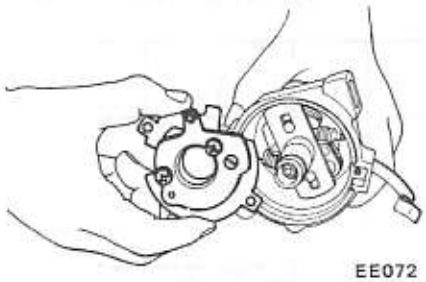
3. Remove contact breaker.

Refer to Page EE-32, when contact set is removed.



EE071

Fig. EE-80 Removing contact set

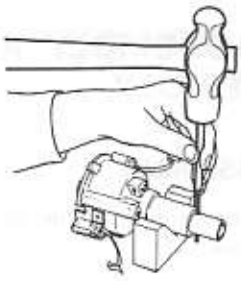


EE072

Fig. EE-81 Removing contact breaker

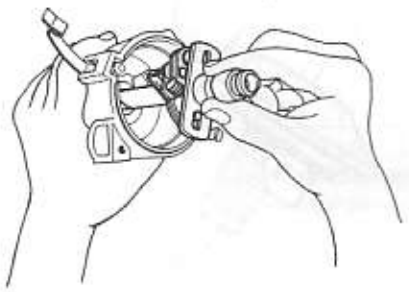
4. When contact breaker is disassembled, be careful not to lose steel balls between breaker spring and breaker plate.

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



EE073

Fig. EE-82 Removing knock pin



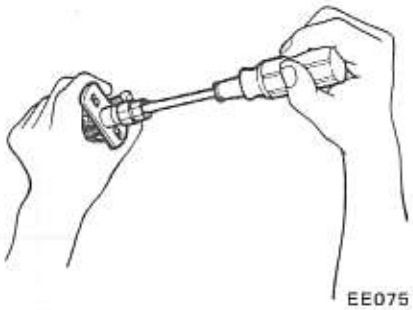
EE074

Fig. EE-83 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.

7. When governor weight and spring are disconnected, be careful not to stretch or deform governor spring.

After disassembling, apply grease to governor weights.



EE075

Fig. EE-84 Removing cam

ASSEMBLY

Assembly can be made in reverse sequence of disassembly. Refer to Figure EE-85 for replacement and reassembly of governor spring and cam.

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

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

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

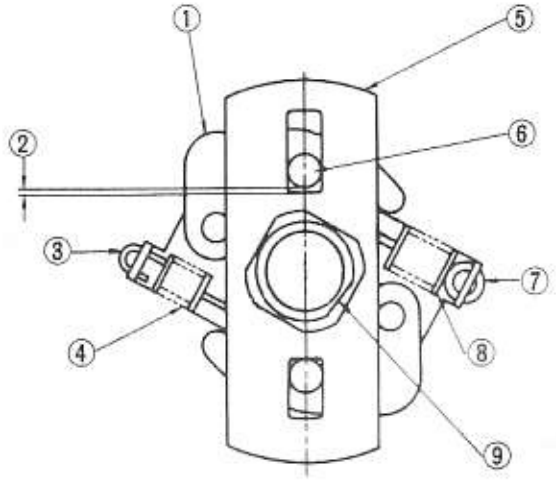
Meanwhile, weight pin on opposite side fits in short rectangular hole.

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

With unit assembled, check to be sure that driven slit and rotor position tip (9) are set in the same direction. See Figure EE-85.

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

Ignition timing should be tested with unit mounted on engine.



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-85 Setting governor spring and cam

SERVICE DATA AND SPECIFICATIONS

SERVICE DATA

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)	12.430 to 12.440 (0.4894 to 0.4898)
Housing inner diameter	mm (in)	12.450 to 12.468 (0.4902 to 0.4909)
Clearance between shaft and housing	mm (in)	0.010 to 0.038 (0.0004 to 0.0015)
Repair limit of clearance	mm (in)	0.08 (0.0031)
Shaft diameter (upper part)	mm (in)	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 (0.1969 to 0.1976)
Clearance between pivot and hole	mm (in)	0.01 to 0.046 (0.0004 to 0.0018)
Condenser capacity	μF	0.20 to 0.24
Condenser isolate resistance	MΩ	5
Cap isolate resistance	MΩ	50
Rotor head isolate resistance	MΩ	50
Cap carbon point	mm (in)	12 (0.472)

SPECIFICATIONS

Distributor model	D606-52	D609-56	D609-56A
Make	Hitachi	Hitachi	Hitachi
Applied engine	L24, L26(T)	L20A, L26	L26, L26(T)
Firing order	1-5-3-6-2-4	1-5-3-6-2-4	1-5-3-6-2-4
Rotating direction	Counterclockwise	Counterclockwise	Counterclockwise
Dwell angle (degree)	35° to 41°	35° to 41°	35° to 41°

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.

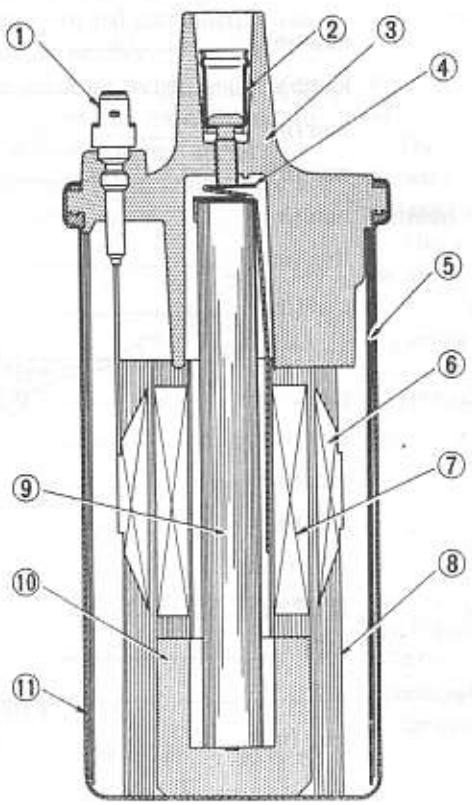
The ignition coil has a greater ratio between the primary and secondary windings to step up the battery voltage to high voltage to cause stronger sparks to jump the spark plug gap

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

EE143

Fig. EE-86 Sectional view of ignition coil

SPECIFICATIONS

Make and type		Hitachi, C6R-200 Hanshin, HP5-13E
Primary voltage	V	12
Spark gap	mm (in)	more than 7 (0.2756)
Primary resistance at 20°C (68°F)	Ω	1.5 to 1.7
Secondary resistance at 20°C (68°F)	KΩ	9.5 to 11.6
Resistor	Ω	1.6

SPARK PLUG

CONTENTS

DESCRIPTION EE-37
INSPECTION EE-37
CLEANING AND REGAPPING EE-37
SERVICE DATA AND SPECIFICATIONS EE-38
TROUBLE DIAGNOSES AND CORRECTIONS EE-38

DESCRIPTION

The spark plugs are of the resister type, having 14 mm (0.551 in) threads and 0.8 to 0.9 mm (0.031 to 0.035 in) gap. Inspection and cleaning should be made every 10,000 km (6,000 miles), and replacement should be carried out every 20,000 km (12,000 miles).

Note: All spark plugs installed on an engine, must be of the same brand and 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-87.

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

Caron fouled: Dry fluffy carbon deposits on the insulator and electrode are mostly caused by slow speed driving in city, weak ignition, too rich fuel mixture, dirty air cleaner, etc.
It is advisable to replace with plugs having hotter heat range.

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

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

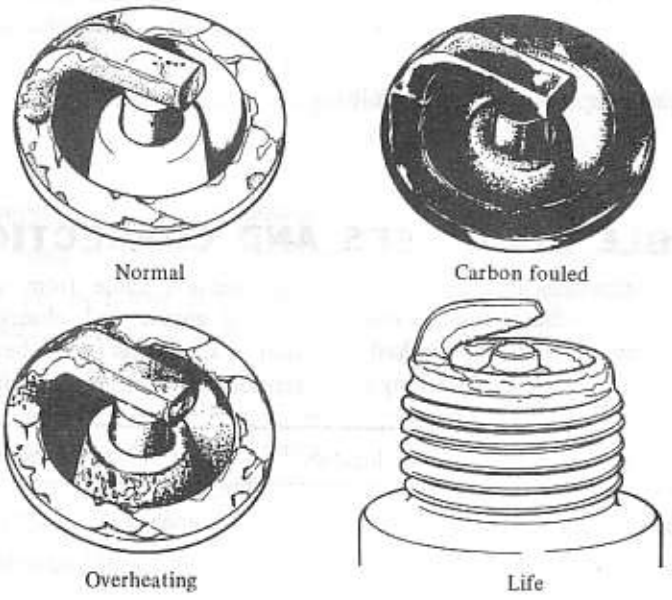


Fig. EE-87 Spark plug

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 15 ft-lb).
6. Connect spark plug wires.

CLEANING AND REGAPPING

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 0.8 to 0.9 mm (0.030 to 0.035 in) using a round wire feeler gauge. All spark plugs new or used should have the gap checked and reset by bending ground electrode.

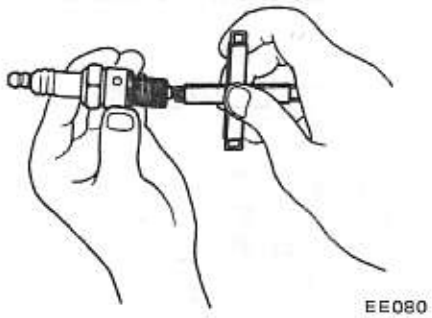


Fig. EE-88 Setting spark plug gap

SERVICE DATA AND SPECIFICATIONS

Model		BP-5ES	BP-6ES
Make		NGK	NGK
Applied engine		L20A	L24, L26
Size (screw dia. x reach)	mm (in)	14 x 19 (0.55 x 0.75)	14 x 19 (0.55 x 0.75)
Plug gap	mm (in)	0.8 to 0.9 (0.031 to 0.035)	0.8 to 0.9 (0.031 to 0.035)
Tightening torque	kg-m (ft-lb)	1.5 to 2.5 (11.0 to 15.0)	1.5 to 2.5 (11.0 to 15.0)

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	Trouble 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 with a new one.
	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.
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.
		Expiration of plug life.	Replace.

2. When engine turns over but does not run smoothly.

In this case, there are many causes resulting from the ignition system and other engine conditions not related to ignition. Therefore, first complete inspection of ignition system should be carried out.

Trouble	Trouble location	Probable cause	Corrective action
Engine misses.	Distributor	Dirty point.	Clean.
		Improper point gap.	Correct.
		Leak of electricity of cap and rotor head.	Repair or replace.
		Faulty insulation of condenser.	Replace.
		Faulty arm.	Oil shaft.
		Faulty spring of arm.	Replace assembly.
		Breakage of lead wire.	Replace.
		Worn out or shaky breaker plate.	Replace assembly.
		Worn out or shaky distributor shaft.	Replace assembly.
	Ignition coil	Layer short circuit or use of inferior quality.	Replace with good one.
	High tension code	Deterioration of insulation and leak of electricity.	Replace.
	Spark plugs	Dirty.	Clean.
		Leak of electricity at upper porcelain insulator.	Repair or replace.
Engine knocks very often.	Distributor	Improper and advance timing.	Correct the fitting.
		Coming off or breakage of governor spring.	Correct or replace.
		A pin or a hole of governor portion worn out.	Replace.
	Spark plugs	Burnt too much.	Replace.
Engine does not give enough power.	Distributor	Improper and retarded timing.	Correct the fitting.
		Faulty function of governor.	Replace assembly.
		Dirty point.	Clean.
		Point gap too narrow.	Correct.
	Spark plugs	Dirty.	Clean.