SERVICE MANUAL

MODEL

J13, J15 & J16 SERIES

ENGINES

SECTION ET

ENGINE TUNE-UP

ET

ENGINE TUNE-UP

CONTENTS

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 CLEARANCES

Valve clearance adjustment should be made while engine is stationary.

To adjust, proceed as follows:

1. 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.
2. Rotate crankshaft to bring No. 1 cylinder in top dead center on its compression stroke.
3. Remove valve rocker cover to gain access to valve operating mechanism.

Adjust valve clearance at the following four points while engine is still hot:

① Exhaust valve of No. 1 cylinder
② Intake valve of No. 1 cylinder
③ Intake valve of No. 2 cylinder
⑤ Exhaust valve of No. 3 cylinder

Note: Numbers in parenthesis agree with those in accompanying sketch.

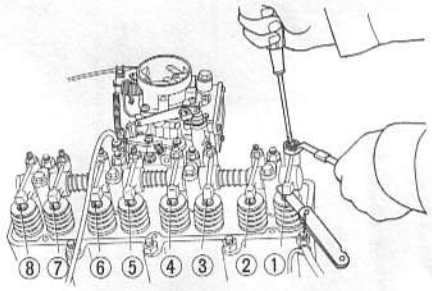

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Fig. ET-1 Adjusting valve clearance

4. Again, rotate crankshaft one turn so that No. 4 piston is in top dead center on its compression stroke. Adjust following valves:

④ Exhaust valve of No. 2 cylinder
⑥ Intake valve of No. 3 cylinder
⑦ Intake valve of No. 4 cylinder
⑧ Exhaust valve of No. 4 cylinder

Adjustment should be made while engine is hot. After all valves have been adjusted correctly, tighten lock nut firmly to secure the adjustment.

Valve clearance

Hot	Intake	0.35 mm (0.014 in)
	Exhaust	

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 of 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)

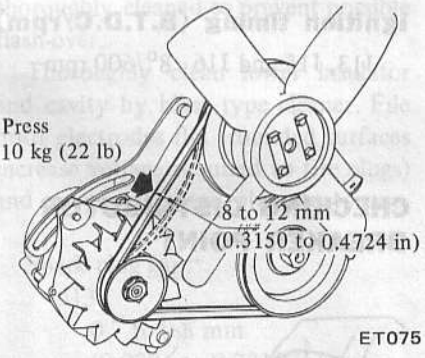


Fig. ET-2 Adjusting fan belt tension

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

Cylinder head nuts and valve rocker shaft bracket 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.

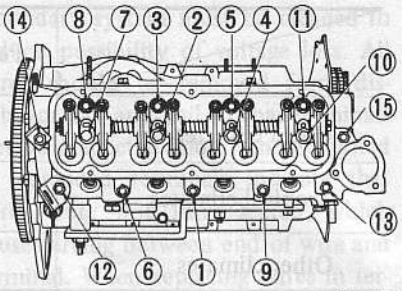


Fig. ET-3 Tightening sequence

Tightening torque
Cylinder head stud nut:
5.0 to 6.0 kg-m
(36 to 43 ft-lb)
Valve rocker shaft bracket bolts:
2.0 to 3.0 kg-m
(14 to 22 ft-lb)

When the engine is warm, tighten the bolts and nuts to a torque 0.5 kg-m (3.6 ft-lb) higher than the specifications.

Manifolds nuts:

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

Tightening torque:
Intake and exhaust manifold:
1.7 to 2.3 kg-m
(12 to 17 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 check is made for worn rings or for the cause of low speed, compression check should not be necessary.

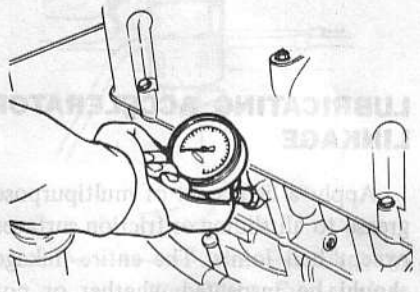


Fig. ET-4 Testing compression pressure

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

Standard	12.0 (171)/350
Minimum	10.0 (142)/350

LUBRICATING ACCELERATOR LINKAGE

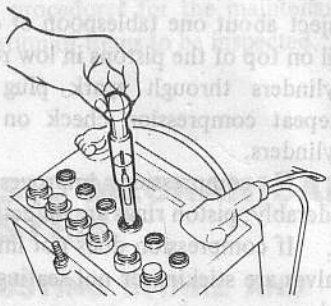
Apply a light coat of multipurpose grease to all sliding or friction surfaces except ball joints. The entire linkage should be inspected whether or not foot rest returns to normal height smoothly when releasing foot from it. This test should be made with engine running. Added care should be taken in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

IGNITION SYSTEM

CHECKING BATTERY

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.



ET078

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

	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.

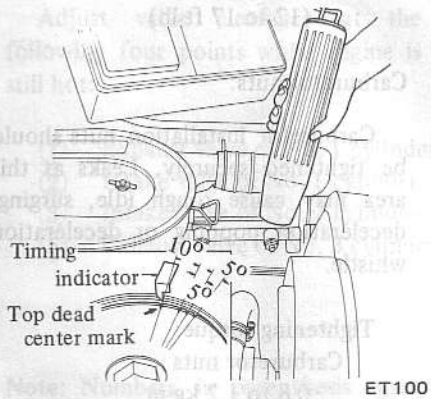
In addition to current leakage, prolonged accumulation of acid and dirt on the top of battery may cause corrosion of straps. After tightening terminals, coat them with petrolatum (vaseline) to protect them from corrosion.

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 extreme left as viewed from the inspector's side.



ET100

Fig. ET-6 Checking ignition timing

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

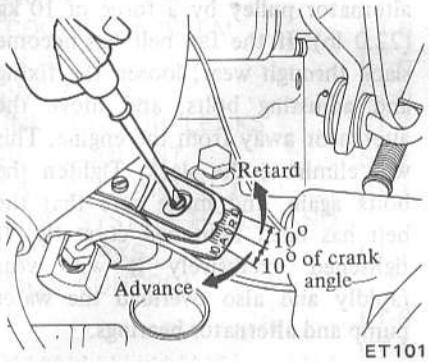


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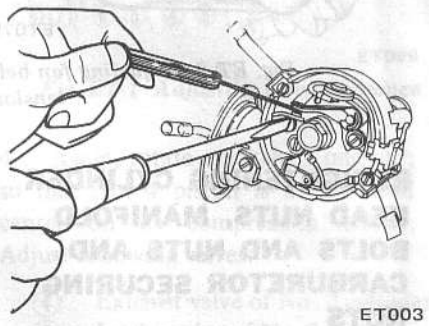
Fig. ET-7 Adjusting ignition timing

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

J13, J15 and J16 8°/600 rpm

CHECKING DISTRIBUTOR BREAKER POINT



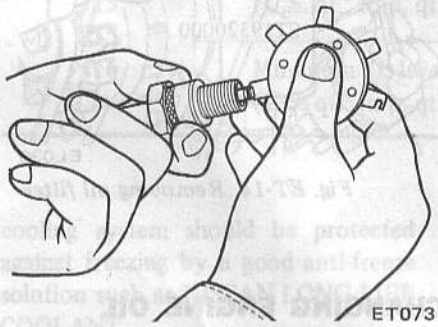
ET003

Fig. ET-8 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:
49° to 55°

CHECKING OR REPLACING SPARK PLUGS



ET073

Fig. ET-9 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:
J13
0.7 to 0.8 mm
(0.0276 to 0.0315 in)
J15, J16
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.

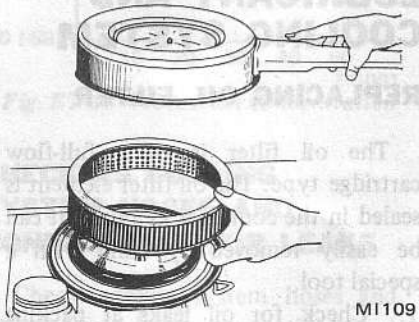


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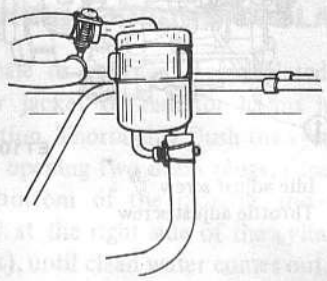
Fig. ET-10 Replacing air cleaner filter

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.

REPLACING FUEL FILTER

Check for a contaminated element, and water deposit.

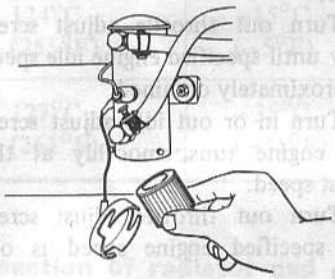


ET103

Fig. ET-11 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



ET104

Fig. ET-12 Replacing fuel pump filter

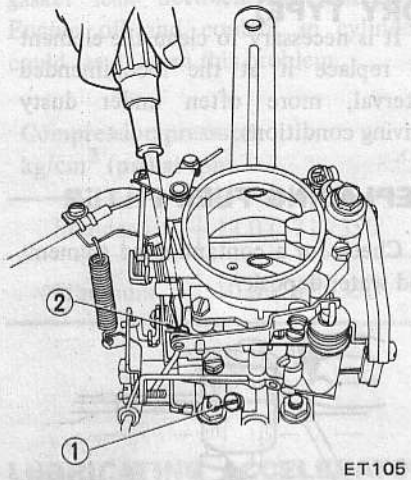
Check for a contaminated filter and water deposit. If filter is defective, replace it with a new one.

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

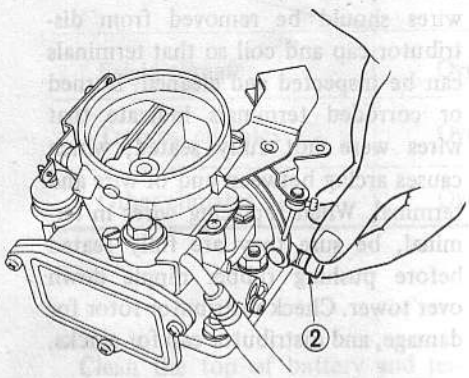
ADJUSTING CARBURETOR-IDLE RPM MIXTURE RATIO

Idle adjustment is made by throttle adjust screw and idle adjust screw after engine is warmed up. See Figure ET-13.

For bonnet type truck



For cabover type truck



1 Idle adjust screw
2 Throttle adjust screw

Fig. ET-13 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).
7. Then, throttle adjust screw must be adjusted so that engine speed is 20 rpm faster than specified.
8. Finally, turn in idle adjust screw until specified engine speed is attained.

Notes:

a. Items 7 and 8: Best method to eliminate carbon monoxide in exhaust emission.

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

	J13, J15 and J16
Engine idle speed	600
Engine manifold vacuum at idle speed mmHg (inHg)	480 or above

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. It can be easily removed by hand with a special tool.

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.

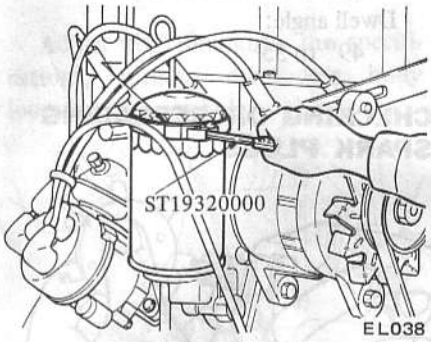


Fig. ET-14 Removing oil filter

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.

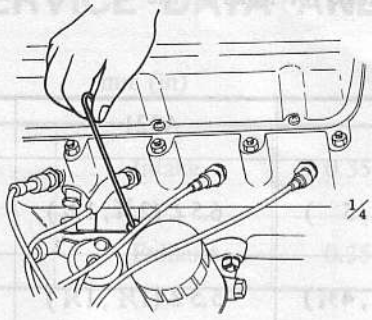


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Fig. ET-15 Checking engine oil level

Oil capacity of engine (including oil filter)

J13 J15 J16	8%	Maximum (H level) (U.S. qt., Imp. qt.)	4.4 ℓ (4 5/8, 3 7/8)
		Minimum (L level) (U.S. qt., Imp. qt.)	3.4 ℓ (3 5/8, 3)

CHECKING ENGINE OIL FOR LEAKS

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

Percent concentration	Boiling point: Sea level	Boiling point: 0.9 kg/cm^2 (13 psi) cooling system pressure	Freeze protection
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)

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.

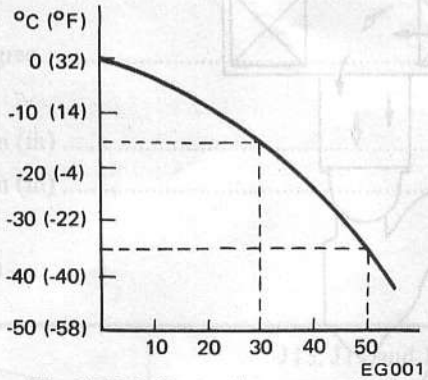

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Fig. ET-16 Protection concentration

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 by means of a cap tester to see if it is in good condition. Replace cap assembly if necessary.

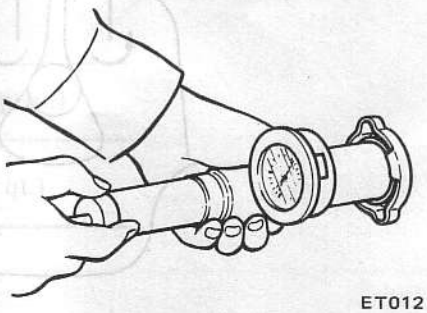

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Fig. ET-17 Testing radiator cap

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

	620	A321	T20
With heater (U.S. qt., Imp. qt.)	6.0 ℓ (6⅜, 5)	6.5 ℓ (2¾, 1¾)	8 ℓ (8½, 7)
Without heater (U.S. qt., Imp. qt.)	5.4 ℓ (5¾, 4¾)	5.5 ℓ (1½, 1¼)	7 ℓ (7⅜, 6⅛)

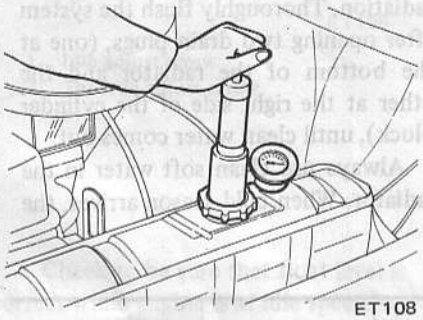


Fig. ET-18 Testing cooling system pressure

CRANKCASE EMISSION CONTROL SYSTEM

DESCRIPTION

This system is adopted in all T20 and A321 model series and others exported to only Australia.

The control system consists of a hose connected to the valve rocker cover from the carburetor air cleaner.

This is referred to as a "sealed system" which provides an escape path for the blow-by gas with no provision for the introduction of ventilation air into the crankcase.

Flow of blow-by gas is inducted into the hose by the negative pressure created when the engine sucks the fresh air through the air cleaner.

The oil filler cap and oil level gauge are of a sealed type to prevent blow-by gas in crankcase from escaping into the atmosphere.

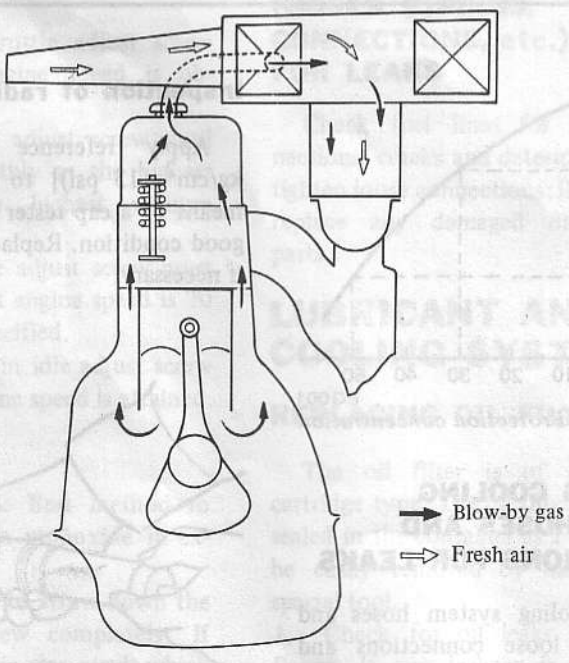


Fig. ET-19 Sealed type crankcase ventilation system

CHECKING VENTILATION HOSES (ALL T20 AND A321 MODEL SERIES AND OTHERS ONLY FOR AUSTRALIA)

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

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

SERVICE DATA AND SPECIFICATIONS

Valve clearance mm (in)

Hot	Intake	0.35	(0.0138)
	Exhaust	0.35	(0.0138)

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

Compression pressure

Standard kg/cm^2 (psi) at rpm ..... 12.0 (171)/350

Minimum kg/cm^2 (psi) at rpm ..... 10.0 (142)/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) ..... 8°/600

Distributor point gap mm (in) ..... 0.45 to 0.55 (0.0177 to 0.0217)

Dwell angle degree ..... 49 to 55

Spark plug gap

J13 mm (in) ..... 0.7 to 0.8 (0.028 to 0.031)

J15, J16 mm (in) ..... 0.8 to 0.9 (0.032 to 0.035)

Oil capacity of engine (including oil filter)

	J13, J15 and J16
Maximum (H level)	4.4 ℓ (4⅝ U.S. qt., 3⅞ Imp. qt.)
Minimum (L level)	3.4 ℓ (3⅝ U.S. qt., 3 Imp. qt.)

Cooling system

Testing pressure of radiator cap kg/cm^2 (psi) 0.9 (13)

Testing pressure of cooling system

kg/cm^2 (psi) 1.6 (2.3)

Water capacity

	620	A321	T20
With heater (U.S. qt., Imp. qt.)	6.0ℓ (6⅜, 5¼)	6.5ℓ (2¾, 1⅜)	8ℓ (8½, 7)
Without heater (U.S. qt., Imp. qt.)	5.4ℓ (5¾, 4¾)	5.5ℓ (1½, 1¼)	7ℓ (7⅜, 6⅛)

Tightening torque

Cylinder head stud nut	kg-m (ft-lb)	5.0 to 6.0 (36 to 43)
Rocker shaft bracket bolt	kg-m (ft-lb)	2.0 to 3.0 (14 to 22)
Manifold nuts		
Intake & exhaust	kg-m (ft-lb)	1.7 to 2.3 (12 to 17)
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.
	Defective battery.	Replace.
	Loose fan belt.	Adjust.
	Trouble in charge system.	Inspect.
	Wiring connection trouble in starting circuit.	Correct.
	Defective starter switch.	Repair or replace.
	Defective starter motor.	Repair or replace.

(Trouble-shooting procedure on starting circuit)
Switch on the starting motor with light "ON."
When light goes off or dims considerably.

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

When light stays bright.

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

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 for shorted primary circuit. 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.
	Defective condenser.	Replace.
	Leak at rotor cap and rotor.	Clean or replace.
	Defective spark plug.	Clean, adjust plug gap or replace.
	Improper ignition timing.	Adjust.
	Defective ignition coil.	Replace.
	Disconnection of high tension cable.	Replace.
	Loose connection or disconnection in primary circuit.	Repair or replace.
Fuel system trouble	Lack of fuel.	Supply.
	Dirty fuel strainer.	Replace.
	Dirty or clogged fuel pipe.	Clean.
	Fuel pump will not work properly.	Repair or replace.
	Carburetor choke will not work properly.	Check and adjust.
	Improper adjustment of float level.	Correct.
	Improper idling.	Adjust.
	Dirty or clogged carburetor.	Disassemble and clean.
	Clogged breather pipe of fuel tank.	Repair and clean.
Low compression	Incorrect spark plug tightening or 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.

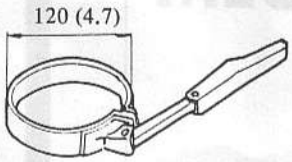
Condition	Probable cause	Corrective action
IMPROPER ENGINE IDLING		
Fuel system trouble	Clogged or damaged carburetor jets.	Clean or replace.
	Incorrect idle adjustment.	Adjust.
	Clogged air cleaner.	Replace element.
	Defective manifold gaskets or carburetor insulator.	Replace gasket or insulator.
	Improper float level adjustment.	Adjust.
Low compression		Previously mentioned.
Others	Incorrect valve clearance.	Adjust.
	Extremely low revolution.	Adjust.
ENGINE POWER NOT UP TO NORMAL		
Low compression		Previously mentioned.
Ignition system trouble	Incorrect ignition timing.	Adjust.
	Defective spark plugs.	Clean, adjust or replace plugs.
	Defective distributor points.	Dress, or replace points. Also check condenser.
Fuel system 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.
	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.
Overheating	Insufficient coolant.	Replenish.
	Loose fan belt.	Adjust fan belt.
	Worn or defective fan belt.	Replace.
	Defective thermostat.	Replace.
	Defective water pump.	Replace.
	Clogged or leaky radiator.	Flush, repair or replace.

Condition	Probable cause	Corrective action
	Defective radiator filler cap.	Replace.
	Air in cooling system.	Retighten each part of cooling system.
	Improper engine oil grade.	Replace with proper grade oil.
	Incorrect ignition timing.	Adjust.
	Defective carburetor (lean mixture).	Overhaul carburetor.
Overcooling	Defective thermostat.	Replace.
Others	Improper octane fuel.	Replace with specified octane fuel.
	Improper tire pressure.	Inflate to specified pressure.
	Dragging brake.	Adjust.
	Clutch slipping.	Adjust.
NOISY ENGINE		
Car knocking	Overloaded engine.	Use right gear in driving.
	Carbon knocking.	Disassemble cylinder head and remove carbon.
	Timing knocking.	Adjust ignition timing.
	Fuel knocking.	Use specified octane fuel.
	Preignition (misusing of spark plug).	Use specified spark plug.
Mechanical knocking		
Crankshaft bearing knocking.	This strong dull noise increases when engine is accelerated. To locate the place, cause a misfire on each cylinder. If the noise stops by the misfire, this cylinder generates the noise.	This is caused by worn or damaged bearings, or unevenly worn crankshaft. Renew bearings and adjust or change crankshaft. Check lubrication system.
Connecting rod bearing knocking.	This is a little higher-pitched noise than the crankshaft knocking, and also increases when engine is accelerated. Cause a misfire on each cylinder and if the noise 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, cause a misfire on each cylinder.	This may cause a wear on piston pin, or piston pin hole. Renew piston and piston pin assembly.
Water pump noise.	This noise may be caused by worn or damaged bearings, or by the uneven surface of sliding parts.	Replace water pump with a new one.

Condition	Probable cause	Corrective action
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.
	Defective carburetor jet.	Disassemble carburetor and check it.
	Improper function of the float.	Adjust the level, and check needle valve.
	Uneven idling. (Run on)	Adjust.
Defective cylinder head, etc.	Improperly adjusted valve clearance.	Adjust.
	Excess carbon in combustion chamber.	Remove head and get rid of carbon.
	Damaged valve spring (back fire, after fire).	Replace it with a new one.
EXCESSIVE OIL CONSUMPTION		
Oil leakage	Loose oil drain plug.	Tighten it.
	Loose or damaged oil pan gasket.	Renew gasket or tighten it.
	Loose or damaged chain cover gasket.	Renew gasket or tighten it.
	Defective oil seal in front and rear of crankshaft.	Renew oil seal.
	Loose or damaged locker cover gasket.	Renew gasket or tighten it (but not too much).
	Improper tightening of oil filter.	Renew gasket and tighten it with the proper torque.
	Loose or damaged oil pressure switch.	Renew oil pressure switch or tighten it.
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.

Condition	Probable cause	Corrective action
	Worn piston ring groove and ring.	Renew piston and piston ring.
	Fatigue of valve oil seal lip.	Replace seal lip with a new one.
	Worn valve stem.	Renew valve or guide.
Others	Inadequate quality of engine oil.	Use the designated oil.
	Engine overheat.	Previously mentioned.
POOR FUEL ECONOMY		
See the explanation of the power decrease		
Others	Exceeding idling revolution.	Adjust it to the designated rpm.
	Defective acceleration recovery.	Adjust it.
	Fuel leakage.	Repair or tighten the connection of fuel pipes.
TROUBLE IN OTHER FUNCTIONS		
Decreased oil pressure	Inadequate oil quality.	Use the designated oil.
	Overheat.	Previously mentioned.
	Defective function of oil pump regulator valve.	Disassemble oil pump and repair or renew it.
	Functional deterioration of oil pump.	Repair or replace it with a new one.
	Blocked oil filter.	Renew it.
	Increased clearance in various sliding parts.	Disassemble and replace the worn parts with new ones.
	Blocked oil strainer.	Clean it.
	Troubles in oil gauge pressure switch.	Replace it with a new one.
Excessive wear on the sliding parts	Oil pressure decreases.	Previously mentioned.
	Defective quality or contamination of oil.	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.

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 ET-14