

SERVICE MANUAL

MODEL
A10 & A12
ENGINE

SECTION ET

ENGINE TUNE-UP

ET

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ENGINE TUNE-UP

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DESCRIPTION

To keep the engine in top running condition, proper maintenance (tune-up) is necessary. Moreover, it is important that the engine be tuned up in accordance with the maintenance schedule included in the applicable Owner's Manual.

The results of proper engine maintenance are, among others, maximum fuel economy and minimal exhaust emissions.

This section describes proper maintenance procedures.

BASIC MECHANICAL SYSTEM

RETIGHTENING CYLINDER HEAD BOLTS, MANIFOLD NUTS AND CARBURETOR SECURING NUTS

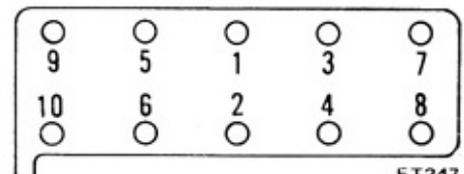
Refer to the following tightening torque specifications.

- Tightening torque:
- Cylinder head bolts
 - A10 engine
 - 6.0 to 6.5 kg-m (43 to 47 ft-lb)
 - A12 engine
 - 7.0 to 7.5 kg-m (51 to 54 ft-lb)

Notes:

- a. When engine is cold, tightening should be accomplished in two or three steps, in the sequence shown in Figure ET-1, starting from center and working out toward ends.
- b. Retighten cylinder head bolts after engine has been warmed up.

- Manifold nuts:
0.9 to 1.4 kg-m (6.5 to 10 ft-lb)
- Carburetor nuts:
0.5 to 0.7 kg-m (3.6 to 5.1 ft-lb)



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Fig. ET-1 Cylinder head bolt tightening sequence

CHECKING ENGINE COMPRESSION

Compression pressure test

1. Warm up engine sufficiently.
2. Disconnect all spark plugs.
3. Disconnect anti-dieseling solenoid valve connector, if equipped.
4. Properly attach a compression tester to spark plug hole in cylinder being tested.

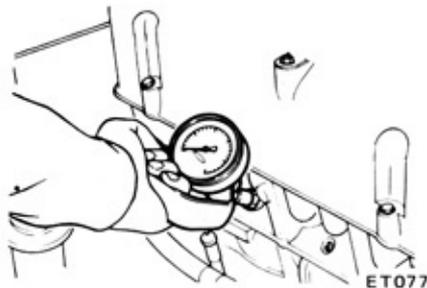


Fig. ET-2 Testing compression pressure

5. Depress accelerator pedal to open throttle and choke valves.

Note: Do not "pump" pedal.

6. Start engine as quickly as possible.
7. Ensure that engine compression pressure is within the following range.
8. Different compression in two or more cylinders usually indicates that valve is improperly seated or piston ring is broken.
9. Low compression in cylinders can result from worn piston rings. This condition may usually be accompanied by excessive fuel consumption.

Compression pressure

Unit: kg/cm² (psi) at rpm

Engine model	Standard	Minimum
A10	12.7/350 (181/350)	10.0/350 (142/350)
A12		

Test result

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

1. If adding oil increases compression pressure, it means that rings are faulty.
2. If pressure stays low, probable cause is that valve is sticking or seating improperly.
3. If cylinder compression in any two adjacent cylinders is low, and if adding oil does not help compression, there is leakage from gasket surface.

Oil and water in combustion chambers can result from leakage.

ADJUSTING INTAKE AND EXHAUST VALVE CLEARANCE

Valve clearance adjustment cannot be made while engine is in operation.

To adjust, proceed as follows:

1. Start engine and run it until it reaches 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.

Adjust valve clearance at 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 circle agree with those in accompanying sketch.

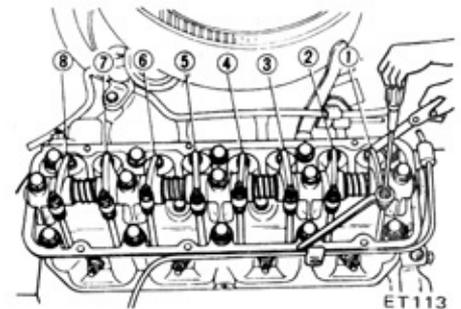


Fig. ET-3 Adjusting valve clearance

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

Cold:

- Intake 0.25 mm (0.0098 in)
- Exhaust 0.25 mm (0.0098 in)

Hot:

- Intake 0.35 mm (0.0138 in)
- Exhaust 0.35 mm (0.0138 in)

CHECKING AND ADJUSTING FAN BELT

1. Check for cracks or damage. Replace if necessary.
2. Adjust fan belt tension. It is correct if deflection is as indicated in the chart when thumb pressure of 10 kg (22 lb) is applied midway between fan pulley and alternator pulley.

Fan belt tension

Unit : mm (in)

Car model Engine model	F10		B210	B120
	A10	A12	A12	A12
When alternator is on distributor side.	-	12 to 16 (0.47 to 0.63)		-
When alternator is on manifold side.	8 to 12 (0.31 to 0.47)		-	8 to 12 (0.31 to 0.47)

at 10kg (22 lb)

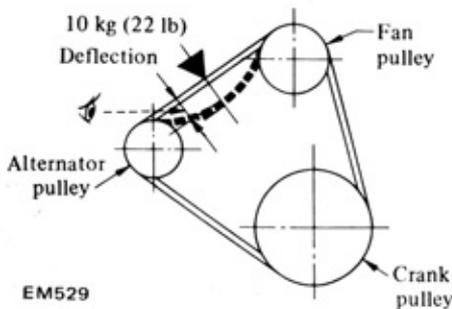


Fig. ET-4 Adjusting fan belt tension

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.

Checking carburetor return spring

Check throttle return spring for cracks, squareness or deformation; if necessary, replace.

IGNITION SYSTEM

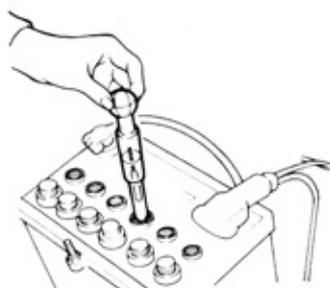
CHECKING BATTERY

Check electrolyte level in each battery cell. Refer to "Battery" in Section EE.

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

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

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



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

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

CHECKING OR REPLACING SPARK PLUGS

Spark plug gap:

A10 engine:
0.7 to 0.8 mm
(0.0276 to 0.0315 in)

A12 engine:
0.8 to 0.9 mm
(0.0315 to 0.0354 in)

Tightening torque:

2.0 to 3.0 kg-m
(14 to 22 ft-lb)

Note: If porcelain or electrodes of spark plugs appear abnormal, refer to "Spark Plug" in Section EE.

CHECKING DISTRIBUTOR WORKING PARTS AND IGNITION WIRING

Distributor breaker points

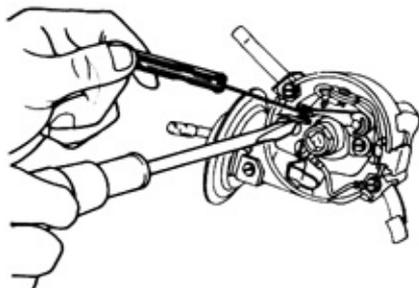
Make sure they are properly aligned and that point dwell and gap are correct.

Distributor point gap:

0.45 to 0.55 mm
(0.177 to 0.217 in)

Distributor dwell angle:

49 to 55 degrees



ET003

Fig. ET-6 Measuring point gap

Ignition wiring

Use an ohmmeter to check resistance of secondary cables. Disconnect cables from spark plugs.

Remove distributor cap and secondary cables as an assembly. Do not remove cables from cap.

Check resistance of one cable at a time. Connect ohmmeter between spark plug side and corresponding electrode inside cap. If resistance is more than 30,000 ohms, remove cable from cap and check cable resistance only. If resistance is still more than 30,000 ohms, replace cable assembly.



EF 125

Fig. ET-7 Checking high tension cable

CHECKING DISTRIBUTOR CAP, ROTOR AND CONDENSER

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

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

Condenser

1. Clean outlet of condenser lead wire, and check for loose setscrew. Retighten if necessary.
2. Check condenser with a condenser tester. Refer to "Distributor" in Section EE.

Ignition timing

(°/rpm)

Car model / Engine model		F10	B210	B120
		A10	8°/700	—
A12	M/T	7°/700	7°/600	7°/600
	A/T		7°/700 in "N" position	—

M/T: Manual transmission
A/T: Automatic transmission

GREASING DISTRIBUTOR SHAFT AND CAM HEEL

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

Note: Do not apply grease excessively.

CHECKING AND ADJUSTING IGNITION TIMING

1. Check spark plugs and distributor breaker points for condition.
2. Thoroughly remove dirt and dust from timing mark on crank pulley and timing indicator on front cover.
3. Warm up engine sufficiently.
4. Install a timing light on No. 1 cylinder spark plug wire, and install a tachometer.
5. Set idling speed to the following specifications.
6. With a timing light check that ignition timing is 8° (A10 engine) or 7° (A12 engine) B.T.D.C. (Before Top of Dead Center).

If necessary, adjust it as follows:

- (1) Loosen setscrew until distributor can be moved by hand. See Figure ET-9.
- (2) Adjust ignition timing to the following specifications.
- (3) Lock distributor setscrew, and make sure that timing is correct.



Fig. ET-8 Checking ignition timing

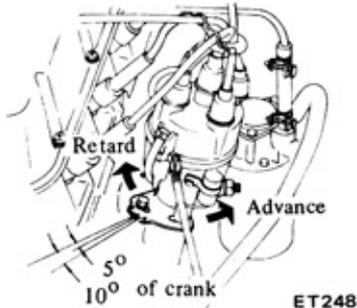


Fig. ET-9 Adjusting ignition timing

FUEL SYSTEM

REPLACING AIR CLEANER FILTER (VISCIOUS TYPE)

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 cleaner element looks dirty, do not attempt to clean. Cleaning performance is constantly maintained although it looks contaminated. Care must be taken not to damage cleaner element.

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

CLEANING OR REPLACING AIR CLEANER FILTER (DRY TYPE)

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

REPLACING FUEL FILTER

Check for a contaminated element, and water deposit.

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

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

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

ADJUSTING CARBURETOR-IDLE RPM AND MIXTURE RATIO

Idle adjustment is made by throttle adjust screw and idle adjust screw after engine is warmed up. See Figure ET-10.

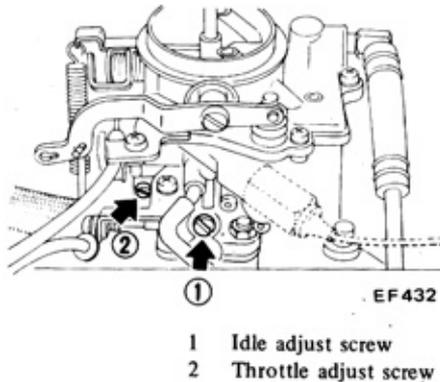


Fig. ET-10 Throttle adjust screw and idle adjust screw

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 about 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 the idle adjust screw down completely. Doing so could cause damage to tip, which in turn will tend to cause malfunctions.

Engine idling

Unit: rpm

Engine model		F10	B210	B120
A10		700	—	—
A12	M/T	700	600	600
	A/T	—	700 in "N" position	—
Engine manifold vacuum at idle speed mmHg (inHg)		480 (18.9) or above		

LUBRICANT AND COOLING SYSTEM

REPLACING OIL FILTER

The oil filter is a cartridge type and can be removed using Oil Filter Wrench ST19300001.

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

Notes:

- a. Do not overtighten oil filter, or oil leak may occur.
- b. When assembling, lightly oil seal ring.

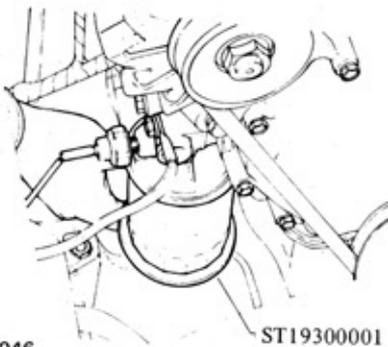


Fig. ET-11 Removing oil filter

CHECKING ENGINE OIL

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

Notes:

- a. A milky oil indicates presence of cooling water. Isolate cause and take corrective measure.
- b. An oil with extremely low viscosity indicates dilution with gasoline.
- c. Make sure that car is on a level surface while engine is being drained, filled and checked.

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

Engine oil capacity (including oil filter)

Unit : ℓ (U.S. qt., Imper. qt.)

Engine model		Car model		
		F10	B210	B120
A10 or A12	Maximum (H level)	3.2 (3 ⅜, 2 ¾)		
	Minimum (L level)	2.2 (2 ¼, 1 ⅜)		

CHECKING ENGINE OIL FOR LEAKS

Check cylinder head, front chain cover, oil pan, rocker cover, oil filter gasket, etc. for sign of leaks past their gasketed surfaces. If necessary, replace gaskets or faulty parts. After maintenance has been done, check 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 bottom of radiator and one at left side of cylinder block), until clean water comes out.

Always use clean soft water in radiator. When cold season arrives, cooling system should be protected from freezing with a good anti-freeze solution such as Nissan Long Life Coolant (L.L.C.).

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

CHANGING ENGINE COOLANT (L.L.C.)

Whenever L.L.C. is changed, cooling system should be flushed and refilled. Check level. See instructions attached to anti-freeze container for the proper ratio of anti-freeze and water. When L.L.C. is used, refer to Section EG.

Note: The anti-freeze must not be mixed with other products.

CHECKING COOLING SYSTEM HOSES AND CONNECTIONS

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

Inspection of radiator cap

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

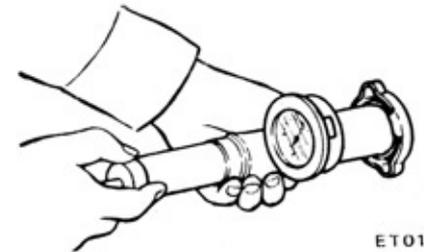


Fig. ET-12 Testing radiator cap

Cooling system pressure test

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

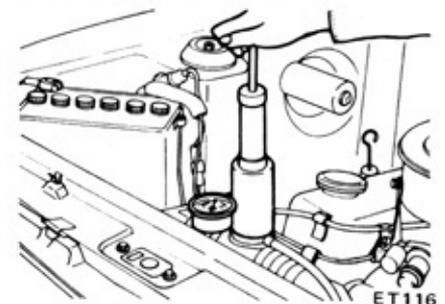


Fig. ET-13 Testing cooling system pressure

Engine Tune-up

Water capacity

Unit : ℓ (U.S. qt., Imper. qt.)

Car model	F10		B210		B120	
	Standard	Option	Standard	Option	Standard	Option
Without heater	4.8 (5 1/8, 4 1/4)	5.2 (5 1/2, 4 3/8)	4.4 (4 3/8, 3 3/8)	4.8 (5 1/8, 4 1/4)	4.3 (4 1/2, 3 3/4)	4.8 (5 1/8, 4 1/4)
With heater	5.4 (5 3/4, 4 3/4)	5.8 (6 1/8, 5 1/8)	5.1 (5 3/8, 4 1/2)	5.5 (5 7/8, 4 3/8)	4.9 (5 3/16, 4 5/16)	5.4 (5 3/4, 4 3/4)

CRANKCASE EMISSION CONTROL SYSTEM

REPLACING P.C.V. VALVE

Checking P.C.V. valve in accordance with following method.

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

CHECKING VENTILATION HOSE

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air.

If any hose cannot be free of obstructions, replace.

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

EVAPORATIVE EMISSION CONTROL SYSTEM

CHECKING FUEL TANK, VAPOR-LIQUID SEPARATOR AND VAPOR VENT LINE

1. Check all hoses and fuel tank filler cap.
2. Disconnect vapor vent line connecting flow guide valve to vapor-liquid separator.

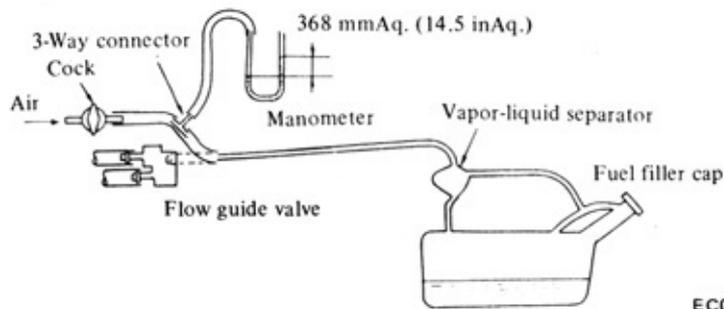


Fig. ET-14 Checking evaporative emission control system (for B210)

3. Connect a 3-way connector, a manometer and a cock (or an equivalent 3-way charge cock) to end of vent line.
4. Supply fresh air into vapor vent line through cock little by little until pressure becomes 368 mmAq. (14.5 inAq.).
5. Shut cock completely and leave it unattended.
6. After 2.5 minutes, measure height of liquid in the manometer.
7. Variation of height should remain with 25 mmAq. (1.10 inAq.).
8. When filler cap does not close completely, height should drop to zero in a short time.
9. If height does not drop to zero in a short time when filler cap is removed, it is cause of a stuffy hose.

Note: In case vent line is stuffy, breathing in fuel tank is not thoroughly made, thus causing insufficient delivery of fuel to engine

or vapor lock. It must, therefore, be repaired or replaced.

CHECKING FLOW GUIDE VALVE

1. Disconnect all hoses connected to the flow guide valve.
2. When low pressure air is forced into flow guide valve from ends of vent line on fuel tank side, air should go through valve and flow to crankcase side. If air does not flow, valve should be replaced.

When air is blown from crankcase side, however, it should never flow to other two vent lines.

3. When air is forced into flow guide valve from carburetor air cleaner side, it flows to fuel tank side and/or crankcase side.

4. This valve opens when inner pressure reaches 10 mmHg (0.4 inHg). If it should start to malfunction or break, replace it.

CHECKING FUEL TANK VACUUM RELIEF VALVE OPERATION

Remove fuel filler cap and see it functions properly.

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

CHECKING VENT CLEANER OPERATION

Check 1-way valve and element located at outside air inlet.

1. Orally blow through port T. Flow should not be directed to port A, but to port E.
2. With port E (or T) plugged, attempt to suck back through port T (or E). Flow accompanied with a slight resistance should be directed from port A.

Port A: outside air inlet port

Port E: port to engine

Port T: port from fuel tank

SERVICE DATA AND SPECIFICATIONS

Tightening torque

Cylinder head bolts

A10 engine	kg-m (ft-lb)	6.0 to 6.5 (43 to 47)
A12 engine	kg-m (ft-lb)	7.0 to 7.5 (51 to 54)

Manifold nuts	kg-m (ft-lb)	0.9 to 1.4 (6.5 to 10)
Carburetor nuts	kg-m (ft-lb)	0.5 to 0.7 (3.6 to 5.1)
Spark plugs	kg-m (ft-lb)	2.0 to 3.0 (14 to 22)

Compression pressure at rpm

kg/cm² (psi)

Engine model	Standard	Minimum
A10	12.7/350 (181/350)	10.0/350 (142/350)
A12	12.7/350 (181/350)	10.0/350 (142/350)

Valve clearance

Cold	Intake	mm (in)	0.25 (0.0098)
	Exhaust	mm (in)	0.25 (0.0098)
Hot	Intake	mm (in)	0.35 (0.0138)
	Exhaust	mm (in)	0.35 (0.0138)

Fan belt tension

When alternator is on distributor side	mm (in)	12 to 16 (0.47 to 0.63)
When alternator is on manifold side	mm (in)	8 to 12 (0.31 to 0.47)
When thumb pressure	kg (lb)	10 (22) is applied

Battery specific gravity

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

Engine Tune-up

Spark plug gap

A10 engine	mm (in)	0.7 to 0.8 (0.0276 to 0.0315)
A12 engine	mm (in)	0.8 to 0.9 (0.0315 to 0.0354)

Distributor

Point gap	mm (in)	0.45 to 0.55 (0.0177 to 0.0217)
Dwell angle	degree	49 to 55

Ignition and idling adjustment (B.T.D.C./rpm)

Car model		F10	B210	B120
Engine model				
A10		8°/700	—	—
A12	Manual transmission	7°/700	7°/600	7°/600
	Automatic transmission	—	7°/700 in "N" position	—

Manifold vacuum at idle speed mmHg (inHg) 480 (18.9)

Engine oil capacity (including oil filter)

Maximum (H level)	liters (U.S. qt, Imp. qt)	3.2 (3 3/8, 2 3/8)
Minimum (L level)	liters (U.S. qt, Imp. qt)	2.2 (2 3/8, 1 3/8)

Cooling system

Radiator cap pressure test	kg/cm ² (psi)	0.9 (13)
Cooling system pressure test	kg/cm ² (psi)	1.6 (23)

Cooling water capacity liters (U.S. qt, Imp. qt)

Car model	F10		B210		B120	
	Standard	Option	Standard	Option	Standard	Option
Without heater	4.8 (5 1/8, 4 1/4)	5.2 (5 1/2, 4 5/8)	4.4 (4 3/8, 3 3/8)	4.8 (5 1/8, 4 1/4)	4.3 (4 1/2, 3 3/4)	4.8 (5 1/8, 4 1/4)
With heater	5.4 (5 3/4, 4 3/4)	5.8 (6 1/8, 5 1/8)	5.1 (5 3/8, 4 1/2)	5.5 (5 3/8, 4 3/8)	4.9 (5 3/16, 4 5/16)	5.4 (5 3/4, 4 3/4)

TROUBLE DIAGNOSES AND CORRECTIONS

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

(Trouble-shooting procedure on starting circuit)

Switch on the starting motor with light "ON".

When light goes off or dims considerably,

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

When light stays bright,

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

ENGINE WILL CRANK NORMALLY BUT WILL NOT START

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

Ignition system in trouble

Fuel system in trouble

Valve mechanism does not work properly

Low compression

(Trouble-shooting procedure)

Check spark plug firstly by following procedure.

Disconnect high tension cable from one spark plug and hold it about 10 mm (0.39 in) from the engine metal part and crank the engine.

Good spark occurs.

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

No spark occurs.

Check the current flow in primary circuit.

Very high current.

Inspect primary circuit for short.

Check breaker point operation.

Engine Tune-up

Condition	Probable cause	Corrective action
Ignition system out of order	Low or no current.	Check for loose terminal or disconnection in primary circuit. Check for burned points.
	Burned distributor point.	Repair or replace.
	Improper point gap.	Adjust.
	Faulty condenser.	Replace.
	Leak at rotor cap and rotor.	Clean or replace.
	Faulty spark plug.	Clean, adjust plug gap or replace.
	Improper ignition timing.	Adjust.
	Faulty ignition coil.	Replace.
Fuel system out of order	Disconnection of high tension cable.	Replace.
	Loose connection or disconnection in primary circuit.	Repair or replace.
	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.
Low compression	Clogged breather pipe of fuel tank.	Repair and clean.
	Malfunctioning anti-dieseling solenoid valve. (A12 engine)	Check for loose terminal or wire harness.
	Incorrect spark plug tightening or faulty gasket.	Tighten to normal torque or replace gasket.
	Improper grade engine oil or low viscosity.	Replace with proper grade oil.
	Incorrect valve clearance.	Adjust.
	Compression leak from valve seat.	Remove cylinder head and lap valves.
	Sticky valve stem.	Correct or replace valve and valve guide.
	Weak or damaged valve springs.	Replace valve springs.
	Compression leak at cylinder head gasket.	Replace gasket.
	Sticking or damaged piston ring.	Replace piston rings.
Worn piston ring or cylinder.	Overhaul engine.	
(Trouble shooting procedure)		
Pour the engine oil from plug hole, and then measure cylinder compression.		
Compression increases.		Malfunctioning cylinder or piston ring.
Compression does not change.		Compression leaks from valve, cylinder head or head gasket.

Engine Tune-up

Condition	Probable cause	Corrective action
IMPROPER ENGINE IDLING		
Fuel system out of order	Clogged or damaged carburetor jets. Incorrect idle adjustment. Clogged air cleaner filter. Damaged manifold gaskets or carburetor insulator. Improper float level adjustment. Malfunctioning carburetor choke.	Clean or replace. Adjust. Replace element. Replace gasket or insulator. Adjust. Check and adjust.
Low compression		Previously mentioned.
Others	Incorrect valve clearance. Extremely low revolution. Malfunction in P.C.V. valve. Faulty malfunction of the ignition system (spark plug, high tension cable, breaker point, ignition coil, etc.). Incorrect basic ignition timing. Malfunction of choke valve or linkage. Incorrect idle adjustment. Clogged air cleaner filter. Loose manifold and cylinder head bolts.	Adjust. Adjust. Replace P.C.V. valve. Replace. Adjust. Adjust. Adjust idle speed. Replace air cleaner filter. Retighten bolts.
High engine idle speed	Dragged accelerator linkage. Incorrect idle adjustment.	Check and correct accelerator linkage. Adjust idle speed.
ENGINE POWER NOT UP TO NORMAL		
Low compression		Previously mentioned.
Ignition system out of order	Incorrect ignition timing. Damaged spark plugs. Worn distributor points.	Adjust. Clean, adjust or replace plugs. Dress, or replace points. Also check condenser.
Fuel system out of order	Malfunction of choke system. Clogged fuel pipe or floating valve. Dirty or clogged fuel strainer. Fuel pump will not work properly. Clogged carburetor jets. Throttle valve does not open fully.	Adjust. Clean. Replace. Repair or replace. Disassemble and clean. Readjust.

Engine Tune-up

Condition	Probable cause	Corrective action
Air intake system out of order	<p>Clogged air cleaner.</p> <p>Air inhaling from manifold gasket or carburetor gasket.</p>	<p>Replace element.</p> <p>Replace gasket.</p>
Overheating	<p>Insufficient coolant.</p> <p>Loose fan belt.</p> <p>Worn or oiled fan belt.</p> <p>Inoperative thermostat.</p> <p>Worn water pump.</p> <p>Clogged or leaky radiator.</p> <p>Worn radiator filler cap.</p> <p>Air in cooling system.</p> <p>Improper engine oil grade.</p> <p>Incorrect ignition timing.</p> <p>Clogged carburetor (lean mixture).</p>	<p>Replenish.</p> <p>Adjust fan belt.</p> <p>Replace.</p> <p>Replace.</p> <p>Replace.</p> <p>Flush, repair or replace.</p> <p>Replace.</p> <p>Retighten each part of cooling system.</p> <p>Replace with proper grade oil.</p> <p>Adjust.</p> <p>Overhaul carburetor.</p>
Overcooling	<p>Inoperative thermostat.</p>	<p>Replace.</p>
Others	<p>Improper octane fuel.</p> <p>Improper tire pressure.</p> <p>Dragging brake.</p> <p>Clutch slipping.</p>	<p>Replace with specified octane fuel.</p> <p>Adjust to specified pressure.</p> <p>Adjust.</p> <p>Adjust.</p>
NOISY ENGINE Car knocking	<p>Overloaded engine.</p> <p>Carbon knocking.</p> <p>Timing knocking.</p> <p>Fuel knocking.</p> <p>Preignition (misusing of spark plug).</p>	<p>Use right gear in driving.</p> <p>Disassemble cylinder head and remove carbon.</p> <p>Adjust ignition timing.</p> <p>Use specified octane fuel.</p> <p>Use specified spark plug.</p>
Mechanical knocking Crankshaft bearing knocking.	<p>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.</p>	<p>This is caused by worn or damaged bearings, or unevenly worn crankshaft. Renew bearings and adjust or change crankshaft. Check lubrication system.</p>
Connecting rod bearing knocking.	<p>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 connecting rod bearing generates the noise.</p>	<p>Same as the case of crankshaft bearings.</p>

Engine Tune-up

Condition	Probable cause	Corrective action
Piston and cylinder noise.	When you hear an overlapping metallic 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 output 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.
Others.	An improper adjustment of valve clearance. Noise of timing chain. An excessive end-play on crankshaft. Note: This noise will be heard when clutch is disengaged. Wear on clutch pilot bushing. Note: This noise will be heard when clutch is disengaged.	Adjust. Adjust the tension of chain. Disassemble engine and renew main bearing. Renew bushing and adjust drive shaft.
ABNORMAL COMBUSTION (backfire, afterfire, run-on, etc.)		
Improper ignition timing	Improper ignition timing. Improper heat range of spark plugs.	Adjust ignition timing. Use specified spark plugs.
Fuel system out of order	Damaged carburetor or manifold gasket (backfire, afterfire). Clogged carburetor jet. Improper function of the float. Uneven idling. (Run on) Malfunction of anti-dieseling solenoid valve. Malfunction of auto-choke.	Replace them with new parts. Disassemble carburetor and check it. Adjust the level, and check needle valve. Adjust. Check or replace. Adjust.
Faulty cylinder head, etc.	Improperly adjusted valve clearance. Excess carbon in combustion chamber. Damaged valve spring (backfire, afterfire).	Adjust. Remove head and get rid of carbon. Replace it with a new one.
EXCESSIVE OIL CONSUMPTION		
Oil leakage	Loose oil drain plug. Loose or damaged oil pan gasket.	Tighten it. Renew gasket or tighten it.

Engine Tune-up

Condition	Probable cause	Corrective action
Excessive oil consumption	Loose or damaged chain cover gasket. Worn oil seal in front and rear of crankshaft. Loose or damaged locker cover gasket. Improper tightening of oil filter. Loose or damaged oil pressure switch. Cylinder and piston wear. Improper location of piston ring gap or reversely assembled piston ring. Damaged piston rings.	Renew gasket or tighten it. Renew oil seal. Renew gasket or tighten it (but not too much). Renew gasket and tighten it with the proper torque. Renew oil pressure switch or tighten it.
Others	Worn piston ring groove and ring. Fatigue of valve oil seal lip. Worn valve stem. Inadequate quality of engine oil. Engine overheat.	Overhaul cylinder and renew piston. Remount piston rings. Renew rings. Repair or renew piston and cylinder. Renew piston and piston ring. Replace seal lip with a new one. Renew valve or guide. Use the designated oil. Previously mentioned.
POOR FUEL ECONOMY See the explanation of the power decrease Others	Exceeding idling revolution. Inoperative acceleration recovery. Fuel leakage.	Adjust it to the designated rpm. Adjust it. Repair or tighten the connection of fuel pipes.
PROBLEM IN OTHER FUNCTIONS Decreased oil pressure	Inadequate oil quality. Overheat. Worn oil pump regulator valve. Functional deterioration of oil pump. Blocked oil filter. Increased clearance in various sliding parts. Blocked oil strainer. Inoperative oil gauge pressure switch.	Use the designated oil. Previously mentioned. Disassemble oil pump and repair or renew it. Repair or replace it with a new one. Renew it. Disassemble and replace the worn parts with new ones. Clean it. Replace it with a new one.
Excessive wear on the sliding parts	Oil pressure decreases. Improper quality or contamination of oil. Damaged air cleaner. Overheat or overcool.	Previously mentioned. Exchange the oil with proper one and change element. Change element. Previously mentioned.

Engine Tune-up

Condition	Probable cause	Corrective action
Scuffing of sliding parts	Improper fuel mixture.	Check the fuel system.
	Decrease of 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	For use on	Reference page or Figure No.
1.	ST19300001 Oil filter wrench	<p>This tool is used to take oil filter out of place. In tightening filter, do not use this tool, to prevent excess tightening.</p> <div style="text-align: center;">  <p style="margin-top: 10px;">SE339</p> </div>	All A-series engines	Fig. ET-11