

ALFA ROMEO ENGINE MODIFICATION

Alfa Romeo 1750 (1969-71)
Alfa Romeo 2000 (1972-73)

DESCRIPTION

Alfa Romeo uses mechanical fuel injection and engine modifications to obtain low exhaust emission levels. Ignition timing and accurate control of fuel injection are key factors in Alfa Romeo's control of exhaust emissions. With proper fuel distribution and combustion control, engines do not need auxiliary exhaust emission devices. Fuel injection system consists of injection pump, control unit, injector nozzles, idle air adjuster and equalizer, electric fuel pump, fuel lines, and connecting levers. Four air intake ducts, all the same length, and four air throttle valves on a common shaft are used to equalize air/fuel ratios between each combustion chamber.

OPERATION

Fuel is injected into each intake duct near intake valves by means of four pumping elements. Fuel delivery rate from pumping elements is regulated by a control unit on injection pump. A cam in control unit provides correct quantity of fuel delivered according to throttle opening and engine speed. Normal fuel delivery is varied by compensating devices, giving proper correction for changes in engine temperature, atmospheric pressure, cold starting, initial running, and fuel cut off during deceleration. With the aid of fuel injection compensating devices, and modified ignition distributor, exhaust emissions are maintained below maximum permissible levels. See *Alfa Romeo Spica Fuel Injection in CARBURETION Section*.

ADJUSTMENT

IGNITION TIMING

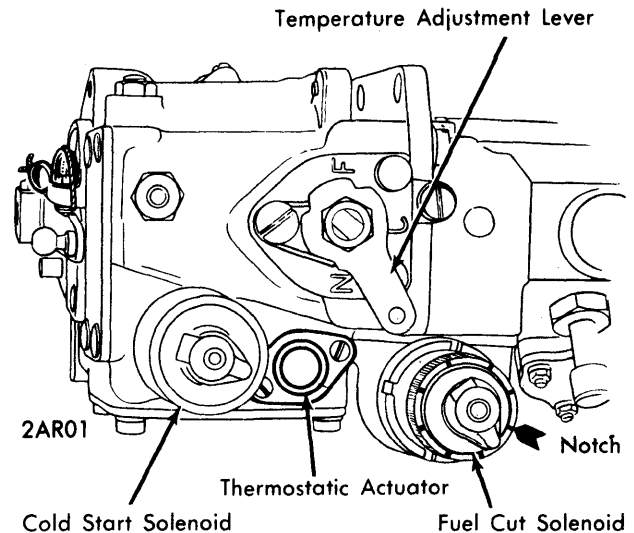
Set ignition timing after cam angle is set to 57-63°. With engine at normal operating temperature, connect a timing light and tachometer to engine. **CAUTION** — To avoid possible damage to alternator, do not use battery in car being tested to power timing light, use a separate car battery. Timing at idle should be retarded the specified number of degrees which corresponds to the "F" mark on engine pulley. Maximum ignition advance should be set to specifications and corresponds to the "M" mark on engine pulley (at 5000 RPM). Adjust timing by rotating distributor housing.

Application	Degrees @ Idle	Maximum Advance
1750 (1969-70).....	1-3° ATDC	31-37°
1750 (1971).....	2° ATDC	31-37°
2000 (1972-73).....	5-7° ATDC	27-33°

IDLE SPEED & MIXTURE

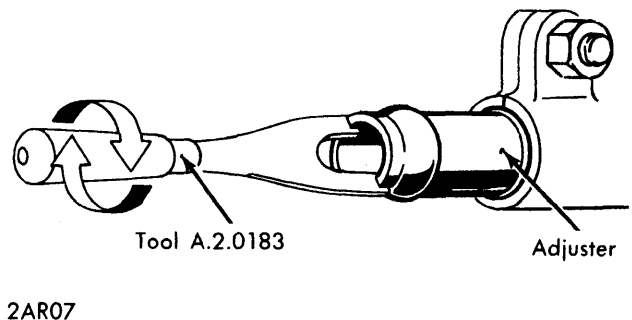
To insure proper control of exhaust emissions and proper driveability, it is necessary to adjust idle and operating mixture correctly. To obtain proper CO percentage at idle, operating mixture must be set properly. Operating mixture can only be set by road test or on engine dyno. To make necessary adjustment proceed as follows:

Idle — 1) With engine at normal operating temperature (170°F), remove air cleaner-to-equalizer block, and loosen tube and adjuster lock screw. Connect an accurate tachometer.



FUEL INJECTION PUMP CONTROL UNIT

- Using a suitable tool (A.2.0183), set idle speed on 1969-72 models to 650 RPM by turning adjuster. On 1973 models, set idle to highest RPM without engine running rough, but no less than 600 RPM. Screw adjuster in to reduce speed, out to increase speed. Tighten lock screw and replace tube.
- With engine at normal operating temperature, road test car. Drive vehicle at a high RPM in low gears to burn deposits off spark plugs, then drive at constant speeds of 20-35 MPH in third gear. Next, accelerate very slowly from 30-35 MPH.
- If a hesitation is felt, air/fuel mixture is too lean. In this case, fuel cut off solenoid must be backed out to obtain correct air/fuel mixture. If acceleration is sluggish, mileage is poor, spark plugs foul easily, or other over rich conditions exist, the air/fuel mixture must be leaned. Screw solenoid in until a lean mixture is obtained, then back out until lean hesitation no longer exists.



ADJUSTING IDLE SPEED

- Mixture** — 1) On top of fuel cut off solenoid are eight notches. Mark one of them with respect to a fixed point on control unit housing (for reference).
- Disconnect solenoid feed wire. Loosen ring nut at bottom of solenoid, using a suitable tool (A.5.0177). **NOTE** — Do not rotate solenoid.

Exhaust Emission Systems

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3) Move solenoid one notch (1/8 turn) in or out, depending on whether mixture is lean or rich.

4) Retighten ring nut and connect feed wire. Check reference to be sure that solenoid had been moved one notch. Install air cleaner, idle air tubes, crankcase breather tubes, air inlet and road test (as described above).

CO Adjustment - 1) Attach a tachometer and a suitable exhaust gas analyzer to engine. On 1969-72 models, with engine speed at 650 RPM, CO reading must be between .8 and 2.2%. On 1973 models, with engine idle speed adjusted to 600-700 RPM, CO level should be .8-2.0%.

2) If CO level is not within specifications, remove air cleaner-to-equalizer block hose and loosen adjuster lock screw. Screw equalizer adjustment screw in to decrease RPM and increase CO level, and screw adjustment screw out to increase RPM and decrease CO level. Tighten lock screw and replace hose.

TEMPERATURE SETTING

To maintain a constant air/fuel ratio at changing ambient air temperatures, a temperature compensator is installed on fuel injection pump. Set lever (see illustration) to correct position as follows:

Temperature	Setting
Above 59°F	"N" (Normal)
32-59°F	"C" (Cold)
Below 32°F	"F" (Freezing)

MAINTENANCE

In order to maintain exhaust emissions below the maximum permissible level, perform the following every 12,000 miles or once a year whichever comes first:

THROTTLE VALVE THROATS

Throttle valve throats should be cleaned with a bottle brush and gasoline. Clean areas of throttle valve contact in throat and edges of valves.

MAIN FUEL FILTER

The main fuel filter element should be replaced every 12,000 miles. Extreme care should be used to avoid dirt entering fuel system during filter change. With air cleaner removed, disconnect battery ground and then clean outside of filter housing. Remove bolt securing filter to bracket and remove filter element. Clean inside of filter housing and install a new filter, and gasket. Reinstall bolt and check filter for leaks.

FUEL TANK FILTER

Fuel tank filter should be replaced every 12,000 miles. It is located under rear of car between gas tank and electric fuel pump. Remove clamp bolt securing filter and remove hose clamps. Plug the fuel line from gas tank to prevent fuel leaking from tank during filter replacement.

TUNE-UP

Service ignition system and set ignition timing to specifications. Adjust idle speed and mixture.

VALVE TIMING CHAIN TENSION

1750 Models - Remove camshaft cover and loosen chain tensioner setscrew. Check that tensioner spring is working properly. Place car in gear and push forward to allow tensioner to tighten chain; then lock tensioner setscrew.

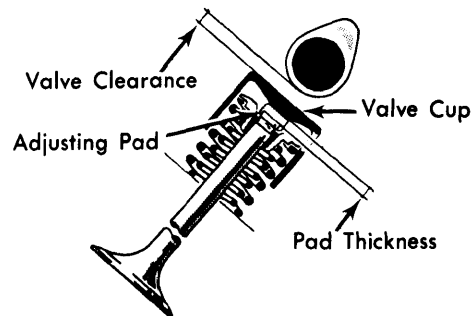
2000 Models - Remove the camshaft cover. With engine at idle, loosen chain tensioner setscrew and allow tensioner to tighten the chain. Then tighten setscrew and turn engine off. Reinstall camshaft cover. **CAUTION** - Do not race or speed engine during this procedure.

VALVE CLEARANCE

With engine cold, measure valve clearance between heel of cam and valve cups. If clearance is not as specified, remove camshafts and valve cups. Measure thickness of adjusting pad on each valve stem and replace pads with another of proper thickness to obtain correct valve gap clearance. Replacement pads are available in thicknesses ranging from .05-.138" (1.3-3.5 mm), in increments of .001" (0.025 mm).

Application	Intake Valve	Exhaust Valve
All Models.....	.0187-.0197"	.0206-.0216"

2AR02



VALVE CLEARANCE ADJUSTMENT (TYPICAL)