INSTRUCTION AND MAINTENANCE MANUAL

FOR ALFA ROMEO 2000

FUEL INJECTION MODELS

U.S.A. VERSION

IMPORTANT NOTE

The fuel injection system for the 2000 model has been designed not only to attain high performance and low fuel consumption but also to keep the exhaust emissions below the levels allowed by U.S.A. regulations.

The low exhaust emission levels have been obtained by improving the distribution and combustion. No devices to burn the unburned gases downstream of the exhaust valves are required.

Simple and efficient systems for controlling crankcase and evaporative emissions are fitted.

Of course, even with the mentioned systems fitted to the Alfa 2000 the emissions will not continue to meet Federal and State regulations unless the owner himself provides to have the prescribed servicing, carried out by authorized Alfa Romeo Dealers and provided that, when remedying troubles or performing any maintenance works on the engine or fuel feed system, the factory prescribed procedures are strictly followed.

Alfa Romeo warrants to the ultimate purchaser and each subsequent purchaser that the vehicle is designed, built, and equipped so as to conform at the time of sale with all U.S. emission standards applicable at the time of manufacture and that is free from defects in materials and workmanship which would cause it not to meet these standards within the period of 5 years of 50,000 miles, whichever occurs first. Failures, other than those resulting from defects in material or workmanship, which arise solely as a result of owner abuse and/or lack of proper maintenance are not covered by the warranty.

Federal Law prohibits manufactures and dealers from knowingly removing or rendering an emission control system inoperative or ineffective after sale and delivery to an ultimate purchaser.

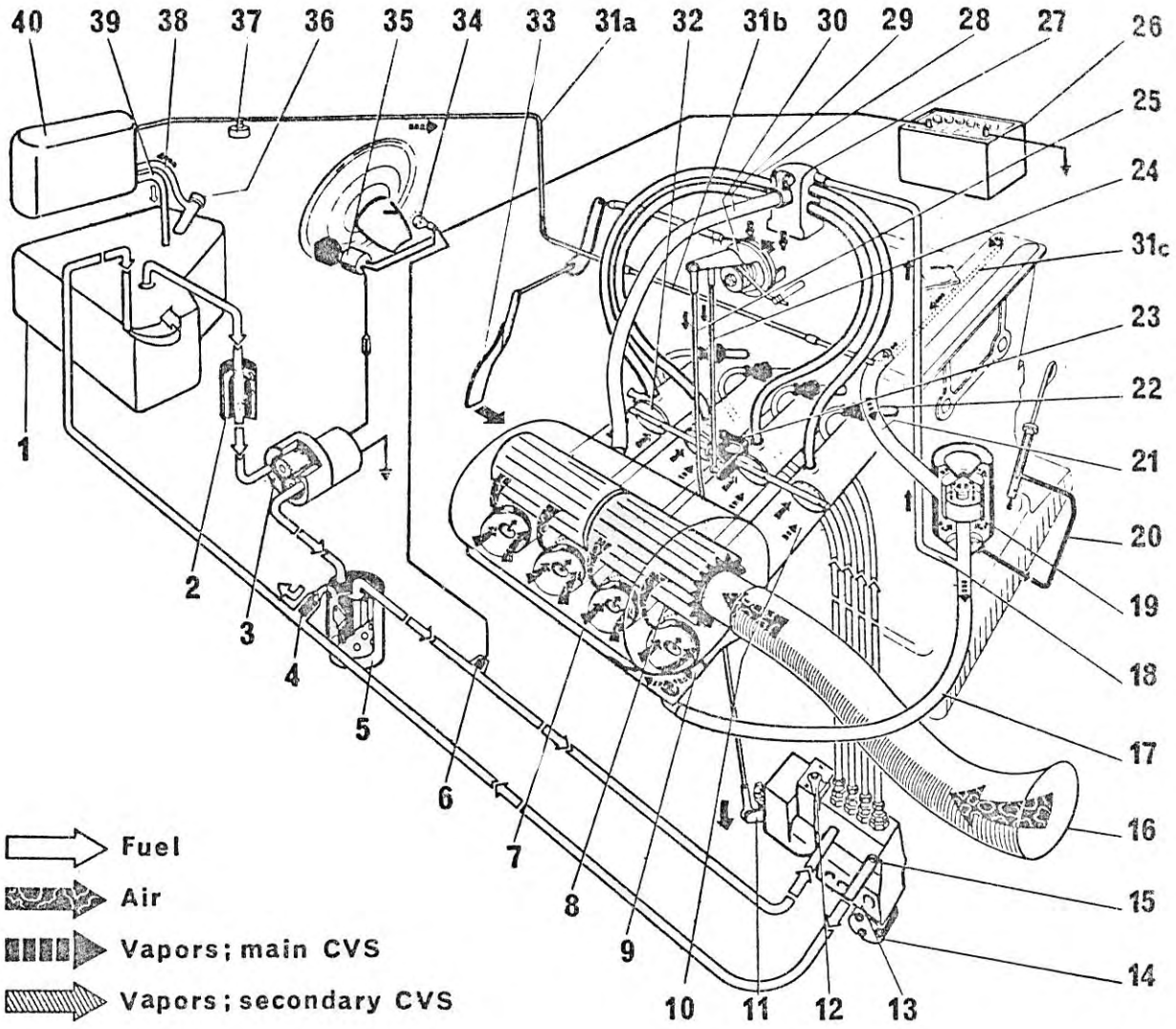

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Fig. 1 - GENERAL ARRANGEMENT OF FUEL INJECTION SYSTEM

1	Fuel tank	22	Injector
2	Tank filter	23	Throttle lever
3	Electric pump	24	Relay crank – to – throttle rod
4	Pressure relief valve	25	Relay crank – to – control unit rod
5	Main filter	26	Battery
6	Pressure switch	27	Idle air adjuster and equalizer
7	Filter housing	28	Idle air hoses
8	Filter element	29	Idle air supply pipe
9	Manifold gallery	30	Relay crank
10	Intake duct	31a	Fuel tank vent pipe
11	Control unit lever	31b	Fuel tank vent pipe
12	Average seasonal temperature compensator, hand operated	31c	Fuel tank vent pipe
13	Injection pump	32	Throttles
14	Injection pump oil filter	33	Accelerator pedal
15	Calibrated orifice	34	Low fuel pressure warning light
16	Air hose	35	Ignition switch
17	Main crankcase ventilating system hose	36	Sealed filler cap
18	Secondary crankcase ventilating system hose	37	Air inlet valve
19	Oil separator	38	Fuel tank – expansion connection
20	Oil separator draining hose	39	Liquid return hose
21	Suction hose for crankcase ventilating systems	40	Expansion tank (vapor – liquid separator)

A - FUEL INJECTION SYSTEM

A1 GENERAL

Fuel is supplied to the engine by injection into the intake port of each cylinder by means of four pumping elements (one per cylinder) whose delivery is controlled by a control unit. A cam in the control unit provides a "base" delivery according to the opening of throttles and to rpm range; the "base" delivery is varied by compensating devices giving proper corrections for atmospheric pressure, engine temperature, cold starting, initial running and fuel cut off on deceleration.

A2 FUEL FEED SYSTEM (see fig. 1)

Inserting the key in the ignition switch (35) and rotating clockwise to the first click will operate the electric pump (3). The gasoline flows from the fuel tank (1) thru tank filter (2) and main filter (5) and feeds the injection pump (13).

The excess fuel, acting also as a coolant for the injection pump (13), before returning to the tank, passes thru a calibrated orifice (15) which regulates the fuel pressure within the injection pump. A pressure switch (6) inserted in the delivery pipe will switch on the warning light (34) on instrument panel if a pressure drop occurs in fuel lines; the pressure should never by lower than 7.1 psi –(0.5kg/cm²)

A3 AIR INDUCTION SYSTEM (see fig. 1)

The air induction system consists of the housing (7) incorporating two filtering elements (8), directly connected to the intake ducts (10) which deliver air to the throttles (32); an air hose (16) connects the housing (7) to a ram intake port at the front of the car (an automatic device provides for the draining of water possibly entered thru the air intake port).

The accelerator pedal (33) is mechanically linked thru a relay crank (30) to both the throttle lever (23) and the control unit lever (11). Therefore, any position of accelerator pedal corresponds to an exact position of throttle and control unit levers.

A4 INJECTION PUMP (see fig. 1)

The injection pump (13), (SPICA AIBB. 4C.S.75), has four variable displacement plungers controlled by the control unit thru a rack. The plungers are actuated by conn.rods driven by a crankshaft revolving at half engine speed. The pump is lubricated with the engine oil drawn from the main gallery just after the main filter.

The lubricating oil, filtered further by a filter (14) in the injection pump mount, seeps past the plungers, lubricates the various moving parts then returns to the pan thru a suitable port in the pump mount itself.

A5 COLD START DEVICE

The cold start device incorporates a solenoid which, energized when the engine is started, enriches the mixture by increasing the injection pump delivery thru an additional movement of control unit rack

The cold start device cuts off gradually, according to engine temperature, when the ignition key is released from cranking position.

A6 INITIAL RUNNING DEVICE (see fig. 1)

This device provides for a smooth operation of the engine soon after a cold start; it consists of a thermostat which, sensing engine coolant temperatures, acts thru a linkage on the control unit rack so as to increase the injection pump delivery in accord with the decrease in temperature and at the same time, thru rods (24) and (25) outside the control unit, opens the throttles so that the engine can be properly fed.

This device cuts off automatically and progressively as the engine warms up to operating temperature thus restoring the standard idling conditions.

A7 CRANKCASE VENTILATING SYSTEM (see fig. 1)

The exhaust gases and the oil vapors developed during engine operation and gas vapors from the fuel tank are sucked thru the camshaft cover in the combustion chambers and burned.

The crankcase ventilating system controls gases both at high engine rpms and at idling speed when the throttles are closed.

The gases and vapors flow from camshaft cover to the oil separator (19) thru the hose (21), then enter either the main or secondary crankcase ventilating system according to the opening of throttles (32):

When throttles are fully opened, the vapors are delivered from the oil separator (19), thru the main system hose (17), to the manifold gallery (9), communicating directly with the four intake ducts (10) and, from here, to the throttle throats; when the throttles are instead closed or partially opened, the oil vapors are delivered from the oil separator (19) via the secondary system hose (18), to the equalizer (27), where they are suitably mixed with fresh air and thence, thru four hoses (28) they are delivered to the intake ducts downstream of the throttles.

The oil collected in the oil separator (19) returns to the pan via the hose (20).

A8 FUEL VAPOR RECOVERY SYSTEM AND TANK VENTILATION (see fig. 1)

Gas vapors, emanating from fuel tank (1) both during engine operation and hot soak period after engine shutdown, are collected in the expansion tank (40) which acts also as a vapor liquid separator returning the condensate to the fuel tank via the pipe (39) located at the bottom of the expansion tank.

The pipe (38) serves to make a proper connection between the fuel tank (1), when fully replenished, and the expansion tank (40).

To prevent gas vapors from escaping in the open air, a sealed filler cap (36) is provided.

Gas vapors coming to the expansion tank (40) flow out of the separator from the top and, passing thru the pipes (31a) and (31b), enter the cylinder head, then, via the pipe (31c) which extends into the cylinder head, get into the crankcase: during the hot soak period, the crankcase is used as a storage volume while during engine operation the crankcase is purged of vapors by the action of the ventilation system as outlined on page 4 at the beginning of paragraph.

In the event that, after engine shut down, the pressure in the vapor separator tends to diminish as a consequence of drop in temperature, gas vapors will flow back thru pipes (31a - b - c) thus keeping the fuel tank (1) and expansion tank (40) at atmospheric pressure.

A valve (37) on the pipe (31a) allows to keep a constant supply of fuel to the engine even if an obstruction should occur in the pipe (31a - b - c) itself.

B - RECOMMENDATIONS ON THE USE

B1 STARTING THE ENGINE

Under normal conditions:
Insert the key in the ignition switch and turn it clockwise to the first click; wait a few seconds to make sure the low fuel pressure warning light goes off.

WARNING: if the warning light does not flash on or stays on, this is an indication of failure of the indicating device or fuel feed system; therefore have them checked as soon as possible.

Turn the ignition key further clockwise to operate the starter.

As soon as the engine fires release the key.

NOTE: automatic devices act as a standard chock usually does, namely, facilitate the initial running of engine after a cold start until the proper operating temperature is reached.

As an aid in starting from cold, proceed as per 1) above taking care to depress slightly the accelerator pedal as soon as cranking motor starts operating (at the second "click"). After a cold start and particularly when the ambient temperature is below freezing point, wait a fairly long time before getting away so as to warm up properly all engine parts and allow the oil to reach all points requiring lubrication.

Top performance must never be demanded of the car until coolant temperature is about 158°F (70°C).

When the engine is already hot or with very high ambient temperatures (above 77°F - 25°C) proceed as per 1) above taking care to depress slightly the accelerator pedal as soon as cranking motor starts operating (at the second "click").

CAUTION: owing to the special construction of the injection pump the pump plungers must on no account be operated directly with a lever or any other tool.

B2 TEMPERATURE SETTING

To keep a constant fuel/air ratio even when the ambient temperature varies as the seasons change, the temperature compensator lever on the control unit shall be shifted to:

"N" (normal) for ambient temperatures exceeding 59°F (15°C).

"C" (cold) for temperatures between 59°F (15°C) and 32°F (0°C).

"F" (freezing) for temperatures below 32°F (0°C).

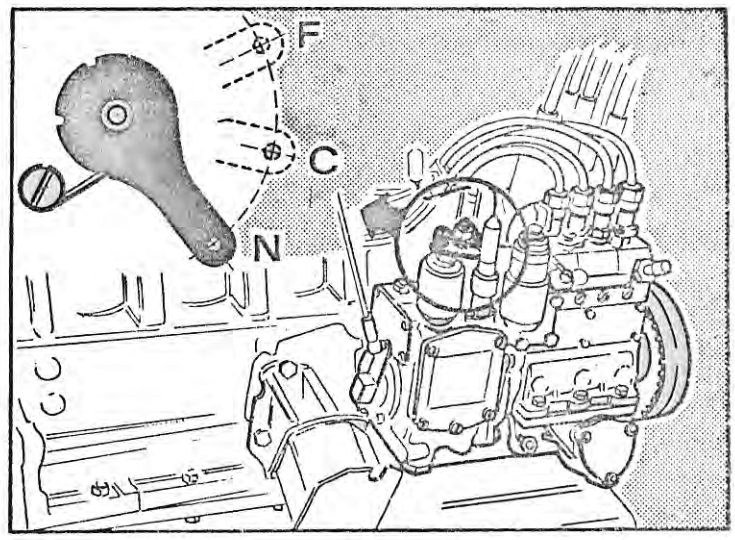


Fig. 2 - TEMPERATURE SETTING LEVER

B3 DECELERATION

On deceleration, the injection pump delivery is automatically cut off by means of an electromagnetic device fed thru a microswitch which, being actuated by a particular profile suitably shaped in the control unit cam, closes when the accelerator pedal is released; this not only eliminates the unburned gases in a condition which is critical for the emission levels, but also favorably affects the fuel consumption.

As the engine speed reaches about 1,300 rpm, the fuel delivery restores to prevent stopping the engine. Of course, the fuel delivery restores even if the engine is re-accelerated before it slows down to 1,300 rpm.

C - REGULAR SERVICING

C1 SCHEDULE OF REGULAR SERVICING REQUIRED TO KEEP THE EXHAUST EMISSION LEVEL WITHIN LIMITS PRESCRIBED BY U.S. REGULATIONS

In order to maintain the fuel injection system in good operating conditions and the exhaust emissions below the limits specified by Federal regulations, the servicing operations listed in the Owner's Manual and in the Service Coupon Book must be performed at the prescribed period.

On the following pages, each operation specifically related to the injection system will be set out in details particularly those requiring the special tools and facilities the authorized workshops are equipped with.

Index of Servicing Operations

C2 REPLACING THE AIR FILTER ELEMENTS (see Fig. 1)

To provide room for subsequent operations, the air filter elements shall be removed as a whole: to do so, remove the pipe 931b); detach the two upper anchoring straps at manifold side; loosen at the engine side the four clamps on the intake hoses; free the crankcase ventilation hose (17) from the oil separator; disconnect the idle hose (29) from the idling air equalizer (27); remove the hose (16) connecting the air filter housing to the ram intake port.

Then the cover of the filter housing can be removed and the elements replaced after having cleaned the inside of air filter housing.

Do not reinstall the air filter on engine at this point.

C3 REPLACING THE MAIN FUEL FILTER ELEMENT (see Fig. 3)

This operation, to be performed after the previous one has already been accomplished, should be carried out as follows:

Disconnect the battery negative terminal, disconnect the starter positive cable if necessary.

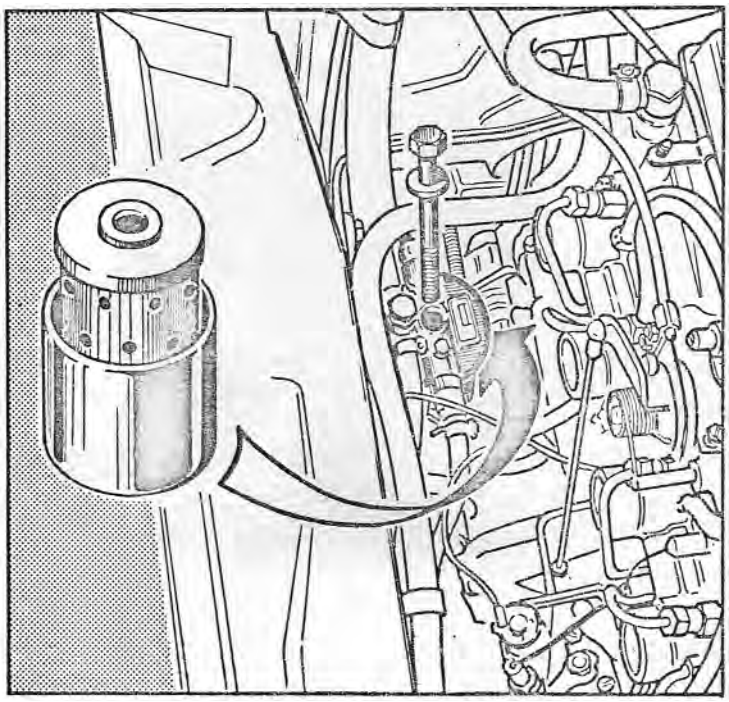


Fig. 3 - MAIN FUEL FILTER ELEMENT

CAUTION: first of all clean carefully the outside of filter body to make sure no foreign matter could enter the filter on reassembly.

Slacken the bolt securing the filter to its bracket and remove the filter,

Withdraw the filter element,

Get fid of foreign matter that may have collected in the housing and fit a ne2w element; also replace the housing gasket if damaged and the sealing ring on bolt.

WARNING: extreme cleanliness is required in the area of the main fuel filter.

C4 CHECKING THE SPARK PLUGS (Lodge HL) AND REPLACING

The spark plugs are of the surface gap type with four points and a central electrode. The only maintenance required is occasional cleaning with a brush of the central electrode and points. No routine adjustment is necessary of the gap between the electrode and points.

If the ceramic insulator is cracked or the electrodes are excessively worn away, the spark plugs must be replaced.

The spark plugs should be tightened when cold to a torque of 18 - 25.3 lb-ft

In order to comply with the Federal rule regarding the control of air pollution the engine is fitted with LODGE-HL spark plugs.

These plugs are completely adequate when the automobile is driven at speeds not exceeding the limits specified by speed regulations. If the automobile is driven at sustained speeds higher than the said speed limits, LODGE-2L spark plugs must be used.

(2.5 – 3.5 kgm); lubricate the threads with graphite grease before fitting.

The standard plugs fitted to the engine are LODGE HL. A decal, giving the specifications for these plugs, is attached under the hood; here below, the text of the decal is repeated.

Under no condition can substitute spark plugs be used, unless they are specifically advised and approved by Alfa Romeo. Use of other plugs can promote serious engine damage, as well as alter emission levels.

C5 CHECKING THE ALTERNATOR AND FAN DRIVING BELT

The belt should be tightened enough to drive the fan and alternator pulley without slipping and without overloading the bearings.

The tension is correct when, on pressing the belt down, the sag is about ½" (10-15 mm).

To tighten the belt, unscrew the nut on the adjusting arm and move the alternator outward.

C6 CHECKING THE VALVE TIMING CHAIN TENSION

Run engine at idling speed; while performing the following adjustment any revving up of the engine must be absolutely avoided; slacken off the setscrew securing the chain tensioner; wait a few minutes to allow the tensioner to tighten the chain, then lock the chain tensioner setscrew firmly.

On refitting the camshaft cover, make sure the gasket is in sound conditions or replace, if necessary. Moderately tighten the cover retaining nuts in diagonal order.

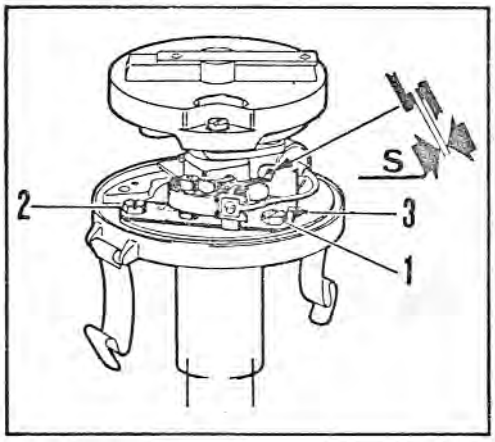


Fig. 4 - DISTRIBUTOR POINTS GAP CHECK

To adjust, loosen the screws (1) and (2), insert a screwdriver in the adjustment slot (3) and pry the stationary-point plate

S = .017 - .019 in.

Automatic Advance Graph and Specifications of Marelli S 103 B or S 103 BA Distrubutor

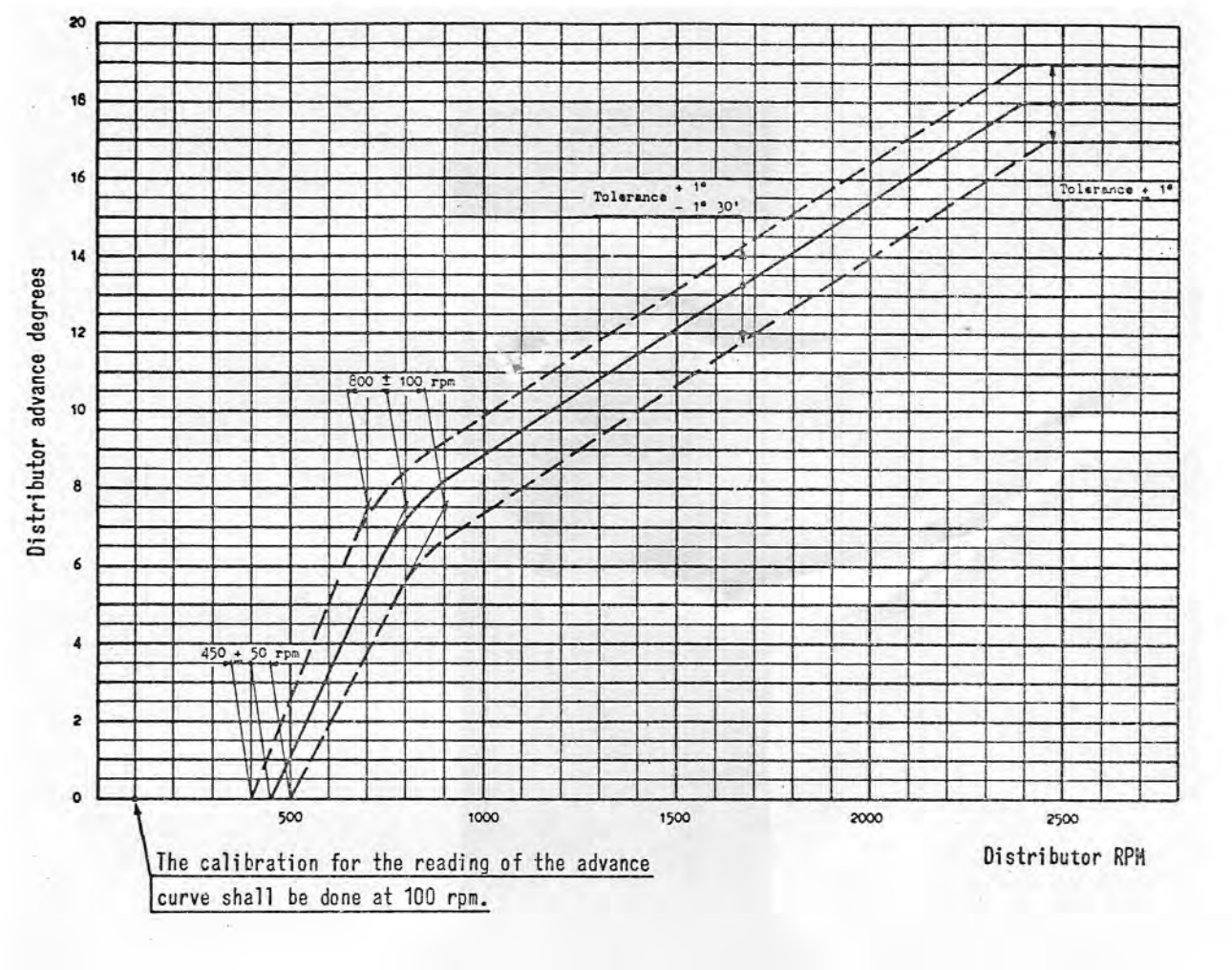


Fig. 5 - DISTRIBUTOR CENTRIFUGAL ADVANCE CURVE

Contact gap.....017 - .019”

Contact opening angle .....30° ± 3°

Dwell Angle.....60° ± 3°

Contact Pressure.....18-21 oz

Condenser capacity test

Should an excessive wear of breaker points be experienced, check that the condenser capacity is not lower than 0.20 μF i.e. ever 20% less than its rated capacity (0.25 μF) marked on the condenser body.

C7a CHECKING THE DISTRIBUTOR (Marelli S 103 B or S 103 BA) AND THE IGNITION TIMING

Dwell meter should read between 57 and 63 degrees, with new points closed, corresponding to .017 to .019' (.43 to .48 mm) gap.

Smear the distributor cam with grease. Check the inside of distributor cap for any sign of moisture, carbon deposits or cracks and the central power electrode for free movement in its seat and for effective spring action. Finally check cap terminals for good conditions.

IGNITION TIMING

The ignition timing should be checked when the engine is warmed up to operating temperature (coolant exceeding 158°F; 70°C) by using a timing light.

At idle speed the timing should be 5 to 7 degrees ATDC, that is the mark "F" on the pulley should be in line with the pointer or .04" (1 mm) apart either side.

With the engine running with no load at 5,000 rpm, the ignition advance should be 27 to 33 degrees, that is the mark "M" on the pulley should be in

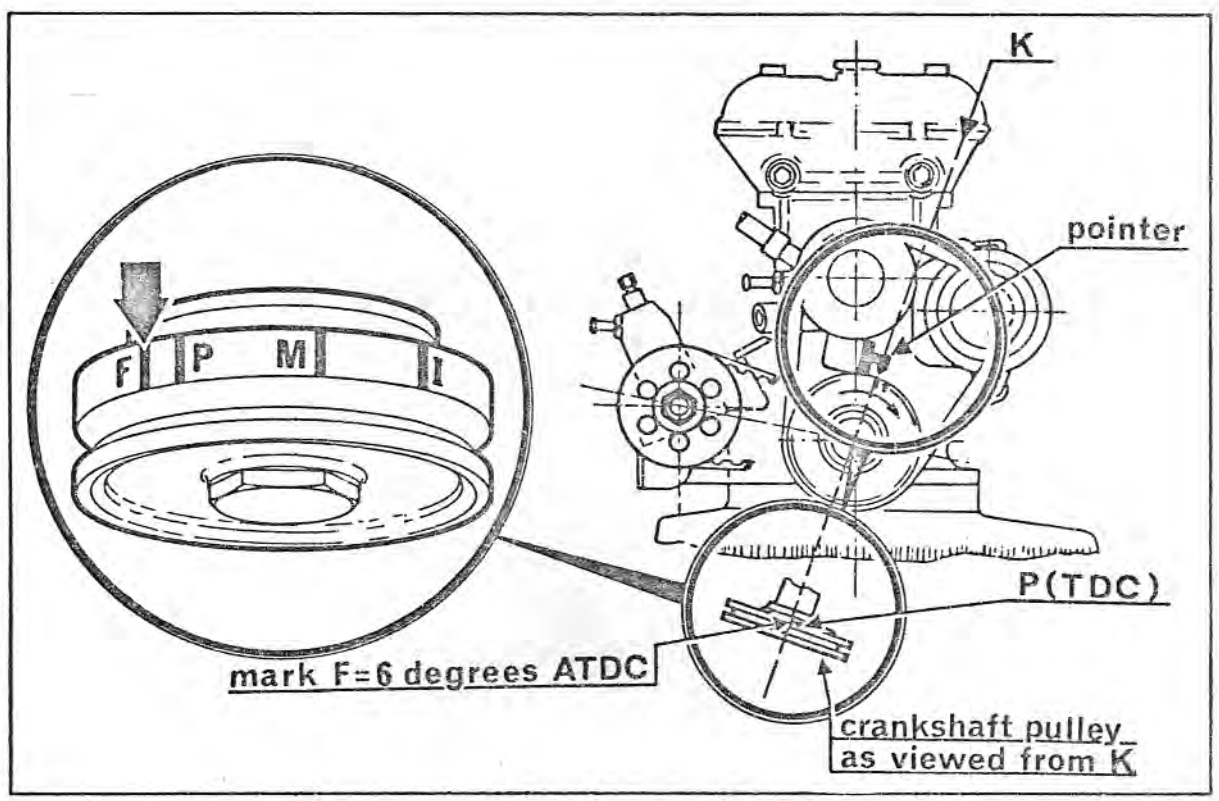


Fig. 6 - IGNITION TIMING

line with the pointer or .12" (3 mm) apart either side.

Timing at idle speed must be adjusted with special care as it affects the emission levels greatly.

Timing adjustment (maximum accuracy required)

If the timing requires adjustment, proceed as follows:

Unscrew the distributor securing nut (1) or the stud so as to allow the distributor to be rotated together with its supporting clamp, then rotate the distributor body counterclockwise or clockwise accordingly to whether it is necessary to respectively advance "A" or retard "R" the ignition setting;

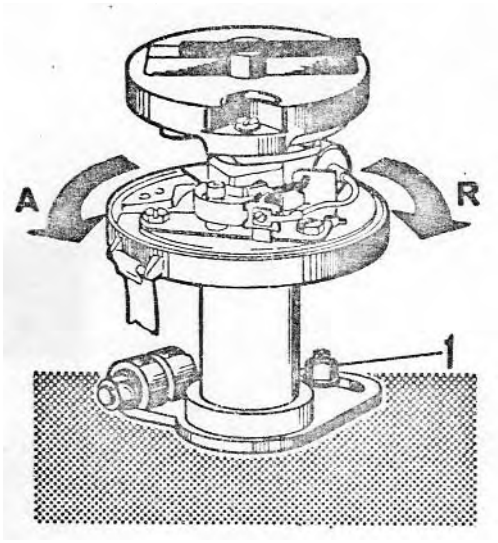


Fig. 7 - IGNITION TIMING ADJUSTMENT

Retighten the nut (1), taking care not to move the distributor or body;

Recheck timing.

In the event of reinstallation or renewal of the distributor, refer to the directions given on paragraph C7b.

C7b REPLACING THE DISTRIBUTOR

When reinstalling or renewing the distributor, perform the following procedure;

Rotate the crankshaft to bring no. 1 cylinder piston to the compression stroke that is with both valves closed;

By slightly rotating the crankshaft, bring the fixed advance mark "F" on pulley into line with the reference pointer;

Fit the supporting clamp into the distributor body and tighten the clamp just snug;

Remove distributor cap and rotate the drive shaft by hand to bring the rotor arm in line with the contact for no. 1 cylinder;

As a trial installation, place the distributor on engine and move the supporting clamp so that the stud is centered in the clamp slot when the contact-breaker points are about to open for no. 1 cylinder;

Then, remove the distributor with its supporting clamp, taking care not to disturb the distributor body/clamp setting and lock the clamp in place;

Reinstall the distributor and adjust timing as directed on paragraph C7a.

C8 CHECKING THE VALVE CLEARANCE - VALVE TIMING DIAGRAM

The V-mounted overhead valves are directly operated by two camshafts acting thru oil bath cups.

When the engine is cold, carefully measure the clearance "G" with a feeler

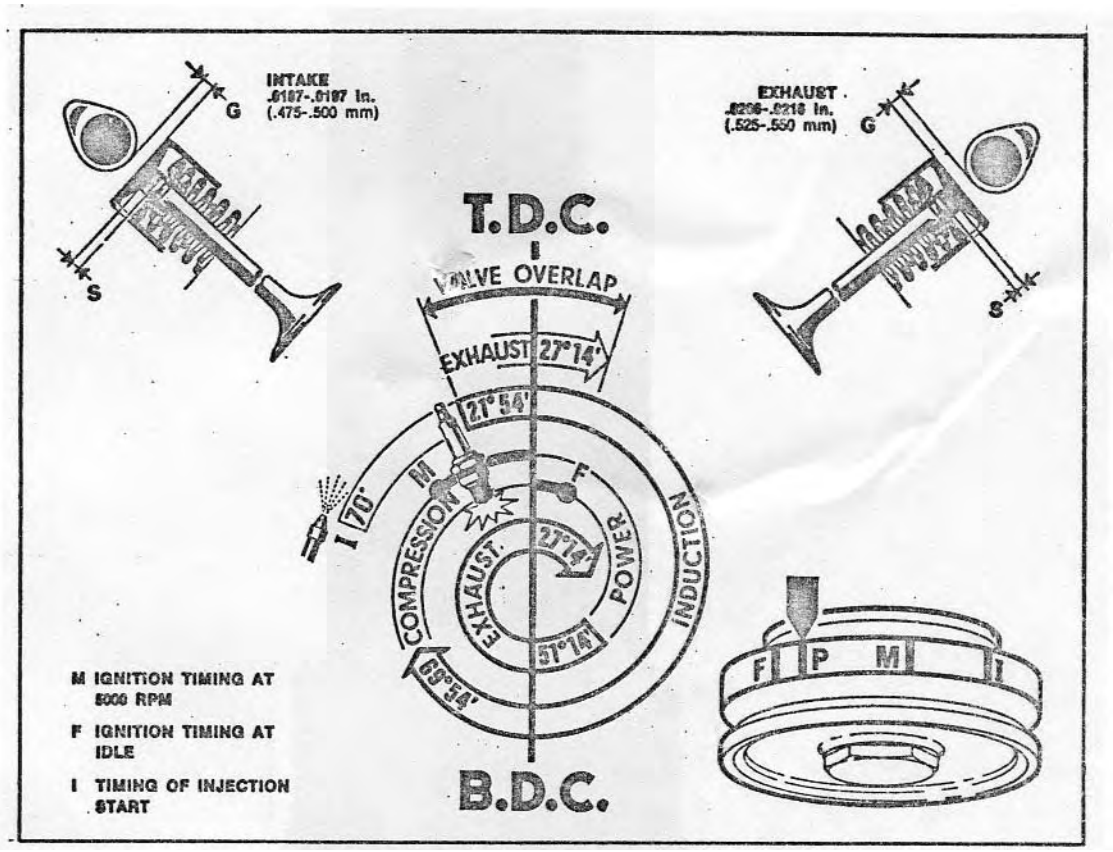


Fig. 8 - VALVE CLEARANCE AND VALVE TIMING DIAGRAM

gage. If the clearance is not as specified, remove camshafts and valve cups; measure the thickness "S" of the adjusting pad on each valve stem and replace it with another of proper thickness so that the clearance is the correct one shown in the figure 8.

To facilitate this adjustment, the pad are made available in a series of thicknesses ranging from .05 to .014' (1.3 to 3.5 mm) in increments of .001" (.025 mm).

C9 REPLACING THE TANK FUEL FILTER

To replace the tank fuel filter (throw-away type) see 2, fig. 1), located on the rear underbody of car, proceed as follows:

slacken the bolt on the clamp securing the filter to the underbody; loosen the clamps securing the hoses to the filter inlet and outlet adapters; it is advisable to stop the pipe from fuel tank provisionally.

Remove the filter and replace it with a new one by proceeding in reverse order of removal. Make sure the hoses are properly positioned.

C10 CLEANING THE THROTTLE VALVE THROATS

Clean the valve throats especially at the areas of contact of throttle valve edges and throat by holding the throttles in full open position and using a brush soaked in gasoline; the cleaning can be completed by rubbing repeatedly the affected areas with a lint-free cloth.

Then, clean in a similar way the throttle valve edges taking care not to strain the spindles.

C11 REPLACING THE INJECTION PUMP OIL FILTER (see fig. 9)

Clean very carefully the filter housing cover and the surrounding areas to prevent any foreign matter from entering the filter housing.

Remove the cover and withdraw the element; wash thoroughly the filter housing with gasoline, then insert the new element in such a way that the spring faces the cover; renew the cover gasket, if necessary.

To facilitate the air bleed and the quick filling up of filter housing with oil, slightly tighten the two upper cover retaining nuts, crank the engine a few seconds (even by means of the starter) until the oil just oozes out; then lock the nuts fully.

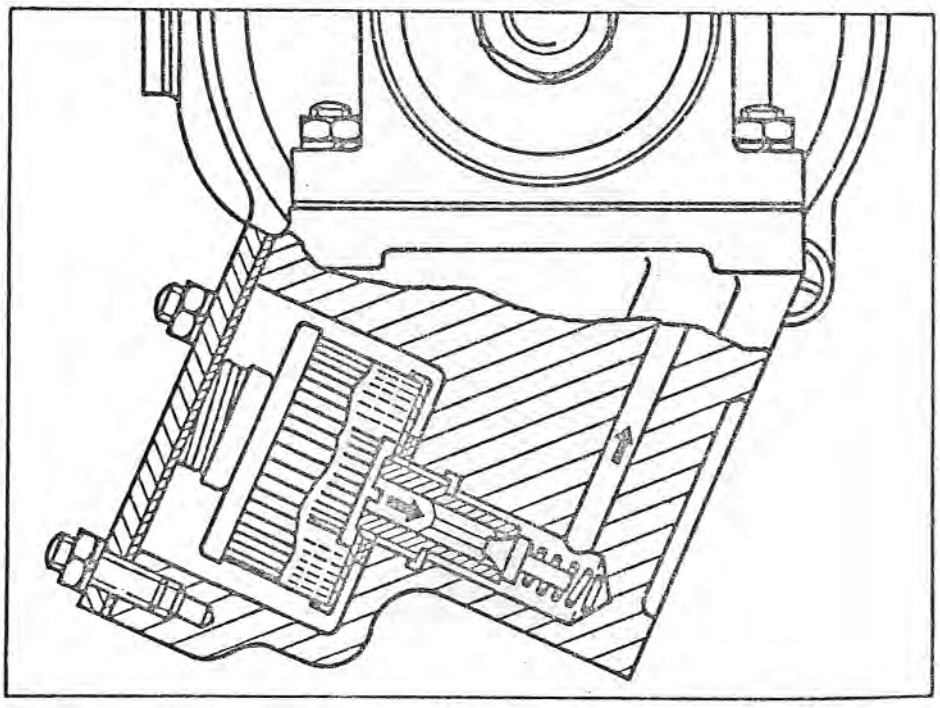


Fig. 9 - INJECTION PUMP OIL FILTER ARRANGEMENT

C12 CHECKING THE POSITIONING OF THROTTLE-CONTROL UNIT LINKAGE

Proceed as follows:

Disconnect the push-pull rods (5) and (6) (see fig. 10), the cable from the relay crank sheave and the battery negative terminal.

Fit tool A.4.0121 to cable clamp studs (see fig. 11), then adjust idle stop screw until ball joint just touches reference plane of tool and lock in position. Also adjust the full throttle stop screw in the same manner.

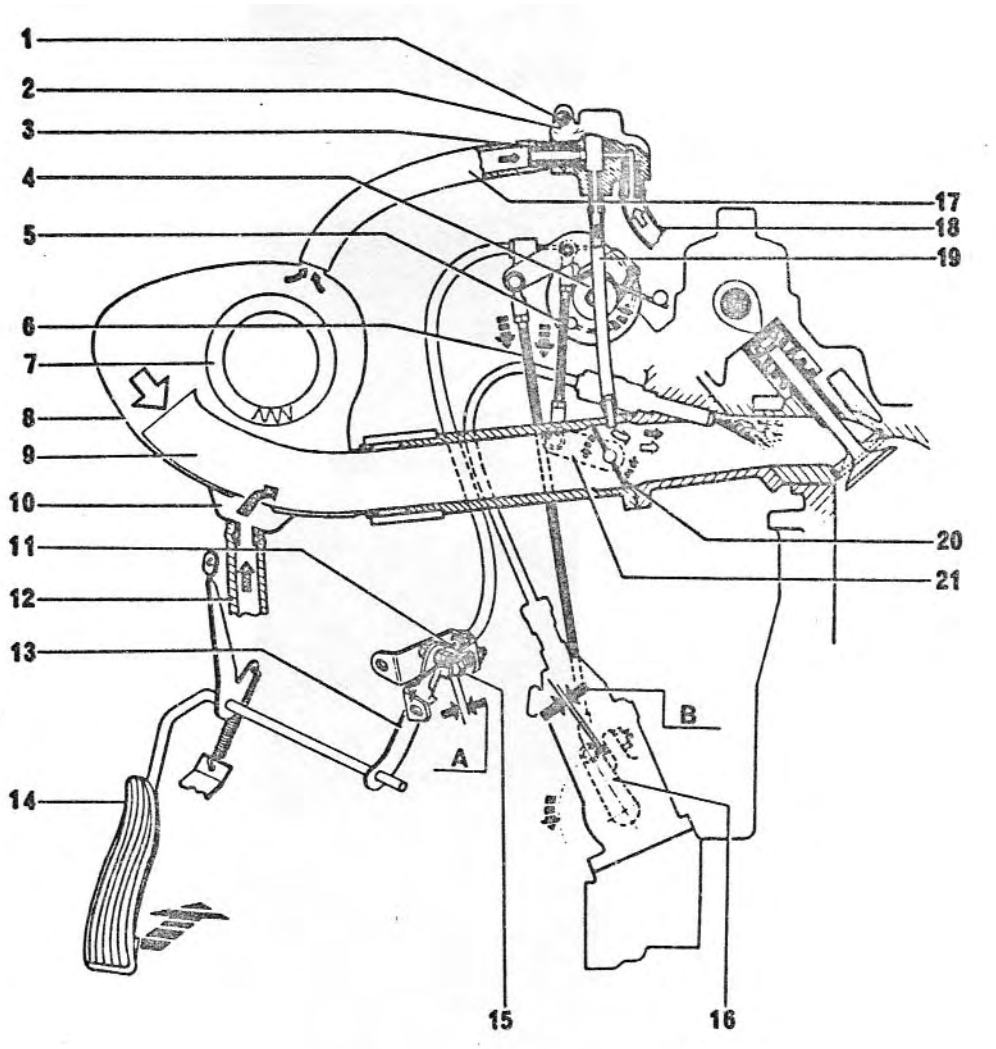


Fig. 10 - THROTTLE-CONTROL UNIT LINKAGE ADJUSTMENT

1	Lockscrew	12	Main crankcase ventilating system hose
2	Idle air adjuster and equalizer	13	Accelerator arm
3	Adjuster	14	Accelerator pedal
4	Relay crank	15	Limit screw
5	Relay crank-to-throttle rod	16	Control unit lever
6	Relay crank-to-control unit rod	17	Idle air supply pipe
7	Filter element	18	Secondary crankcase ventilating system hose
8	Filter housing	19	Idle air hose
9	Intake duct	20	Throttles
10	Manifold gallery	21	Throttle lever
11	Throttle cable		

Now, remove tool and refit throttle cable. Apply grease to cable and pulley.

Check that clearance (see "A" fig. 10) between accelerator arm (13) and limit screw is .040 - .060" as pressure is applied to the pedal while the relay crank is prevented from rotating. Adjust screw if necessary.

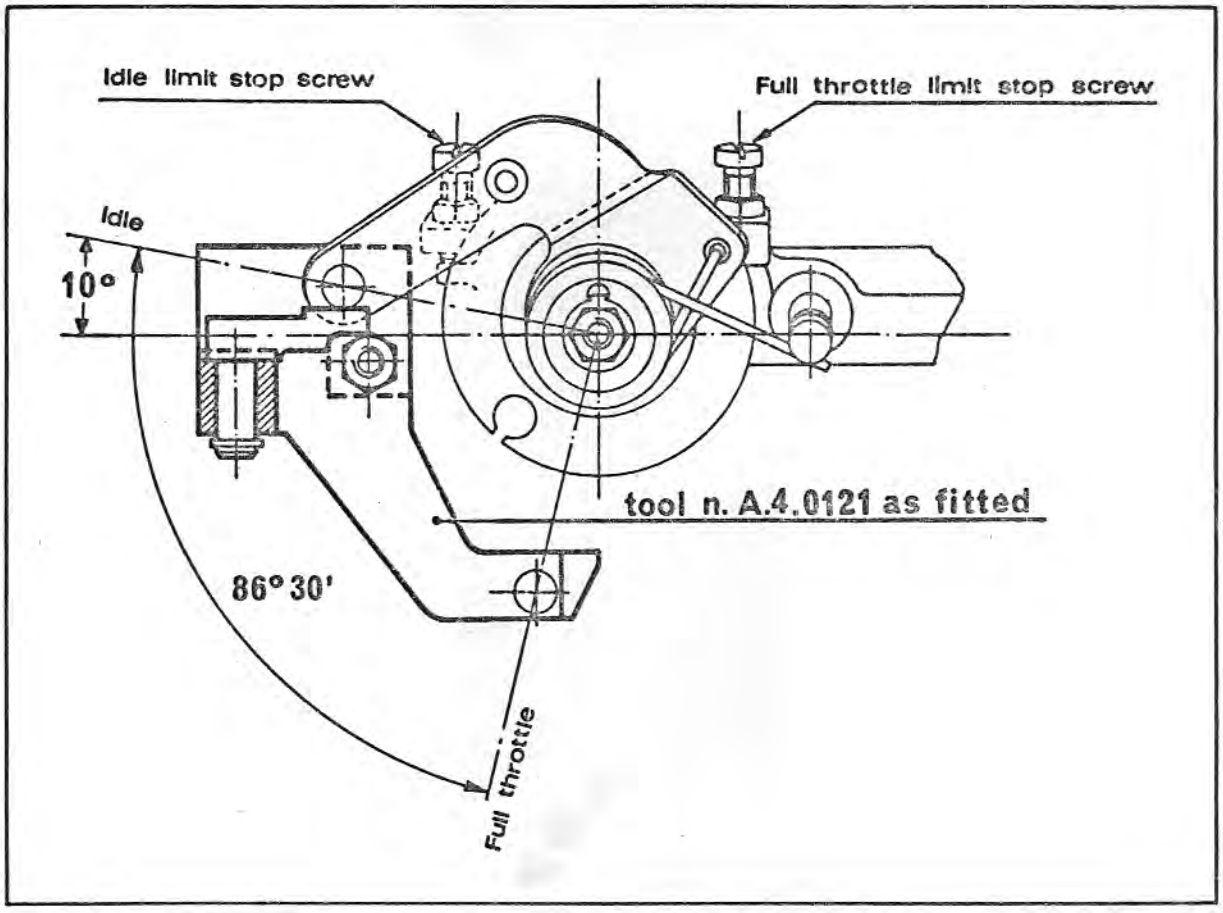


Fig. 11 - POSITIONING OF RELAY CRANK

Depress the accelerator pedal to the floor and check that the clearance between the relay crank lug and full throttle limit stop screw is .080". Adjust the pedal stop screw on floor as required.

Reconnect relay crank-to-throttle rod (5) (see fig. 10) and adjust its length so that throttle are just closed when the relay crank is resting on the idle limit stop screw. "Just closed" can be verified by opening and closing the throttles by hand with the relay crank very slowly. The throttle plates will be felt touching their bores as they close.

When the relay crank is opened slightly and allowed to close under its return spring pressure there will be a click as the crank hits the limit stop screw.

Reconnect the relay crank-to-control unit rod (6), the battery cable start the engine and warm it up to 170°F. (77°C).

Check that clearance (free travel, see "B" fig. 10) between control unit arm and its reference screw is .010 - .024" (0.3 – 0.6 mm) (the closer to .019"/0.5 mm the better).

WARNING: Never tamper with the sealed reference screw on control unit.

Adjust the length of the rod as required. Twisting the rod ends up to 30° off a common plane is permitted to obtain desired clearance.

C13 CHECKING THE POSITIONING AND ALIGNMENT OF THROTTLES

To perform this check, the air cleaner body and hoses shall be removed from the engine and the four adapters of tool no. C.2.0012 connected to the idle fittings on the throttle valve throats after having removed the four idle pipes from the fittings: the other end of these adapters shall be connected to the four columns of mercury gage (tool no. C.2.0014) (see fig. 12).

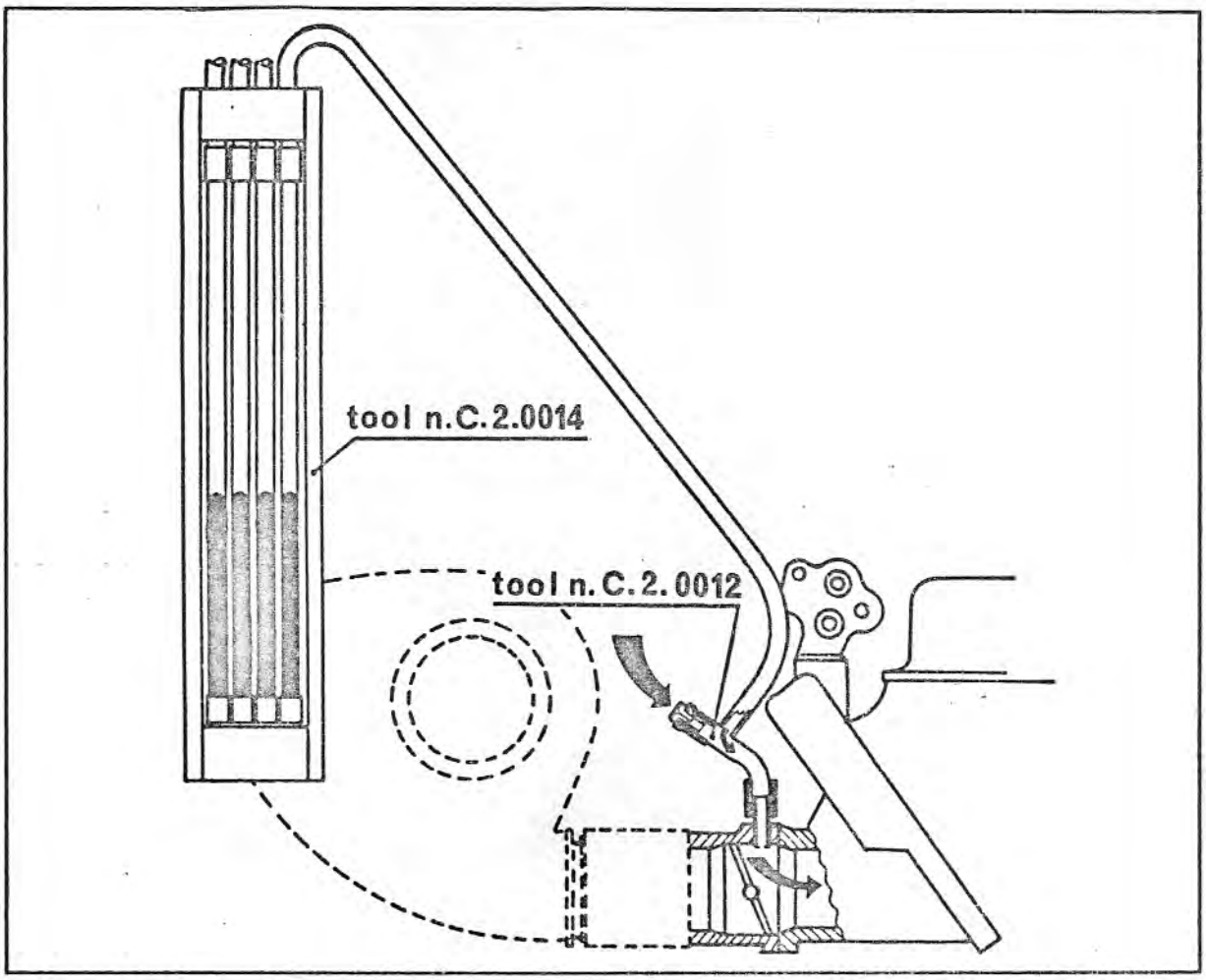


Fig. 12 - THROTTLES ALIGNMENT CHECKING

Start the engine and warm it up until the coolant temperature is at least 158°F (70°C); first check that the clearance between control unit lever and its reference screw is .012 to .024" (the closer to .019" the better) with hot engine and thermostat actuator fitted.

Now, check that readings on mercury gage columns are much the same (maximum difference: .4" - 10 mm); if this is not the case, proceed as follows:

- If readings show that vacuum in front pair of cylinders is higher than in the rear, unscrew the throttle coupling adjusting screw so as to close the rear pair of throttles.

- If vacuum in front pair of cylinders is lower than that in rear pair, disconnect the relay crank-to-throttle rod and set the throttle coupling adjusting screw in such a way as to close the front pair of throttles (screw in the adjusting screw); then, reconnect the relay crank-to-throttle rod and adjust its length so that the throttle valves are in the "just closed" condition as outlined in the paragraph: "Check the positioning of throttle/control unit linkage".

- If, before commencing the above adjustments, the engine would run unevenly (lean mixture), make sure the throttle valves are in the "just closed" position; if not the relay crank-to-throttle rod must be shortened.

CAUTION: avoid sudden revving up of the engine or too great a vacuum could take place and the mercury might be sucked out of the gage columns.

Disconnect adapters and install air cleaner, crankcase ventilation tube, four idle air tubes, fuel vapor tube and air cleaner-to-equalizer tube.

C14 IDLE ADJUSTMENT - MIXTURE AND EXHAUST EMISSIONS ADJUSTMENT

To insure control of exhaust emissions and proper driveability it is necessary to adjust the idle and operating mixture correctly.

To obtain proper Carbon Monoxide (CO) percentage and HC emissions at idle, the operating mixture must be properly set.

Operating mixture can only be set with a road test or on a chassis dyno.

For this reason the steps to follow in adjusting idle and mixture are three.

First - the idle speed is roughly set.

Second - the operating mixture is adjusted.

Third - the idle speed and CO are set accurately, HC emissions are checked.

NOTE: On cars where it is known that the operating mixture is correct, the second step can be eliminated.

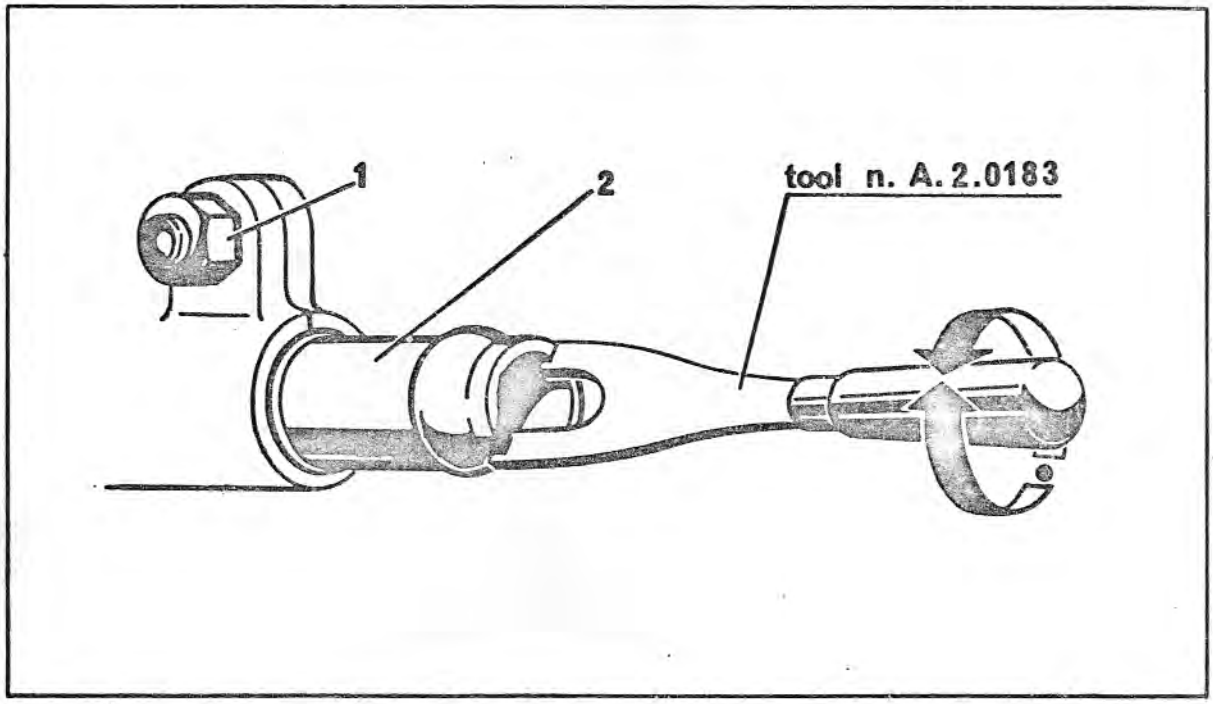


Fig. 13 - IDLE AIR ADJUSTMENT

FIRST STEP (see fig. 13)

Preliminary Idle Adjustment

The adjustment procedure is as follows:

Warm the engine up to 170°F (77°C).

Remove the air cleaner-to-equalizer block hose and loosen adjuster lock screw (1).

Connect accurate electronic tachometer. Act on the adjuster (2) until the engine is idling at as fast a speed as possible, yet with no roughness or hunting (in any case not slower than 600 rpm).

NOTE: Screw in adjuster to reduce speed; screw out adjuster to increase speed; use tool A.2.0183.

Tighten lock screw (1) and replace hose.

SECOND STEP

Road Test and Operating Mixture Adjustment

With engine at operating temperature drive the car hard for a few miles using high revs and low gears to burn off any deposits from the spark plugs.

Drive the car at a constant speeds of 20-25-30 MPH in third gear and accelerate very slowly to 40-45 MPH. If any hesitation is felt the mixture is too lean and the fuel cut off solenoid must be unscrewed to obtain a richer mixture.

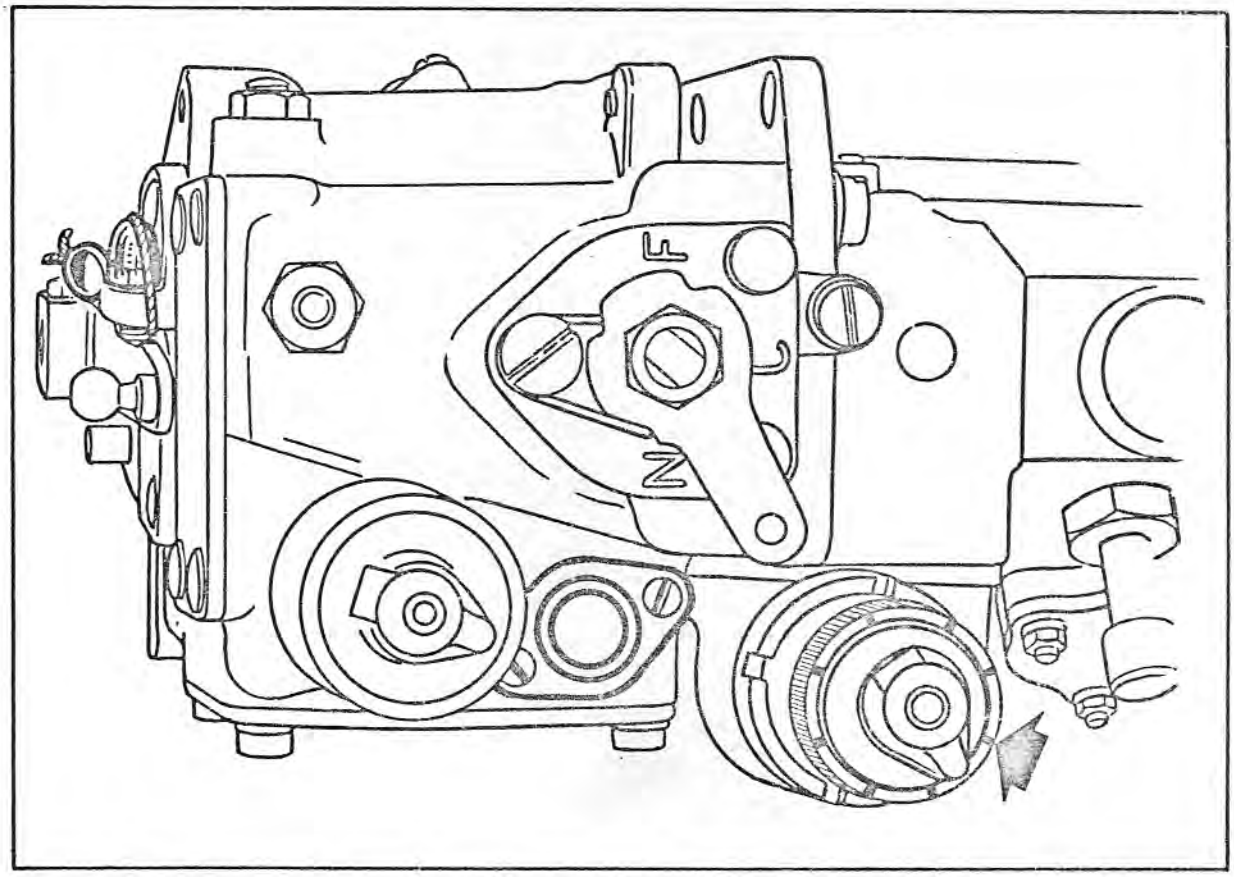


Fig. 14 - MIXTURE ADJUSTMENT

If, instead, during the road test the acceleration is sluggish and the car shows other signs of an over rich mixture such as dirty spark plugs or poor mileage, then the cutoff solenoid must be screwed in until a lean condition is experienced. Then proceed to screw out the solenoid only until the lean hesitation disappears.

Adjusting the Fuel Mixture (see fig. 14)

Looking down at the top of the fuel cut-off solenoid there are 8 notches around the top edge.

Mark one of the notches with respect to a fixed point on the control unit housing for a reference.

Disconnect the solenoid feed wire.

Loosen the rind nut at the bottom of solenoid (tool A.5.0177) taking care not to rotate the solenoid.

Move the solenoid only one notch (1/8 of a turn), in our out, depending on whether mixture is rich or lean.

Retighten ring nut and connect feed wire. Check reference marks to insure that solenoid has been moved one notch.

Install air cleaner, idle air tubes, crankcase breather tubes, air inlet and road test.

THIRD STEP

Idle Speed and CO Adjustment, HC Emission Checking

This operation must be done with an accurate electronic tachometer with engine at normal operating temperature immediately after the road test.

The readings of values of carbon monoxide (CO) and unburned hydrocarbons (HC) at the exhaust must be taken exclusively with NDIR instrumentation.

Following manufacturer's instructions install and calibrate the NDIR analyzer; attach the tachometer.

Idle speed must not be lower than 600 RPM (it is recommended not to exceed 700 RPM.

CO percentage must be 0.8 – 2.0% (the closer to 1% the better)

If adjustments are necessary remove the air cleaner-to-equalizer block hose, loosen the adjuster lock screw (1) (see fig. 13) and adjust the equalizer adjuster accordingly:

screw in to decrease RPM and increase CO
screw out to increase RPM and decrease CO

Tighten lock screw and replace hose.

Check idle HC emissions that must not exceed 400 ppm.

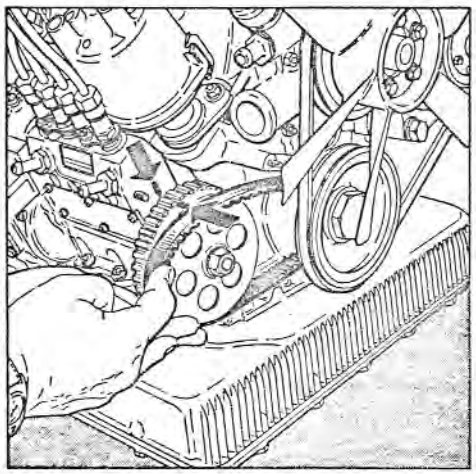
N.B. Should higher level of HC emissions be experienced after having performed the idle adjustment as above directed, the cause may be found in an improperly operating ignition system component (spark plugs, breaker points, condenser, terminals, etc.) or in the formation of deposits in the combustion chambers (particularly those fouling the spark plugs).

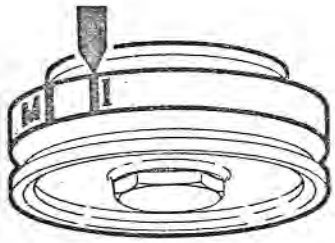
To burn off such deposits, drive the car hard for a few miles using high revs and low gears.

C15 CHECKING THE INJECTION PUMP TIMING

To check the injection pump timing, proceed as follows:

- unscrew the attaching nuts and remove the pump drive belt cover;
- turn the crankshaft over (by shifting into a top gear and pushing the car slowly) and inspect the belt throughout its length for sound conditions;
- turn the crankshaft over again so as to bring the reference mark "I" in line with the pointer; remove the spark plug from cylinder no. 1 and check that the exhaust valve is still open (if closed, turn the crankshaft over by one more revolution);





I = mark on pulley 70° BTDC of the induction stroke

- check that the reference mark on the splined pulley and the pointer on the pump body are aligned.

NOTE: reference mark and pointer can be out of alignment within a tolerance of about ± 0.2″ (5 mm) corresponding to half pitch of the pulley splines.

If the pump is out of timing:

- take the drive belt off the pump pulley

- line up the reference marks of the injection pump and refit the drive belt by rotating the pulley in either direction to engage the nearest spline.

On completion of the timing procedure, re-install the drive belt cover.

D - INJECTION PUMP REPAIRS

Only the following repairs are permitted. For any other work the injection pump must be repaired by Alfa Romeo, Inc.

D1 REMOVAL OF THE INJECTION PUMP

After having removed the air cleaner (see relevant directions) perform the following steps:

- disconnect the negative battery terminal;
- disconnect the lead from cold starting device solenoid and the loose junction on the wire feeding the microswitch of fuel cut-off solenoid;
- remove the two screws on the thermostat actuator mounting flange and the two screws clamping the actuator pipe anchoring grommet (do not remove the thermostat bulb); then withdraw the actuator from the control unit, taking care not to distort excessively the pipe;
- disconnect the fuel hoses from injection pump;
- detach the push-pull rod from the control unit.

Proceed by timing the injection pump with the engine (instant in which fuel injection starts); to do this, bring the no. 1 piston at 70°BTDC of the induction stroke by aligning the mark "I" cut in the crankshaft pulley with the pointer on crankcase front cover (doing so will facilitate the reinstallation on the injection pump to the engine).

Finally, unscrew the three attaching nuts and remove the drive belt cover; then take the drive belt off the injection pump pulley.

Now, perform the removal of the injection pump proper as follows:

- fully slacken the injection pipe nuts on pump outlet fittings (use the wrench tool no. A.5.0164), without removing the pipes;
- unscrew the nuts on the two bolts attaching the pipe cluster plate and the injection pump slanting bracket;
- loosen the two screws attaching the control unit to its bracket at the engine mount;
- unscrew, from the underside of car, the four nuts (use tool A.5.0167 for the front ones) attaching the injection pump support to the engine front cover.

Withdraw the injection pump and its support as a unit by tilting it suitably.

D2 REINSTALLATION OF THE INJECTION PUMP

To reinstall the injection pump, reverse the removal procedure.

The tightening torque of the injection pipe fittings is about 18 lb-ft (2.5 Kgm). After re-tightening, check for leaks.

In case of injection pump renewal, the new injectors, supplied with the new pump, must be installed on the engine in place of the old ones. The new injectors bring a location number and must be installed accordingly.
The tightening torque of the injectors is 20.2-23.1 lb-ft (2.8-3.2 Kgm).

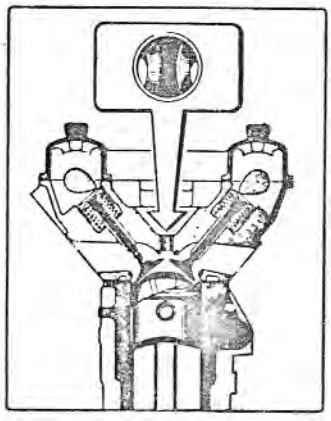
Make sure the pump base-to-engine block gasket and O-ring are in place.

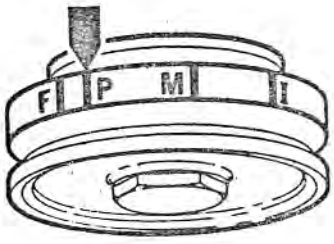
CAUTION: Owing to the special construction of the injection pump, the pump plungers must on no account be operated directly with a lever or any other tool.

If for any reason, the crankshaft has been rotated or the injection pump drive belt needs replacement, follow this procedure to time the injection pump and reinstall the drive belt:

- Turn the crankshaft over (by shifting into fourth and pushing the car either forward or backward), so as to bring the no.1 piston to the T.D.C.; remove the spark plug from cylinder no. 1 to check that both valves, intake and exhaust, are in the open position (overlap stage), (if the valves are closed, turn the crankshaft over by one more revolution).

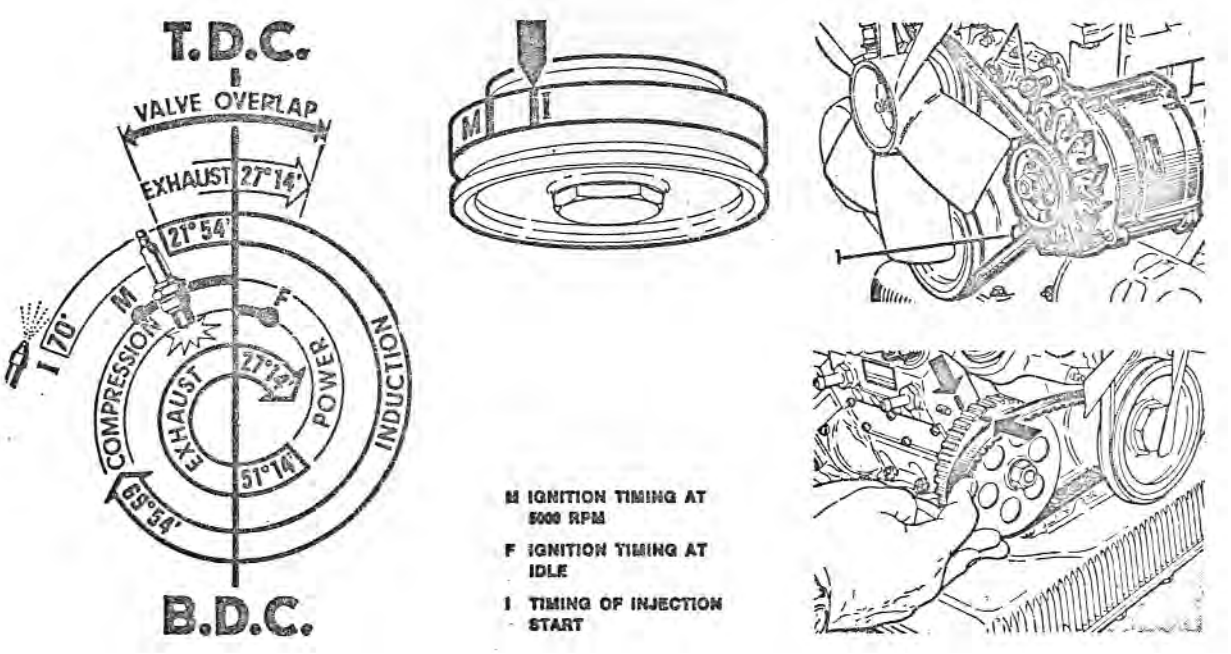
In this condition, the mark P on the crankshaft pulley shall line up with the pointer.





- Push the car slowly backward so as to rotate the crankshaft counter-clockwise by 70 degrees, i.e. in such a way that mark "I" on crank-shaft pulley and pointer line up.

N.B.: Should the injection pump drive belt need replacement, loosen the bolt 1 and the nuts 2, move alternator toward the crankcase and take the alternator drive belt off. Replace the injection pump drive belt with a new one; to install the new drive be3lt, first mount it onto the crankshaft splined pulley.



- Then, rotate the injection pump splined pulley by hand to align the reference mark on the pulley with the pointer on pump body and mount the toothed belt onto the pump pulley; slightly turn the pulley in either direction to engage the nearest spline.

N.B.: Reference mark and pointer can be out of alignment within a tolerance of about ±0.2" (5 mm) corresponding to half pitch of splines.

Refit:

- The spark plug.
- The alternator drive belt, if previously removed (and adjust tension).
- The pump drive belt cover.
- After refitting, road test the car, adjust idle and test CO and HC emissions.

D3 REPLACEMENT OF THERMOSTATIC ACTUATOR (see fig. 10)

Remove air filter elements and described in C2.

Drain one gallon of coolant from cooling system and remove thermostatic

actuator assembly.

The actuator can be checked by measuring the protrusion of the piston. The measurement is made from the end of the piston to the face of the mounting flange.

With the bulb at a temperature of 20°C, the piston protrusion should be 23± 1 mm.

WARNING: Before taking the above measurement, keep the bulb at the specified temperature (20°C) for about 5 minutes.

Before installing the new actuator, the screw in the control unit upon which the actuator acts should be checked for position.

Disconnect the long rod (6) (see fig. 10) from the control unit lever.

Install a 27 mm dummy thermostat (Tool no. A.4.0158).

With the 27 mm dummy thermostat in, place the clearance "B" between the control unit lever and reference screw2 should be .5 mm (.020"). Unscrew the screw under the actuator to decrease the clearance or screw it in to increase the clearance.

Install the new thermostatic actuator, connect long rod and refit cooling system.

Start and warm up engine and adjust clearance between control unit arm and reference screw to .012-.024" (the closer to .019" the better).

Replace air filter elements.

D4 REPLACING THE FUEL CUT OFF SOLENOID (See fig. 16)

To renew the solenoid, proceed as follows:

Remove the air cleaner.

Disconnect the terminal of solenoid feed wire.

Keep a record of the projection "A" of solenoid body from the ring nut top.

Slacken the ring nut with the special tool no. A.5.0177 taking care not to cock the solenoid.

Unscrew the solenoid by hand and take it away.

Test the solenoid by energizing it with a 12 Volt D.C. supply.

When energized, the solenoid plunger must protrude by .193 - .205" (4.9 - 5.2 mm); when the solenoid is de-energized, the plunger must back up fully with no sluggishness.

Repeat the test several times, each time rotating the plunger to make certain it moves freely in any position.

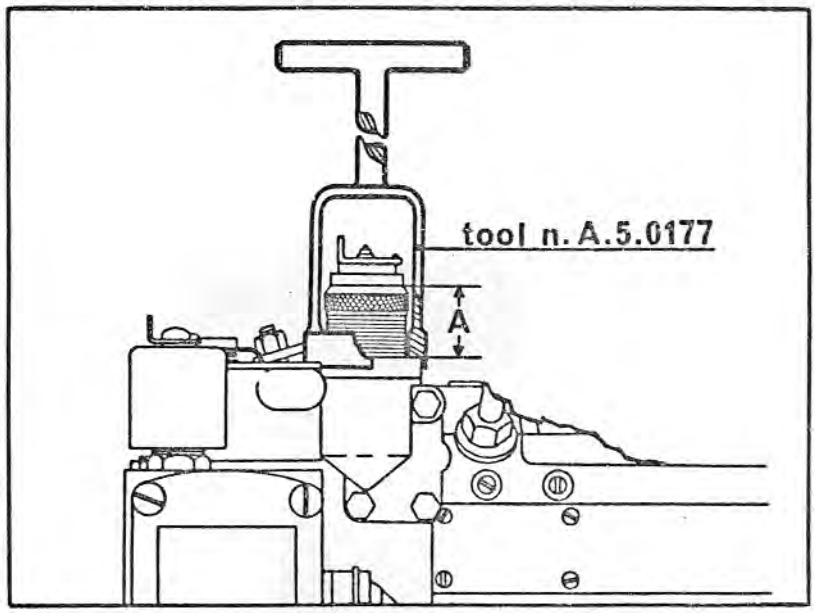


Fig. 16 - FUEL CUT-OFF SOLENOID REMOVAL AND SETTING

- If the solenoid is operating properly, screw it in again to the projection previously recorded (tighten the ring nut before checking for correct dimension "A".

- If the solenoid is not operating properly, change it with a new one and screw it in until projection "A" (ring nut tightened is 1 inch (25.4 mm).

- Reconnect the feed wire

- Refit the air cleaner

Road test the car to check that drivability is satisfactory:

- If the solenoid has not been renewed and the driveability is not completely satisfactory, this may be due to a slight misalignment of the solenoid on reinstallation; in this case, merely unscrew the solenoid by one eighth of a turn (one reference notch as suitably provided).

- If the solenoid has been renewed and the driveability is not satisfactory, unscrew the solenoid by one notch at a time until the appropriate carburation is obtained.

- If the solenoid has been renewed and if the driveability is satisfactory, screw in the solenoid by one notch at a time until slight hesitations take place; at this point, unscrew the solenoid by one notch so as to put it back into the next former setting giving good driveability.

CAUTION: When tightening or slackening the ring nut, take care not to rotate the solenoid or it will go out of correct setting.

Reset idle speed and CO as described in C 14/3.

D5 REPLACEMENT OF COLD START SOLENOID AND PLUNGER REMOVAL (See fig. 17)

Removal

Remove the injection pump as described in D1. Remove the side and rear inspection plates from the control unit. Then remove the cotter key (3) and the clevis pin (4) attaching the solenoid to the plunger shaft (5). Measure the distance "H" from bottom of solenoid to control unit.

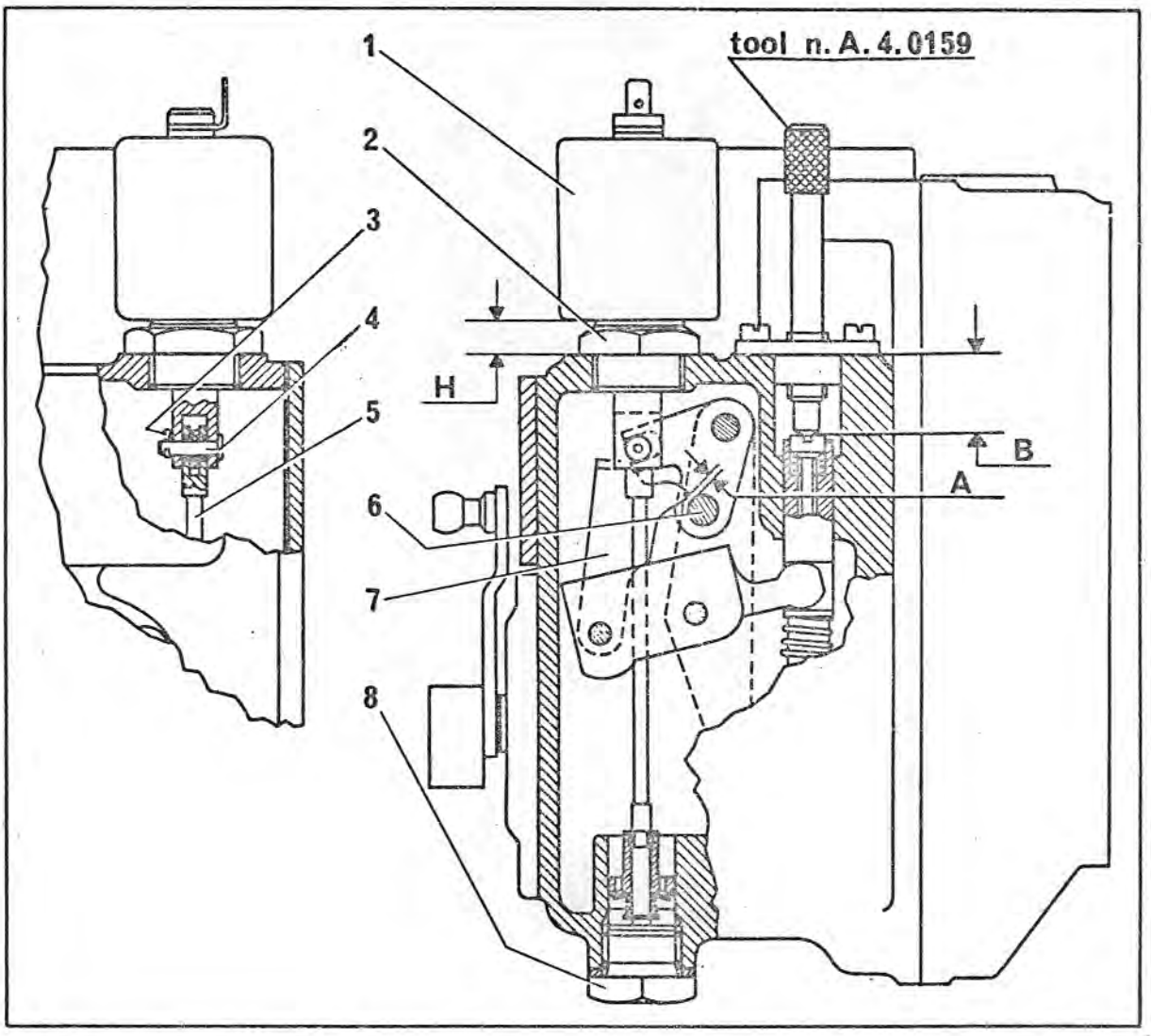


Fig. 17 - COLD START DEVICE AND ITS PLUNGER

Loosen the solenoid lock nut (2) and unscrew the solenoid (1). Then check that the plunger shaft (5) moves up and down freely.

NOTE: If it is necessary to remove the plunger shaft (5), unscrew the plug (8) from underneath and withdraw the plunger shaft.

Check that the diameter of plastic plunger is .5335" (13.55 mm). Replace the plunger or reduce its diameter if required.

Installation

The height of the cold start solenoid above the control unit housing governs

the operation of the cold start device. It is essential that it be carefully adjusted or serious damage may occur to the control unit.

Fit the plunger shaft (5) and the plug (8) in reverse order of removal.

Install the solenoid (1) and lock the nut (2) to same solenoid height "H" as previously measured.

Connect the plunger shaft (5) to the solenoid with the clevis pin (4). Then install the cotter key (3).

To adjust solenoid height "B" a .7490" (19mm) dummy thermostat (tool no A.4.0159) has to be installed.

Measure the clearance "A" between the pin (6) on the lever actuated by the solenoid and the arm (7) which it actuates. Refer to the figures. Clearance must be .008" - .012". Screw the solenoid out to decrease the clearance and screw in to increase clearance.

Tighten solenoid lock nut (2) and install inspection plates.

Assemble pump to engine as described in D1.

D6 TESTING THE INJECTORS

Since the operating conditions of the injectors are not so heavy (being located in the air intake ports and therefore not subject to the high pressures and temperatures of the combustion chamber) and since the life of the injectors is expected to be the same as that since the life of the injectors is expected to be the same as that of the car, they should undergo a test only when the cause for malfunctions is unquestionably attributed to the injectors themselves.

To test the injectors use a handpump like that for testing Diesel injectors but supplied with gasoline and provided with a pressure gage whose top dial reading is 700 - 1000 psi (50 - 70 kg/cm²).

The procedure for checking the spray shape, injection pressure and leaks is as follows:

- connect the test pump pipe to the injector inlet fitting which has a 12 x 1.5 mm metric thread.

- pump quickly to prime pump and injector.

- pump slowly until injector nozzle opens. This must take place at 360 400 psi (25 - 28 kg/cm²) for new injectors and at no less than 260 psi (18 kg/cm²) for used injectors.

- again pumping slowly, bring the pressure to 15-30 psi (1 - 2 kg/cm²) below the rating pressure taken as directed above and make sure that there is no drip from the nozzle within five seconds.

- pump quickly and check that the spray is narrow, deeply plunging and has good vaporization even at minimum delivery. At a distance of 4" (100 mm) from the nozzle orifice, the spray cone diameter should be

about .8" (20 mm). If the injector does not meet these requirements, replace it with a new one.

- the injectors must be tightened in place with a torque of 20.2 - 23.1 lb-ft (2.8 - 3.2 kgm).

N.B. To remove the injectors, use the wrench tool no. A.5.0165.

D7 REPLACING THE ALTITUDE COMPENSATOR (in car)

Proper adjustment of the barometric capsule is critical for proper operation of the pump.

In order to make the adjustment you must have an accurate barometer in your shop which has been set to compensate for your elevation above sea level. Your barometer will have directions for doing this and it is essential that they are followed.

Proceed as detailed below after having removed in this sequence:

- The air cleaner.
- The relay crank-control unit rod.
- The rear inspection cover from the control unit.
- The altitude compensator with its mounting flange.

CAUTION: Do not move the control unit input lever (even better tape it in place) nor disturb the inside devices of control unit or serious damage and out-of-adjustment may result.

Measure the dimension "A" (see fig. 18) between the mounting flange face on which the spring rests and the top of bellows. Such a dimension should fall between .35 and .41" (9 - 10.5 mm) when the temperature setting lever is in "N" position.

Loosen the locknut and unscrew the capsule taking care not to rotate the setting lever with respect to the mounting flange.

Screw in the new capsule until the dimension previously taken is obtained. Then slightly tighten the locknut.

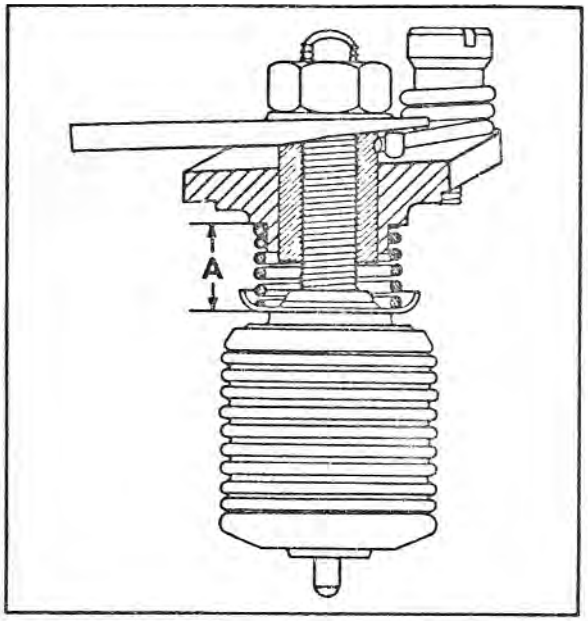


Fig.18 - ALTITUDE COMPENSATOR

NOTE: If, because of any reason, the dimension "A" does not fall within the specified limits, screw in the new capsule to a dimension of .37" (9.5 vmm) irrespective of the dimension previously read.

Install capsule and mounting flange assembly on the control unit making sure the setting lever spring is properly positioned and the setting lever itself is in "N" position.

Refit the rear inspection cover and the rod.

Start the engine and warm it up until the coolant has reached a temperature of no less than 158° F (70° C) then race the engine a few times up to 4,000 rpm and fully release the throttle pedal each time.

Stop the engine, again remove the rear inspection cover and (with the aid of a suitable mirror and a lamp to light the inside of control unit) see whether the wire at the end of link engages the notch corresponding to the actual atmospheric pressure as listed below (notches to be counted starting from the top of the notched lever).

- atmospheric pressure falling between 29.9 - 30.7 in Hg. The wire should engage the 7th notch.

- pressure falling between 29.1 - 29.9 in Hg. The wire should engage the 8th notch.

- pressure between 28.3 - 29.1 in Hg. The wire should engage the 9th notch.

- pressure between 27.6 - 28.3 in Hg. The wire should engage the 10th notch.If the above conditions are not fulfilled, adjust the position of the

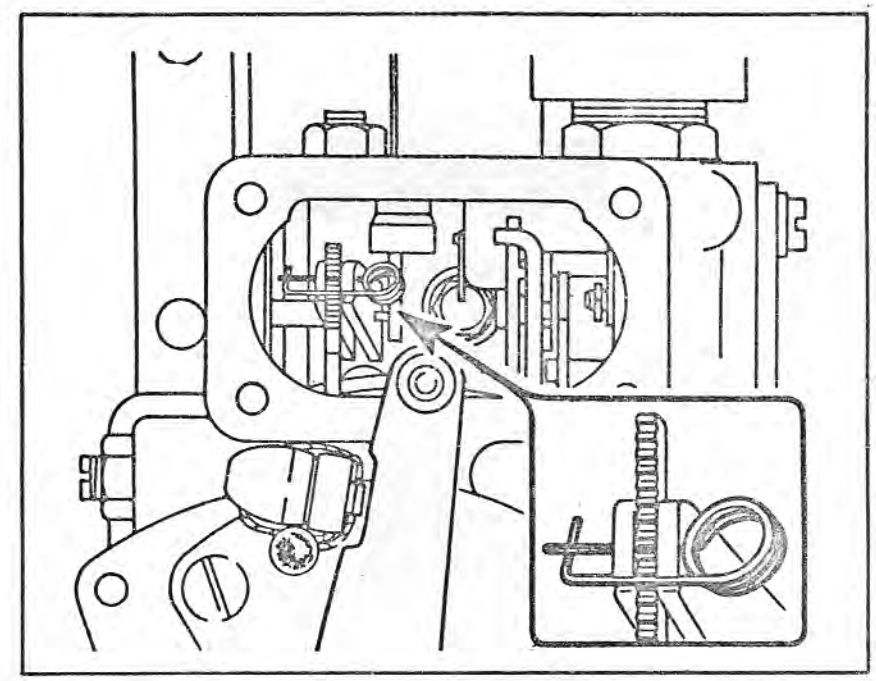


Fig. 19 - ENGAGING WIRE AND NOTCHED LEVER

capsule so that, when the engine is started again (before that refit the rear inspection cover on control unit) and the warming up procedure (racing the engine followed by a complete release of accelerator) is repeated, the wire positions itself correctly. Screw in the capsule to cause the wire to engage notches of higher numbers and unscrew the capsule to engage notches of lower numbers. Keep in mind that a rotation of about 150 decrees corresponds to one notch.

Tighten securely the locknut on the capsule, place the temperature setting lever in the position corresponding to the ambient conditions and reinstall the air cleaner.

D8 CHECK THE RELATIONSHIP BETWEEN THROTTLE ANGLES AND CONTROL UNIT LEVER ANGLES

Perform this check when the engine is cold. The air cleaner must then be removed from engine (see under "Replace the Air Cleaner Elements"), the procedure for disconnecting the rods (5) and (6) (see fig. 10) must be repeated as well as the removal of thermostatic actuator (taking care not to distort excessively the small pipe).

At this point, check the positioning of linkage at idle and full throttle setting with the special tool no A.4.0121 and fit the dummy actuator, tool no A.4.0120. Reconnect the rod and check for a clearance "A" of .012 to .024" (the closer to .019" the better) between the control unit lever and its reference screw (if necessary, adjust the rod length by acting on the threaded clevis).

WARNING

Never tamper with the seal on the reference screw of control unit input lever as this will result in loss of any benefit under warranty.

Fit the fixed protractor tool no C.6.0140 onto rear end of control unit, using the cover attaching screws, and the pointer tool no.C.6.0141 aligned with the zero on the scale (see fig. 20), to take readings use the suitable built-in light mirror.

Reconnect the rod (5), and check for a proper closure of throttles as directed under "Check the Positioning of Throttle/Control Unit Linkage".

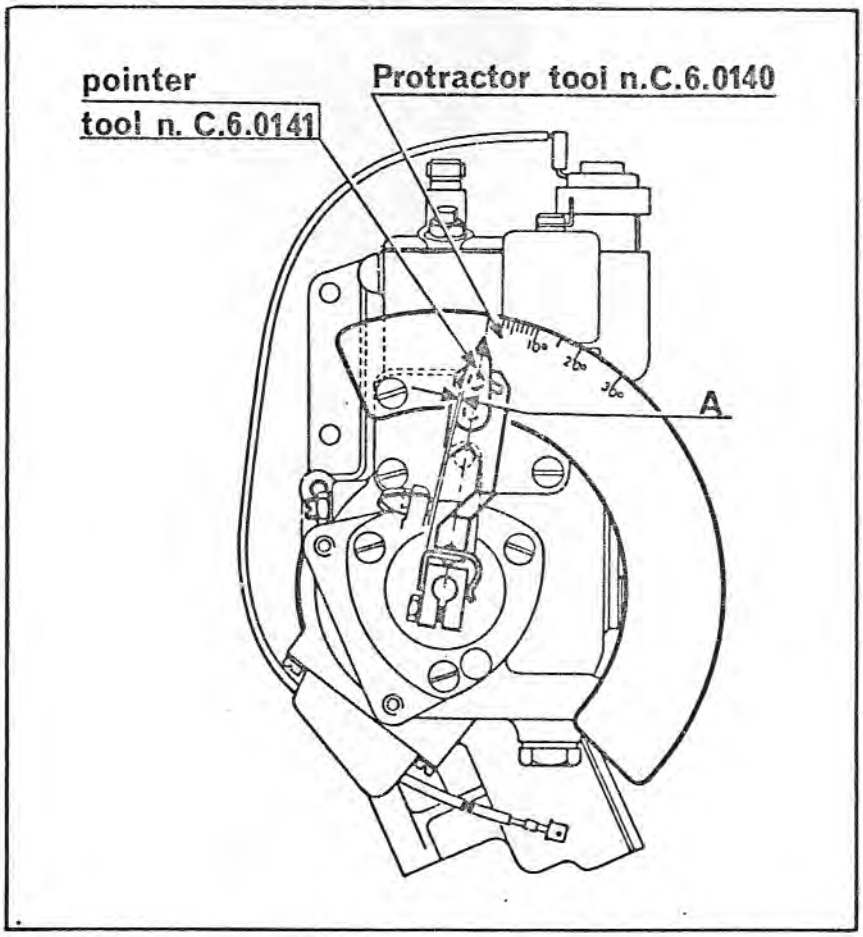


Fig. 20 - CHECKING THE CONTROL UNIT LEVER ANGLE

Place the movable protractor tool no. C.6.0142 on the spindle of rear throttle valve pair and set to zero in correspondence of the pointer tool no C.6.0143 (see fig. 21)

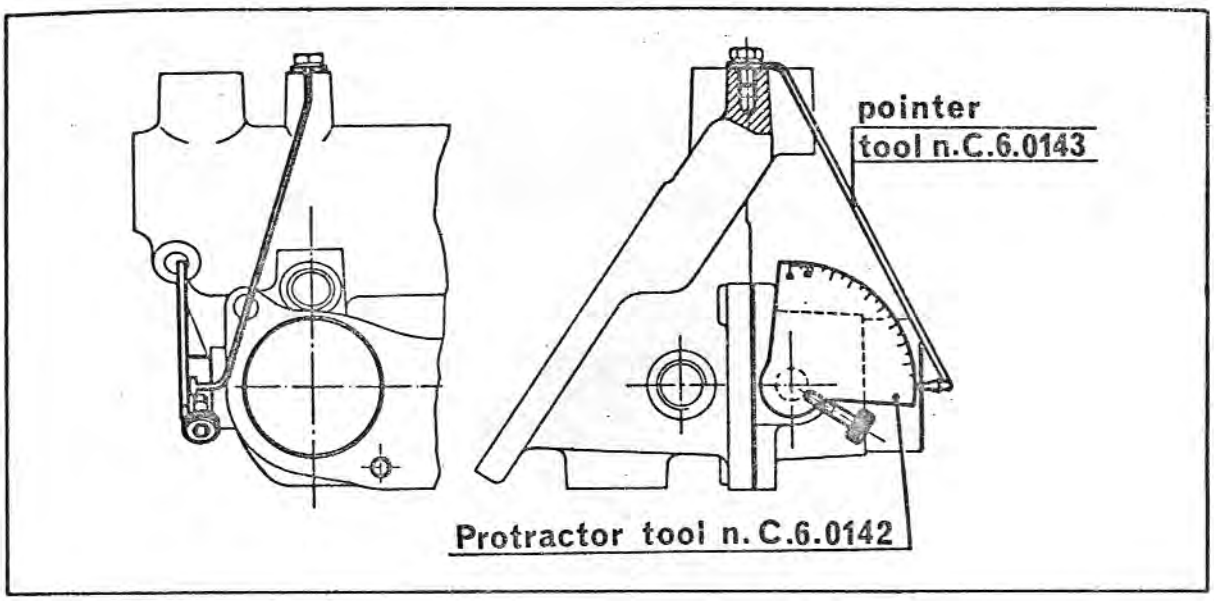


FIG. 21 - CHECKING THE THROTTLE OPENING ANGLES

Install the tool no. A.2.0181 using the cable sheath clips and gradually rotate the relay crank by acting on the adjuster (See fig. 22).

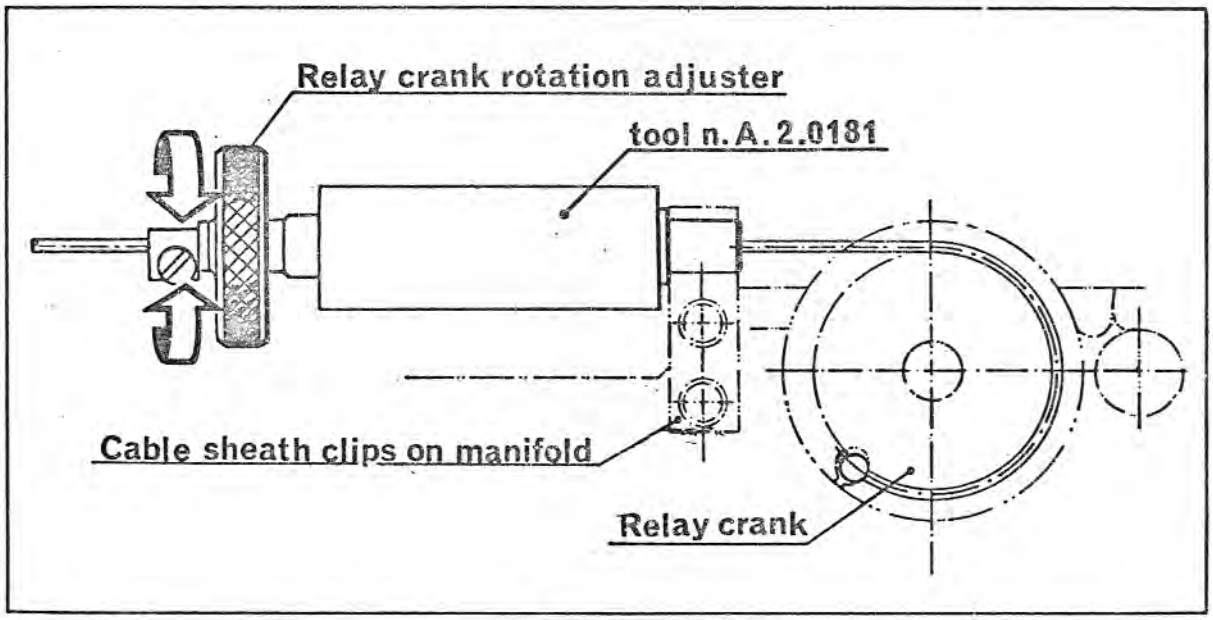


Fig 22 - ADJUSTING THE RELAY CRANK

Open the throttle valves to predetermined angles (2,4,6 degrees - see table) and read the corresponding rotations of control unit lever.

α	ß	Tolerance on ß
0°	0°	
2°	8° 13′	± 20′
4°	14° 40′	
6°	20° 09′	± 1°
10°	29° 30′	
15°	39° 20′	
20°	47° 54′	± 2°
25°	55° 33′	
30°	62° 30′	
35°	68° 51′	
40°	74° 41′	
50°	84° 55′	
60°	93° 25′	
70°	100° 12′	
82°	106° 08′	

α — Throttle Rotation Angle

ß - Control Unit Lever Rotation Angle

In the event the throttle angles and control unit lever angles are out of the specified relation, it is likely that checking procedure has not been perfectly accomplished. Therefore, try once more. If again it will not satisfy, inspect carefully any component of control linkage, or parts directly affecting it, replace any defective part and repeat the procedure.

When the above checks are over, lengthen the rod (6) until there is a clearance of .035 to .051" (0.9 - 1.3 mm) or 1° to 1° 30' between the control unit lever and reference screw.

On completion of adjustment, reinstall the standard thermostatic actuator and check for a clearance of .012 to .024" (.3 to .6 mm) with a hot engine (coolant temperature above 158° F - 760° C) between the control unit lever and its reference screw. If necessary, adjust the length of rod (6) by acting on the clevis thread.

D9 REPLACING THE ROTATING SEAL AND THE MOTOR OF THE ELECTRIC PUMP (See fig. 23)

Remove the electric pump unit from the car. Loosen the screws (1) securing the motor to the pump assembly and remove the motor. Take the seal (3) out of pump body. Lubricate the seal housing and install a new seal (3) with the aid of the suitable tool (no. A.3.0476). To do this, position a thin strip of foil (no more than 0.05 mm thick and about 5 mm wide) over the drain hole so as to prevent damaging the outer edge of the seal being installed. After the seal has been fitted, the foil strip can be slipped off. Also replace the muting face (7) and the "O" ring (6) on motor shaft with new ones.

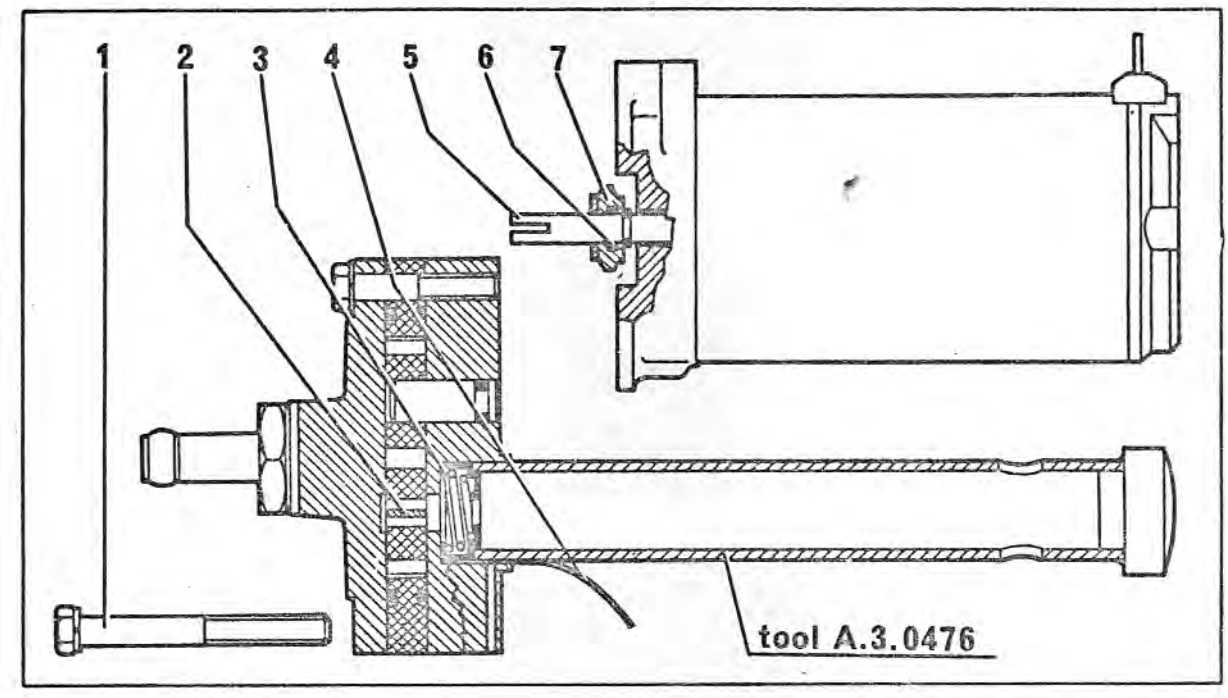


Fig. 23 - REPLACING THE ROTATING SEAL OF THE ELECTRIC PUMP

Re-assemble the motor to the pump body taking care that the coupling at the shaft end properly engages the key in the gear.

WARNING: The rotating seal must be renewed whenever the pump is overhauled and/or the pump motor is replaced with a new one.

Re-install the pump and check whether the seal settled properly within 20 minutes of pump operation. Fuel ceasing to drip from the drain hole indicates that the seal has settled down.

Should the fuel dripping fail to stop within the above mentioned lapse of time, the seal must again be inspected.

E - TROUBLE SHOOTING

The following chart lists several malfunctions, possible cause for each of them and remedies.

If deficiencies or malfunctions are experienced in the fuel system,it is absolutely essential to make sure they are not caused nor affected by the incorrect operation of the ignition system. In fact, it is impossible to distinguish "a priori" whether a failure of fuel or ignition system is the cause for the deficiencies. Therefore, first inspect the ignition system for the following and remedy, if necessary.

- spark plugs for proper operation and type.
- contact-breaker points conditions and gap.
- ignition coil for continuity or leakage.
- ignition distributor for correct timing using a timing light. Adjust timing or replace the ignition distributor, if necessary.

Should any of the troubles listed be experienced, it is recommended to clean thoroughly the affected areas of both engine and engine compartment with a suitable solvent. This to the purpose of preventing any foreign matter from entering, on removal or reinstallation, the mechanical components and specifically the fuel feed circuit.

Soon after cleaning, inspect the mechanical units for loose attaching or joining parts, the pipes for loose fittings and the brackets for sound conditions.

E1 ALFA ROMEO SPICA PUMP POLICY

Injection pumps are not to be opened for any reason. An exchange pump service is available for complete pump units. Pumps that have been tampered with will forfeit any core valve.

Always before removing a pump consult your Alfa Romeo representative or zone office.

E2 TROUBLE CHART

TROUBLE	POSSIBLE CAUSE	REMEDY
Low fuel pressure warning light does not flash on when ignition key is turned.	Fuse no. 6 blown	Replace fuse
	Warning light bulb burnt	Replace bulb
	Pressure switch faulty (jammed open)	Check switch and replace, if necessary.

TROUBLE	POSSIBLE CAUSE	REMEDY
Low fuel pressure warning light stays on (fuel pump operates properly)	Pressure switch faulty (jammed closed) Low fuel pump outlet pressure doe to: - Tank to pump lines clogged or air seeping thru them - Tank fuel filter clogged - Main fuel filter clogged - Main filter pressure relief valve defective or stuck open Fuel pump delivery too low	Replace switch - Inspect fuel lines - Replace filter (See C3) - Clean filter and replace element (see C2) - Check relief valve and replace, if necessary Have fuel pump checked or replaced (See D9)
Low fuel pressure warning light stays on (fuel pump fails to operate)	Fuse blown (in the additional fuse box) Electric wires to pump disconnected Fuel pump faulty	Replace fuse Check and reconnect Have the pump checked or replaced (see D9)
Engine will not start from cold	Solenoid-actuated cold start device fails to operate	- Check electric connections - have the device checked or replaced
Smoky exhaust after starting	Cold start solenoid plunger stuck	Have the plunger checked (See D5)
Engine misfires: rough idle	One injector defective Injection pipe fittings leaking Injection pipes cracked	Trace the cylinder by grounding each spark plug and replace the injector, if necessary. Tighten fittings Check and replace, if necessary.
Idle too slow but even. Idle CO too high (engine runs smoothly)	Too rich a mixture	Adjust idle as directed in C14
Idle too slow and rough (engine runs unevenly)	One of the hoses connecting idle equalizer to throttle throats is obstructed (by buckling) cracked or disconnected from a fitting.	Reconnect or replace the hose, if necessary and adjust idle as directed in C14
Idle too fast and rough (engine runs unevenly; hunting also takes place)	Too lean a mixture due to air leaking through one of the hoses connecting idle equalizer to throttle throats or even to an idle equalizer improperly adjusted.	Check the hoses for sound conditions and leaks and adjust idle as directed in C14
Idle HC too high	Too rich or too lean a mixture. Ignition system not in perfect working order. Heavy deposits in combustion chambers and spark plug fouling due to particular driving conditions such as short rides preventing proper warming up.	Adjust idle as directed in C14. Check ignition system. With a hot engine, drive the car hard for a few miles using high revolutions and low gears to burn off any deposit.

TROUBLE	POSSIBLE CAUSE	REMEDY
Too fast an idle and smoky exhaust.	Faulty thermostatic actuator.	Replace thermostatic actuator (See D3)
Engine keeps running at idle but stops on accelerating.	Altitude compensator faulty	Replace altitude compensator (See D7)
Idle too fast	Accelerator linkage fails to return fully	Check: - flexible cable - linkage joints and pivot pins for free movement - pedal return spring for sound conditions - pedal and linkage limit stop for proper adjustment Clean linkage joints and pack with grease
Unsatisfactory drivability; hesitations	Control linkage out of adjustment Fuel pump outlet pressure too low (warning light comes on while running at high speed) Injector defective Injection pump or control unit defective Temperature setting lever improperly positioned	Check throttle/control unit linkage (See C12) Check and replace, if necessary, tank fuel filter and/or main filter element Refer to remedies as under "Engine misfires; rough idle" Have them checked and replaced, if necessary, by an authorized workshop Position the lever correctly
Unsatisfactory road performance	Temperature setting lever improperly positioned Control linkage out of adjustment Fuel pump outlet pressure too low (warning light comes on while running at high speed) Air induction clogged Injector defective Injection pump or control unit/defective (defective carburation)	Position the lever correctly Check throttle/control unit linkage (See C12) Check and replace, if necessary, tank fuel filter and/or main filter element Check and replace air cleaner elements, if necessary Refer to remedies as under "Engine misfires; rough idle" Have them checked and replaced, if necessary, by an authorized workshop
Excessive fuel consumption	Fuel feed circuit leaks Thermostatic actuator defective; also refer to causes as under "Too fast an idle" Defective carburation	Check pipes, fittings, seals and replace defective parts Have the thermostatic actuator checked and replaced, if necessary, by an authorized workshop (See D3) Have the injection pump adjusted by an authorized workshop

TROUBLE	POSSIBLE CAUSE	REMEDY
Engine stalls in positions other than idle	Defective altitude compensator or excessive vibrations of injection pump and control	Have the altitude compensator checked (See D7); also check injection pump and control unit brackets for sound conditions and firm attachment.
Engine stalls flat	Injection pump driving belt broken	Replace belt (check for proper injection pump timing). (See D2)
Engine does not slow down to idle on deceleration (fast idle)	Both throttles and control unit lever fail to return fully on deceleration	Check: - flexible cable - linkage joints and pivot pins for free movement - pedal and linkage return springs for sound conditions - pedal and linkage limit stops for proper adjustment - clean linkage joints and pack them with grease suitable for low temperatures
Detonations in the exhaust pipe on deceleration	Fuse no. 6 blown Feed wire disconnected at fuel cut off solenoid Loose junction of fuel cut off device feed wire disconnected Defective fuel cut off solenoid Defective fuel cut off device microswitch	Replace fuse Re-connect wire Reconnect junction Have the fuel cut off solenoid checked and replaced, if necessary Have the fuel cut off device checked by an authorized workshop
Engine stops: - wholly or occasionally on deceleration in neutral - occasionally or wholly when re-accelerating after a deceleration Engine fires again suddenly and with delay when re-accelerating after a deceleration	Fuel cut off solenoid stuck in cut off position or sluggish in backing up	Have the fuel cut off solenoid checked and replaced, if necessary.
Noisy electric fuel pump	Line between pump and main filter distorted or forced in the rubber mounting or against the recovery pipe Tank filter and hoses improperly fitted	Reset the line making certain it is centered in the rubber mountings without forcing against the recovery pipe Check that the filter is properly fitted and that hoses have a correct run