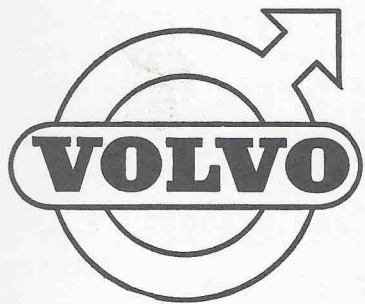


1800E FUEL INJECTION





1. SPECIFICATIONS

ENGINE

Model - B20 E

Type No. 496940

HP/RPM - 130 @6000

Torque /RPM - 130 ft. pds. @3500

Displacement - 121 cubic inches (1986 cc)

Compression Ratio - 10.5:1

Valve Clearance (intake and exhaust) - .017"

Head Bolt Torque - 60-70 ft. lbs.

Spark Plugs - Bosch, W225 T35

Spark Plug gap - .028"

Distributor Point gap - .016"

Dwell angle - 60°

Timing setting (vacuum line disconnected) - 10° B.T.D.C. @ 750 R.P.M.

Idle Speed - 900 R.P.M.

Oil Capacity - with filter 4 qts.

without filter 3½ qts.

Engine Oil (for Service MS)

above 90° F - SAE 20W-40

below 90° F - SAE 10W-30

Coolant Capacity - 9½ qts. (Note: Closed type system - 10 p.s.i.)

System filled with 50/50 solution permanent antifreeze and water year around.

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1. Description of System
2. Testing Instruments and Tools Required
3. Testing the Fuel Injection System with Test Instrument EFAW 228
4. Fault Chart, Cause-Remedy
5. Removal, Installation and Adjustment of the Individual Components in the System

Special testing devices and tools are required for repairing the electronically controlled fuel injection system.

In case of trouble the complete component (except ignition distributor) is to be replaced instead of repairing.

1. DESCRIPTION OF SYSTEM

1.1 Fuel System

Fuel is drawn by the fuel pump (2) from the tank (1) via the suction side of a header tank and through the filter (3). From here it passes through the pressure side of the header tank and into the fuel pressure line.

The pressure regulator (4) connected to the end of the pressure line limits the fuel pressure to 2 kg/cm^2 (28 psi). The electromagnetic fuel injectors (8) are connected to the pressure line by means of the fuel distributor pipes (9). From the pressure regulator the excess fuel can flow back to the tank through the return line. The return line coming from the pump also leads into this line. A relief valve is fitted in the fuel pump which opens if, due to a fault in the pressure system, the pressure reaches a value much above that required (above about 64 psi). A check valve in the pressure connection of the fuel pump presents a complete loss of pressure in the fuel line when the pump is switched off.

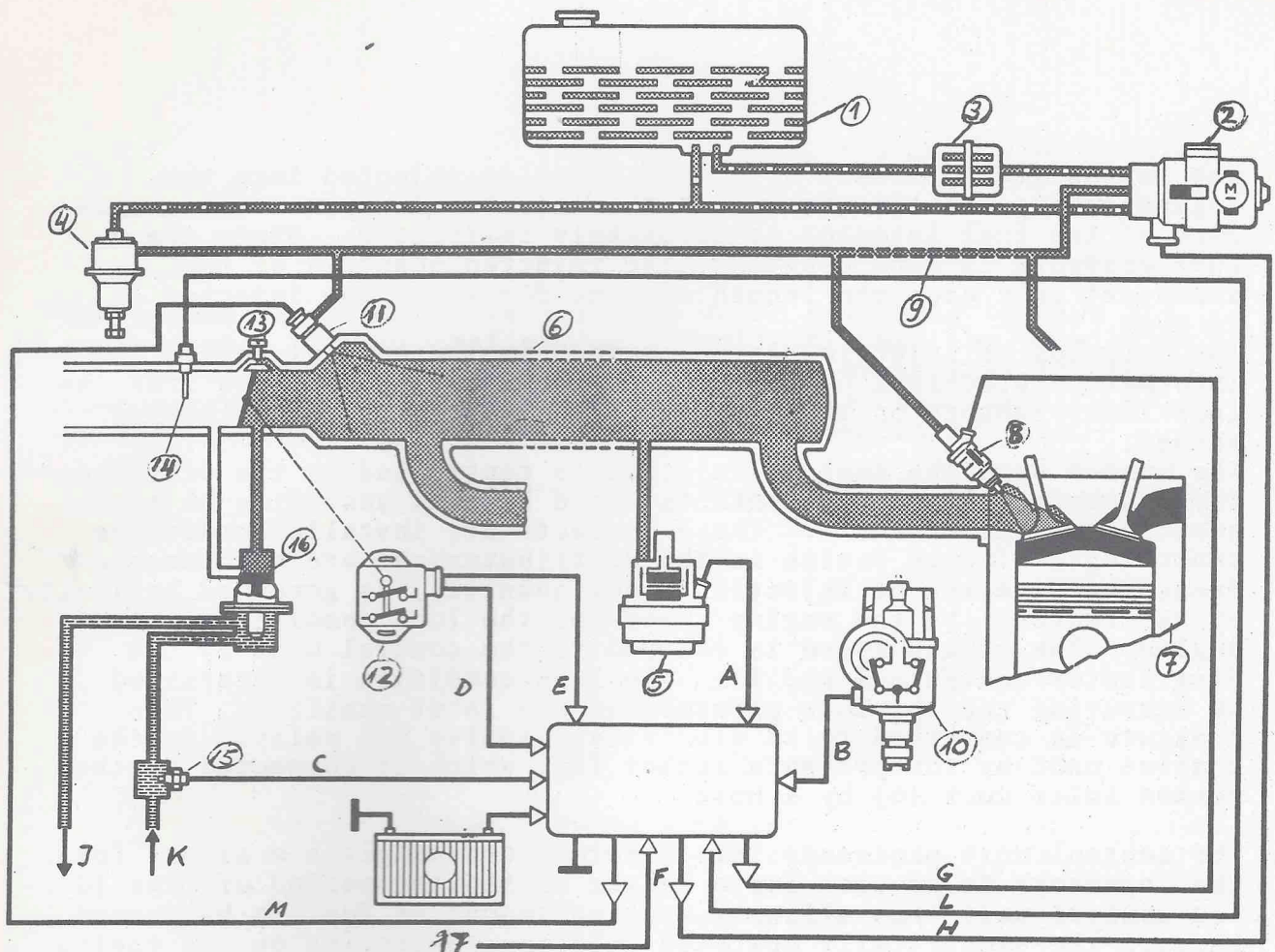
1.2 Air System

The 4 cylinders are supplied with air through 4 individual induction pipes which are connected to one common inlet duct. The pressure sensor and the vacuum retard for the ignition distributor are also connected to the common inlet duct.

There is a throttle valve, which is operated by a linkage from the accelerator pedal, at the mouth of the common inlet duct. Air is drawn into the common inlet duct through an air filter.

When driving, the air flow into the common inlet duct is controlled by the throttle valve. When idling the throttle valve is completely closed. The idling air enters through a by-pass air passage. The idling speed is set by alteration of the cross-section of the passage when the engine is warm, approx. 175° F water temperature.

This will ensure that the auxiliary air regulator is closed. (In addition, if the engine is not fully warmed up, an additional air flow is required for smooth running. This is controlled by the auxiliary air regulator). It alters the effective cross-sectional area of the auxiliary air pipe depending on the water temperature. The position of the regulator is dependent of an element made of expanding material which projects into the cooling water system. At (-13 F) , the regulator is open and at $(+140^{\circ} \text{ F})$ it is completely closed.



1.3 PRINCIPLES OF OPERATION

Key to schematic of system

- (1) Fuel tank
- (2) Fuel pump
- (3) Fuel filter
- (4) Pressure regulator
- (5) Pressure sensor
- (6) Common inlet duct
- (7) Cylinder head
- (8) Fuel injector
- (9) Fuel distributor pipes to the 4 injectors
- (10) Ignition distributor with triggering contacts
- (11) Cold start valve
- (12) Throttle valve switch with temporary enrichment device
- (13) Idling adjustment screw
- (14) Temp. sensor I, intake air
- (15) Temp. sensor II, engine water
- (17) From starter terminal 50

Information for the control unit

INFORMATION	SIGNAL
A Pressure sensor	Load condition of the engine
B Triggering contacts from ignition distributor	Speed, triggering signal for start of injection
C Temperature sensor II	Warming up
D+E Throttle valve switch	Switching off the fuel supply on the overrun and temporary enrichment
F Starting relay terminal 50 and if at the same time temperature switch closed	Cold start enrichment
L Temperature Sensor I	Control of fuel for correct engine temperature
G To injectors	
H To fuel pump	
J+K Cooling water circuit of the auxiliary air regulator, temperature sensor and temperature switch (triggering) signal for the cold start valve)	
M To cold start valve	

Due to the fuel pressure of 28 psi, fuel is injected into the engine during the time for which the injector is open. The nozzle duct of the fuel injector is accurately calibrated. Since the fuel pressure is kept constant, the injected quantity of fuel is dependent only upon the length of time for which the injector is open.

The duration of injection is "computed" by the control unit. The information processed by the electronic control unit comes from the individual sensors on the engine. This is done in the following manner:

The moment when the fuel is injected is controlled by the distributor contacts (triggering contacts I and II) (B) according to the position of the camshaft. These contacts are installed under the centrifugal advance device in the distributor and are maintenance free. The duration of injection (fuel quantity) is governed basically by two factors: by the engine speed and the load condition of the engine. The engine speed is relayed to the control unit by the distributor contacts I and II. The load condition is determined by measuring the absolute pressure in the inlet manifold. This pressure is converted to an electrical impulse and relayed to the control unit by the pressure sensor (5), which is connected to the common inlet duct (6) by a hose.

The control unit processes this information and gives a signal for the injectors to be open for a longer or shorter period of time (G). The control unit thus allows a varying amount of fuel to be passed through the electrically operated injectors depending on the engine load and speed. This is how the "basic quantity" of fuel is governed.

In addition to the "basic quantity" of fuel, an accurately metered amount of fuel is injected additionally when starting at low ambient temperatures, when warming up, during acceleration and at full load.

The cold start valve (11), injects fuel into the common inlet duct, as the starter is operating. If the engine does not start after 10 seconds the fuel flow stops so as not to flood the engine. Restarting gives another 10 seconds of fuel to the valve. However, the engine after starting will receive the additional fuel at a cooling water temperature up to approximately 104° F. The additional quantity of fuel gives a considerably better cold start performance of the engine.

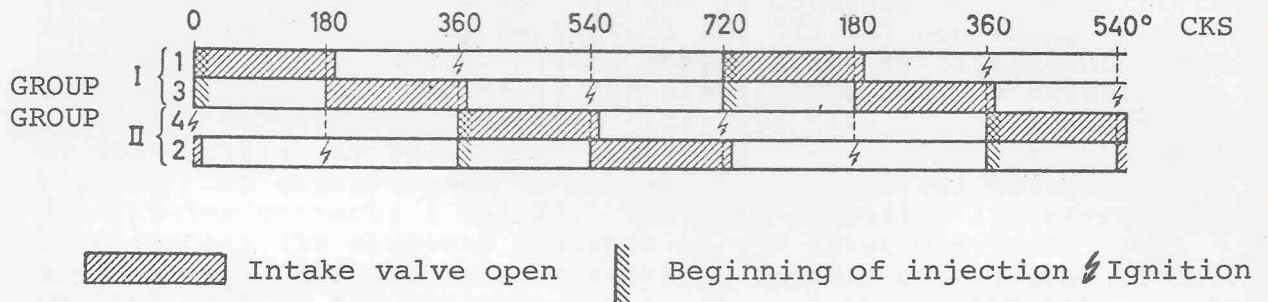
The control unit receives the information "warming up" (C) from the temperature sensor in the cooling water circuit (15).

The temperature sensor I (14) corrects the injection timing according to intake air temperature.

The throttle valve switch (12) has two functions. Firstly, it gives the information "over-run" (D) (braking with the engine), in this condition no fuel should be injected. This operating condition is characterised by closed throttle valve and increased engine speed.

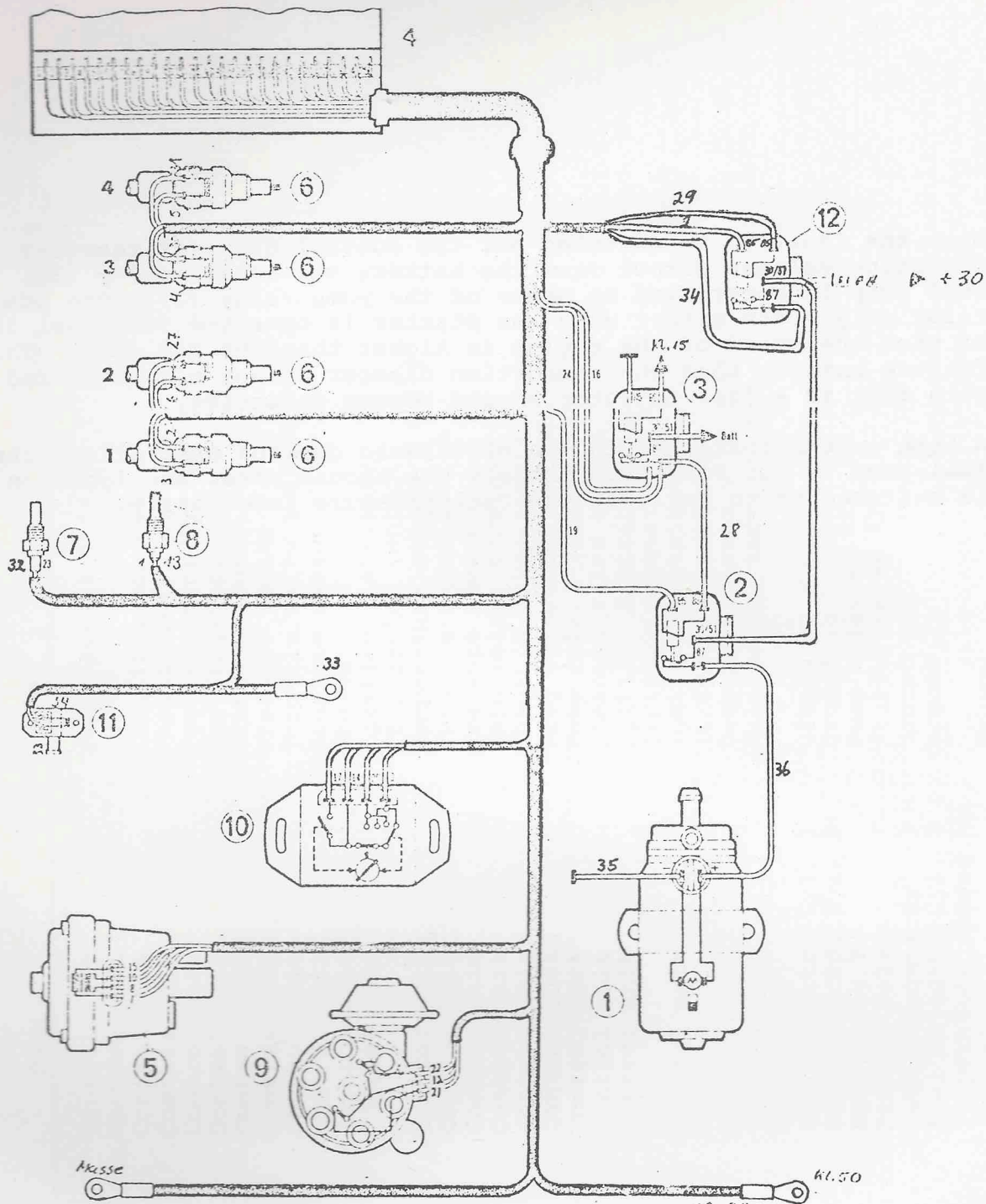
The throttle valve switches off the fuel supply at overrun when the speed is over 1700 R.P.M. If, when on overrun, the speed drops to 1000 R.P.M. the fuel supply is switched on again so that a smooth change over to idling operation is guaranteed. When the engine is cold, the speed limits are raised by approximately 300 R.P.M. because of the higher frictional resistance with a cold engine.

The second function of the throttle valve switch is to give the control unit the information "more fuel" (E) when the accelerator is depressed, i.e. when accelerating. This means that for the temporary enrichment, a certain accurately metered quantity of fuel is injected in addition to the normal amount of fuel.



The fuel injectors (8) are opened electrically in two groups (Group 1: Cyl, 1-3; Group 2: Cyl. 2-4) by signals from the control unit.

The two fuel injectors in one group inject at the same time. In doing so, the injectors of cylinders 1 and 4 inject fuel during the inlet stroke. The remaining injectors inject onto the still closed inlet valves and store the fuel there. This fuel is transferred later when the inlet valve opens together with the air stream into the combustion chamber.



1.4 ELECTRONIC CONTROLS

Description

- | | |
|------------------------------------|--|
| 1. Electric Fuel Pump | 7. Temperature sensor II (water) |
| 2. Pump relay | 8. Temperature sensor I (air) |
| 3. Main relay | 9. Ignition distributor with triggering contacts |
| 4. Electronic control unit | 10. Throttle valve switch |
| 5. Pressure sensor | 11. Cold start valve |
| 6. Electro Magnetic fuel injectors | 12. Starter relay |

When the ignition is switched on, the control unit (4) receives its operating voltage direct from the battery via a main relay (3). The fuel pump is controlled by means of the pump relay (2). The pump relay only works either when the starter is operated (terminal 50) or when the speed of the engine is higher than 200 rev./min. This feature ensures that the combustion chamber cannot become filled with fuel if a fuel injector should become defective.

A time switch installed in the electronic control unit allows the fuel pump to run for approximately one second after the ignition is switched on to build up the fuel pressure immediately.

Description of the cable runs

NOTE

The individual cables are marked with the corresponding cable number. These cable numbers are printed at a distance of about 20 mm from the plug.

CABLE NUMBER	FROM	TO	CABLE NUMBER
1	Control unit	Temp. sensor I (air)	85
2	Control unit	Fuel injector Cyl. 1	
3	Control unit	Fuel injector Cyl. 3	
4	Control unit	Fuel injector Cyl. 4	
5	Control unit	Fuel injector Cyl. 2	
6	Control unit	Pressure sensor	
7	Control unit	Pressure sensor	
8	Control unit	Throttle valve switch	
9	Control unit	Pressure sensor	
10	Control unit	Ground	
11	Control unit	Ignition Distributor	
12	Control unit	(triggering contact)	
13	Control unit	Temperature sensor I (air)	
14	Control unit	Throttle valve switch	
15	Control unit	Pressure sensor	
16	Control unit	Main relay, terminal 87	
17	Control unit	Throttle valve switch	
18	Control unit	Plug connector, Terminal 50	
19	Control unit	Pump relay, Terminal 85	
20	Control unit	Throttle valve switch	
21	Control unit	Ignition Distributor	
22	Control unit	(triggering contact)	
23	Control unit	Ignition Distributor	
24	Control unit	(triggering contact)	
25	Not used	Temperature sensor II (water)	
26	Fuel Injector Cyl. 1	Main relay, terminal 87	
27	Fuel Injector Cyl. 2	Ground	
28	Main Relay 87	Ground	
29	Starter relay	Pump Relay 86	
30	Fuel injector Cyl. 3	Starter relay 50	
31	Fuel injector Cyl. 2	Ground	
32	Temperature sensor II (water)	Ground	
33	Cold start valve	Ground	
34	Cold start valve	Starter relay 87	
35	Electric fuel pump grd.	Ground	
36	Electric fuel pump pos.	Pump relay 87	

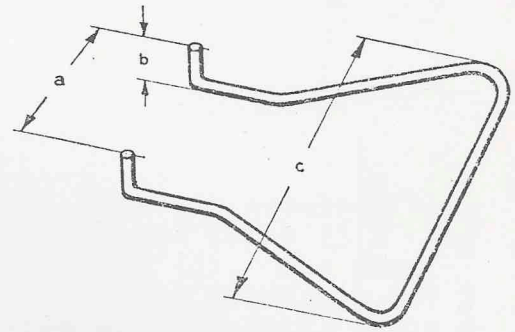
2. TESTING INSTRUMENTS AND TOOLS REQUIRED

Tester EFAW 228 for testing the system in the vehicle

Dwell-tach tester, Stroboscope timing light , Vacuum tester

Extractor hook for cable harness plug to be made up.

2 clips to close off the fuel hoses;



a = (1 3/4 in.)

b = (1/2 in.)

c = (approx. 3 15/16 in.)

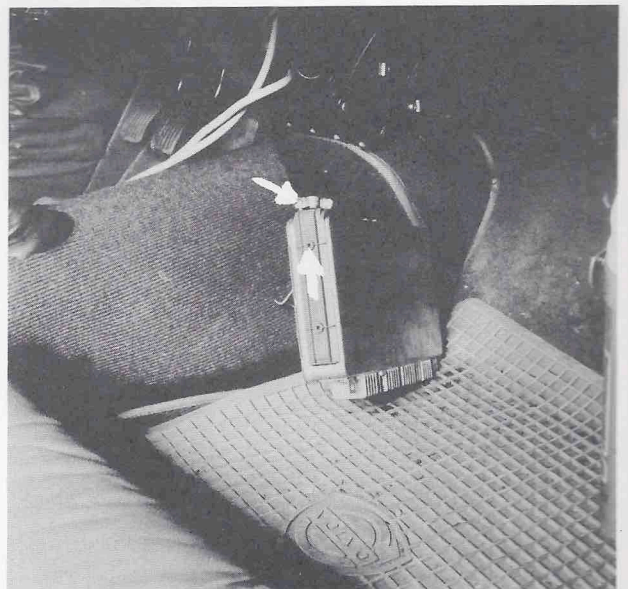
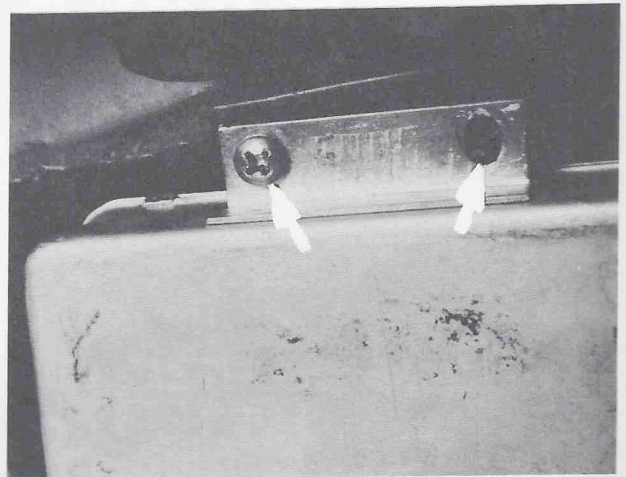
Material : Welding wire
(1/16 in.)

3. TESTING THE FUEL INJECTION SYSTEM WITH TEST INSTRUMENT EFAW 228

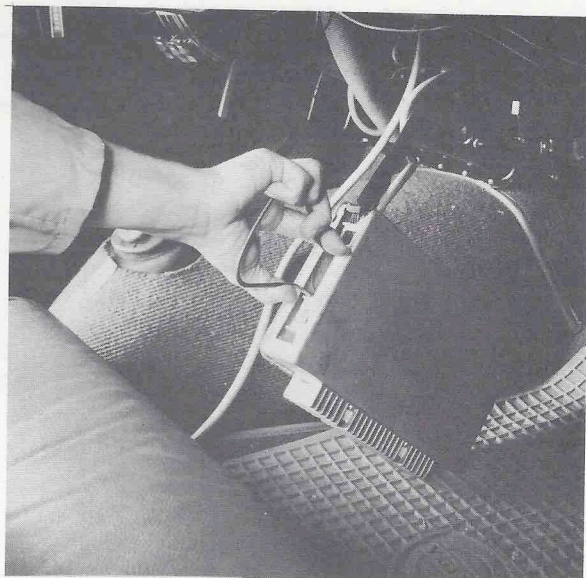
With the test instrument EFAW 228 all the sensors as well as the fuel pump and the injectors are tested according to the set program. It is important that all points be checked. All the steps described in the following must be carried out with the ignition switched off!

Remove the control unit from under the dash. To do this, unscrew the 2 fixing screws (arrow) and remove the control unit.

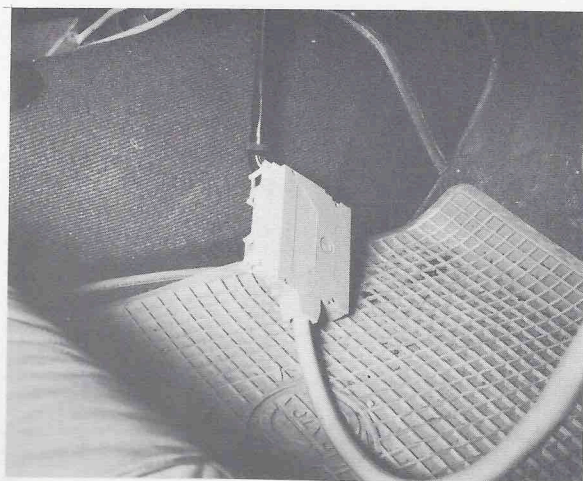
Open the cable clip (arrow) with a Phillips screw driver and draw the cover panel out.



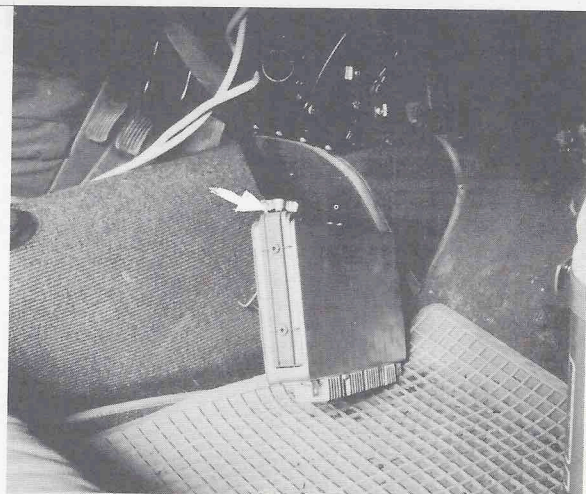
Carefully pull the cable harness plug out of the control unit with the extractor hook (to be made up).



Connect the cable harness plug to the multi-channel plug on the test instrument EFAW 228.



When refitting the control unit, observe the following:
Push the cable harness plug carefully into the control unit (the plug can only be connected in one position). Carefully push the rubber grommet on the cable harness into the cutout on the control unit.
Tighten the cable clip.
When sliding the control unit into position make certain that the control unit fits in its correct position in the support bracket on fire wall.



PREPARATORY WORK (without electronic control unit connected): Switch on ignition, turn switch "A" to position "Measuring". The test stages are listed in the following chart. When checking the fuel injection system the entire test program must always be carried out. Any defects which are found should be eliminated before testing is continued.

Position of switch B	Operate	To measure
Voltage I	Switch on ignition and leave on through out the following test procedure	Voltage supply for the control unit Main relay
Voltage II		
Voltage Starter voltage	Operate starter for a short time	Voltage at terminal 50 of starter solenoid
	Set test instrument to "oo" by turning knob	
Adjustment "oo" pressure sensor	Push "ground" button	Resistance between pressure sensor windings and ground (short circuit to ground)

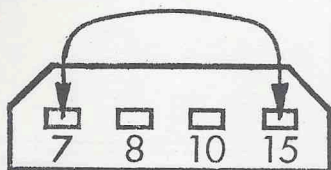
Indication (nominal value)	Deviation from nominal value. Possible faults and elimination.
11...12.5 volt	<p>No reading: Open circuit: cable main relay-control unit, main relay inoperative ignition switch defective (check for voltage at terminal 87 on the relay). Check cable 16 from main relay to control unit. Cable 11 broken (faulty ground connection, check central ground cable).</p> <p>Voltage below 11 volt: Contact resistance in cable 16, 11 or on relay contacts (check cable, replace main relay).</p>
	As for voltage I but check cable 24.
9.0...12 volt	<p>No voltage, starter operates: Open circuit from starter terminal 50 to control unit (check cable 18 to the control unit terminal 18).</p> <p>No voltage as above, starter does not operate: Ignition/starter switch defective, open circuit in cable.</p> <p>Voltage below 9.5 volt: Battery flat, voltage drop in the cable from ignition/starter switch to terminal 50 on the starter solenoid too high (check cable with voltmeter).</p>
	<p>When full deflection on the instrument is not obtained the voltage of the vehicle battery is too low.</p> <p>See also test stage "voltage I".</p>
Resistance "oo" (oo ohms)	<p>Resistance "0": Short circuit to ground in cable or at pressure sensor (pull plug out of pressure sensor and if test instrument shows "oo", replace pressure sensor. If test instrument remains at "0", the cables 7,8,10 or 15 may be short circuited; replace cable harness).</p> <p>Resistance below "oo", but not "0": Damage to insulation (proceed as described above).</p>

Position of switch B	Operate	To measure
Adjustment "oo", pressure sensor	Push "primary" button	Resistance of primary windings of pressure sensor
	Push "secondary" button	Resistance of second- ary windings of pressure sensor

Indication (nominal value)

Deviation from nominal value. Possible faults and elimination.

0.5...1.0 on the ohms scale (approx. 90 ohms)



Resistance considerably smaller than nominal value: Damage to insulation (pull plug out of pressure sensor and if test instrument shows "oo" replace pressure sensor).
Resistance "0": Short circuit to ground, short circuit in secondary windings (pull plug out of pressure sensor and if test instrument shows "oo" replace pressure sensor).

Resistance considerably larger than nominal value: High contact resistance (test plugs and cables for corrosion or open circuits).
Resistance "oo": Open circuit. Bridge plug as shown in illustration. If test instrument shows "0", replace pressure sensor. If "oo" indicated, check cables.

3...4 on the ohms scale (approx. 350 ohms)

As under "primary". With resistance "oo", bridge the two inner terminals.

Position of switch B	Operate	To measure
Distributor contact I Distributor contact II	Rotate distributor by operating starter for a short time	Functioning of the triggering contacts in the distributor
Throttle valve switch I Throttle valve switch II	Depress accelerator pedal slowly.	Functioning of the temporary enrichment device
Throttle valve switch III	a) Throttle valve in idling position (closed) b) Throttle valve slightly open (approx. 1°)	Functioning of the contacts in the throttle valve switch.
Temperature sensor I (air)		Resistance of the temperature sensor I
Temperature sensor II (cooling water)		Resistance of the temperature sensor II
Fuel injectors	Adjust instrument again to oo if necessary (switch in position "Injectors") 1=injectors for cyl. 1 2=injectors for cyl. 4 3=injector for cyl. 2 4=injector for cyl. 3	Resistance of the windings in the injector with cable.

Indication (nominal value)	Deviation from nominal value. Possible faults and elimination
Alternating between "0" and "oo" (0/oo ohm)	If the needles of the test instrument does not swing when starting, i.e. remains at oo or 0 replace the triggering contacts. (exchange the contact holder).
Instrument needles swings approx. 10 times between "0" and "oo". (Alternately 0/oo ohm)	As the fully depressed accelerator pedal is released the needles of the instrument must remain in the "oo" position. If "0" is shown then the throttle valve switch is defective, replace.
a) 0 (0 ohm) b) oo (oo ohm) <div data-bbox="243 703 500 829" style="text-align: center;"> </div>	a) resistance "oo": Throttle valve switch incorrectly adjusted or open circuit in cable (check adjustment, pull out plug and bridge as shown in illustration). If still at "oo", replace cable harness, otherwise replace throttle valve switch. b) resistance "0": Throttle valve switch incorrectly adjusted or short circuit in the cable. Pull out plug; if the test instrument still indicates "0", replace the cable harness, otherwise adjust or replace throttle valve switch.
2...5 (300 ohm at 68°F, strongly affected by temperature, higher temperatures give lower values.	Nominal value is at 68°F. At higher temperatures, the resistance is smaller. Reading "oo": Open circuit (make connection to ground; if instrument shows "0", replace temperature sensor, otherwise replace cable harness). Reading "0": Short circuit (pull out plug if reading is the same, cable is defective). If the test instrument then shows "oo", replace temperature sensor.
2...5 (approx. 2.5 K. ohms) Strongly affected by temp. higher temperature give lower values.	Same as temperature Sensor I
2...3 (2.4 ohm at 68°F)	Resistance "0": Short circuit in the cable or in the injector (pull out of injector concerned and if test instrument shows "00", exchange injector; otherwise replace cable harness). Resistance "oo", Open circuit in the cable or in the injector windings Bridge contacts in injector plug; if test instrument then shows "oo", cable harness is defective. If "0" then injector is defective. Resistance over "3" Ground cable from the injectors has a bad connection on the engine.

Position of switch "A" switch "B" has no effect	Operate	To measure
Valve check	Press "pump" button	Pressure in fuel line (connect pressure gauge: disconnect the fuel line on the pressure side of the pressure regulator and connect the pressure gauge to the fuel line).
	Press "pump" button briefly.	Leaks in the fuel system (pressure side)
Note: Carry out the following test only if injectors are thought to be defective. Injectors are removed.	Pressure build-up: Press "pump" button. Press buttons 1,2,3 and 4, one after the other.	Visual check of the injector spray. Collect fuel.
Checking cold start valve: 1. Cooling water temperature over 100° F ± 5.4°. 2. Cooling water temperature below 100° F ± 5.4°.	1. Disconnect temp. sensor II for cooling water. Press "pump" button, operate starter briefly. 2. Press "pump" button and operate starter briefly for 1 second temp. sensor II normally connected.	Function of the cold start valve.

Switch off ignition and remove pressure gauge.

Indication (nominal value)	Deviation from nominal value. Possible faults and elimination.
Nominal value 2 kg/cm ² (28 psi)	<p>No pressure build-up (pump does not start up): Pull out 2-pole plug from pump, press "pump" button and measure the voltage with the voltmeter at the plug contacts. Reading 12 volt: Pump defective, exchange. Reading "0": Check by listening whether relay energizes or not. If yes: break in cable from pump relay terminal 87 to pump plug or from plug to ground. Fuse in individual fuse box blown. If cables are good, pump relay is defective. If not: Break in cable from main relay terminal 87 to pump relay terminal 86 or from pump relay terminal 85 to cable 19 to the control unit. If the cables are in order then exchange the pump relay.</p> <p>Pressure above or below (28 psi): Pressure regulator incorrectly adjusted (readjust); if adjustment is not possible, pressure regulator defect (replace)</p>
Pressure may drop back to 1.2 kg/cm ² ; (17 p.s.i.) after this, any pressure drop should be very slow.	<p>Pressure drops below 1.2 kg/cm² as soon as the "pump" button is released or drops immediately to "0": Leak in pressure system (from header tank to pressure regulator). Pinch off fuel pressure line which comes from the pump just before injector pressure line. If the pressure continues to drop then the leak should be sought at the connections to the injectors, in the injectors themselves or in the pressure regulator. To determine in which group of injectors the leak is occurring, pinch off the fuel line just after the injector group to be tested. If pressure continues to fall, this injector group should be removed. Build up the pressure several times during the test as required. Make visual check to see if leaks occur at hose connections (also pressure gauge connection).</p>
	<p>Press "pump" button and check visually for leaks. The injector orifice may become wet, but not more than two drops should form per minute on the injector. If no leaks have been determined, exchange the pressure regulator.</p>
1. Cold start valve injects, gauge pressure drops.	<p>1. Check cable 34 from cold start valve to 87 on relay. Check 33 ground to cable 29. From starter relay check 50 to 86 on the control relay. Check terminal 85 to ground. Check cold start valve after above checks.</p>
2. Pressure must drop slowly or remove injector and visually check operation.	<p>2. If the pressure does not drop, renew temperature sensor II or check cold start as described under 1. above.</p>

IMPORTANT!

The following points must be observed before starting up the engine or damage can occur to the electronic unit:

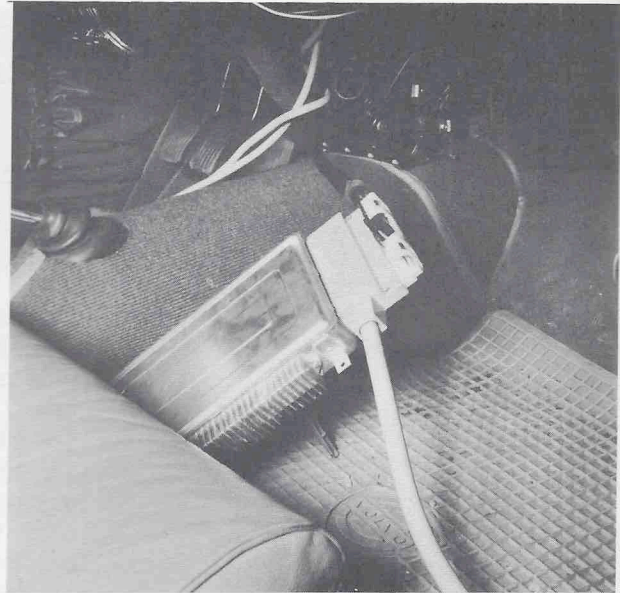
1. Never let the engine run without the battery connected.
2. Never use a high speed battery charger as a starting aid.
3. When using a high speed charger to charge the battery in the vehicle, the battery should be disconnected from the rest of the electrical system.
4. Check the polarity of the battery before installing.

Starting engine:

Cold engine: without depressing the accelerator pedal (throttle valve closed).
Warm engine: On part throttle (throttle valve slightly open).

Connect the control unit to the multi-way plug of the test instrument. The position of the switch "B" has no influence on the test procedure.

Turn off ignition before attaching tester. Before starting turn switch "A" to distributor contact I.



Position of switch "A"	Operate	To measure
Distributor contact I then Distributor contact II	Let engine run at about 2000 R.P.M. Switch over test instrument from Distributor contact I to Distributor contact II	Displacement of the triggering contacts in the ignition distributor

Indication

Needle moves toward full deflection and oscillates about an average value. When switching over from distributor contact I to II, max. deviation may be 2 graduations from the average value on the voltage scale.

Deviation from nominal value.
Possible faults and elimination.

If deviation is greater, the triggering contact holder in the ignition distributor should be renewed.

4. FAULT CHART BASED ON TROUBLES THAT COULD OCCUR (FUEL INJECTION SYSTEM ONLY). PREREQUISITE IS THAT THE IGNITION SYSTEM AND ENGINE IS IN SATISFACTORY CONDITION.

TROUBLE	CAUSE	REMEDY
Engine will not start. Pump not running.	1. Fuse faulty. Cables to pump relay or cables on pump relay defective. 2. Check plug on pump for good connection.	Renew 8 amp fuse. Check whether pump relay operates (switch ignition on and off and listen for audible of relay), if necessary test with voltmeter.
	No voltage at terminal 86 on pump relay (12 volt), because voltage supply relay not operating or cable broken	Eliminate any existing open circuit.
	Voltage present at terminal 86 on pump relay but no ground connection at terminal 85.	Pump operates for approx. 1-2 sec. after switching on ignition. Check with voltmeter; ground for terminal 85 is made by control unit. Replace control unit.
	Open circuit in cable 36 from cable harness.	Eliminate open circuit (check plug connection).
Engine will not start. Pump runs.	Connection from cable harness (cable 18) to starter terminal 50 defective.	Check with EFAW 228
	Pressure sensor cable not connected or open circuit.	Push on pressure sensor cable or repair.
	Open circuit in cable connection at temperature sensor.	Check cables, if necessary exchange temperature sensor.
	No pressure building up in main fuel line (pipe compressed or pressure regulator defective.)	Check pressure with gauge, if necessary exchange pressure regulator.
Engine will start cold, but stalls	Cable connector for triggering contacts not pushed on at ignition distributor or open circuit in cable.	If necessary, connect test instrument EFAW 228 and localize the fault; exchange.
	Triggering contact defective	Replace
	See also "Engine will not start".	
	Pressure sensor defective	Replace
Engine cuts out when driving (usually preceded by misfiring)	1. Triggering contact have excessive contact resistance or are dirty. 2. Plug loose 3. No fuel pressure 4. Ignition contacts defective.	1. Replace triggering contacts. 2. Check 3. Measure pressure Determine cause. 4. Check ignition

TROUBLE	CAUSE	REMEDY
Engine runs irregularly one cylinder not firing, exhaust white	One injector sticking	Exchange
	Connection to injector or injector coil not in order	Check connections, exchange injector, Test with instrument EFAW 228
Engine misfiring but not caused by ignition system	Loose connections, main ground cable has poor connection to body.	Check connections, tighten up ground connection.
Engine not reaching full power.	Fuel pressure too low.	Check pressure regulator
	Pressure sensor defective	Exchange
	Throttle valve not completely open	Check throttle valve.
Fuel consumption too high.	Fuel pressure incorrect	Check pressure regulator if necessary exchange.
	"Information sensors or the control unit not functioning correctly or the electrical connection have too high contact resistances.	Test the system according to section 3.
	Throttle valve switch III incorrectly adjusted	Adjust with test instrument EFAW 228
Engine hunts excessively at idle (between 1000 and 1700 rev/min)	Hose between auxiliary air regulator and induction manifold detached or defective	Push hose into position or replace.
	Throttle valve stop incorrectly adjusted (too wide open).	Readjust throttle valve stop.
	Idling speed set too high	Adjust idling speed
Engine misfires when accelerating.	Temporary enrichment device in throttle valve switch not functioning or plug incorrectly connected.	Check throttle valve switch (test instrument EFAW 228)
Too high idling speed. Idling speed cannot be adjusted.	1. Idling air system leaks	1. Check idling air system
	2. Smaller rubber sealing ring under the injector	2. Replace rubber sealing ring.
	3. Throttle valve incorrectly set.	3. Adjust throttle valve according to Section 5.2.

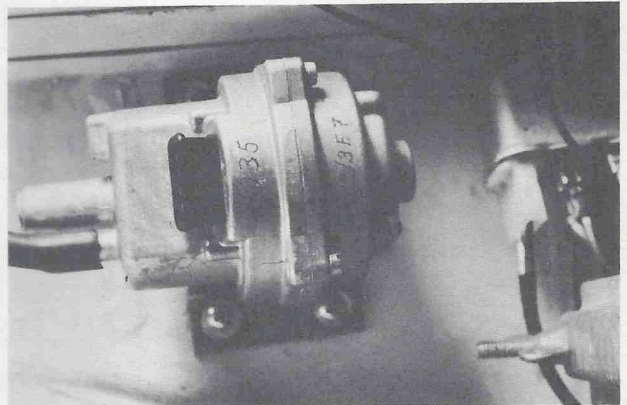
5. REMOVAL, INSTALLATION AND ADJUSTMENT OF THE INDIVIDUAL COMPONENTS IN THE SYSTEM

Grip the sides of the plugs when pulling them out, never pull on the cable. When reconnecting the plugs, onto the individual components, take care that the rubber caps are correctly pushed over the plugs.
Disconnect the battery.

5.1 Pressure sensor

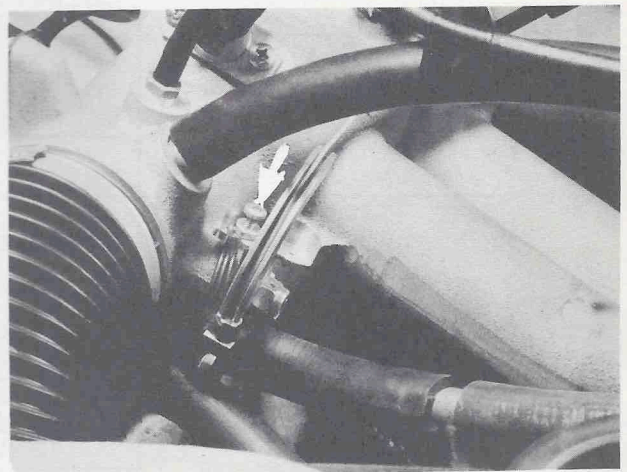
Pull off the hose, having removed the clips. Pull out four-way plug. Undo the three fixing screws with a 10 mm socket spanner and remove completely.

Note for installation!
The protective sleeve on the hose connection of a new pressure sensor must be removed only immediately before pushing on the connecting hose. Danger of dirt!



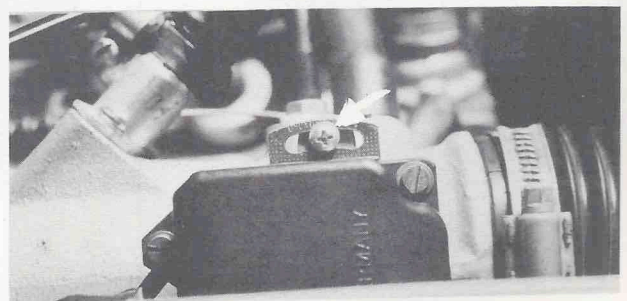
5.2 Adjusting the throttle valve

Important note!
The throttle valve stop screw is set in the factory so that the valve is completely closed. The stop screw is locked and must not be readjusted. It prevents the valve from closing too hard and possible seizure of the throttle valve. If a readjustment becomes necessary, one should proceed as follows:
Disconnect air hose from induction manifold. Screw in the top screw until the throttle valve lever is just touched, then turn the stop screw one-eighth-one quarter turn further. Check that the throttle valve is not sticking in the idle position.



5.3 Throttle valve switch

For removal pull out four way plug, undo both fixing screws and draw the switch off the throttle valve shaft.



Adjusting throttle valve switch:

The throttle valve switch must operate just as the throttle valve has opened 1° from its closed position. To facilitate the adjustment, graduations have been stamped into the both sides (one graduation mark = 2°). The degree markings correspond to marking on the induction manifold.

When adjusting, proceed as follows: Connect test instrument EFAW 228 as described in paragraph three; turn switch "A" to the "measure" position; turn switch "B" to the throttle valve switch "3".

Slide switch onto throttle valve shaft and lightly tighten up the two fixing screws. Reconnect four way plug and turn on ignition. Rotate the switch until the needle on the test instrument moves from "oo" position to "0". Now turn the switch by approximately one-half of a graduation = 1° further in a counter clock wise direction and tighten up. Finally check the adjustment by operating the throttle valve.

5.4 Pressure regulator

Removal of pressure regulator:

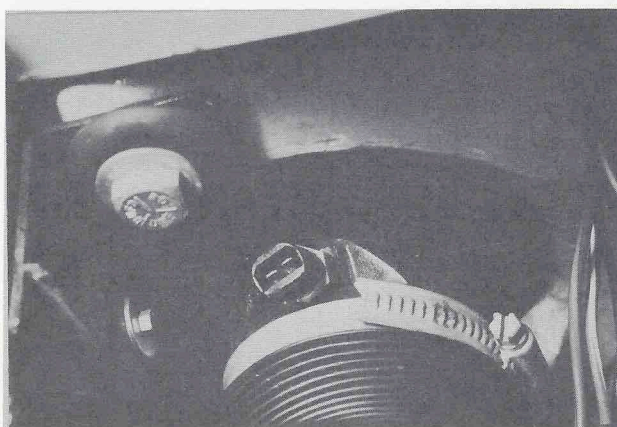
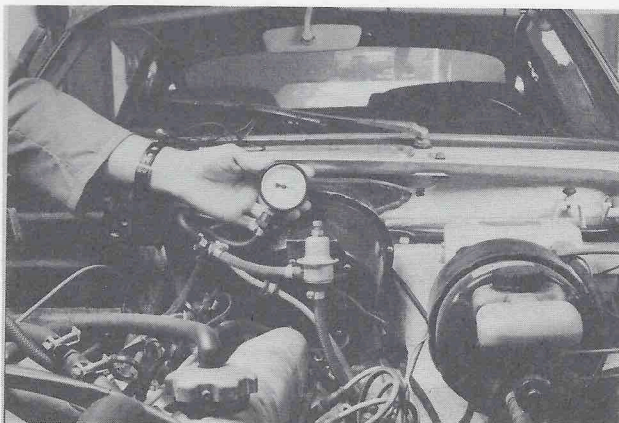
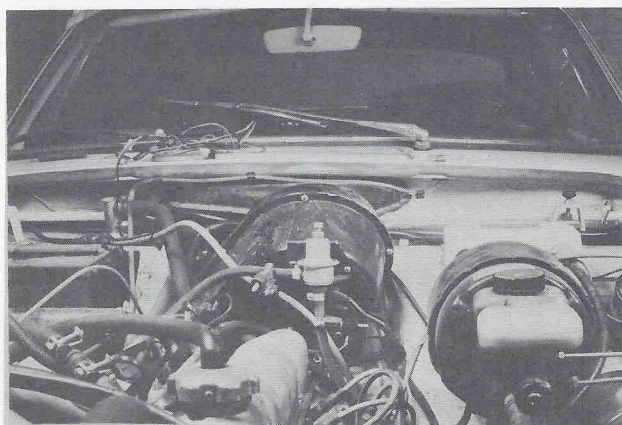
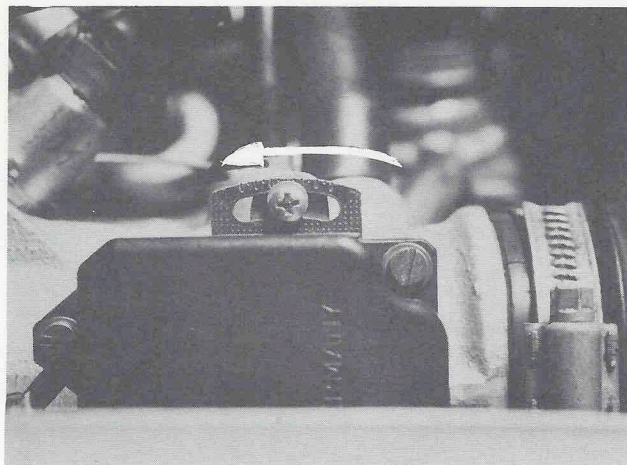
Remove the pressure and return pipes, having undone the hose clips. The hoses should be immediately plugged to prevent loss of fuel. Use either a $11/16$ in. open ended or ring spanner to loosen the fixing nut and remove pressure regulator.

Adjusting the pressure regulator:

The setting of the pressure regulator (and hence the fuel pressure) has considerable effects on the fuel consumption and the composition of the exhaust gasses. For this reason the setting should be altered only if the pressure measured varies from the nominal value of (28 psi). Connect pressure gauge in the fuel pipe to pressure regulator. Start up the engine and run at high idling speed or control the fuel pump from the test instrument EFAW 228. Loosen locking nut on the pressure regulator and set the pressure to (28 psi), using the hexagon screw. Finally tighten up the lock nut.

5.5 Temperature Sensor I (air)

To remove the temperature sensor remove the two pronged plug and using a $1/2$ " open end wrench, Unscrew the sensor. When installing the sensor a new sealing ring (arrow) must be used.

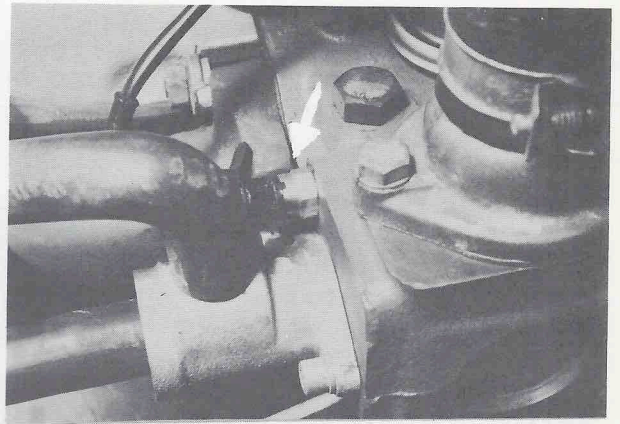


5.6 Temperature sensor II (cooling water)

Before the temperature sensor can be removed a certain quantity of cooling water must be drained off (catch the cooling water) and discharge the pressure of the cooling system by turning the radiator cap. Then, retighten the cap.

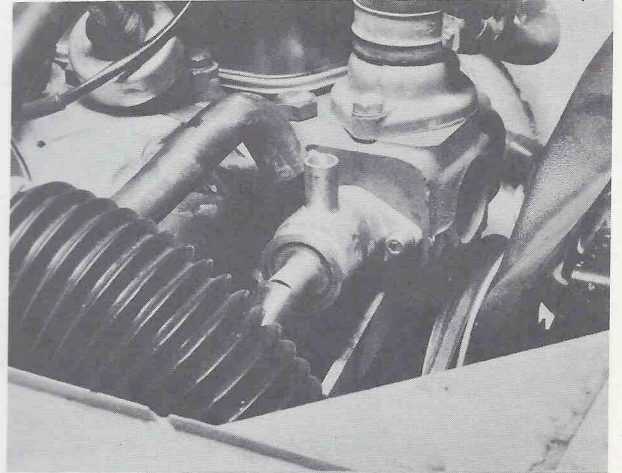
Disconnect electrical plug connection and screw out the sensor with a 13 mm (1/2 in) open ended spanner.

When refitting the temperature sensor, the sealing ring (arrow) must always be renewed.



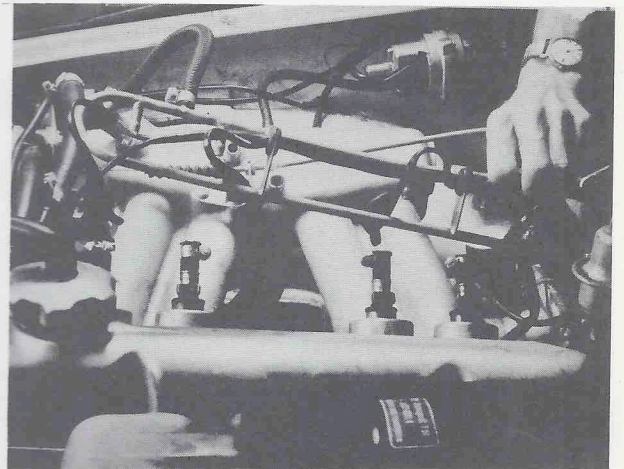
5.7 Auxiliary air regulator

Drain off some cooling water, remove the two air hoses from the auxiliary air regulator. Undo 3/16 Allen screws and draw out regulator. When refitting, the sealing ring between auxiliary air regulator and the engine block should be renewed. (arrow)

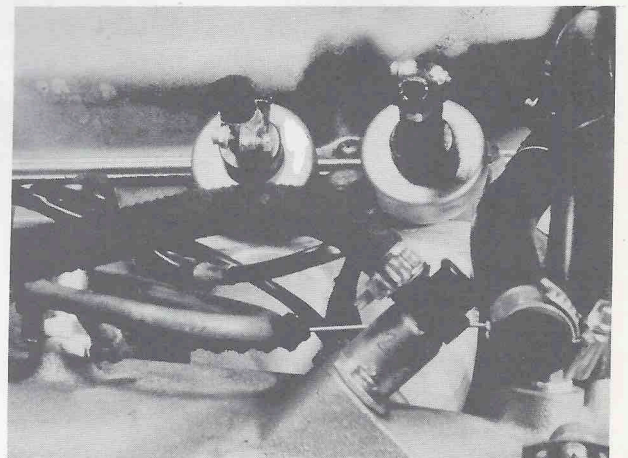


5.8 Fuel Injectors

Install a line clamp on the hose from the regulator to the supply tube. Remove the rubber boots and disconnect the plugs to each injector. Loosen the hose clamps at the injectors, press down on each injector hose to loosen it from the supply tube, and remove the tubing.

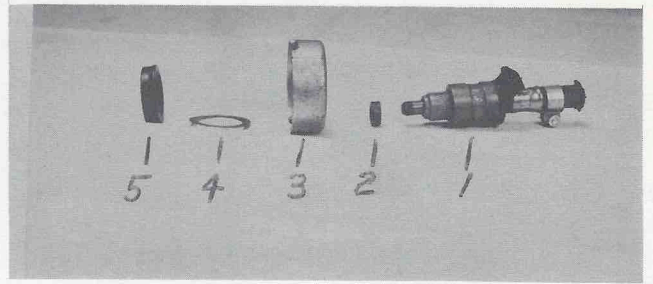


Rotate the locking ring counter clock wise, (arrow) 1/4 turn.

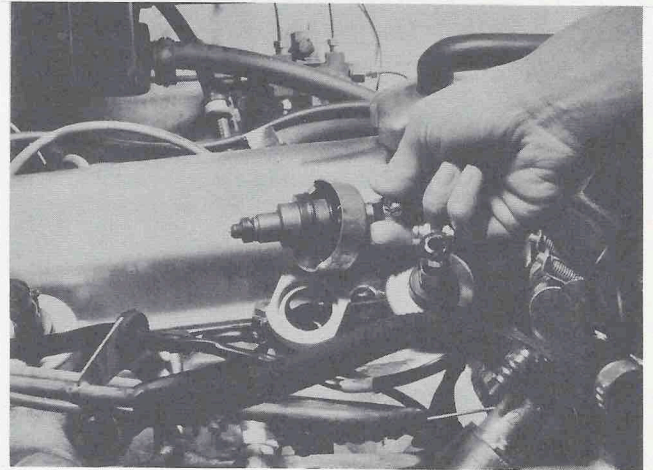


Fuel injector and mounting and seals

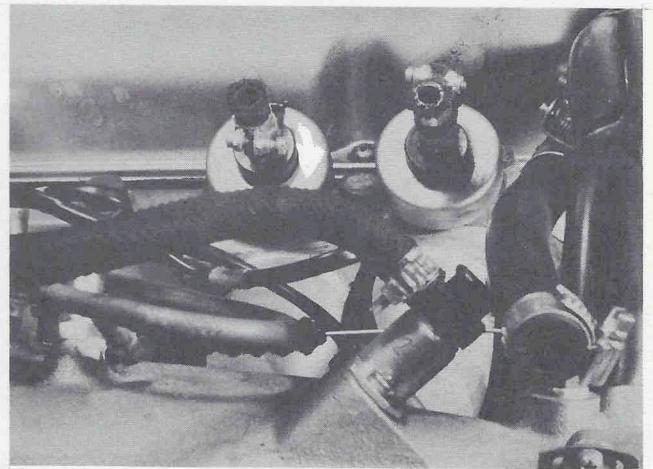
1. Injector complete
2. Seal-intake passage
3. Lock ring
4. Washer
5. Seal-cylinder head



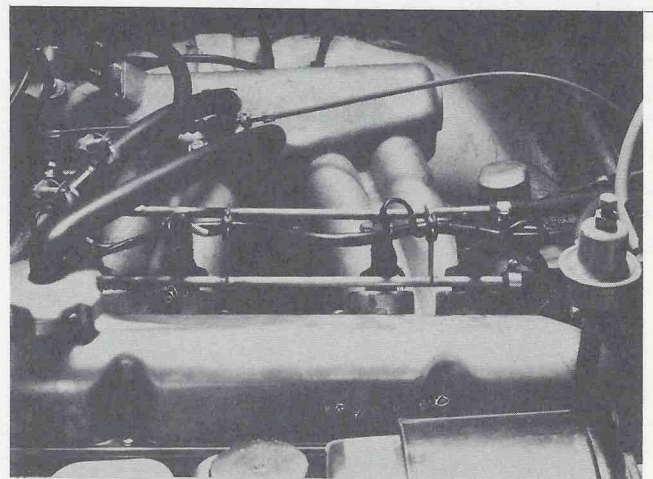
Fuel injectors - Install
First install lock ring (3), then
washer (4), then seal (5) and finally
seal (2).



Carefully install injector into
cylinder head and rotate lock ring
clock wise (arrow) until it stops.

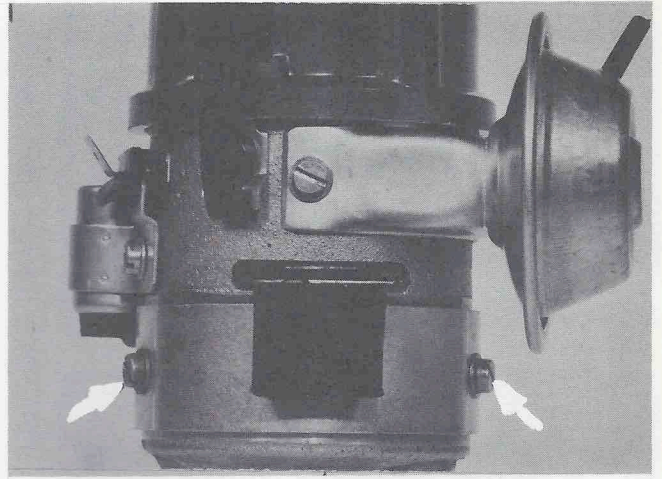


Install the fuel supply tubes to each
injector and tighten the clamps
securely. Install the connector plugs
and install the boots over the edges
of the connector housings securely.
Remove the hose clamp on the supply
hose installed previously.

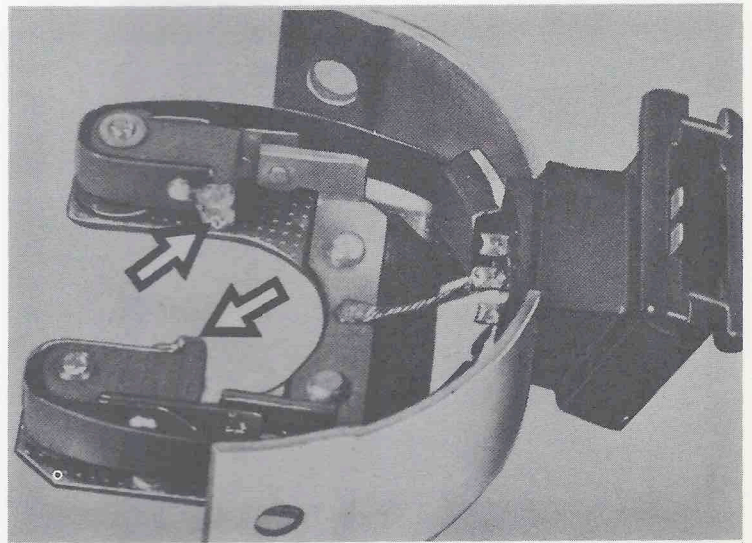


5.12 Ignition distributor triggering contacts.

To replace the holder with the triggering contacts, the ignition distributor should be first removed. The two triggering contacts are mounted on the holder in the lower part of the distributor. Undo the two screws for the holder (arrow) and pull out the holder.

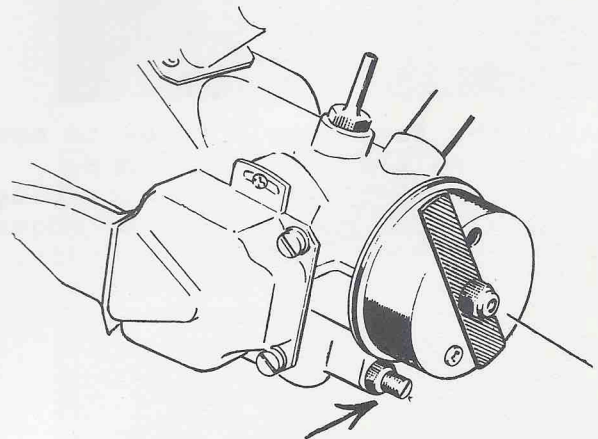


Before installing the new holder lubricate the contact rubbing blocks with ignition contact lubricant.



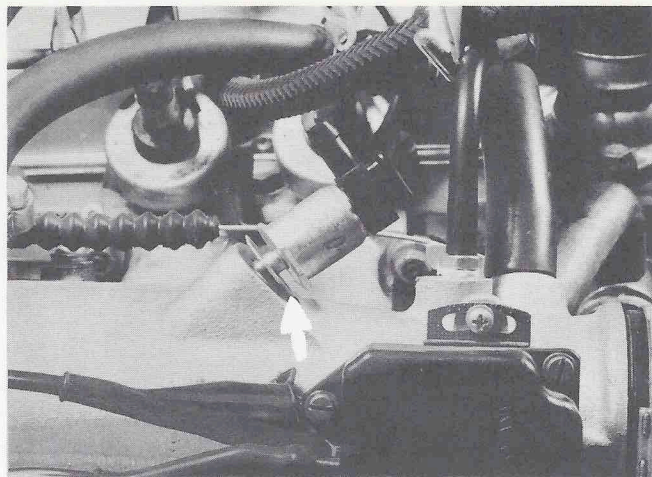
5.13 Adjusting ignition timing and idling speed.

Cover 9992902 is placed over air intake as shown and idle speed lowered to 750 R.P.M. by controlling small opening in cover. Ignition timing is set to 10° B.T.D.C. with the distributor vacuum line disconnected. Engine idle speed is set to 900 R.P.M. by adjusting the idle by pass screw. The lock nut is tightened to hold this adjustment. Engine temperature must be at least 175° F. when setting idle speed.



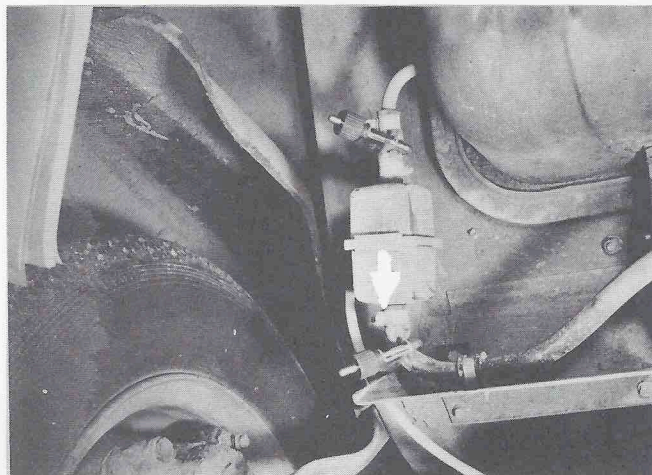
5.9 Cold Start Valve

Install a line clamp on the fuel supply hose. Remove the hose from the valve after loosening the clamp. Remove the electrical connector. Remove the two screws and lift out the valve. Use a new gasket (arrow) when installing the valve.



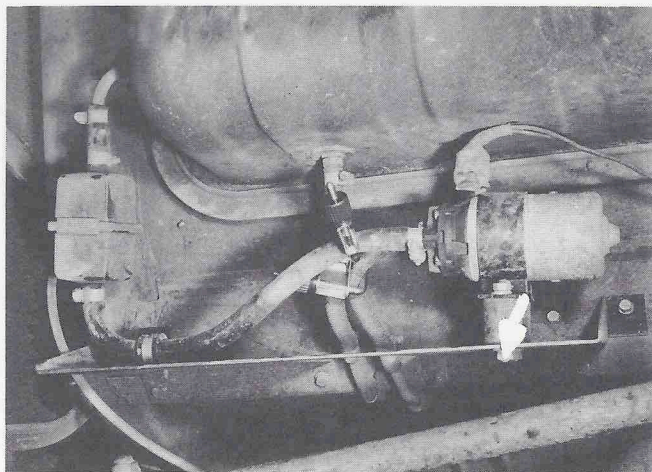
5.10 Fuel Filter

Install two line clamps as shown. Loosen hose clamps on fuel lines and remove filter. Be sure to install filter with direction of flow arrow as shown.

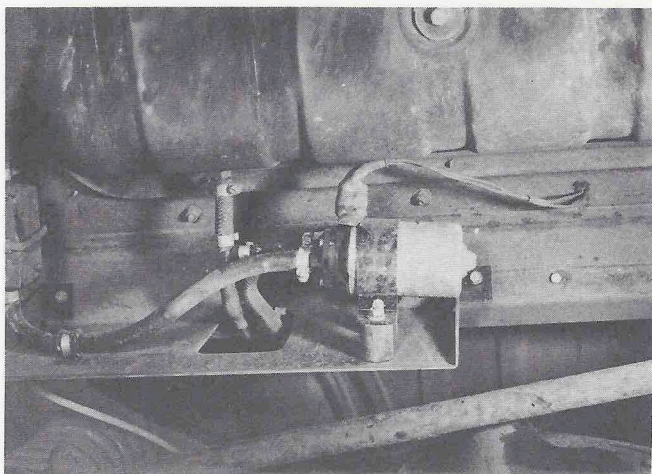


5.11 Fuel Pump

Remove electrical contact. Install line clamps as shown. Loosen clamps on pump and remove hoses. Remove nuts at arrow.



Install fuel lines and tighten clamps. Install mounting nuts. Install contact plug and boot. Remove fuel line clamps.



NOTES

