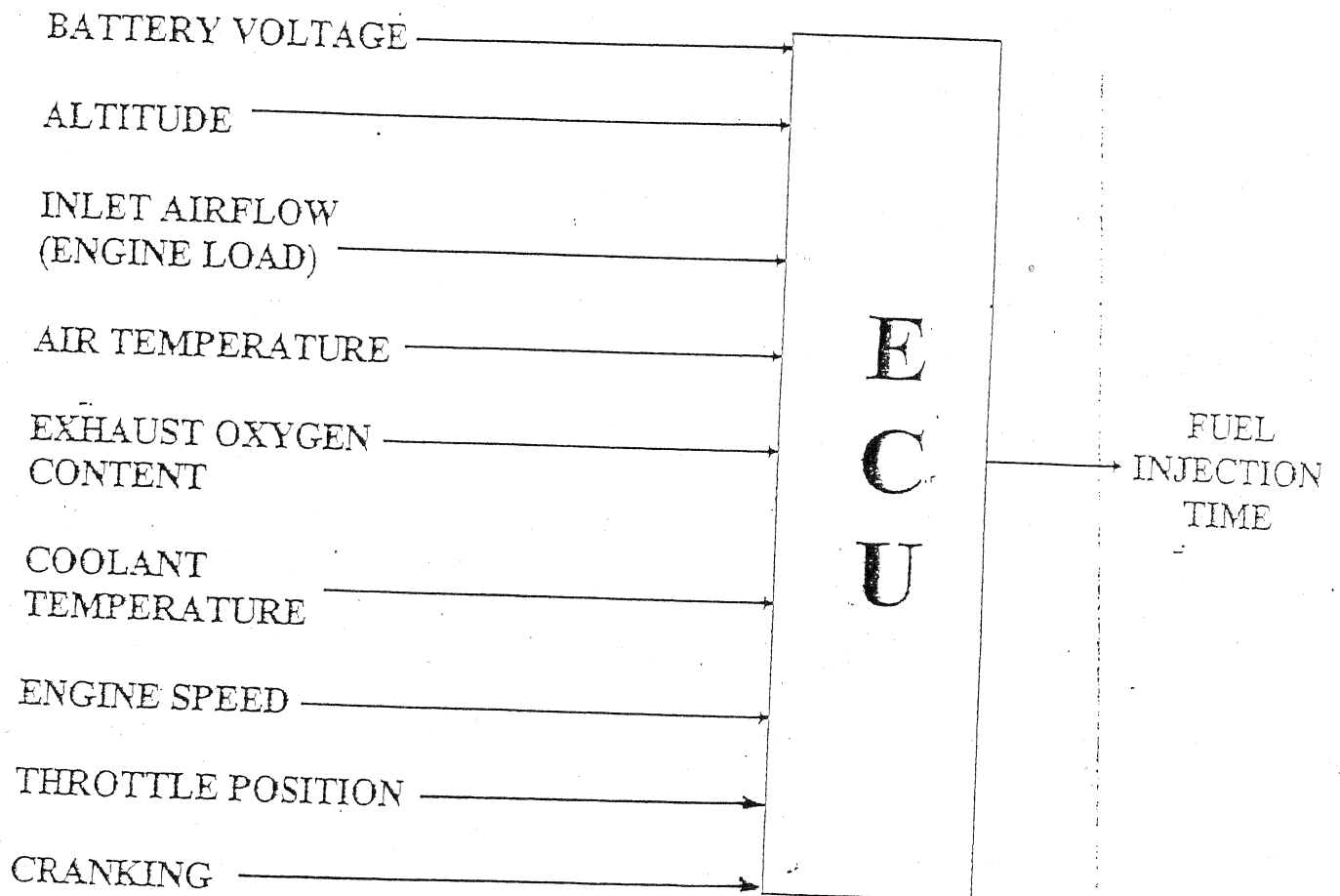


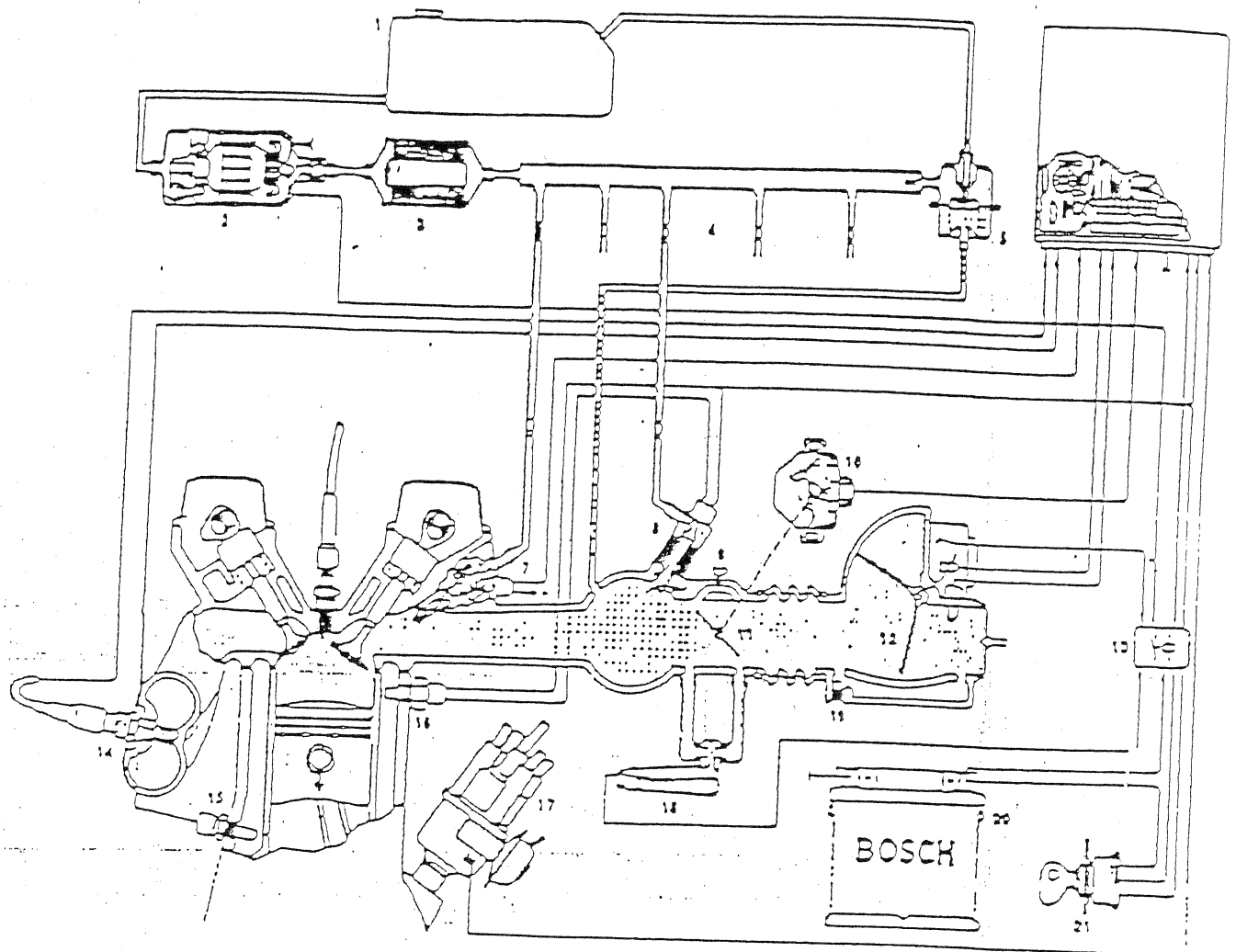
ELECTRONIC FUEL INJECTION CONTROL SYSTEM



L - Jetronic

L-Jet. Complete system

L - Jetronic, complete system with Lambda sensor



- | | |
|--------------------------------|---------------------------|
| 01. Fuel tank | 02. Fuel pump |
| 03. Fuel filter | 04. Distribution pipe |
| 05. Pressure regulator | 06. Control unit |
| 07. Injector | 08. Cold-start valve |
| 09. Idle speed adjusting screw | 10. Throttle valve switch |
| 11. Throttle plate | 12. Air-flow sensor |
| 13. Relay set | 14. Lambda sensor |
| 15. NTC 2 | 16. Thermo time switch |
| 17. Distributor | 18. Auxiliary-air valve |
| 19. CO adjusting screw | 20. Battery |
| 21. Ignition switch | |

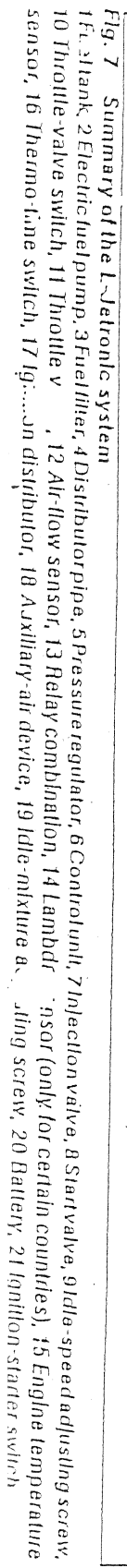
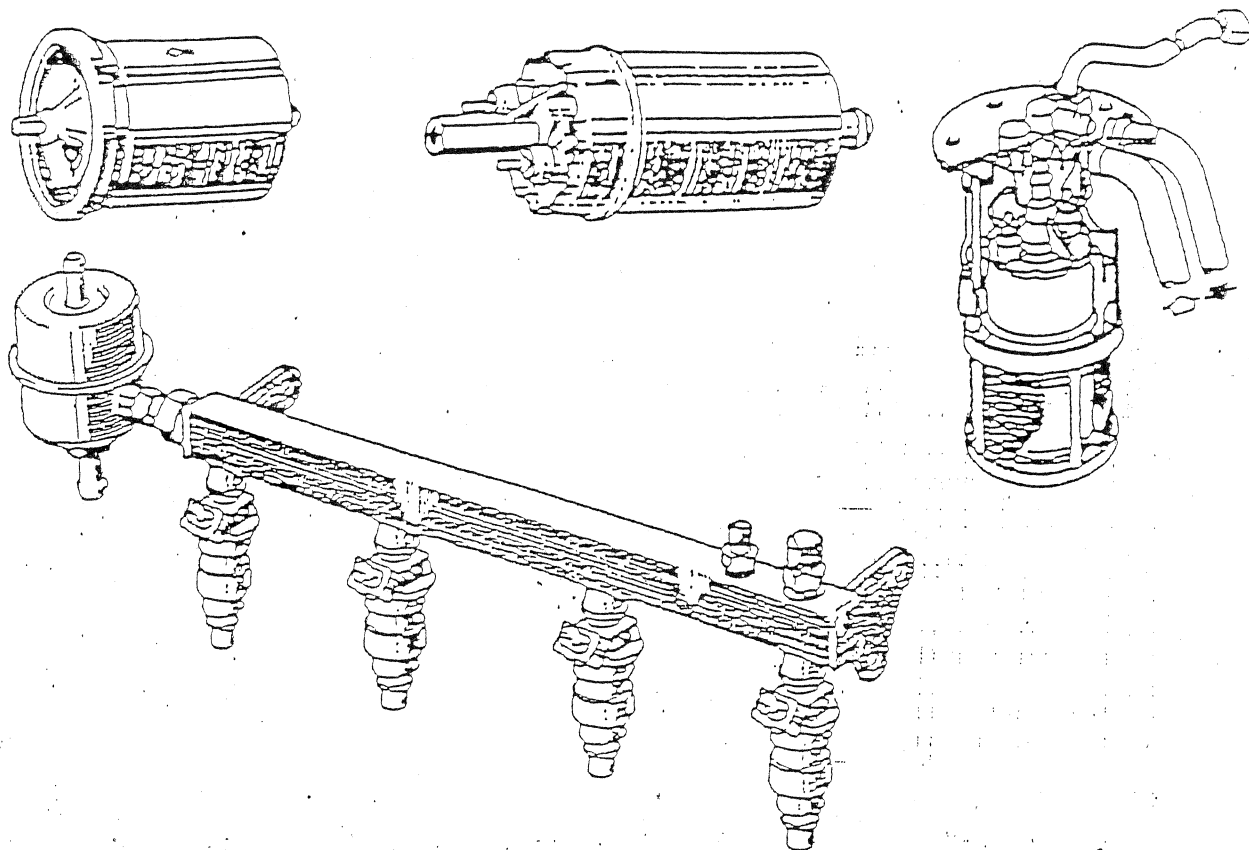


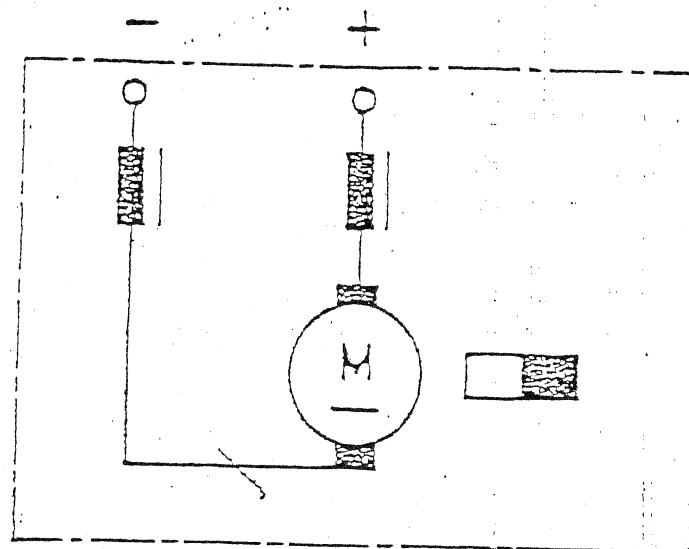
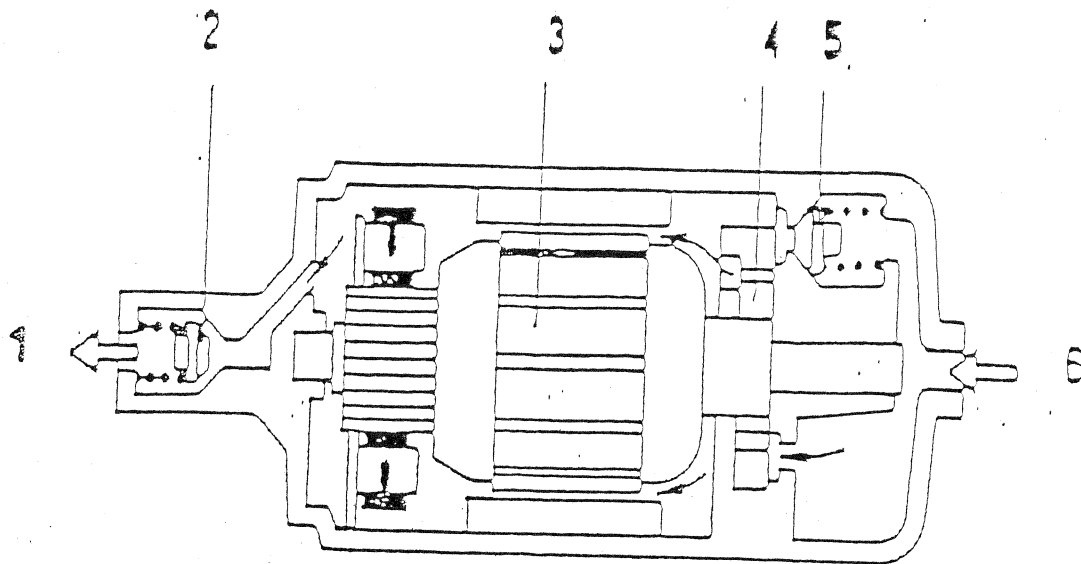
Fig. 7 Summary of the L-Jetronic system

L - Jetronic Fuel system



01. Which components comprise the L - Jetronic fuel system?

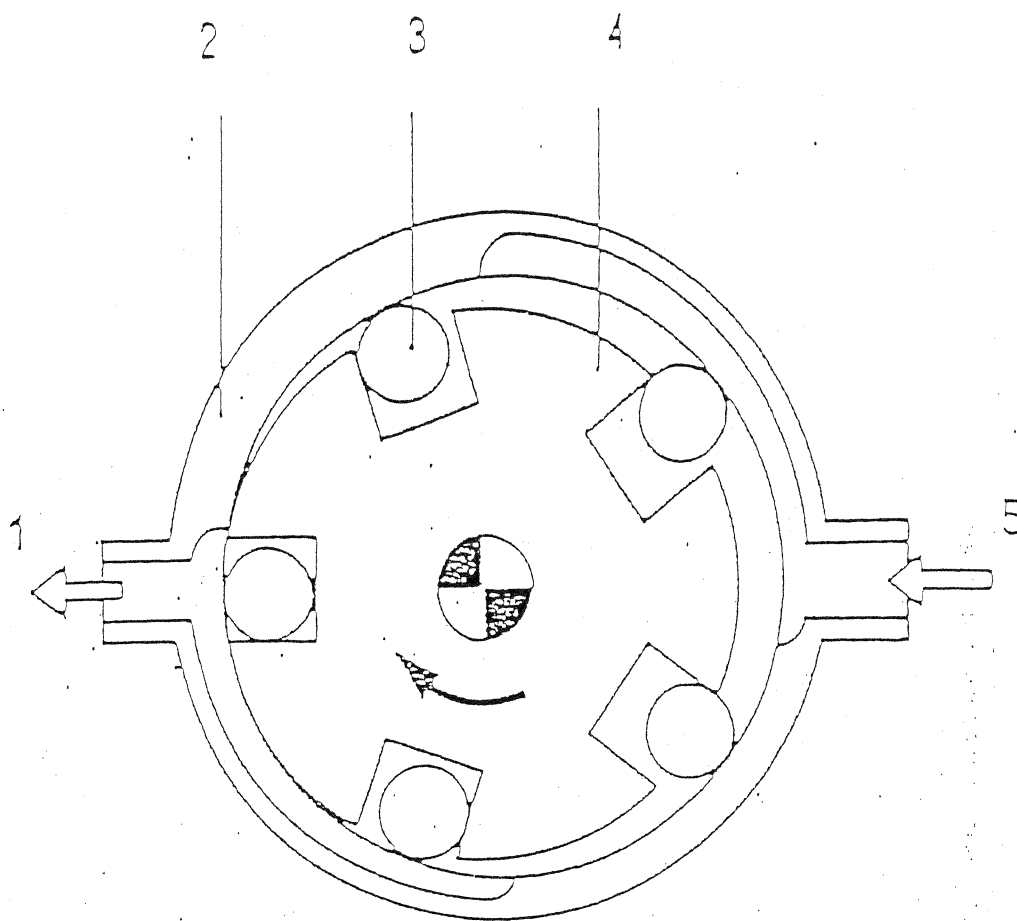
- FUEL FILTER
- ELECTRIC FUEL PUMP
- FUEL PRESSURE REGULATOR
- FUEL DISTRIBUTOR PIPE
- INJECTORS
- PRESSURE DAMPER
-
 -
 -
 -
 -



NAME THE ABOVE PARTS:

- 1 = OUTLET
- 2 = NON-RETURN VALVE
- 3 = MOTOR
- 4 = ROLLER CELL
- 5 = SAFETY VALVE
- 6 = INLET

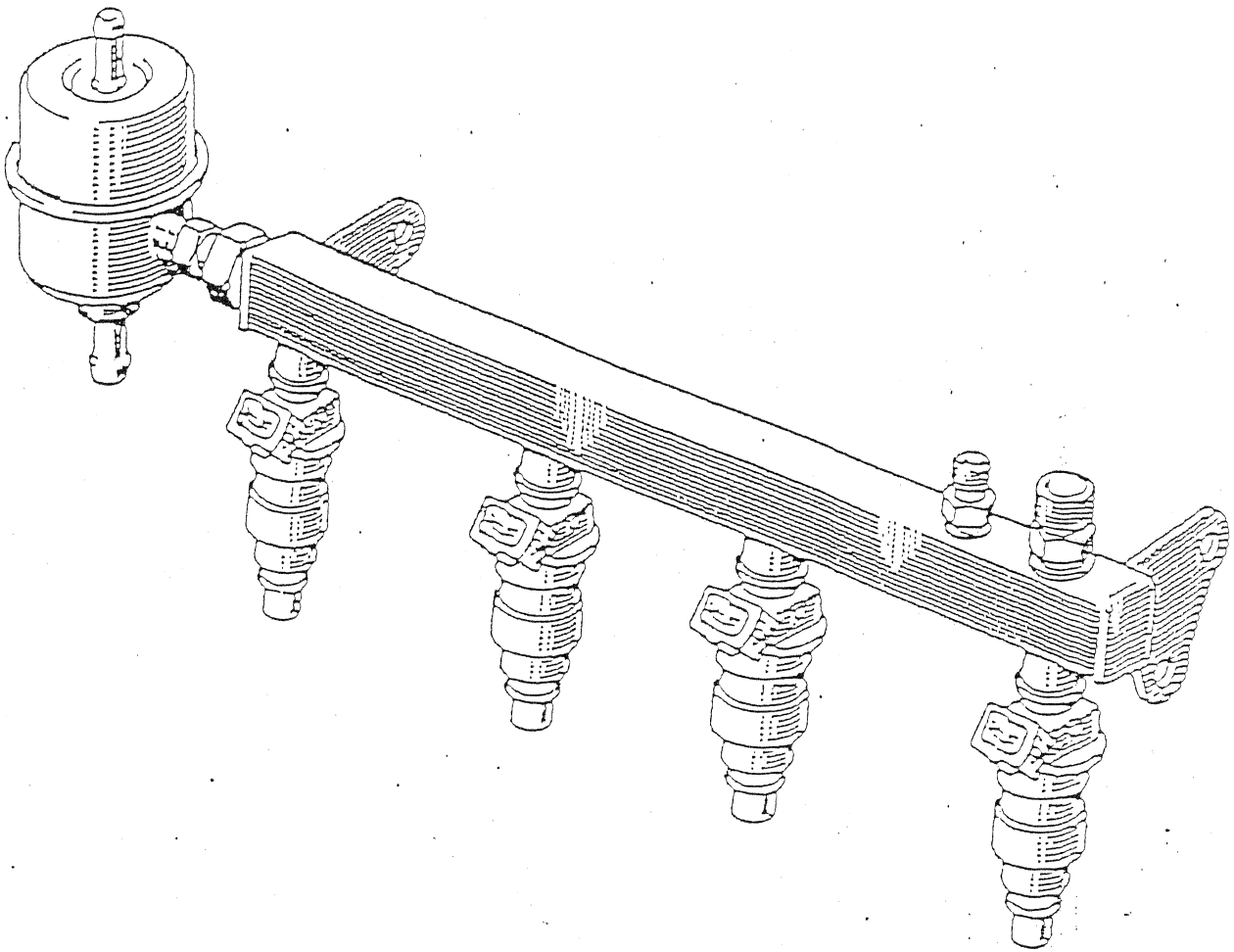
ELECTRICAL FUEL PUMP
CONSTRUCTION AND CIRCUIT



- 1 = PRESSURE SIDE
- 2 = PUMP HOUSING
- 3 = ROLLERS
- 4 = PUMP ROTOR
- 5 = SUCTION SIDE

ELECTRIC FUEL PUMP
 ROLLER CELL PUMP

Fuel distribution pipe



01. What are the functions of the fuel distribution pipe?

1. PRESSURE DAMPER
2. EQUAL PRESSURE TO INJECTORS
3. HOLDER FOR INJECTORS

02. What are the different modes of connection?

1. STANDARD CONNECTION WITH SEAL BEAD
2. DOUBLE SEAL EDGE CONNECTION
3. PLUG IN CONNECTION WITH 'O' RING SEAL

03. Why is the flow or return of some vehicles fitted with a diaphragm damper?

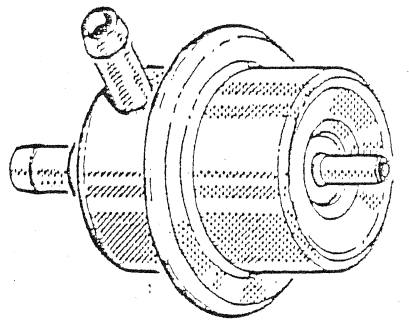


Fig. 9 Fuel pressure regulator Model 4RV

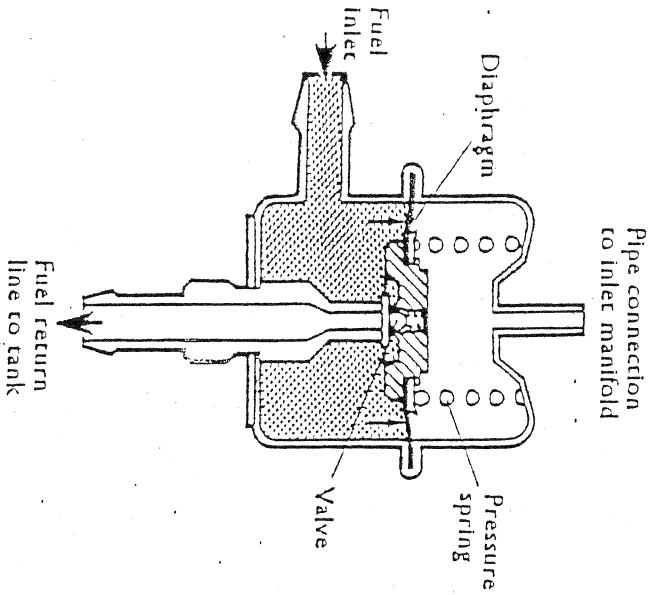


Fig. 10 Fuel pressure regulator, sectioned

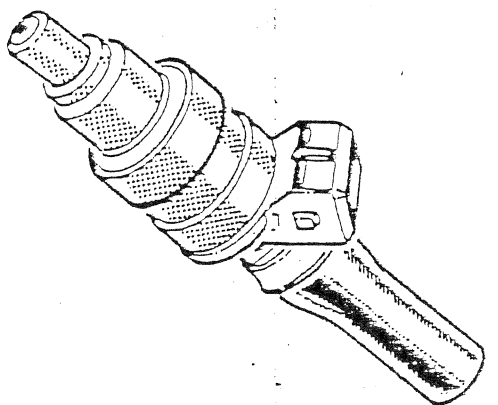


Fig. 11 Fuel injector Model 4NI

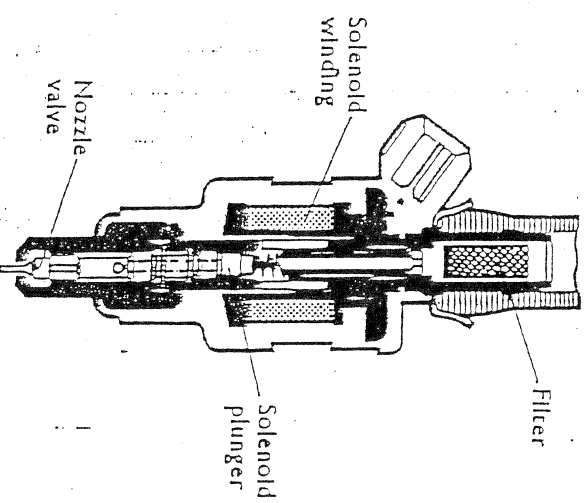
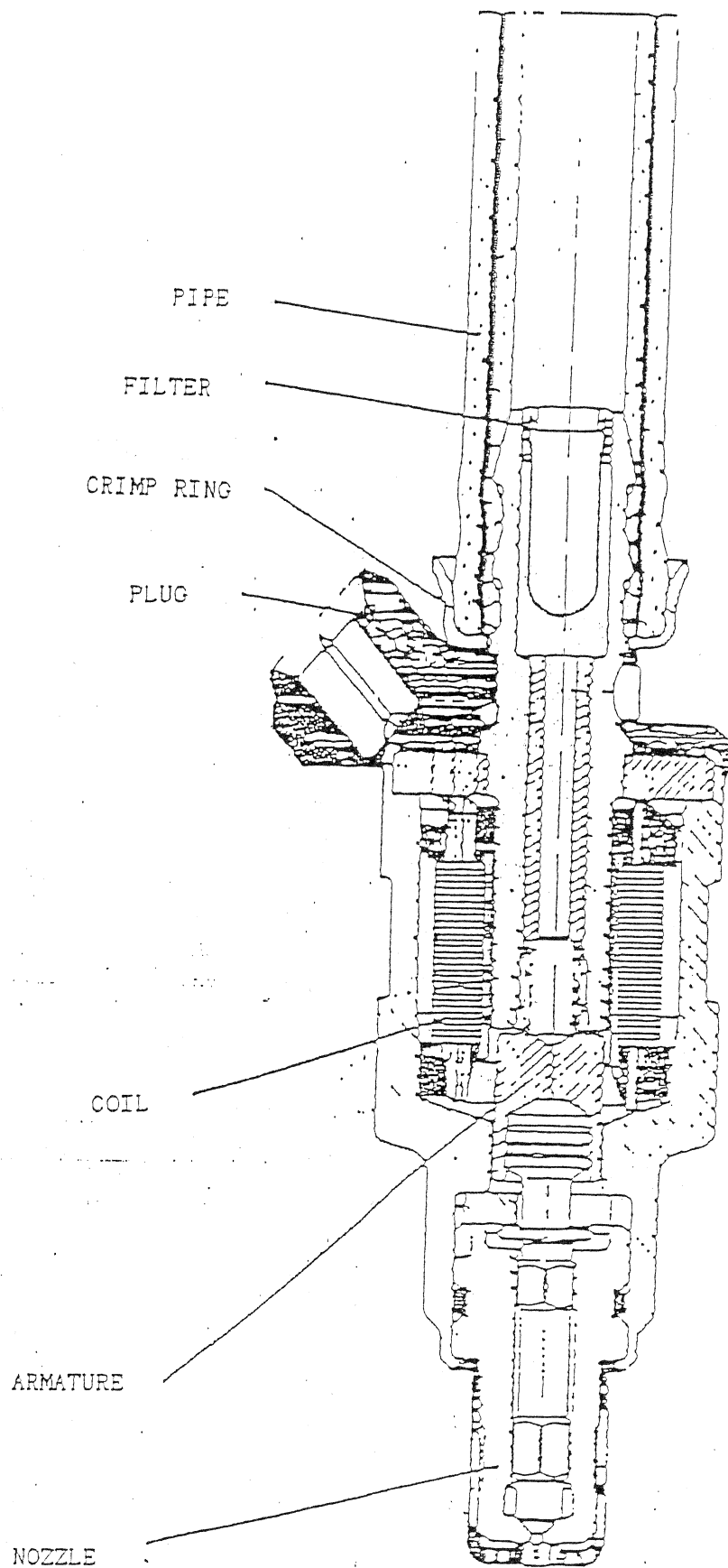
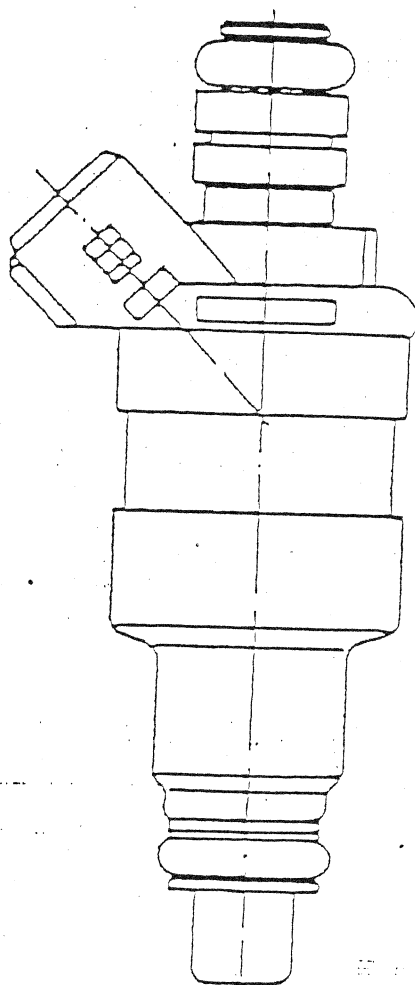


Fig. 12 Fuel injector, sectioned

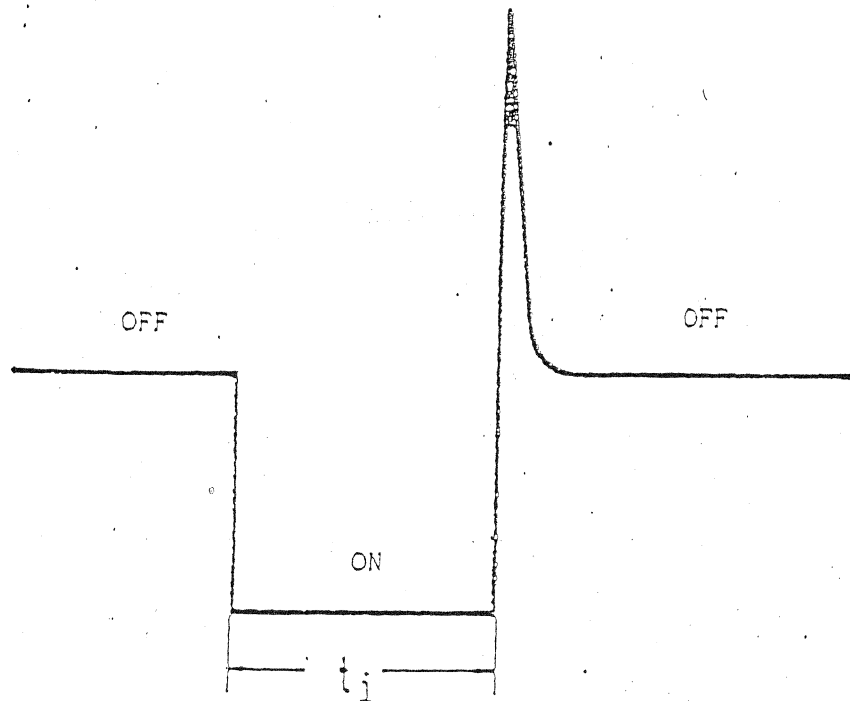


L - JETRONIC
INJECTOR VALVE

NEW JETRONIC INJECTOR VALVE



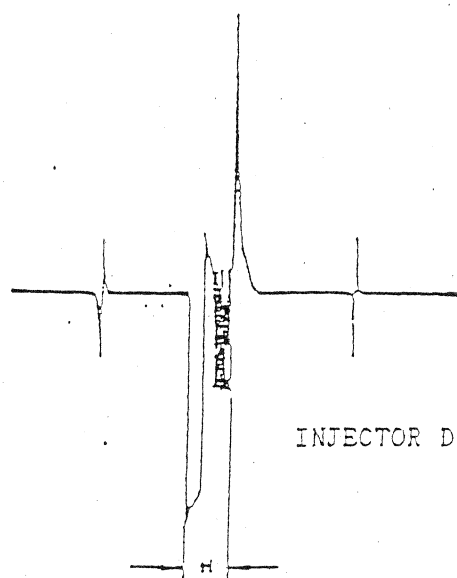
INJECTION SIGNAL FOR ECU WITH SERIES END STAGE



UPON WHICH FACTORS IS THE LENGTH OF THE SIGNAL DEPENDANT?

1. ENGINE LOAD
2. ENGINE SPEED
3. BATTERY VOLTAGE
4. ENGINE COOLANT TEMPERATURE

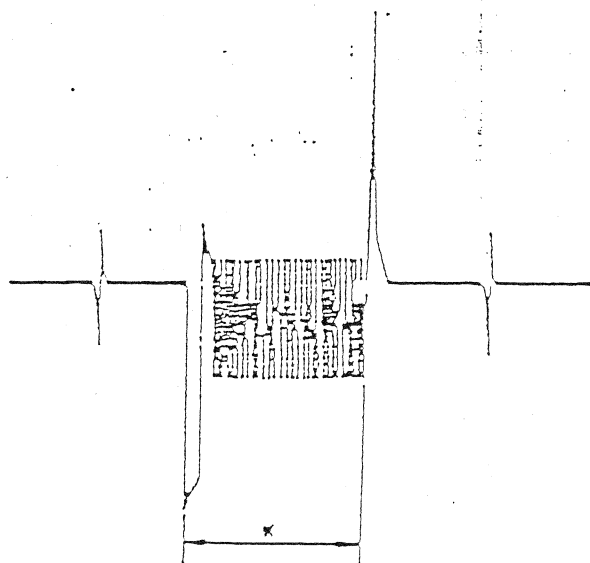
INJECTION SIGNAL WITH CURRENT REGULATED END STAGE



NO SERIES RESISTORS (BMW)

INJECTOR DURATION

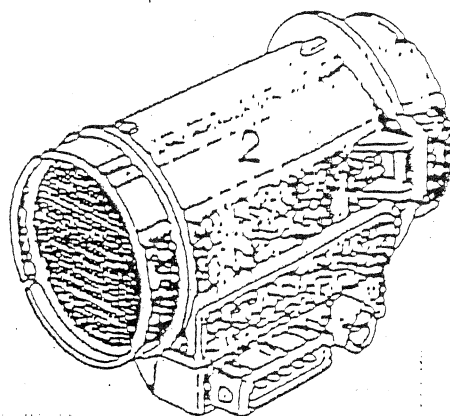
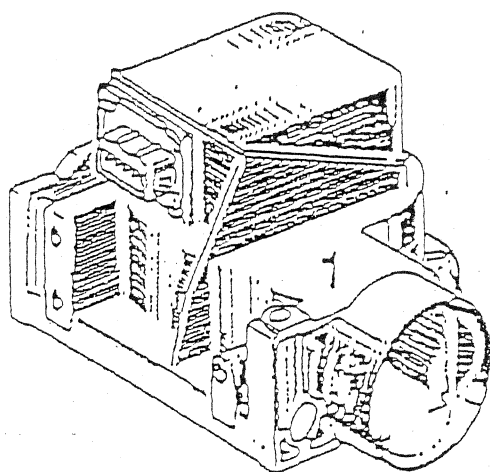
IDLE



FULL LOAD

L - Jetronic

Load measurement



- 1 = VANE/FLAP TYPE AFM
 2 = HOT WIRE AIR MASS METER

01. Which load measurement options are possible in Jetronic systems?

Option	Type of measurement/application
1. - PRESSURE	MANIFOLD DEPRESSION MEASUREMENT D-JETRONIC
2. - AIR-FLOW	AIR FLOW THROUGH AFM L - LE - LU - LES JETRONIC
3. - AIR MASS	AIR MASS OVER HOT WIRE AIR MASS METER LH JETRONIC
4. - ALPHA-N CONTROL	THROTTLE VALVE ANGLE BY POTENTIOMETER ENGINE SPEED MONO-JETRONIC

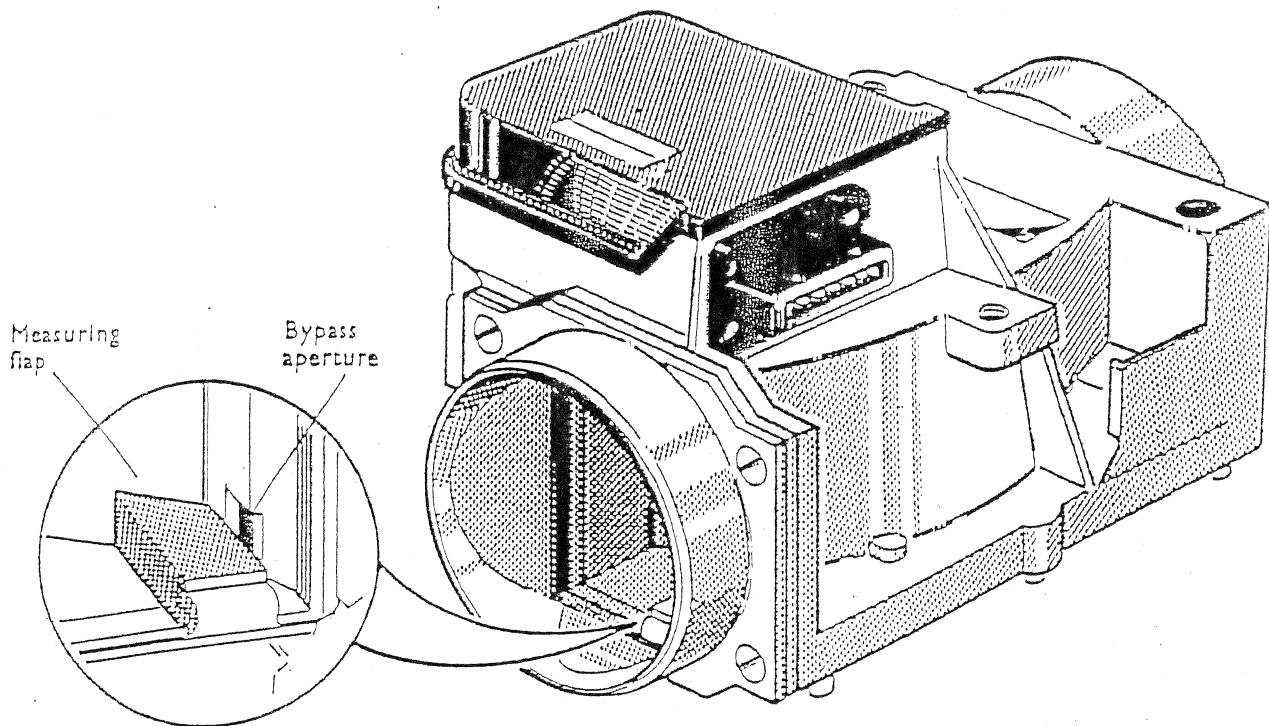


Fig. 13 Airflow meter Model 2AM

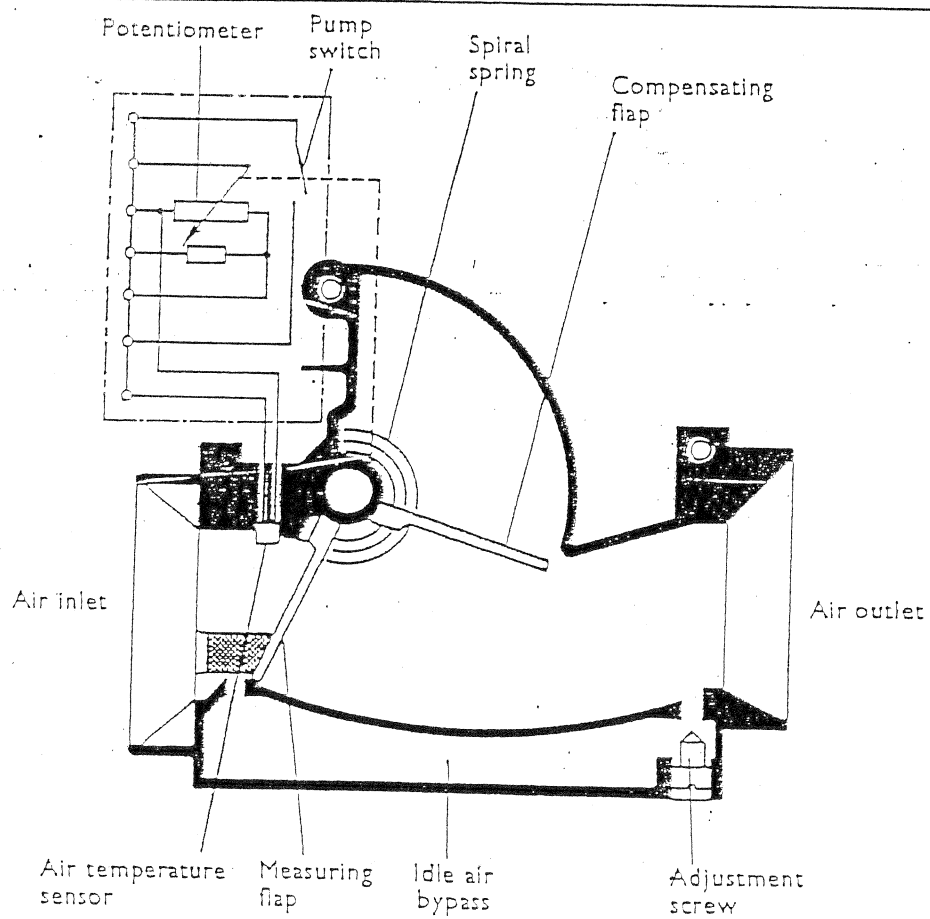
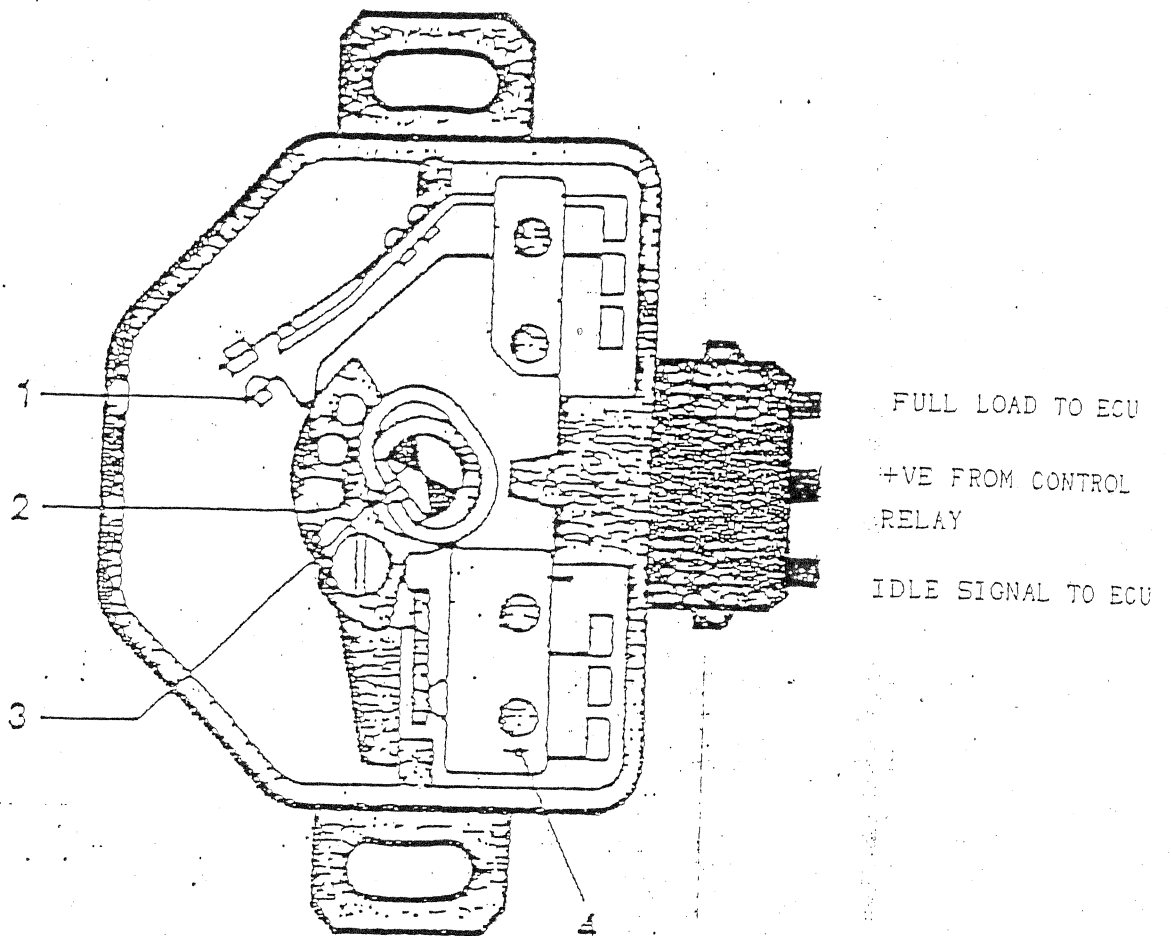


Fig. 15 Schematic drawing of airflow meter

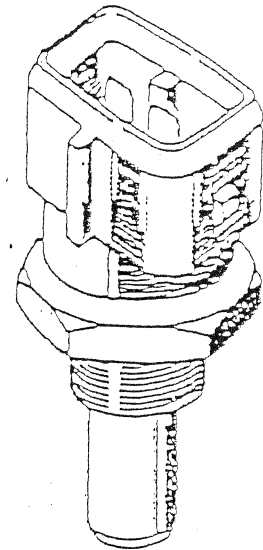
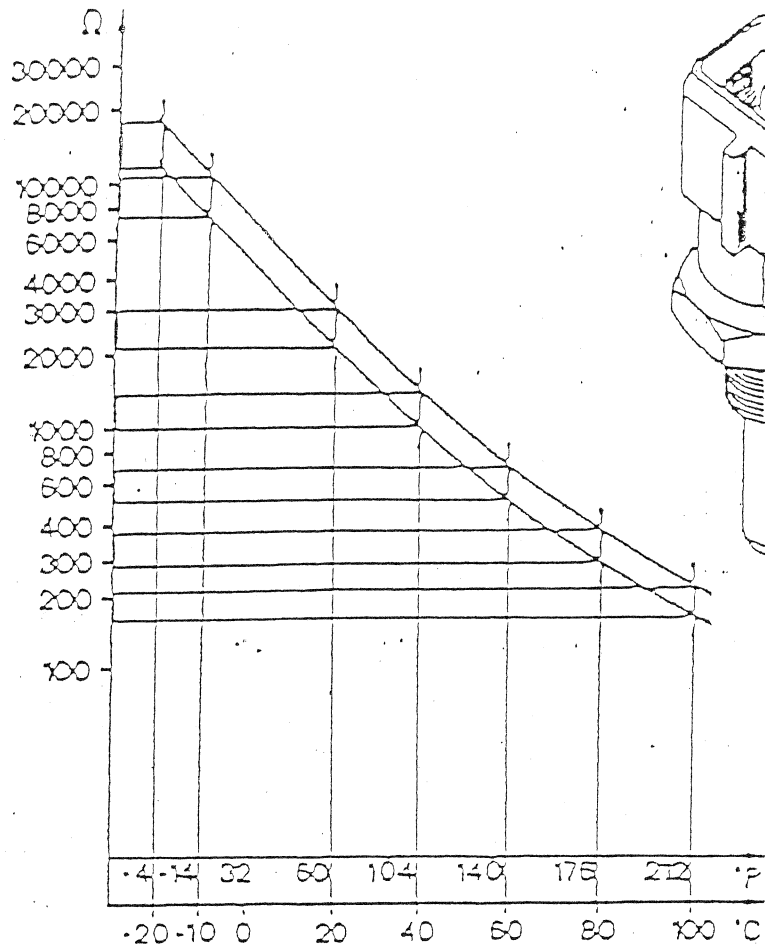
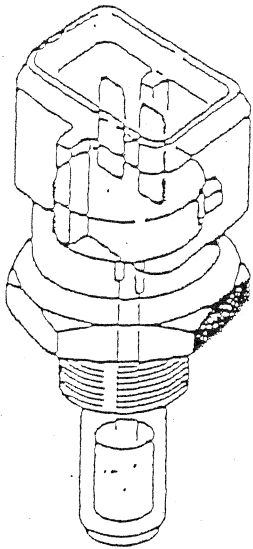
THROTTLE VALVE SWITCH WITH MICROSWITCH



NAME THE ABOVE COMPONENTS...

1. FULL LOAD CONTACTS
2. FULL LOAD CONTACTS OPERATING CAM
3. SHAFT
4. IDLE MICROSWITCH

Engine temperature sensor



01. Which types of NTC resistor are currently in use?
- WHITE - 5% TOLERANCE
 - BLUE - 2.5% TOLERANCE
 - BLACK - 2.5% TOLERANCE

02. What are the functions of NTC 1 and NTC 2?

NTC 1 AIR TEMPERATURE SENSOR

NTC 2 COOLANT TEMPERATURE SENSOR

03. Determine the resistance values for the following temperatures from the graph.

- 20 °C: = 11 - 18 kΩ

+ 20 °C: = 2 - 3 kΩ

+ 60 °C: = 500 - 700 Ω

+ 80 °C: = 290 - 375 Ω

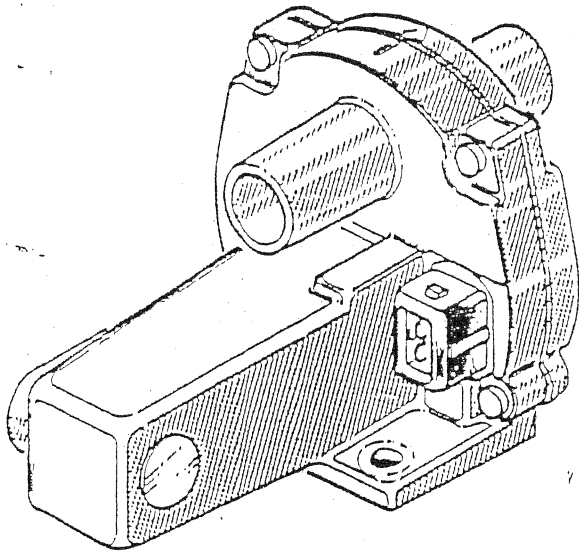
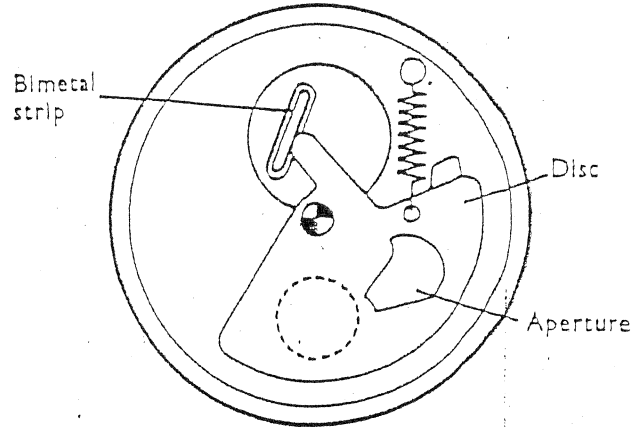
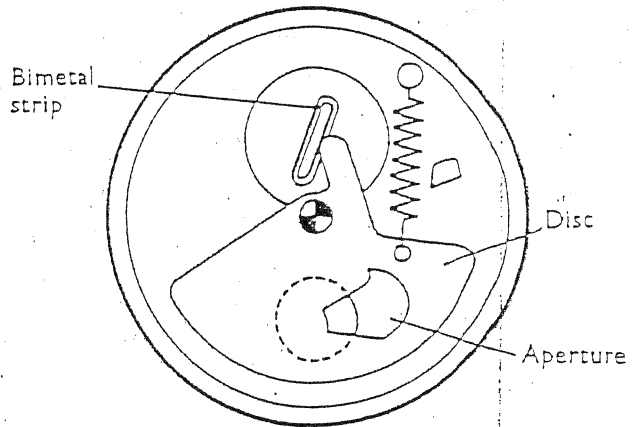


Fig. 23 Extra air valve Model 5AV



(i) By-pass channel closed



(ii) By-pass channel partly open

Fig. 24 Diagrams showing operation of extra air valve

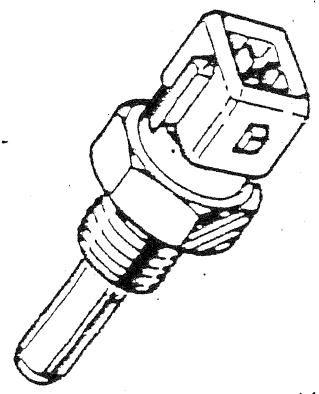
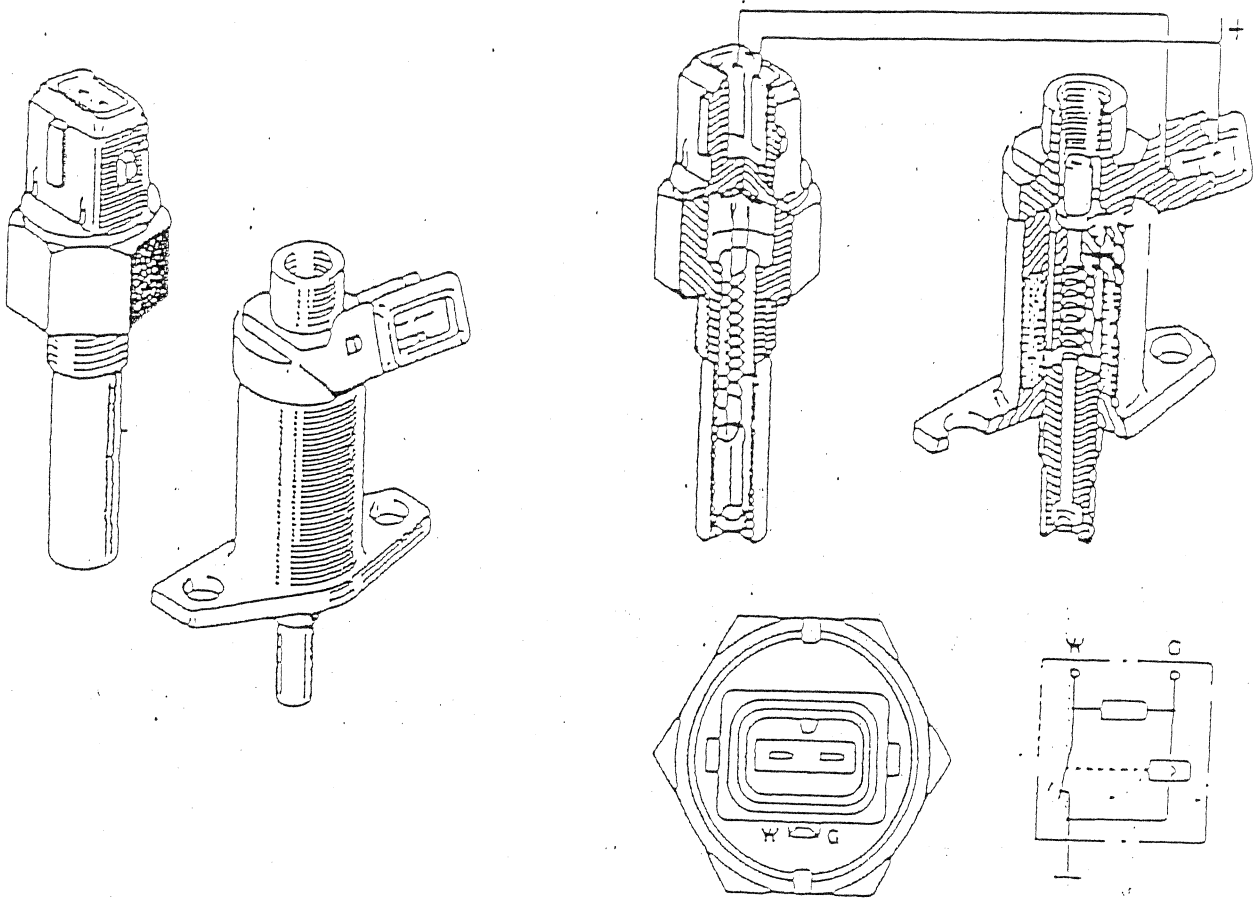


Fig. 25 Coolant temperature sensor Model 3TT

Cold-start equipment



01. What are the functions of the thermo time switch?

TO CONTROL THE 'ON' TIME OF COLD START VALVE

02. What is the meaning of the inscription '35°C 8 seconds'? 35°C AND ABOVE - SWITCHING CONTACTS OPEN

8 SEC - SWITCHING TIME FROM -20°C

03. What is the function of the cold-start valve?

INJECTS ADDITIONAL FUEL DURING CRANKING - ENGINE COLD

04. What do the inscriptions 'G' and 'W' mean?

G = TERMINAL 50 - STARTER W = GROUND FOR COLD START VALVE

05. What tests can be made on the cold-start valve?

RESISTANCE CHECK - SPRAY PATTERN - LEAK CHECK - VOLTAGE CHECK

06. What are the symptoms of a defective cold-start valve?

RICH MIXTURE - DIFFICULT COLD START - DIFFICULT HOT START

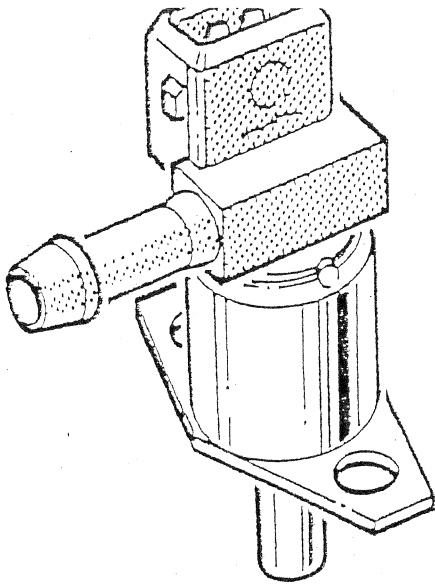


Fig. 19 Cold start injector Model 5NJ

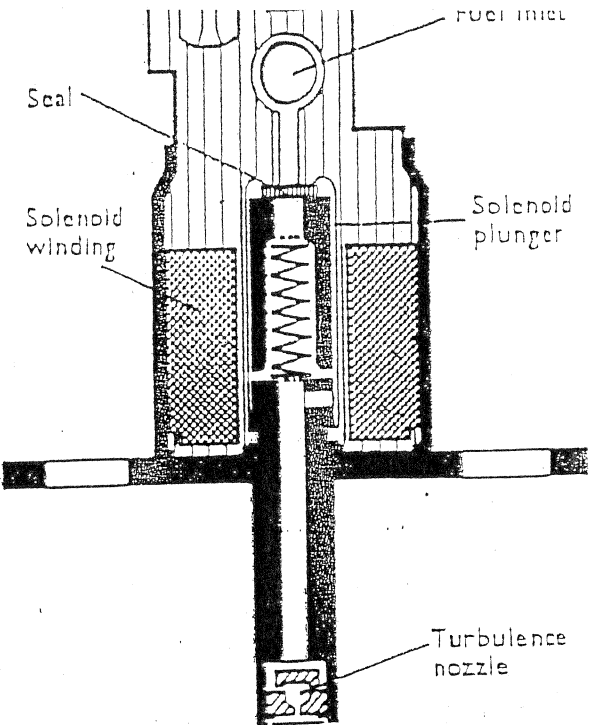


Fig. 20 Cold start injector, sectioned

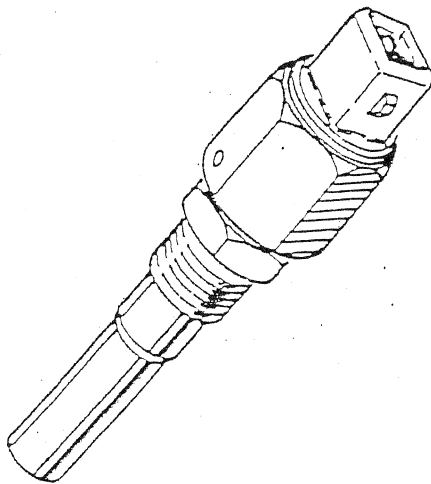


Fig. 21 Thermotime switch Model 198SA

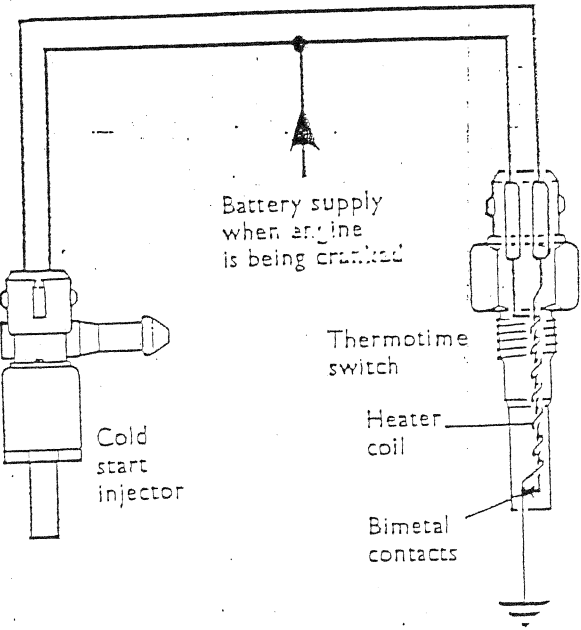
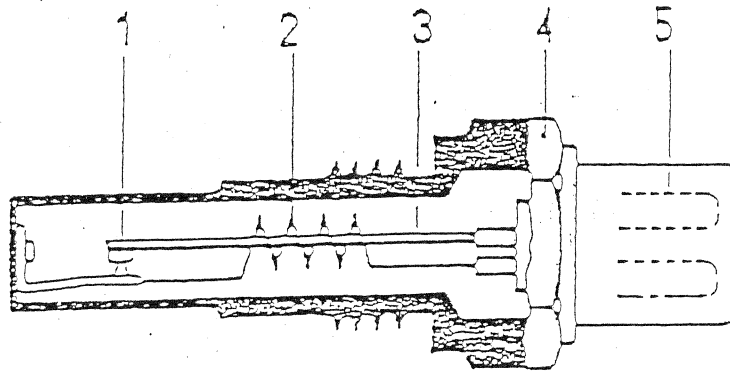
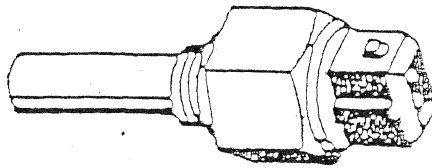


Fig. 22 Typical cold start arrangement



NAME THE ABOVE PARTS :

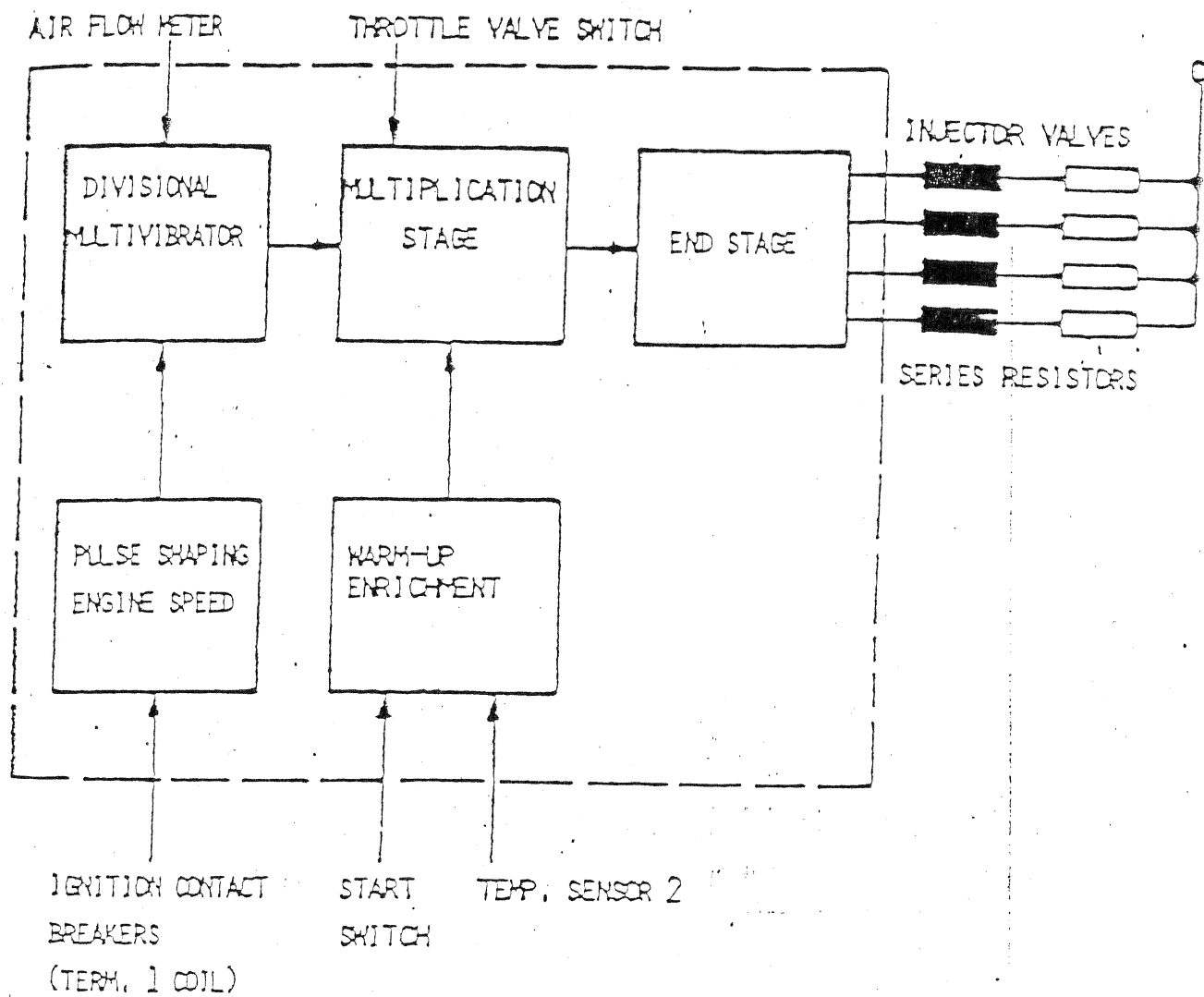
1 = CONTACTS

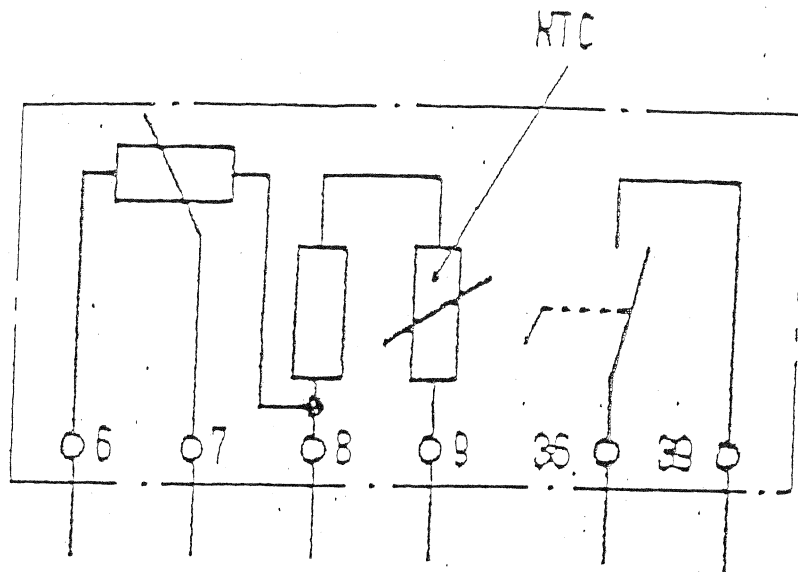
2 = HEATING COIL

3 = BI-METAL STRIP

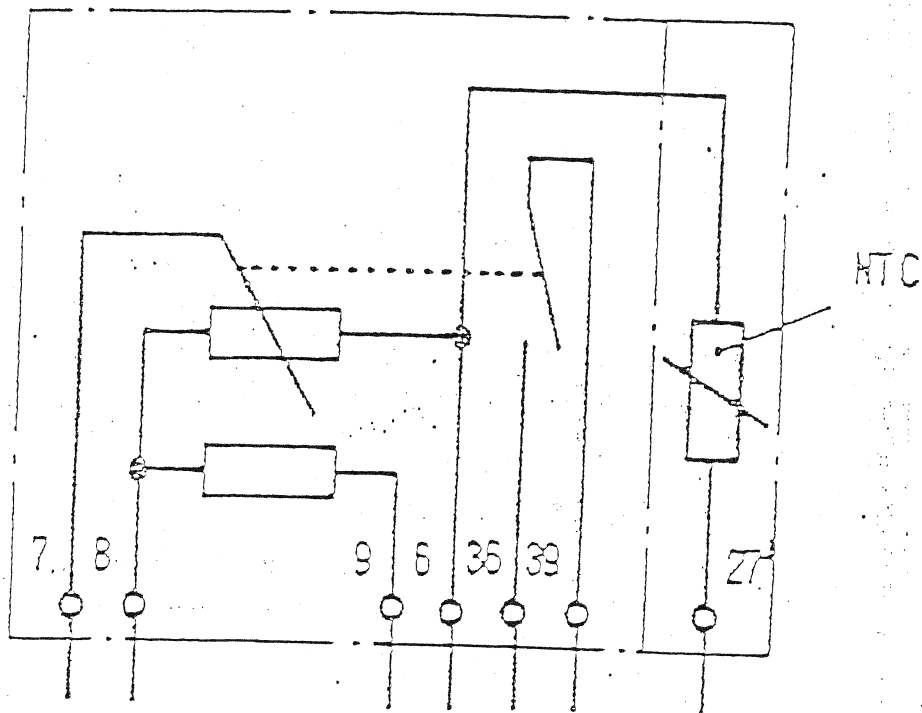
4 = HOUSING

5 = ELECTRICAL CONNECTION





AFM WITH 6-POLE CONNECTOR



AFM WITH 7-POLE CONNECTOR

THE TERMINAL NUMBERS ARE CONNECTED TO:

6 = GROUND

7 = WIPER VOLTAGE

8 = REFERENCE POINT

9 = VOLTAGE SUPPLY

27 = NTC1 SIGNAL (AIR)

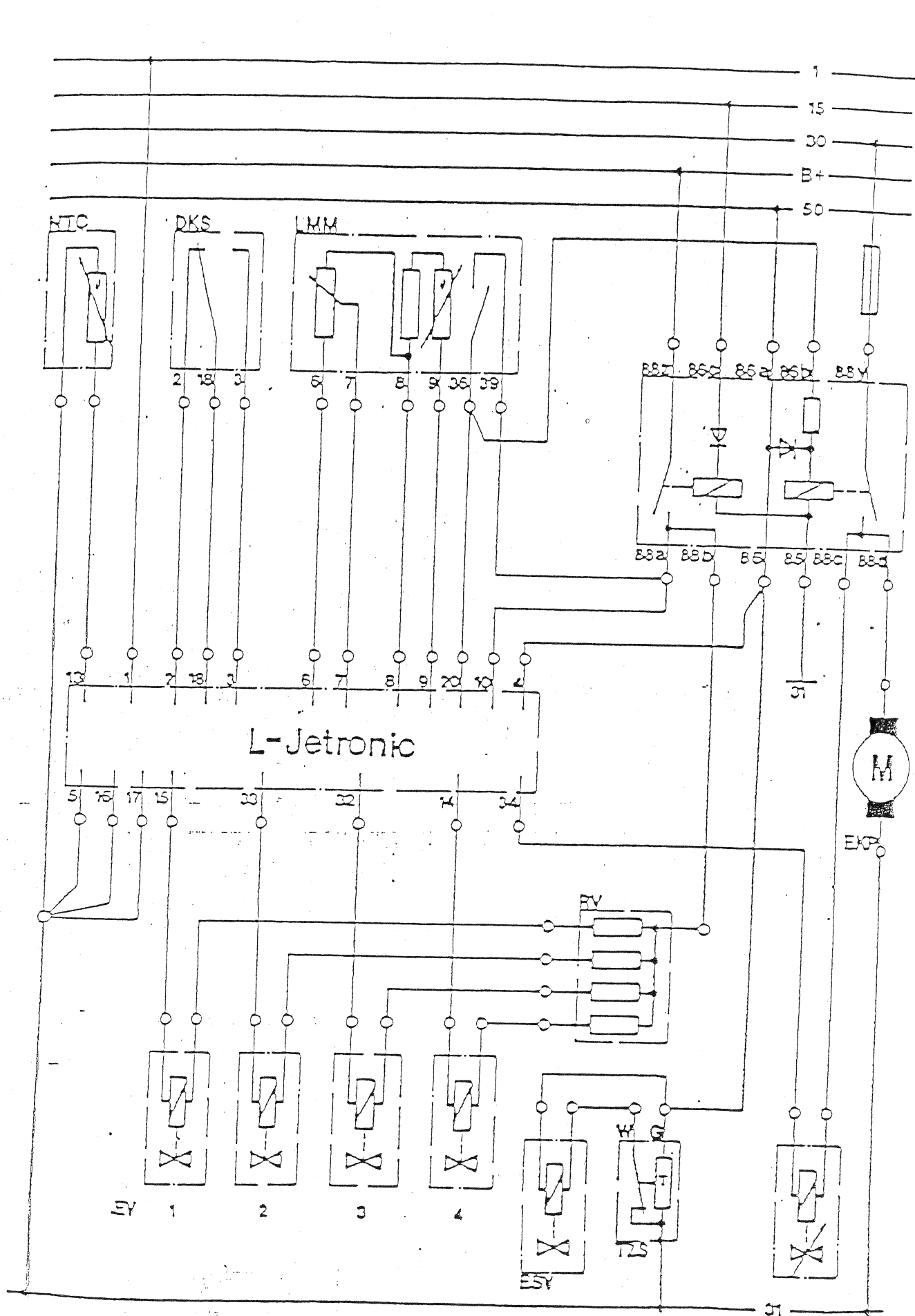
35/39 = PUMP CONTACTS

A circuit diagram of a Wheatstone bridge. It consists of four resistors arranged in a diamond shape. The top-left resistor is labeled 'NTC1' with an arrow pointing to it. The other three resistors are unlabeled. The bridge is connected to a power source, indicated by a battery symbol on the right. The nodes of the bridge are labeled with numbers: 5 at the top-left, 8 at the top-right, 7 at the bottom-right, and 9 at the bottom-left. The bridge is divided into two parallel branches by a central vertical wire. The top branch contains two resistors in series, and the bottom branch also contains two resistors in series. The central vertical wire connects the midpoint of the top branch to the midpoint of the bottom branch.

Hand-drawn schematic of a 12-position potentiometer assembly. The assembly consists of a vertical stack of 12 potentiometers, each with a wiper and a terminal. The terminals are labeled R_1 through R_{12} . A common wiper line, labeled "WIPER" and connected to a ground symbol, is shown on the left. The potentiometers are labeled with positions 1 through 12. The top of the assembly is connected to a +VE supply, and the bottom is connected to a 50 supply. A label "POTENTIOMETER TRACK" is written across the middle of the stack. A label "WTC" is written near the top right. A label "GE" is written on the left side.

Potentiometer LE-Jetronic

L-Jet. circuit diagram (series output stage)



Summary, Sheet 1

Electric fuel pump

delivers the fuel and generates the required pressure. Because of the large delivery rate, the pressure remains stabilised, even when the injectors are opened.

Fuel filter

retains the finest contaminations. The pressure side was chosen for its location to prolong its service life.

Pressure Regulator

operates in dependence on the intake manifold depression and therefore maintains a constant pressure drop at the injectors.

Injector

injects the fuel intermittently in front of the inlet valve. Half the amount is injected twice for each operating cycle to facilitate formation of a good mixture and to allow mixture correction. Internal resistance approximately 3 Ohms or 16 Ohms.

Air-flow sensor

measures the intake air quantity by means of the movable sensor flap and supplies the control unit with a corresponding signal. Some adaptation to the air mass is possible by simultaneous measurement of the air temperature (NTC 1). Acceleration enrichment is triggered by overswing of the sensor flap. Distinguishing features L and LE-Jet, L-Jet 6-7 connections and pump contact, LE-Jetr. 4 connections without pump contact.

Throttle valve switch

signals the three operating conditions - idling, partial load and full-load - to the control unit. This information is required to correct the mixture (for example full-load enrichment) or for controlling certain functions (for example overrun fuel cut-off).

L - Jetronic

Summary, Sheet 2

Engine temperature sensor

normally measures the coolant temperature, to permit temperature-dependent mixture adaptation.

Control unit

processes the input information from which the pulse length is formed with which the injectors are driven.

The pulse length depends on the fundamental load signal of the air-flow sensor and on the rotational speed (t_p), on the throttle valve switch, engine temperature, starting information (t_m), supply voltage of the injector and control unit (t_u).

Control of special functions, for example overrun cutoff, Lambda control.

Cold-start valve

injects additional fuel into the intake tube during the starting operation and therefore compensates for condensation losses. Condensation losses depend not only on temperature but also on engine speed; there is therefore a tendency now to perform cold start control via the ECU in which the starting speed and temperature as well as the starting time is allowed for and the additional fuel quantity is injected via the normal injectors.

Thermo time switch

operates the cold-start valve in dependence on temperature and time.

Auxiliary-air valve

increases the idle speed by opening in dependence on temperature.

Disadvantage: The auxiliary-air valve operates only with a cold engine.

Tendency: Idle speed control, because this regulates the idle speed even with a warm engine.

Relay set, control relay

ensures that the electric fuel pump operates only when the engine runs or during starting.