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US. 42-00-4952-1

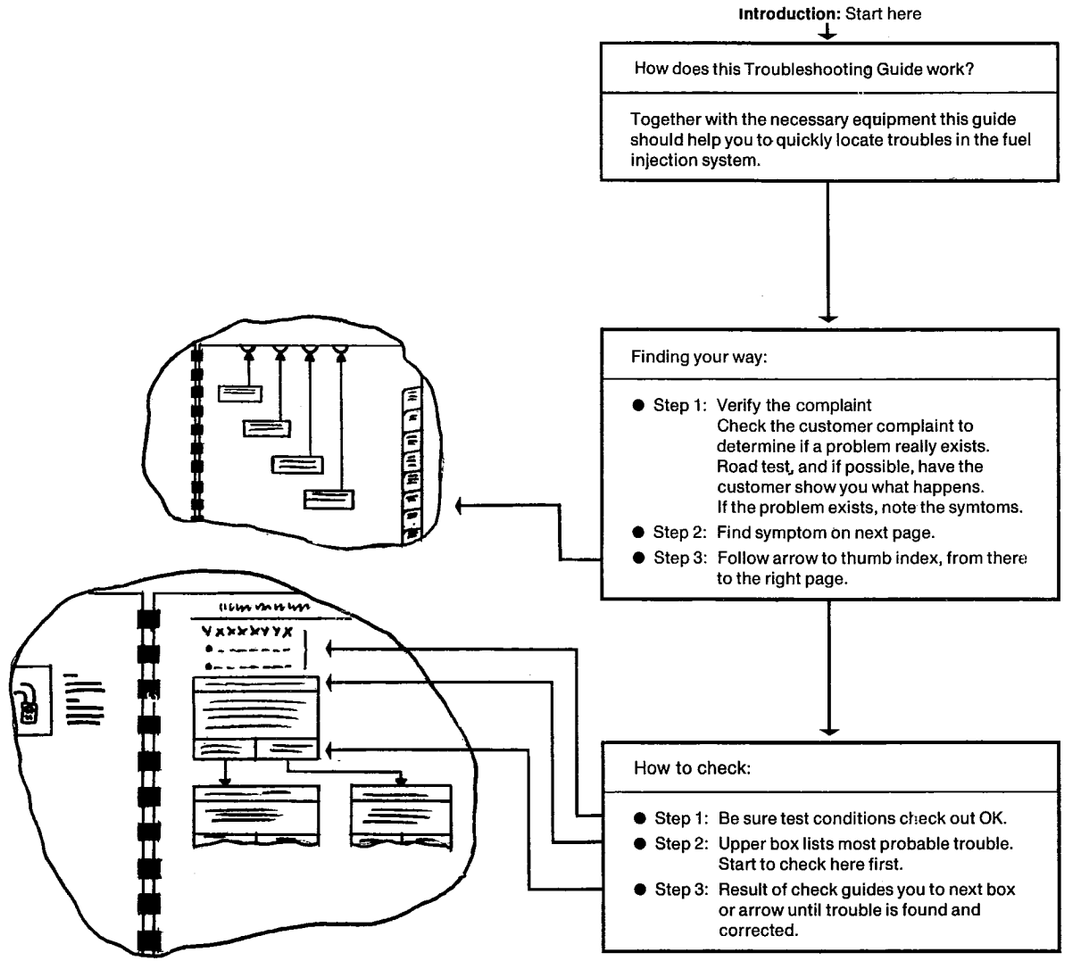
VOLKSWAGENWERK A. G.

# Troubleshooting Guide

## Electronic Fuel Injection
## AFC (air flow controlled)

## Types 1 and 2
## (from November 1974)

# How to use this guide

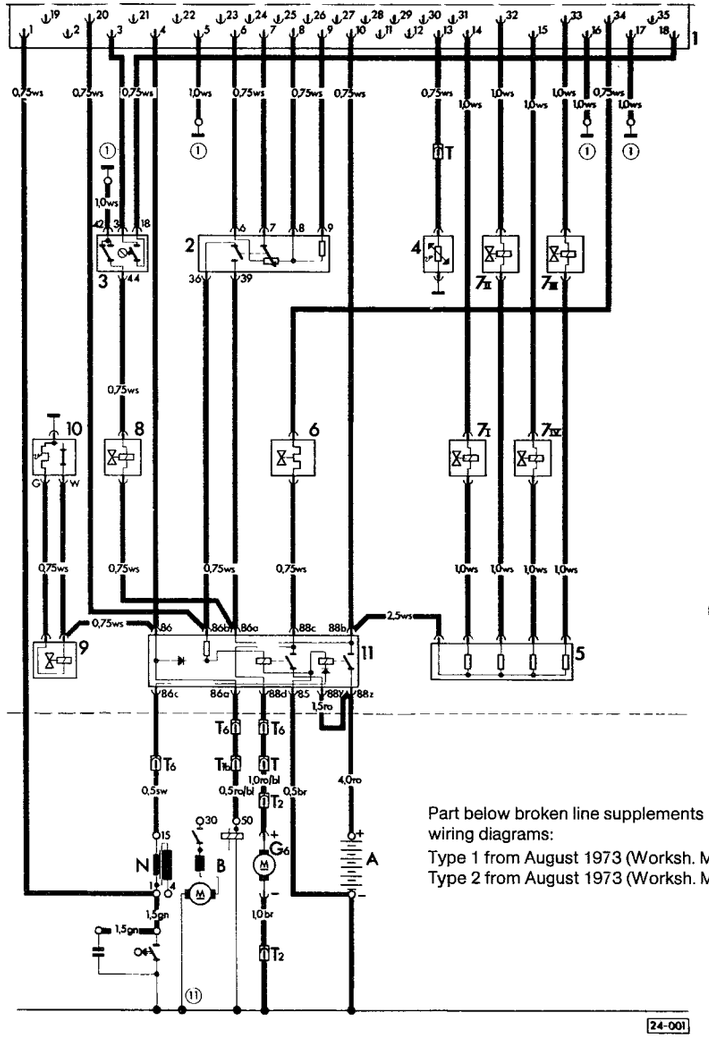



# More Troubleshooting help

| | | Ordering No. |
|---|---|---|
| **Engine** | MPC fuel injection<br>Type 3 all<br>Type 4 autom. transm. up to Oct. '73<br>Type 4 man. transm. | W 42-00-4950-1 |
| | AFC fuel injection<br>Type 4 autom. transm. from Nov. '73 | W 42-00-4946-1 |
| | AFC fuel injection<br>Types 1 and 2 up to model year '75 | W 42-00-4952-1 |
| | AFC fuel injection<br>Type 1 model year 1976 | W 42-00-5954-1 |
| | AFC fuel injection<br>Type 2 model year 1976 | W 42-00-5955-1 |
| | CIS fuel injection<br>Dasher, Rabbit, Scirocco, AUDI 100, AUDI Fox | W 42-00-6957-1 |
| | Carbureted Engines (air and water cooled) | W 42-00-4947-1 |
| | Carburetor-equipped Engines<br>Rabbit/Scirocco Model 1976 | W 42-00-6956-1 |
| **Automatic Transmission** | Automatic transmission 003 troubleshooting<br>Types 2, 3, 4 and Dasher | W 42-00-3945-1 |
| | Automatic transmission 010 troubleshooting<br>Rabbit/Scirocco, Dasher, Audi Fox,<br>Audi 100 LS, VW Transporter | W 42-00-5953-1 |
| | Automatic transmission 003 and 010 troubleshooting<br>Parts wear comparison | W 42-00-6958-1 |
| **Heater** | Heater Type 4 1971/72 | W 42-00-2940-1 |
| | Heater Type 4 1973/74 | W 42-00-3940-1 |
| **Air Conditioner** | Air conditioner, factory installed<br>Rabbit/Scirocco | W 42-00-4122-1 |
| | Air conditioner, factory installed<br>Dasher | W 42-03-5146-1 |
| | Air conditioner, factory installed<br>Audi Fox, Audi 100 | W 42-55-5146-1 |

# Wiring diagram

**Wiring diagram Types 1 and 2**




1 – Control unit (electronic)
2 – Intake air sensor
3 – Throttle valve switch
4 – Temperature sensor on cylinder head
5 – Series resistance
6 – Auxiliary air regulator
7 – Injectors
8 – EGR valve
9 – Cold starting valve
10 – Thermo switch
11 – Double relay
N – Ignition coil
G6 – Fuel pump
A – Battery
B – Starter
T – Wire connector
T1 – Wire connector
T2 – Wire connector, double
T6 – Wire connector, 6 point
① – Ground connector near alternator
⑪ – Ground connector, headlights

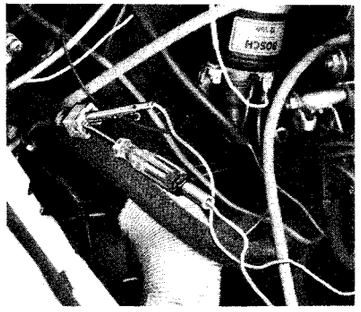
**Color codes**

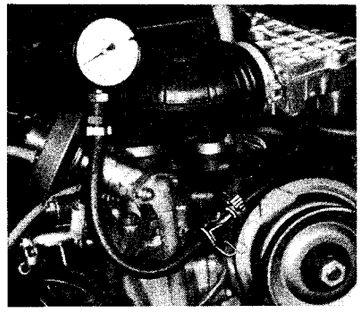
ws = white
sw = black
br = brown
ro = red
gn = green
ro/bl = red/blue

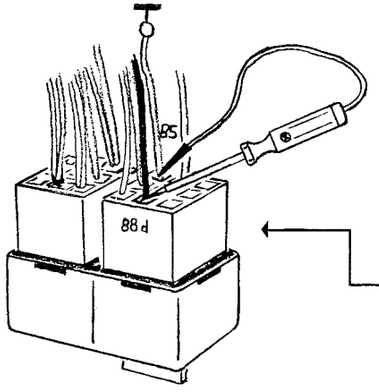
Part below broken line supplements wiring diagrams:
Type 1 from August 1973 (Worksh. Manual E 1.2/11-15)
Type 2 from August 1973 (Worksh. Manual E 1.2/12-7)

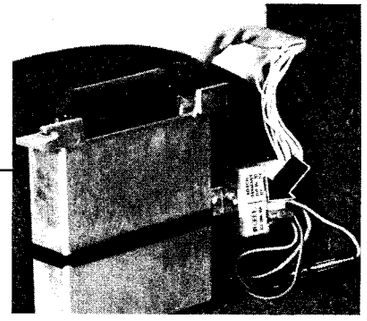
**Note**
Following defects may be found despite visible sparking at plug connectors.

- Distributor cap damp, cracked, burnt by tracking
- Rotor arm defective
- Loose connections on coil
- Spark plugs connectors defective
- Ignition timing off (breaker points)
- Ignition cables badly connected
- Arcing at ignition cables on distributor (through rubber caps)
- Voltage at terminal 15 on coil too low (minimum voltage = 9 Volts when starting)
- Condenser defective







(continued from page 57)

Injector or cold start valve leaking

- Pressure gauge is connected
- Pull wire off coil terminal 1
- Operate starter briefly
- Pressure should not drop quickly to 0 psi

| Pressure remains constant | Pressure drops quickly |
|---|---|

- Remove injector or cold start valve but leave connected to the ring main
- Wire to terminal 1 of coil is disconnected
- Operate starter briefly
- Replace leaking valve

Air flow obstructed

**Possible causes / checking sequence**

- Check air cleaner for dirt
- Check whether air flow is obstructed by incorrect gasket between intake manifold and cylinder head (if in doubt: renew gasket)

| No trouble located | Trouble located and corrected; CO value OK |
|---|---|

**Other possible causes**

- Valve clearances incorrect:
- Poor combustion due to defective spark plugs
- Compression low or uneven
- CO influenced by crankcase ventilation:
  a) excessive oil in crankcase
  b) oil being diluted by fuel (particularly in winter)

Correct any troubles located

**Checking / adjusting valve clearances**

It is important that cylinder heads have cooled down to ambient temperature before checking or adjusting valve clearances.

Particularly critical is when the engine itself is still cold after a short drive but the cylinder heads have become hot (e. g. when vehicle has been driven from parking lot into workshop shortly before adjustment)

**Test condition:**

- No mistakes in starting procedure
- Fuel in tank
- Starter speed is normal (battery voltage)

Trouble in ignition system

Check ignition system, eliminate any defects

| Engine does not start | Engine starts |
|---|---|

Hoses off or damaged

Check hose connections

- between intake air distributor and auxiliary air valve or auxiliary air valve and intake manifold
- between intake air distributor and decleration air valve
- at check valve for automatic stick shift and intake manifold
- for crankcase ventilation

| Hoses were OK | Hoses were off or damaged. After repair engine starts. |
|---|---|

Trouble in fuel system

- Pull off hose to intake air distributor
- Check pressure in ring main with pressure gauge while starting.
  Specified pressure 2.5 kg/cm² (35 psi)

| Pressure builds up | No pressure |
|---|---|

No voltage at injectors

- Pull connector off one injector and connect test light
- Operate starter, light should flicker **weakly**

| Test light flickers **weakly** | Test light does not flicker |
|---|---|

No voltage at fuel pump

- Detach double relay.
- Connect test light to terminals 88 d and 85.
- Operate starter.

| Test light lights up | Test light does not light up |
|---|---|

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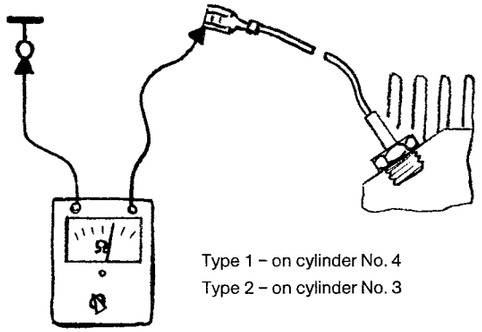
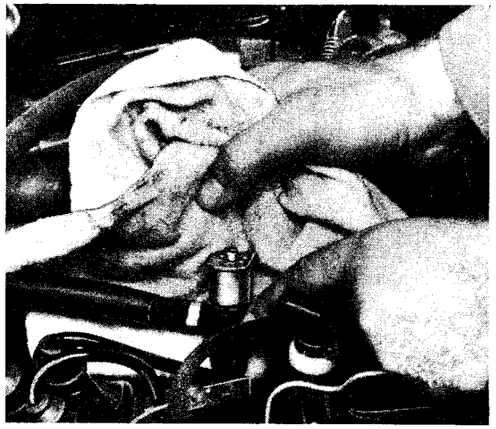


Type 1 – on cylinder No. 4
Type 2 – on cylinder No. 3



Test condition:
- Ignition timing correct
- Engine oil temperature between 50° and 70° C (122° and 157° F)

**Pressure in ring main too high**

Connect pressure gauge
- Pull wire off coil terminal 1
- Operate starter
- Pressure should be 2.5 kg/cm² (35 psi)

| Pressure is correct | Pressure too high |
|---|---|

**Pressure regulator not working**

- Connect wire to coil terminal 1
- Run engine at idling speed
- Pressure should drop to approx. 2.0 kg/cm² (28 psi)

| Pressure drops | Pressure does not drop |
|---|---|

**Replace pressure regulator**

If pressure is still too high, check if return line between pressure regulator and fuel tank is kinked or blocked

**Resistance of temperature sensor in cylinder head too high**

- Run engine until oil temperature is above 80°C (176° F)
- Pull wire off temperature sensor
- Connect ohmmeter

Resistance should be less than 300 Ω

| Resistance is correct | Resistance is well above specified value |
|---|---|

Check hose connections between intake air distributor and pressure regulator. If OK, replace pressure regulator

**Possible causes:**
- Resistance in thread in cylinder head too high due to corrosion
- Temperature sensor defective

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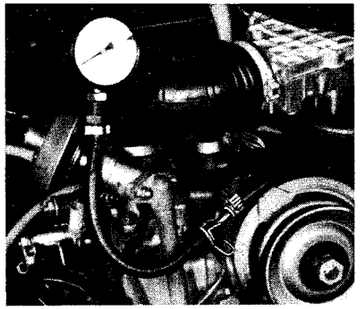

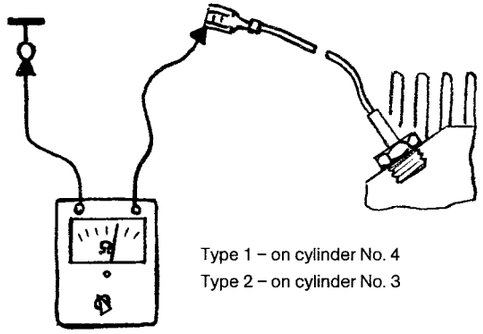

Type 1 – on cylinder No. 4
Type 2 – on cylinder No. 3

(continued from page 3)

**Temperature sensor on cylinder head has no continuity or is shorted**

- Disconnect wire from temperature sensor.
- Connect ohmmeter

Resistance about 2.5k Ω (at 20°C/68°F temperature)

| Measured resistance is as specified | Ohmmeter shows 0 Ω or ∞ Ω |
|---|---|

→ Replace temperature sensor

**Engine floods due to defective cold start valve**

- Pull connector off cold start valve.
- Start engine with throttle fully open because plugs may be wet.

| Engine does not start | Engine starts |
|---|---|

→ Replace thermo time switch

**Engine floods due to leaky cold start valve**

- Detach cold start valve from intake air distributor but leave it connected to the ring main.
- Pull connector off cold start valve.
- Pull wire off terminal 1 on coil.
- Operate starter.

| Valve does not leak | Valve leaks |
|---|---|

→ Replace cold start valve

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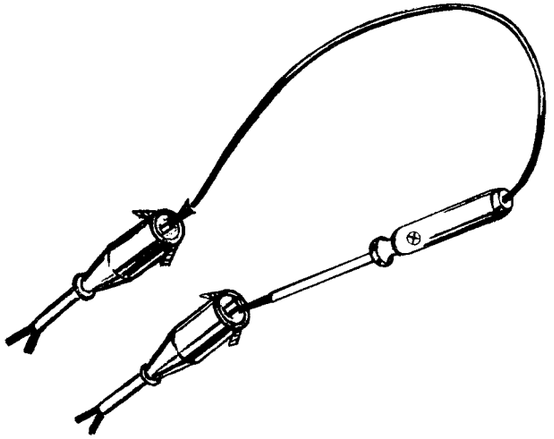




(continued from page 53)

Poor terminal or ground connections in the injection system

Check all connections systematically for proper fit and corrosion

| No defects | Defects found and rectified |
|---|---|

Control unit cuts out intermittently

- Remove control unit but leave it connected
- Tap control unit with hand to check for loose soldered joints
- Move wiring to check for breaks in wires

| No defects | Defects found and corrected |
|---|---|

Faulty contact in intake air sensor

- Install new intake air sensor for testing
- Road test vehicle

| Still misfiring | Not misfiring |
|---|---|

Alternator or regulator defective

Road test vehicle with V belt removed

| Still misfiring | Not misfiring |
|---|---|

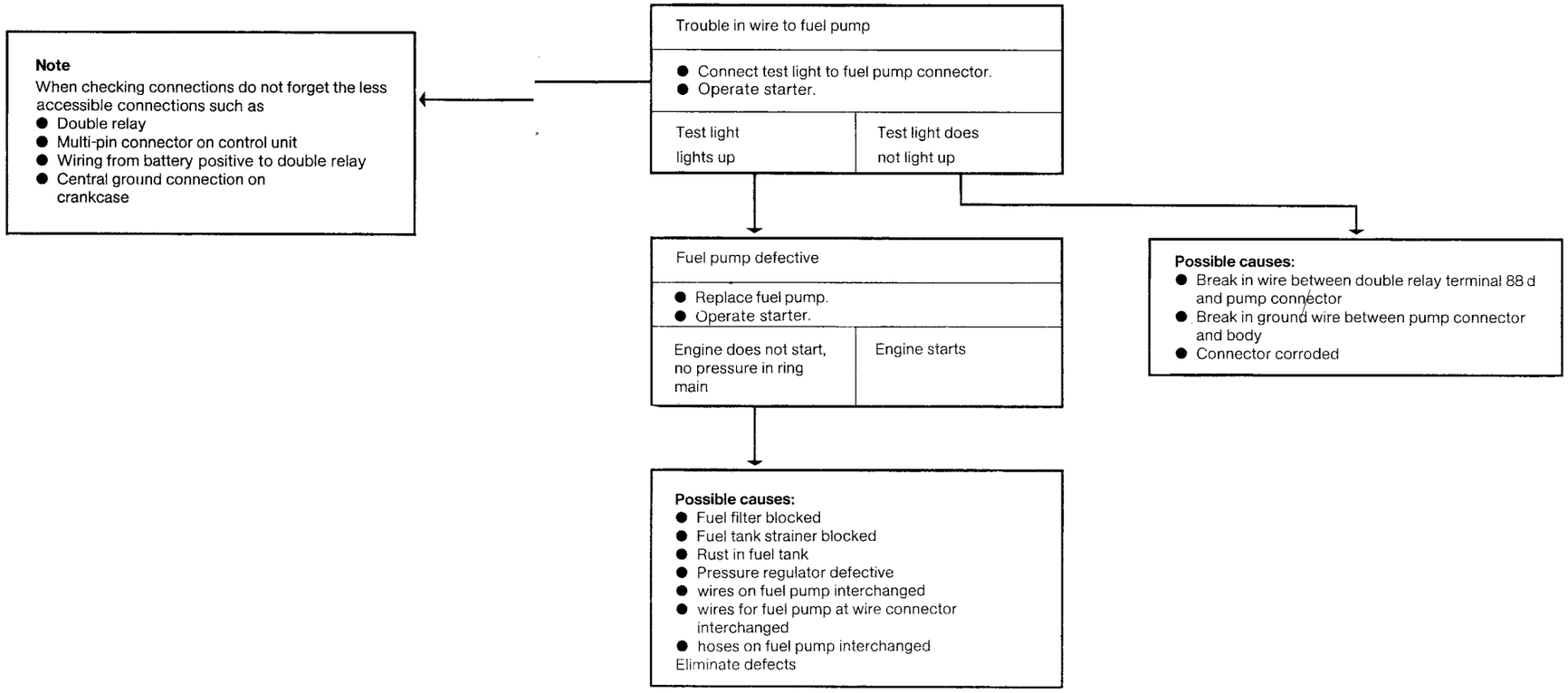
Fuel supply inadequate

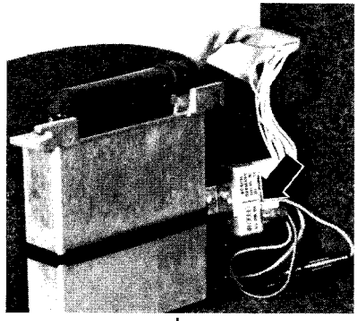
**Possible troubles:**
- Fuel filter blocked
- Tank strainers blocked
- Rust in fuel tank
- Injectors blocked
- Tank ventilation blocked

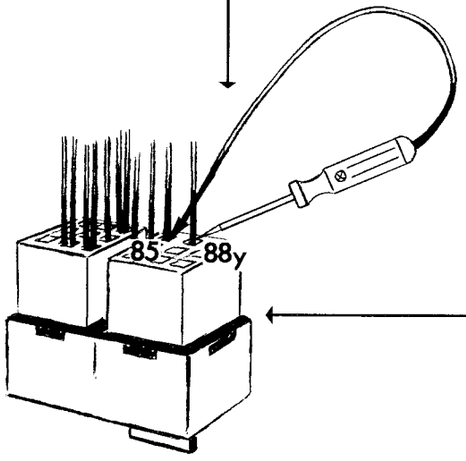
Eliminate defect

Install another regulator, install belt again and road test vehicle
If fault still exists:
Repair or replace alternator

(continued from page 3)








**Test condition**
- If engine stalls **only** after "coasting"

Misfiring caused by electrical components

Operate all electrical components several times one after the other and check if misfiring accurs when components are switched on and off.

| Switching on and off makes no difference | Misfiring occurs only when switching on and off |
|---|---|

**Possible causes:**
- Poor ground connections
  a) between battery and body
  b) between body and transmission

Trouble in ignition system

**Possible causes / checking sequence**
- Check ignition coil for cracks, tracking and loose connections
- Suppression condenser incorrectly connected (on terminal 1 instead of terminal 15)
- Check distributor cap for:
  a) dampness
  b) dirt
  c) cracks, tracking
  d) condition of carbon brush
- Check rotor for continuity
- Check contact breaker for:
  a) pitting
  b) gap/dwell angle
  (do not forget ignition timing adjustment)
- High tension cables or connectors damp, dirty or defective (poor contact, arcing)
- Check spark plugs for:
  a) internal and external dampness
  b) dirt
  c) burning (check for correct heat range)
  d) electrode gap (0.6–0.7 mm/0.024–0.028 in.)
  e) damage
- Condenser loose or defective
- Foreign body (washer or circlip) fallen into distributor housing; blow out with compressed air

| No trouble located | Trouble located and corrected |
|---|---|

Road test

| Engine still stalls | Engine does not stall |
|---|---|

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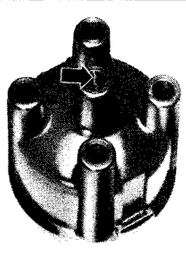
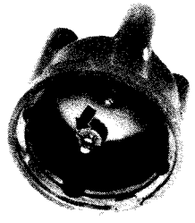
**Note**

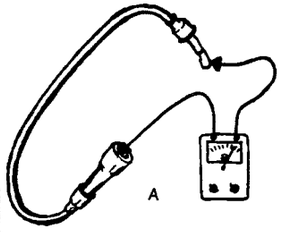
If engine stalls only after "coasting" engine is drawing in oil, possibly through crankcase breather or valve guides, (noticeable by blue smoke being emitted during "coasting").

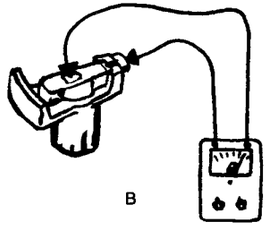
In such cases:
Check crankcase breather or, if necessary check valve guides for wear






**Caution** Check for cracks or signs of carbon tracking




**Check resistance with Ohmmeter**

A – Resistance in each ignition cable with connector
= max. 10 k Ω

B – Resistance for rotor
= max. 10 k Ω

(continued from page 3)

No voltage at terminal 88 y on double relay

Connect test light to terminals 88y and 85

| Test light lights up | Test light does not light up |
|---|---|

Double relay defective

- Connect test light to terminals 86a and 85
- Operate starter

| No voltage | Voltage present |
|---|---|

**Cause:**
Break in wire between terminal 88y and battery
Eliminate defect

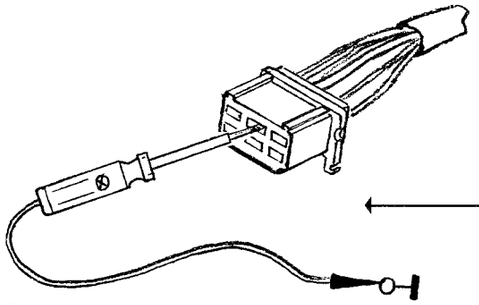
Break in wire from terminal 50 on starter to terminal 86a on double relay

Wire routing:
Type 1 – from wire connector underneath rear seat bench to double relay

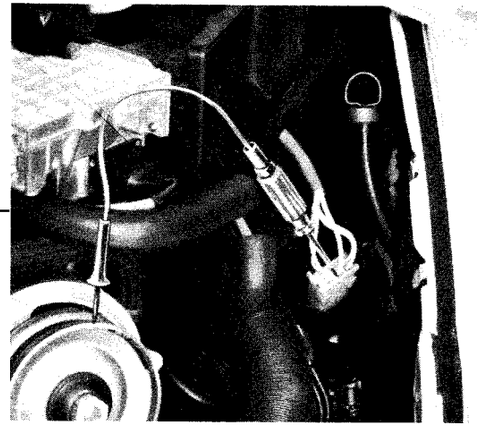
Type 2 – direct

Eliminate defect

Replace double relay



Type 1 – in engine compartment, right
Type 2 – in engine compartment, left

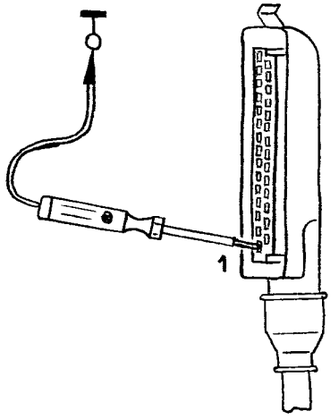


(continued from page 49)

| Resistance of temperature sensor in cylinder head too high | |
|---|---|
| ● Run engine until oil temperature is above 80 °C (176 °F)<br>● Pull wire off temperature sensor<br>● Connect ohmmeter<br>Specified resistance: Less then 300 Ω | |
| Resistance OK | Resistance is well above specified value |

**Possible causes:**
- Resistance in cylinder head thread due to rust
- Temperature sensor defective

| Cold start valve leaking | |
|---|---|
| Check cold start valve for leakage | |
| No leakage | Leakage found and eliminated |

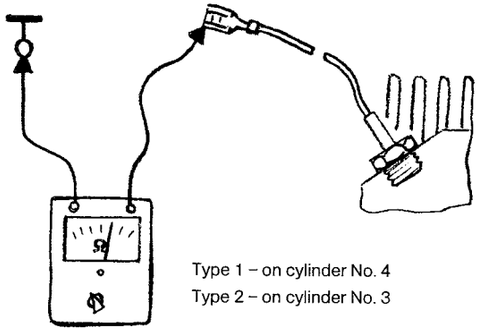



Type 1 – in rear lugagge compartment
Type 2 – next to battery

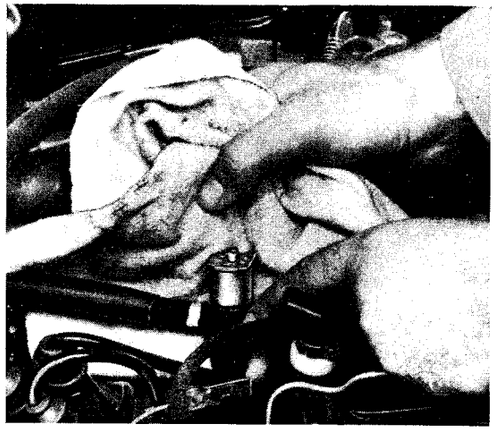
| Injector open continuously | |
|---|---|
| ● Remove injectors but leave them attached to the ring main<br>● Pull wire off coil terminal 1<br>● Operate starter briefly and check if more than two drops leak from each injector per minute | |
| Injectors OK | Injector leaking |

| Control unit defective |
|---|
| Replace control unit |

| Replace injector |
|---|



Type 1 – on cylinder No. 4
Type 2 – on cylinder No. 3



**Note**
- Detach cold start valve from intake air distributor but leave it connected to the ring main
- Operate starter briefly and check if more than two drops leak from valve per minute.

**Warning**
Fire hazard

(continued from page 3)

Double relay defective

- Connect test light between center slot in moulded connector of series resistance and vehicle ground.
- Switch ignition on

| Test light lights up | Test light does not light up |
|---|---|

Check wire between series resistance and double relay terminal 88b, including connections.
If OK, replace double relay

No triggering impulse from coil terminal 1

- Pull multi-pin connector off control unit.
- Connect test light between terminal 1 and vehicle ground.
- Operate starter
  Test light should flicker

| Test light flickers | Test light does not flicker |
|---|---|

**Possible troubles:**
- Break in wire between terminal 1 on distributor and terminal 1 on control unit multi-pin connector
- Breaker contacts in distributor defective or incorrectly adjusted
- Condenser shorting to ground
- Coil defective

Control unit not grounded

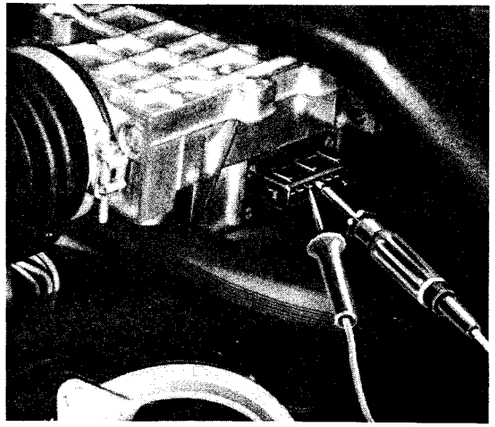
- Switch ignition on
- Test voltage between the following terminals on multi-pin connector of control unit.
  between 10 and 5
  between 10 and 16
  between 10 and 17

| Test light lights up | Test light does not light up |
|---|---|

**Possible troubles:**
- Check wiring to control ground connection
  Type 1 – on top of alternator
  Type 2 – on top of crankcase
- Break in wire between multi-pin connector terminal 10 and double relay terminal 88b.

Control unit defective

Replace control unit



Test condition:
- Standard tire size and type
- Air cleaner insert clean
- Wheels turning freely (brakes, wheel bearings)
- Ignition timing correct
- Road test has shown clearly that the fuel consumption is too high

**Pressure in ring main too high**

- Connect pressure gauge
- Pull wire off coil terminal 1
- Operate starter
  Specified pressure: 2.5 kg/cm² (35 psi)

| Pressure OK | Pressure much higher |
|---|---|

→ Pressure much higher: **Replace pressure regulator**

→ **If pressure is still too high, check if return line between pressure regulator and tank is kinked or blocked**

**Pressure regulator not working**

- Connect wire to coil terminal 1 again
- Run engine at idling speed
- Pressure must drop to about 2.0 kg/cm² (28 psi)

| Pressure drops | Pressure does not drop |
|---|---|

→ Pressure does not drop: **Check hose between intake air distributor and pressure regulator, if OK, replace pressure regulator**

**Engine warms up too slow**

Check thermostat and adjustment of cooling air regulation

| No defects | Defect found and corrected |
|---|---|

→ Defect found and corrected: go to page 51

(continued from page 5)

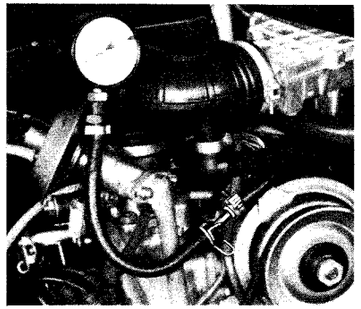
**Road testing instructions:**

- Where possible customer should be present during the road test
- Plan test route to include mixed driving and traffic conditions (equal parts of city traffic and expressway)
- Measure consumption with a fuel consumption tester or by fuel tank exactly before and after test
- Approximate consumption figure for mixed traffic driving at an ambient temperature above 0° C (32° F) are:

  Type 1 – 21.5 mpg/US (25.5 mpg/Imp.)
  Type 2 – 15.5 mpg/US (18.8 mpg/Imp.)

**Caution**

- This figure is only for comparsion with the figure obtained during the road test under the given driving and traffic conditions. It is not to be used for comparsion with the consumption figure given by the customer.
- When the vehicles is driven short distances and under rush hours conditions, the consumption can go up.



Intake air sensor defective

- Pull connector off intake air sensor
- Connect ohmmeter to terminals 6 and 9 on intake air sensor (resistance 200 to 400 Ω)
- Then check at terminal 7 and 8 (resistance 120 to 200 Ω)

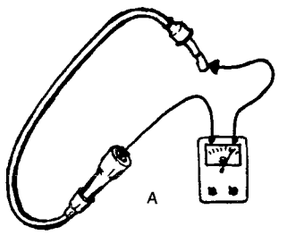
| Reading is as specified | Reading outside tolerances |
|---|---|

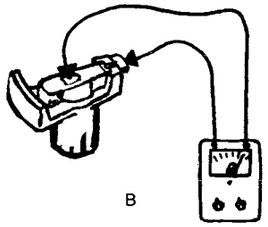
Reading is as specified → Break in wire or connections between control unit and intake air sensor
Eliminate defects

Reading outside tolerances → Replace intake air sensor

**Starting engine**

- Selector lever or gearshift lever in neutral
- Do **not** press accelerator pedal
  This holds true for a cold engine and an engine at operating temperature no matter what the outside temperature is
- Switch on ignition and start engine
- At outside temperatures below 0° C (32° F) press clutch pedal before starting



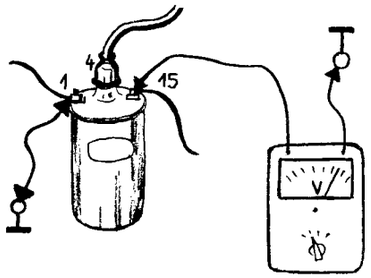




**Check resistance with Ohmmeter**

**Check resistance with Ohmmeter**

A – Resistance in each ignition cable with plug connector = max. 10k Ω

B – Resistance for rotor = max. 10kΩ




(continued from page 45)

Fuel pressure in ring main too low at full throttle

- **Pull off** hose between intake air distributor and pressure regulator
- Measure pressure in ring main with a pressure gauge
  a) At idling speed (specified pressure 2.5 kg/cm²/35 psi)
  b) At full throttle (specified pressure 2.5 kg/cm²/35 psi)

| Pressure at idling and full throttle about 2.5 kg/cm² (35 psi) | Pressure drops noticeably at full throttle | Pressure same at idling and full throttle but too low |
|---|---|---|

Replace pressure regulator

Control unit defective

- Try another control unit
- Road test vehicle

| Output not OK | Output OK |
|---|---|

**Further possible causes:**

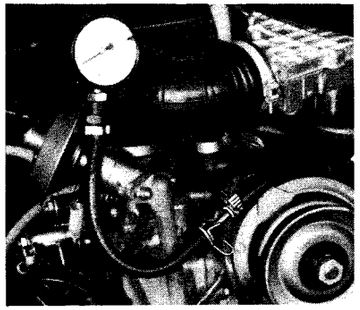
- Excessive roll resistance due to wheel toe being badly out of adjustment
- Transmission or final drive tight
- Resistance in EGR system too high (muffler, catalytic converter)

Fuel supply inadequate

**Possible causes:**

- Fuel line kinked
- Fuel filter blocked
- Tank strainer blocked
- Corrosion in fuel tank
- Pump not delivering sufficient fuel

Correct defects



**Test conditions**

- Correct starting procedure
- Fuel in tank
- Engine must be cold at start of test
- Starter speed normal (battery voltage)

**Trouble in the ignition system**

- Check distributor cap for:
  – dampness, dirt, cracks, tracking and also condition of carbon brush
- Check contact breaker points for pitting and gap
- Check ignition coil for cracks, tracking and loose connections
- Check high tension cables and connectors for dampness, dirt and good contact
- Check rotor with ohmmeter for continuity

| No trouble located | Trouble located and corrected; engine starts normally |
|---|---|

**Voltage at coil terminal 15 is too low**

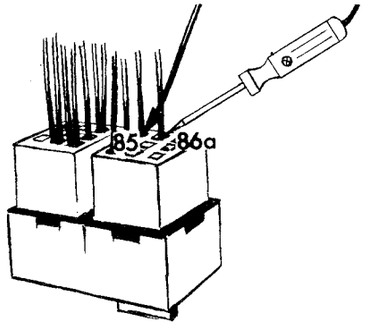
- Install additional wire from terminal 1 to ground.
- Measure voltage at terminal 15 with voltmeter while operating starter

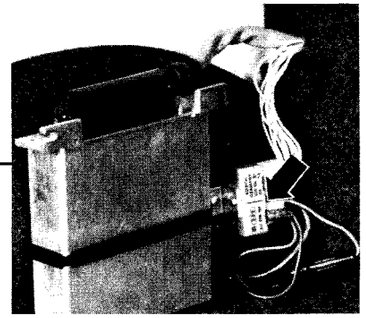
| Voltage is 9 volts or more | Voltage is less than 9 volts |
|---|---|

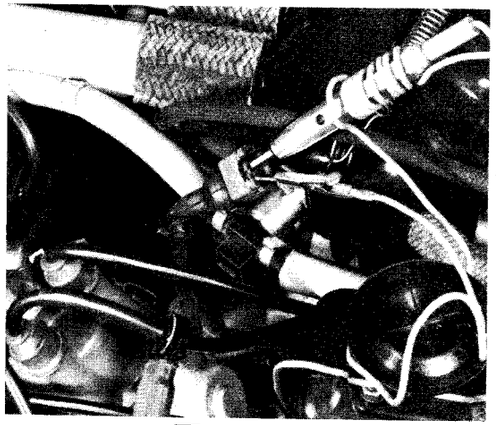
**Possible causes:**

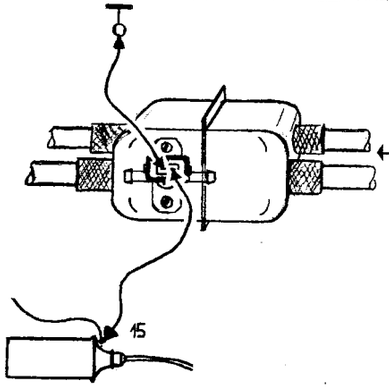
- Voltage loss in circuit from battery via light switch, ignition-starter switch to coil terminal 15 is too high
- Starter current draw too high

go to page 17








**Test instructions**

**a. Thermo-time switch and wiring**

- Engine ambient temperature must be below 10° C (50° F)
- Pull connector off cold start valve
- Connect test light
- Pull off wire from terminal 1 on coil
- Operate starter: Test light should light up brightly at first and than go noticeabley dimmer after not more than 11 seconds

**b. Cold start valve**

- Connect pressure gauge in the ring main
- Operate starter briefly to build up fuel pressure
- Pull connector off cold start valve
- At valve connect one terminal to ground, the other terminal to terminal 15 on coil, using jumper wires
- Turn on ignition. Fuel pressure should slowly drop

(continued from page 43)

Full throttle contact in throttle valve switch not closing

- Pull multi-pin connector off control unit
- Connect ohmmeter between terminals 3 and 18
- Open throttle fully, ohmmeter reading must change from ∞Ω to 0 Ω

| Reading changes to 0 Ω | Reading remains at ∞ Ω |
|---|---|

Electrical fault in intake sensor

- Pull connector off intake air sensor
- Connect an ohmmeter to terminals 6 and 9 on intake air sensor (resistance 200 to 400 Ω)
- Measure on terminals 7 and 8 (resistance 120 to 200 Ω)

| Resistance OK | Resistance not OK |
|---|---|

Break in wiring to throttle valve switch or throttle valve switch defective
Eliminate defect

Mechanical fault in intake air sensor

- Remove intake air sensor
- Check if pressure flap is jamming or stiff in operation, in case of doubt, compare with a new part

| Flap is OK | Flap jams or is stiff in operation |
|---|---|

Replace intake air sensor

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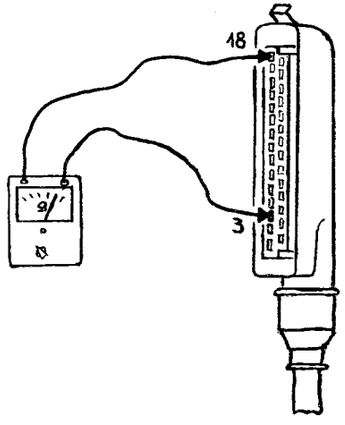
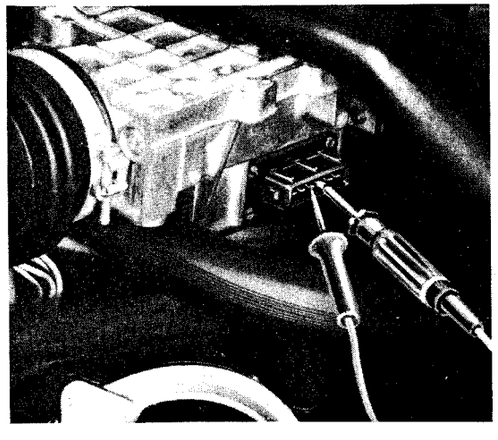
Replace intake air sensor, road test vehicle




Type 1 – in rear lugagge compartment
Type 2 – next to battery



(continued from page 15)

Break in wire to starter terminal 50

- connect test light between terminals 86a and 85 on double relay
- operate starter

| Test light lights up | Test light does not light up |
|---|---|

Check wire between starter terminal 50 and double relay

Wire routing:
Type 1 – wire connector underneath rear seat bench
Type 2 – direct

Eliminate defects

Fault in cold start device

**Possible troubles:**

- Cold start valve wire detached from terminal 50 of solenoid
- Wire detached from thermo-time switch
- Cold start valve or thermo-time switch defective
  Replace cold start valve or thermo-time switch as necessary

| No defects | Defects found and eliminated |
|---|---|

If you have not found any faults so far the trouble involved is not a typical cold starting trouble
Continue to find out the trouble under "Engine does not start"

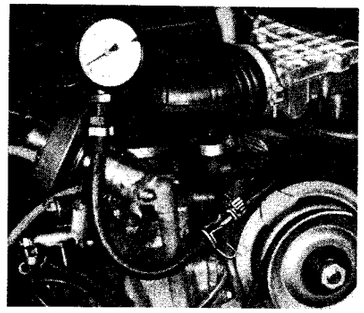
(continued from page 41)

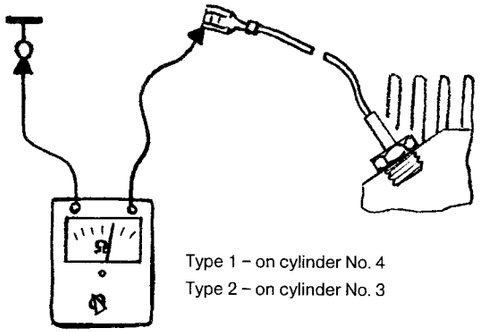
**Starting engine**

- Selector lever or gearshift lever in neutral
- Do **not** press accelerator pedal
  This holds true for a cold engine and an engine at operating temperature no matter what the outside temperature is
- Switch on ignition and start engine
- At outside temperatures below 0° C (32° F) press clutch pedal before starting

**Checking/adjusting valve clearances**

With air cooled engines it is important that cylinder heads have cooled down to ambient temperature before checking or adjusting valve clearance.
Particularly critical is when the engine itself is still cold after a short drive but the cylinder heads have become hot (e. g. when vehicle has been driven from parking lot into workshop shortly before adjustment takes place).





Type 1 – on cylinder No. 4
Type 2 – on cylinder No. 3

EGR valve leaks

- Run engine at idle
- Exhaust gas recirculating pipe may not warm up

| Pipe does not warm up | Pipe warms up |
|---|---|

→ Replace EGR valve

Trouble in ignition system

**Checking procedure**

- Check distributor cap and ignition coil for cracks or signs of tracking (inside and outside)
- Check vacuum hose connections for free passage and tightness
- Check ignition cables, plug connectors and rotor with ohmmeter
- Check ignition advance with stroboscopic timing light

| No trouble | Trouble located and corrected |
|---|---|

Road test

| Performance not OK | Performance OK |
|---|---|

Intake air duct restricted

**Possible causes**

- Air cleaner dirty
- Intake manifold gaskets at intake air distributor or cylinder head squashed
- Hose between intake air sensor and throttle valve housing sucked together during full power, (check stiffness of hose against new part) or restricted diameter by wrong routing

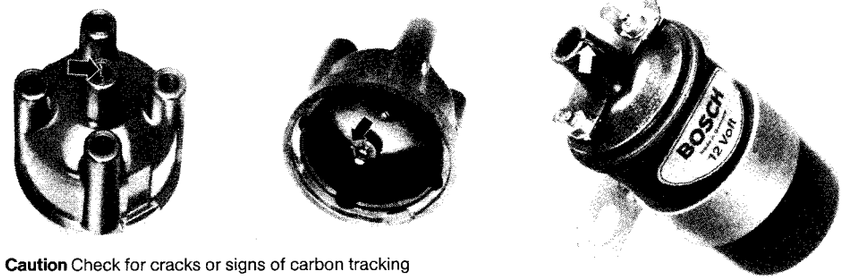
| No trouble located | Trouble corrected |
|---|---|

Road test

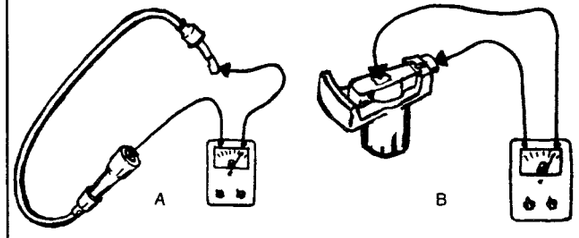
| Performance not OK | Performance OK |
|---|---|

go to page 45

go to page 45




**Caution** Check for cracks or signs of carbon tracking




**Check resistance with Ohmmeter**

A – Resistance in each ignition cable with plug connector = max. 10 k Ω

B – Resistance for rotor = max. 10 k Ω

**Note**
**Full spark advance** is essential if top speed is to be achieved; therefore check that prescribed full spark advance value is being reached (see table in Workshop Manual "M", chapter "Ignition System")

**Test condition:**
- Correct starting procedure
- Fuel in tank

Valve clearance incorrect

- Adjust valves properly with **engine cold**
- Warmup engine and carry out starting tests

| Engine difficult to start | Engine starts normally |
|---|---|

Pressure in ring main too high (mixture too rich)

- **Pull vacuum hose off pressure regulator**
- Measure pressure with gauge while operating starter (Specified value: 2.5 kg/cm²/35 psi)

| Pressure is OK (2.5 kg/cm²/35 psi) | Pressure is above 2.5±0.2 kg/cm² (35±2.8 psi) |
|---|---|

Resistance of cylinder head temperature sensor too high

- Engine **hot**, oil temperature above 80° C (176° F)
- Pull wire off temperature sensor
- Connect ohmmeter

Resistance less then 300 Ω

| Resistance is as specified | Resistance above specified value |
|---|---|

Replace temperature sensor

Pressure regulator defective

- Replace pressure regulator
- Measure fuel pressure

| Pressure still too high | Pressure OK. (2.5 kg/cm² / 35 psi) |
|---|---|

Return line between pressure regulator and fuel tank blocked or kinked
Eliminate defect

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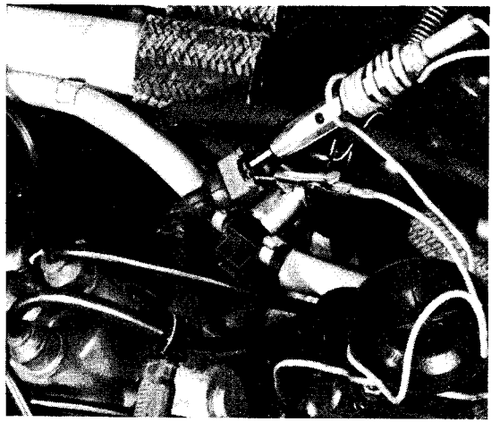
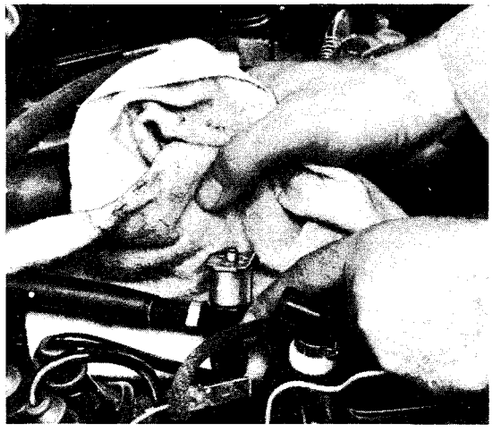


**Test instructions**

a. **Thermo-time switch**
- Pull connector off cold start valve
- Connect test light as shown
- Operate starter, test light must not light up

b. **Cold start valve**
- Pull connector off cold start valve
- Detach cold start valve from intake air distributor but leave it connected to the ring main
- Pull wire off coil terminal 1
- Operate starter and check if valve leaks

**Warning**
Fire hazard







**Test conditions**
- Speedometer reading normal
- Tire sizes and types of tire are to standard specifications
- Wheels rotate freely (brakes, wheel bearings!)
- Clutch and clutch play OK
- No accessories which could reduce top speed (roof rack etc.)
- Break-in period completed (from approx. 3000 miles according to driving style and conditions under which car had been driven).

**Faults in basic engine settings**
- Check accelerator cable adjustment (Throttle must be fully open with pedal at full throttle)
- Check valve clearance with engine cold, adjust if necessary
- Check ignition timing, adjust if necessary
- Check intake air preheating (with engine warm, cold air must be drawn in)
- Check spark plugs for:
  a) dampness (inside and outside)
  b) dirt
  c) burning (heat range)
  d) electrode gap
  e) damage
- Check compression

| No trouble located | Trouble located and corrected |
|---|---|

**Road test**

| Performance not OK | Performance OK |
|---|---|

**Contact in throttle valve switch does not operate**
- Pull off connector on EGR valve
- Connect test light
- Operate throttle valve (Test light must light up at idle and full throttle position)

| Test light lights up | Test light does not light up |
|---|---|

Replace EGR valve

Check wire to throttle valve switch, if OK replace throttle valve switch

**Exhaust gas recirculates at full throttle**
- Switch on ignition
- Operate throttle valve. EGR valve must click if throttle valve is opened approx. 11° and 75°

| EGR valve clicks | EGR valve does not click |
|---|---|

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**Speed table**

– for a 1 mile stretch –

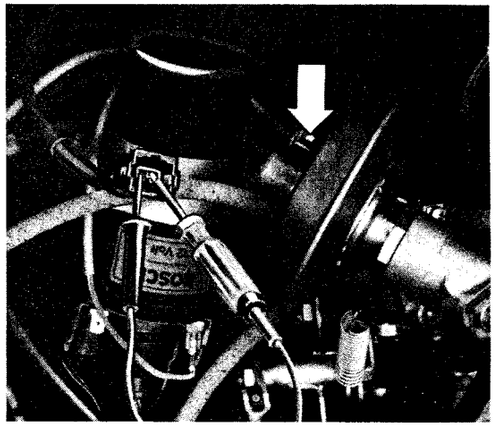
| Seconds | mph |
|---|---|
| 58 | 62 |
| 55 | 65 |
| 52 | 69 |
| 48 | 75 |
| 45 | 80 |
| 43 | 85 |
| 40 | 90 |
| 38 | 95 |
| 36 | 100 |

**Road testing instruction**

- Increase tire pressure to 3 psi above normal tire pressure
- Engine and transmission must be warm
- Level, dry asphalt road surface
- Normal wind conditions
- Take average readings from one run in each direction
- Check maximum speed where legally permitted on a measured test stretch (1 mile) with a stop watch
- Find actual speed from speed table and compare with speedometer to find variation

**Note**

If the compression is uneven or too low on a relatively new engine:
check/adjust valve clearance with cold engine
After 300 miles recheck compression; if still low, repair engine



(continued from page 19)

Engine floods due to defective cold start valve

**Possible causes:**
- Thermo-time switch does not switch off at higher temperatures
- Cold start valve leaking

Eliminate faults and start engine

| Engine difficult to start | Engine starts normally |
|---|---|

Injectors leaking

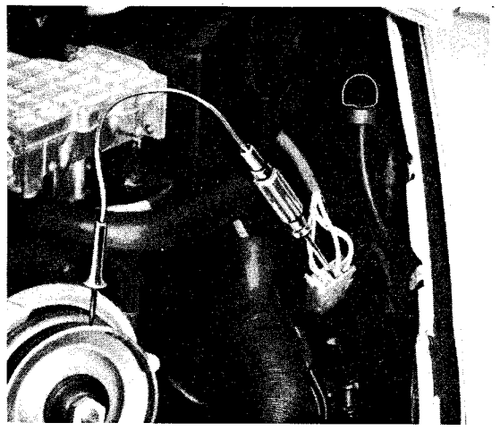
- Remove injectors but leave them connected to the ring main.
- Pull wire off terminal 1 on coil
- Operate starter briefly and check if more than two drops leak from each injector per minute.

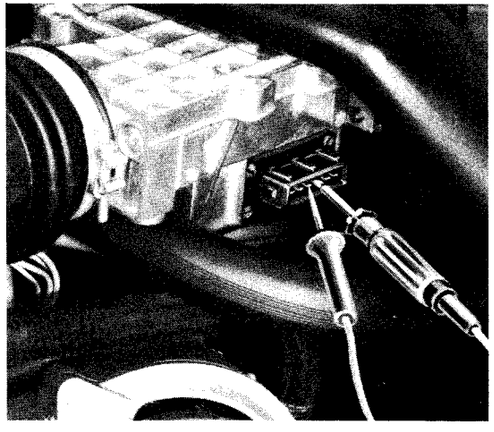
Replace leaking injectors

| No defect found | Defect rectified |
|---|---|

If you have not found any defects so far the trouble involved is not a typical hot starting trouble

Continue to find the trouble under "Engine does not start"





(continued from page 37)

**Pressure in ring main too high or too low**

- Connect pressure gauge to ring main
- Pull wire off terminal 1 on coil
- Operate starter

Specified pressure: about 2.5 kg/cm² (35 psi)

| Pressure is correct | Pressure noticeably higher or lower |
|---|---|

**Pressure regulator not working**

- Connect wire to coil terminal 1 again
- Run engine at idling speed
- Pressure must drop noticeably to about 2.0 kg/cm² (28 psi)

| Pressure drops | Pressure does not drop |
|---|---|

**Leaks in intake manifold**

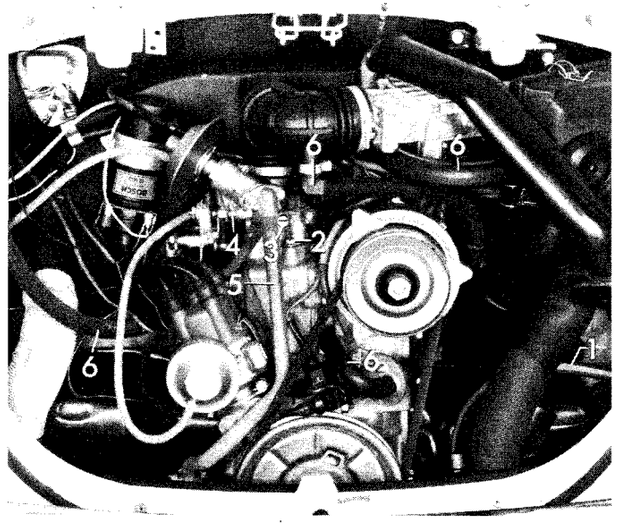
**Check the following:**

- Intake pipes on cylinder head
- Cold start valve on intake air distributor
- Connections between throttle valve housing/ intake air distributor
- Throttle valve shaft
- Pipe between intake air distributor and exhaust gas recirculation valve
- Hose connections
- Injector seal leaking

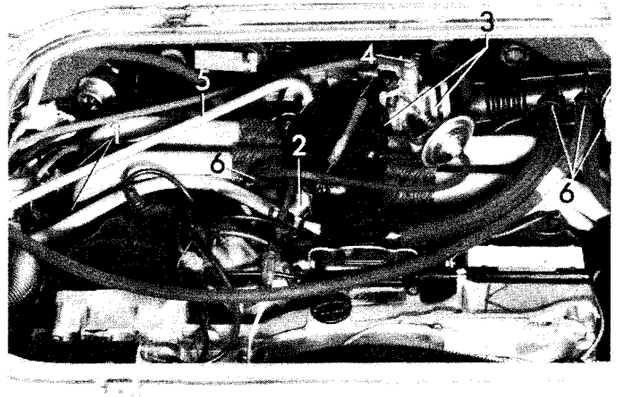
Replace pressure regulator

If pressure still too high check feed back line

Check hose connection between intake air distributor and pressure regulator. If OK, replace pressure regulator




Type 1




Type 2

Auxiliary air regulator defective

Check air flow through auxiliary air regulator with engine cold (blow through)

| Regulator is open | Regulator is closed |
|---|---|

Replace auxiliary air regulator

Voltage supply faulty

- Connect test light between center contact of series resistance plug and vehicle ground.
- Switch ignition on

| Test light lights up | Test light does not light up |
|---|---|

Pump contact in intake air sensor defective

- Pull connector off intake air sensor
- Connect ohmmeter to terminals 36 and 39
- Operate starter
- Ohmmeter needle must move from ∝ Ω (Pump contact closes)

| Pump contact closes | Pump contact does not close |
|---|---|

Replace intake air sensor

Double relay defective

Switch ignition on and contact test light to terminal 88z and ground and then 86c and ground

| Test light does not light up | Test light lights up on both terminals |
|---|---|

Replace relay

Check and repair defective wire

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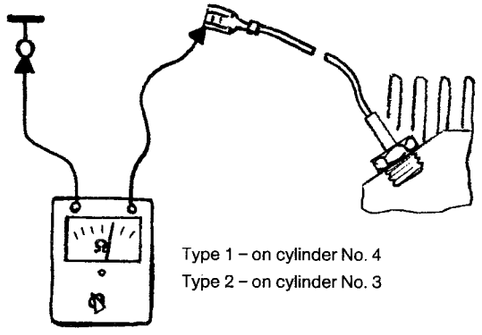
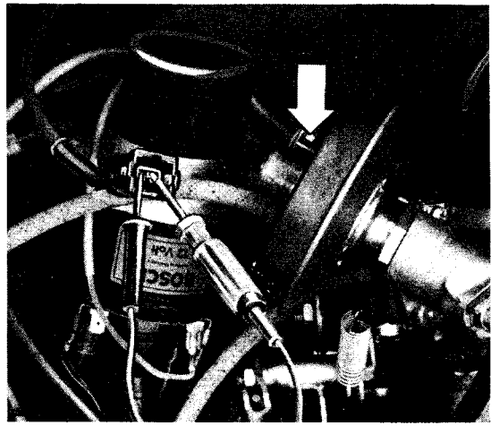


Type 1 – on cylinder No. 4
Type 2 – on cylinder No. 3



Test condition:
Vehicle reaches maximum speed (otherwise see "Poor output")

**Intake air preheating not working correctly**

- Regulator flap stiff or sticking
- Air cleaner thermostat defective
- Hoses on temperature regulator not connected or defective

Correct trouble

| Progression not satisfactory | Progression is OK |
|---|---|

**Faults in ignition system**

Check ignition system and eliminate any faults found

**Note**
Visible sparks at the plug connectors do not always mean that the ignition system is in order

| Progression not satisfactory | Progression is OK |
|---|---|

**Electrical fault in intake air sensor**

- Pull connector off intake air sensor
- Connect ohmmeter to terminals 6 and 9 on intake air sensor (specified reading 200 to 400 Ω)
- Measure at terminals 7 and 8 (specified reading 120 to 200 Ω)

| Reading as specified | Reading outside tolerance |
|---|---|

**Mechanical fault in intake air sensor**

- Remove intake air sensor
- Check if flap is jamming or stiff in operation, when in doubt, compare with new part. Check if interior is dirty, if so, wipe out with a dry cloth

| Intake air sensor OK Progression not satisfactory | Intake air sensor sticking or jammed |
|---|---|

Replace intake air sensor

Replace intake air sensor

go to page 39

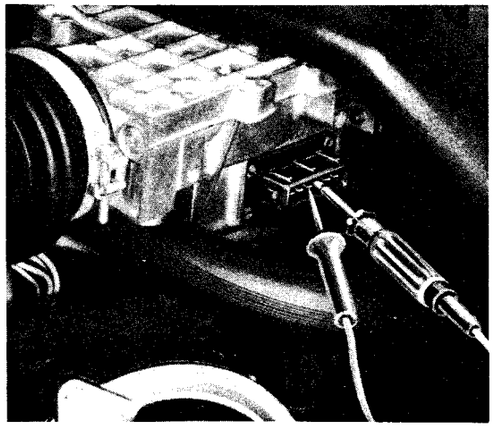
**Operating instructions**

To warm engine up quickly to normal operating temperature drive off immediately after starting engine. If the cold engine runs too long at idle it tends to stall for some time particularly when weather conditions are cold or damp

**Note**

Following defects may be found despite visible sparking at plug connectors:

- Distributor cap (damp, cracked, burnt by tracking)
- Rotor defective
- Loose connections on coil
- Spark plugs or connectors defective
- Ignition timing off (breaker points)
- Ignition leads badly connected
- Arcing at ignition cables on distributor (through rubber caps)
- Voltage at terminal 15 on coil too low (minimum = 9 volts)
- Condenser faulty



(continued from page 23)

Resistance of temperature sensor on cylinder head too high

- Engine must be cold (room temperature 20°C/68°F)
- Pull wire off temperature sensor
- Connect ohmmeter (Resistance approx. 2.5 KΩ)

| Measured resistance is as specified | Ohmmeter shows 0Ω or ∞Ω |
|---|---|

Replace temperature sensor

Exhaust gas recirculates at idle

- Switch on ignition
- Operate throttle valve (EGR valve must click if throttle valve is opened approx. 11° and 75°)

| EGR valve clicks | EGR valve does not click |
|---|---|

EGR valve leaks

- Run engine at idle
- Exhaust gas recirculating pipe may not warm up

| Pipe does not warm up | Pipe warms up |
|---|---|

Replace EGR valve

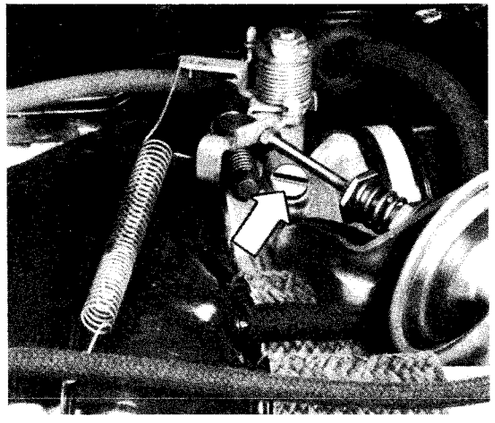
Contact in throttle valve switch does not operate

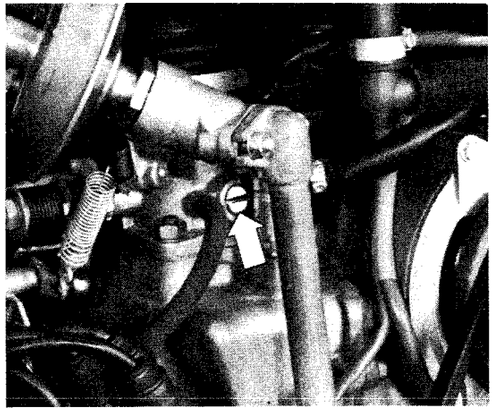
- Pull off connector on EGR valve
- Connect test light
- Operate throttle valve (Test light must light up at idle and full throttle position)

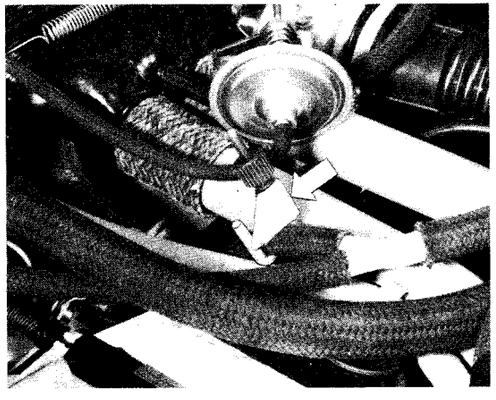
| Test light lights up | Test light does not light up |
|---|---|

Replace EGR valve

Check wire to throttle valve switch, if OK replace throttle valve switch







(continued from page 33)

**Exhaust is being fed back at idling speed**

- Let engine run at idling speed
- Pipe between exhaust recirculation valve and intake air distributor should not get hot

| Pipe does not get hot | Pipe gets hot |
|---|---|

**Idling speed regulator incorrectly adjusted**

Check adjustment and correct if necessary

| Idling still irregular | Idling OK |
|---|---|

**Injector leaking**

- Remove injectors but leave them connected to the ring main
- Pull off wire terminal 1 on coil
- Operate starter briefly and check if more than two drops leak from each injector per minute

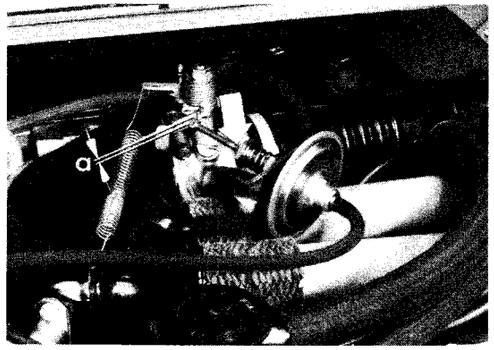
Replace leaking injectors

**Contact in throttle valve switch does not operate**

- Pull off connector on EGR valve
- Connect test light (with ignition switched on test light must light up)

| Test light lights up | Test light does not light up |
|---|---|
| Replace EGR valve | Check wire to throttle valve switch, if OK replace throttle valve switch |

# Idle irregular

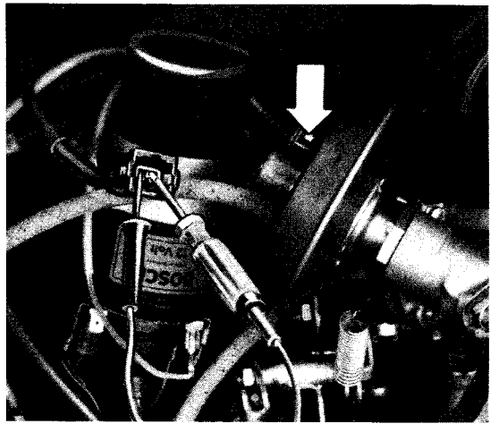



Idle speed regulator must be set with engine running

- Engine oil temperature 50° – 70° C (122° – 158° F)
- Set idle speed to 850 ± 50 rpm
- Apply parking brake and select a driving range (under this load idle speed must be 700 – 750 rpm and gap a = 0.5 – 1.0 mm (0.02 – 0.04 in.)
- If necessary adjust gap on push rod (arrow)

Type 2

– automatic transmission – only



# Idle speed to high

Test condition:

- Engine warm 50°–70° C (122°–158° F)
- Tachometer connected
- Engine running at idling speed

**Throttle valve not closing**

Press throttle valve with thumb to see if it is fully closed and watch idling speed

| Idle does not drop | Idle drops |
|---|---|

**Adjusting screw out of adjustment**

Adjust idle by turning screw

| Correct setting can only be obtained by turning screw fully in | Speed can be adjusted |
|---|---|

**Auxiliary air regulator not closing**

Block hose between auxiliary air regulator and rubber elbow with a clamp

| Speed does not drop | Speed drops |
|---|---|

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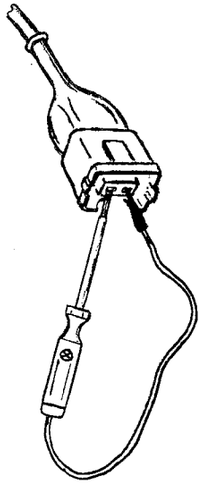
**Throttle valve sticking**

**Possible troubles:**

- Throttle control sticking (accelerator cable, pedal)
- Throttle shaft stiff in operation
- Throttle valve switch base plate bent
- Hose from speed regulator disconnected

Type 2 – automatic transmission – only

- Speed regulator incorrectly adjusted
- Speed regulator defective





**Test conditions**
- Idle within tolerances

| Engine not running on all cylinders | |
|---|---|
| Pull off plug connectors one after the other and check if all cylinders are firing | |
| All cylinders firing | Not running on all cylinders |

| Valve clearance incorrect | |
|---|---|
| Check clearance and if necessary correct (engine cold) | |
| Idling still irregular | Idling OK |

| Engine drawing in air via crankcase | |
|---|---|
| **Possible causes:**<br>● Oil filler pipe leaking<br>● Oil filler cap leaking<br>● Dipstick cap leaking<br>● Connections of crankcase ventilation<br>● Valve cover gasket leaking | |
| Idling still irregular | Idling OK |

| Leaks in air intake system | |
|---|---|
| **Possible causes:**<br>● Intake pipes on cylinder head<br>● Cold start valve on intake air distributor<br>● Connections between throttle valve housing/ intake air distributor<br>● Throttle valve shaft<br>● Pipe between intake air distributor and exhaust gas recirculation valve<br>● Injector seal leaking<br>● Hose connections | |
| Idling still irregular | Idling OK |

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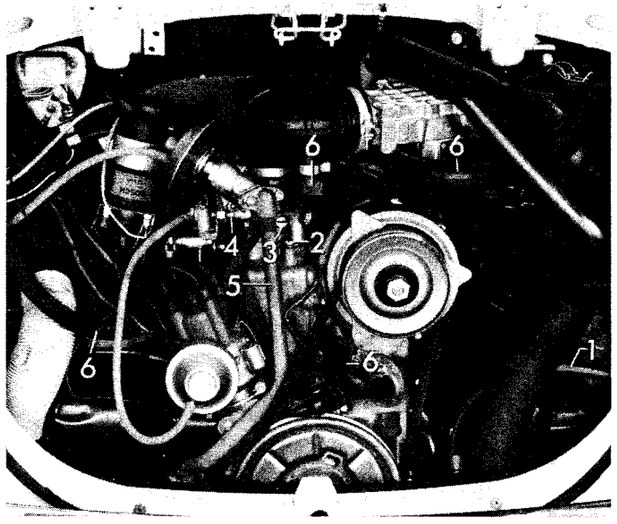
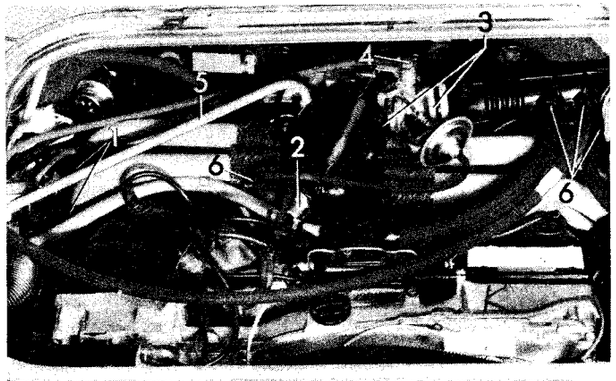
| Trouble in ignition distributor or coil | |
|---|---|
| ● Check distributor cap for:<br>– dampness, dirt<br>– cracks, tracking<br>– condition of carbon brush<br>● Check contact breaker points for gap and pitting<br>● Check ignition coil for:<br>– cracks, tracking<br>– ground connection and good wire contacts | |
| No trouble located | Trouble located and corrected; engine now runs smoothly |

Ignition wires or plug connectors defective. Eliminate defect




Type 1




Type 2

(continued from page 27)

Auxiliairy air regulator defective

- Pull off connector on auxiliary air regulator
- Connect test light
- Light must light up when engine is running

| Test light does not light up | Test light lights up |
|---|---|

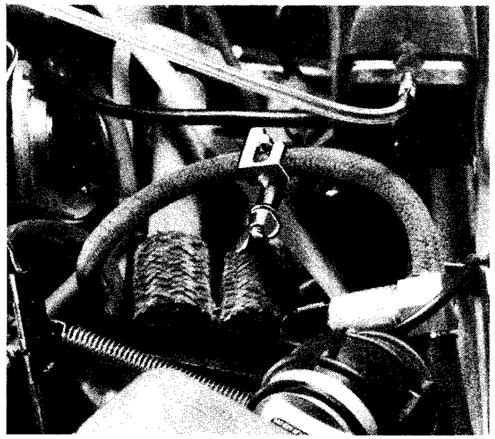
Test light lights up → Replace auxiliary air regulator

Test light does not light up →

**Dead wire:**

- to double relay, terminal 88 c
- to control unit, terminal 34

Repair defect



(continued from page 27)

Deceleration air valve not closing

Seal hose between deceleration air valve and intake air distributor with a clamp

| Speed does not drop | Speed drops |
|---|---|

Speed does not drop → Hose between pressure regulator and air intake distributor defective or disconnected

Speed drops → Type 1 and Type 2 – manual transmission → Replace deceleration air valve

Speed drops → Type 2 – automatic transmission – only

Deceleration air valve defective

Take clamp off, pull a wire off air valve

| Idling speed still too high | Idling speed normal |
|---|---|

Idling speed still too high → Replace deceleration air valve

Idling speed normal → Check for ground circuit in wire to ATF pressure switch.
If OK, replace ATF pressure switch