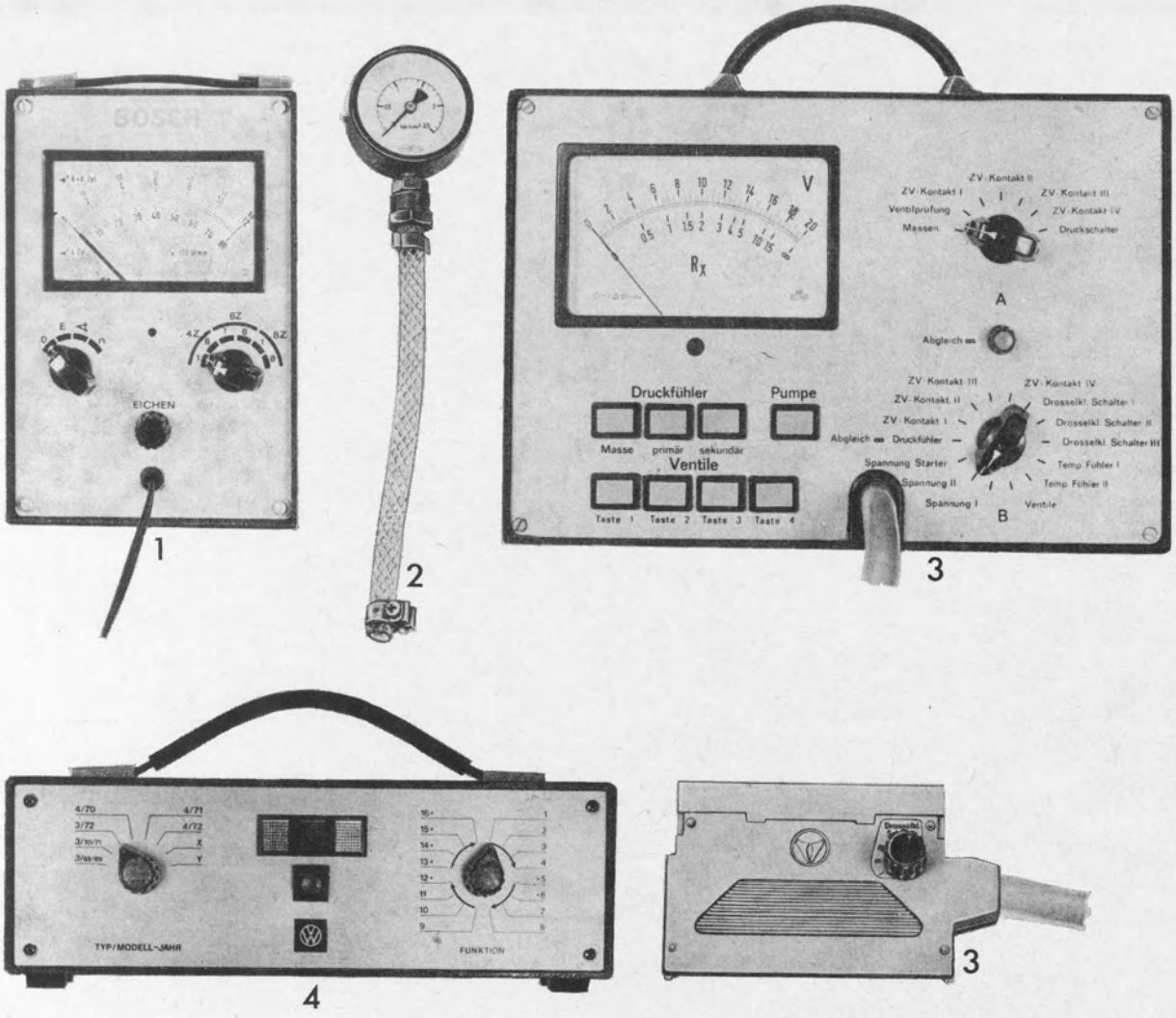

1 - Tachometer
2 - Pressure gauge
3 - EFAW 193 with adaptor or EFAW 238
4 - VW 1218

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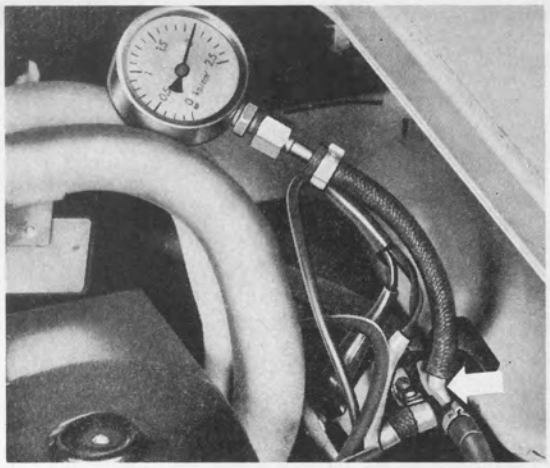
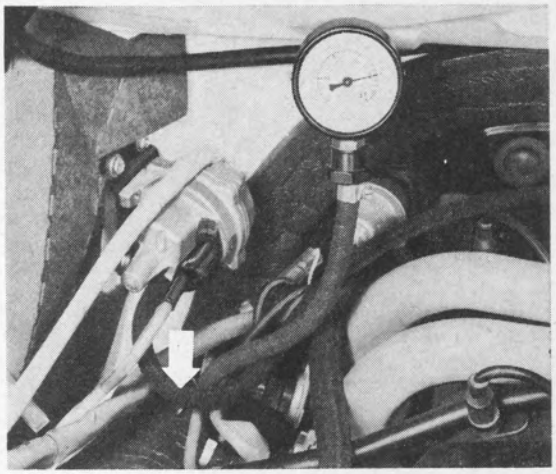


Type 3

Pressure gauge

1 - Remove the plug from the connector nipple.

2 - Connect pressure gauge (arrow).



Type 4

Type 4

Test appliances EFAW 193 or 238

1 - Switch off the ignition so that no current is passing through the control unit

2 - Remove control unit (see page K 7.7/4)

3 - Pull the multi-point connector out of the control unit (page K 7.7/4) and connect the plug of the test appliance to the multi-point connection of the wire harness. The control unit remains disconnected.

4 - Switch on the ignition and check all operations in accordance with the check list.

VW 1218 Tester

Calibration

Before using the tester, adjust it first to the local altitude above sea level. Your local Chamber of Commerce, airport, etc. will tell you what it is. To calibrate:

1) Remove plastic cap from back of tester.

2) You will see a scale and a screw head. Set the red side of the slot (marked with a red paint dot) to the local altitude. The scale is expressed in feet (ft) and meters (m). The figures on the foot scale must be multiplied by 1000 and those on the meter scale by 100.

Connecting VW 1218 to vehicle

1) Remove wire from terminal No. 1 of the ignition coil to prevent starting of the engine.

2) Ignition switch "off."

3) Remove control unit.

4) Insert tester plug into control unit.

5) Insert multiple plug into tester plug.

6) Set tester type switch to type and year of vehicle being tested.

7) Set test selector switch to position No. 1.

8) Switch on ignition and proceed with test sequence as indicated on the following pages.

9) When the test is completed, reinstall control unit and connect wire to terminal No. 1 on ignition coil.

Note

Test should preferably be performed at room temperature, but may also be performed anywhere between + 10° F and + 120° F.

If indicator light shows "not in order," correct defect before proceeding. After the defect has been corrected, the complete test (positions 1—16) must be repeated.

Warning

Under no circumstances may the engine be started while the VW 1218 tester is connected. This is to prevent permanent damage to the unit.

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Check list for tester EFAW 193 and EFAW 238

I - Electrical testing

Position of switches on tester: **Switch A in position "measure"** / **Switch B see check list**

Test stage	Tester EFAW 193		Tester EFAW 238		measure:	On scale (Nominal value) "in order"	On scale "not in order"	Diagnosis	Repair instructions
	Switch B in position:	operate:	Switch B in position:	operate:					
1	Voltage I	Switch ignition on and leave it on for the whole of the following testing sequence	Voltage I	Switch ignition on and leave it on for the whole of the following testing sequence	Voltage supply for control unit	11—12.5 (11—15.5 V)	No reading	No voltage at relay I terminals 86, 30 No ground at relay I terminals 85 The connection between terminal 87 on relay 1 and terminal 16 on control unit is interrupted.	Check for voltage at terminal 15 of the coil Check ground connection Check wire 16.
							Less than 11 volt	Contact resistance in the wiring 16/control unit or on the relay contacts.	Examine wiring, replace relay 1
2	Voltage II		Voltage Ii				As for test stage 1, but check wire to terminal 24/control unit		
3	Starting Voltage	Starter	Starting Voltage	Starter	Voltage at terminal 50 of solenoid switch	9.5—12 (9.5—12 V)	No voltage starter turns	Wiring breakdown from starter solenoid to control unit	Examine wire 18
							No voltage starter does not turn	Wiring breakdown	Ignition/starter switch defective
							Less than 9 volts	Battery run down, excessive voltage drop in the wiring from ignition starter switch.	Check the cable with a voltmeter
4	Adjustment	Set tester to ∞ by turning knob			Adjust tester	∞	Adjust to ∞	When full needle deflection cannot be obtained on the instrument, the battery voltage in the vehicle is low.	See test stages 1 and 2.
5	Pressure sensor		Adjustment pressure sensor	Set tester to ∞ by turning knob	Adjust tester	∞			
		Depress "ground" button		Depress "ground" button	Resistance between pressure sensor windings and ground (short circuit to ground	Resistance (∞ Ω)	Resistance 0	Ground connection in the cable or pressure sensor	Pull the plug off the pressure sensor. If needle moves to ∞, replace pressure sensor. If scale remains unchanged at 0, wiring 7, 8, 10 and 15 have short circuits, replace wiring harness.
							Below ∞ but not 0	Faulty insulation	As for 6, resistance 0

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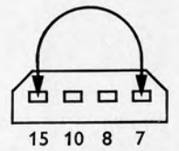
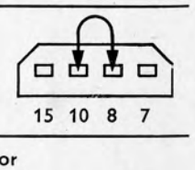
Test stage	Tester EFAW 193 Switch B in position:	Tester EFAW 193 operate:	Tester EFAW 238 Switch B in position:	Tester EFAW 238 operate:	measure:	on scale (Nominal value) "in order"	on scale "not in order"	Diagnosis	Repair instructions
6	Pressure sensor	Depress "primary" button	Adjust pressure sensor	Depress "primary" button	Resistance of primary windings of pressure sensor	0.5—1.5 on Ω scale (approx. 90 Ω)	Resistance considerably smaller than 90 Ω	Faulty insulation	Pull plug out of pressure sensor and if tester shows ∞, replace pressure sensor
							Resistance 0	Short circuit to ground, short circuit in secondary windings	
							Resistance considerably larger than 90 Ω	High contact recistance	Check plugs and wirings for corrosion or open circuit
							Resistance ∞	Open circuit	Bridge at plug as shown in illustration. If tester shows 0, replace pressure sensor. If tester shows ∞, repair wiring. 
7		Depress "secondary" button		Depress "secondary" button	Resistance of secondary windings of pressure sensor	3—4 on Ω scale (approx. 350 Ω)	As in 6 nominal value approx. 350 Ω	As in 6	As in 6. With resistance at ∞, bridge other two terminals. 
8	Distributor contact I	Distributor by turning starter over briefly	Distributor contact I	Turn distributor by operating starter briefly	Resistance of trigger contacts in distributor — Group I	alternately between 0 and ∞ (0 Ω / ∞ Ω)	Resistance larger than 0 or smaller than ∞ Ω	If needle of tester does not swing when "starting" i.e., remains at — ∞ or 0, replace the contacts.	Replace contact holder in distributor
9	Distributor contact II		Distributor contact II		Resistance of trigger contacts in distributor — Group II				
				Distributor contacts III and IV are not required for four cylinder engines					
10*)	Throttle valve and adaptor in position throttle valve switch I	Open throttle valve slowly	Throttle valve switch I	Open throttle valve slowly	Contacts of the 1 contact strip in throttle valve switch	Alternately 10 times between 0 and ∞ (0/∞ Ω)	Needle stays on ∞/or, needle does not stay on ∞ when the throttle valve is taken back	Throttle valve switch defective	Replace
11*)	As in 10 but with adaptor switched to throttle valve switch II	As in 10	Throttle valve switch II	As in 10	As in 10	As in 10			
11a*)	switch adaptor to throttle valve switch II	Close throttle valve	As in 11	Close throttle valve	Operation of switch	When the throttle valve is closed the needle should stay at ∞ (∞ Ω)	Needle stays on "0"	Short circuit	Pull out plug on throttle valve switch, when pointer indicates ∞ replace throttle valve switch, otherwise exchange wiring harness.

Test stage	Tester EFAW 193 Switch B in position:	Tester EFAW 193 operate:	Tester EFAW 238 Switch B in position:	Tester EFAW 238 operate:	measure:	on scale (Nominal value) "in order"	on scale "not in order"	Diagnosis	Repair instructions
12*)	As in 10 but with adaptor switched to throttle valve switch III	Throttle valve in idle position (closed)	Throttle valve switch III	Throttle valve in idle position (closed)	Resistance of contacts in throttle valve switch	0 (0 Ω)	Resistance ∞ with throttle valve lever in "idle" position	Throttle valve switch wrongly adjusted or open circuit in wiring.	Check adjustment, pull out plug, bridge. If still at ∞, replace wiring harness, otherwise replace throttle valve switch.
13*)		Throttle valve open more than 1°		Throttle valve open more than 1°		∞ (∞ Ω)	Resistance 0 Ω with throttle valve open more than 2°	Throttle valve switch wrongly adjusted or short circuit in wiring.	Pull out plug, if tester still shows 0, replace wiring harness or adjust or replace throttle valve switch.
14	Temperature sensor I		Temperature sensor I		Resistance of temperature sensor	2—5 (approx. 300 Ω) strongly affected by temperature, higher temperature, lower value	Resistance larger or smaller 350 Ω	Nominal value is for 68° F (20° C). At higher temperature resistance is smaller. If 0 or ∞ is not shown, sensor in order.	
							∞ Ω	Open circuit	Bridge, if tester shows 0, replace temperature sensor or wiring harness.
							0 Ω	Short circuit	Pull out plug, if reading is same, wiring defective. If reading ∞, replace temperature sensor.
15	Temperature sensor II (cylinder head)		Temperature sensor II (cylinder head)		Resistance of temperature sensor	0.5—2.5 (approx. 2,5 K Ω) strongly affected by temperature, higher temperature, lower value		As 14 but with following deviations: Nominal value 2.5 k Ω. Instead of bridging, hold plug of wiring harness on ground.	
16	Fuel injectors	Depress buttons Cyl. 1 injector Cyl. 2 injector Cyl. 3 injector Cyl. 4 injector	Fuel injectors	Depress buttons Cyl. 1 injector Cyl. 2 injector Cyl. 3 injector Cyl. 4 injector	Resistance of injector windings and wirings	approx. 2—3 (approx. 2.4 Ω)	Resistance 0 Ω	Short circuit in wiring or at injector	Pull plug out of appropriate injector and if tester shows ∞, replace injector, otherwise replace wiring harness.
							Resistance ∞ Ω	Open circuit in wiring or in injector windings	Bridge contacts in injector plug and if tester then shows ∞, wiring harness defective. If 0, injectors defective.
							Nominal value: 2.4 Ω at 68° F (20° C), resistance larger but not ∞	Injector ground cable makes bad contact with crankcase or flat terminals not properly connected	Tighten ground connection, provide good ground contact
							Resistance below 2.4 Ω but not 0	Short circuit in injector windings	Replace

*) Note: Type 3 up to July 1969 do not perform tests 10, 11, 11a.
Type 3 from August 1969 perform tests 10, 11, 11a.
Type 4 from August 1969 do not perform tests 12, 13.

Visual check: That injectors are correctly connected (gray protective caps at rear, black protective caps at front, viewed in driving direction).
That all protective caps are correctly installed.

II - Hydraulic test (Sequence applies to EFAW 193 and EFAW 238) **Testing injectors** Preparation: Connect pressure gauge if necessary switch on ignition again Switch position on measuring device: **switch A on injector testing** switch B has no influence

Test stage	Operate:	Tests	On scale (nominal value) in order	On scale "not in order"	Diagnosis	Repair instructions
17	Depress "pump" button	Fuel pressure in the ring main	28 psi (2 kg/cm²)	Pressure above 28 psi (2 kg/cm²) Pressure below 28 psi (2 kg/cm²)	Pressure regulator maladjusted	Adjust, when not adjustable, replace pressure regulator.
	Pull out two pinned plug from pump. Press "Pump" button, and measure voltage at plug with a voltmeter.			Reading 12 volt	Pump defective	Replace
				Reading 0 volt	Listen to determine whether relay (under instrument panel) operates.	—
				If yes:	Open circuit in wiring from pump relay terminal 87 to two-pin plug or from two-pin plug to ground connection	If the wiring connections are in order, the pump relay is defective.
				If no:	Open circuit in wiring from terminal 87 of voltage supply relay to pump relay terminal 86 or 85 to wiring 19 in harness	Check wiring connector in engine compartment
				If wiring O. K.	Pump relay defective	Replace pump relay.
18	Briefly depress "pump" button	Sealing of the fuel system (pressure side)	Fuel pump up to July 1969. At first the pressure is permitted to drop briefly by a max. 5.6 psi after which the pressure may only continue to drop **very slowly.** Fuel pump from August 1969. Pressure is permitted to drop to 17 psi after which the pressure may only continue to drop **very slowly.**	Pressure drops immediately after push button "pump" is released	Leakage in pressure system from fuel pump to pressure regulator	Pinch fuel ring main in front of right injectors with clamp. If no pressure drop, leak in pressure line or pump. If pressure drop, try ring main connections to injectors, at injectors or at pressure regulator. If necessary, build-up pressure several times during test. Do not unclamp fuel line when building up pressure. Check visually whether hose connections (pressure gauge too) leak.
	Injector dribble (catch fuel) Push "Pump" button			When **more** than 2 drops per minute on one injector.	Injector defective	Replace
				When injector nozzle becomes wet **(not more** than 2 drops per minute).	Pressure regulator defective	Replace
19	Press "Pump" button, operate starter briefly.	Starting valve and thermoswitch a - Temperature around engine + 5° ± 5° C (41° F ± 41° F)	Pressure must not visually drop.	If pressure drops when operating starter	Thermo switch defective	Replace
	Connect thermo switch connection to ground.		Pressure must fall	Pressure does not fall when operating starter	No continuity in the wiring 31 from cold starting valve to starter terminal 50	Check cable for continuity. When no continuity, replace wiring harness. When in order check cold starting valve as in test stage 3. Winding resistance 4.2 Ω at 20° C (68° F).
	Press "Pump" button. Operate starter briefly (thermo switch connected).	b - Temperature engine below + 5° ± 5° C (41° F ± 41° F)	Pressure must drop slowly	Pressure	Thermoswitch or cold starting valve defective	Replace thermo switch or cold starting valve — as described at "a" — check.

Remove pressure gauge, close off connection with screw and sealing washer. Make sure there is no leak.

III - Dynamic testing (Sequence applies to EFAW 193 and EFAW 238)

Test performed with a control unit and engine running.

Preparation:

Caution

The test stages must be adhered to. When using test appliance EFAW 193 and adaptor EFAW 243 the switch "A" must under no circumstances be set to "Injector Test" when carrying out the dynamic test as all the injectors would then be opened.

Switch off ignition. Plug the test appliance into the control unit (cable harness is to stay attached to testing appliance). **Turn switch "A" on the test appliance to "Zv-Kontakt I"** (distributor contact I). Switch B has no influence. Start engine and allow to idle.

Switch positions: **Switch "A" see check list**
Switch "B" has no influence

Caution

Never run the engine with the battery disconnected! Do not use a quick charger to start the engine! On a few Type 4/Wagon vehicles the terminal 85 of the current supply relay is connected to ground via terminal 14. But the terminal 14 of the multi-point connection is only connected to ground when the control unit is plugged in. The current supply relay must therefore be connected to ground with terminal 85 before testing with a test appliance.

Test stage	Switch A in position*)	Operate:	Needle on the V-Scale
20	Distributor contact I	Allow engine to idle if necessary at slightly increased speed	Approx. 18 (middle value)
21	Change over between distributor contact I and distributor contact II	Switch A	The difference between I and II may not be greater than 3 divisions on the current scale
22**)	Pressure switch	Allow engine to idle	The needle on the instrument must move towards the end position.
		Stop engine — ignition switched "on"	minimum 2—3

*) The switch positions for distributor contacts III and IV do not apply to 4 cylinders engines.
**) Applies only to Type 3 up to July 1969.

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Check list for VW 1218 tester

Note

If indicator light shows "not in order," correct defect before proceeding.

After the defect has been corrected, the complete test (positions 1—16) must be repeated.

Test selector switch in position	Checks	Manual Operation	In Order	Not in Order	Diagnosis	Repair Instructions	Notes
1	Current supply on terminal No. 16	—	Green	No light	Plug loose in control unit or current relay defective	Secure plug in control unit. Check relay and connections (loose or corroded). Replace relay if necessary. Note: If vehicle does not start, check voltage on terminal No. 24 with test light or similar. If no voltage, check cable and connections from No. 24 to terminal No. 87 on voltage supply relay.	
	Battery voltage (no-load test)	—	Green	Red	Voltage too low	Check for loose or corroded battery cable terminals, charge or replace battery.	
	Injectors with plug and cables	—	Green	Red and Green	Open circuit or poor connections	To exactly locate defect, turn selector switch to position No. 3. The injectors are now activated and a non-operating injector can be felt. Repeat test in position No. 1. Make sure plug of non-operating injector is secure. Check ground. If red and green lights are still on, bridge terminals in plug. Red and green still on, repair open circuit in cable . . . green light on: replace injector.	
2	Temperature sensor I with plug and cables (intake air distributor) open circuit only	—	Green	Red Steady	Open circuit or poor connections	Check plug connection. If light remains red, bridge terminals in plug. If light is still red, repair open circuit in cable. If you get a green light while bridging, replace sensor.	
	Temperature sensor II with plug and cables (cylinder head) open circuit only	—	Green	Red Blinking	Open circuit or poor connections	Check plug connection. If light continues to blink red, disconnect sensor wire and ground. If red blinking continues, repair open circuit in cable. If you get a green light while grounding, replace temperature sensor.	
	Temperature sensor I and II (characteristic curve) **Note** Test may only be performed at cylinder head temperature below 43° C (110° F)	Keep reset button depressed	Green	Yellow Steady	Sensor I defective	Replace sensor I.	
				Yellow Blinking	Sensor II defective	Replace sensor II.	
3	Control unit and injectors with cables	—	Green	Red	Defect in control unit, short circuit in injector or short in injector cable harness	Establish which injector is not working (can be felt). Remove plug from defective injector, press reset button and release: Green light: replace injector Red light: replace control unit Red light stays on, eliminate short circuit in cable.	

Test selector switch in position	Checks	Manual Operation	In Order	Not in Order	Diagnosis	Repair Instructions
4—11*	Control unit [1]	—	Green	Red	Control unit defective	Replace control unit.
12 + 13**	Pressure sensor with plug and wires	—	Green	Red	Defective pressure sensor or wire with plug	Check pressure sensor including connections. Eliminate fault at plug or cable. Check for water, dirt and oil in pressure sensor. Replace sensor if necessary.
	Pressure sensor (Emission control)	Keep reset button depressed	Green	Red	See: repair instructions	Red light: repeat test with new pressure sensor. If light is green, the old pressure sensor is defective. If light still shows red, you may have extreme atmospheric conditions (e.g., very high or low atmospheric pressure). Note: Make sure tester is calibrated to local altitude.
14	Cable from starter terminal No. 50 to control unit (wire No. 18)	—	Yellow	Yellow and Red	Open circuit	Check wire and connections (possible that wire on starter is loose). Look for disconnected cold starting device or modified wiring harness.
	Distributor trigger contacts with plug and wire	Yellow: [2] Crank engine 5—10 seconds.	Green after cranking	Yellow after cranking	Trigger contacts defective, or wire and plug open circuit	If test result after cranking is green, it is of no importance what lights were on while cranking. However, if test result after cranking is yellow it is important to know the light combination during cranking: If while cranking, the lights are yellow and red, the trigger contacts or wire with plug are defective. If while cranking, the light is yellow only, there is a short circuit in wire No. 18 from terminal No. 50 to the control unit. If test result is still yellow, perform battery load test, since battery voltage might drop too much while cranking.
15	Pressure switch All 1968 and 1969 vehicles only	—	Green	Yellow	Open circuit, poor connections or defective pressure switch.	Check pressure switch, connections and wires. Replace pressure switch if necessary. Look for modified wiring harness.
	Throttle valve switch contact strips All vehicles from 1970 and later	Yellow: Open throttle valve completely (Yellow light must come on when switch is turned to position No. 15)	Changes from yellow to green	Yellow does not change to green	Open circuit or defective contact strips	Check throttle valve switch, wires and switch adjustment. Replace or adjust throttle valve switch as necessary. Note: The counting of the contacts is done by the tester. The test result is displayed by one change from yellow to green when in order. (Only the first 5 contacts are checked.)
16	Throttle valve switch fuel cut-off All VW Type 3 and 4 and Porsche 914 vehicles	Green: [3] Open throttle valve wide Note: On VW Type 4 automatic, pull dashpot rod back	Changes from green to yellow	Green does not change to yellow	Open circuit, short circuit, improperly adjusted or defective throttle valve switch	Check throttle valve switch, switch adjustment and wires. Adjust or replace switch as necessary.
	Throttle valve [4] switch full load contact only for VW Type 3 vehicles from 1972 model year.	As above	Changes from green to yellow to green	Does not change from green to yellow to green	As above	As above
	Fuel pump relay and fuel pump	Green: [3] Keep reset button depressed	Yellow	Yellow	Open circuit in pump relay or defective relay	Check fuel pump relay, wires, plug and connections. If pump does not operate (accoustical check) check pump.

* Tests in position 5 and 6 should also be performed with the reset button depressed.

Green: in order. Red: not in order.

[1] In positions No. 4 — 11 the following functions of the control unit are checked:

Position No. 4 — Engine speed correction, pump control
5 — Basic compensation rich
6 — Basic compensation lean
7 — Engine speed correction, full load enrichment
8 — Acceleration/full load enrichment
9 — Start and warm-up enrichment
10 — Pump control
11 — Pump control

** Position No. 13 is a precision test of the pressure sensor with regards to emission control.

[2] After cranking do not turn off ignition or test is invalid. (Readings are cancelled.)

Since test is performed at cranking speed bouncing of the trigger contacts at high speed cannot be detected with the VW 1218.

[3] Green light must come on when switch is turned to position No. 16

[4] 1972 Type 3 vehicles manufactured for sale in California are equipped with an exhaust gas recirculation valve. It is located in the front right hand side of the engine compartment.

Its function is checked as follows:

1. Engine temperature above 18° C (65 degrees F)
2. Throttle valve switch in order (test No. 15)
3. When the throttle valve switch is opened, the exhaust gas recirculation valve must click twice.