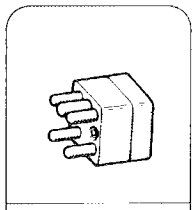
A. Testing with Bosch tester

Special tool



126 589 15 63 00

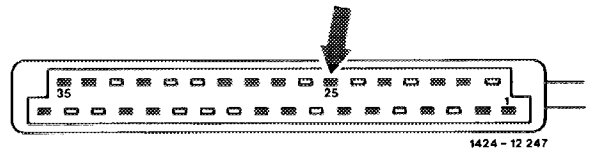
Conventional tool

Tester	e.g. Bosch Type ETT 016.00 Order No. 0684 101 600

Note

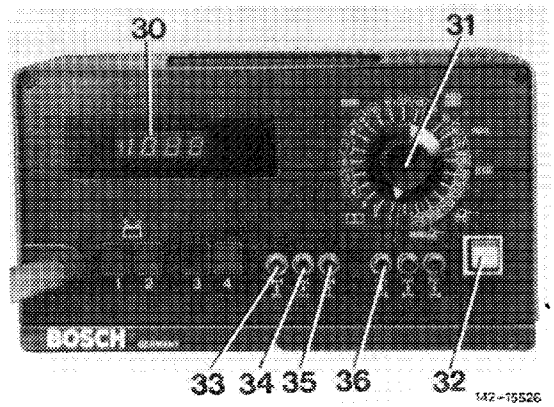
Perform all test steps, starting with test step 1, on principle. Except on electronic control unit with green Bosch type rating plate and Bosch number 0 265 101 011 or blue type rating plate and Bosch No. 0 265 101 016 of the series phased-in starting February 1984. This electronic control unit can no longer be tested with the Bosch tester. Test steps 13, 16, 17, 18 and 19 have been eliminated.

Owing to the modified electronic control unit the ABS cable harness is also modified, since the stop lamp switch has been additionally included in the ABS logics. The stop lamp switch is connected to the 35-pole plug on pin 25 and should be checked as follows:



Actuate brake and measure voltage between PIN 25 and ground by means of a voltmeter, e.g. SUN-DMM5 or Avometer 2003. To prevent damaging the contact on cable plug, it is recommended to use the pertinent connecting cable from „electric connection set".

1 Green light (battery voltage)
2 Red light (battery voltage)
3 Green light
4 Red light
30 Digital readout
31 Program switch
32 Yellow light button
33 Pushbutton front wheel brake
34 Pushbutton front wheel brake left
35 Pushbutton front wheel brake right
36 Pushbutton rear wheel brake



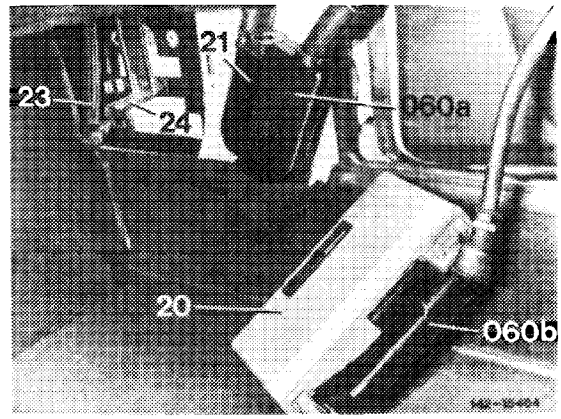
Connecting tester

1 Remove electronic control unit (20) with ignition switched off.

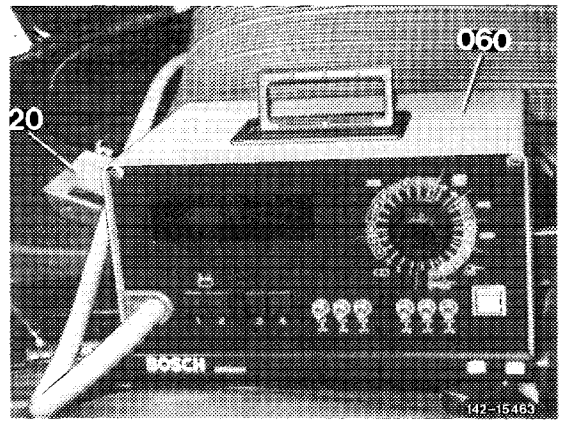
2 Connect multi-pole plug (35-pole) (21) of cable set for electronic control unit to plug (060a).

3 Attach plug (060b) of tester to electronic control unit, holding spring should engage audibly on plug.

4 Switch on ignition, make sure that all the other consumers are switched off.



Note: Do not drive vehicle with tester connected.

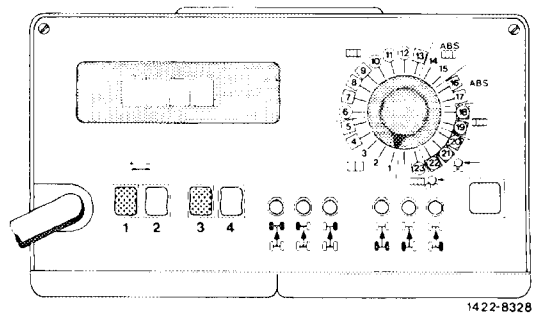


Testing battery voltage
(at all program switch positions).

Note
The battery voltage is constantly monitored during entire test sequence. Lamps (1) and (2) are check lights.

If no lamp lights up, the power supply to the electronic control unit and to tester is interrupted.

Since September 1981 the overvoltage protection (51) and the relay (50) for the power supply of the electronic control unit are one unit.



1. Poor contact of plug connection at valve relay (16).

2. Lines to valve relay interrupted (refer to electric wiring diagram).

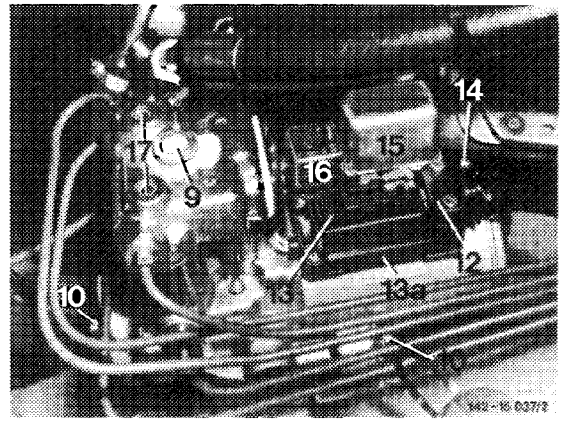
3. Valve relay (16) defective.

Remedy

1. Check plug connection.

2. Check lines from harness and in plug socket of hydraulic unit.

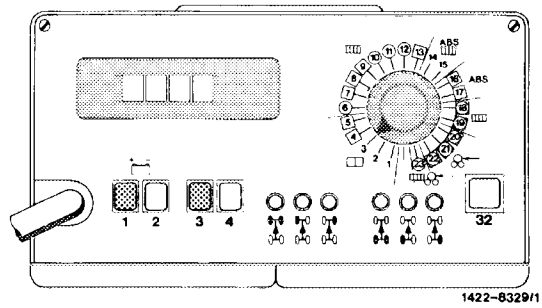
3. Replace valve relay (16).



Test step 3
Testing relay for motor of return pump in rest position.

Actuation: none

Readout Good	Fault
Lamp 1 (green) Lamp 3 (green)	Lamp 4 (red)

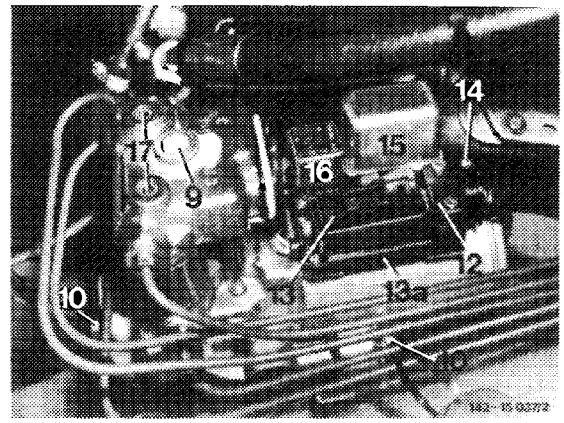


1. Poor contact at plug connection on motor relay (15).

2. Lines to motor relay interrupted (refer to electric wiring diagram).

3. Grounding strap (14) or positive connection loose (visual checkup).

4. Motor relay (15) defective.



Remedy

1. Check plug connections.
2. Check lines to motor relay and in plug socket of hydraulic unit.
3. Attach grounding strap or positive connection.
4. Replace motor relay.

Test step 4

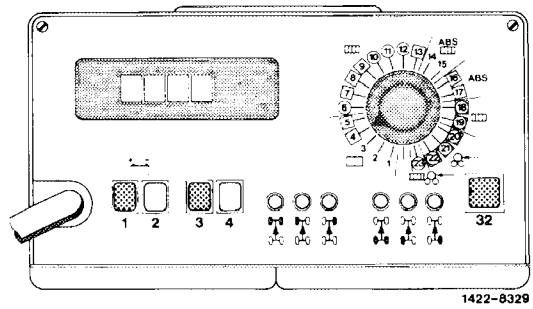
Testing contacted relay for motor of return pump.

Actuation

Push yellow light button (32).

Readout

Good	Fault
Lamp 1 (green) Lamp 3 (green), lights up upon actuation of yellow light button (32), (pump motor runs following actuation of yellow light button).	Lamp 4 (red), lights up following actuation of yellow light button (32).

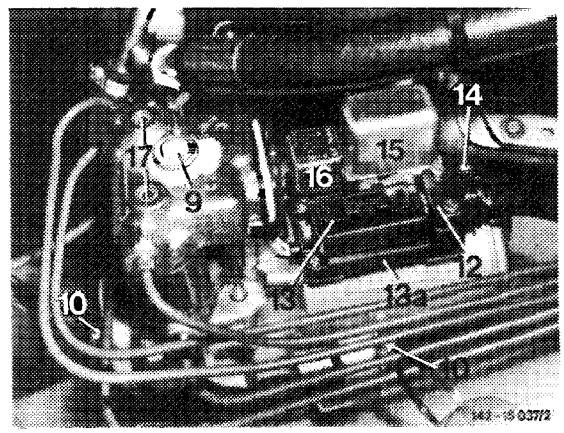


1422-8329

1. Poor contact at plug connection on motor relay (15).
2. Lines to motor relay interrupted (refer to electric wiring diagram).
3. Grounding strap (14) loose (visual checkup).
4. Motor relay (15) defective.

Remedy

1. Check plug connections.
2. Check lines to motor relay and in plug socket of hydraulic unit.
3. Fasten grounding strap.
4. Replace motor relay.



Possible faults:

a) Multi-pole plug (35-pole) (21) not connected.

b) Line from battery to overvoltage protection interrupted (refer to electric wiring diagram).

c) Overvoltage protection (51) defective (refer to test step 5).

d) Grounding line from electronic control unit to overvoltage protection (terminal 2) interrupted.

e) Check lines to relay (50) (refer to electric wiring diagram).

f) Relay (50) defective.

g) Grounding line (52) to overvoltage protection (51) interrupted.

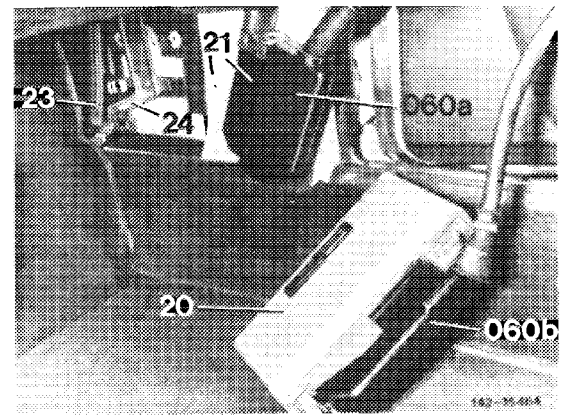
If lamp (2) lights up during one of the following test steps, the supply voltage of the battery under load of test jobs is too low.

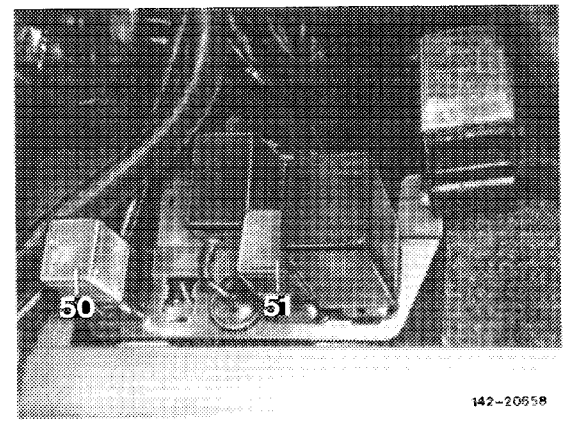
Readout	
good	fault
Lamp 1 (green)	Lamp 2 (red)

1. Battery voltage < (smaller) 10.8 V
2. Battery voltage > (higher) 15 V

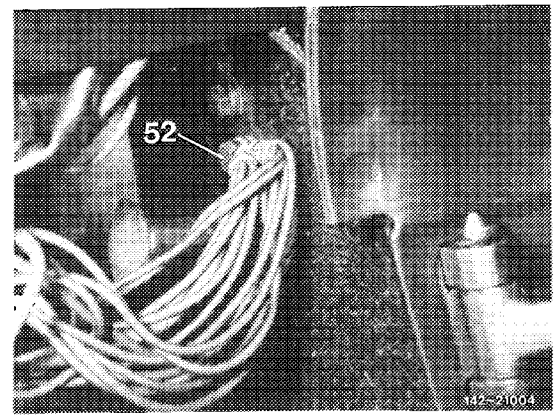
Remedy

1. Check battery and recharge, if required.
2. Check regulating voltage of alternator.





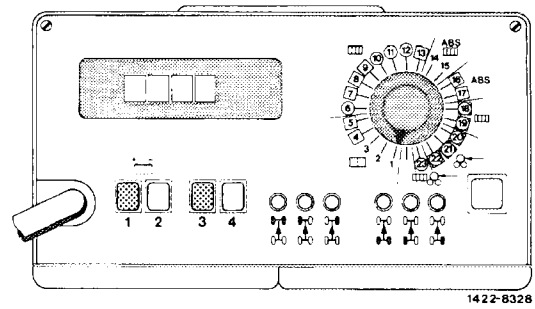
142-20558



Test step 1
Testing valve relay in rest position.

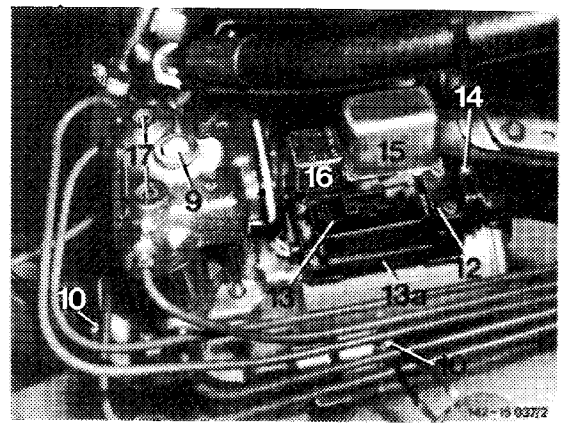
Actuation: none

Readout	
Good	Fault
Lamp 1 (green) Lamp 3 (green)	Lamp 4 (red)



1422-8328

1. Poor contact of plug connection on valve relay (16).
2. Lines to valve relay interrupted (refer to electric wiring diagram).
3. Valve relay (16) defective.

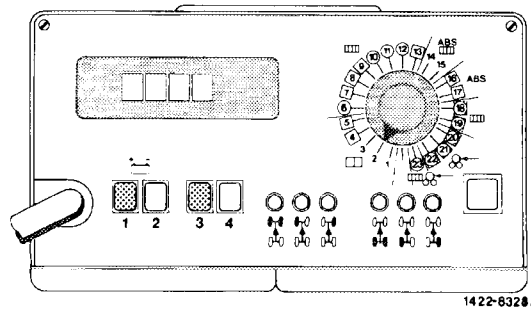


Remedy
1. Check plug connection.
2. Check lines from harness and in plug socket of hydraulic unit.
3. Renew valve relay (16).

Test step 2
Testing contacted valve relay.

Actuation: none

Readout	
Good	Fault
Lamp 1 (green) Lamp 3 (green)	Lamp 4 (red)



1422-8328/1

Test step 5
Testing overvoltage protection.

Attention!
An overvoltage protection with integrated relay for voltage supply of electronic control unit and an exchangeable fuse are installed since September 1981. During the test, plug the overvoltage protection version installed in vehicle into test unit. Starting September 1985 the overvoltage protection has also been additionally modified. It can now be tested only together with the protective adapter, part No. 126 589 15 63 00. As of September 1986 overvoltage protection with 7 pins.

Note: Overvoltage protection up to September 1981. A fuse wire (arrow) can be seen through bore in rear part of overvoltage protection. The overvoltage protection may be damaged even though the fuse wire is intact.

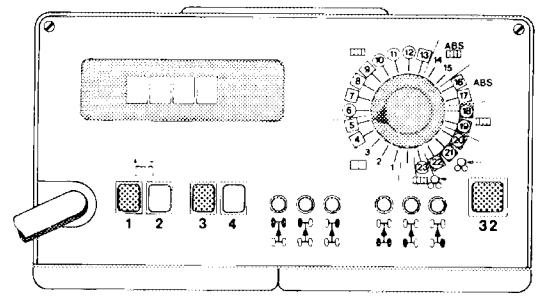
Actuation
Switch off ignition, pull multiple plug from electric control unit. Remove overvoltage protection (51) from test socket of tester or from socket of vehicle.

Insert overvoltage protection (51) of tester (060) into plug socket of vehicle and overvoltage protection of vehicle into test socket of tester. Switch on ignition. After approx. 0.5 s, push yellow light button (32). Switch off ignition. Attach multi-pole plug to electronic control unit. Then switch on ignition again.

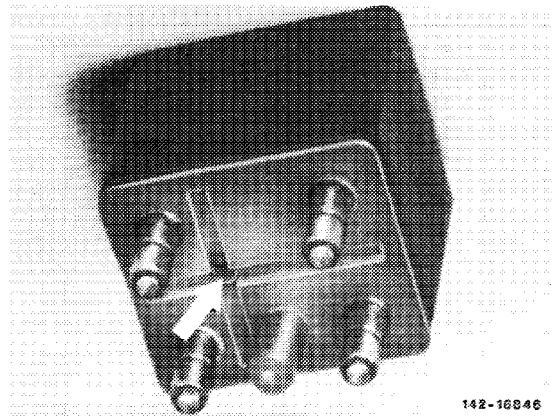
Readout	
Good	Fault
Lamp 1 (green) Lamp 3 (green) lights up following actuation of yellow light button.	Lamp 4 (red) lights up following actuation of yellow light button. (Repeat test step).

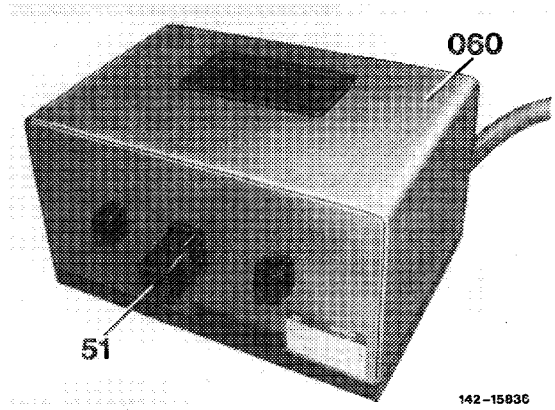
Overvoltage protection defective.

Remedy
Replace overvoltage protection (51).

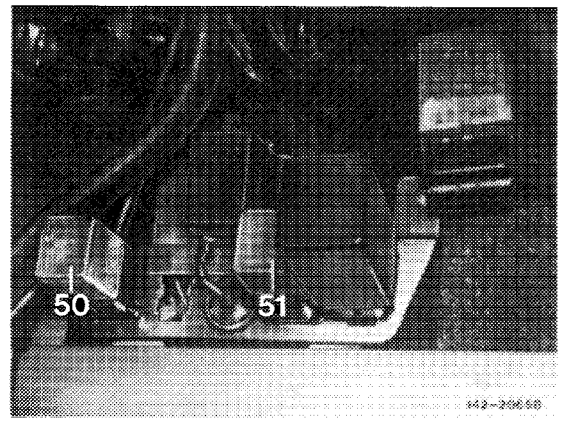


1422-8344


142-16846



142-15836

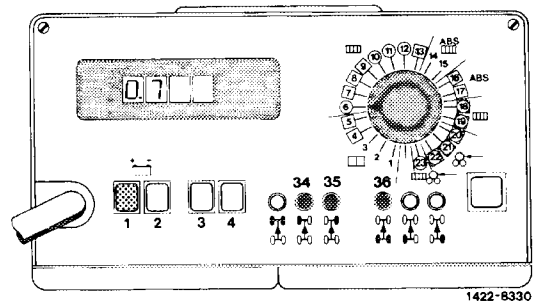


Test step 6
Testing internal resistance of solenoid valves.

Actuation
Depress pushbutton VL (34), VR (35) and HA (36) one after the other. Read value on tester after pushing each button.

Readout

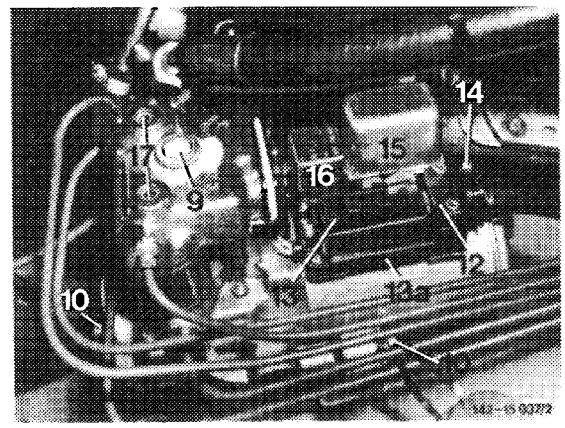
Good	Fault
Lamp 1 (green) Digital readout: between 0.7 Ω – 1.7 Ω	Readout: > (higher) 1.7 Ω – 999 Ω < (lower) 0.7 Ω



1. Poor contact at plug connection on hydraulic unit.

2. Lines to respective valve interrupted (refer to electric wiring diagram). Lines in plug socket of hydraulic unit interrupted.

3. Respective valve has short circuit or interturn ground connection.



Remedy
1. Check plug connections and spray with contact spray, if required.

2. Check lines, also in plug socket of hydraulic unit.

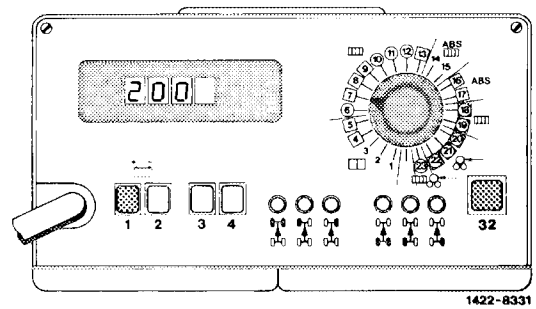
3. Replace hydraulic unit.

Test step 7
Testing ground connection from overvoltage protection to electronic control unit terminal 10.

Test step 8
Ground connection from grounding point (52) to electronic control unit terminal 34.

Test step 9
Ground connection from grounding point (52) to electronic control unit terminal 20.

Actuation
Push yellow light button (32).



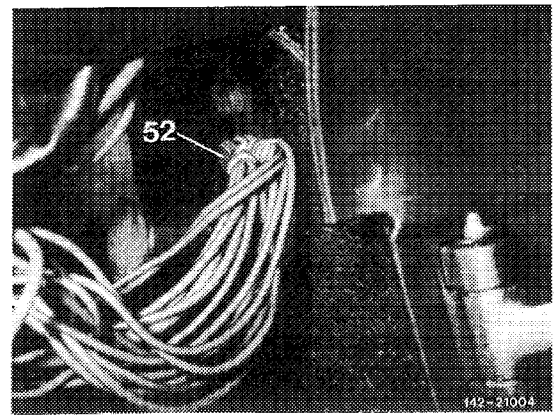
1422-8331

Readout

Good	Fault
Lamp 1 (green) Digital readout:	Readout:
Test step 7 between 110 mV – 300 mV	> (higher) 300 mV < (lower) 110 mV
Test step 8 and 9 between 40 mV – 250 mV	> (higher) 250 mV < (lower) 40 mV

Test step 7, 8, 9
Lines from grounding point (52) to electronic control unit terminal 10, 34, 20, poor contact or interrupted or ground connection terminal on overvoltage protection has poor contact or is interrupted (refer to electric wiring diagram).

Remedy
Check ground connections or tighten.



142-21004

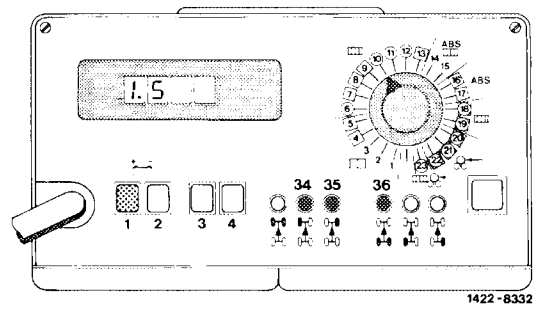
Test step 10
Testing internal resistance of speed sensor.

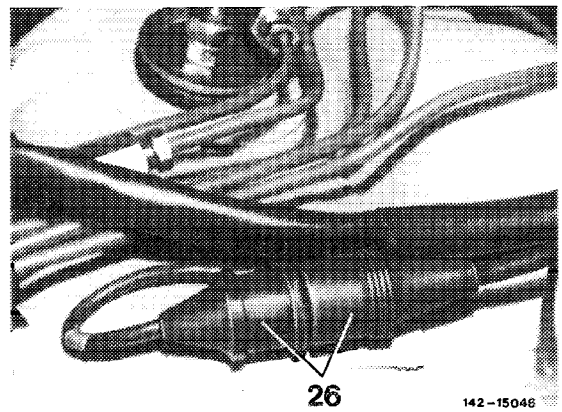
Actuation
Depress pushbutton VL (34), VR (35) and HA (36) one after the other.

After pushing each button, read value on tester.

Readout

Good	Fault
Lamp 1 (green) Digital readout for: Front axle 0.85 kΩ – 2.3 kΩ Rear axle 0.6 kΩ – 1.6 kΩ	Readout: Front axle < (lower) 0.85 Ω > (higher) 2.3 kΩ Rear axle < (lower) 0.6 kΩ > (higher) 1.6 kΩ

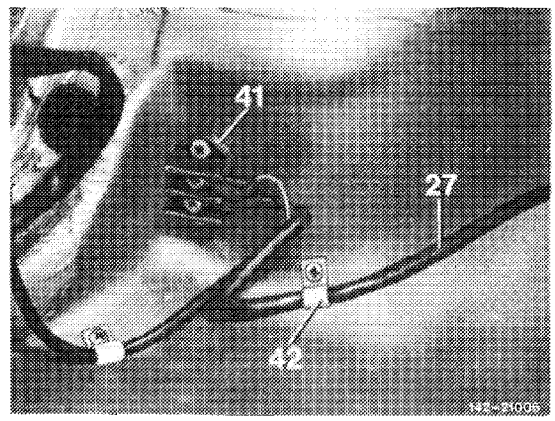




1. Poor contact at coaxial plugs (26) or cable connector (41).

2. Line to respective speed sensor interrupted.

3. Speed sensor defective.



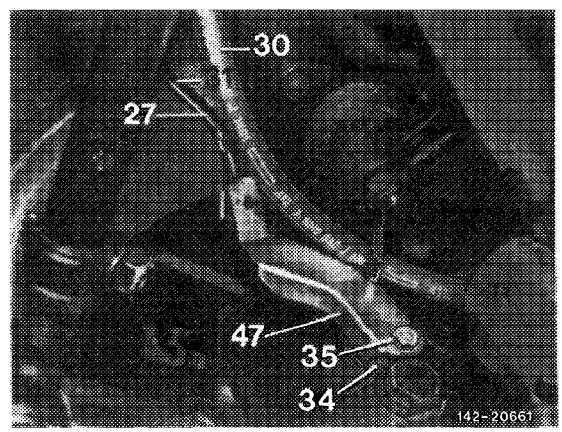
Remedy

1. Test coaxial plug or plug connector.

2. Pull off both coaxial plugs (26) and test lines to electronic control unit.

   Disconnect lines on cable connector (41) and test.

3. Replace respective speed sensor.



Test step 11
Testing insulation resistance of speed sensor against ground.

Actuation
Depress pushbutton VL (34), VR (35) and HA (36) one after the other.

After pushing each button, read value on tester.

Readout

Good	Fault
Lamp 1 (green) Digital readout: > (higher) 20 kΩ (max. 999)	Readout: < (lower) 20 kΩ

1. Line to respective speed sensor has ground connection.

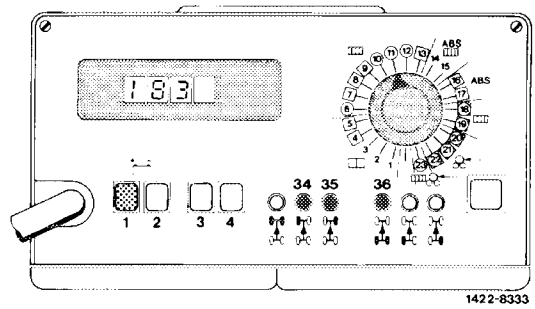
2. Coaxial plug or cable connector has ground connection.

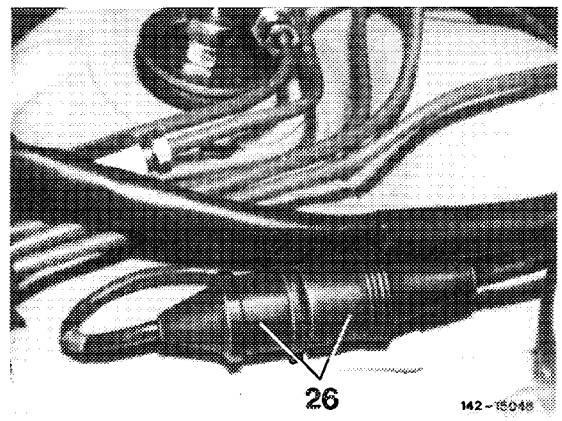
3. Rpm sensor has ground connection.

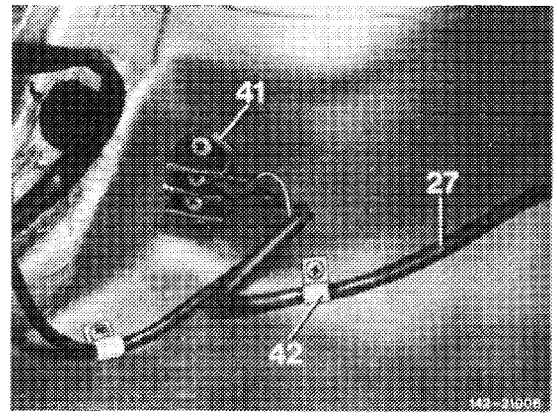
Remedy
1. Test line to rpm sensor.

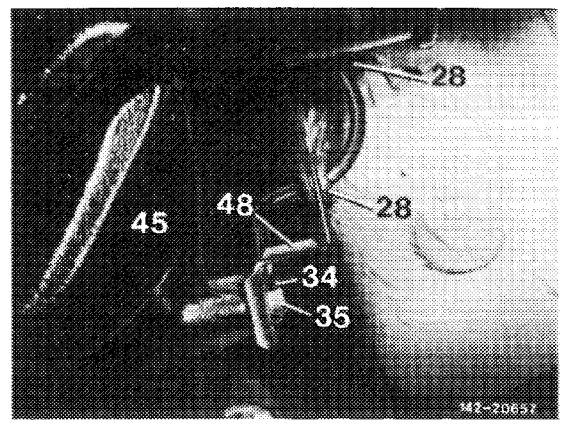
2. Test coaxial plug or cable connector.

3. Replace respective rpm sensor.









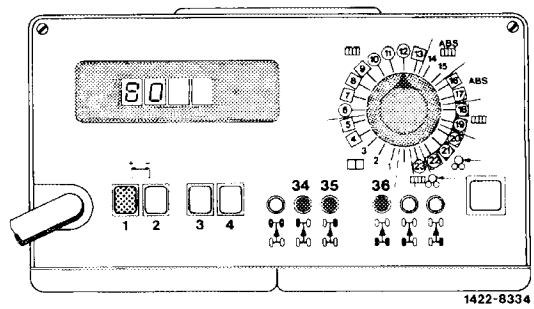
Test step 12
Testing insulation resistance of speed sensor against supply voltage.

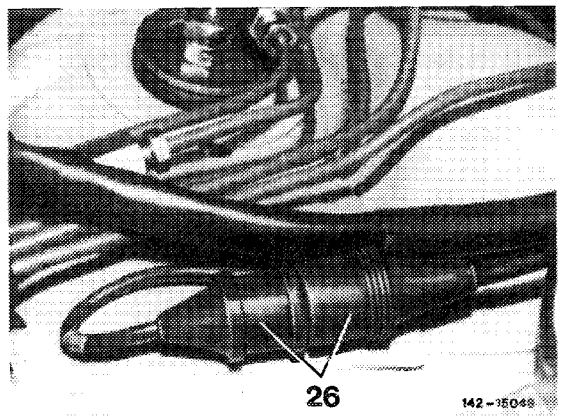
Actuation
Depress pushbutton VL (34), VR (35) and HA (36) one after the other.

After pushing each button read value on tester.

Readout

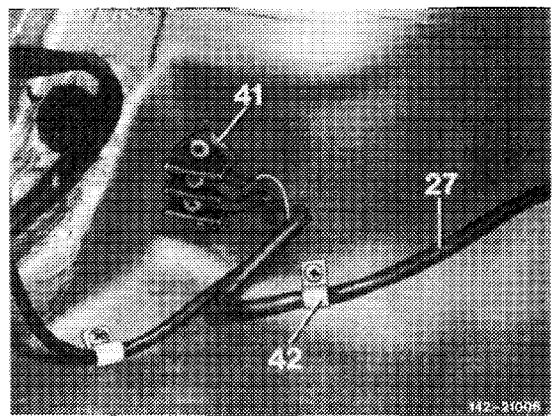
Good	Fault
Lamp 1 (green) Digital readout: between 0 – 100 mV	Readout: > (higher) 100 mV (max. 999)

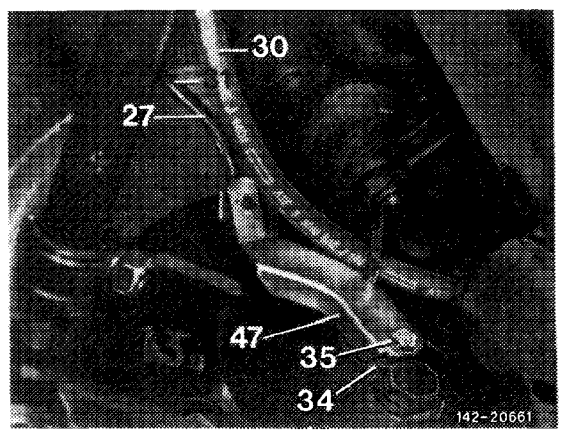




Line from rpm sensor to electronic control unit shorted against plus (12 V).

Remedy
Repair line from rpm sensor to electronic control unit or renew.





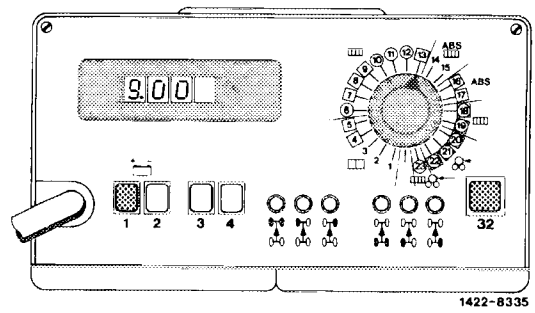
Test step 13
Testing electronic control unit (internal electronic voltage).

Note
Not possible on electronic control unit ..... 3rd version with green or blue type rating plate. Installed starting February 1984.

Actuation
Depress yellow pushbutton (32) up to digital tester.

Readout

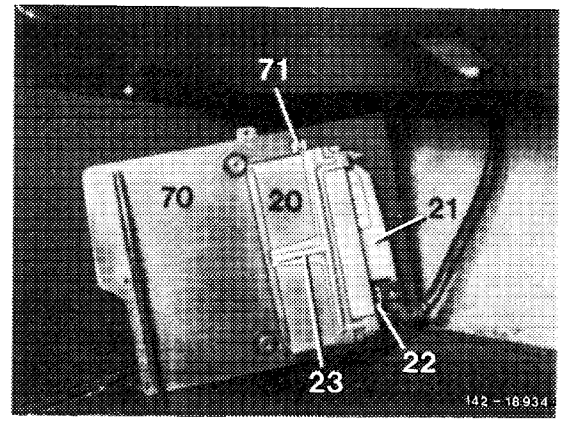
Good	Fault
Lamp 1 (green) Digital readout: between 8.82 – 9.18 V	Readout: < (lower) 8.82 V > (higher) 9.18 V



1422-8335

Electronic control unit defective.

Remedy
Replace electronic control unit (20).

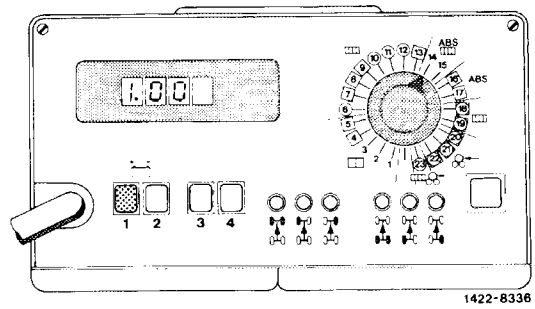


142-18934

Test step 14
Testing function of ABS indicator lamp.
(Diode in flow direction).

Actuation: none

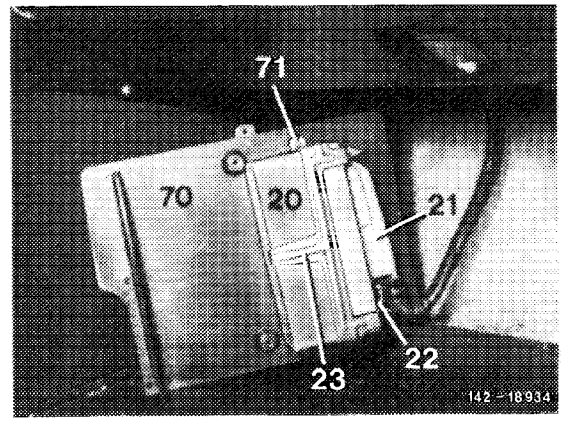
Readout	
Good	Fault
Lamp 1 (green) ABS indicator lamp lights up. Digital readout: between 0.4–1.5 V	ABS indicator lamp not lighting up. Readout: < (lower) 0.4 V > (higher) 1.5 V



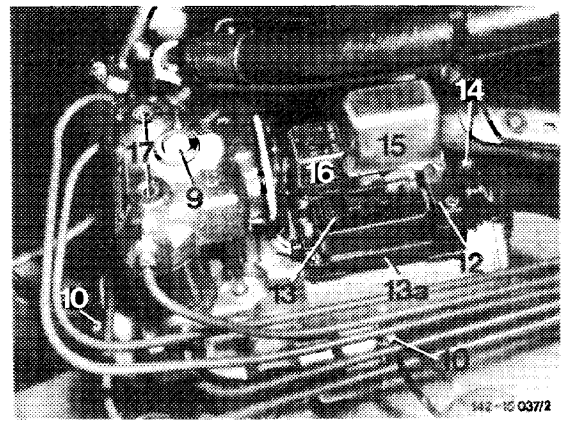
1. Indicator lamp defective.

2. Line from plug socket (13a) of hydraulic unit (terminal 7) to 35-pole multi-plug (terminal 29) of electronic control unit interrupted (refer to electric wiring diagram).

3. Diode in plug socket (13a) of hydraulic unit or in valve relay (16) interrupted or short-circuit.



Note
Modified hydraulic unit without diode in plug socket since early 1986.



Remedy
1. Replace indicator lamp.

2. Check lines.

3. Replace hydraulic unit or valve relay (16).

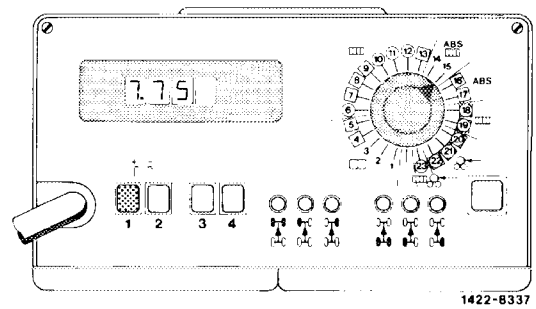
Attention!
If the ABS indicator lamp goes out upon replacement of hydraulic unit with ignition switched on but without the engine running, also replace the electronic control unit since it is a consecutive damage of the defective diode.

Test step 15
Testing function of ABS indicator lamp (diode in locking direction).

Actuation: none

Readout

Good	Fault
Lamp 1 (green) ABS indicator lamp lights up darker. Digital readout: between 5.5–8.5 V	Readout: ABS indicator lamp not lighting up. < (lower) 5.5 V > (higher) 8.5 V



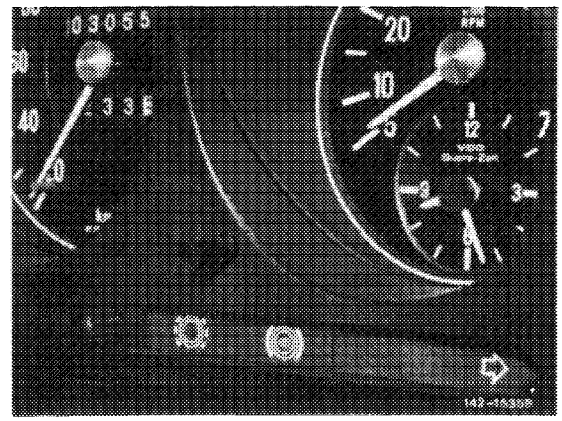
1422-8337

1. Indicator lamp defective.

2. Lines to indicator lamp interrupted (refer to electric wiring diagram).

3. Diode in plug socket (13a) of hydraulic unit or in valve relay (16) interrupted or short-circuit.

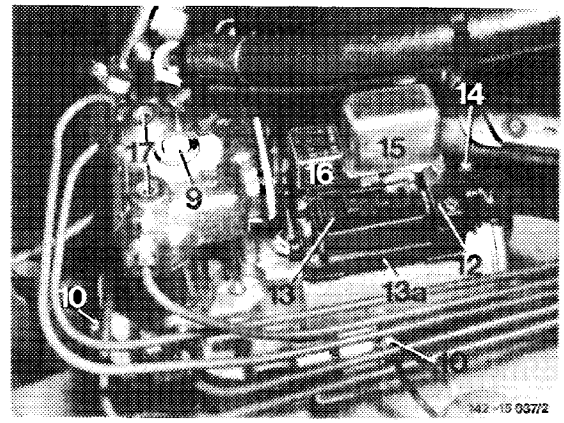
Note
Modified hydraulic unit without diode in plug socket since early 1986.



Remedy
1. Test indicator lamp.

2. Test line to indicator lamp.

3. Replace hydraulic unit or valve relay (16).



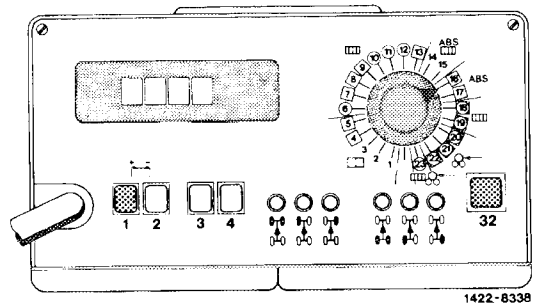
Attention!
If the ABS indicator lamp goes out upon replacement of hydraulic unit with ignition switched on but without the engine running, also replace the electronic control unit since it is a consecutive damage of the defective diode.

Perform test steps 16–22 with engine running.

Test step 16
Testing electronic control unit, completing test cycle.

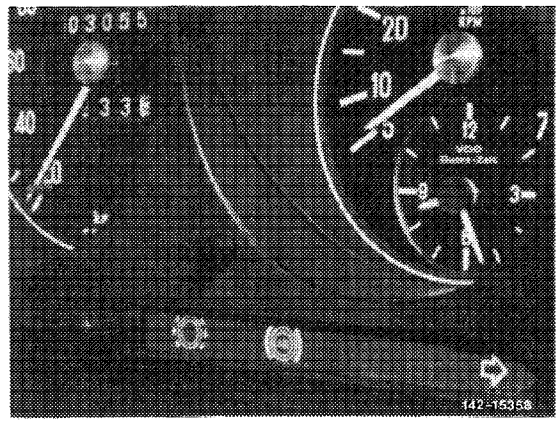
Note
Not possible on electronic control unit 3rd version with green or blue type rating plate. Installed starting February 1984.

Actuation
Push yellow light button (32).



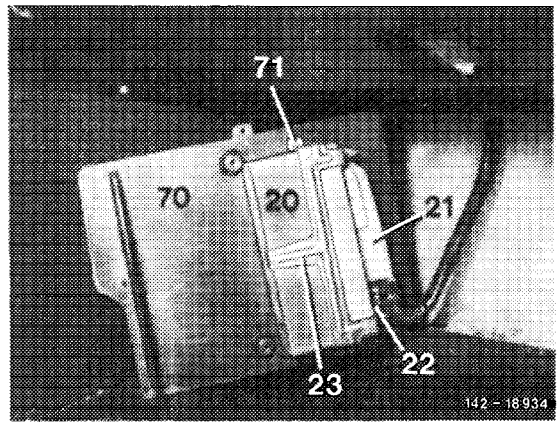
Readout

Good	Fault
Lamp 1 (green) ABS indicator lamp in instrument cluster goes out after approx. 0.5 s.	ABS indicator lamp not going out. (If in doubt, repeat test step).



Electronic control unit defective.

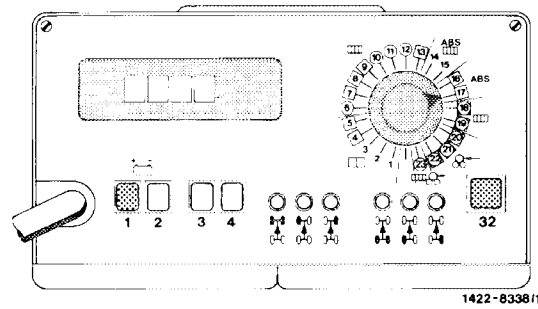
Remedy
Replace electronic control unit (20).



Test step 17
Testing electronic control unit (test cycle with input of a simulated fault).

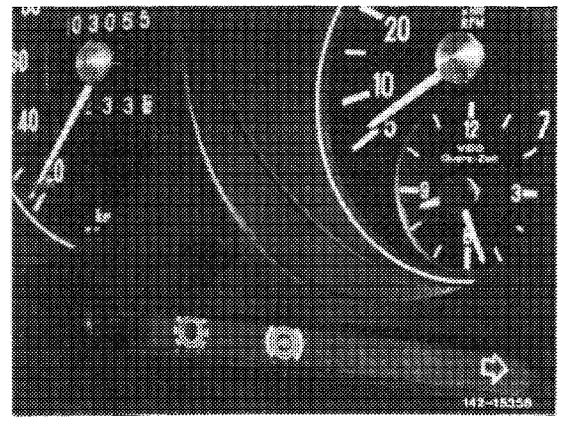
Note
Not possible on electronic control unit 3rd version with green or blue type rating plate. Installed starting February 1984.

Actuation
Depress yellow pushbutton (32) approx. 2 s.



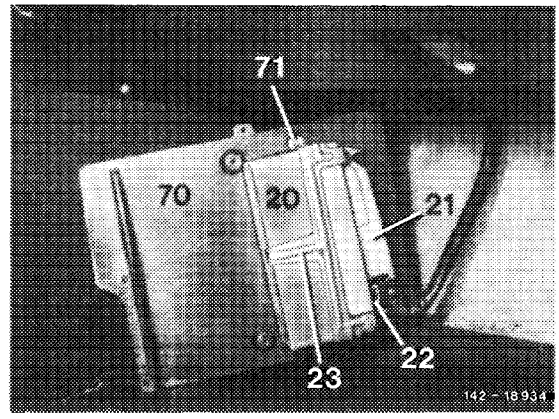
Readout

Good	Fault
Lamp 1 (green) ABS indicator lamp in instrument cluster goes out for a short moment and lights up again.	ABS indicator lamp goes out and is not lighting up again.



Electronic control unit defective.

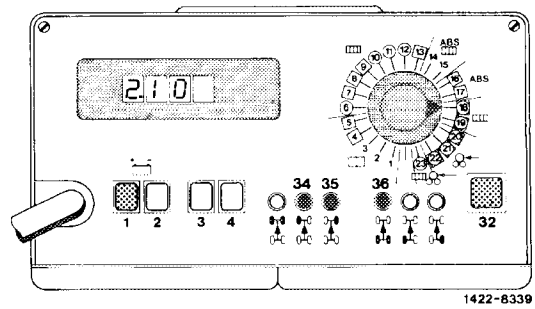
Remedy
Replace electronic control unit (20).



Test step 18
Testing electronic control unit (current to solenoid valve "pressure-holding stage").

Note
Not possible on electronic control unit 3rd version with green or blue type rating plate. Installed starting February 1984.

Actuation
Attention! Do not actuate brake pedal. Wait for approx. 5 s after test step 17, then depress push-buttons VL (34), VR (35) and HA (36) one after the other. Additionally push yellow light button (32) at each pushbutton position. After releasing yellow light button, wait for zero readout and only then push yellow light button again. Following each actuation of pushbutton and light button, read value on tester.



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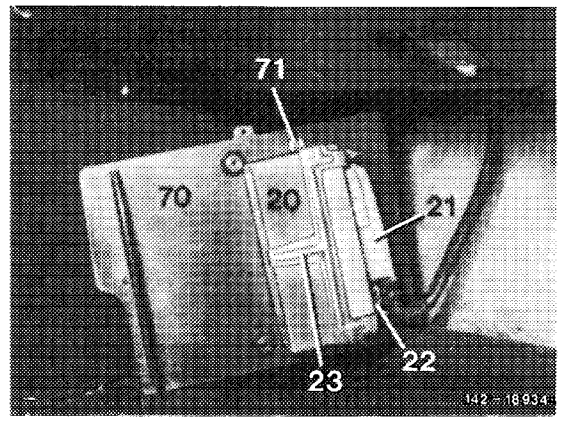

142-18934

Readout	
Good	Fault
Lamp 1 (green) Digital readout between 1.9–2.3 A	Readout: < (lower) 1.9 A > (higher) 2.3 A

Electronic control unit defective.

Remedy
Replace electronic control unit (20).