

Audi 100 1991 ➤

K-Jetronic/TCl-H ignition system									
Engine ID	ABB								

Edition 03.1992



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

List of Workshop Manual Repair GroupsList of Workshop Manual
Repair GroupsList of Workshop Manual Repair Groups
Audi 100 1991 ➤

K-Jetronic/TCL-H ignition system

Repair Group

25 - Mixture preparation, Injection

28 - Ignition system



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.

All rights reserved.
No reproduction without prior agreement from publisher.

Contents

25 - Mixture preparation, Injection	1
1 Servicing K-Jetronic injection system	1
1.1 Servicing K-Jetronic injection system	1
1.2 Safety precautions	1
1.3 Rules for cleanliness	1
1.4 Technical data	2
1.5 Checking fuel pump relay -J17 and actuation	3
1.6 Checking cold start valve -N17	6
1.7 Checking thermo-time switch -F26	10
1.8 Checking cold acceleration enrichment	12
1.9 Checking diaphragm pressure switch -F93	14
1.10 Checking and adjusting throttle valve switch -F25	15
1.11 Checking auxiliary air valve -N21	18
1.12 Basic setting of throttle valve	20
1.13 Checking intake system for leaks (unmetered air)	21
2 Servicing fuel system	23
2.1 Servicing fuel system	23
2.2 Exploded view of fuel distributor	23
2.3 Exploded view of air-flow meter/intake manifold	26
2.4 Exploded view of throttle valve assembly	30
2.5 Checking idling speed and CO content	33
2.6 Checking idling-speed boost	36
2.7 Connecting remote control V.A.G 1348/3A with adapter lead V.A.G 1348/3-2	38
2.8 Connecting pressure gauge V.A.G 1318 with test adapter 1318/4	39
2.9 Checking system pressure and holding pressure	39
2.10 Checking warm-up regulator -N9	42
2.11 Removing and installing injectors	44
2.12 Checking injectors	46
2.13 Checking air-shrouded injectors and inserts for leaks	49
2.14 Removing and installing injector insert	50
2.15 Checking adjusting lever and control plunger	50
2.16 Checking and adjusting rest position and idle motion of sensor plate	51
2.17 Basic setting of adjusting lever	53
2.18 Removing and installing control plunger	54
28 - Ignition system	56
1 Checking ignition system	56
1.1 Checking ignition system	56
1.2 Safety precautions	56
1.3 Adjustment data, spark plugs	56
1.4 Servicing ignition system	57
1.5 Installing ignition distributor	61
1.6 Checking and adjusting ignition point	63
1.7 Checking ignition timing	65
1.8 A - Checking centrifugal advance	66
1.9 B - Checking vacuum advance	67
1.10 Checking ignition coil	70
1.11 Checking TCI-H switch unit -N41	71
1.12 Checking Hall sender -G40	73

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



Audi 100 1991 ➤

K-Jetronic/TCI-H ignition system - Edition 03.1992



Audi

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

25 - Mixture preparation, Injection

1 - Servicing K-Jetronic injection system

1.1 - Servicing K-Jetronic injection system

1.2 - Safety precautions

Attention:

Fuel system is pressurised. Wrap cloth around joint before opening system. Then dissipate pressure by carefully unfastening joint.

Heed the following so as to avoid possible injury and/or the destruction of the ignition system:

- ◆ Never touch/disconnect ignition cables with engine running or at cranking speed.
- ◆ Always switch off ignition before disconnecting and connecting ignition system wires (also applies to H.T. wires and measuring instrument leads).
- ◆ If engine is to be operated at cranking speed without fuel pump running (e.g. for checking compression pressure), unplug connector of Hall sender at ignition distributor.
- ◆ If engine is to be operated at cranking speed and fuel pump has to run (e.g. when testing cold start valve), disconnect ignition cable/terminal 4 at ignition distributor and connect to earth with test lead from V.A.G 1594 A.
- ◆ Boost starting with rapid charger is only permitted for up to 1 minute at a maximum of 16.5 V.
- ◆ Always switch off ignition before washing engine.
- ◆ Always switch off ignition before disconnecting and connecting battery.
- ◆ For connection of measuring instruments (e.g. voltage tester V.A.G 1527 B, portable multimeter V.A.G 1526 A), always make use of adapter set V.A.G 1594 A.

Pay attention to the following if testers and measuring instruments have to be used in the course of a test drive on vehicles fitted with front passenger's airbag.

Attention:

- ◆ **Always attach testers and measuring instruments to back seat and have them operated from there by a second person.**
- ◆ **If testers and measuring instruments were to be operated from front passenger's seat, person sitting there could suffer injury in the event of an accident due to triggering of front passenger's airbag.**

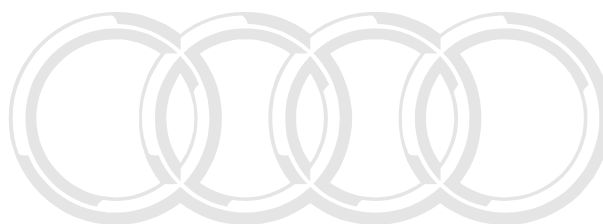
1.3 - Rules for cleanliness

When working on fuel supply/injection system, pay careful attention to the following rules:

- ◆ Carefully clean all joints and adjacent areas before disconnecting.
- ◆ Place parts removed on a clean surface and cover them over. Do not use fluffy cloths.
- ◆ Carefully cover or seal opened components if repairs are not to be performed immediately.
- ◆ Only install clean components:
Do not remove replacement parts from wrapping until immediately prior to installation.
Do not use parts that have been stored loose (e.g. in tool boxes).
- ◆ When system is open:
Do not work with compressed air if at all possible.
Do not move vehicle unless absolutely necessary.



- ♦ Unplugged connectors:
Protect against dirt and damp.
Only connect when dry.



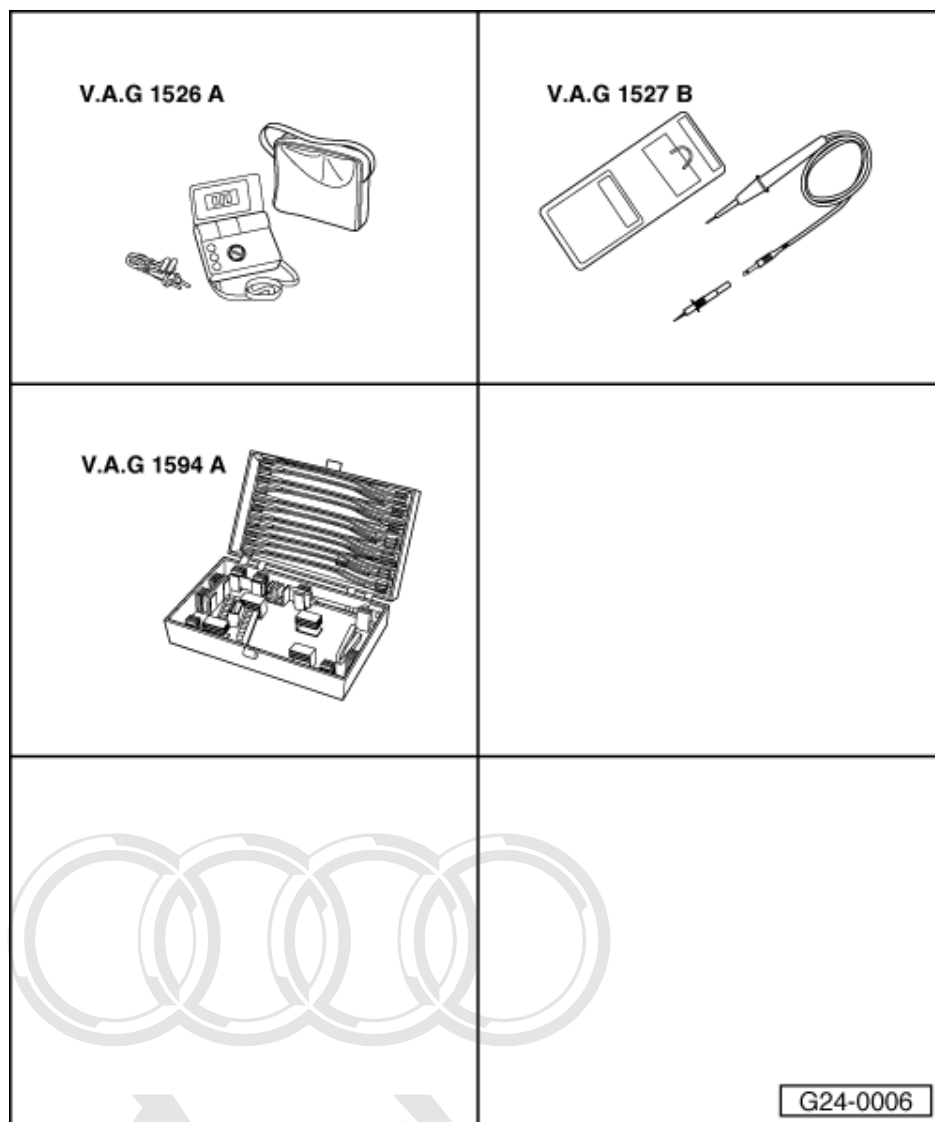
1.4 - Technical data

Engine codes			ABB (1.6 l / 75 kW engine)
Speed governing	By way of fuel-pump relay		6500 ... 6700 rpm
Idling-speed setting	Hose from two-way valve for idling-speed boost pinched off		800 ... 1000 rpm 1) 950 ± 30 rpm 0.5 ... 1.5 % by vol. 1) 1.3 ± 0.2 % by vol.
	Test specification		
	Setting		
CO content	Check value		0.5 ... 1.5 % by vol. 1) 1.3 ± 0.2 % by vol.
	Setting		
Control pressure	Engine cold	At 20 °C	1.0 ... 1.4 bar
		At 25 °C	1.2 ... 1.7 bar
		At 30 °C	1.3 ... 1.9 bar
	Engine warm	After 2.5 ... 5.0 minutes	3.4 ... 3.8 bar
System pressure			5.2 ... 5.9 bar
Holding pressure		After 10 minutes	min. 3.3 bar
Injectors		Spray pressure	4.0 ... 4.6 bar

1) Current values:

=> Exhaust emission test binder

1.5 - Checking fuel pump relay -J17 and actuation

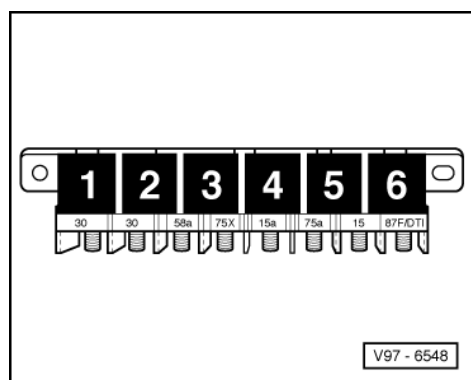


Special tools and workshop equipment required

- ◆ V.A.G 1526 A
- ◆ V.A.G 1527 B
- ◆ V.A.G 1594 A

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Note:





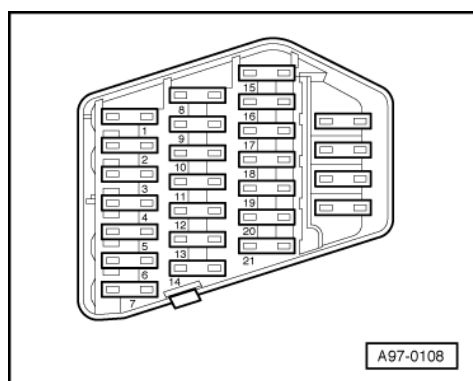
-> Fitting location of fuel-pump relay: Central electrics beneath dash panel on left, position 6

Test requirement:

- Battery voltage at least 12.7 V

Checking operation of fuel-pump relay

- Detach cover from fuse box on left.



- -> Pull out fuse S17.
- Connect up voltage tester V.A.G 1527 B between one of the contacts of fuse S17 and engine earth.
- Briefly operate starter.
 - Energisation of fuel-pump relay (central electrics beneath dash panel on left, position 6) must be heard and felt; LED must light

A - If relay is not energised:

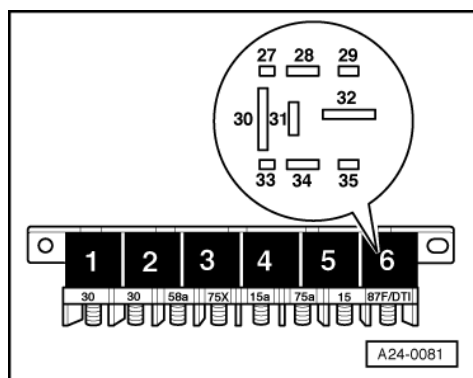
- Check actuation => Page 5 .

B - If relay is energised but LED does not light:

- Repeat test at other contact of fuse S17.

If LED still does not light:

- Disconnect fuel-pump relay.



- -> Use current flow diagram to check for open circuit in the following connection.

Central electrics, position 6 Contact	Fuse
---	------



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

30	S17
----	-----

If connection is OK:

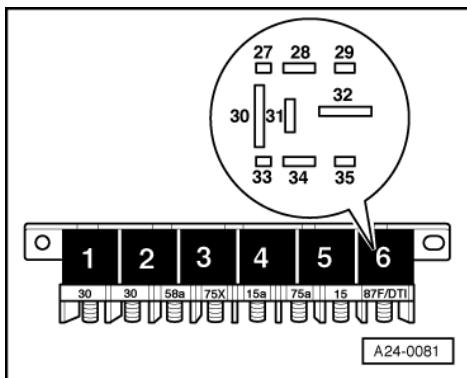
- Replace fuel pump relay -J17.
- Re-insert fuel-pump relay and fuse S17.

Checking power supply and actuation of fuel-pump relay

- Disconnect fuel-pump relay.

Checking power supply

- Switch on ignition.



- -> Connect up multimeter for voltage measurement as follows.

Central electrics, position 6 Contacts	Specification
28 + 34	approx. battery voltage
32 + 34	approx. battery voltage

- Switch off ignition.

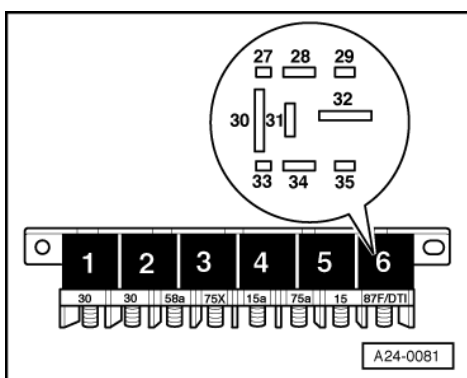
If readings do not match specifications:

- Check wiring.

=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder

This document is a technical document and is not to be used for commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Checking actuation



- -> Connect up voltage tester V.A.G 1527 B as follows.



Fuel-pump relay socket Contact	Measure to
29	Battery positive

- Operate starter.
 - LED must flash constantly during starting

If LED does not flash:

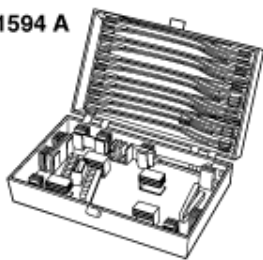
- Check wiring.

=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder

If no fault is found:

- Replace fuel pump relay -J17.

1.6 - Checking cold start valve -N17

V.A.G 1526 A 	V.A.G 1527 B  Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.
V.A.G 1594 A 	
	G24-0006

Special tools and workshop equipment required

- ◆ V.A.G 1526 A
- ◆ V.A.G 1527 B
- ◆ V.A.G 1594 A

Checking internal resistance

- Unplug connector at cold start valve.
- Connect multimeter to valve for resistance measurement.
 - Specification: 8 ... 15 ω

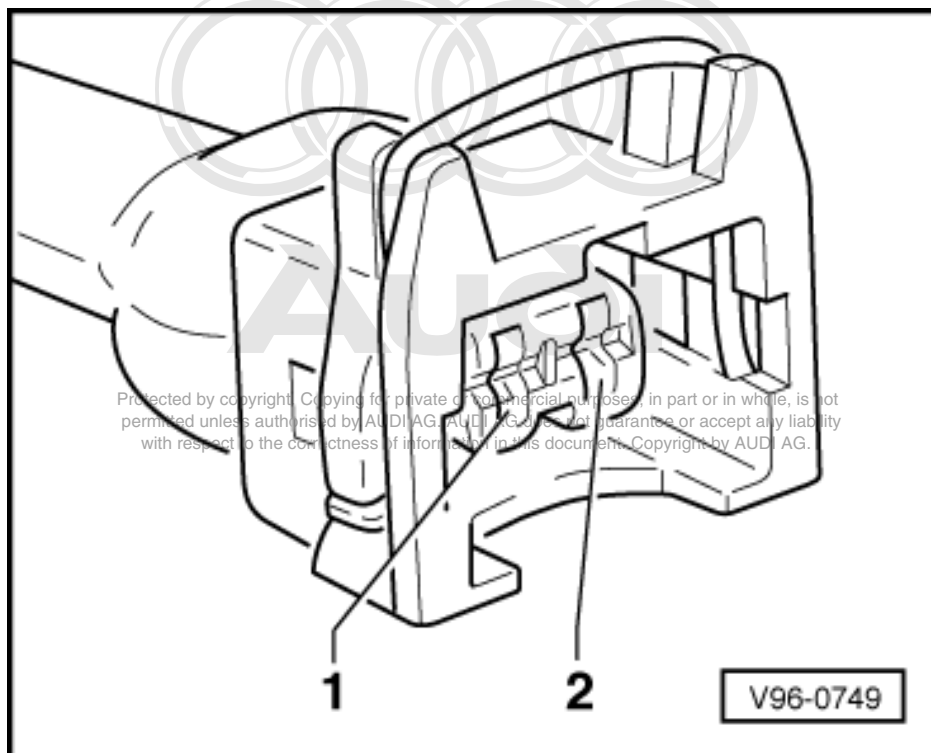
If reading does not match specification:

- Replace cold start valve.

Checking power supply

Test requirement:

- Ignition cable/terminal 4 detached from ignition distributor and connected to earth with test lead from V.A.G 1594 A
- Unplug connector at cold start valve.



- -> Connect up multimeter for voltage measurement as follows.

Connector Contact	Measure to
1	Engine earth

- Operate starter.
 - Specification: approx. battery voltage



If reading does not match specification:

- Use current flow diagram to eliminate open circuit in wiring.

If reading matches specification:

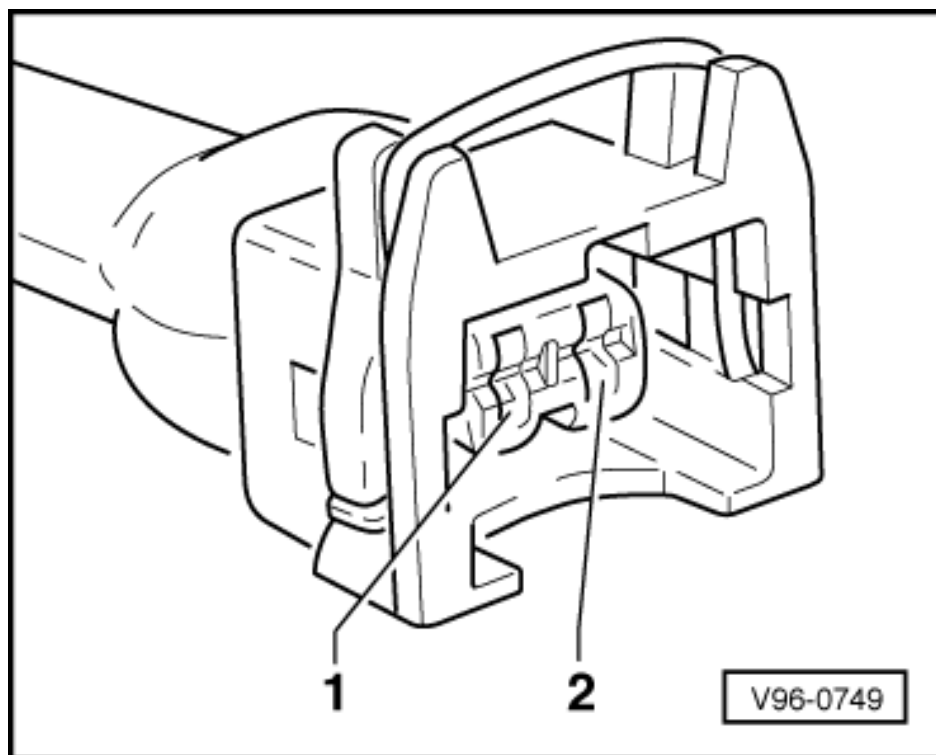
- Check actuation.

Checking actuation

Test requirements:

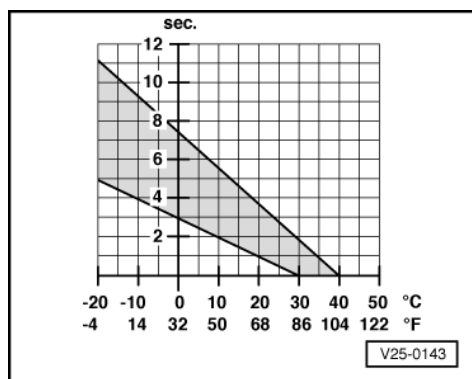
- Ignition cable/terminal 4 detached from ignition distributor and connected to earth with test lead from V.A.G 1594 A
- Coolant temperature less than 30 °C

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- -> Connect up voltage tester V.A.G 1527 B between contacts 1 and 2.

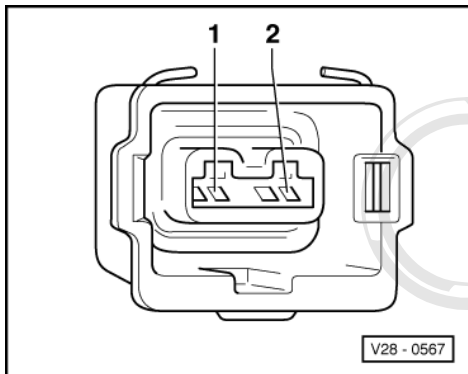
- Operate starter.



- -> LED must light as a function of coolant temperature (duration in hatched area)

If LED does not light:

- Unplug connector at thermo-time switch.



- -> Connect contact 2 (green/white wire) to earth using test lead from V.A.G 1594 A.

Note:

To avoid possible short circuit, terminal 1 (red/black wire to terminal G of thermo-time switch) is never to be connected to earth.

- Operate starter.
 - LED must light constantly during starting

If LED does not light:

- Use current flow diagram to eliminate open circuit in wiring.

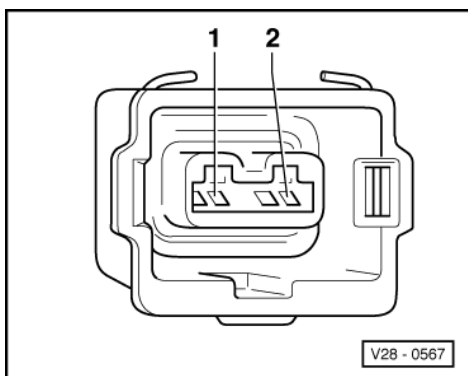
If connection is OK:

- Check thermo-time switch => Page 10 .

Checking spray pattern, injection period and freedom from leaks of cold start valve

Test requirement:

- Ignition cable/terminal 4 detached from ignition distributor and connected to earth with test lead from V.A.G 1594 A
- Unplug connector at thermo-time switch.
- Detach cold start valve with fuel pipe connected from intake manifold and hold valve over a graduated beaker.



- -> Connect contact 2 (green/white wire) to earth using test lead from V.A.G 1594 A.

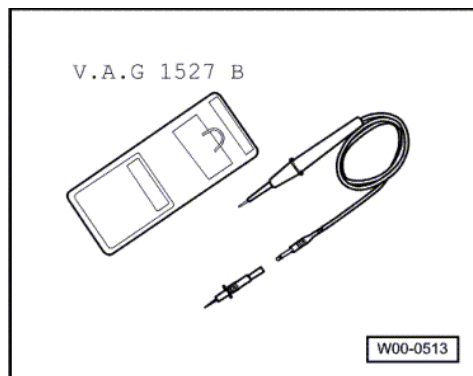


Note:

To avoid possible short circuit, terminal 1 (red/black wire to terminal G of thermo-time switch) is never to be connected to earth.

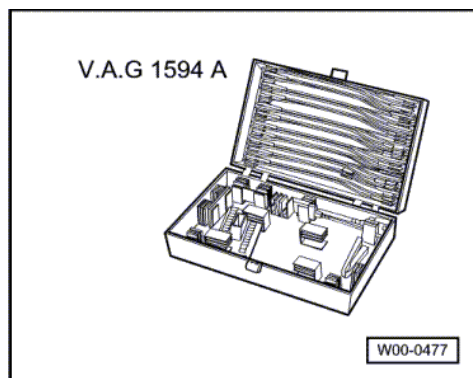
- Operate starter.
 - Cold start valve spray must exhibit an even conical pattern during starting
- Dry off nozzle of cold start valve.
 - Cold start valve must not dribble within 1 minute; outside of cold start valve must also not become moist

1.7 - Checking thermo-time switch -F26



Special tools and workshop equipment required

- ♦ Voltage tester V.A.G 1527 B



- ♦ Adapter set V.A.G 1594 A

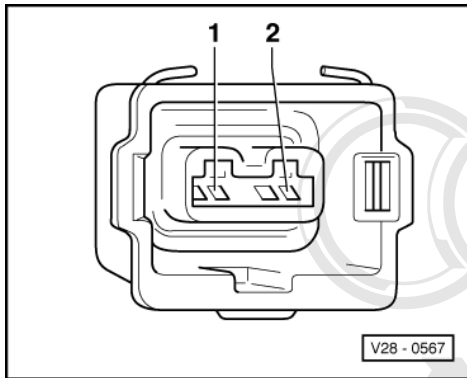
Checking power supply

Test requirement:

- Ignition cable/terminal 4 detached from ignition distributor and connected to earth with test lead from V.A.G 1594 A
- Unplug connector at thermo-time switch.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- -> Connect up voltage tester V.A.G 1527 B as follows.

Connector Contact	Measure to
1 1)	Engine earth

- 1) Red/black wire to terminal G of thermo-time switch
- Operate starter.
 - LED must light constantly during starting

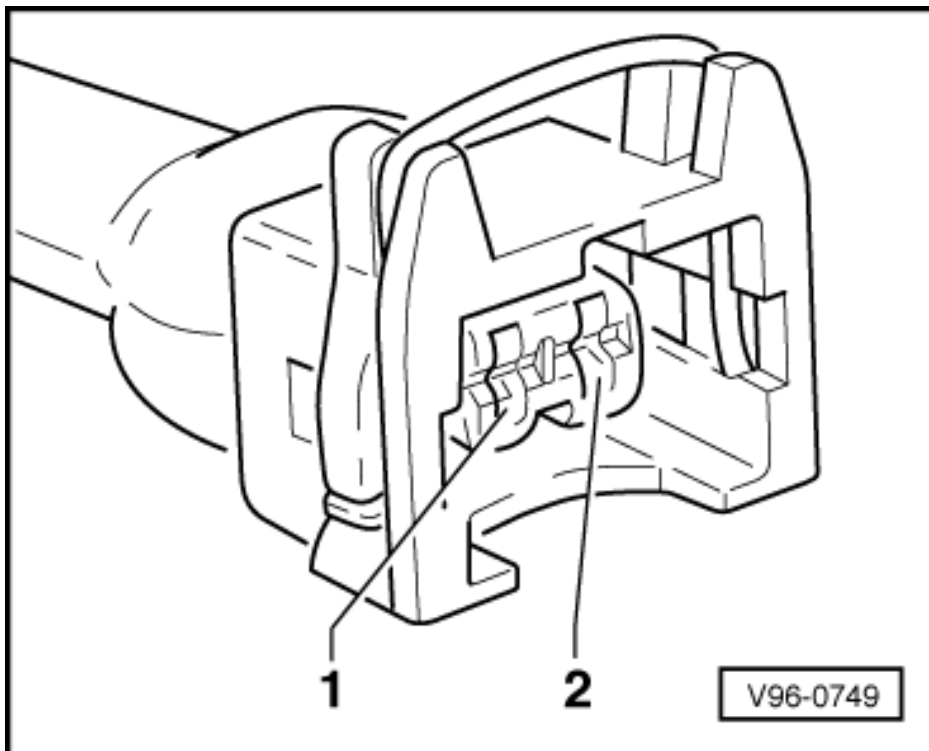
If reading does not match specification:

- Use current flow diagram to eliminate open circuit in wiring.

Checking operation

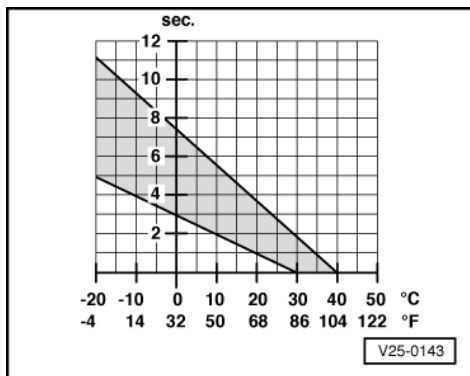
Test requirements:

- Ignition cable/terminal 4 detached from ignition distributor and connected to earth with test lead from V.A.G 1594 A
- Coolant temperature less than 30 °C; if necessary, remove thermo-time switch and allow it to cool down; connect switch removed to earth during test
- Battery voltage at least 12.7 V
- Unplug connector at cold start valve.





- -> Connect up voltage tester V.A.G 1527 B between contacts 1 and 2.
- Operate starter.

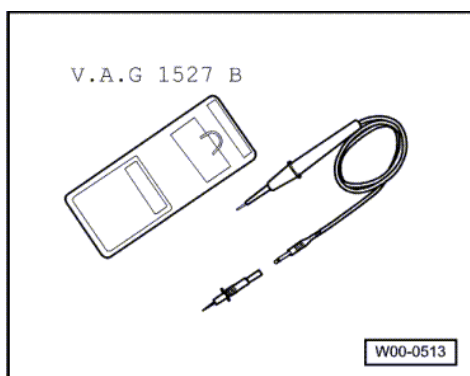


- -> LED must light as a function of coolant temperature (duration in hatched area)

If reading does not match specification:

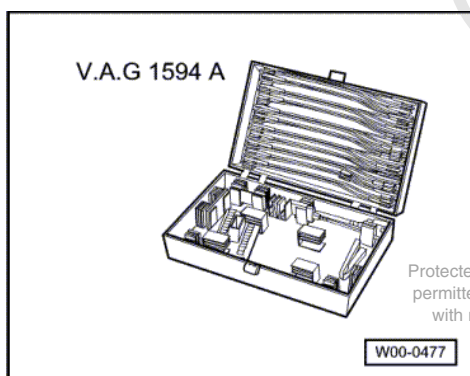
- Replace thermo-time switch.

1.8 - Checking cold acceleration enrichment



Special tools and workshop equipment required

- ♦ Voltage tester V.A.G 1527 B



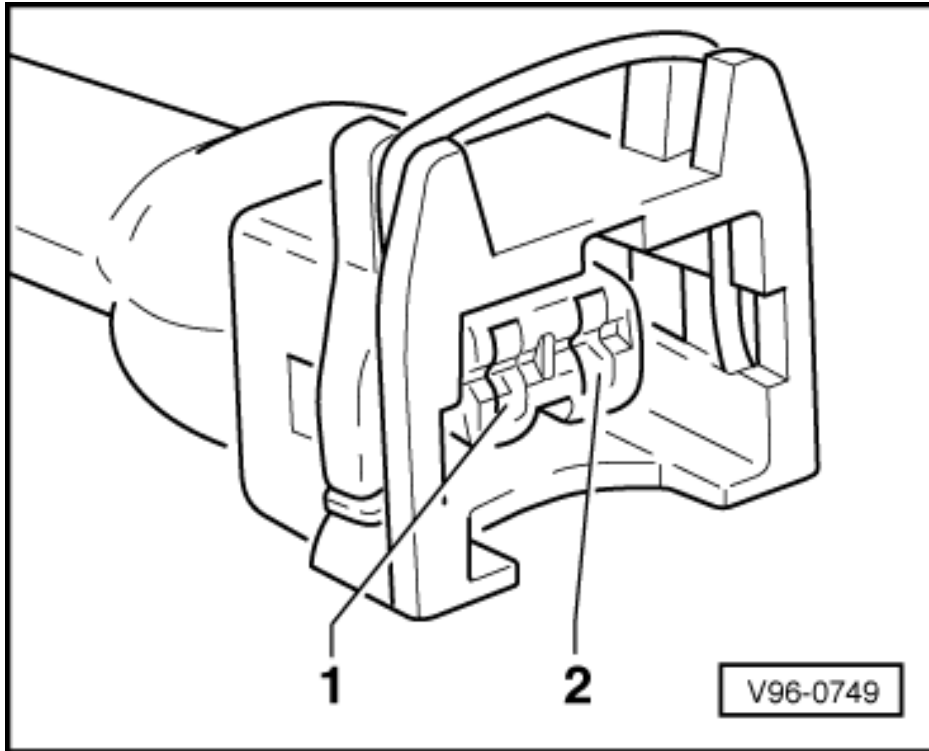
- ♦ Adapter set V.A.G 1594 A

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Test requirement:

- Cold start valve OK

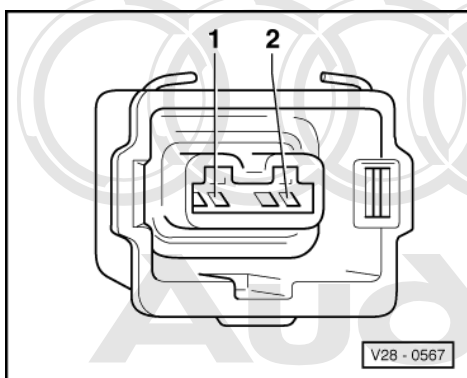
Test sequence



Note:

Cold acceleration enrichment only operates if thermo-time switch -F26, diaphragm pressure switch -F93 and throttle valve switch -F25 are closed.

- Unplug connector at cold start valve.
- -> Connect up voltage tester V.A.G 1527 B between contacts 1 and 2.
- Unplug connector at thermo-time switch.



> Connect contact 2 (green/white wire) to earth using test lead from V.A.G 1594 A.

Protected by copyright. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage and retrieval system, without prior written permission from Audi AG. Audi AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by Audi AG.



Note:

To avoid possible short circuit, terminal 1 (red/black wire to terminal G of thermo-time switch) is never to be connected to earth.

- Start engine and let it idle.
 - LED must not light
- Increase engine speed by opening throttle valve rapidly.
 - LED must light for approx. 0.4 second

If readings do not match specifications:

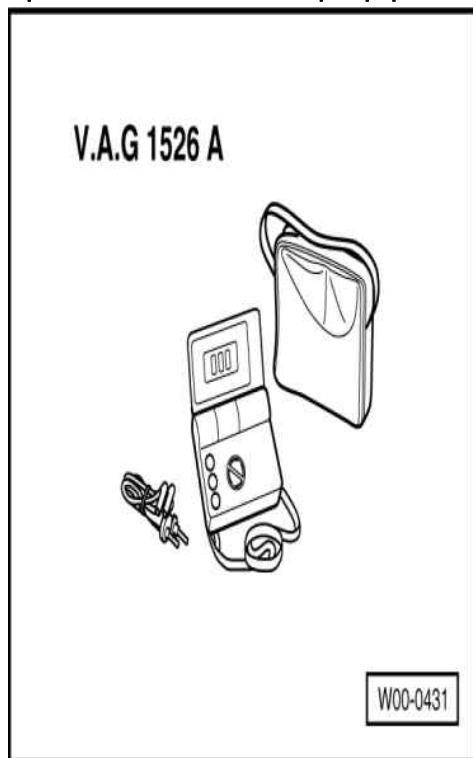
- Perform the following checks marked with a dot.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability for errors or omissions. Copyright by AUDI AG.

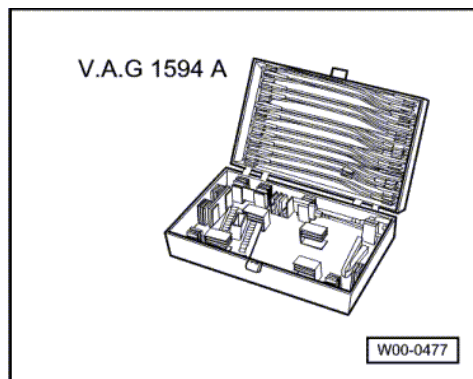
- Use current flow diagram to eliminate open circuit in wiring.
- Check diaphragm pressure switch => Page 14 .
- Check throttle valve switch => Page 25-26.

1.9 - Checking diaphragm pressure switch -F93

Special tools and workshop equipment required



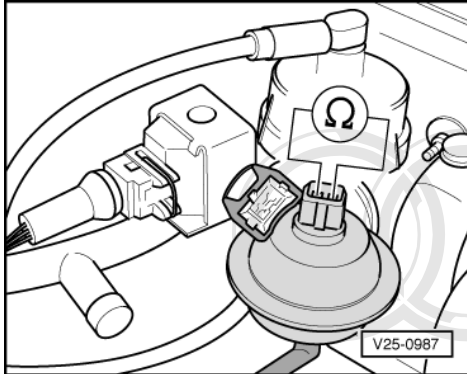
- ♦ Portable multimeter V.A.G 1526 A



- ♦ Adapter set V.A.G 1594 A

Test sequence

- Unplug connector at cold start valve.



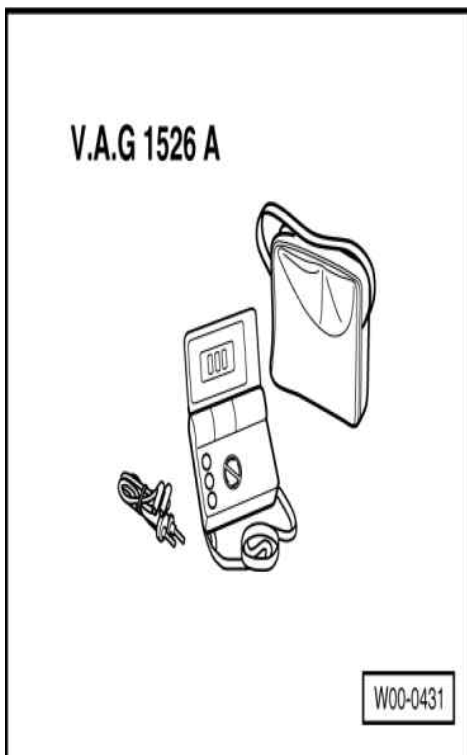
- -> Connect up multimeter for resistance measurement to contacts of diaphragm pressure switch.
- Start engine and let it idle.
 - Specification: $\infty \omega$ (no continuity)
- Increase engine speed by opening throttle valve rapidly.
 - Specification: $\infty \omega$ (no continuity)

If readings do not match specifications:

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted. Copyright by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Replace diaphragm pressure switch.

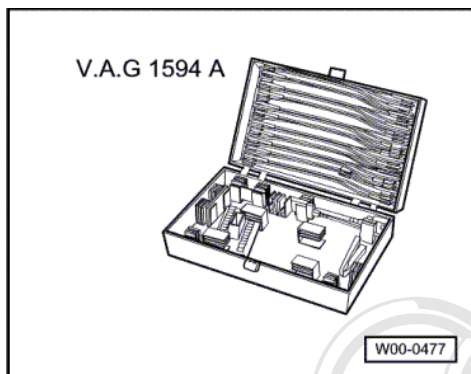
1.10 - Checking and adjusting throttle valve switch -F25





Special tools and workshop equipment required

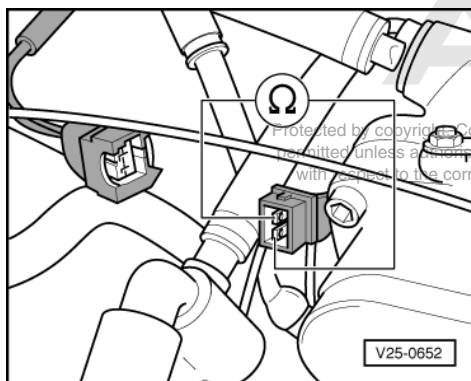
- ♦ Portable multimeter V.A.G 1526 A



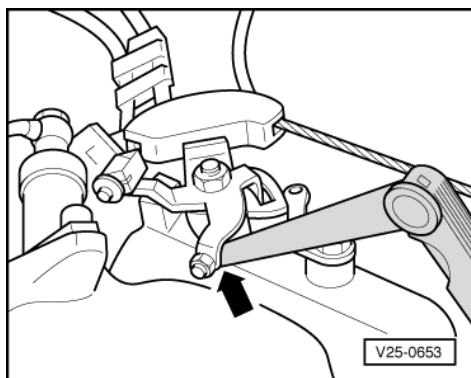
- ♦ Adapter set V.A.G 1594 A
- ♦ Feeler gauge

Checking operation

Test requirement:



- Basic setting of throttle valve OK; checking => Page 20
- Unplug connector at throttle valve switch.
- -> Connect up multimeter for resistance measurement to connector of throttle valve switch.
 - Specification: $\infty \omega$ (no continuity)
- Open throttle valve slightly (switch must click).



- -> Specification: 0 ω

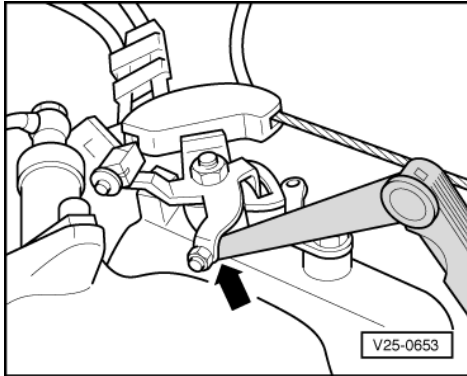
Air gap between throttle valve lever and idle stop 0.20 ... 0.60 mm (measured with feeler gauge)

If readings do not match specifications:

- Adjust throttle valve switch => Page 17 .

Adjustment

- Slacken off bolts of throttle valve switch and adjust switching point by moving switch in elongated holes.

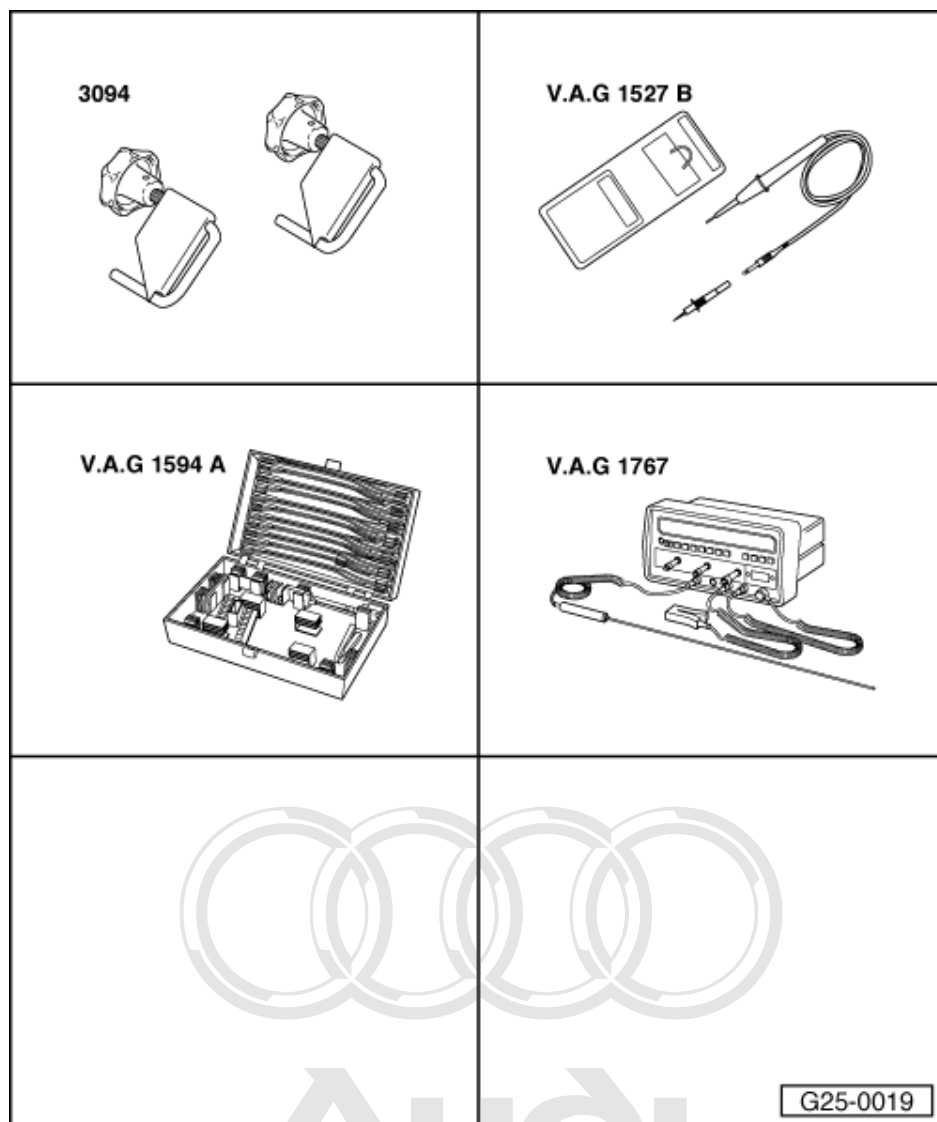


- -> Insert 0.4 mm feeler gauge between idle stop and throttle valve lever -arrow-.
- Move throttle valve switch against throttle valve lever until switching point is just exceeded (distinct clicking noise must be audible).
- Tighten bolts and secure with locking fluid.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



1.11 - Checking auxiliary air valve -N21



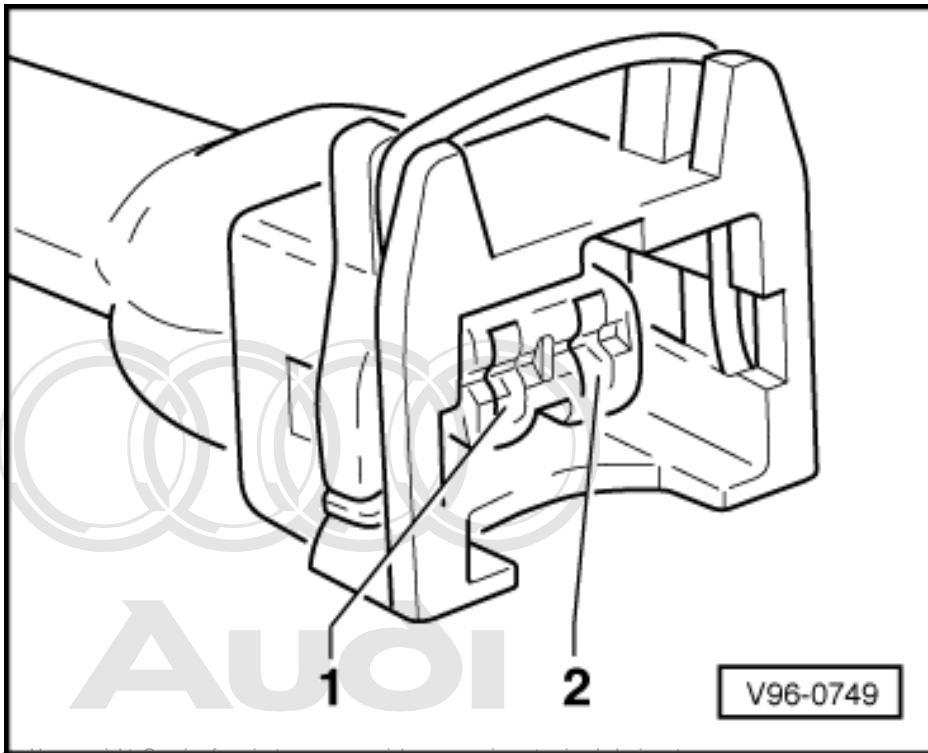
Special tools and workshop equipment required

- ♦ Hose clamps 3094
- ♦ V.A.G 1527 B
- ♦ V.A.G 1594 A
- ♦ V.A.G 1767 or V.A.G 1367 with V.A.G 1367/8

Checking power supply

Test requirements:

- Fuel pump relay OK; checking => Page 3
- Fuse for auxiliary air valve OK
- Ignition cable/terminal 4 detached from ignition distributor and connected to earth with test lead from V.A.G 1594 A
- Unplug connector at auxiliary air valve.



Protected by copyright. Copying for private or commercial purposes in part or in whole, is not permitted without the express written consent of Audi AG. All rights reserved. No liability with respect to the correctness of information in this document. Copyright by AUDI AG.

→ Connect up voltage tester V.A.G 1527 B between contacts 1 and 2.
Operate starter.

- LED must light constantly during starting

If reading does not match specification:

- Use current flow diagram to eliminate open circuit in wiring.

If reading matches specification:

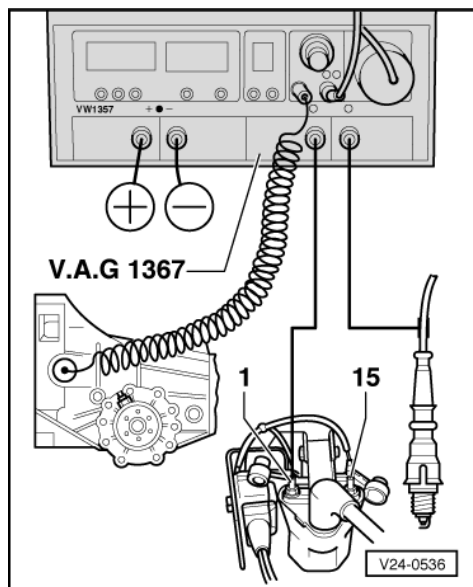
- Check operation of auxiliary air valve.

Checking operation

- Battery voltage at least 12.7 V
- Coolant temperature less than 30 °C
- Connector at auxiliary air valve unplugged

Note:

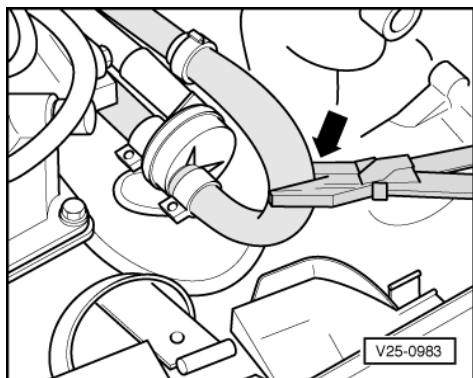
When performing this check, only switch on ignition after unplugging connector at auxiliary air valve.



- -> With ignition switched off, connect up ignition tester V.A.G 1767 (or V.A.G 1367).

=> Operating instructions

- Start engine and let it idle.



- -> Use pliers to pinch off hose -arrow- between auxiliary air valve and intake manifold.
- Engine speed must decrease
- Repeat test with warm engine and connector attached to auxiliary air valve.
- Engine speed must not change

If readings do not match specifications:

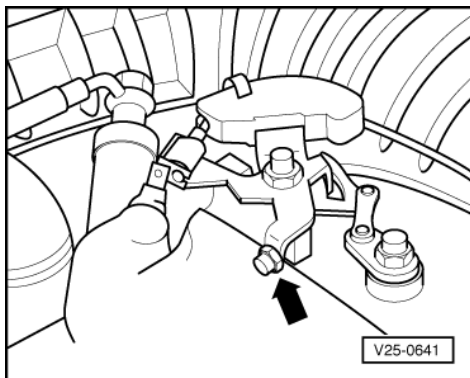
- Replace auxiliary air valve.

1.12 - Basic setting of throttle valve

Note:

Limiting screw is set at factory and is not to be altered. If screw has been inadvertently turned, perform the following adjustment procedure and mark the screw with locking fluid again.

Audi AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- -> Screw out limiting screw -arrow- until there is a gap between limiting screw and stop.
- Then screw in limiting screw until it makes contact with stop.

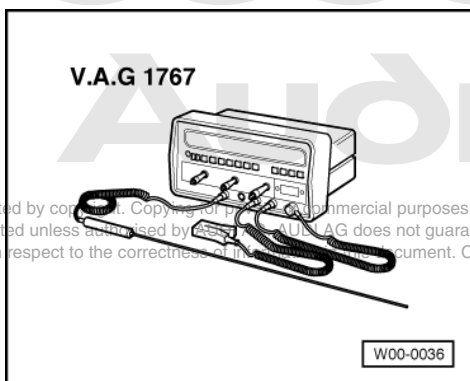
Note:

For precise determination of limiting screw stop point, insert a thin sheet of paper between limiting screw and stop. Establish exact stop point by constantly moving sheet of paper and at the same time turning limiting screw.

- Screw in limiting screw 1/2 a turn from stop point determined in the above manner.
- Mark screw with locking fluid.
- Check idling speed and CO content=> Page 33 .
- Check throttle valve switch -F25 =>Page 15 .

1.13 - Checking intake system for leaks (unmetered air)

Special tools and workshop equipment required

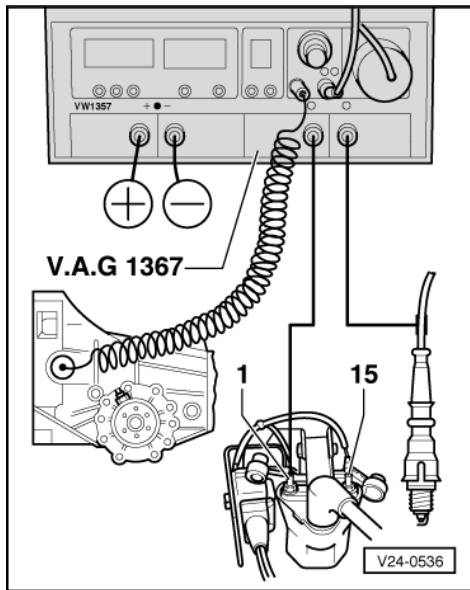


- ◆ Ignition tester V.A.G 1767 or V.A.G 1367 with clip-on trigger V.A.G 1367/8
- ◆ Engine leak detector spray G 001 800 A1

Notes:

- ◆ Due to the vacuum in the intake system, the leak detector spray is drawn in with the unmetered air. The spray reduces the ignition performance of the mixture, thus causing a drop in engine speed and a sharp increase in CO content.
- ◆ Always heed the safety instructions on the can.

Test sequence



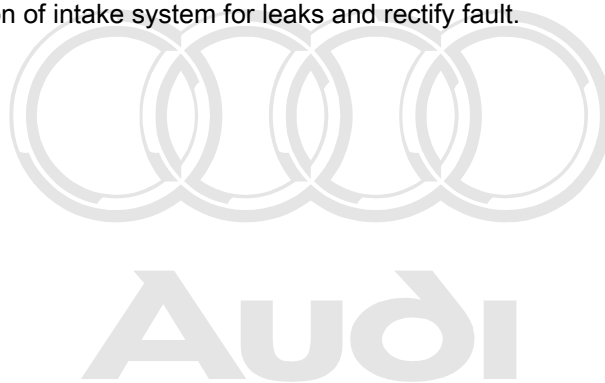
- -> With ignition switched off, connect up ignition tester V.A.G 1767 (or V.A.G 1367).

=> Operating instructions

- Start engine and let it idle.
- Read off idling speed on ignition tester V.A.G 1767 (or V.A.G 1367).
- Systematically apply engine leak detector spray to intake system components.
 - Air intake elbow, crankcase breather hoses, hoses to activated charcoal filter, activated charcoal filter solenoid valve and vacuum pipes

If engine speed decreases:

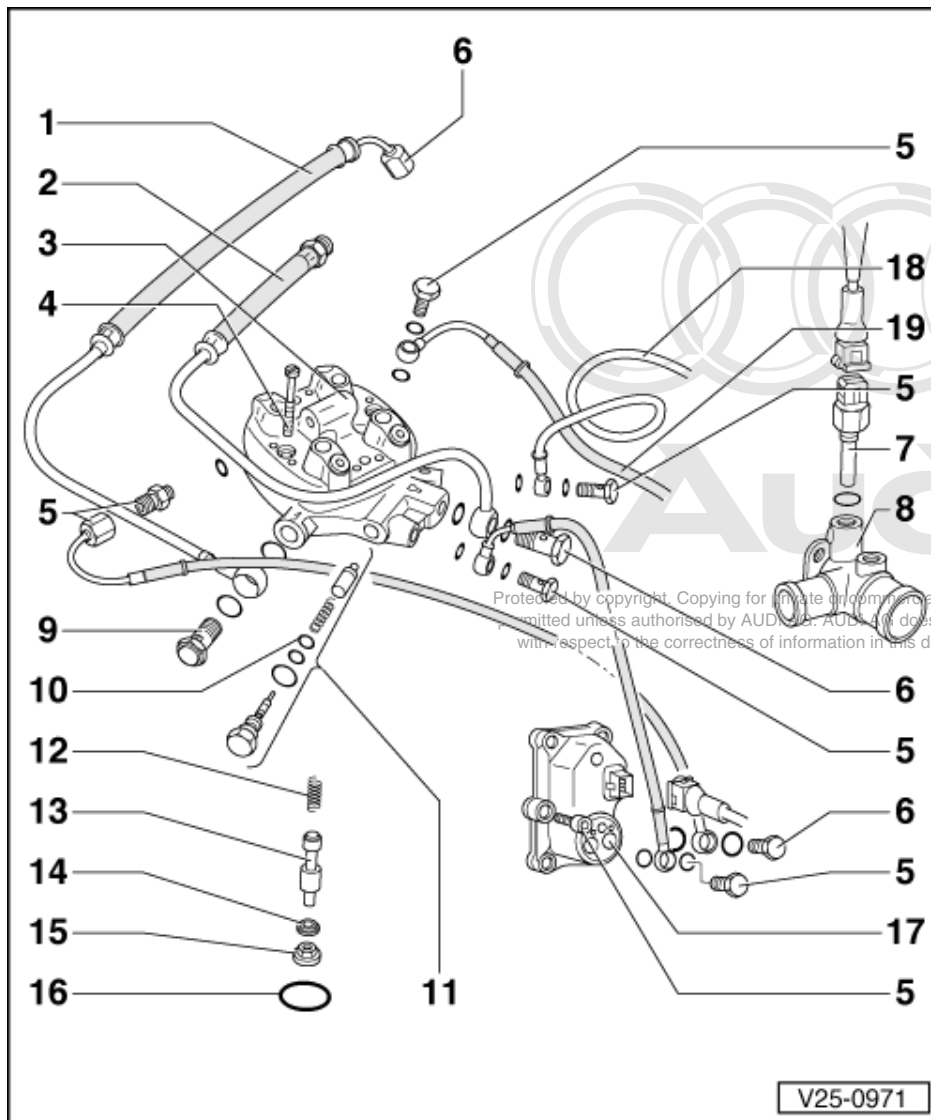
- Switch off ignition.
- Check sprayed section of intake system for leaks and rectify fault.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

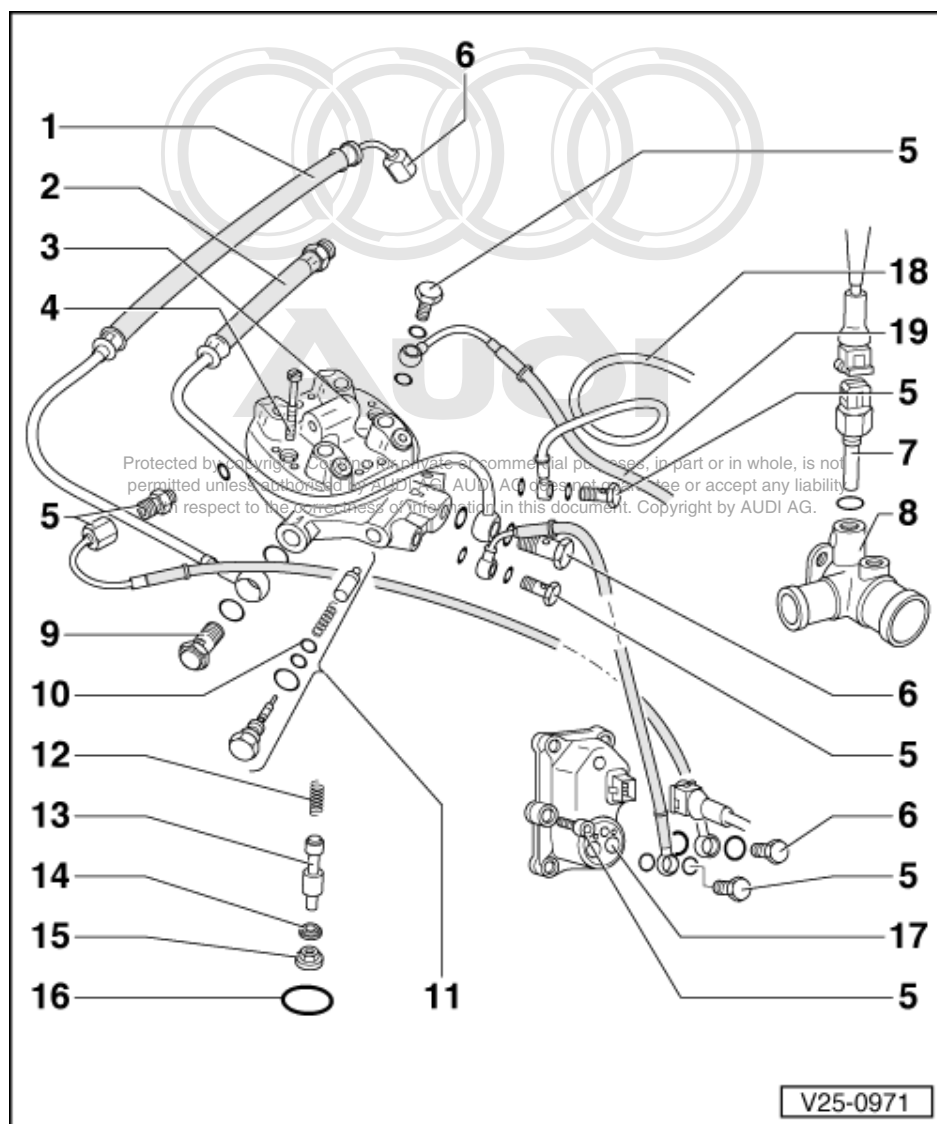
2 - Servicing fuel system

2.1 - Servicing fuel system



2.2 - Exploded view of fuel distributor

- 1 Fuel supply pipe
 - ♦ From fuel filter
- 2 Fuel return pipe
 - ♦ To fuel tank
- 3 Fuel distributor
 - ♦ Checking =>Checking idle injection tolerance, Page 48
 - ♦ Following installation, check and if necessary adjust idle motion of sensor plate => Page 51
- 4 3.5 Nm
- 5 10 Nm
- 6 20 Nm


7 Thermo-time switch -F26 - 30 Nm

- ♦ Checking =>Page **10**

8 Connection
9 20 Nm

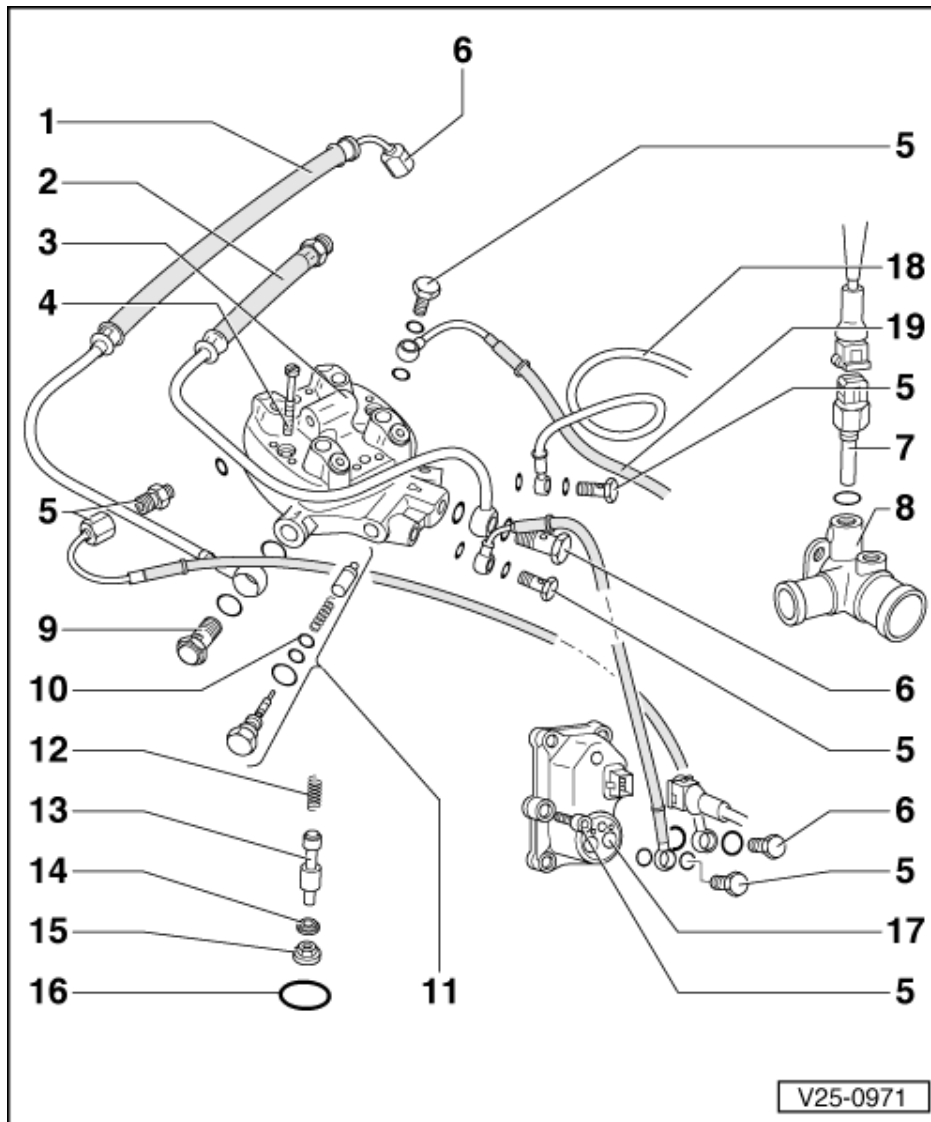
- ♦ In the event of engine running problems, screw in banjo bolt instead of minifilter

10 Shim
11 System pressure regulator/pressure relief valve, 20 Nm

- ♦ Checking system pressure and holding pressure => Page **39**

12 Spring
13 Control plunger

- ♦ Checking adjusting lever and control plunger => Page **50**
- ♦ Adjusting stop bolt for control plunger => Page **54**



14 Sealing ring

- ♦ Installation position: Small diameter facing control plunger
- ♦ Only provides seal in rest position of sensor plate

15 Stop bolt

- ♦ For control plunger
- ♦ Adjusting => Page 54

16 O-ring

- ♦ Replace

17 Warm-up regulator -N9

- ♦ Checking =>Page 42

18 Fuel pipe

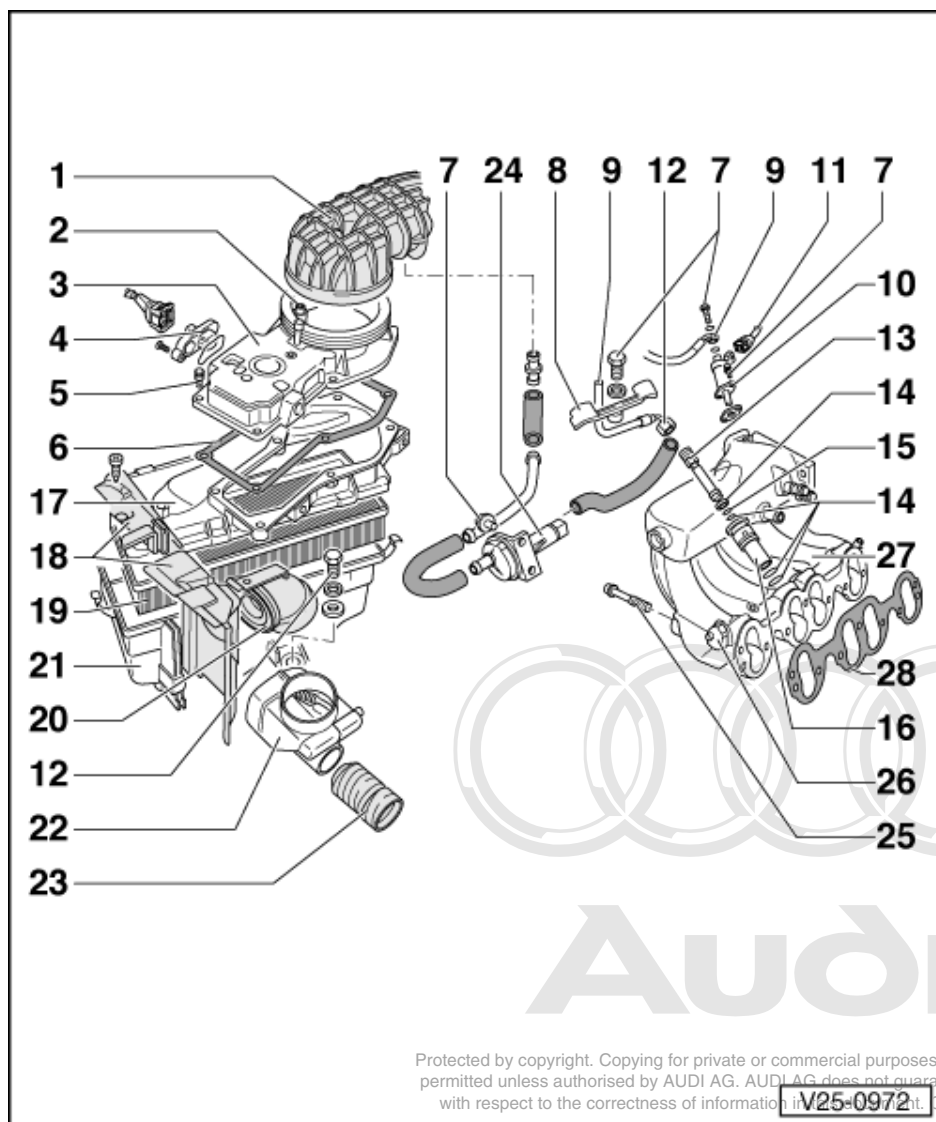
- ♦ To cold start valve

19 Fuel pipe

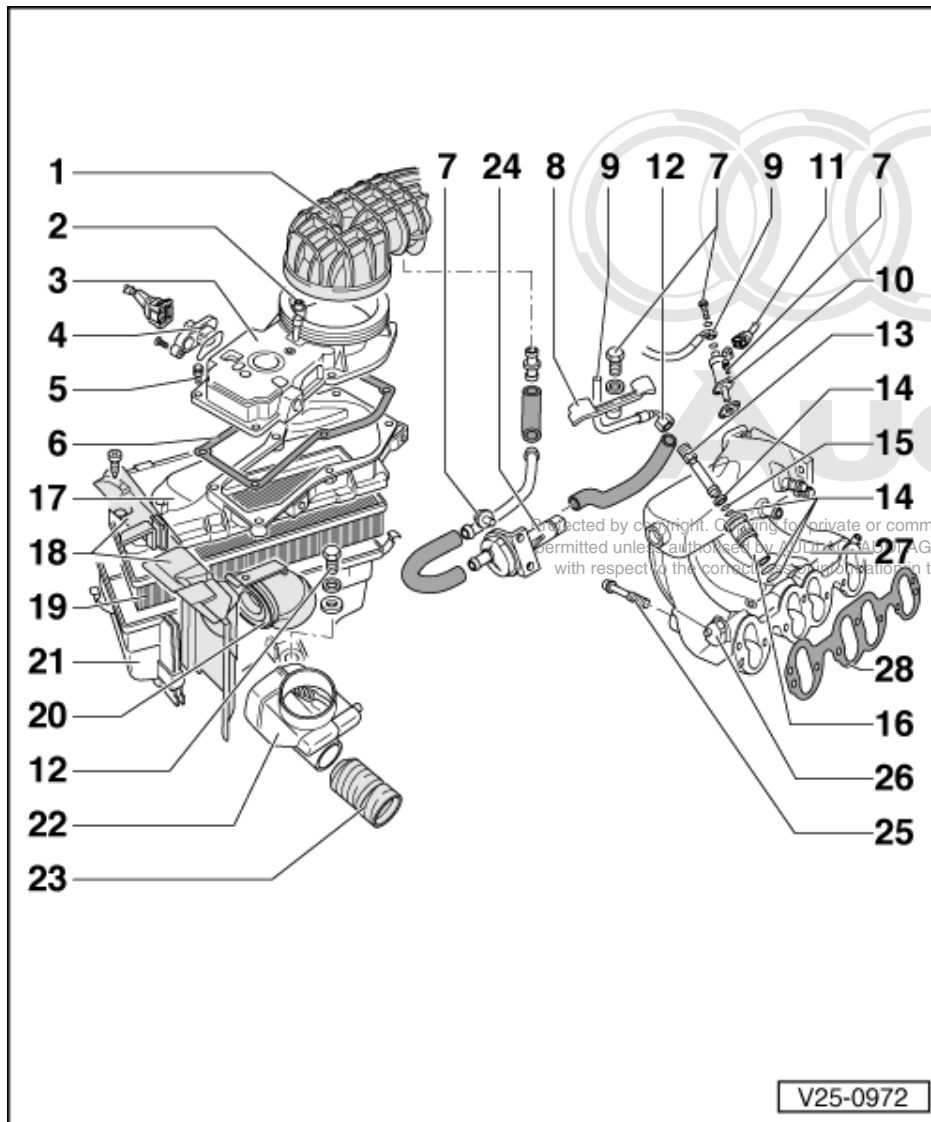
- ♦ To injector

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

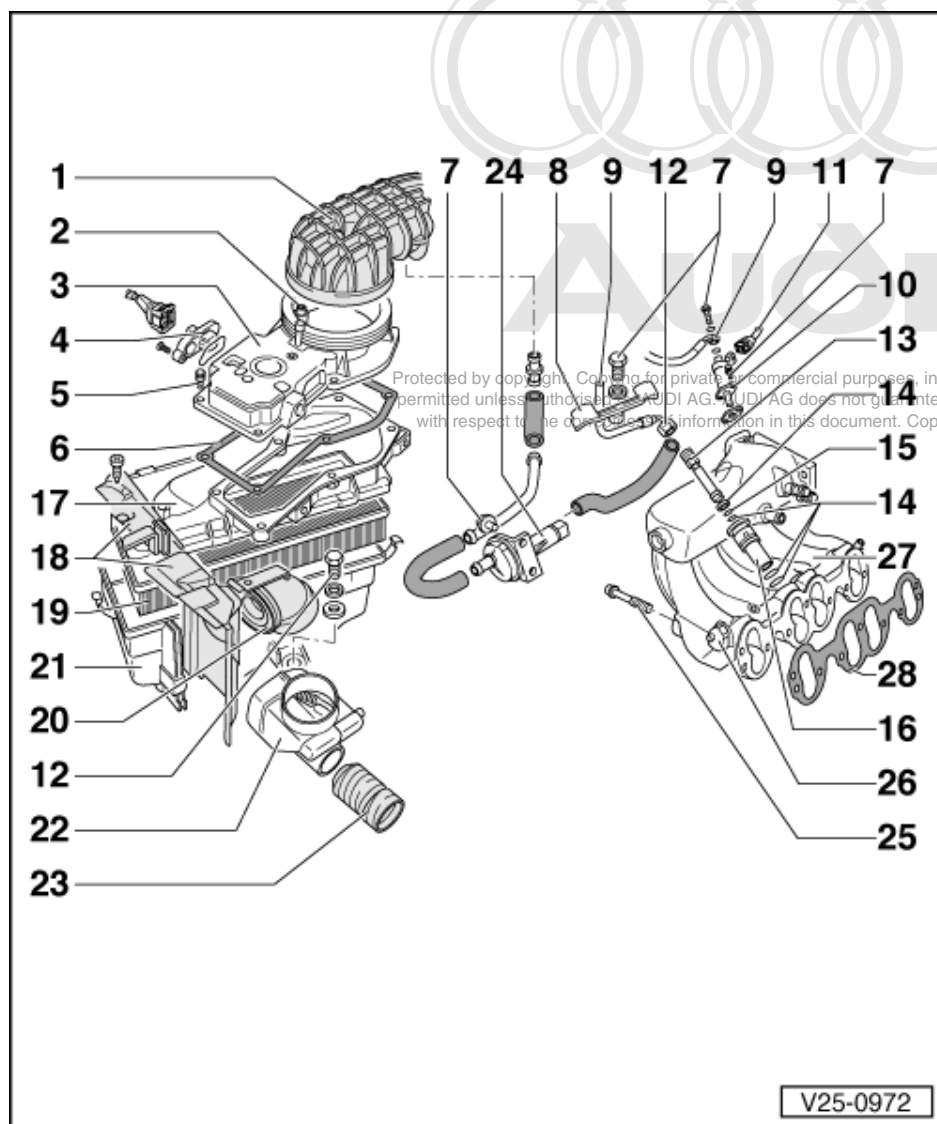
2.3 - Exploded view of air-flow meter/intake manifold



- 1 Air intake elbow
- 2 Securing plug
 - ♦ Take out prior to adjustment
 - ♦ Checking idling speed and CO content => Page 33
- 3 Air-flow meter
 - ♦ Checking adjusting lever=>Page 50
 - ♦ Checking and adjusting rest position and idle motion of sensor plate=>Page 51
- 4 Sender for fuel consumption indicator
- 5 3.5 Nm



- 6 Gasket
- 7 10 Nm
- 8 Bracket
 - ♦ For injectors
- 9 Fuel pipe
 - ♦ From fuel distributor
- 10 Cold start valve -N17
 - ♦ Checking =>Page 7
- 11 Connector
- 12 20 Nm
- 13 Injector
 - ♦ Checking =>Page 46
 - ♦ Leak test => Page 49


14 O-ring

- ◆ Replace
- ◆ Moisten with fresh engine oil when fitting

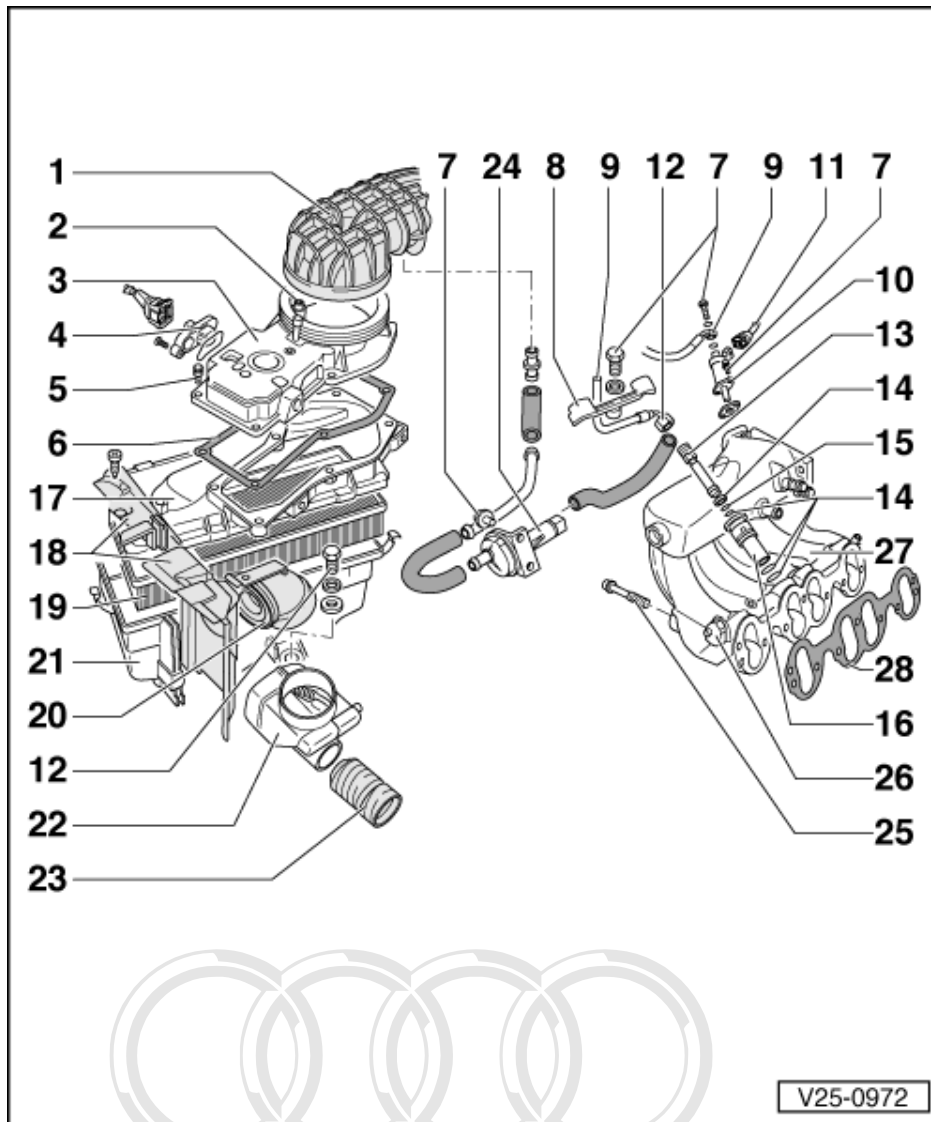
15 Circlip
16 Injector insert

- ◆ Leak test => Page 49
- ◆ Removing and installing=>Page 50

17 Upper part of air cleaner
18 Cover

- ◆ For intake air

19 Filter element
20 Air intake elbow
21 Lower part of air cleaner



22 Air inlet connection

- ♦ With control flap and thermostat
- ♦ Check operation with refrigerant spray
- Less than 0 °C: Control flap completely open
- Above +10 °C: Control flap completely closed

23 Hose

- ♦ To exhaust manifold

24 Auxiliary air valve -N21

25 M6 = 10 Nm
M8 = 25 Nm

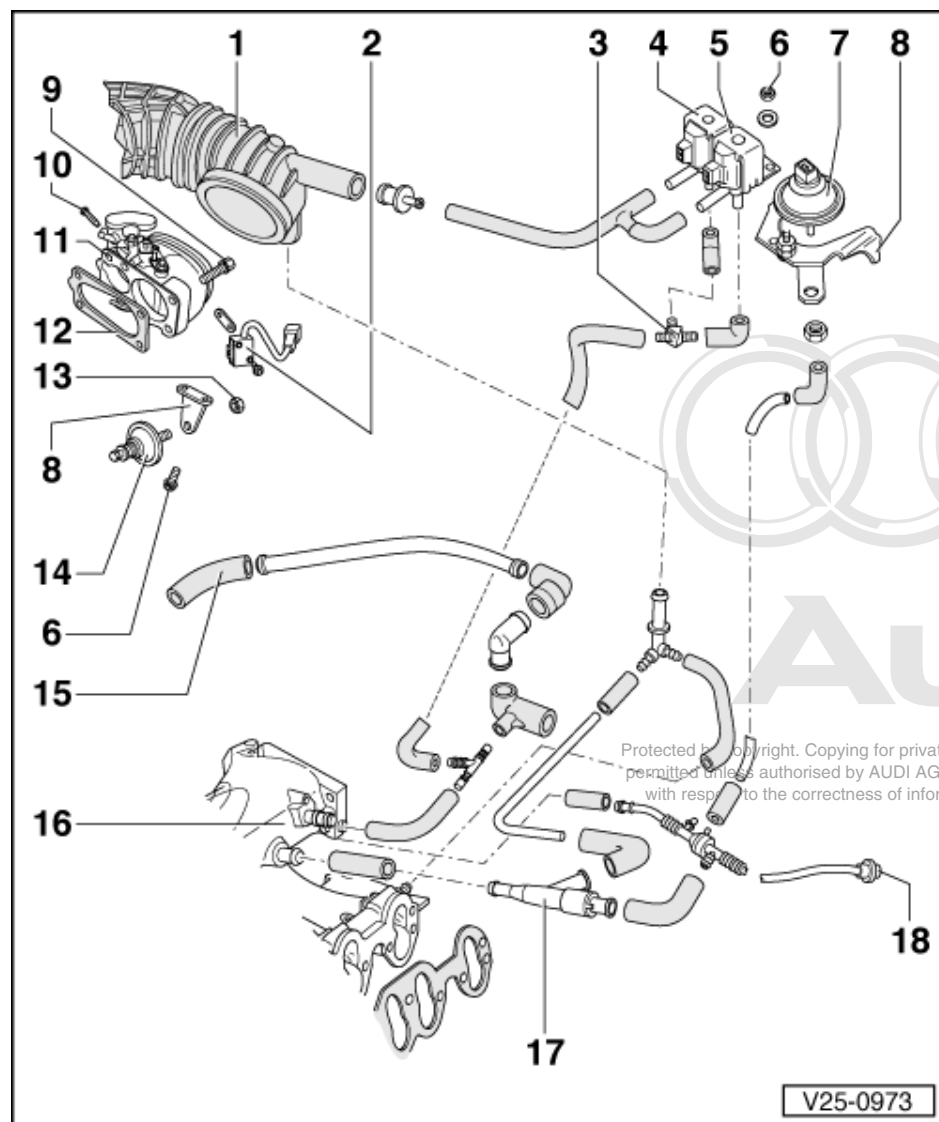
26 Thermoswitch for fan run-on

27 Intake manifold

28 Gasket

- ♦ Replace

2.4 - Exploded view of throttle valve assembly

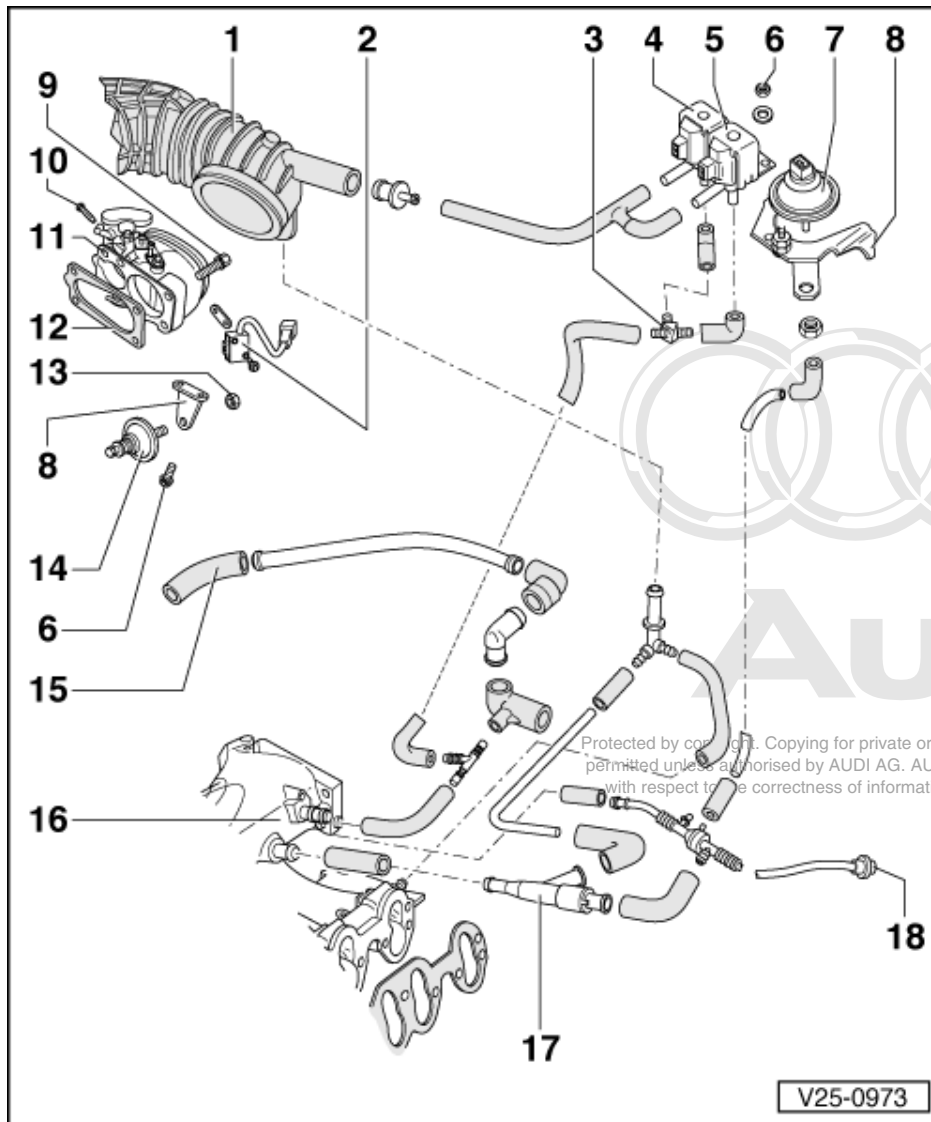


Note:

Checking cold acceleration enrichment

=> Page 12.

- 1 Air intake elbow
- 2 Throttle valve switch -F25
 - ♦ Checking and adjusting =>Page 25-26
- 3 Branch
 - ♦ Installation position: Large bore facing two-way valve II
- 4 Two-way valve II
 - ♦ For idling-speed boost
 - ♦ For vehicles with air conditioner
 - ♦ Checking =>Page 36



5 Two-way valve I

- ♦ For idling-speed boost
- ♦ Checking =>Page 36

6 10 Nm

7 Diaphragm pressure switch -F93

- ♦ Checking =>Page 14

8 Bracket

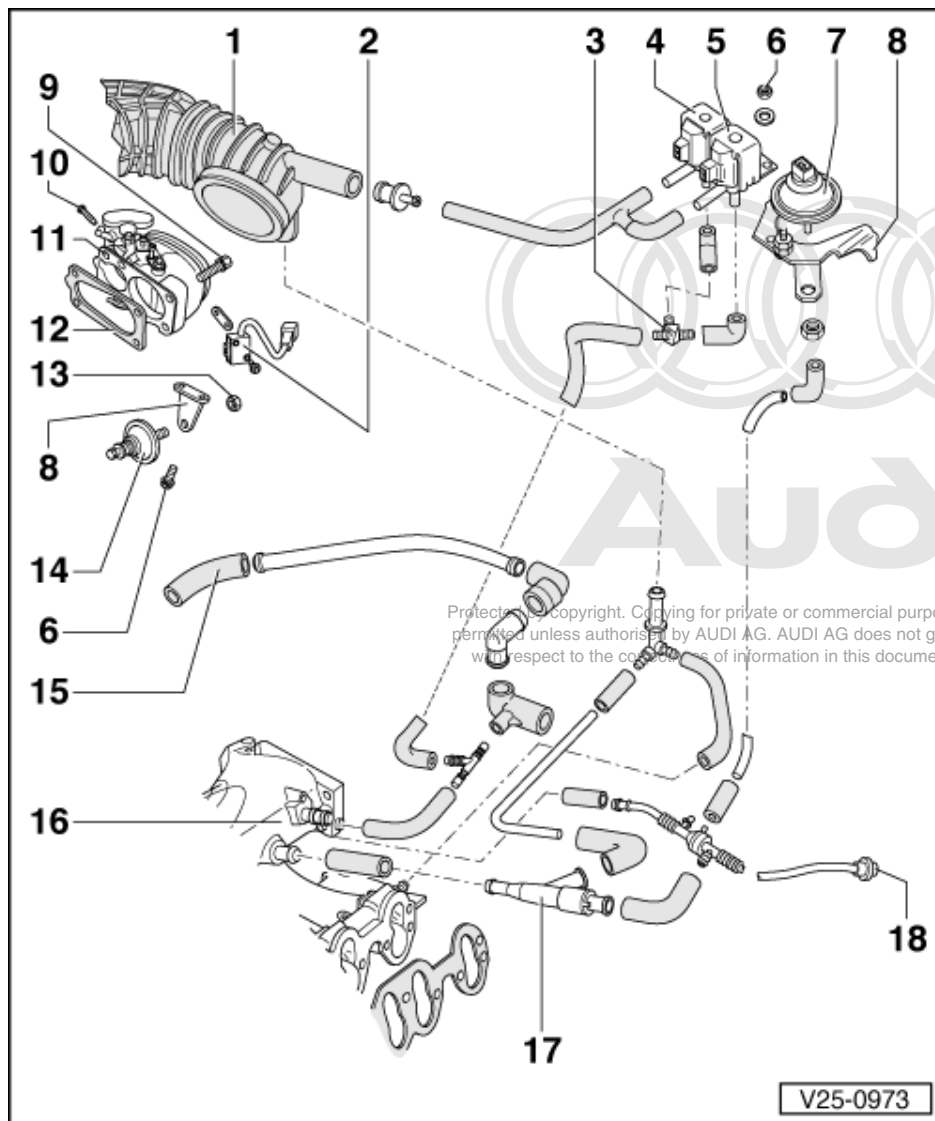
9 20 Nm

10 Idle adjusting screw

- ♦ Replace O-ring if damaged
- ♦ Adjusting idling speed =>Page 33

11 Throttle valve assembly

- ♦ Basic setting of throttle valve
=> Page 20



12 Gasket

13 Hexagon nut

- ◆ Secure with locking fluid after tightening

14 Throttle damper

- ◆ Adjusting: With throttle valve closed and stem completely pressed in, gap between stem and drive lever must be 1.5 ± 0.5 mm

15 To connection

- ◆ At upper part of air cleaner

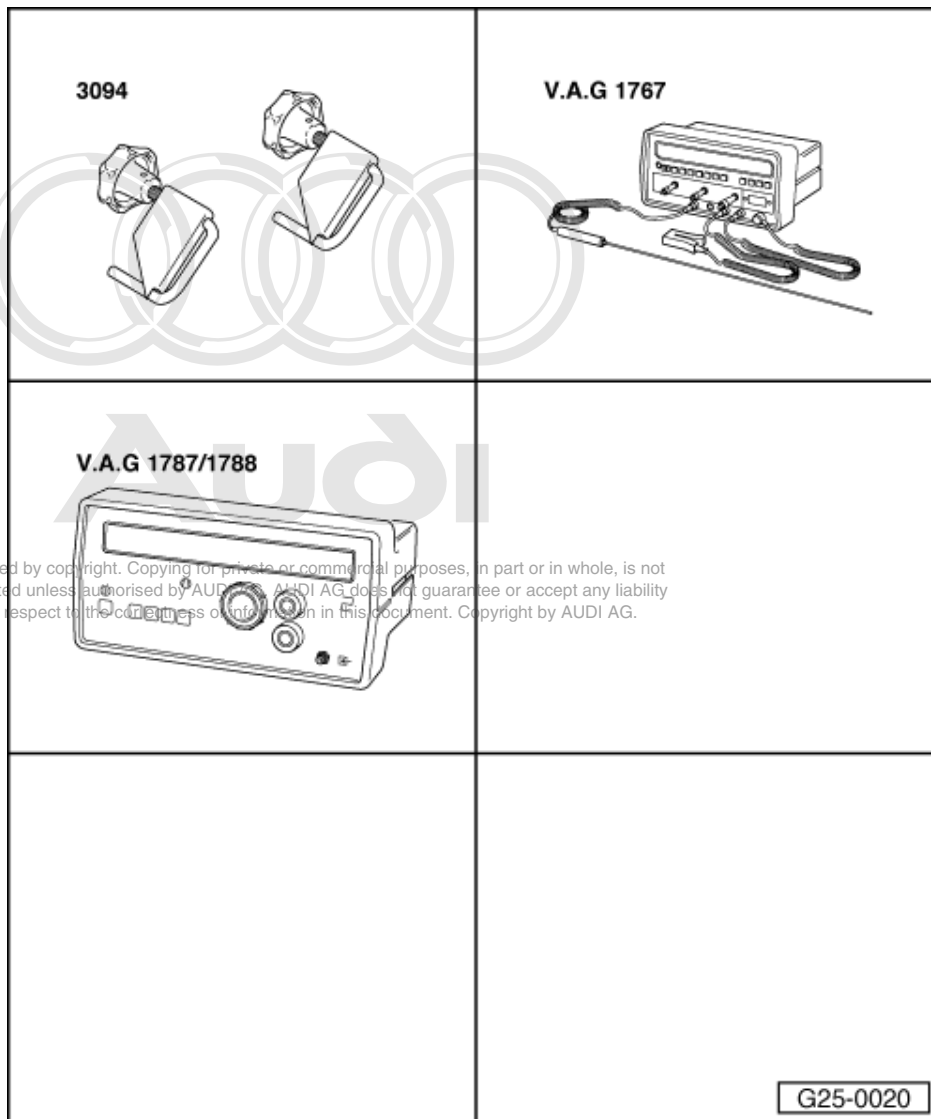
16 Intake manifold

17 Suction jet pump

- ◆ To boost vacuum
- ◆ For brake servo

18 To brake servo

2.5 - Checking idling speed and CO content



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Special tools and workshop equipment required

- ◆ Hose clamps 3094
- ◆ V.A.G 1767 or V.A.G 1367 with V.A.G 1367/8
- ◆ V.A.G 1788

Test requirements:

- Ignition point OK => Page 63
- No leaks in exhaust system
- Coolant temperature at least 85 °C
- Electr. loads switched off (radiator fan must not run during test)
- Throttle valve in idle position
- Throttle cable correctly adjusted

=> Repair Group 20

- No pressure gauge connected
- Air conditioner switched off



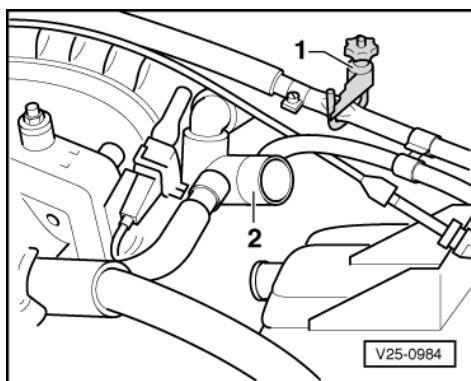
- If injector pipes have been unfastened or replaced: Rev up engine several times to 3000 rpm and leave it idling for at least 2 minutes

Connecting testers

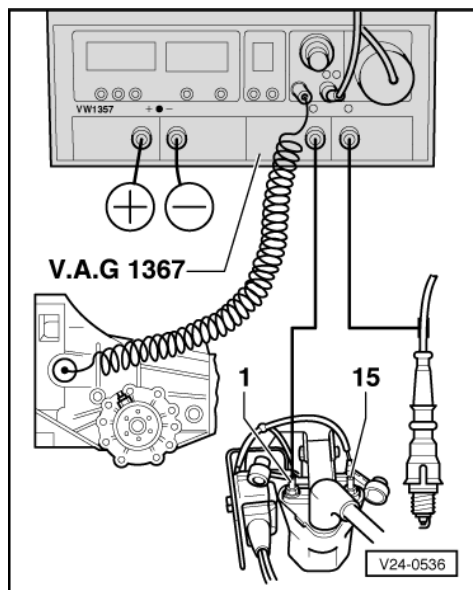
- Connect up exhaust tester V.A.G 1788.

=> Operating instructions

- Insert measurement probe in exhaust tailpipe.



- -> Pinch off hose from two-way valves for idling-speed boost with hose clamp 3094 -Item 1-.
- Detach crankcase breather hose -2- at cylinder head cover and route such that only fresh air can be drawn in.
- Detach vacuum hose from vacuum unit of ignition distributor and seal off.



- -> With ignition switched off, connect up ignition tester V.A.G 1767 (or V.A.G 1367).

=> Operating instructions

Notes:

- ♦ Take particular care to ensure that TDC sender of ignition tester V.A.G 1367 is fully inserted in gearbox housing.
- ♦ Ignition point is displayed directly on V.A.G 1767 (or V.A.G 1367). There is no need to aim timing light at ignition point notches.

- ♦ Incorrect measurements may occur with ignition tester V.A.G 1767 if triggering probe is slightly open (e.g. excessive tension on helical cable).
- Start engine and let it idle.
- Read off idling speed on ignition tester V.A.G 1767 (or V.A.G 1367).
 - Specification: 800 ... 1000 rpm 1)

1) Current values:

=> Exhaust emission test binder

- Read off CO content on exhaust tester.
 - Specification: 0.5 ... 1.5 % by vol. 1)

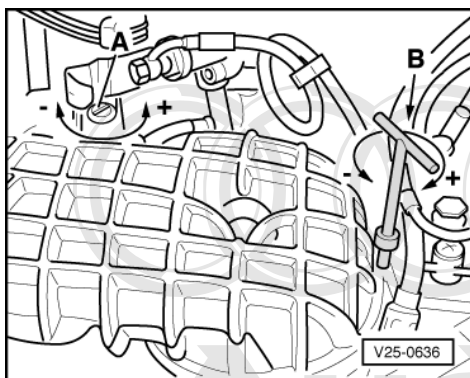
1) Current values:

=> Exhaust emission test binder

Note:

If idling speed/CO content is outside tolerance:

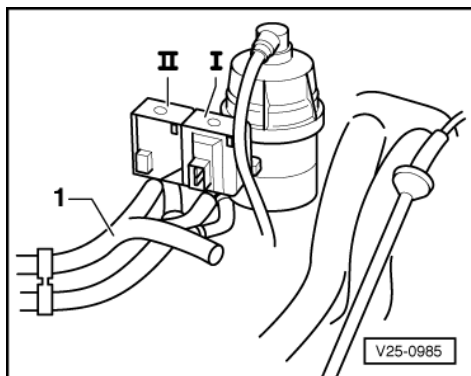
- Lift cap out of hole for CO adjusting screw.
- Adjust idling speed to setting 930 ± 30 rpm.
- Adjust CO content to setting 1.3 ± 0.2 % by vol.



- -> Correct idling speed and CO content by alternately turning idle adjusting screw -A- and CO adjusting screw -B-.
- ♦ When adjusting CO, do not press down adjusting key and do not accelerate with adjusting key inserted.
- ♦ After each adjustment operation, remove adjusting key and accelerate briefly before reading off CO content at idling speed.
- Fit CO adjusting screw with new cap.

If CO content increases after checking idling speed with crankcase breather hose attached, this is not the result of an incorrect setting, but is caused by enrichment from the crankcase due to oil dilution on account of predominantly short-distance driving. After a lengthy cross-country drive at good speed, the amount of fuel in the oil decreases and the CO content returns to normal. This can also be achieved quickly by way of an oil change.

2.6 - Checking idling-speed boost

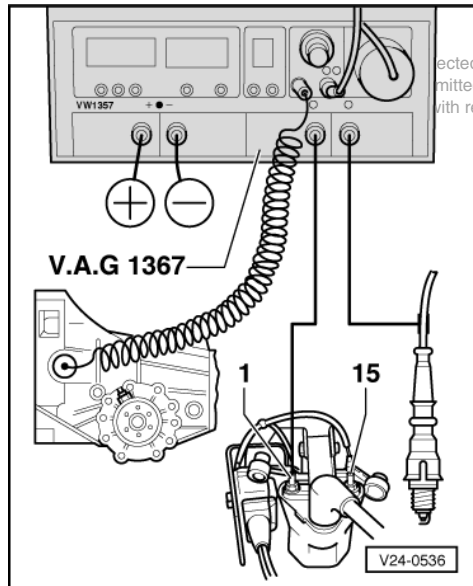


- ♦ -> Idling speed is boosted by way of two-way valve I -N62 if it drops below 700 rpm.
- ♦ Two-way valve I is actuated (earth) by way of idling-speed boost control unit -J143.
- ♦ Vehicles with air conditioner additionally feature two-way valve for idling-speed boost II -N16.
- ♦ Two-way valve II boosts idling speed if air conditioner is switched on. Actuation (positive) is by way of air conditioner.

Checking idling-speed boost two-way valve I -N62

Test requirements:

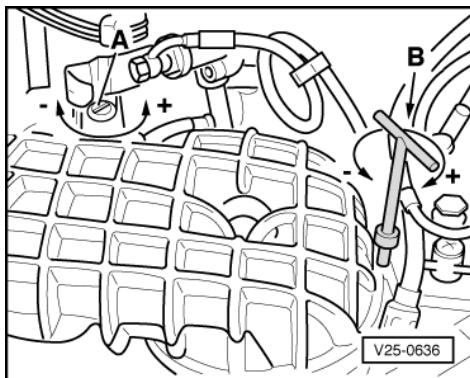
- Coolant temperature at least 85 °C
- Air conditioner switched off
- Fuse for two-way valve OK



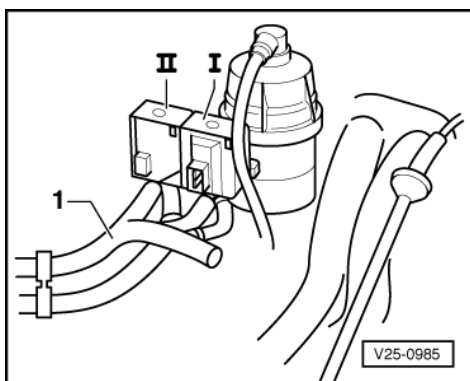
- -> With ignition switched off, connect up ignition tester V.A.G 1767 (or V.A.G 1367).

=> Operating instructions

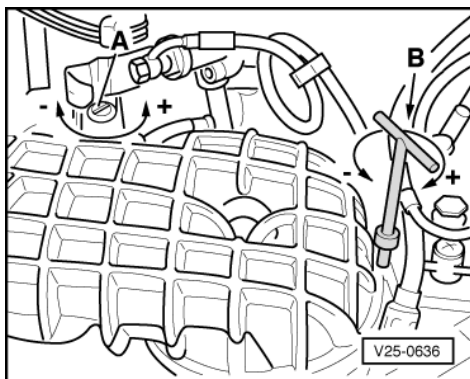
- Start engine and let it idle.
- Switch on all electr. loads; leave air conditioner switched off.



- -> Reduce idling speed by screwing in idle adjusting screw -A-.



- -> Below approx. 700 rpm, two-way valve I must open and idling speed must increase again
- Pinch off hose -1- with hose clamp 3094.
- Idling speed must decrease
- Switch off all electr. loads.

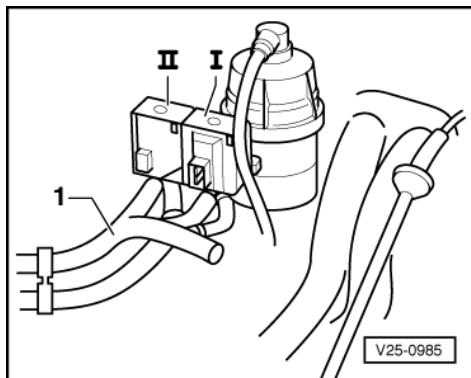


- -> Set idling speed at idle adjusting screw -A-.
- Specification: 930 ± 30 rpm
- Detach hose clamp 3094.
- Idling speed must increase until two-way valve I closes at approx. 1050 rpm; engine speed must then drop off again to set value

Checking two-way valve for idling-speed boost II -N16

Test requirement:

- Air conditioner switched off
- Start engine and let it idle.



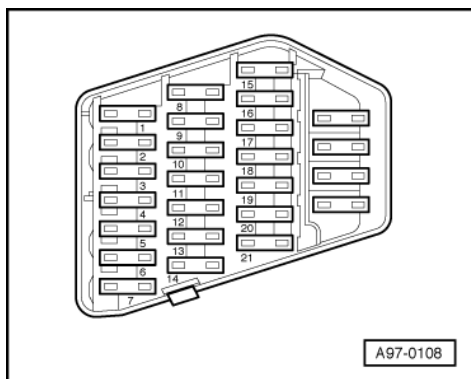
- -> Pinch off hose -1- with hose clamp 3094.
- Idling speed must not change
- Switch on air conditioner.
- Idling speed must decrease

Note:

Heed installation position of branch in hose: Large bore faces two-way valve II

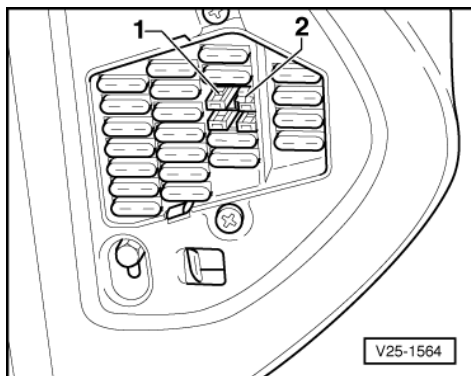
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

2.7 - Connecting remote control V.A.G 1348/3A with adapter lead V.A.G 1348/3-2



Sequence of operations

- Detach cover from fuse box on left.
- -> Pull out fuse S17.



- -> Connect remote control V.A.G 1348/3A with adapter lead V.A.G 1348/3-2 to rear contact -2- of fuse socket.

- Connect pick-off to vehicle battery (+).

Note:

On vehicles with air conditioner, connect pick-off to boost-starting socket (+).

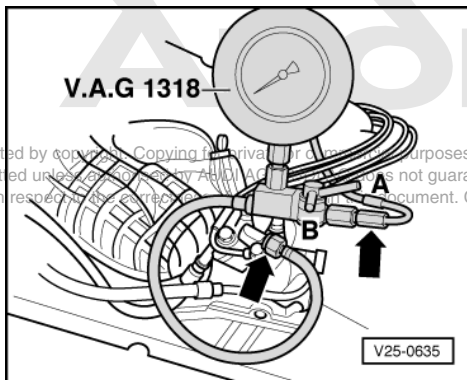
2.8 - Connecting pressure gauge V.A.G 1318 with test adapter 1318/4

Attention:
Fuel system is pressurised. Wrap cloth around joint before opening system. Then dissipate pressure by carefully unfastening joint.

- To dissipate pressure, detach control pipe at warm-up regulator (large connection).

Note:

Always use new sealing rings.



- -> Connect up pressure gauge V.A.G 1318 with test adapter 1318/4 between fuel distributor and warm-up regulator -arrows-; move lever on pressure gauge to -open- position (lever in direction of flow).

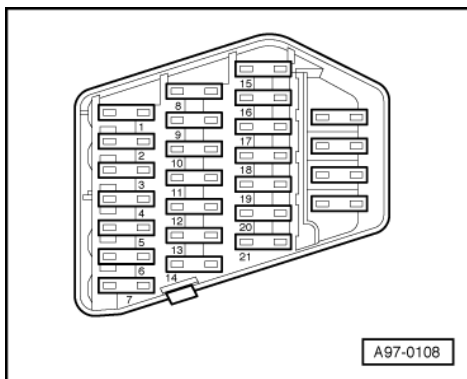
Position of cut-off valve:

- A - open
- B - closed

2.9 - Checking system pressure and holding pressure

Test requirements:

- Battery voltage at least 12.7 V





- -> Fuse S17 OK (in fuse box)
- Fuel pump relay OK; checking => Page 3
- Fuel pump OK; checking

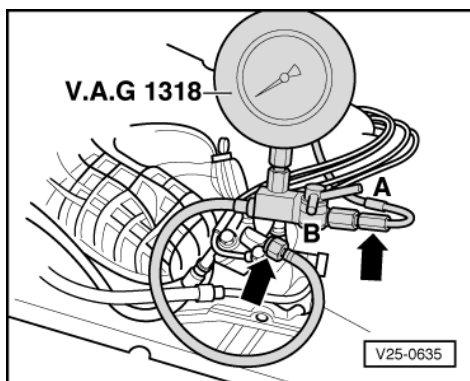
=> Repair Group 20

- Fuel filter OK
- Pressure gauge V.A.G 1318 connected with test adapter 1318/4
=> Page 39

Attention:

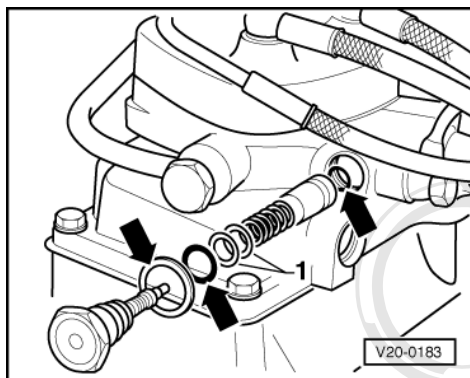
Fuel system is pressurised. Wrap cloth around joint before opening system. Then dissipate pressure by carefully unfastening joint.

Checking and adjusting system pressure



- -> Close cut-off valve of pressure gauge V.A.G 1318 -position B-.
- Start engine and let it idle.
 - Specification: 5.2 ... 5.9 bar

If reading does not match specification:



- -> Adjust system pressure by fitting or taking out shims -1-.
- To increase system pressure: Use thicker or several shims
- To reduce system pressure: Use thinner or fewer shims
- Change in pressure per 0.5 mm shim thickness: approx. 0.3 bar

Note:

To dissipate pressure, detach control pressure pipe at warm-up regulator (large connection).

Attention:

- ♦ Fuel system is pressurised. Wrap cloth around joint before opening system. Then dissipate pressure by carefully unfastening joint.
- ♦ Unfastening fuel supply pipe causes pressure container to be drained - approx. 10 cm of fuel squirts out.

- Repeat test.

If reading still does not match specification:

A - System pressure too low

- ◆ Fuel pipe kinked, clogged or leaking
- ◆ Fuel accumulator leaking
- ◆ Fuel filter clogged
- ◆ Inadequate fuel pump delivery

=> Repair Group 20

- ◆ System pressure regulator/pressure relief valve defective or dirty
- ◆ Fuel distributor defective

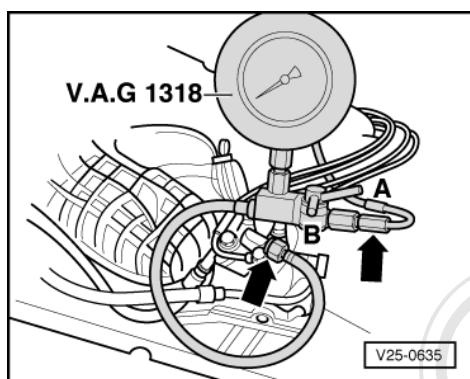
B - System pressure too high

- ◆ Fuel return pipe kinked or clogged
- ◆ System pressure regulator/pressure relief valve defective

Checking holding pressure

Test requirements:

- Coolant temperature at least 80 °C
- System pressure OK



- Start engine and let it idle.
- -> Open cut-off valve of pressure gauge V.A.G 1318 -position A-.
- Switch off engine after reaching specified value.
 - Specification: 3.4 ... 3.8 bar
- Check holding pressure on gauge.
 - After 10 minutes pressure must still be at least 3.3 bar

If holding pressure drops below 3.3 bar:

- ◆ Non-return valve in fuel pump defective

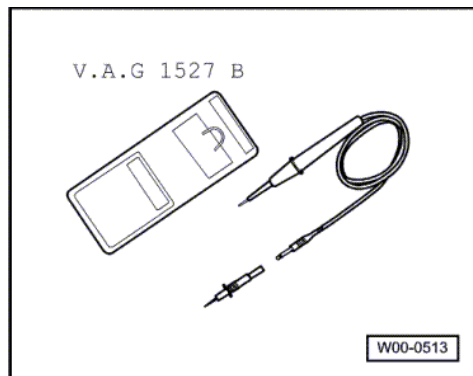
=> Repair Group 20

- ◆ Fuel pipes to fuel distributor leaking
- ◆ System pressure regulator/pressure relief valve leaking
- ◆ Cold start valve and injectors leaking
- ◆ Fuel distributor and pipe connections leaking

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

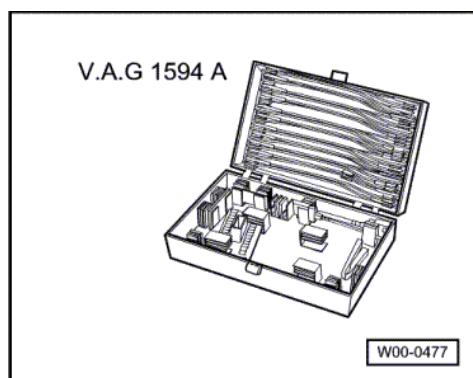


2.10 - Checking warm-up regulator -N9



Special tools and workshop equipment required

- ♦ Voltage tester V.A.G 1527 B

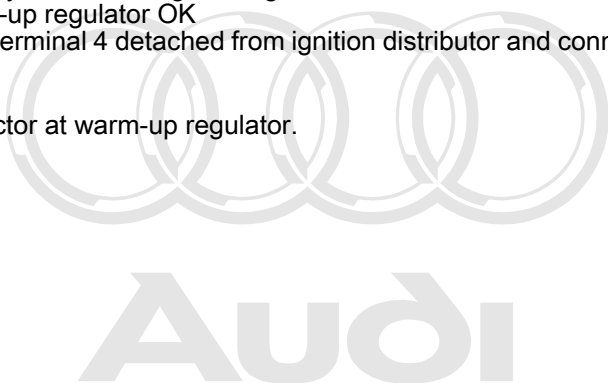


- ♦ Adapter set V.A.G 1594 A

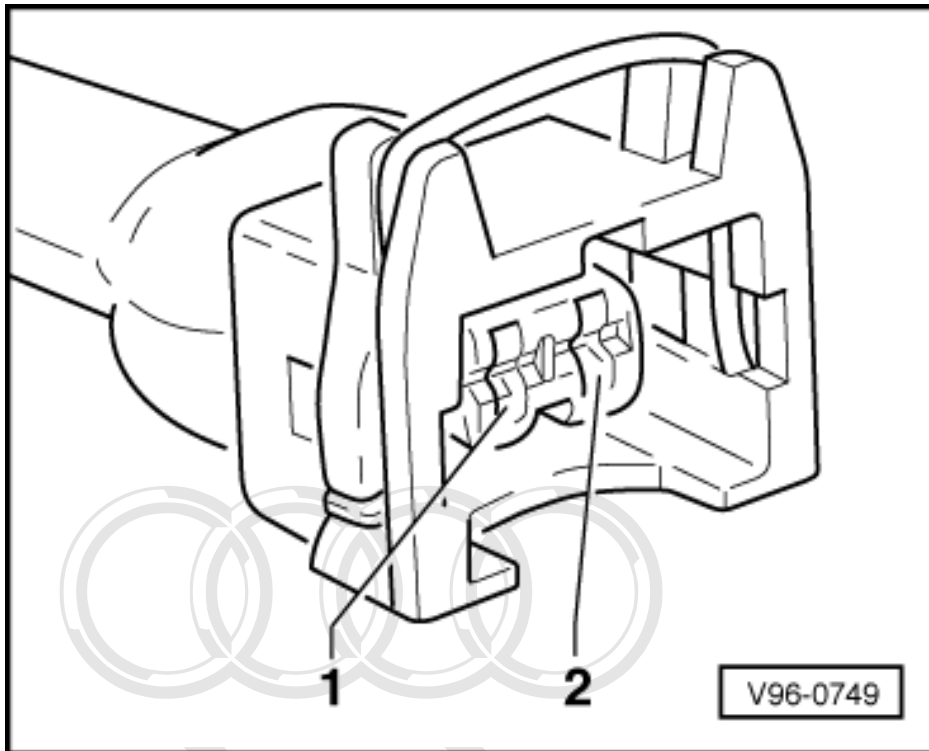
Checking power supply

Test requirements:

- Fuel pump relay OK; checking => Page 3
- Fuse for warm-up regulator OK
- Ignition cable/terminal 4 detached from ignition distributor and connected to earth with test lead from V.A.G 1594 A
- Unplug connector at warm-up regulator.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- -> Connect up voltage tester V.A.G 1527 B between contacts 1 and 2.
- Operate starter.
 - LED must light constantly during starting

If reading does not match specification:

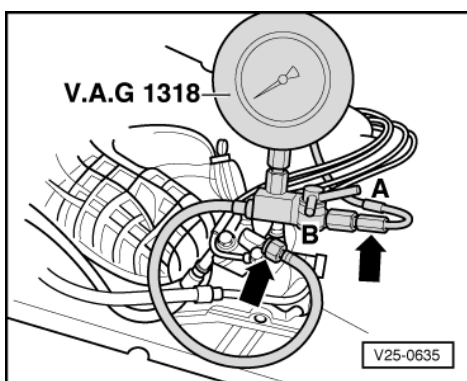
- Use current flow diagram to eliminate open circuit in wiring.

Checking control pressure with engine cold

Test requirements:

- Ambient temperature 20 ... 30 °C
- Connector unplugged at warm-up regulator -N9 and auxiliary air valve -N21
- Pressure gauge V.A.G 1318 connected with test adapter 1318/4

=> Page 39



- -> Open cut-off valve of pressure gauge V.A.G 1318 -position A-.
- Start engine and let it idle.
 - Immediately after starting engine, control pressure must assume the following specified values:

Ambient temperature °C	Control pressure bar
approx. 20	1.0 ... 1.4



Ambient temperature °C	Control pressure bar
approx. 25	1.2 ... 1.7
approx. 30	1.3 ... 1.9



Checking control pressure with engine warm

Test requirements:

- Cut-off valve of pressure gauge V.A.G 1318 open
- Connector unplugged at warm-up regulator -N9 and auxiliary air valve -N21
- Engine idling

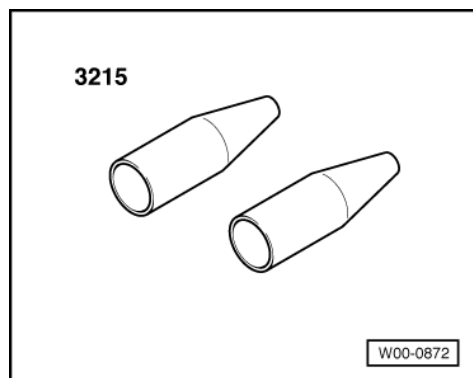
- Re-attach connector to warm-up regulator -N9 and auxiliary air valve -N21.

- Specification after 2.5 ... 5.0 minutes:
Pressure increase to 3.4 ... 3.8 bar

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

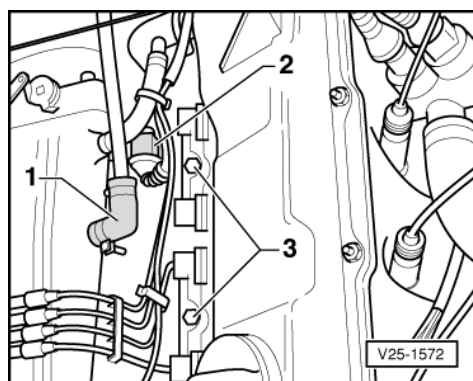
2.11 - Removing and installing injectors

Special tools and workshop equipment required



- ♦ Assembly sleeves 3215

Removing



- -> Detach hose -1- to brake servo.
- Unplug connector -2-.
- Unscrew retaining rail for injectors -3-.
- Pull injectors with connected fuel pipes out of intake manifold.

Note:

Take care not to kink fuel pipes.

- Injector must be unscrewed from injector pipe for injector replacement.

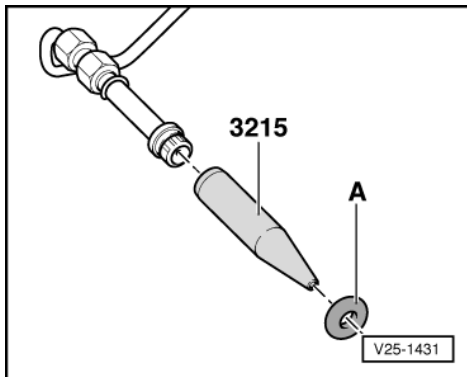
Attention:

- ◆ Fuel system is pressurised. Wrap cloth around joint before opening system. Then dissipate pressure by carefully unfastening joint.
- ◆ Unfastening fuel supply pipe causes pressure container to be drained - approx. 10 cm of fuel squirts out.

- Detach upper and lower O-ring at injector.

Installing

Install in reverse order, paying attention to the following:



- -> Moisten large O-ring -A- with fresh engine oil and slip it onto assembly sleeve 3215.
- Attach assembly sleeve 3215 to injector and push O-ring into rear annular groove of injector until it engages.
- Moisten small O-ring with fresh engine oil and insert it in front groove at injector.

Tightening torques

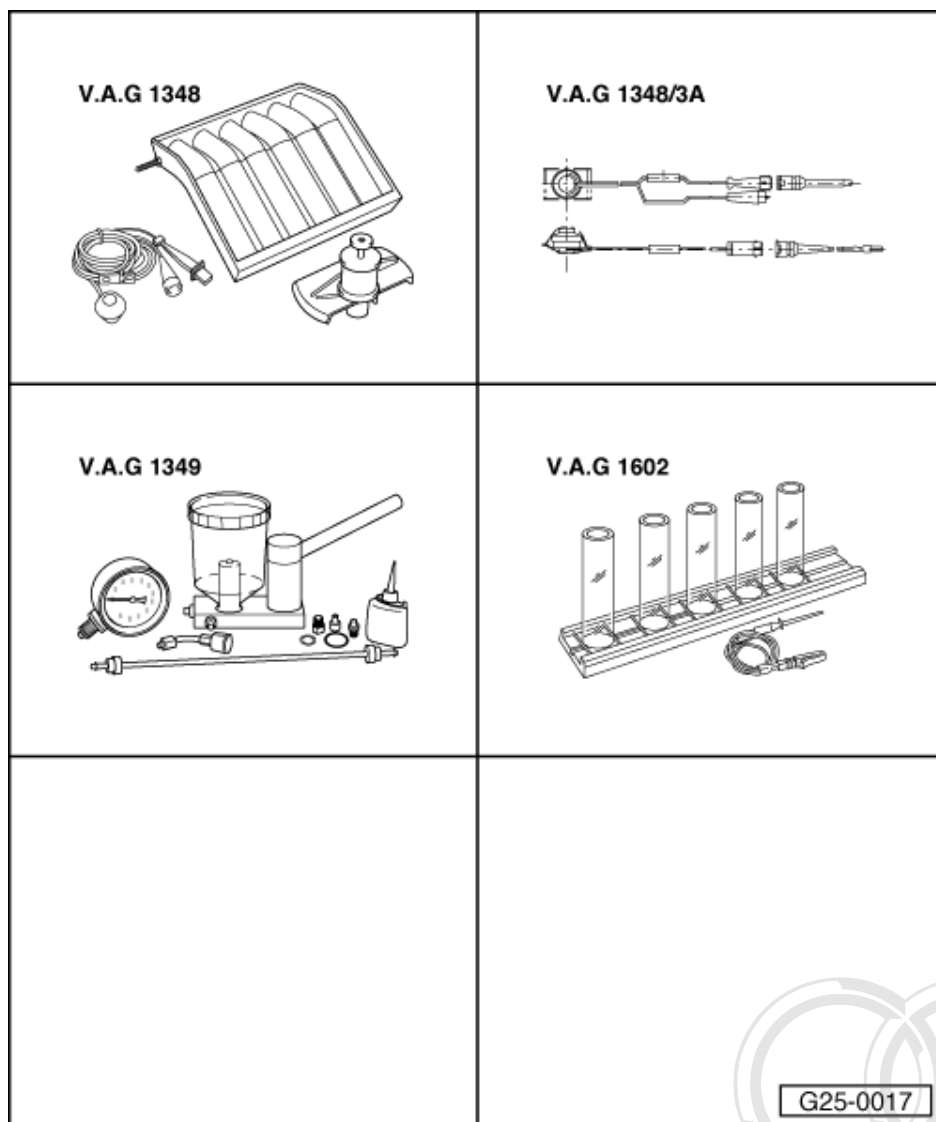
Component	Nm
Bracket for injectors to intake manifold	10
Injector pipe to injector	20



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



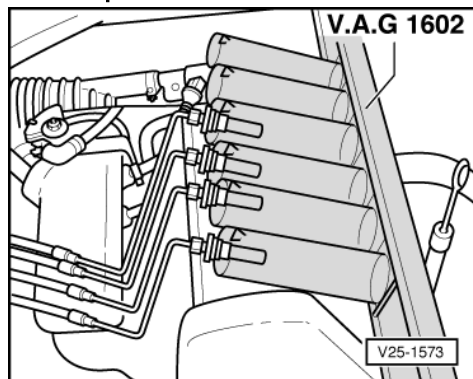
2.12 - Checking injectors



Special tools and workshop equipment required

- ♦ V.A.G 1348/1A from V.A.G 1348
- ♦ V.A.G 1348/3A with V.A.G 1348/3-2
- ♦ V.A.G 1349
- ♦ V.A.G 1602

Test sequence

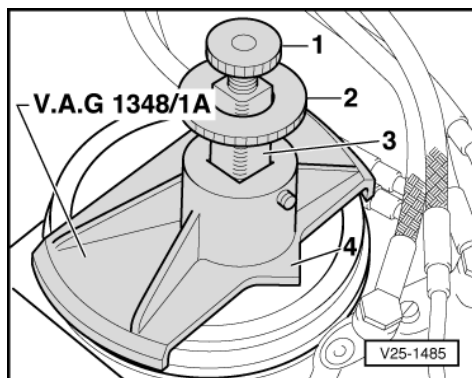


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

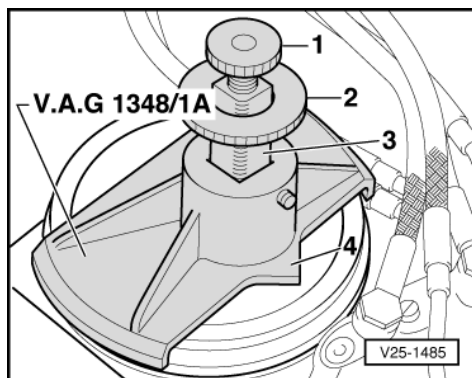
- Remove injectors => Page **44** .
- -> Insert injectors in openings in measuring device V.A.G 1602.

Note:

Make sure fuel pipes are not kinked; remove from retaining clips if necessary.



- -> Screw adjusting screw -1- and knurled nut -2- at V.A.G 1348/1A into upper end position and pull slide -3- upwards.
- Position V.A.G 1348/1A on rim of air-flow meter such that tip -4- points in direction of fuel distributor.
- Push in slide -3- as far as it will go.
- Hold sensor plate manually in rest position.
- Screw in adjusting screw -1- until magnetic base makes contact with securing bolt of sensor plate.
- Connect up remote control V.A.G 1348/3A with adapter lead V.A.G 1348/3-2 => Page **38** .



- -> Press switch on remote control and at the same time screw out adjusting screw -1- at V.A.G 1348/1A until start of injection is visible at one of the injectors.

Checking spray pattern and freedom from leaks

- Pull up slide -3- as far as it will go.
- Press switch on remote control.
 - Injectors must exhibit conical spray pattern
 - Spray pattern must be the same for all injectors

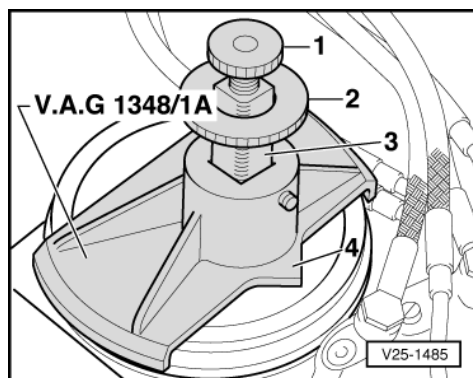
If spray pattern of one injector is different:

- Briefly lift sensor plate once and repeat test.
- Return sensor plate to rest position.
- Dry nozzles of injectors.

- Press switch on remote control for 2 minutes.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Injectors must not dribble within 2 minutes



- -> Push in slide -3- as far as it will go.
- Drain V.A.G 1602.

Checking idle injection tolerance

- Pull up slide -3- into 1st locking position.
- Press switch of remote control until a level of 20 ml is reached in graduated beaker.
- Compare fuel quantities of injectors.
 - Permissible difference: max. 3.0 ml for all injectors

Note:

Hold measuring device horizontal.

If difference is greater:

- Interchange injectors with highest and lowest injection quantity.
- Drain V.A.G 1602.
- Repeat test.

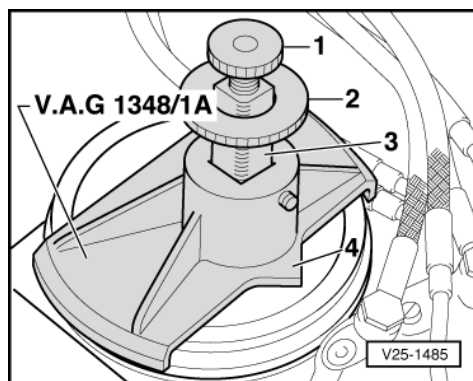
If difference in fuel quantity accompanies injector:

- ♦ Injector defective

If difference in fuel quantity is still found at same cylinder:

- ♦ Pipe to injector constricted or fuel distributor defective
- Drain V.A.G 1602.

Checking full throttle injection tolerance



- -> Pull up slide -3- into 2nd locking position.
- Press switch of remote control until a level of 80 ml is reached in graduated beaker.
- Compare fuel quantities of injectors.
 - Permissible difference: max. 8.0 ml for all injectors

Note:

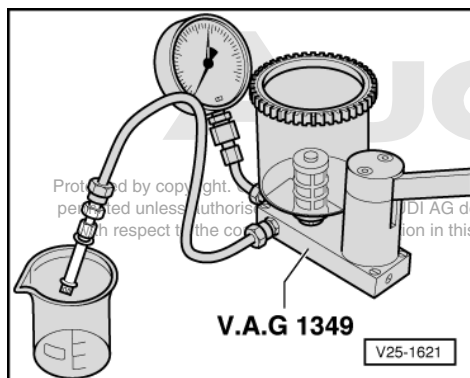
Hold measuring device horizontal.

Checking spray pressure

- Disconnect fuel pipe at injector to be checked.

Attention:

- ◆ **Fuel system is pressurised. Wrap cloth around joint before opening system. Then dissipate pressure by carefully unfastening joint.**
- ◆ **Unfastening fuel supply pipe causes pressure container to be drained - approx. 10 cm of fuel squirts out.**



- -> Connect injector to V.A.G 1349.
- Bleed pipe to injector with union nut open by moving lever on V.A.G 1349 several times.
- Tighten union nut.
- Bleed injector by rapidly moving lever 10 ... 15 times on V.A.G 1349.
- Open cut-off valve.
- Check spray pressure by moving lever slowly.
 - Specification: 4.0 ... 4.6 bar

If reading does not match specification:

- Replace injector.

2.13 - Checking air-shrouded injectors and inserts for leaks

- Detach hose to air-shrouded injectors.
- Apply non-flammable leak detector spray to injectors and injector inserts.
- Use compressed-air gun to inject a pressure of 1 bar into hose connection -arrow- to air-shrouded injectors. Attach adapter hose if necessary.
- In the event of bubbles between cylinder head and injector insert, check and if necessary replace injector insert => Page 50 .
- In the event of bubbles between injector insert and injector, replace O-rings => Page 44 .

2.14 - Removing and installing injector insert

Removing

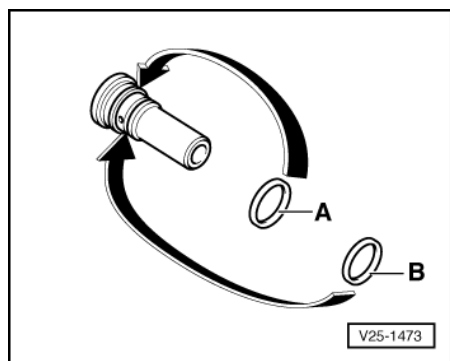
- Remove injectors => Page 44 .
- Use screwdriver to carefully prise out injector insert.

Note:

Replace damaged injector insert.

Installing

Install in reverse order, paying attention to the following:



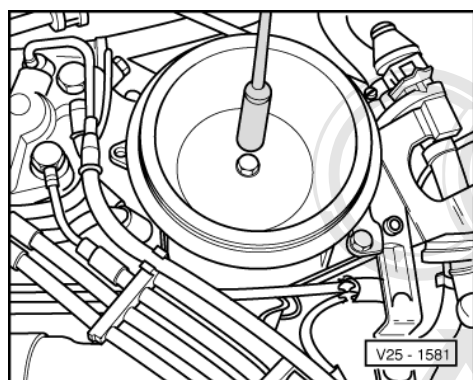
- -> Moisten black O-ring -A- with fresh engine oil and insert it in upper annular groove at injector insert.
- Moisten green O-ring -B- with fresh engine oil and insert it in lower groove at injector insert.
- Position injector insert in intake manifold and press it in with fingers until it is felt to engage.

2.15 - Checking adjusting lever and control plunger

- Operate starter for approx. 10 seconds to build up control pressure.

Or

- Press switch of remote control for approx. 10 seconds (Connecting remote control V.A.G 1348/3A with adapter lead V.A.G 1348/3-2 => Page 38).
- Detach air intake elbow.



- -> Lift adjusting lever by way of sensor plate.
- Lever resistance must be uniform over entire distance
- No resistance must be felt on rapid downwards movement
- If necessary, replace air flow meter.

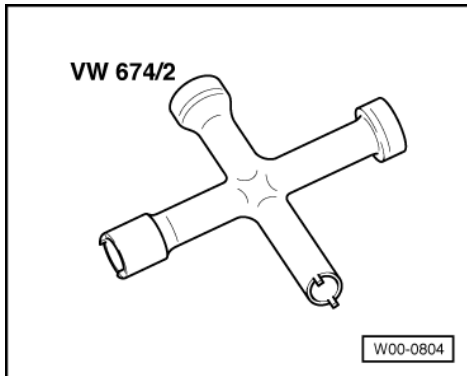
Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

If lever is difficult to move upwards but moves easily downwards, then control plunger is sticking:

- Replace fuel distributor.

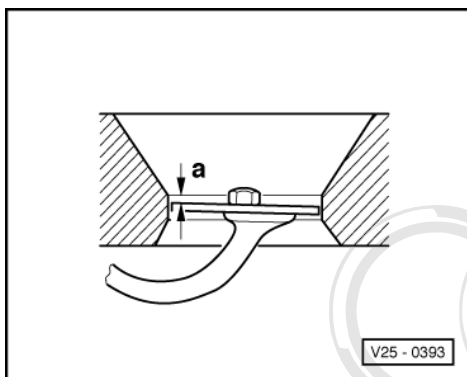
2.16 - Checking and adjusting rest position and idle motion of sensor plate

Special tools and workshop equipment required



- ♦ Cross wrench VW 674/2

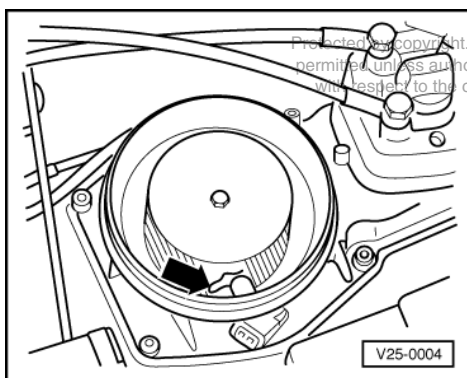
Checking rest position



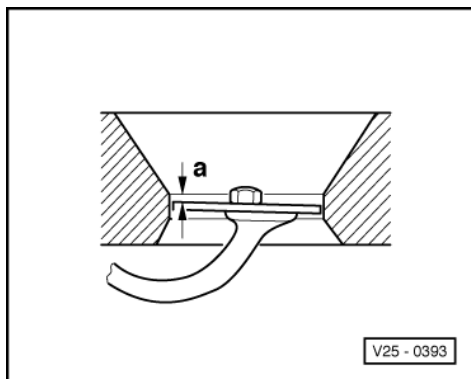
- -> Top edge of sensor plate must be below tapered edge of venturi (dimension -a-).
- Dimension a = 1.9 +1.1 mm

Adjusting rest position

- Remove lower part of air cleaner housing and take out filter element.



- -> Adjust rest position of sensor plate by bending retainer -arrow- such that ...



- -> ... top edge of sensor plate is below tapered edge of venturi (dimension -a-).
- Dimension a = 1.9 +1.1 mm

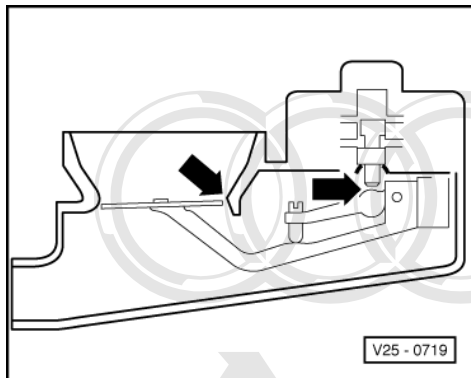
Notes:

- ♦ Take care not to damage venturi of air-flow meter.
- ♦ Do not bend leaf spring.

Checking idle motion of sensor plate

Test requirements:

- Rest position of sensor plate OK
- CO setting OK; checking => Page 33



-> Idle motion refers to the clearance between control plunger and adjusting lever -right arrow- measured on side of sensor plate facing fuel distributor -left arrow-.

- Operate starter for approx. 10 seconds to build up control pressure.

Or

- Press switch of remote control for approx. 10 seconds (Connecting remote control V.A.G 1348/3A with adapter lead V.A.G 1348/3-2 => Page 38).
- Lift sensor plate slightly until resistance is felt.
 - Min. idle motion: 0.5 mm
 - Max. idle motion: As far as tapered edge of venturi = 3.0 mm

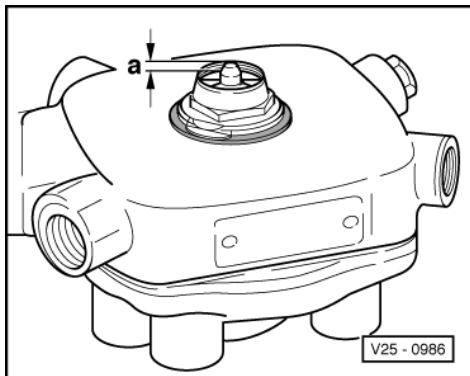
If idle motion is not OK:

- Adjust idle motion at fuel distributor.

Adjusting idle motion at fuel distributor

Requirement:

- CO setting OK; checking => Page 33



- -> Set idle motion of sensor plate using cross wrench VW 674/2 at stop bolt for control plunger.

Note:

Gap -a- between stop bolt and collar of hexagon nut: approx. 0.6 mm

Protected by Copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

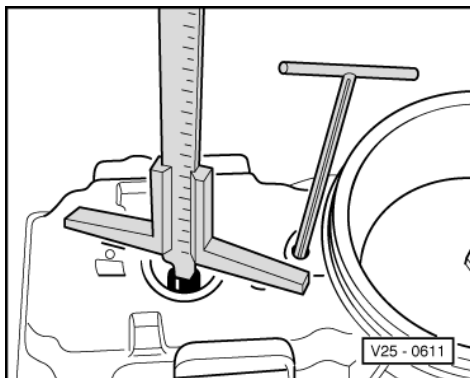
Alteration to dimension -a-:

- Screw in = Greater idle motion
 - Screw out = Less idle motion
 - 1/4 turn = approx. 1.3 mm at sensor plate
- Check idling speed and CO content => Page 33 .

2.17 - Basic setting of adjusting lever

Note:

Basic setting of adjusting lever is only necessary if fuel distributor or air-flow meter is replaced.



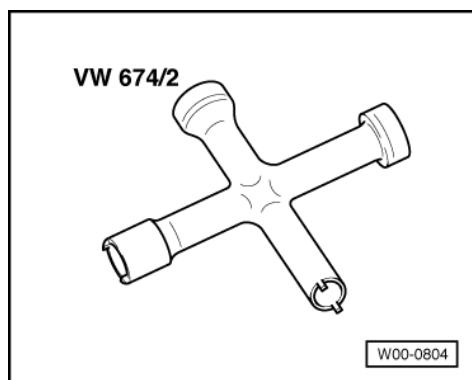
- -> Measure distance between resting surfaces for fuel distributor at air-flow meter and roller of adjusting lever.
- Specification: 18.8 ± 0.1 mm
- If necessary, adjust distance at CO adjusting screw.

Note:

This setting is no longer valid after adjusting CO content to specified value.

2.18 - Removing and installing control plunger

Special tools and workshop equipment required



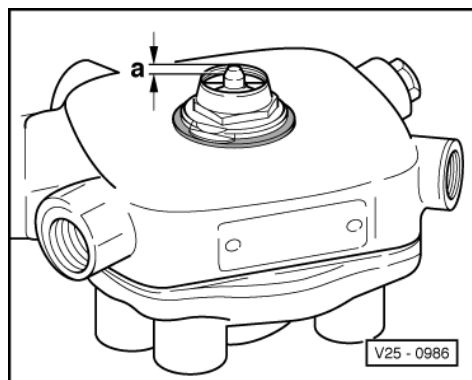
- ♦ Cross wrench VW 674/2

Sequence of operations

Note:

Stop bolt only has to be adjusted after replacing gasket for control plunger.

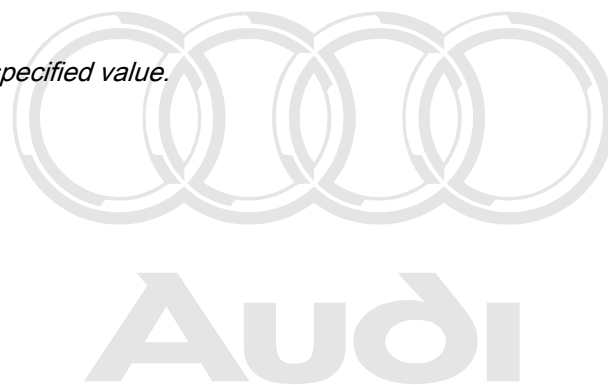
- Perform the following operations before turning stop bolt:
 - Use scriber to mark position of stop bolt.



- -> Measure distance -a- between stop bolt and collar of hexagon nut and note down value.
Screw out stop bolt for control plunger using tool VW674/2.
Clean control plunger with petrol before inserting.
- Replace sealing ring for stop bolt.
 - Small $\varnothing$ of sealing ring faces control plunger
- Screw in stop bolt as far as value -a- noted down.
- Check rest position and idle motion of sensor plate => Page 51 .

Notes:

- ♦ Mechanical cleaning of control plunger is not permitted.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- ♦ If control plunger is severely scored or if freedom of movement cannot be achieved by applying clean naphtha, replace fuel distributor.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



28 - Ignition system

1 - Checking ignition system

1.1 - Checking ignition system

1.2 - Safety precautions

Heed the following so as to avoid possible injury and/or the destruction of the ignition system:

- ♦ Never touch/disconnect ignition cables with engine running or at cranking speed.
- ♦ Always switch off ignition before disconnecting and connecting ignition system wires (also applies to H.T. wires and measuring instrument leads).
- ♦ If engine is to be operated at cranking speed without fuel pump running (e.g. for checking compression pressure), unplug connector of Hall sender at ignition distributor.
- ♦ Boost starting with rapid charger is only permitted for up to 1 minute at a maximum of 16.5 V.
- ♦ Always switch off ignition before washing engine.
- ♦ Always switch off ignition before disconnecting and connecting battery so as not to damage TCI-H switch unit.
- ♦ Vehicles with a definite or suspected fault in the ignition system are only to be towed after unplugging connector at TCI-H switch unit.
- ♦ Never connect capacitor to terminal 1 (-).
- ♦ 1 kW ignition distributor rotor (identification: R1) is never to be replaced with a different rotor (including radio interference suppression).
- ♦ For connection of measuring instruments (e.g. voltage tester V.A.G 1527 B, portable multimeter V.A.G 1526 A), always make use of adapter set V.A.G 1594 A.

1.3 - Adjustment data, spark plugs

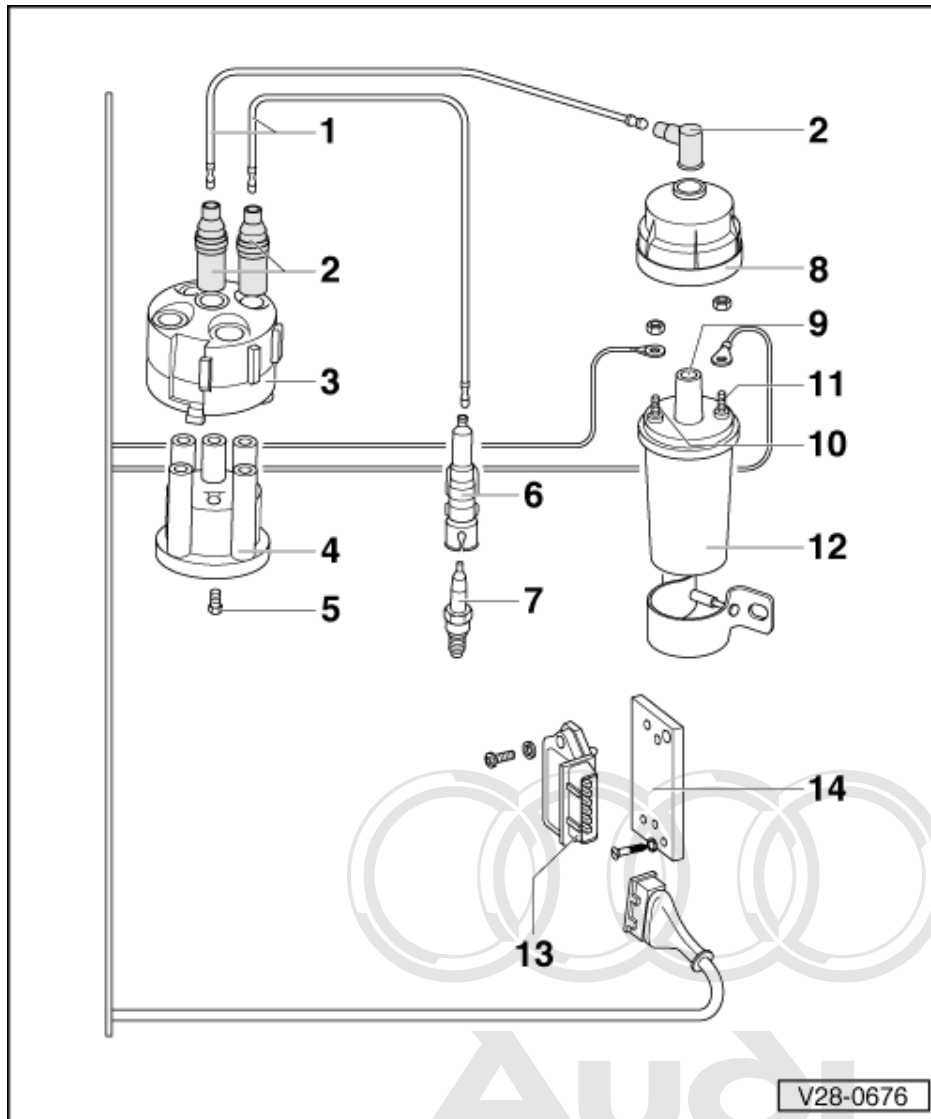
Engine codes			ABB (1.6 l / 75 kW engine)
Ignition point	Test specification	For 98 RON fuel	4 ... 8° before TDC
Vacuum hose		For 95 RON fuel	1 ... 5° before TDC
disconnected	Setting	For 98 RON fuel	6 ± 1° before TDC
		For 95 RON fuel	3 ± 1° before TDC
Idling speed	Test specification		800 ... 1000 rpm 1)
	Setting		950 ± 30 rpm
Firing order			1-3-4-2
Spark plugs 1)	Tightening torque		30 Nm

Copyright © 1992 Audi AG. All rights reserved. Reproduction or use for commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

1) Current values.

=> Exhaust emission test binder

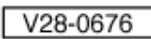
1.4 - Servicing ignition system



Part I

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- 1 Ignition cable**
 - ♦ Check for continuity
- 2 Interference suppression connector**
 - ♦ 0.6...1.4 kW
- 3 Screen**
 - ♦ For radio interference suppression
- 4 Distributor cap**
 - ♦ Watch out for cracks and traces of leakage current
 - ♦ Check contact wear
 - ♦ Clean before fitting
- 5 Carbon brush with spring**
 - ♦ Check for wear, damage and freedom of movement



- ◆ 4...6 kw

- ◆ Type and spark gap

- 10 Terminal 1 (-)**

- 10 Terminal 1 (-)**

- 11 Terminal 15 (+)**

- ## 12 Ignition coil

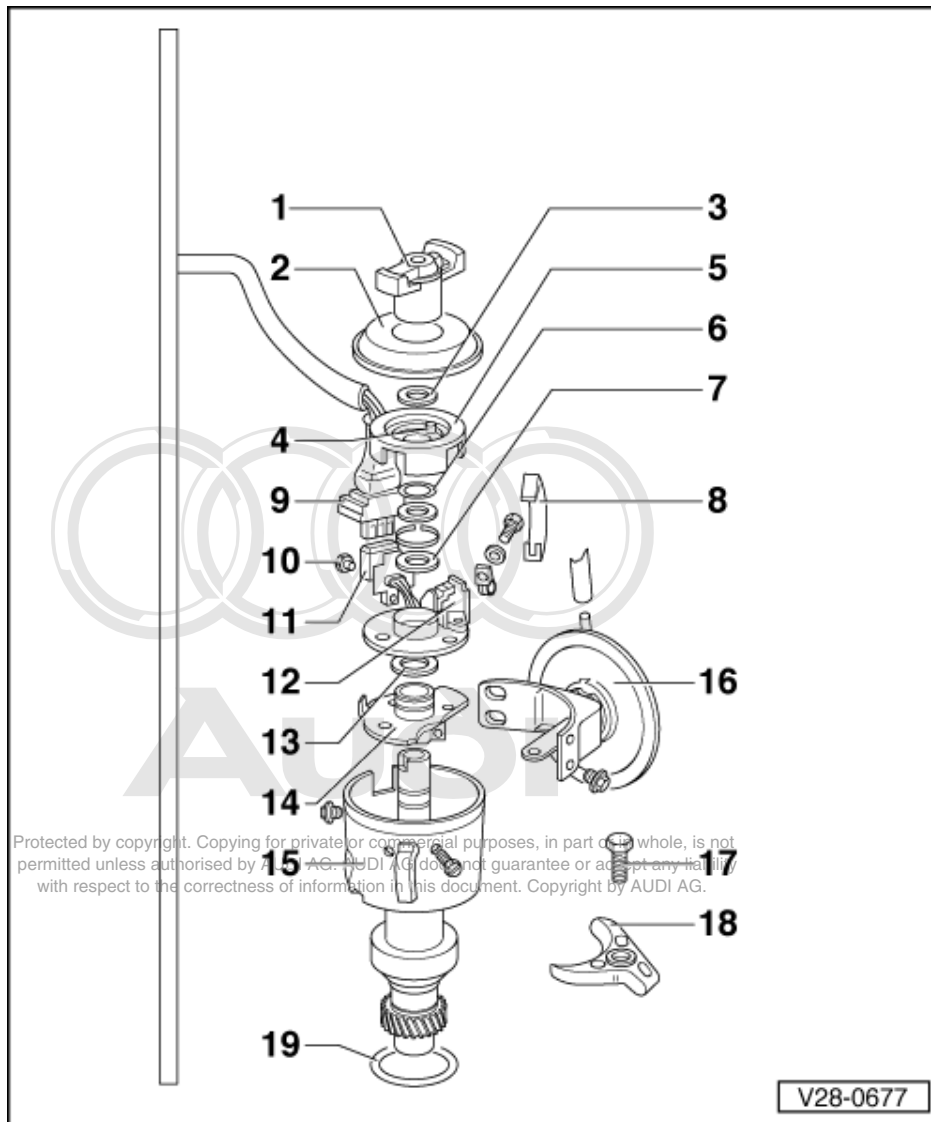
- ◆ Checking =>Page 70

- 13 TCI-H switch unit -N41**

- ◆ After replacement, check and if necessary adjust ignition point

- => Page 33

- ## 14 Heat sink



Part II

1 Ignition distributor rotor

- ◆ Identification: R1
- ◆ 0.6...1.4 kw

2 Dust cap

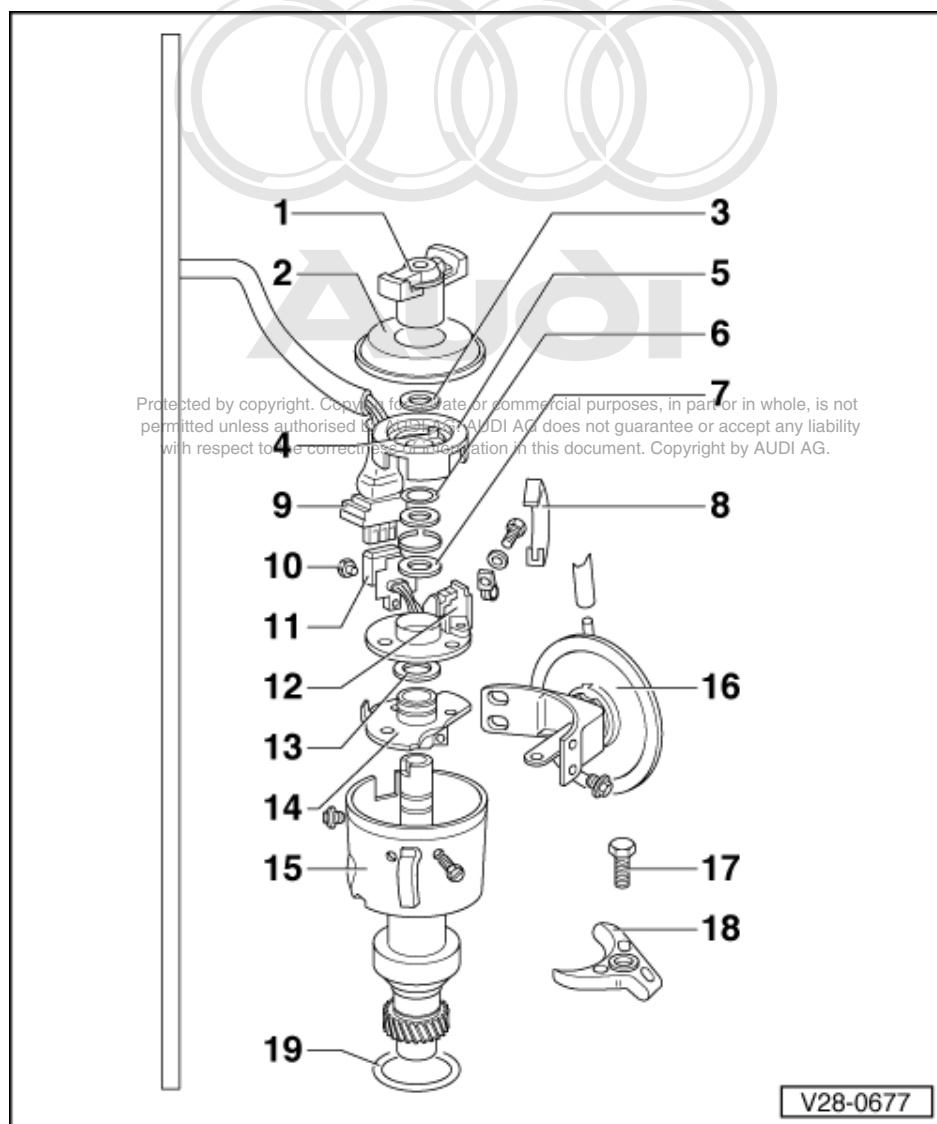
3 Circlip

4 Pin

5 Rotor

- ◆ For Hall sender
- ◆ Use puller 3163 to detach from distributor shaft
- ◆ Pay attention to locating element on assembly
- ◆ Check for freedom of movement by turning distributor shaft; replace bent rotor

6 Spring lock washer(s)


7 Washer(s)
8 Clamp

- ◆ Must not face inwards with dust cap detached as otherwise Hall sender rotor could be damaged

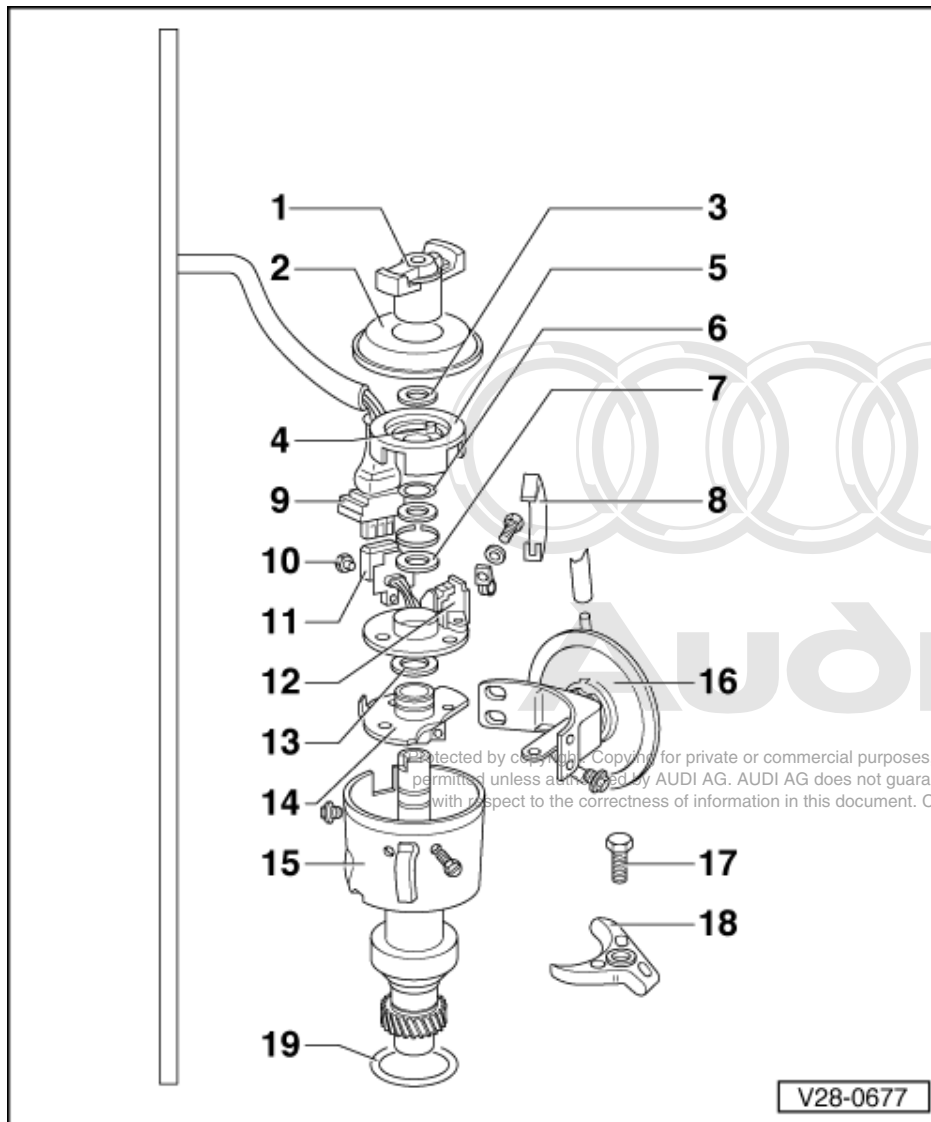
9 3-pin connector

- ◆ For Hall sender -G40
- ◆ Press wire clip to unplug

10 Locking knob
11 Connection piece
12 Hall sender -G40

- ◆ Checking =>Page 73

13 Washer
14 Base plate



15 Ignition distributor

- ♦ Installing => Page 61
- ♦ Checking and adjusting ignition point => Page 63
- ♦ Checking vacuum advance
=>Page 66
- ♦ Checking Hall sender => Page 73

16 Vacuum unit

- ♦ Checking vacuum advance
=>Page 67

17 25 Nm

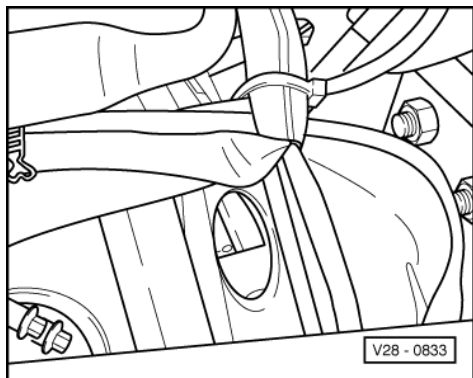
18 Clamp

19 O-ring

- ♦ Replace if damaged

1.5 - Installing ignition distributor

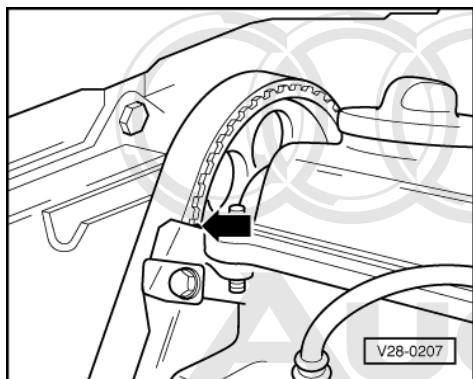
A - Engine in position:



- -> Set flywheel no. 1 cylinder TDC.

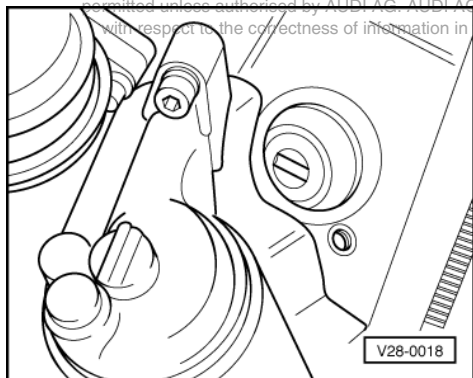
B - Engine removed:

- Mark on vibration damper (pulley) must coincide with arrow on toothed belt guard.

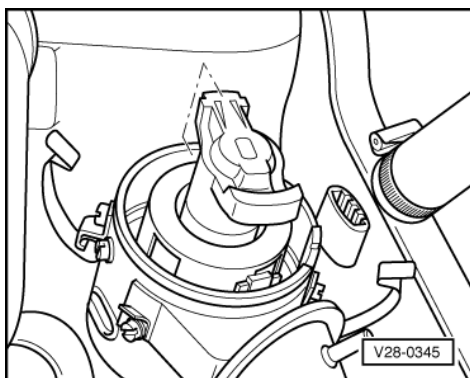


- -> Mark on camshaft sprocket must be aligned with cylinder head cover.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorized by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

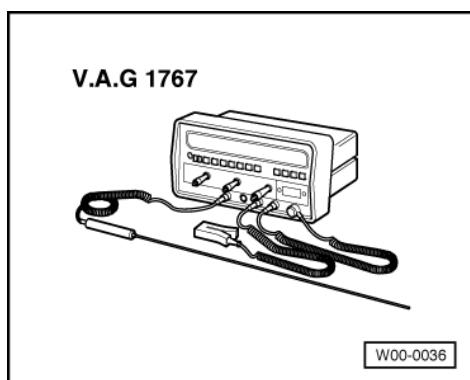


- -> Position locating lug of oil pump shaft in parallel with crankshaft.



- -> Position distributor rotor such that it faces mark -arrow- for no. 1 cylinder at distributor housing.
- Insert ignition distributor.
- Tighten bolt of clamp for ignition distributor to 25 Nm.
- Clean ignition distributor cap before fitting, watch out for cracks and traces of leakage current and replace if necessary.
- Check ignition point => Page 33 .

1.6 - Checking and adjusting ignition point



Special tools and workshop equipment required

- ♦ V.A.G 1767

Or

- ♦ V.A.G 1367 with V.A.G 1367/8

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Test requirement:

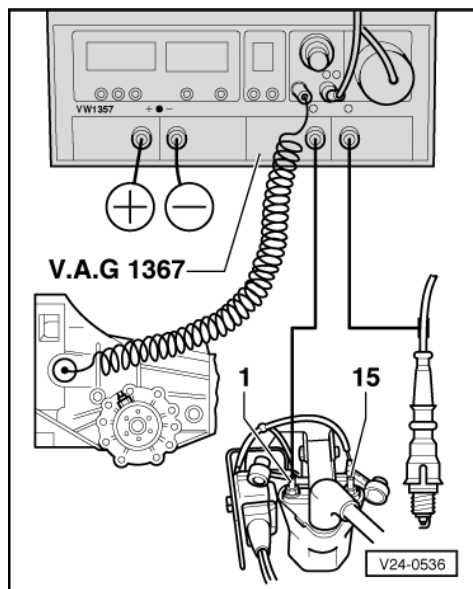
- Coolant temperature at least 80 °C

Note:

Ignition point is only to be adjusted if a deviation is found when checking idling speed => Page 33 .

Test sequence

- Detach vacuum hose at vacuum unit on ignition distributor.
- Seal vacuum hose.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- -> With ignition switched off, connect up ignition tester V.A.G 1767 (or V.A.G 1367).

=> Operating instructions

Notes:

- ♦ Take particular care to ensure that TDC sender of ignition tester V.A.G 1367 is fully inserted in gearbox housing.
- ♦ Ignition point is displayed directly on V.A.G 1767 (or V.A.G 1367). There is no need to aim timing light at ignition point notches.
- ♦ Incorrect measurements may occur with ignition tester V.A.G 1767 if triggering probe is slightly open (e.g. excessive tension on helical cable).

- Start engine and let it idle.
- Read off ignition point on ignition tester V.A.G 1767 (or V.A.G 1367).
 - Test specification 1):
 - 4 ... 8° before TDC for 98 RON fuel
 - 1 ... 5° before TDC for 95 RON fuel

1) Current values:

=> Exhaust emission test binder

Note:

Ignition point must be adjusted if value displayed is outside tolerance.

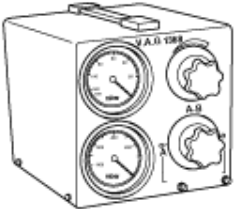
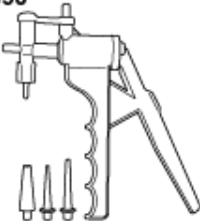
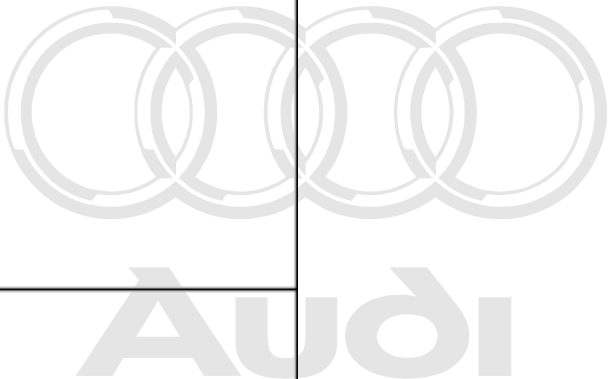
- Adjust ignition point by turning ignition distributor.
 - Setting 1):
 - 6 ± 1° before TDC for 98 RON fuel
 - 3 ± 1° before TDC for 95 RON fuel

1) Current values:

=> Exhaust emission test binder

- After adjusting ignition point, check idling speed => Page 33 .

1.7 - Checking ignition timing

V.A.G 1368 	V.A.G 1390 
V.A.G 1767 	
	Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG. G25-0021

Special tools and workshop equipment required

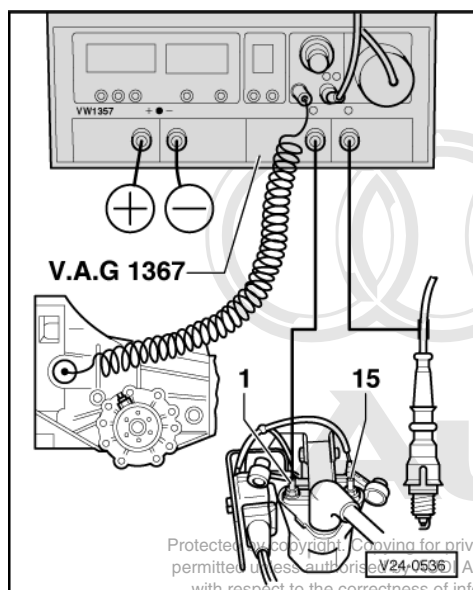
- ◆ V.A.G 1368
- ◆ V.A.G 1390
- ◆ V.A.G 1767 or V.A.G 1367 with V.A.G 1367/8

Test requirement:

- Coolant temperature at least 80 °C
- Idling speed and ignition point OK

1.8 - A - Checking centrifugal advance

Checking centrifugal advance with ignition tester



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by V.A.G. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- -> With ignition switched off, connect up ignition tester V.A.G 1767 (or V.A.G 1367).

=> Operating instructions

Notes:

- ♦ Take particular care to ensure that TDC sender of ignition tester V.A.G 1367 is fully inserted in gearbox housing.
- ♦ Incorrect measurements may occur with ignition tester V.A.G 1767 if triggering probe is slightly open (e.g. excessive tension on helical cable).
- Detach vacuum hose at vacuum unit of ignition distributor.
- Start engine and let it idle.
- Note down value displayed (basic value).
- Slowly increase engine speed until ignition point starts to change.
- Compare starting point to table.

Engine speed rpm	Centrifugal advance °crankshaft
1050...1450	Start -
2200	9 ... 14
4000	17 ... 21
6000	End 20 ... 24

- Slowly increase engine speed to next test level.
- Take reading, calculate centrifugal advance and compare it to table.

Example:

Reading	17 °
- Basic value	- 6 °
= Centrifugal advance	= 11 °

- Repeat test at other test speeds.

Checking centrifugal advance with timing light

- With ignition switched off, connect up timing light:

=> Operating instructions

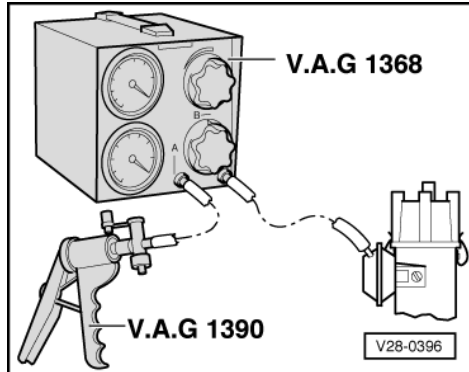
- Detach vacuum hose at vacuum unit of ignition distributor.
- Start engine and let it idle.
- Slowly increase engine speed until ignition point starts to change.
- Compare starting point to table.

Engine speed rpm	Centrifugal advance °crankshaft
1050...1450	Start -
2200	9 ... 14
4000	17 ... 21
6000	End 20 ... 24

- Slowly increase engine speed to next test level.
- Move ignition point notch back to ignition point mark.
- Read off centrifugal advance and compare it to table:
- Repeat test at other test speeds.

1.9 - B - Checking vacuum advance

Checking vacuum unit for leaks

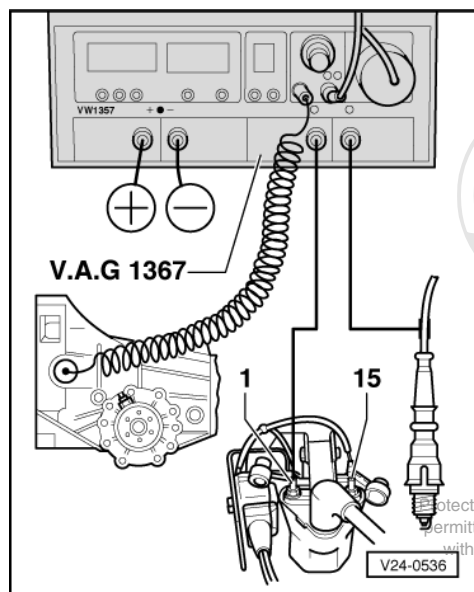


- -> Connect up vacuum tester V.A.G 1368 and vacuum hand pump V.A.G 1390 to vacuum unit of ignition distributor.
- Switch vacuum tester V.A.G 1368 to "connection" setting.
- Use vacuum hand pump V.A.G 1390 to generate a vacuum of approx. 450 mbar.
- Set vacuum tester V.A.G 1358 such that vacuum is maintained on vacuum unit end.
- Set vacuum on V.A.G 1358 to 450 mbar.
 - Drop in vacuum must not exceed 10 % within 1 minute

If vacuum decreases more sharply:

- Check vacuum hose for leaks/replace vacuum unit.

Checking vacuum advance with ignition tester

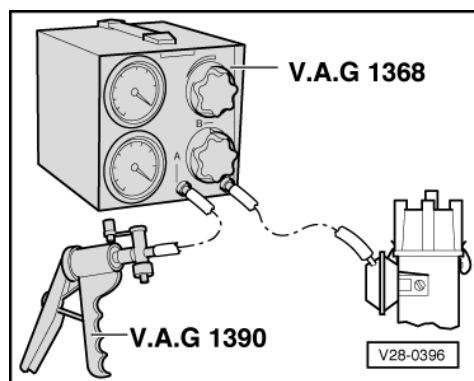


- -> With ignition switched off, connect up ignition tester V.A.G 1767 (or V.A.G 1367).

=> Operating instructions

Notes:

- ♦ Take particular care to ensure that TDC sender of ignition tester V.A.G 1367 is fully inserted in gearbox housing.
- ♦ Incorrect measurements may occur with ignition tester V.A.G 1767 if triggering probe is slightly open (e.g. excessive tension on helical cable).



- -> Connect up vacuum tester V.A.G 1368 and vacuum hand pump V.A.G 1390 to vacuum unit at ignition distributor.
- Switch vacuum tester V.A.G 1368 to "connection" setting.
- Start engine and let it idle.
- Note down value displayed (basic value).
- Use vacuum hand pump V.A.G 1390 to generate vacuum until ignition point starts to change.
- Compare starting point to table.

Vacuum advance			
	mbar	mmHg	°crankshaft
Start	60 ... 140	45 ... 105	-

	Vacuum advance		
	mbar	mmHg	°crankshaft
End	320 ... 340	240 ... 255	13 ... 17

- Increase vacuum as far as "End" test specification.
- If necessary, reduce idling speed again to approx. 950 rpm => Page 33 .
- Take reading, calculate vacuum advance and compare it to table.

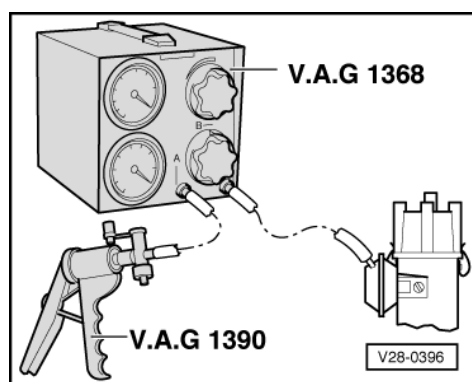
Example:			
Reading			21 °
- Basic value		-	6 °
= Vacuum advance		=	15 °

- Increase vacuum.
 - Ignition point must not "migrate" further

Checking vacuum advance with timing light

- With ignition switched off, connect up timing light:

=> Operating instructions



- -> Connect up vacuum tester V.A.G 1368 and vacuum hand pump V.A.G 1390 to vacuum unit at ignition distributor.
- Switch vacuum tester V.A.G 1368 to "connection" setting.
- Start engine and let it idle.
- Use vacuum hand pump V.A.G 1390 to generate vacuum until ignition point starts to change.
- Compare starting point to table.

	Vacuum advance		
	mbar	mmHg	°crankshaft
Start	60 ... 140	45 ... 105	-
End	320 ... 340	240 ... 255	13 ... 17

- Increase vacuum as far as "End" test specification.
- If necessary, reduce idling speed again to approx. 950 rpm
=> Page 33 .
- Move ignition point notch back to ignition point mark.
- Increase vacuum.
 - Ignition point must not "migrate" further

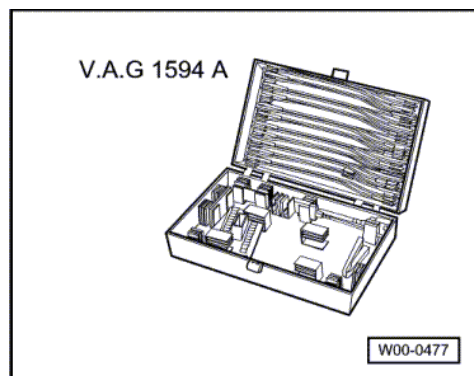


1.10 - Checking ignition coil

Special tools and workshop equipment required



- ♦ V.A.G 1526 A



- ♦ V.A.G 1594 A

Test sequence

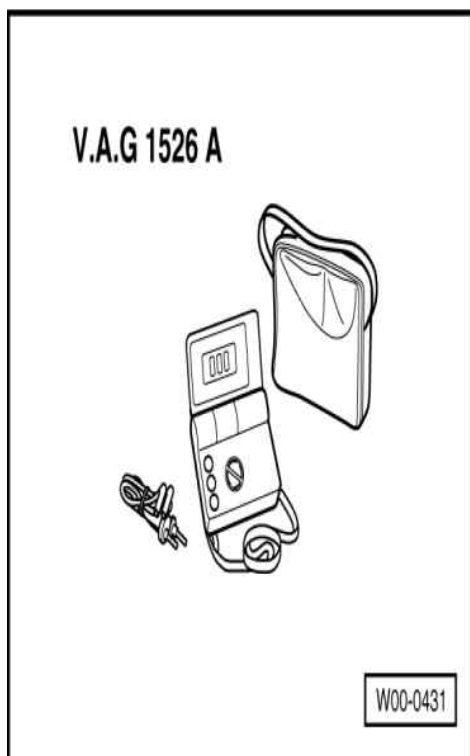
- Disconnect main ignition cable from ignition coil.
- Check primary resistance with portable multimeter V.A.G 1526 A between terminals 1 and 15.
 - Specification: 0.5 ... 0.8 ω
- Check secondary resistance with portable multimeter between terminals 4 and 15.
 - Specification: 2.4 ... 3.5 kw

If a reading does not match specification:

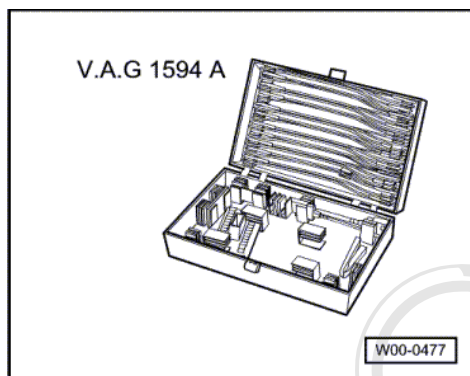
- Replace ignition coil.

1.11 - Checking TCI-H switch unit -N41

Special tools and workshop equipment required



♦ V.A.G 1526 A



♦ V.A.G 1594 A

Attention:

So as not to destroy electronic components, select required measuring range on measuring instrument before connecting test leads.

Notes:

- ♦ The specifications listed apply to an ambient temperature of 0 °C to 40 °C.
- ♦ Use current flow diagram to establish fault if readings do not match specifications.
- ♦ If measured values only differ slightly from specifications, clean sockets and connectors of testers and test leads and repeat test. Check wiring and connections before replacing components. Repeat resistance measurement at component, particularly in the case of specifications below 10 ω .



- ♦ Use can also be made for checking of the transistorised ignition tester V.A.G 1451. Perform testing in line with operating instructions.

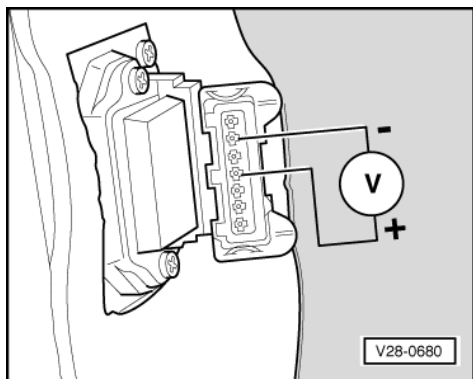
=> Operating instructions

Test requirement:

- Fuse for TCI-H switch unit OK

Checking power supply

- Unplug connector from TCI-H switch unit.



- -> Connect up multimeter for voltage measurement between contacts 2 (earth) and 4 (positive).
- Switch on ignition.
 - Specification: approx. battery voltage
- Switch off ignition.

If reading does not match specification:

- Use current flow diagram to eliminate open circuit in wiring.
- Re-attach connector to TCI-H switch unit.
- Unplug connector of Hall sender at ignition distributor.
- Connect up multimeter for voltage measurement between terminal 1 and terminal 15 at ignition coil.
- Switch on ignition.
 - Specification: At least 2 V
 - Must drop after 1 ... 2 seconds to 0 V

If reading does not match specification:

- Replace TCI-H switch unit.
- Additionally check whether sealing compound has emerged at ignition coil. If it has, replace ignition coil.

If reading matches specification:

- Briefly connect centre wire at Hall sender connector to earth.
 - Specification: Voltage displayed must increase to at least 2 V
- Switch off ignition.

If reading does not match specification:

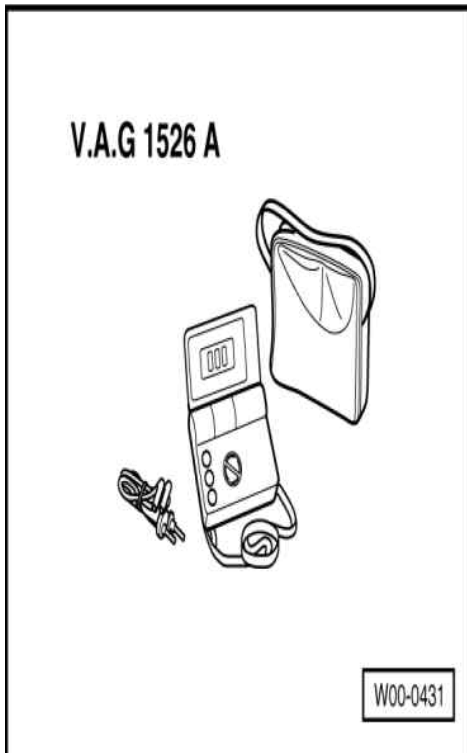
- Use current flow diagram to eliminate open circuit in wiring.

If no fault is found in wiring:

- Replace TCI-H switch unit.

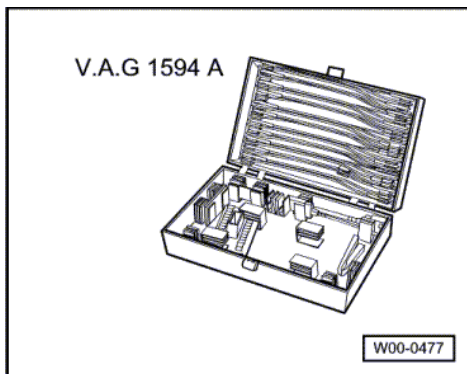
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

1.12 - Checking Hall sender -G40



Special tools and workshop equipment required

- ♦ Portable multimeter V.A.G 1526 A



- ♦ Adapter set V.A.G 1594 A

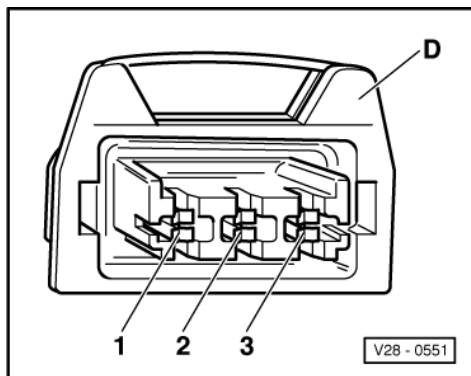
Test requirements:

- Fuse for TCI-H switch unit OK
- TCI-H switch unit OK; checking => Page 71
- Ignition coil OK; checking => Page 70
- Wiring, connectors and connection elements at ignition distributor, Hall sender and TCI-H switch unit OK



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Test sequence



- -> Connect up multimeter for voltage measurement between outer contacts of connector at Hall sender.
- Switch on ignition.
 - Specification: At least 5 V

If reading matches specification:

- Use current flow diagram to eliminate open circuit in wiring.

If no fault is found in wiring:

- Replace TCI-H switch unit.

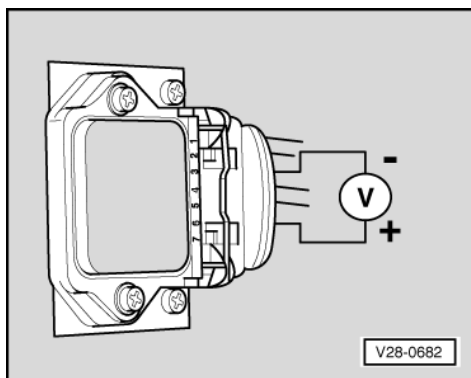
If reading matches specification:

- Disconnect main ignition cable from ignition coil.
- Use test lead to connect wire/terminal 4 to earth.

Attention:

When performing following test, avoid contact with connection elements of ignition coil and test leads.

- Push back rubber grommet of TCI-H switch unit connector but leave connector attached.



- -> Connect up multimeter for voltage measurement between contacts 3 and 6.

Note:

Pin assignment is marked on back of connector.

- Switch on ignition.
- Slowly crank engine by hand in direction of engine rotation.
- In doing so, observe multimeter.

- Specification: Fluctuating between 0 V and 2 V

If reading does not match specification:

- Use current flow diagram to eliminate open circuit in wiring.

If no fault is found in wiring:

- Replace Hall sender.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.