
Fault Finding Programmes	Nr.
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Starter does not turn

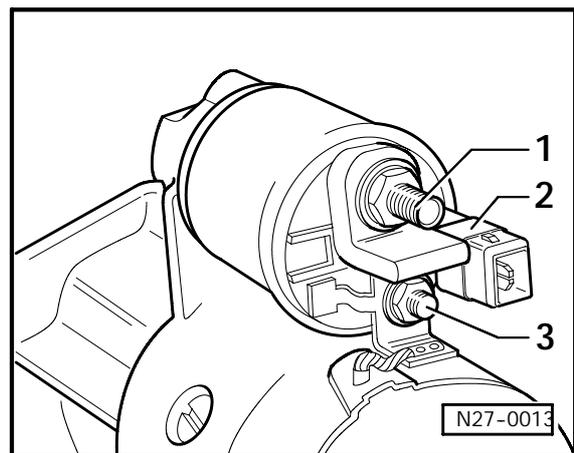
Test conditions:

- ◆ Battery charged and OK.
- ◆ Wiring connections on solenoid switch must be firmly seated and may not be oxidised!
- ◆ Fuse S190 (15 A) OK.
- ◆ Fuse S33 (20 A) OK.

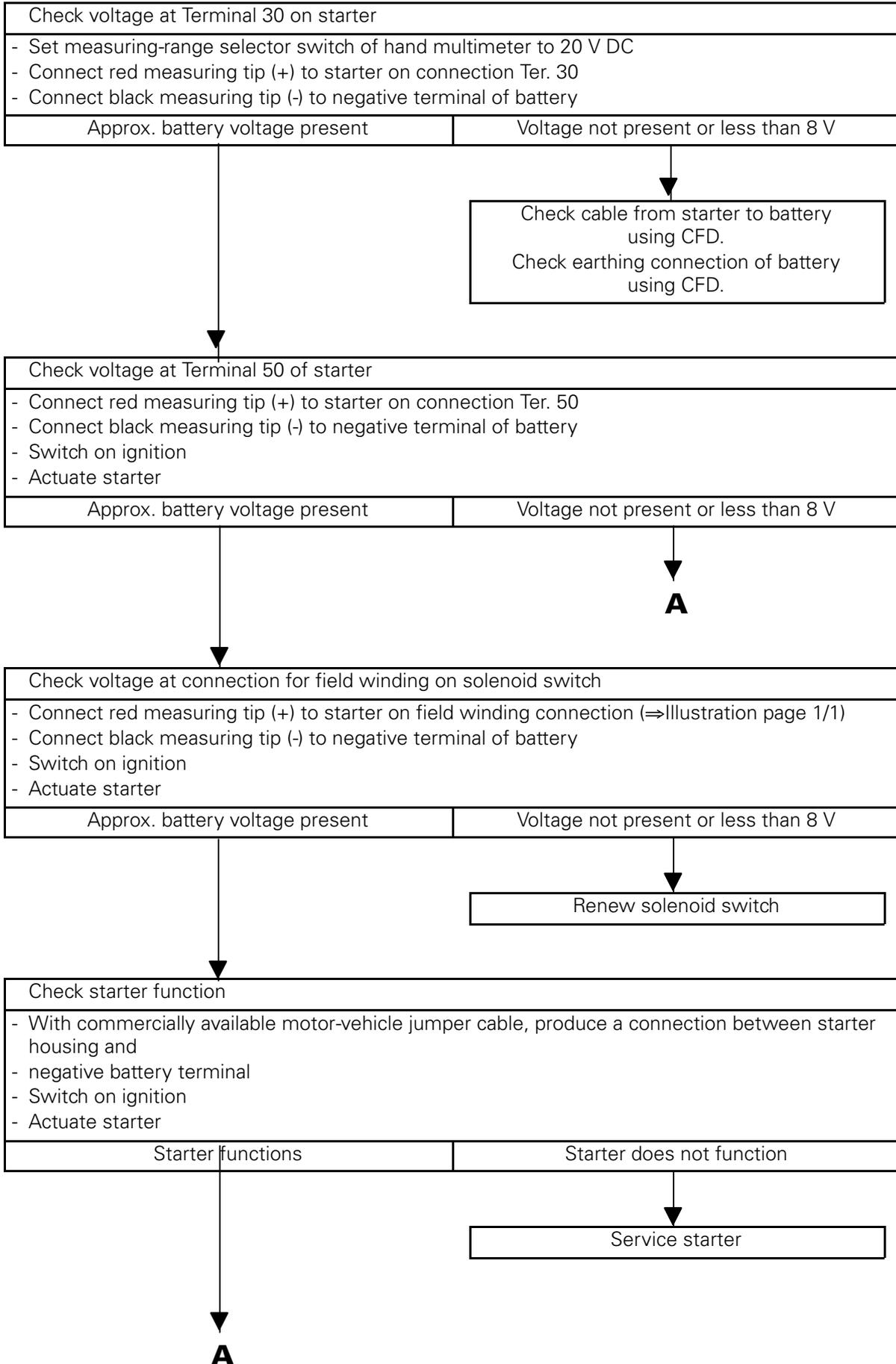
The following are required for fault finding:

- ◆ VAS 6214 Auxiliary test set
- ◆ Valid current flow diagram
- ◆ Commercially available motor-vehicle battery jumper cable, suitable for diesel engines

- 1 -Terminal 30, from battery
- 2 -Terminal 50, from starter relay
- 3 -Connection for field winding



Starter does not turn



A



Check earth switch-over relay -J591-	
<ul style="list-style-type: none"> - Set measuring range switch on hand multimeter to $\leftarrow / \text{musical note}$ - Connect red measuring tip (+) to starter housing - Connect black measuring tip (-) to negative terminal of battery - Switch on ignition - Press Emergency-Off button -E190- - Check function of relay acoustically and listen for signal tone from hand multimeter 	
Signal tone sounds	Relay does not click, no signal tone or relay clicks, but no signal tone

"Relay clicks, but no signal tone",
renew relay.
"Relay does not click", check earth connection from relay, contact 4/86 to negative battery terminal using CFD.

Check ignition/starter switch -D- and relay for Terminal 15 -J592-	
<ul style="list-style-type: none"> - Switch on ignition - Grasp relay for Ter. 15 and check whether it clicks when ignition is switched on 	
Relay clicks when ignition is switched on	Relay does not click when ignition is switched on

Check cable from relay, contact 4/86 to earth using CFD.
Check presence of supply voltage at Ter.30 on relay, contact 2/30 and on ignition/starter switch, contact "B" using CFD.

Check ignition/starter switch -D-	
<ul style="list-style-type: none"> - Set measuring-range selector switch of hand multimeter to 20 V DC - Pull out relay for Ter. 15 - Connect red measuring tip (+) to relay base, contact 6/85 - Connect black measuring tip (-) to relay base, contact 4/86 - Switch on ignition 	
Display approx. battery voltage	Display not OK

Check cable from ignition/starter switch, contact "I" to relay base for relay Ter. 15, contact 6/85 using CFD.
If no fault can be determined, renew ignition/starter switch -D-.

B

B



Check starting aid relay -J600-	
- Reinstall relay for Ter. 15 - Switch on ignition - Actuate starter - Grasp starting aid relay and check whether it clicks during starting	
Relay clicks during starting	Relay does not click during starting



Check cable from ignition/starter switch, contact "S" to starting aid relay, contact 6/85 using CFD.
Check cable from starting aid relay, contact 4/86 to battery earth terminal using CFD.
If no fault can be determined, renew starting aid relay or ignition/starter switch.



Check starter relay -J19-	
- Bring accelerator lever into neutral position - Bring gearshift into neutral position - Switch on ignition - Grasp starter relay and check whether ignition clicks when switched on	
Relay clicks when ignition is switched on	Relay does not click when ignition is switched on



Check cable from relay for Ter. 15, contact 8/87 to starter relay, contact 6/85 using CFD.
Bridge gearbox and throttle "neutral switch" (-E353- and -E352-), as well as diode between contact 3 and 7 in diode group -J79- as a test and repeat test step.
Renew defective components.
Check cable from starting aid relay, contact 4/86 to earth using CFD.
If no fault can be determined, renew relay for Ter. 15.



C

C

Check voltage at Terminal 50 on starter

- Reinstall all removed relays
- Set measuring-range selector switch of hand multimeter to 20 V DC
- Connect red measuring tip (+) to starter Ter. 50
- Connect black measuring tip (-) to negative terminal of battery
- Bring accelerator lever into neutral position
- Bring gearshift into neutral position
- Switch on ignition
- Actuate starter

Display approx. battery voltage	Display not OK
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End of test

Check presence of supply voltage at Ter. 30 on starting aid relay on contact 8/87.
Check presence of supply voltage at Ter. 30 on starting aid relay on contact 2/30 during starting. If not present, renew starting aid relay.

Check presence of supply voltage at Ter. 30 on starter relay on contact 8/87 during starting. If not present, service fuse box/relay plate.

Check presence of supply voltage at Ter. 30 on starter relay on contact 2/30 during starting. If not present, renew starter relay.

Check cable from starter relay, contact 2/30 to Ter. 50 on starter using CFD.

Checking alternator and voltage regulator

The following are required for fault finding:

- ◆ *VAS 6214 Auxiliary test set*
- ◆ *Valid current flow diagram*

Test conditions:

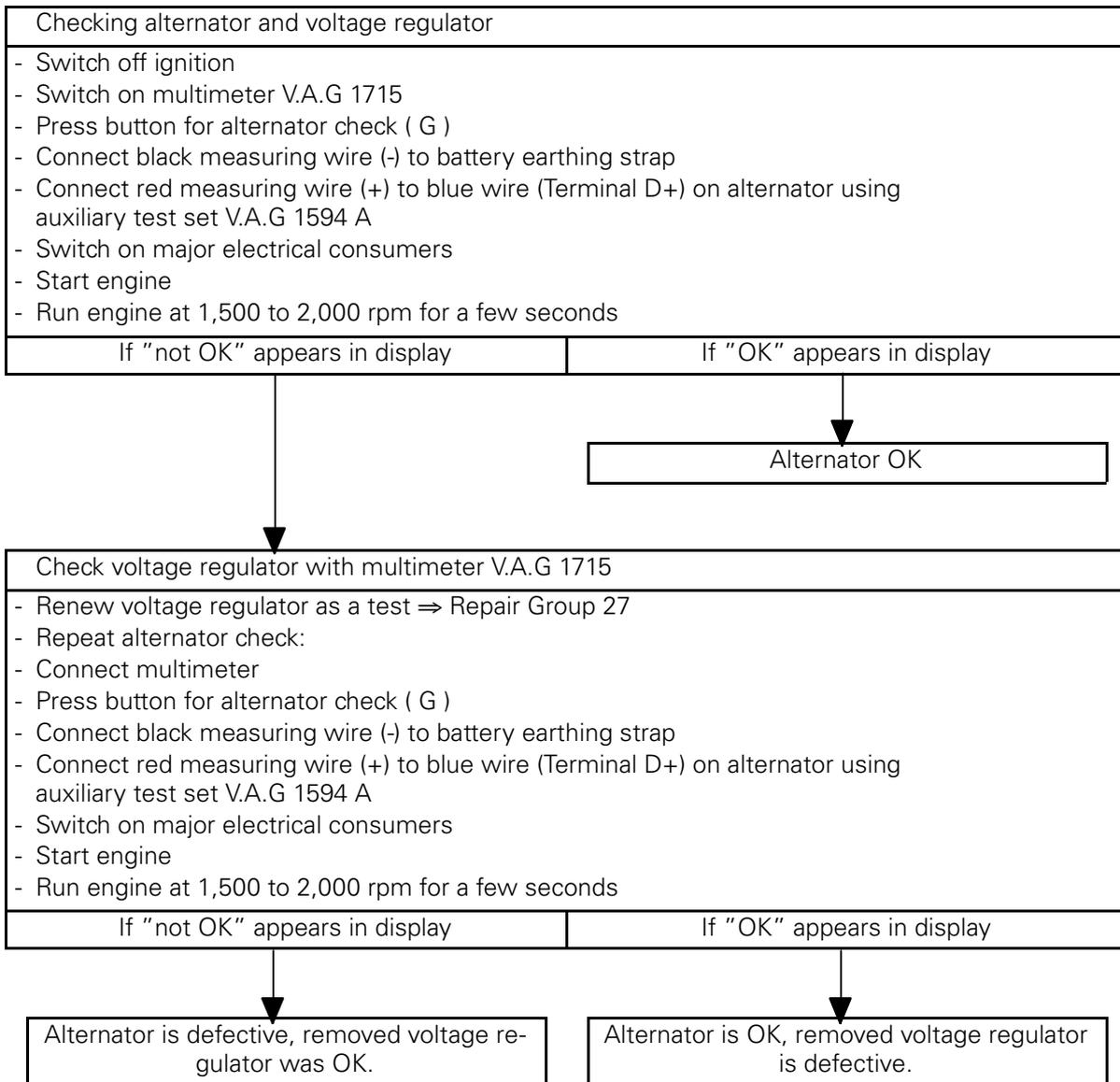
- ◆ Wiring OK.
- ◆ Ribbed V-belt tension and alternator mounting OK.
- ◆ Function of earth switch-over relay -J591- OK.

The fault finding programme begins on the next page.

Checking alternator and voltage regulator

Note:

The screw connection for the B+ wire is marked with B1+ on the alternator. The plug-in connection for the D+ wire is marked with L on the alternator.



Fault finding on 230 V additional alternator

The following are required for fault finding:

- ◆ VAS 6214 Auxiliary test set

Test conditions:

- ◆ Ribbed V-belt tension and alternator mounting OK.

Contents:

- Engine running, green warning lamp in ON/OFF switch lights up, but no current is available 3/1
- Engine running, red warning lamp in ON/OFF switch lights up and no current is available 3/2

Notes:

- ◆ Never conduct fault finding with the engine running, as a 230 V system is concerned that may only be checked by an electrician.
- ◆ This fault finding only provides initial clues and does not replace an exact analysis by an electrician.

Engine running, green warning lamp in ON/OFF switch lights up, but no current is available

