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Engine Code NF, w/CIS-E III

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Safety guidelines

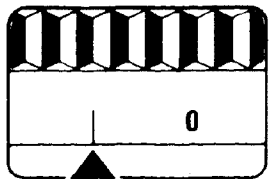
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Ignition System

Ignition distributor data, spark plugs

Ignition data		U.S.A.
Engine code		NF
Introduction date		8/86
Ignition distributor		034 905 205 H
Ignition timing	checking value	13-17° before TDC
	adjusting value	15 ± 1° before TDC
Timing mark location: on flywheel		
Firing order		1-2-4-5-3
Spark plugs	Bosch	W7DTC
	Beru	14-7DTU
	electrode gap mm (in.)	0.8 ± 0.1 (0.031 ± 0.004)
	tightening torque Nm (ft lb)	20Nm (15 ft lb)
Idle RPM*	manual transmission RPM	720 ± 50
	automatic transmission RPM	720 ± 50
Knock sensor (critical torque)		10 Nm (7 ft lb)
CO-content (oxygen sensor probe disconnected)		checking value
		0.3-3.0 vol. %
		adjusting value
(oxygen sensor probe connected, as control)		0.6-1.0 vol. %
		0.3-1.2 vol. %

Idle speed **CANNOT** be adjusted using air screw on throttle body, idle speed is regulated by CIS-E III control unit.

Safety guidelines

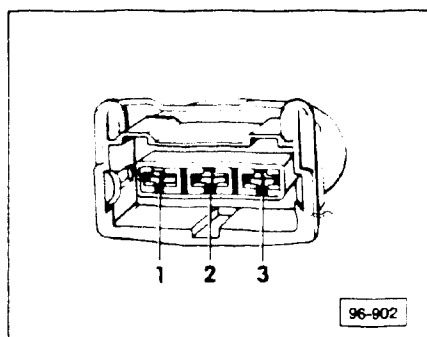
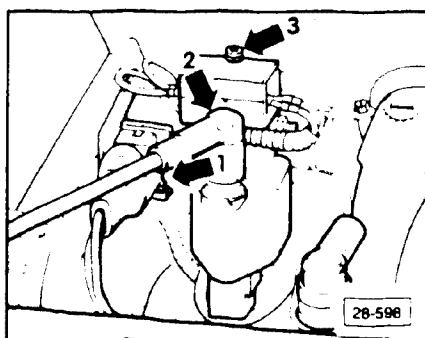
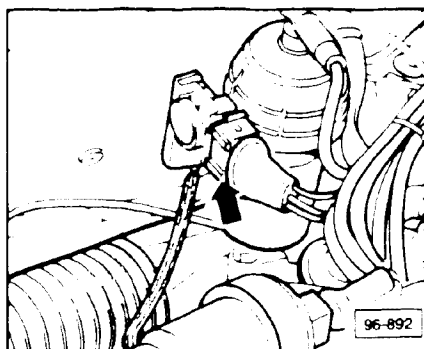
To avoid personal injury and/or damage to the fuel and ignition electronics please observe the following:

- do **NOT** touch or disconnect ignition wires while engine is running
- disconnect engine wiring **ONLY** with ignition off
- connect and disconnect test leads **ONLY** with ignition off
- do **NOT** connect a test lamp to terminal 1 (–) of ignition coil
- do **NOT** connect static suppression condensers to terminal 1 (–) of ignition coil

If the engine must be turned over, but **NOT** started (e.g. compression test)

- remove the coil wire from coil and connect to ground using a jumper clip
- fast charger can be used as a starting aid for up to 15 seconds at a time, at a maximum of 16.5 volts; however, there must be a pause of at least one minute between each attempt
- ignition coil **CANNOT** be replaced with a standard ignition coil
- completely disconnect battery during welding operations
- when heating to more than 80°C (176°F) (e.g. painting, steam cleaning) the engine must **NOT** be started directly after the heat-up phase
- engine washing must be performed with engine turned **OFF**
- do **NOT** disconnect battery with engine running
- do **NOT** apply voltages to the control units to simulate output signals
- do **NOT** start engine with injectors removed

Ignition coil (with power stage), checking



Ignition coil control, checking

Two different ignition coils are being used on engines with CIS-E III systems. Follow the instructions for the version that is found on the repair vehicle.

Version I

- disconnect ignition coil power stage (arrow)

Version II

- disconnect ignition coil power stage 1
- remove coil wire from ignition coil 2
- remove screw 3

Both versions

- connect multimeter **US 1119** between terminal 1 and ground then between terminals 1 and 3
- switch ignition **ON**
 - approximately 12 volts

If **NO**

- repair break in wiring using wiring diagram
- connect multimeter **US 1119** between terminals 2 and 3
- crank engine with starter
 - minimum 0.2 volts

If **NO**

- check wiring between terminal 2 of connector and terminal 22 of ignition control unit according to wiring diagram

If no break in wiring can be determined

- replace ignition control unit

If **YES**

- check ignition coil

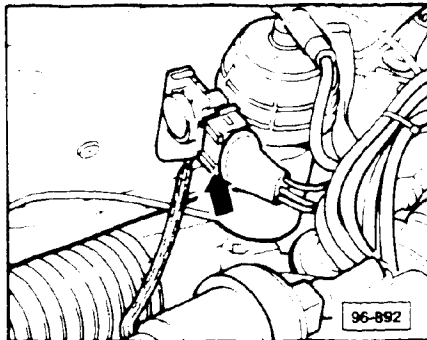
Ignition coil, checking

Check wiring between power stage and ignition coil and ground wire between power stage and engine for corrosion or damage.

Two different ignition coils are being used on engines with CIS-E III systems. Follow the instructions for the version that is found on the repair vehicle.

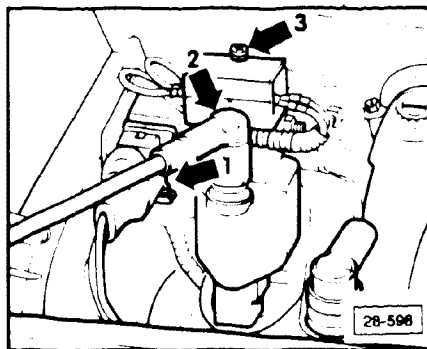
Version I

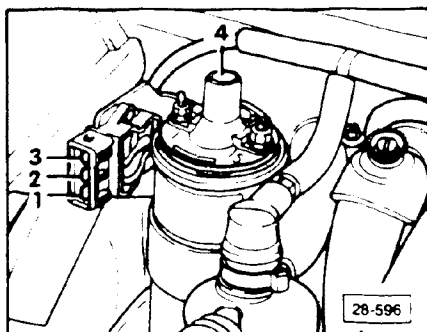
- disconnect ignition coil power stage (arrow)
- remove coil wire from ignition coil



Version II

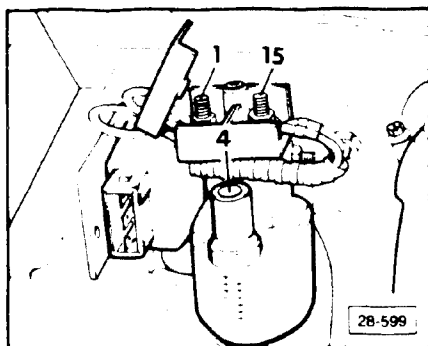
- disconnect ignition coil power stage 1
- remove screw 3





Version I

- use Version II procedure



Version II

Secondary resistance, checking (both versions)

- connect multimeter **US 1119** between terminals **1** and **4** of the appropriate coil
 - 5000-9000 Ω

If **NO**

- replace ignition coil

Primary resistance, checking (both versions)

- connect multimeter **US 1119** between terminal **1** and **15** of ignition coil
 - 0.5-1.5 ohm

If **NO**

- replace ignition coil

If all specified values are obtained in tests of ignition coil with power stage and the engine still does not run (no ignition impulse)

- replace ignition coil with power stage

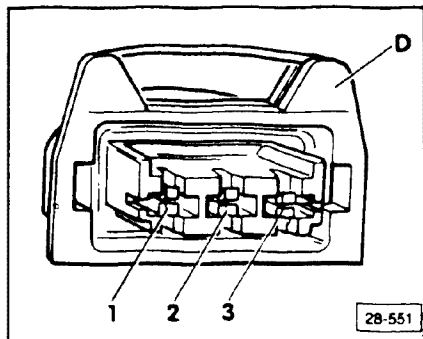
Note

The function of the power stage is **NOT** to be tested on either version.

Hall sender, checking

CAUTION

To check Hall sender, pull coil wire (terminal 4) out of ignition distributor cap and connect to ground using jumper wire.



- disconnect harness connector from Hall sender to ignition distributor
- connect multimeter **US 1119** on outer terminals (1 and 3) of connector **D**
- switch ignition **ON**
 - 9 volts minimum

If NO

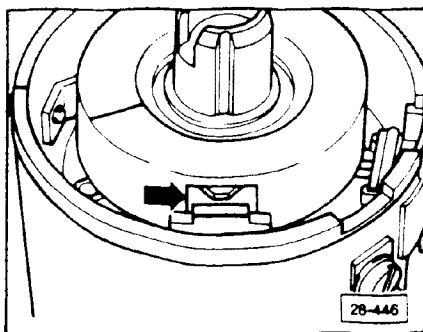
- repair break in wiring using wiring diagram
- switch ignition **OFF**

If YES

- push back rubber boot on Hall sender harness connector
- connect multimeter **US 1119** between terminals 1 and 2
- re-connect harness connector on Hall sender on ignition distributor
- switch ignition **ON**
- remove ignition distributor cap, rotor and dust cap

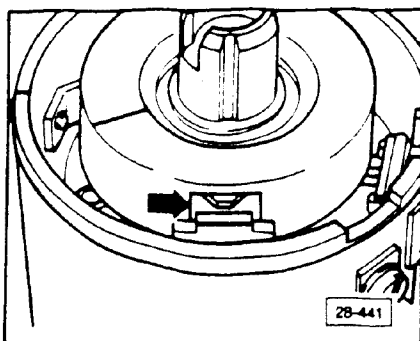
CAUTION

The spring clips used to secure the distributor cap, must not be allowed to swing inward, damage to the trigger wheel could result.



- using tool **2079**, turn crankshaft until trigger window is clear of Hall sender
 - 4.0 volts minimum

more



Hall sender, checking

- turn crankshaft using tool **2079**, until trigger window is fully aligned with Hall sender
 - 0-0.5 volts

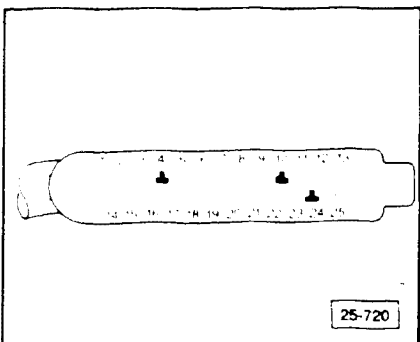
- switch ignition **OFF**

If **NO**

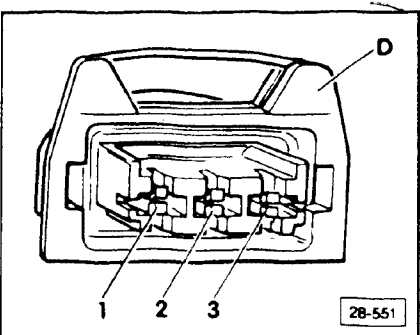
- replace Hall sender

If **YES**

- check wiring between Hall sender harness connector and ignition control unit connector as follows:
- remove ignition control unit cover in left driver side footwell and disconnect harness connector from control unit



25-point connector for ignition control unit



- with multimeter **US 1119**, check continuity between wiring of Hall sender connector **D** and the 25-point connector

connector D	25-point connector
1	10
2	24
3	4

- approximately 0.2 ohm

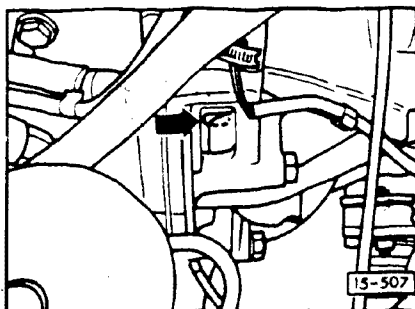
If **NO**

- repair break in wiring using wiring diagram

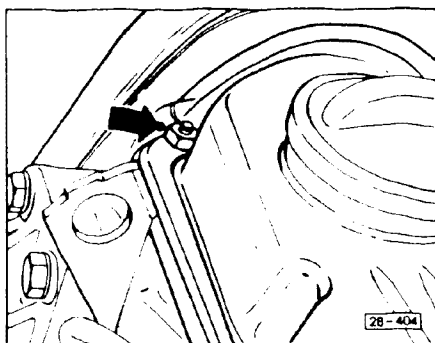
If **YES**

- replace ignition control unit

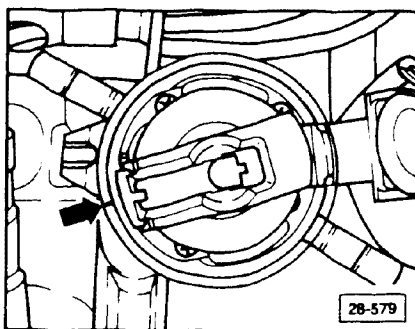
Ignition distributor, basic adjustment



- turn crankshaft to TDC (**arrow**), using tool 2079



- marking on camshaft sprocket must align with upper edge of gasket (**arrow**)
- remove ignition distributor cap
- remove ignition rotor and dust cap
- re-install ignition rotor
- loosen ignition distributor clamp bolt



- turn ignition distributor housing until the center of ignition rotor aligns with the marking on the ignition distributor housing (**arrow**)
- tighten ignition distributor clamp bolt
 - 25 Nm (18 ft lb)

Ignition timing, checking and adjusting

Vehicles without VAG 1551 diagnostic connectors, checking

Requirements:

- engine oil temperature minimum 80°C (176°F)
- throttle in idle setting
- A/C switched **OFF**
- fault lamp **OK**

- connect tester **VW 1367** according to manufacturers instructions

CAUTION

Make sure that the **TDC** sender of the tester is inserted into the transmission housing as far as possible.

- start engine, run at idle

Ignition timing is displayed directly on the **VW 1367** tester. Flashing a strobe light on the timing mark is not required.

- bridge fuel pump relay terminals with spare fuse until completion of checking or ignition point adjustment

The electronic ignition control unit will **NOT** provide a constant timing value until 4 seconds after bridging the terminals.

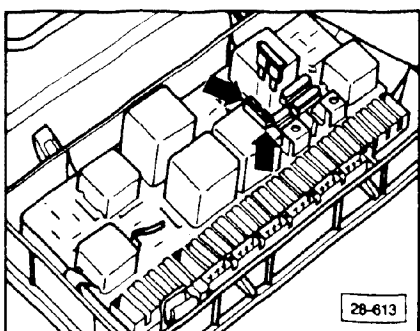
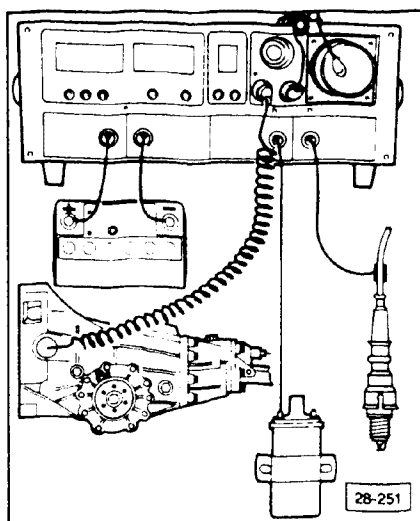
Specification for ignition timing:

- checking: 13-17° before TDC
- adjusting: 15 ± 1° before TDC

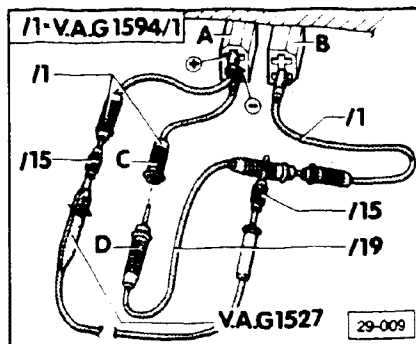
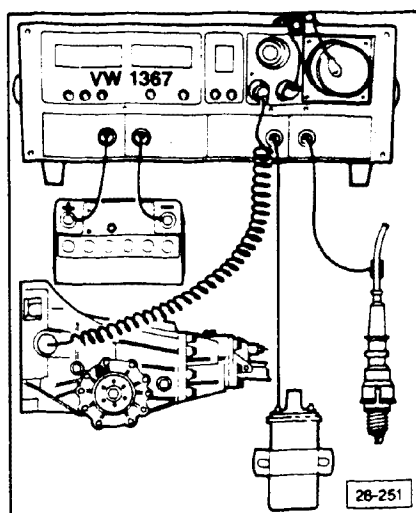
- remove spare fuse from fuel pump relay and briefly raise engine speed to over 2500 RPM
- run engine at idle
 - ignition angle varies within the regulating range from 7° to 20° before TDC
- check idle speed
 - 720 ± 50 RPM

If **NO**

- check CO content



Ignition System



Vehicles with VAG 1551 diagnostic connectors, checking

Check these first:

- engine oil temperature 80°C (176°F) minimum
- throttle in idle position
- A/C switched OFF

- connect **VW 1367** engine tester according to manufacturer's instructions

CAUTION

Make sure that the **VW 1367** TDC pickup is fully seated into the transmission housing recess.

- start engine and let idle

Note

The ignition timing point is displayed directly on the **VW 1367** engine tester. Checking ignition timing using a strobe is **NOT** necessary.

- jumper terminal **C** (ground) with terminal **D** until ignition timing checking/adjusting is completed
 - checking: 13 to 17° Before TDC
 - adjusting: 15 ± 1° Before TDC

Note

A constant ignition timing point is available from the ignition control unit 4 seconds after terminal **C** is jumpered to terminal **D**.

Adjusting

- loosen distributor clamp bolt
- rotate distributor until specification is obtained
- remove jumper between terminals **C** and **D**
- briefly increase engine speed above 2500 RPM
- let engine idle
 - ignition timing must fluctuate between 7° and 20° Before TDC
- if necessary, adjust idle and CO content