Turbocharger system components, servicing

Engine codes: AAZ, 1Z, AHU

- Observe rules of cleanliness

⇒ Page 21-10

- Turbocharger hoses and lines, connecting

⇒ Page 21-11

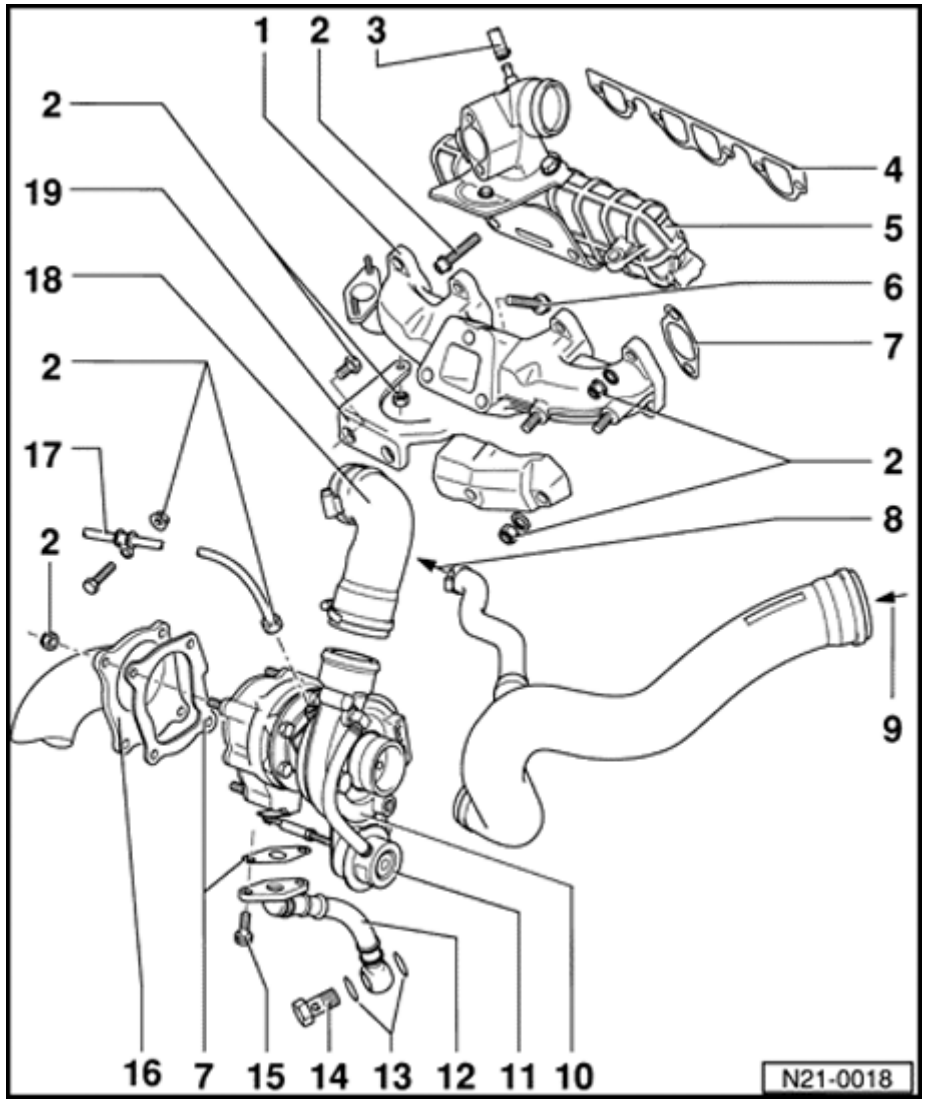
WARNING!

- ***Do not re-use any fasteners that are worn or deformed in normal use.***

- ***Some fasteners are designed to be used only once, and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow the recommendations in this manual-replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.***

Notes:

- *All hose connections are secured with clips.*
- *Charge air system must be free of leaks.*
- *Always replace self-locking nuts.*



Turbocharger system components, removing and installing (engine code AAZ)

Notes:

- *Boost pressure control is switched off during part throttle operation by EGR part throttle switch -F166- and two-way valve for EGR -N161-*
- *Checking and adjusting part throttle switch* ⇒ *Page 26-23*
- *Checking two-way valve* ⇒ *Page 26-20*

1 - Exhaust manifold

2 - 25 Nm (18 ft lb)

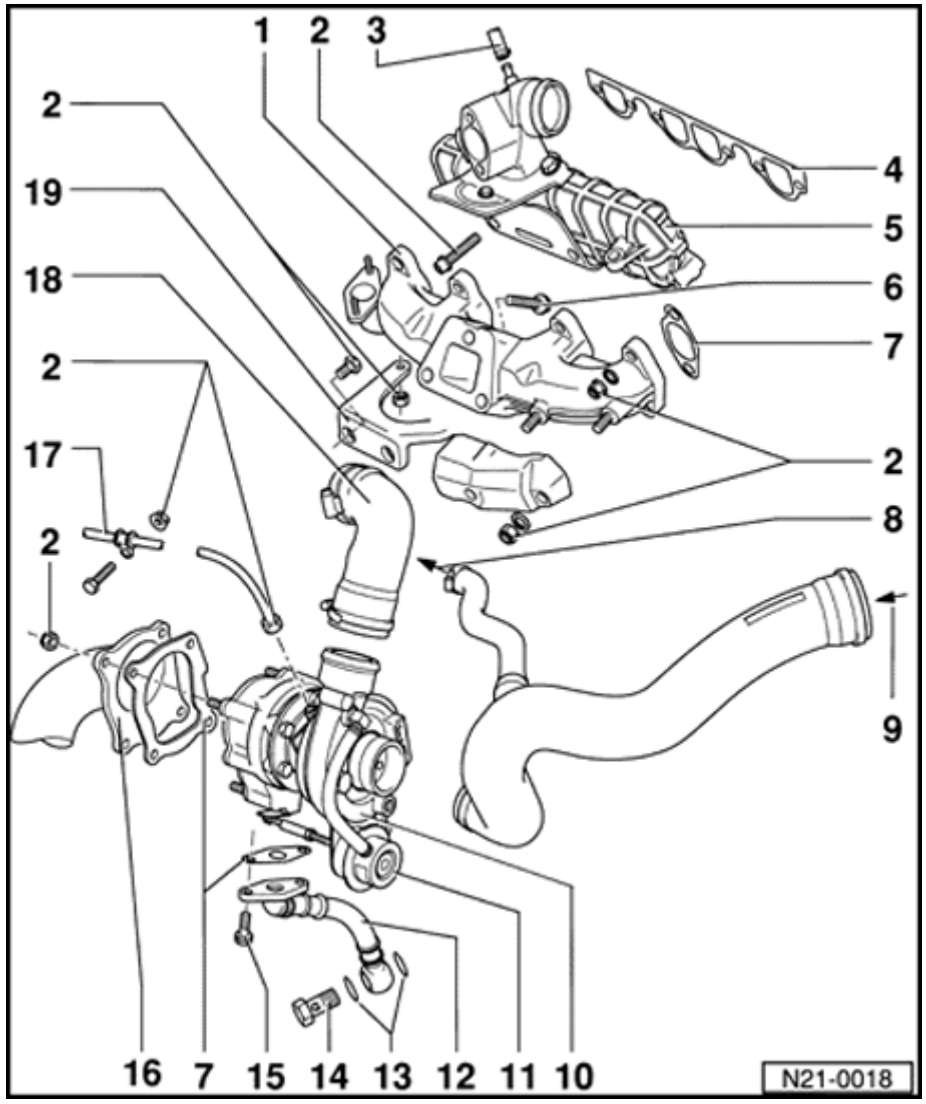
3 - Hose

- To Diesel injection pump

4 - Gasket

- Always replace
- Coating (beading) faces intake manifold

5 - Intake manifold



6 - 45 Nm (33 ft lb)

- Always replace
- Coat threads and bolt head sealing surfaces with high temperature (2000° F) anti-seize compound

7 - Gasket

- Always replace
- Note installation position

8 - To Positive Crankcase Ventilation (PCV) valve

9 - From Air Cleaner

10 - Turbocharger

- Removing and installing ⇒ Page 21-12
- Boost pressure, checking ⇒ Page 21-18

11 - Turbocharger wastegate

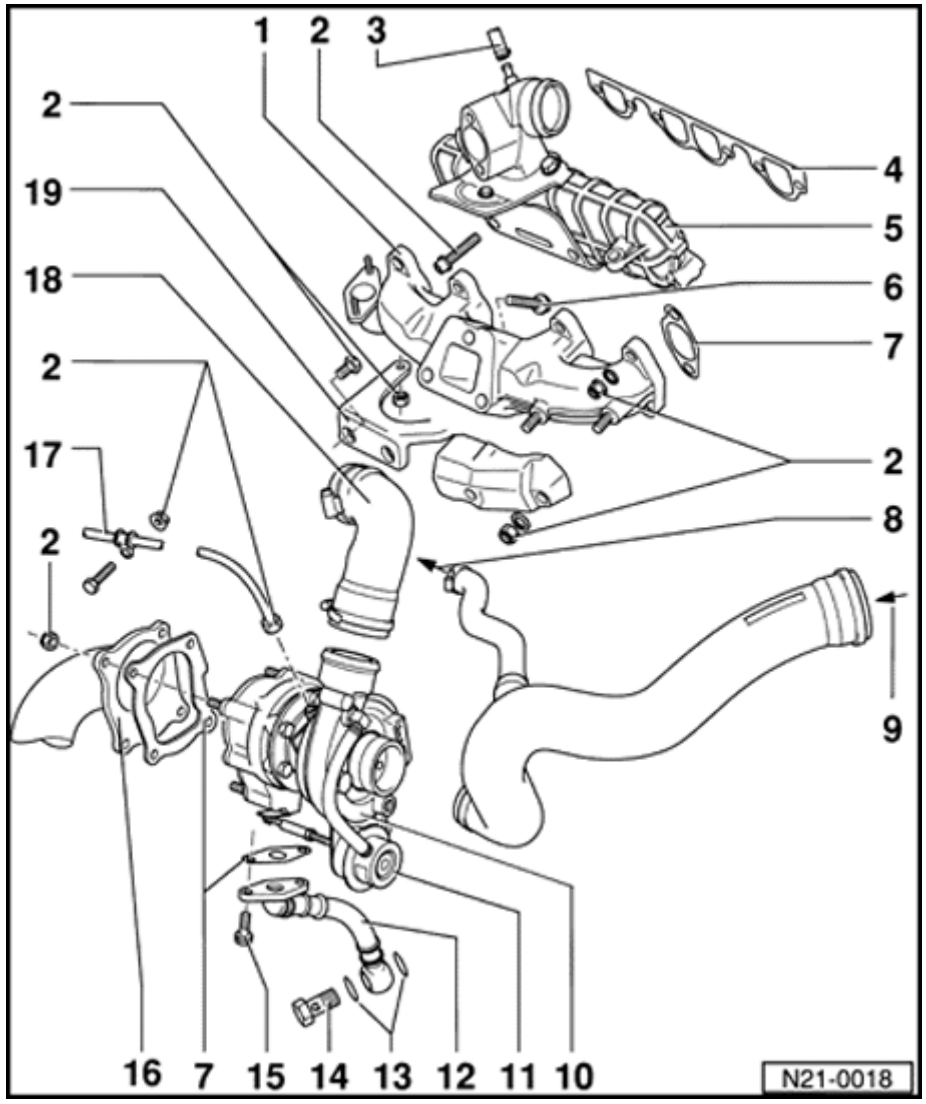
- Integral part of turbocharger cannot be replaced separately
- Hoses and lines, connecting ⇒ Page 21-11

12 - Oil return line

- To cylinder block

13 - Sealing rings

- Always replace



14 - Banjo bolt

- 30 Nm (22 ft lb)

15 - 30 Nm (22 ft lb)

16 - Front exhaust pipe

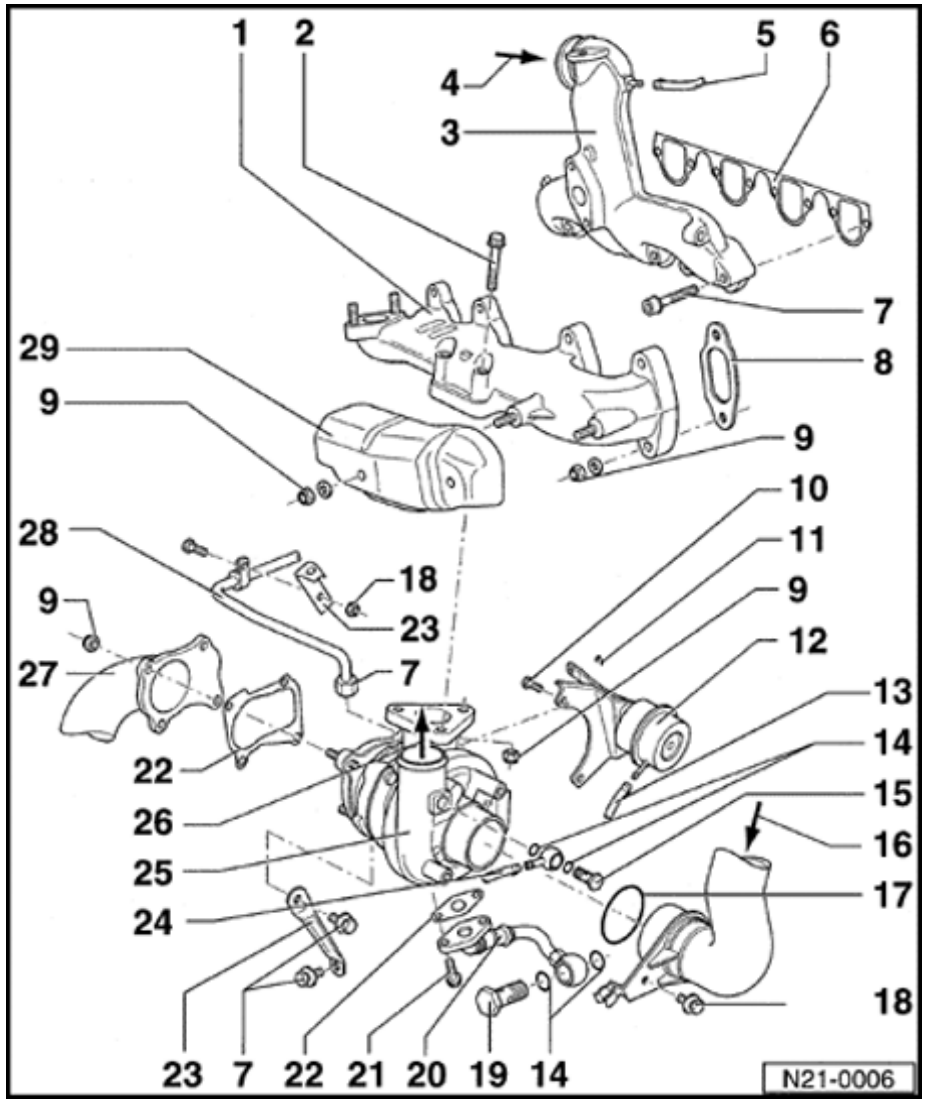
17 - Oil supply line

- From oil filter bracket ⇒ Page 17-4

18 - Intake air hose

19 - Mounting bracket

- Between exhaust pipe and exhaust manifold



Turbocharger system components, removing and installing (engine codes 1Z, AHU)

1 - Exhaust manifold

2 - 35 Nm (26 ft lb)

- Always replace
- Coat threads and bolt head sealing surfaces with high temperature (2000° F) anti-seize compound

3 - Intake manifold

4 - From charge air cooler

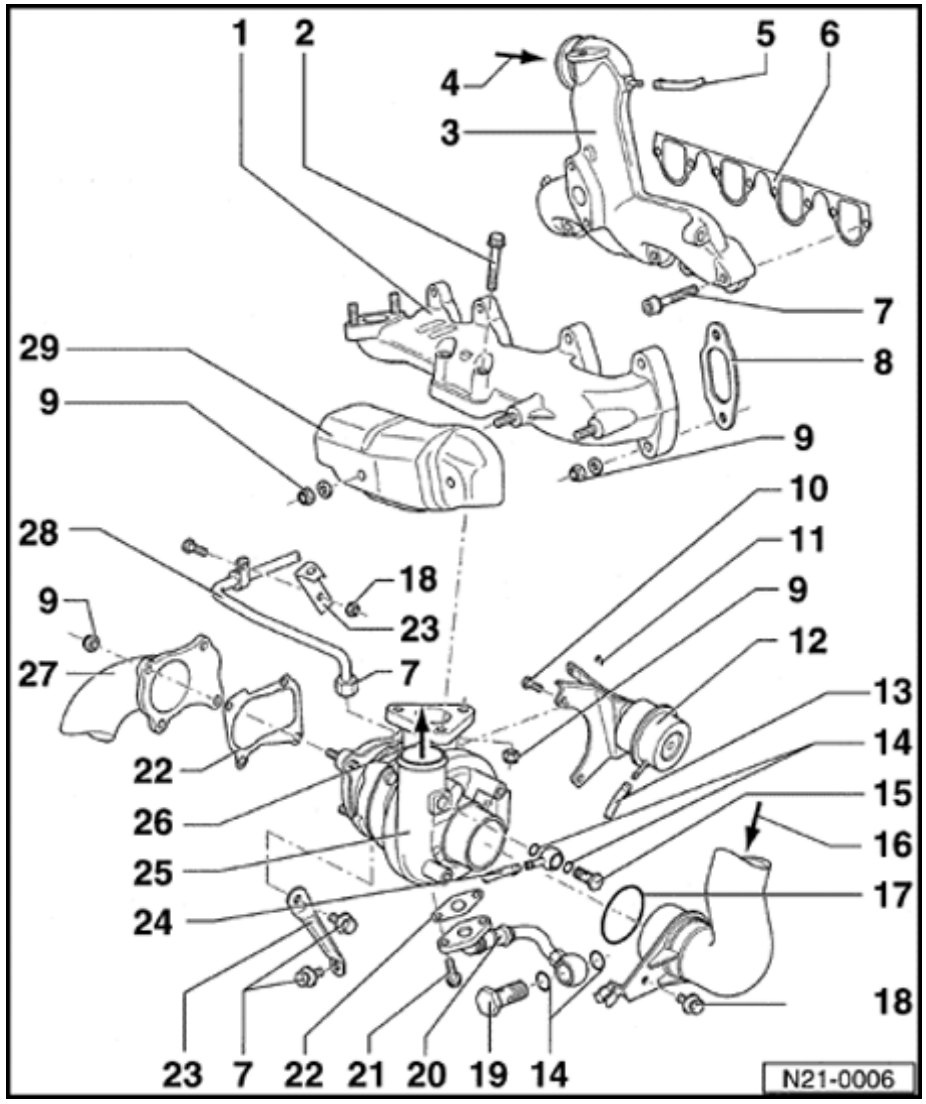
5 - Hose

- Black
- To Diesel Direct Fuel Injection (DFI) Engine Control Module (ECM) -J248-

6 - Gasket

- Always replace
- Coating (beading) faces intake manifold

7 - 25 Nm (18 ft lb)



8 - Gasket

- Note installation position

9 - 25 Nm (18 ft lb)

10 - 10 Nm (7 ft lb)

- Install using D6

11 - Circlip

12 - Turbocharger wastegate

- Checking ⇒ Page 21-24
- Removing and installing ⇒ Page 21-25

13 - Hose

- Blue
- To wastegate bypass regulator valve -N75-
- Connecting ⇒ Page 21-11

14 - Oil seal

- Always replace

15 - Banjo bolt

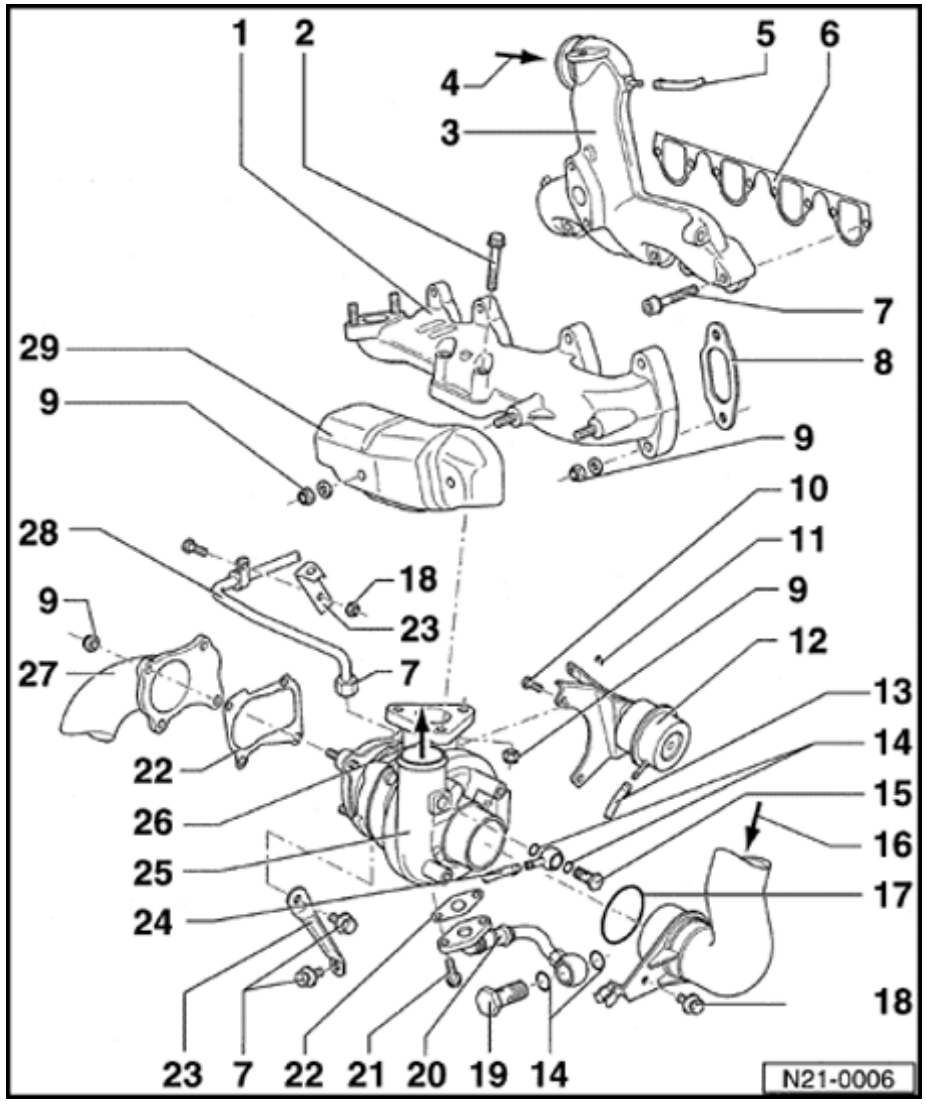
- 15 Nm (11 ft lb)

16 - From air cleaner

17 - O-ring

- Replace if damaged

18 - 10 Nm (7 ft lb)



19 - Banjo bolt

- 30 Nm (22 ft lb)

20 - Oil return line

- To cylinder block

21 - 30 Nm (22 ft lb)

22 - Gasket

- Always replace

23 - Retainer

24 - Hose

- Red
- To wastegate bypass regulator valve -N75-
- Connecting ⇒ Page 21-11

25 - Turbocharger

- Removing and installing ⇒ Page 21-14
- Boost pressure, checking ⇒ Page 21-20

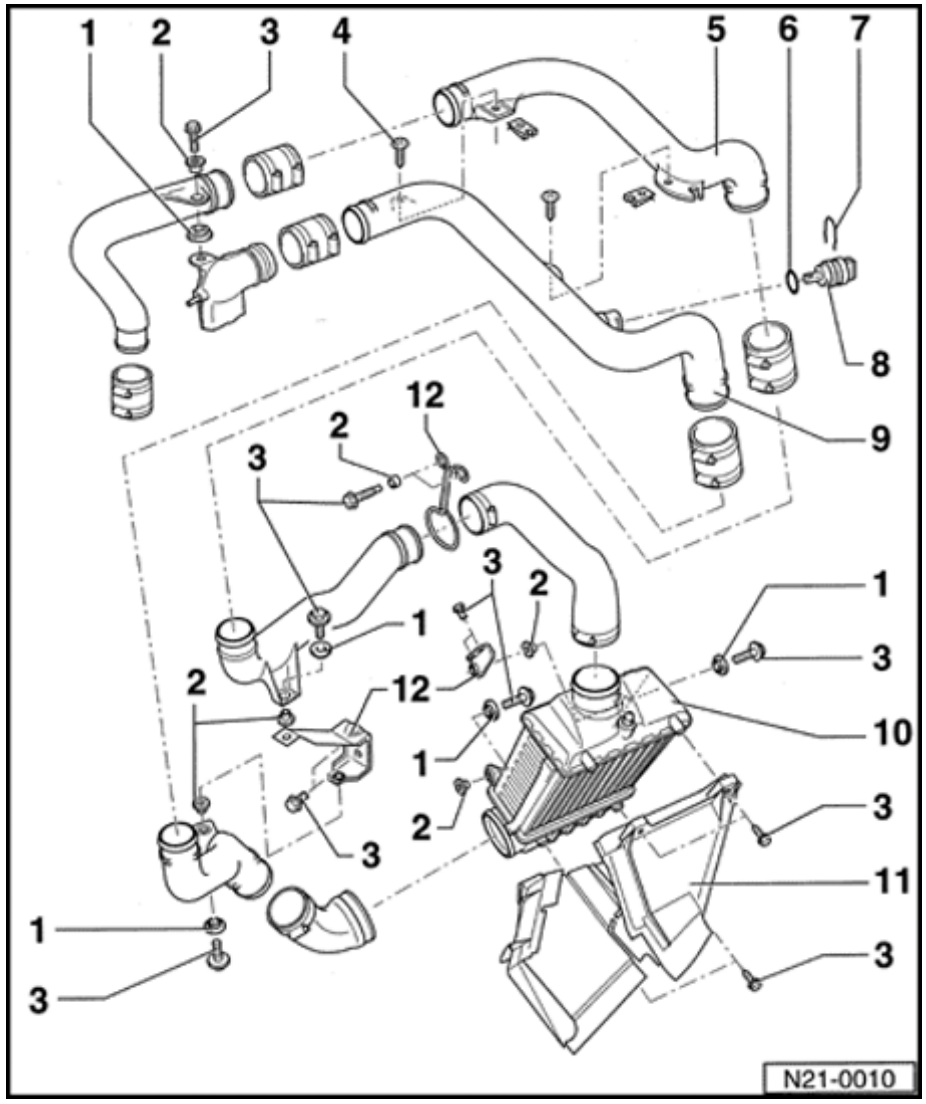
26 - To charge air cooler

27 - Front exhaust pipe

28 - Oil supply line

- From oil filter bracket

29 - Heat shield



Turbocharger cooling system components, removing and installing (engine codes 1Z, AHU)

Notes:

- *All hose connections secured by clips.*
- *Charge air system must be free of leaks.*

1 - Rubber mounting

2 - Spacer

3 - 10 Nm (7 ft lb)

4 - 10 Nm (7 ft lb)

5 - Connecting pipe

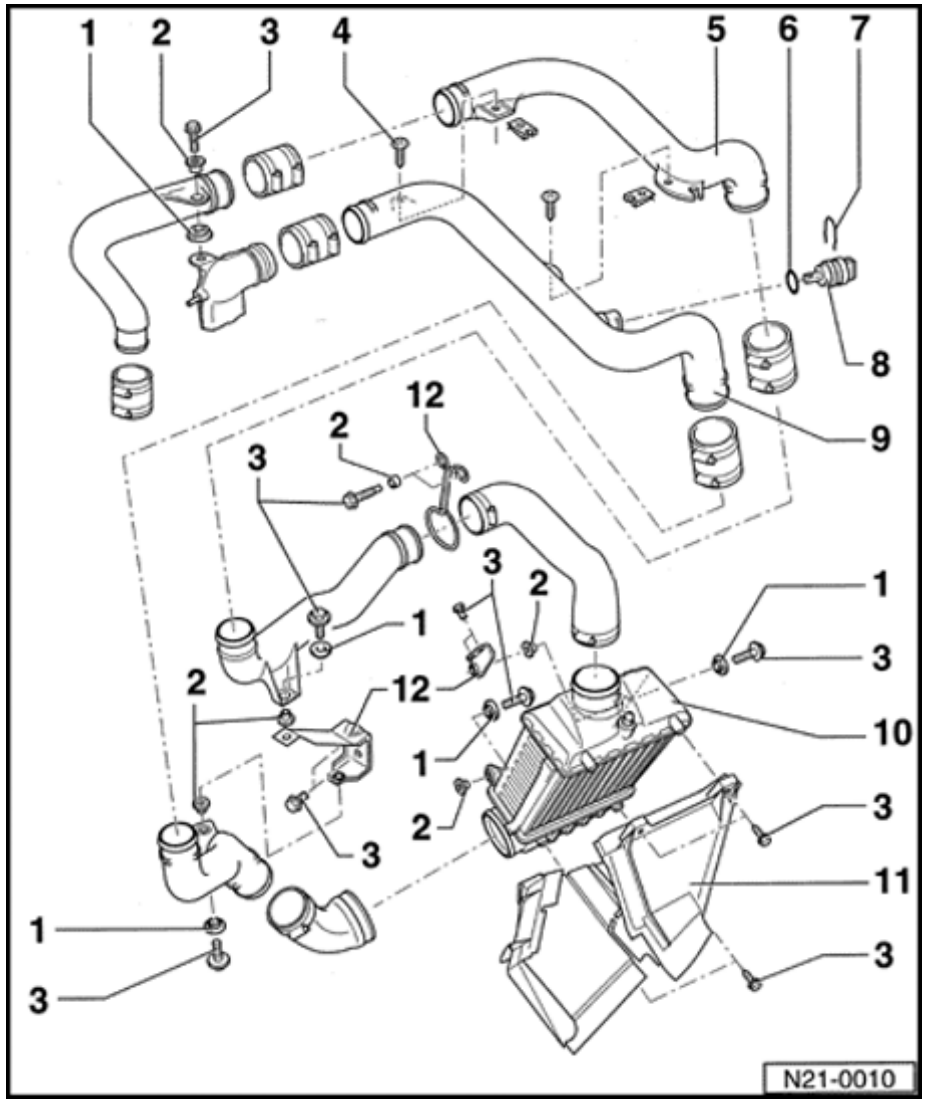
- Between charge air cooler and turbocharger

6 - O-ring

- Replace if damaged

7 - Retaining clip

8 - Intake Air Temperature (IAT) sensor -G72-



9 - Connecting pipe

- Between charge air cooler and intake manifold

10 - Charge air cooler

11 - Air ducting

12 - Retainers

Rules of cleanliness

CAUTION!

Whenever working on turbocharger systems, carefully observe the following rules of cleanliness.

1 - Thoroughly clean fuel system line and hose connections and the surrounding area before disconnecting.

2 - Place removed components on a clean surface and cover. Use plastic sheeting or paper. Do not use fluffy rags that could leave lint!

3 - Carefully cover over or seal any components that have been opened if repairs are not carried out immediately.

4 - Install only clean parts:

Do not remove replacement parts from the packaging until immediately before they are to be installed. Do not use parts that have been stored without packaging (e.g. in toolboxes, etc.).

5 - When the fuel system is opened:

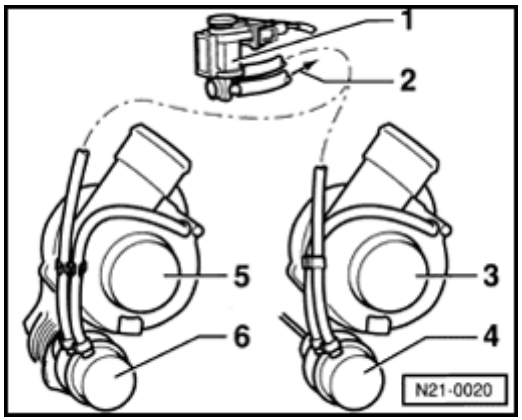
Avoid working with compressed air whenever possible. Avoid moving the vehicle if possible.

6 - Make sure that Diesel fuel does not run onto coolant hoses.

Affected hoses must be cleaned immediately. Contaminated hoses must be replaced.

Turbocharger hoses and lines, connecting

Engine code AAZ



1 - Two-way valve

2 - To vacuum pump

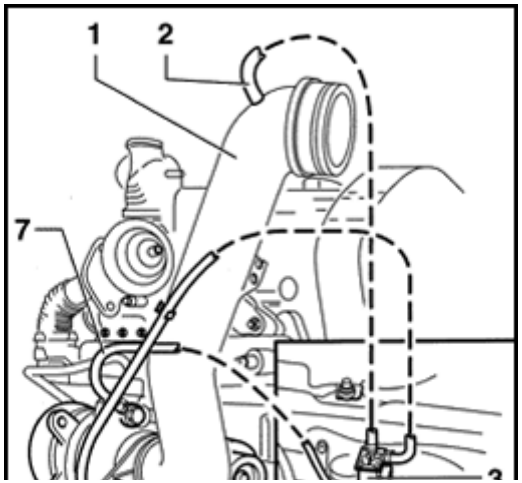
3 - Turbocharger (KKK)

4 - Wastegate

5 - Turbocharger (Garrett)

6 - Wastegate

Engine codes 1Z, AHU



1 - Intake air hose

2 - Hose, black

3 - Wastegate bypass regulator valve -N75-

4 - Wastegate

5 - Hose, blue

6 - Turbocharger

7 - Hose, red

Turbocharger, removing and installing (engine code AAZ)

Engine codes 1Z, AHU, turbocharger removing and installing.

⇒ Page 21-14

Special tools, testers and auxiliary items

- 3205 swivel wrench
- VAG1331 torque wrench, 5 to 50 Nm
- High temperature (2000 ° F) anti-seize compound

Removing

- Switch ignition off.

CAUTION!

Before disconnecting the battery, determine the correct coding for the anti-theft radio.

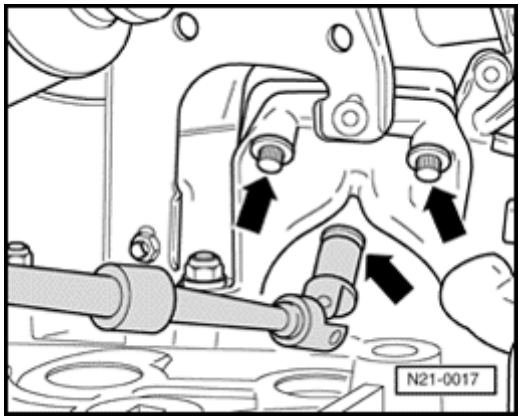
- Disconnect battery Ground strap.

- Remove hoses between intake manifold to turbocharger and turbocharger to air cleaner.

- Disconnect oil supply line from turbocharger and mounting clip from intake manifold.

- Disconnect oil return line at turbocharger.

- Disconnect exhaust pipe from turbocharger and exhaust manifold support.



- Remove 3 mounting bolts (arrows) between turbocharger and exhaust manifold (using either box wrench or 3205 swivel wrench).

Installing

When installing observe the following:

- Install turbocharger and tighten exhaust pipe mounting nuts so that turbocharger can still be moved slightly.
- Install 3 mounting bolts and tighten fully, then tighten exhaust pipe nuts.
- Before attaching oil supply line, fill turbocharger connections with engine oil.

CAUTION!

After installing the turbocharger, let engine idle for approx. 1 minute. DO NOT rev-up the engine at first! (This ensures that the turbocharger is properly lubricated.)

Turbocharger, removing and installing (engine codes 1Z, AHU)

Engine code AAZ, turbocharger removing and installing

⇒ Page 21-12

Special tools, testers and auxiliary items

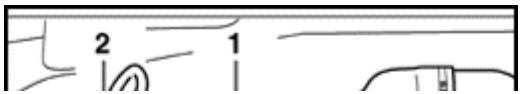
- VAG1331 torque wrench, 5 to 50 Nm
- High temperature (2000 ° F) anti-seize compound

Removing

- Switch ignition off.
- Disconnect battery Ground strap.

CAUTION!

Before disconnecting the battery, determine the correct coding for the anti-theft radio.



- Remove hoses between intake manifold to turbocharger -1- and turbocharger to

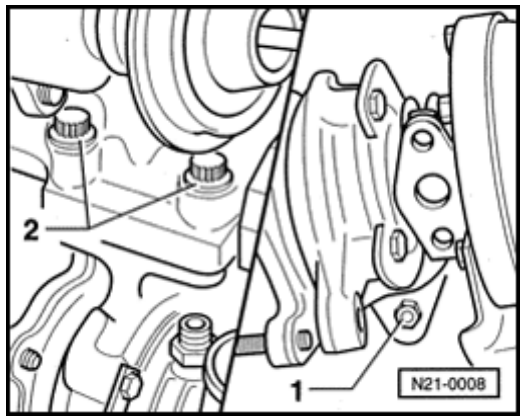
air cleaner -2-.

- Remove red hose (or remove banjo bolt) for wastegate bypass regulator valve - N75- on turbocharger.
- Disconnect exhaust pipe from turbocharger.

- Disconnect oil supply line from turbocharger and mounting clip from intake manifold.

- Remove turbocharger to engine support.

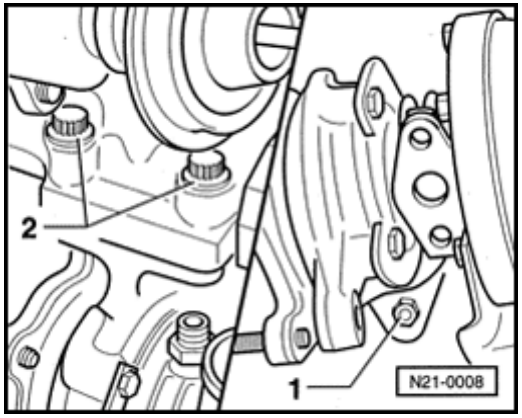
- Disconnect oil return line at turbocharger.



- Remove nut -1- from below and bolts -2- from above.
- Lift turbocharger out and upward.
- Disconnect blue hose from wastegate.

Installing (engine codes 1Z, AHU)

- Install blue wastegate hose on turbocharger and secure with clamp.



- Grease threads of mounting bolts -2- and head contacting surfaces with high temperature (2000 ° F) anti-seize compound.
- Install turbocharger on exhaust manifold and tighten mounting bolts -2- finger-tight.
- Install mounting nut -1- and tighten.

  Tightening torque: 20 Nm (15 ft lb)
- Tighten mounting bolts -2-.

  Tightening torque: 35 Nm (26 ft lb)
- Install turbocharger to cylinder head support.

  Tightening torque: 25 Nm (18 ft lb)
- Install oil return pipe with new seal and tighten.

  Tightening torque: 30 Nm (22 ft lb)
- Install front exhaust pipe with new gasket onto flange and tighten.

  Tightening torque: 25 Nm (18 ft lb).
- Fill turbocharger with engine oil via oil supply connection.

- Install oil supply line.

  Tightening torque: 25 Nm (18 ft lb)

- Tighten oil supply line support to: 10 Nm (7 ft lb).

- Install red hose for wastegate bypass regulator valve -N75- on turbocharger and secure with clamp (or banjo bolt with new seal) and tighten.

  Tightening torque: 15 Nm (11 ft lb)

- Install O-ring onto intake pipe, then install pipe to turbocharger and tighten.

  Tightening torque: 10 Nm (7 ft lb)

- Install pressure line.

CAUTION!

After installing the turbocharger, let engine idle for approx. 1 minute. DO NOT rev-up the engine at first! (This ensures that the

turbocharger is properly lubricated.)

Turbocharger, checking (engine code AAZ)

Special tools, testers and auxiliary items

- VAG1397A turbocharger tester

Checking conditions

The turbocharger and wastegate are an assembly. A faulty turbocharger must be replaced because it is not possible to repair using workshop equipment.

Requirements for proper turbocharger operation and achieving specified boost pressure:

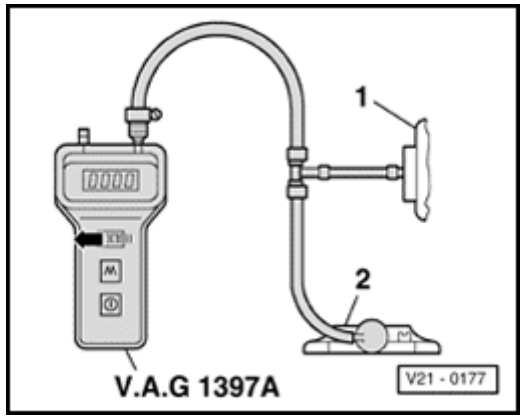
- No leaks from intake and exhaust systems
- Wastegate control line is not blocked, loose or leaking
- No engine or fuel injection mechanical malfunctions, e.g. start of injection, fuel injectors and compression pressure
- Engine oil temperature 80 °C (176 °F)

minimum

Test sequence

- Measure boost pressure under full load, while driving on road.

  Test duration per measurement: 10 seconds maximum



- Disconnect hose (at one end) running between intake manifold -1- and Diesel injection pump -2-.

- Using tee, connect VAG1397A turbocharger tester.

Notes:

- *To operatethe VAG1397Aturbocharger tester see manufacturers operating instructions.*
- *If boost pressure is being measured while driving, a second person must be used to read and operate the turbocharger tester.*
- *Make sure that the pressure hose is not trapped between the hood and the body.*

- Measure boost pressure at wide open throttle.

  While driving on an open road:

  - In 2nd gear (manual) or with transmission range selector lever in position 1 (automatic)
  - While simultaneously applying brakes to maintain approx. 37 MPH (60 kph).

Specification: 0.60 to 0.83 bar (relative pressure)

If specification not obtained:

- Replace turbocharger.

If the boost pressure is too high and if the wastegate control line is not blocked, loose or leaking:

- Replace turbocharger (wastegate is faulty and unit can only be replaced as an assembly).

Turbocharger, checking (engine codes 1Z, AHU)

Special tools, testers and auxiliary items

- VAG1397A turbocharger tester

Checking conditions

- No malfunctions stored in Diagnostic Trouble Code (DTC) memory

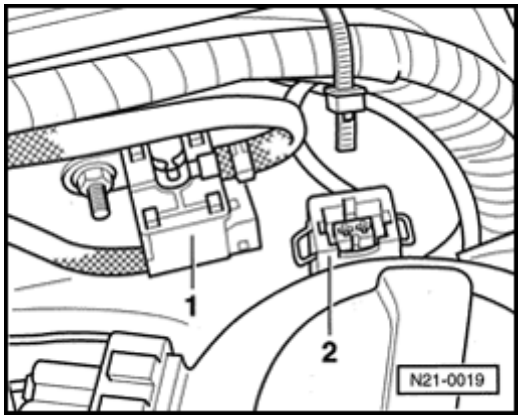
⇒ *Repair Manual, 1.9 Liter 4-Cyl. 2V TDI Fuel Injection & Glow Plug, Engine Code(s): 1Z, AHU, Repair Group 01*

- Perform output Diagnostic Test Mode (DTM)

⇒ *Repair Manual, 1.9 Liter 4-Cyl. 2V TDI Fuel Injection & Glow Plug, Engine Code(s): 1Z, AHU, Repair Group 01*

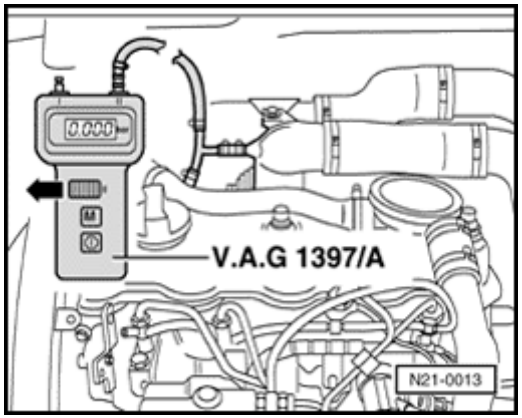
- No leaks from intake and exhaust systems

- Wastegate control line is not blocked, loose or leaking
- No engine or fuel injection mechanical malfunctions, e.g. start of injection, fuel injectors and compression pressure
- Engine oil temperature 80 °C (176 °F) minimum
- Measure boost pressure under full load, while driving on open road.
- Duration of test per measurement: 10 seconds maximum



- Disconnect harness connector -2- from wastegate bypass regulator valve -1- (-N75-).

  Reconnect -N75- after check.



- Disconnect connecting hose running between intake manifold and Diesel Direct Fuel Injection (DFI) Engine Control Module (ECM) -J248-.
- Using tee, connect VAG1397A turbocharger tester and select measuring range II.

Notes:

- *To operatethe VAG1397Aturbocharger tester see manufacturers operating instructions.*
- *Make sure that all of the hoses are connected so there is no possibility of leakage.*
- *If boost is being measured while driving, a second person must be used to read and operate turbocharger tester.*
- *Make sure that the pressure hose is not trapped between the hood and the body.*

- Measure boost pressure at wide open throttle.

  While driving on an open road:

  - In 2nd gear (manual) or with transmission range selector lever in position 1 (automatic)
  - Under acceleration at wide open throttle while watching the tachometer

Note:

Do not apply the brakes while taking boost measurements (unless of course it becomes necessary). The engine control module responds to braking by reducing fuel quantity; which can lead to incorrect boost measurements.

- Press "M" button (memory) on VAG1397A turbocharger tester when engine speed falls between 3500 and 4000 RPM, then read out boost values.

  Specification: 0.50 to 0.65 bar (relative pressure)

If specified boost pressure NOT obtained:

- Check wastegate bypass regulator valve and replace if necessary.

- Repeat boost pressure check.

If specified boost pressure still NOT obtained:

- Replace turbocharger.

If boost pressure is exceeded:

- Check wastegate bypass regulator valve - N75-.

  Flow between turbocharger and valve to wastegate should not be blocked when connector is disconnected.

- Make sure that turbocharger wastegate valve is securely mounted on turbocharger.

- Check wastegate and operating rod, replace if necessary.

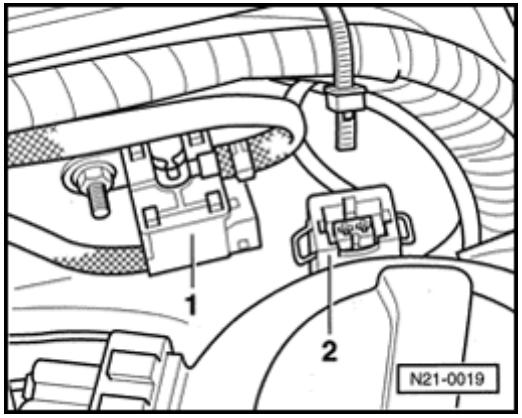
- Check wastegate shaft mounting in turbocharger for ease of movement. If corroded together; replace turbocharger.

Wastegate, checking (engine codes 1Z, AHU)

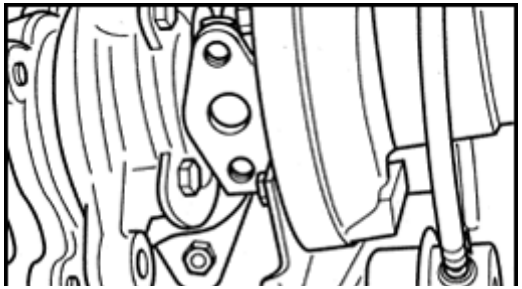
Check conditions

- Engine oil temperature: 80 ° C (176 ° F) minimum

Test sequence



- Disconnect harness connector -2- from wastegate bypass regulator valve -1- (-N75-).



- Start engine and raise to maximum speed briefly by operating throttle.
  - Wastegate operating rod -2- must move

If operating rod does not move:

- Check wastegate lever -1- for ease of movement, if corroded together; replace turbocharger.

If the operating rod does not move, even though the lever is free to move:

- Replace wastegate -3-.

Wastegate, removing and installing (engine codes 1Z, AHU)

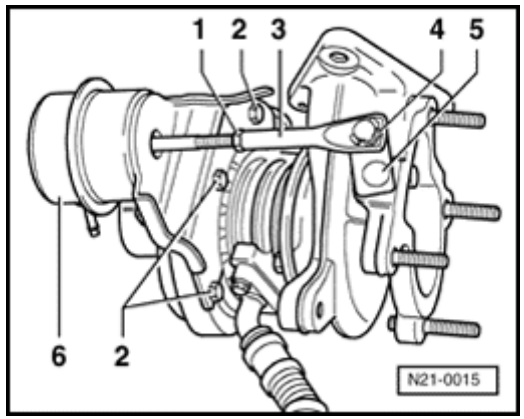
Special tools, testers and auxiliary items

VAG1331 torque wrench 5 to 50 Nm

Removing

- Remove turbocharger.

⇒ Page 21-14



- Unclip mounting clip -4-.
- Remove mounting bolts -2-.
- Remove wastegate -6-.

Installing

- Install wastegate -6- on turbocharger and tighten.

  Tightening torque: 10 Nm (7 ft lb)
- Install mounting bolts -2- using D6.
- Loosen lock nut -1- and operating rod -3-.
- Swing wastegate lever -5- toward turbocharger to stop, and hold.

- Adjust length of rod -3- so that rod eye will install easily on lever pin -5- (lever lies against stop with no play).

- Shorten operating rod 8 full turns from this position.

- Tighten lock nut -1-.

- Attach operating rod onto lever and install mounting clip -4-.

- Re-install turbocharger.

⇒ Page 21-14