

## Programmed Repairs Engines 602.96, 603.96/97 Combustion

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### 07.1 Diesel Injection System

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Complaint:

Engine surges when idling

Engine 603.96 w/o AJC

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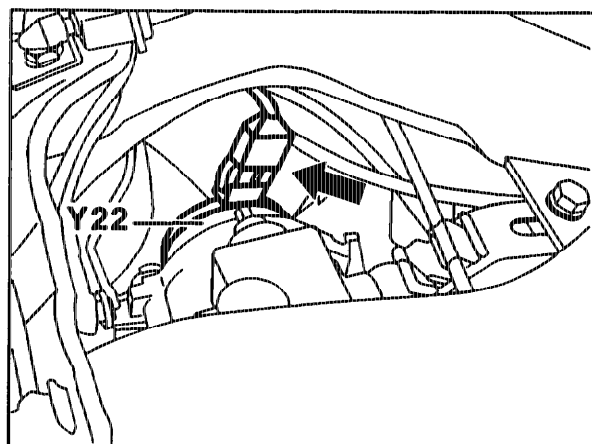
#### Remedy

Run engine at idling speed.

Unplug 2-pin connector (arrow) at servomagnet (Y22).

If engine runs properly, check idle speed and set, if necessary, to  $580 \pm 20$  rpm.

Install modified control module part no. 006 545 36 32 and plug in 2-pin connector again.

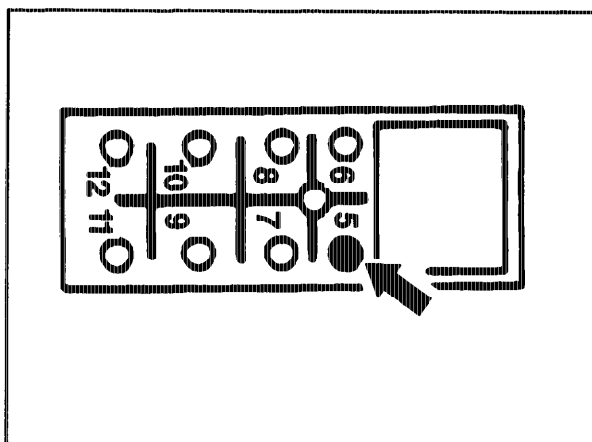


P07-6354-13

#### Note

Coding bridge of old control module must not be plugged into the new control module.

When inserting the new control module, pierce the non-assigned contact 5 in the connector (arrow).



P07-6357-13

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Complaint:

Engine does not start when warm or only sluggishly after standing for about 10 minutes

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#### Cause

Excessive sheer of petrol in diesel fuel. Not more than 20% regular grade petrol is approved at temperatures below  $-23^{\circ}\text{C}$ ; i.e., it is not necessary to add petrol at temperatures higher than  $-23^{\circ}\text{C}$ .

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Complaint:

**After parking car on a hill, engine can no longer be started, fuel level  $\leq$  1/4 full**

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Cause

Injection pump suction chamber runs dry. Internal leak. Vapor bubbles visible at fuel feed.

Remedy

Check fuel flow filter for leak, replace if necessary.

Check connections of top part of filter for leaks and vent drilling for fuel return flow for blockage.

Check overflow restrictor at injection pump return. Check injection pump for leak: fuel tank  $\leq$  1/4 full.

Lift up front of car about 40 cm, no vapor bubbles should be visible in the fuel feed pipe, and also not in the fuel return pipe of the injection pump, within 10 min with engine switched off; replace injection pump if necessary.

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Complaint:

**Engine misfires when cornering sharply, with low fuel level  $\leq$  1/4 full**

**Models 124.1/3, 201.1**

Cause

Fuel pump draws in air.

Remedy

Install fuel tank with splash pot.

**Fuel tank**

| Model                 | Part no.      | Prod. brkpt.                                   |
|-----------------------|---------------|--|
| 124.1/3 sedan         | 124 470 63 01 | 01/88  |
| 124.1/3 station wagon | 124 470 57 01 | 09/86  |
| 201.1                 | 201 470 08 01 | 09/87 Bremen plant<br>02/88 Sindelfingen plant |

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Complaint:

**Engine speed increases and blue exhaust after driving sharply**

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Cause

Fluid level in oil sump too high.

Remedy

Check engine oil level, adjust to correct level if necessary; perform oil change if necessary.

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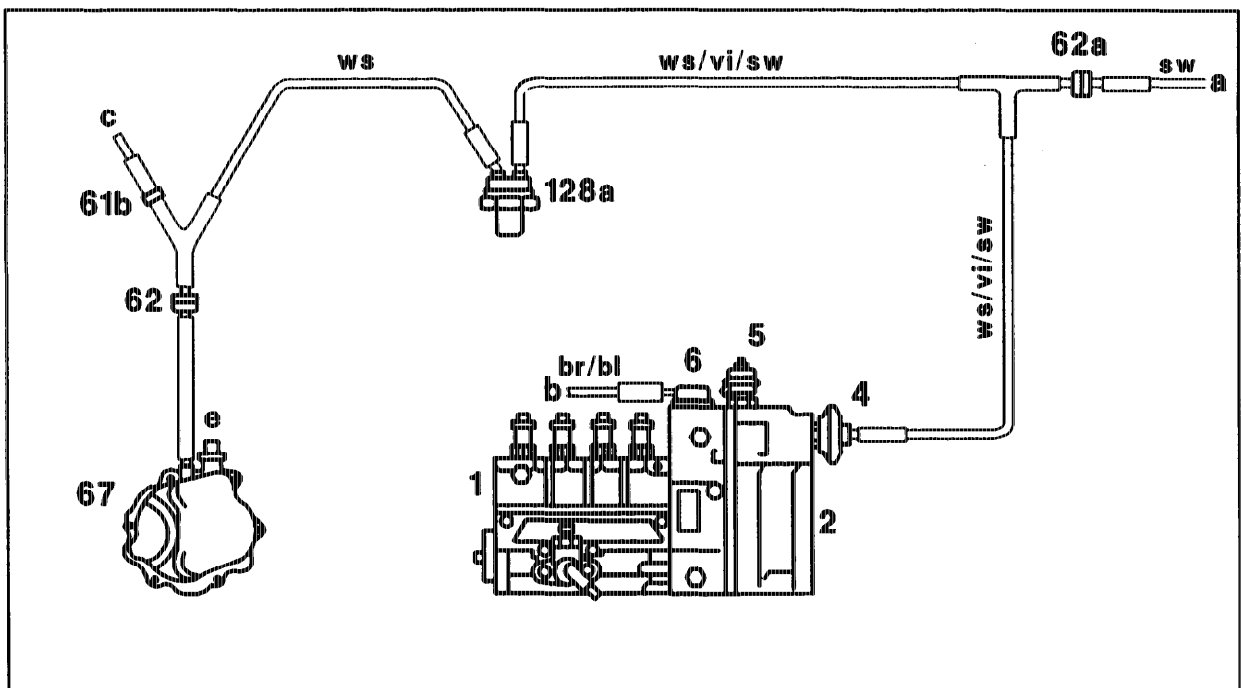
Complaint:

Engine cannot be switched off or not easily.

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Cause/Remedy

- Vacuum hose and vacuum pump (67) may be split.
- Filter (62) blocked or leaking.
- Restrictor (61b, orange) may be blocked.
- Vacuum of vacuum pump not sufficient. Check vacuum at ancillaries connection. Specification when engine idling after 30 s at least 700 mbar.



P07-6356-55

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Complaint:

Engine misfiring evident when slowly accelerating  
(up to about 1000 rpm when stationary)

Engines 602, 603 with  
AJC

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Cause

Results from operation of AJC.

Remedy

Install AJC control module with designation RO2 (was RO1). Part number unchanged. Standard equipment as of end 04/88. No further remedy possible.

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Complaint:

**Sharp drop in power (> 10 kW) at full load**

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Note

Engine does not vibrate when idling, no noises evident, compression and pressure loss in order. Fuel filter not blocked.

Cause

Exhaust or inlet valve spring broken.

Remedy

Replace valve spring.

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Complaint:

**Jolts during deceleration when accelerator released**

**Engines 602, 603 with  
AJC**

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Cause

Deceleration damper has insufficient effect.

Remedy

Install damper 601 070 13 67.

In critical cases the reinforced tension/compression damper 601 070 14 67 can also be installed.

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Complaint:

**Engine cuts out when clutch released after long motorway trip (200-300 km), or does not idle**

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Cause

Pump governor group jamming briefly (centrifugal element in governor of injection pump).

Damage code for warranty/goodwill cases: 07 013 15

Remedy

Replace injection pump.

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Complaint:

Engine misfires at full load from 2000 rpm

Engines 602.96, 603.96

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Cause

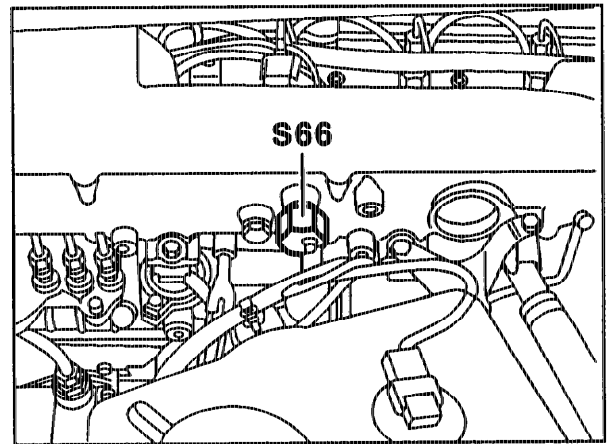
Boost pressure too high or engine overload protection activated too soon.

Remedy

Test boost pressure with connector unplugged from engine overload protection switch (S66).

If boost pressure  $> 0.95$  bar, boost pressure control valve of turbocharger faulty. Replace turbocharger.

If boost pressure  $< 0.95$  bar, switch engine overload protection (S66) reacting too soon. Replace switch (S66).



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Complaint:

Engine has no power (power loss  $> 20\text{kW}$ )

Engines 602.96, 603.96

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Cause

Rubber connection pipe at hose straps split and as a result the barometric pressure compensation unit is not pressurized with boost pressure.

Remedy

If no boost pressure exists at barometric pressure compensation unit, inspect pressure pipes for leaks and replace damaged rubber connection pipes.

Note

Do not overtighten hose clips.

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Complaint:

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**Injection pipes on cylinders 1-4 leaking because of fatigue fracture**

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Remedy

Install injection pipes with double cone.

Ensure the plastic clips are correctly installed.

| Parts                     | Part no.      |
|---------------------------|---------------|
| Cylinder 1 injection pipe | 601 070 23 33 |
| Cylinder 2 injection pipe | 601 070 24 33 |
| Cylinder 3 injection pipe | 601 070 36 33 |
| Cylinder 4 injection pipe | 601 070 26 33 |

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Complaint:

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**Engine cannot be switched off when cold (was SI 07.1/37 and 43/6)**

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Cause

Damaged piston vacuum pump (model up to May 1986).

Remedy

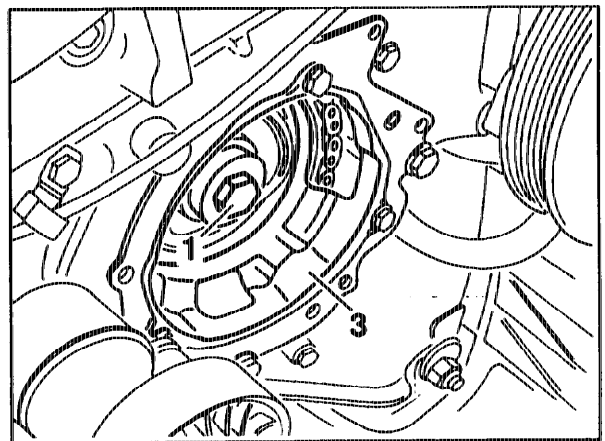
If this problem exists on models manufactured prior to this date, which do not have a second drilling in the oil spray nozzle for the oil supply of the piston vacuum pump, or for performing work which requires taking off the vacuum pump, remove the centering sleeve and install in modified seal for improving the oil supply.

Procedure

- 1 Remove flange shroud, fan and belt (see Repair Instructions Group 13, Op. No. 342).
- 2 Remove piston vacuum pump (see Repair Instructions Group 43, Op. No. 618).
- 3 Remove centering sleeve (3). It must no longer be installed.

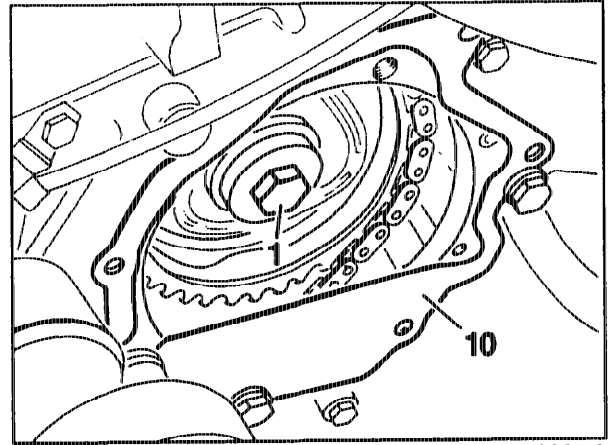
**Note**

The centering sleeve should be installed as an aid when removing the injection pump. It prevents the injection timing device jamming when cranking the engine.



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- 4 Install modified seal (10) in place of the previous one.
- 5 When dealing with the problem mentioned above, install new vacuum piston pump.
- 6 Do not connect vacuum pipes to the brake unit at the piston vacuum pump at this stage.
- 7 Install V-belt, fan and fan shroud.
- 8 Run engine and pour about 50 cm<sup>3</sup> engine oil into the piston vacuum pump through the open vacuum connection with an oil spray can.



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- 9 Connect the vacuum pipe to the brake unit immediately.
- Refer to the microfiche "operation texts and work units" under Op. No. 43-0610 for the work units.

| Part               | Part No.      |
|--------------------|---------------|
| Piston vacuum pump | 000 230 19 65 |
| Seal               | 601 238 03 80 |

#### Production breakpoint of second drilling in oil spray nozzle: May 1986

| Model       | Engine  | Transmission | As of engine end no. |
|-------------|---------|--------------|----------------------|
| 124.133/193 | 603.960 | automatic    | 000602               |
| 126.125     | 603.961 | automatic    | 002202               |
| 124.133     | 603.962 | automatic    | 000057               |

Complaint:

**Engine misfires between 2000 and 3000 rpm**

#### Cause

Overshooting of AJC servomagnet causes quantity reduction.

#### Remedy

Install AJC control module with the designation RO2 (was RO1), part no. unchanged.

Standard equipment as of end 04/88. Adjust AJC control with 2.4 k $\Omega$  or 4.7 k $\Omega$  reference resistor (see RA07.1-1841, pages 13, 14).

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Complaint:

**Turbocharger leaking at flange**

**Engines 602.96, 603.96**

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Remedy

Install gasket at turbocharger flange.

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Part

Part no.

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Gasket (engine 602.96)

602 098 00 80

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Gasket (engine 603.96)

252 098 02 08

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Complaint:

**Loud metallic rattling of 2-mass flywheel after starter not operated long enough. Engine idles with too low a speed.**

**Engine 602.96 as of 09/89 with manual transmission**

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Cause

Idle speed setting at injection pump not correct.

Remedy

Remove injection pump and set on injection pump test bench. The setting is described in the Bosch microfilm W400/00 under "Reducing idle speed stage of MB cars with EP combination M/RSF II Engine 602 and TURBO".

Note

Injection pumps as of production date 069 are no longer affected by this problem.

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Complaint:

**EGR valve noisy when opening or closing**

**Engine 602, 603 up to 30.9.91 with Code 620a models with catalytic converter**

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Remedy

Remove EGR valve, replace, install. In addition on engines 602.96, 603.96:

Remove vacuum pipe to EGR valve. Replace, install. Remove connection piece between EGR switchover valve and vacuum pipe, replace, install.

Damage code: 14 315 36

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Designation

Part no.

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Vacuum pipe

617 997 08 82

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Connection piece

602 078 00 47



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Complaint:

**Hard combustion noise (clattering) when engine cold and warm**

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Cause

Different compression of individual cylinders (as of about 3 bar).

Note

Replacing the injection nozzles does not offer a remedy.

Remedy

Test cylinders for leaks (Repair Instructions Group 01, Op. No. 015), and rectify any leaks.

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Complaint:

**Combustion noise (rumbling) when idling up to about 1300 rpm**

**Engines without exhaust  
gas recirculation**

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Remedy

Set start of delivery to 13° after TDC (GIM method with digital tester).

Replacing injection nozzles does not offer any remedy.

No further remedy possible.

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Complaint:

**Combustion noise accompanied by mechanical noise  
at about 1500 rpm**

**Engines 602, 603  
as of 1.12.91**

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Cause

Axial play of injection timing device.

Diagnostic note

Noise is easily assigned to the injection pump governor.

Remedy

Remove injection timing device, replace, install (see 07.1-8014).

Damage code: 07 111 36

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Designation

Part no.

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Injection timing device

601 070 26 45

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Dished washer

601 990 24 40

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Complaint:

**Engine surges after cold start**

**Engine 603.96  
up to 19.10.94**

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Cause

ESC control module.

Remedy

- 1 Read fault memory.
- 2 Test ESC (see 07.1-2006), testing, adjusting idling speed (see 07.1-2053).
- 3 Install ESC control module with software 10/94 and green dot identification or as of production date 41/94.

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Designation

Part no.

ESC control module with software 10/94 and green dot identification or as of production date 41/94 - automatic transmission.

007 545 96 32

ESC control module with software 10/94 and green dot identification or as of production date 41/94 - manual transmission.

006 545 36 32

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Complaint:

**EGR pipe split between exhaust manifold and EGR valve**

**Engine 603 up to  
18.10.91 with Code 620a  
models with catalytic  
converter**

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Remedy

Replace EGR pipe.

Note

Install new version of EGR pipe.

Damage code: 14 305 06

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Designation

Part no.

EGR pipe

603 142 15 64

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Complaint:

**Engine has occasional power loss**

**Engine 603.971**

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Cause:

Boost air pipe and mixing chamber coked.

Fault code output: EDS control module 

Remedy:

Test vacuum transducer Y31/1 and boost pressure shutoff switchover valve Y31/6 (see RA07.1-1120).

Note:

When performing test step 5.1 of RA 07.1-1120, 11-14V are measured only if short circuit or fault in boost pressure control circuit, otherwise 0.3 - 0.5V.

If no fault can be found, remove boost air pipe and mixing chamber, clean, install.

Damage code: 09 340 24

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Complaint:

**Jerking during load changes**

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Remedy

Install tension/compression damper  
(strengthened version).

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Designation

Part no.

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Tension/compression  
damper

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601 070 14 67

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Complaint:

**Engine vibrates when idling**

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Cause

Excessive idle quantity variation of injection pump.

Note

Replacing engine mounts and injection nozzles does not provide any remedy.

Remedy

Set synchronization of injection pump ( $< 0.5 \text{ mm}^3/\text{stroke}$ ) on injection pump test bench.

Damage code: 07 001 XX setting synchronization.

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Complaint:

Sluggish acceleration when engine cold up to about 2000 rpm

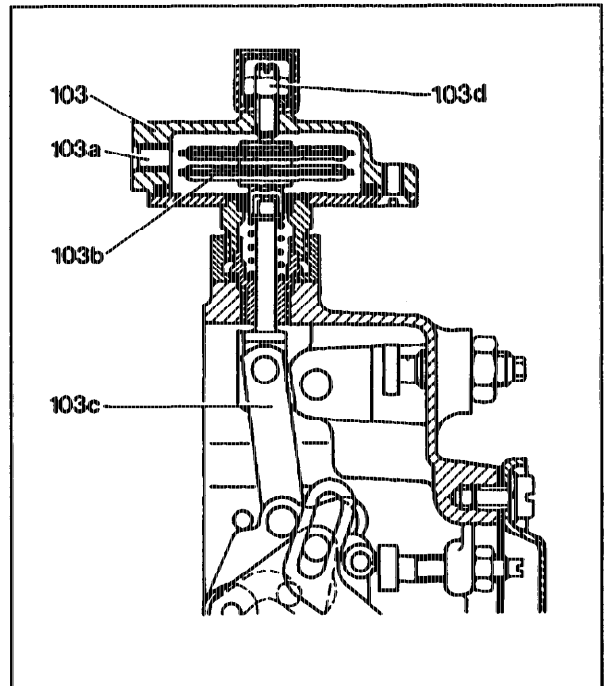
Engines 602.96, 603.96

Cause

- a) Full load stop not correctly set.
- b) Insufficient full load quantity.

Remedy

- a) Check setting of accelerator control linkage, adjust (see RA30-1010).
- b)
  - 1 Remove boost air pipe, install (see RA14-1310).
  - 2 Set full load quantity at barometric pressure compensation unit:
    - Take off cap (black) on barometric pressure compensation unit (103).
    - Slacken lock nut (103d).
    - Use a screwdriver to turn setting screw about 1/4 turn to the left.
    - Tighten lock nut (103d).
    - Fit on cap.



P07.11-0003-02

Complaint:

Drop in power when driving at park load

Engine 602.96 with Code  
(620a) models with  
catalytic converter

Cause

The boost pressure control is switched off by the EDS control module because of a delay in operation of the switchover valve (Y27/5).

Note

After switching off engine or ignition: switching off, on eliminates the problem briefly but does not rectify the cause.

Remedy

Remove switchover valve (Y27/5), replace, install.

Damage code: 54 485 XX delay switch.

| Designation                      | Part no.      |
|----------------------------------|---------------|
| Switchover valve, make<br>Binder | 001 540 86 97 |

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Complaint:

**Starter has to be cranked for some time before engine starts after being switched off for lengthy time (e.g. overnight), has poor throttle response and cuts out again immediately.**

**Engine 602.96 with manual transmission in Model 124, also applies to models with retrofitted immobilizer**

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Cause

Vapor bubbles in fuel pipes.

Damage code: 82 815 XX

Remedy

- 1 Replace check valve.
- 2 Convert fuel pipes upstream and downstream of check valve (because of installation position).

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| Part                         | Part no.      |
|------------------------------|---------------|
| Check valve (black anodized) | 000 476 37 32 |
| Hose clip<br>Qty.: 4         | 003 997 90 90 |

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Complaint:

**Fault code 2 appears when reading EDS fault memory although no fault exists**

**Engine 602.96 as of 1.6.91 with Code (620a) models with catalytic converter**

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Cause

Control module recognizes "no connection at output stage".

Remedy

Ignore fault code.

Note

Control modules as of manufacturers date of production 168 in order.

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Complaint:

Poor engine output, sluggish acceleration, top speed is not reached.

Remedy

1 Check full load stop, adjust  
(see RA 07.1-1100).

2 Perform speedometer comparison on roller  
dynamometer (see RA 07.1-1203).

Note

Perform speedometer comparison at about  
160 km/h. If the difference is not within  
tolerance, calibrate speedometer.

3 Test start of delivery (see RA 07.1-8240,  
RA 07.1-8244).

4 Adjust start of delivery (see RA 07.1-8300).

5 Test max. engine speed at no load  
(see RA 07.1-1203).

6 Set max. engine speed to top tolerance limit  
by turning hexagon socket bolt (2m) to the right.

Note

1/2 turn equals 150 rpm.

7 Test full load CO (see RA 07.1-1203). If full  
load quantity is  $< 0.1\%$ , increase the full load  
quantity.

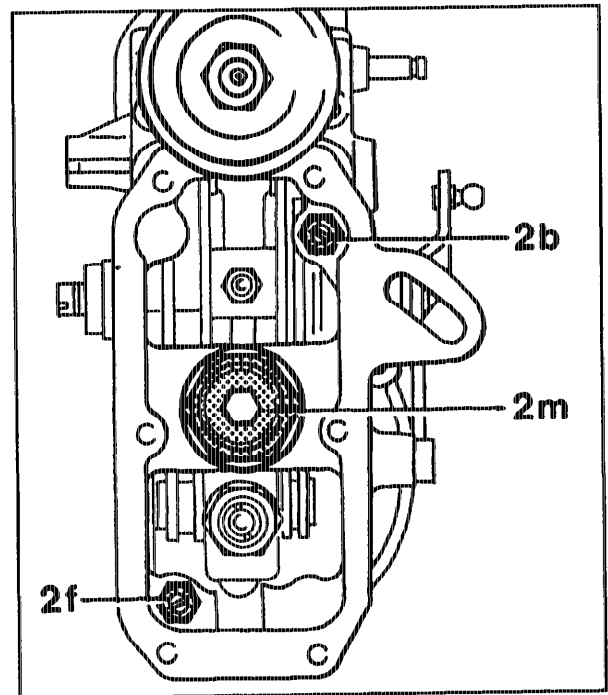
Note

On models with the exhaust gas recirculation  
(Code 620), it is not possible to measure full  
load CO at the tailpipe. A single adjustment  
should be performed. If this does not result in  
any increase in engine output, continue with step  
9.

8 Increase full load quantity.

a) **Engines without anti-jerk control (AJC):**

- Turn slotted screw (2f) about 1/4 turn to the  
left.



P07.11-0001-15

**b) Engines with anti-jerk control (AJC):**

- Remove AJC servomagnet (Y22/3) and flange.

Note

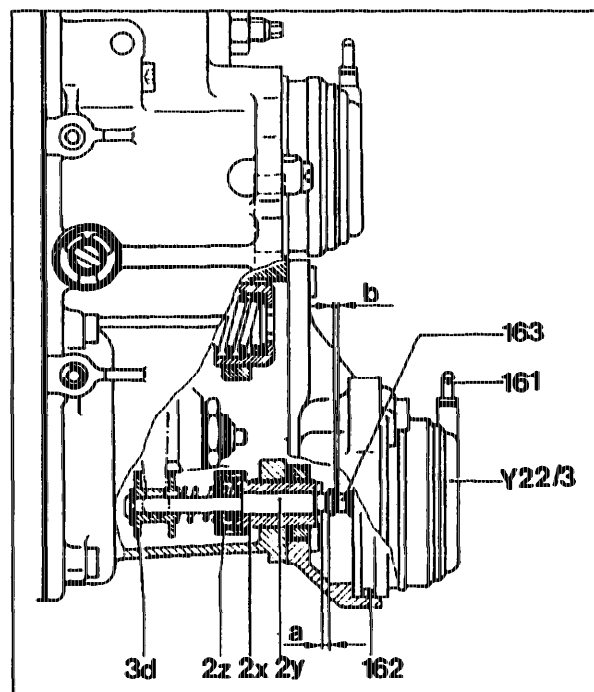
Use T30 Torx. Screws are microencapsulated.

- Slacken lock nut of sliding pin (2y).
- Turn sliding pin (2y) about 1/4 turn to the left.
- Tighten lock nut of sliding pin (2y).
- Bolt on flange and insert servomagnet (Y22/3) without O-ring (162).

Note

When inserting servomagnet, no resistance should be felt; shorten lift rod (163) of servomagnet (Y22/3) up to max. 0.3 mm if necessary.

- Install servomagnet (Y22/3) with O-ring (162).
- Check injection pump for leaks.



P07.11-0002-15

**9 Models with exhaust gas recirculation (Code 620):**

- Remove injection pump, install (see RA 07.1-8410).
- Set injection pump on injection pump test bench.

## 09 Turbocharger, Air Cleaner

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Complaint:

**Oil leak and gasket between boost air distribution pipe and cylinder head** Engines 602.96, 603.96

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### Cause

Gasket between boost air distribution pipe and cylinder head.

### Remedy

Install modified gasket.

### Notes

A slight leakage of oil (sweating) corresponds to the normal condition and is not a problem.

Replacing the turbocharger does not offer any remedy.

If oil leakage is severe, see AF01.30-4040AU

| Part                   | Part no.         |
|------------------------|------------------|
| Gasket (engine 602.96) | 602 141 02 80 05 |
| Gasket (engine 603.96) | 603 141 02 80 05 |