

# Service Information

Caterpillar Motoren GmbH & Co. KG product support information for medium-speed engines

Engine platform: M43  
Engine section: Sensors

Engine type: M46DF  
Validity: until further notice

No. 0017 • Issue 1; August 08, 2019

Information for engine operating and servicing personnel

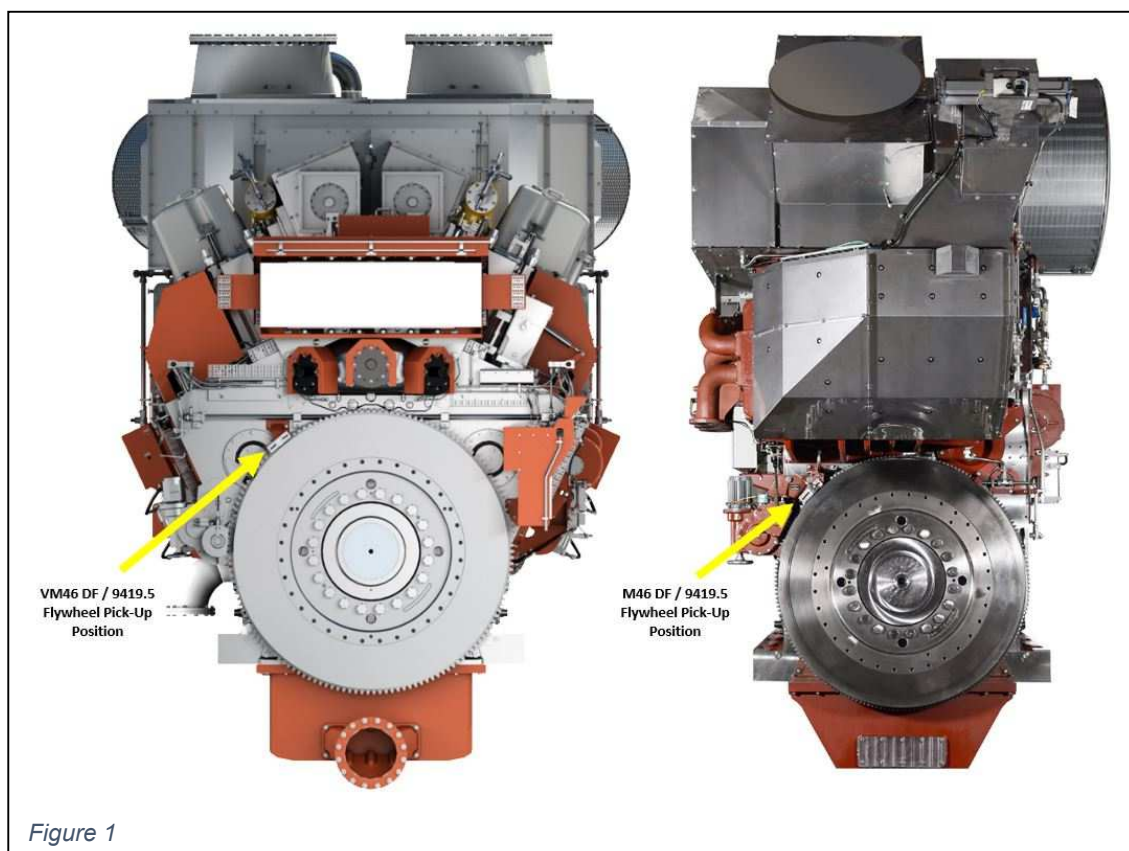
Action: for your information

## Engine speed flywheel pickup adjustment

The M46 DF / VM46DF engines are equipped with engine speed sensors installed above the flywheel (see figure 1). In case these speed sensors are adjusted with the standard speed sensor clearance it might happen that the signal will be inverted which leads to a misinterpretation by the ICPM (In Cylinder Pressure Monitoring). As a consequence a SHOGE (SHut Off Gas supply Engine) is released and the engine changes from gas mode over to diesel mode. A solution for this unwanted effect is the new pick-up clearance for speed monitoring at the flywheel. The clearance of this speed pickup is:

$$s = 2.5 \pm 0.1 \text{ mm.}$$

Please find a new job card attached to this Service Information. Please exchange the old job card in your engine manual by this new one.



Caterpillar Motoren GmbH & Co. KG, Kiel, Germany • Phone: +49 (0) 431 3995-3197 • E-mail: ju\_tecservice@cat.com



See also:

Spare parts sheets:

**Personnel requirement:** 1 pers.

**Personnel qualification:** Skilled engine hand

**Operating medium:** Every fuel

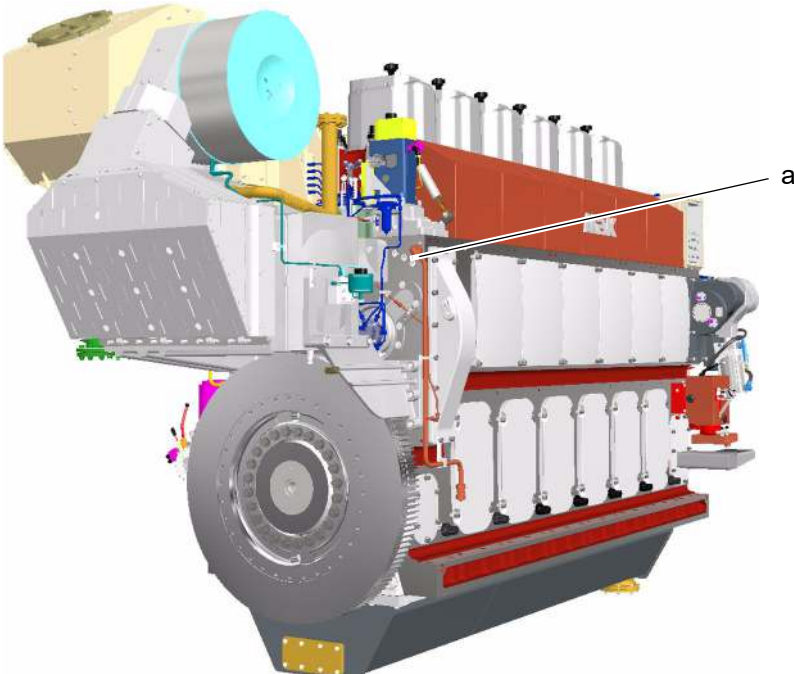
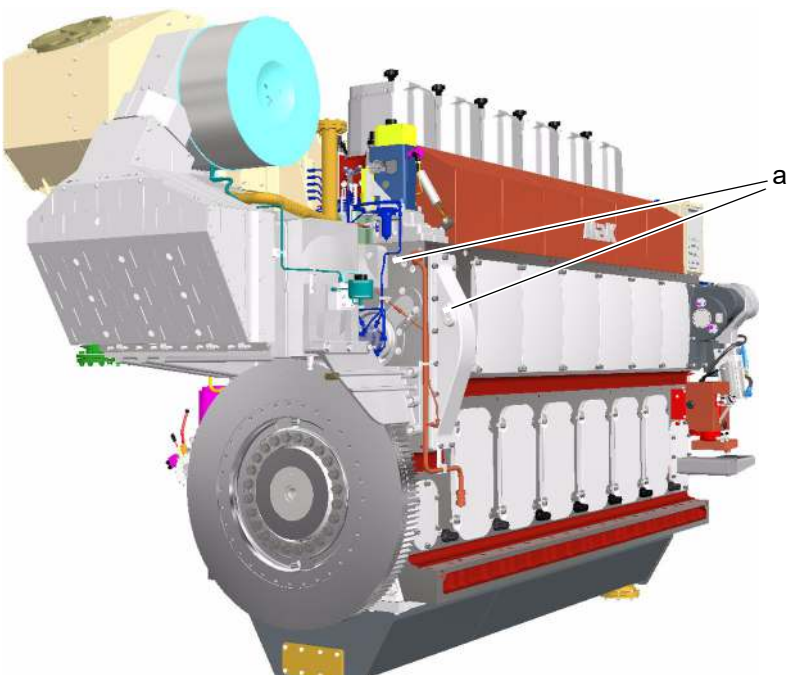
## Activities:

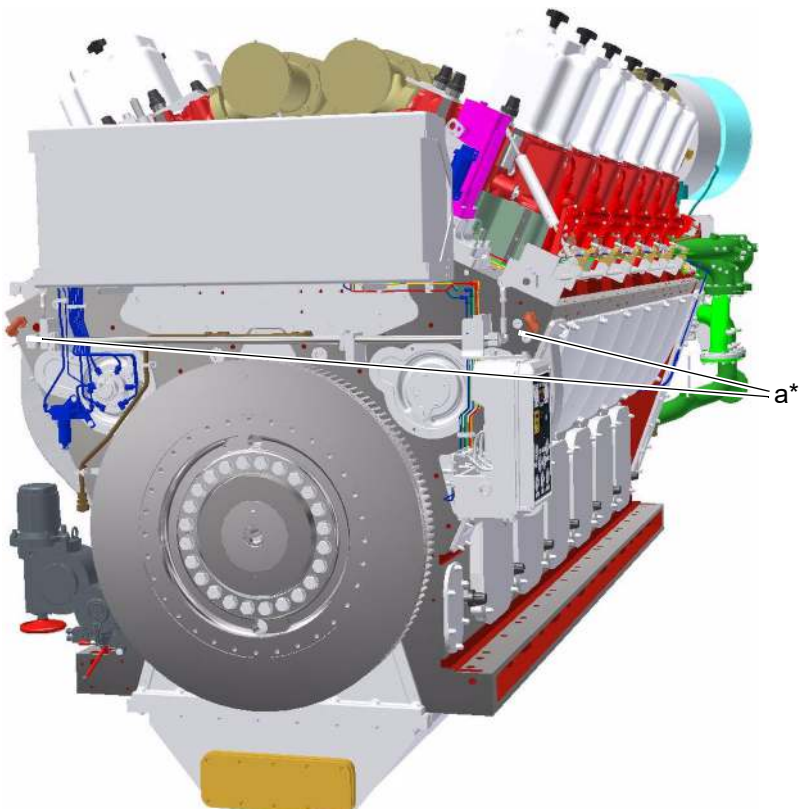
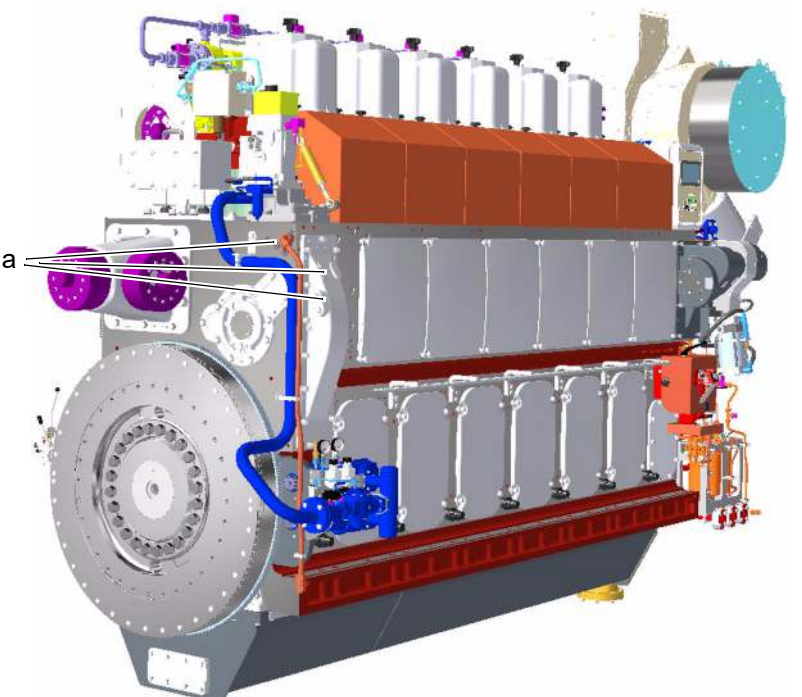
1. Replace the speed pick-up

Engine type	Tools and auxiliary materials	Pos.	Tool No.	
M 43 C / M 46 DF / VM 43 C	Torque wrench 20-200 Nm	W1	1.9454-202	**
M 20 C / M 25 C / M 32 C / M 32 E / M 34 DF / VM 32 C / GCM34 / VM 46 DF	Torque wrench 20-200 Nm	W1	1.9454-202	** / ***
M 20 C / M 25 C / M 32 C / M 32 E / M 34 DF / GCM34 / M 43 C / M 46 DF / VM 32 C / VM 43 C / VM 46 DF	Molykote paste "G-Rapid Plus"		1.9493-001	*
* or equivalent product				
**) no picture				
***) not included in the standard tool kit				

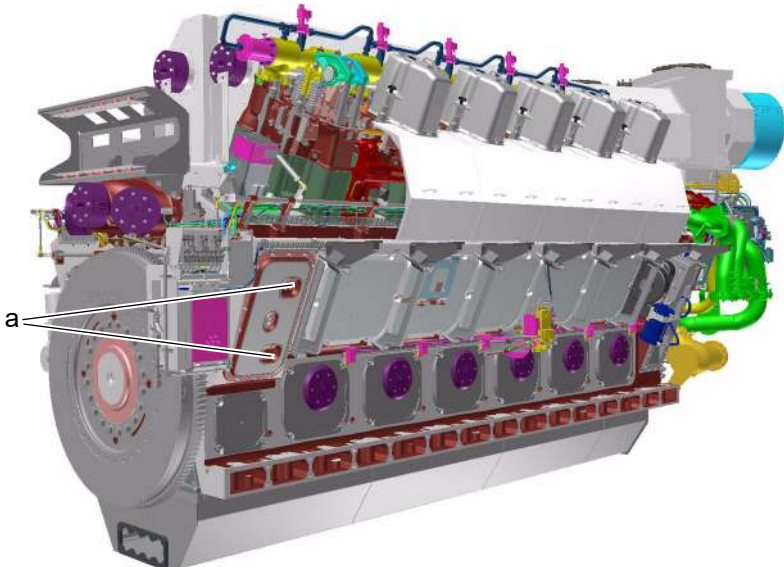
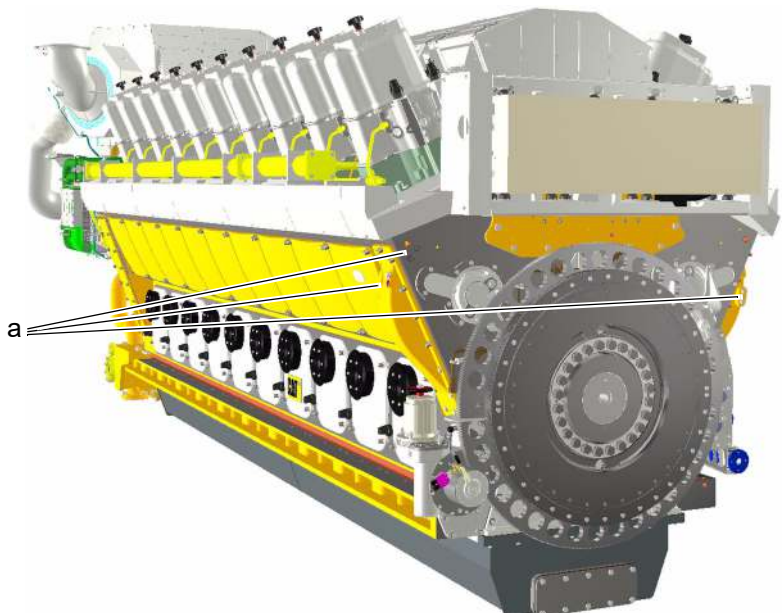
	NOTE
	Exactly observe the installation sequence to ensure correct function of the speed pick-up (3/3). Pay particular attention to the alignment of the marking / LED (3/1) to the travel of the gear.

	NOTE
	Both the measuring point number and the point of installation of the pick-up to be replaced can be found in "Electrical Engine Equipment" and "List of Measuring Points", see <b>engine documentation, chapter 7 "Control and Monitoring"</b> , of the respective engine.  As a rough orientation the following figures show examples of possible points of installation (1/a) of the speed pick-ups for the different engine types.

Engine type	Fig. 1 Schematic diagram
M 20 C M 25 C M 32 C	
M 25 E M 32 E	

Engine type	Fig. 1 Schematic diagram
VM 32 C	
*On VM 32 C engines the point of installation may vary (right or left at the driving end).	
M 34 DF	



Engine type	Fig. 1 Schematic diagram
M 43 C VM 43 C M 46 DF VM 46 DF	
GCM34	

## 1. Replace the speed pick-up

1.1 Secure the engine to prevent unintentional starting.

### Conventional diesel engine:

- Interrupt the starting air supply.
- Switch off and block the fuel supply to the engine.
- Throw and secure the emergency stop lever.
- Set the selector switch at the control stand to "Repair" (depending on equipment).

### Dual fuel engine:

- Interrupt the starting air supply.
- Switch off and block the fuel supply to the engine.
- Set the selector switch at the control stand to "Repair" (depending on equipment).

### Gas engine:

- Interrupt the starting air supply.
- Mechanically block the main shut-off valve of the gas valve unit.
- Set the key switch at the "Local Data Board" to "OFF".
- Remove the key.

1.2 Remove the cable clamps of the speed pick-up cable.

1.3 Disconnect the electrical connector (3/5) to the speed pick-up (3/3) and loosen the locknut (3/2).

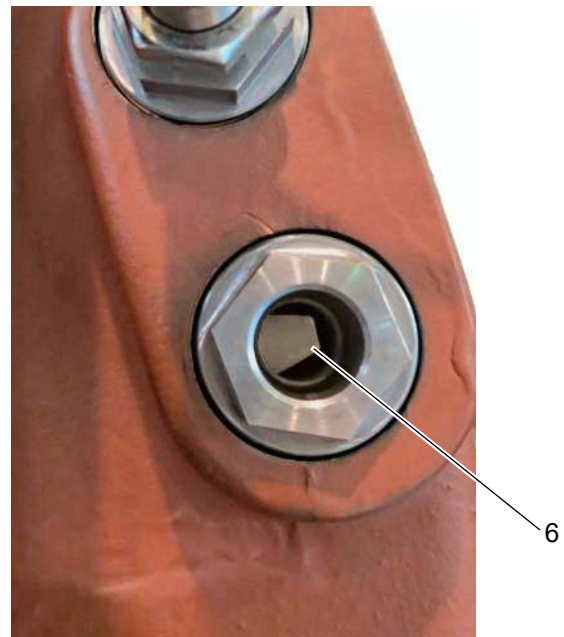
1.4 Unscrew the speed pick-up (3/3) completely. In doing so, make sure the pick-up cable is not twisted.

1.5 Bar the engine to the appropriate installation position. The gear tooth (2/6) must be fully visible and at central position with respect to the installation hole of the speed pick-up (3/3).

1.6 When replacing the speed pick-up (3/3) make sure the **new** speed pick-up is identical in construction to the pick-up used before.

1.7 Apply a thin coat of Molykote to the thread of the **new** speed pick-up (3/3).

1.8 If necessary, screw the locknut (3/2) onto the **new** speed pick-up (3/3).



2

Schematic diagram

Installation situation	Fig. 3 Schematic diagram
Axial installation	<p>Direction of rotation of the gear in the figure "Axial installation" is clockwise.</p>
Radial installation	<p>Direction of rotation of the gear in the figure "Radial installation" is clockwise.</p>



## CAUTION

### Risk of cable break due to twisting!

Twisting of the pick-up cable while screwing in the speed pick-up may result in "cable break". Prevent twisting of the cable by appropriate measures.

In case of counter-clockwise direction of rotation the pick-up must be installed so as to be turned by 180° (LED opposite).



### NOTE

The lead of the pick-up thread can be used as reference for correct adjustment of the desired clearance.

Example: Thread lead: 1.5 mm; desired clearance: 1.5 mm

One full rotation of the pick-up corresponds to 1.5 mm.

- 1.9 Carefully screw in the **new** speed pick-up (3/3) until it contacts the gear.
- 1.10 Then unscrew the speed pick-up until the required clearance (s) between gear (3/4) and pick-up surface is obtained.  
The standard value is **s = 1.5 ±0.5 mm**; however, due to factors such as thread lead, necessary alignment (marking / LED) and end clearance of the camshaft the adjustment value may differ.  
The specified pick-up clearances can be found in the **engine documentation, chapter 7 "Control and Monitoring" -> "Electrical Engine Equipment"**.



### CAUTION

**Observe the flywheel pick-up clearance for M 46 DF / VM 46 DF!**

The pick-up clearance for speed recording at the flywheel for M 46 DF engines must be adjusted to **s = 2.5 +/- 0.1 mm**. If the pick-up clearance is not observed, the speed recording signal may be inverted.

- 1.11 Check the installation position of the speed pick-up (3/3):
  - 1.11.1 The marking / LED (3/1) **must** be positioned parallel to the travel path/direction of the respective gear (see **Fig. 3**; pay attention to whether installation is axial or radial).  
If necessary, unscrew or screw in the speed pick-up (3/3) somewhat more in order to reach the correct position. In doing so, choose the shorter way. The maximum allowable deviation is **+/- 15°**.
- 1.12 Tighten the locknut (3/2) with a torque of **30 Nm (22 lb ft)** making sure that the speed pick-up (3/3) does not get twisted.
- 1.13 Connect the electrical connector (3/5) of the speed pick-up (3/3). In doing so, make sure the plug-in contact is properly locked (palpable overcoming of the locking, crackling in the connector).
- 1.14 Mount the speed pick-up cable and the electrical connector properly with cable clamps / tie wraps making sure not to damage the pick-up cable by kinking / pulling over edges.



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- 1.15 Lift the measures for securing the engine to prevent unintentional starting.

**04**

**Conventional diesel engine:**

- Reestablish starting air supply.
- Set the emergency stop lever to operating position.
- Reestablish fuel supply to the engine.
- Set the selector switch at the control stand to "Engine" or "Remote".

**Dual fuel engine:**

- Reestablish starting air supply.
- Reestablish fuel supply to the engine.
- Set the selector switch at the control stand to "Engine" or "Remote".

**Gas engine:**

- Reestablish starting air supply.
- Open the main shut-off valve of the gas valve unit.
- Insert the key into the key switch at the "Local Data Board".