

**Special tools required:**

- 11 8 780

**Attention!**

Aluminium screws/bolts are permitted with and without colour coding (blue).

Aluminium screws/bolts must be replaced each time they are **released**.

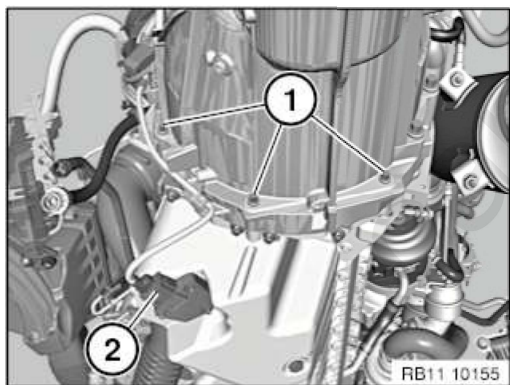
For reliable identification:

Aluminium screws/bolts are **not magnetic**.

Jointing torque and angle of rotation must be observed without fail (**risk of damage**).

**Necessary preliminary work:**

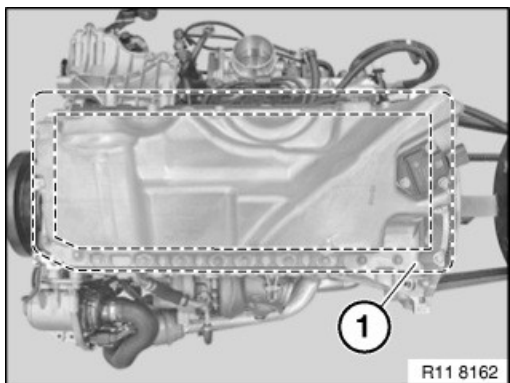
- Drain and add engine oil.
- Remove front axle differential (AWD).
- Removing bearing support (all-wheel drive).
- Lower front axle.
- Removing the engine support arm, left (F30)



Release bolts (1) on transmission.

Tightening torque 11 13 7AZ.

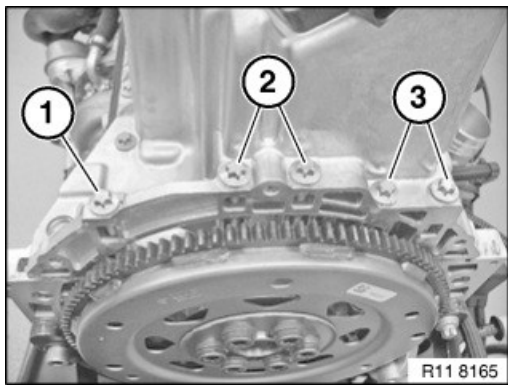
Disconnect plug connection (2) on oil level sensor.



Release bolts along line (1).

If necessary, remove oil level sensor.



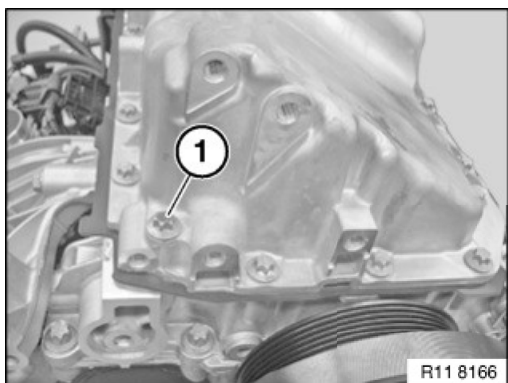


*Installation note:*

Screw (1) M8x92 mm.

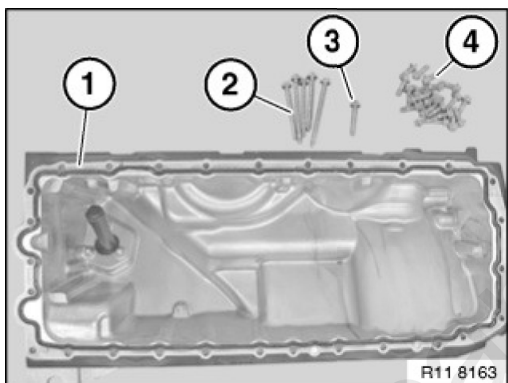
Screws (2) M8x112 mm

Screws (3) M8x92 mm



*Installation note:*

Screw (1) M8x50 mm.



*Installation note:*

**Replacing all O-rings and seals (1).**

Aluminium screws (2) M8x92 mm and M8x112 mm.

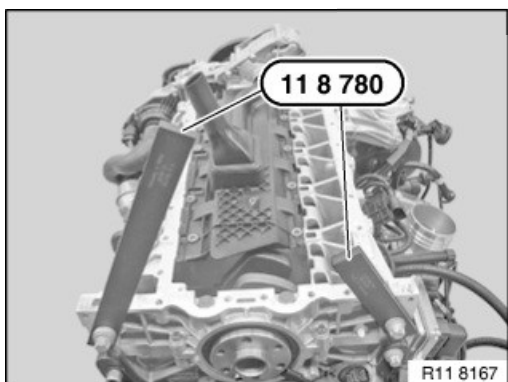
Tightening torque 11 13 3 AZ.

Aluminium screw (3) M8x50 mm.

Tightening torque 11 13 4AZ.

Aluminium screws (4) M8x26 mm.

Tightening torque 11 13 2AZ.

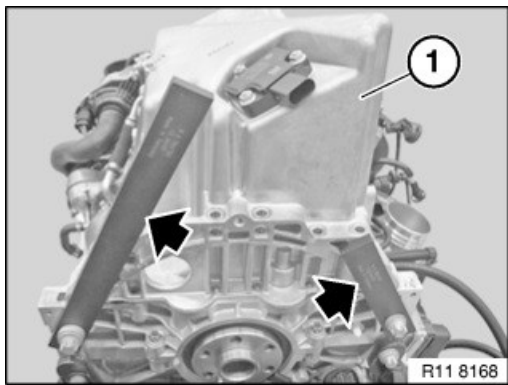


*Installation note:*

Special tool 11 8 780 is only required if gear is not installed as mechanical stop.

Secure special tool 11 8 780 with two bolts on crankcase.





*Installation note:*

Engine removed:

Position oil sump (1) with no gaps until it contacts special tool 11 8 780 .

*Installation note:*

Engine installed:

Position oil sump (1) with no gaps until it contacts gearbox housing.

Bolt on oil sump (1).



Assemble engine.

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## 11 14 015 Removing and installing/replacing sealing cap for oil pump chain tensioner (N55)



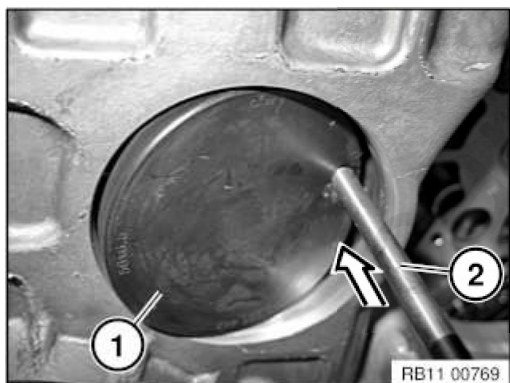
### Special tools required:

- 11 8 530
- 11 8 531
- 11 8 532
- 11 8 533
- 11 8 534
- 11 8 535
- 11 8 537
- 2 318 118
- 2 318 119



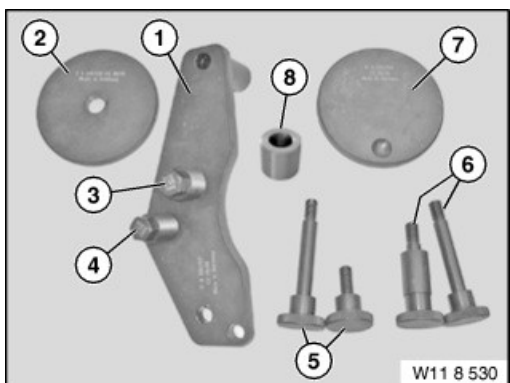
### Necessary preliminary work:

- Remove fan cowl.
- Remove drive belt for alternator.
- Remove both drive belt tensioning devices (hybrid car).
- Remove vibration damper.



Drive out sealing cap (1) with a suitable punch (2) in direction of arrow. *Note:*

The sealing cap is driven out diagonally during this operation.



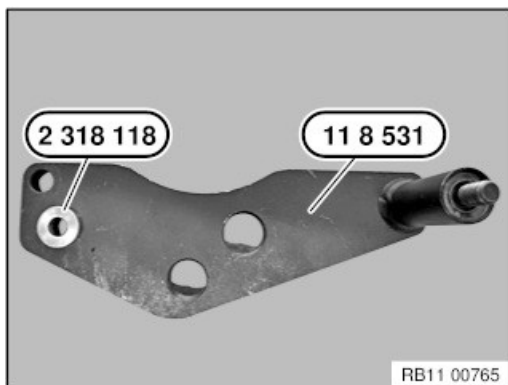
### Removing sealing cap:

Prepare special tool 11 8 530 .

Remove special tool 11 8 533 from special tool 11 8 532 and 11 8 534 .

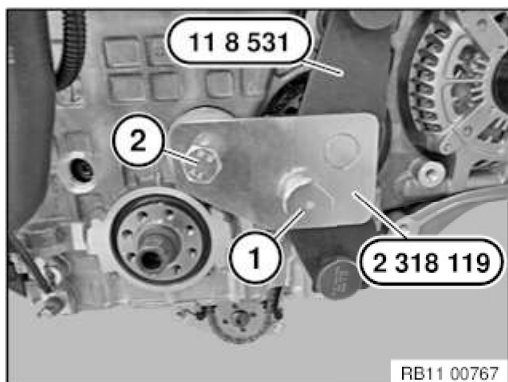
Special tool 11 8 536 is not required.





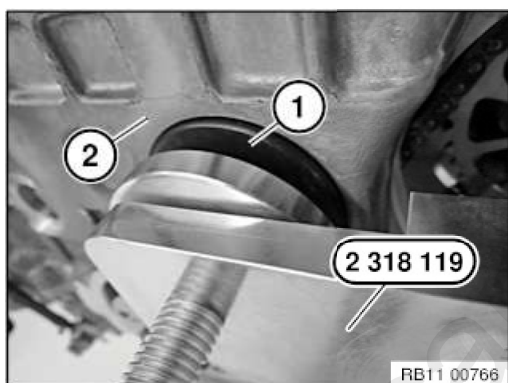
Special tool 2 318 118 is magnetic.

Secure special tool 2 318 118 on special tool 11 8 531 (refer to graphic).

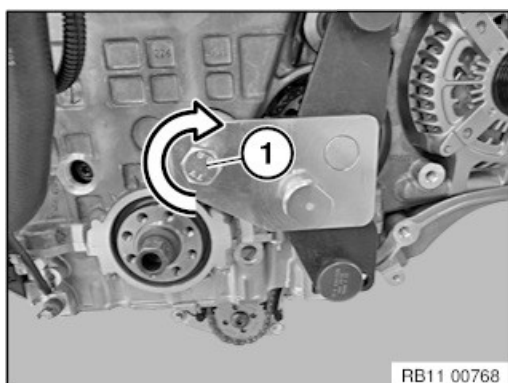


Screw back screw (2) on special tool 2 318 119 .

Install special tool 2 318 119 with screw (1) on special tool 11 8 531 .



Position sealing cap (1) on crankcase (2).



#### Installing sealing cap:

Screw in screw (1) on special tool 2 318 119 up to limit position.

Tightening torque 20 Nm.



Assemble engine.

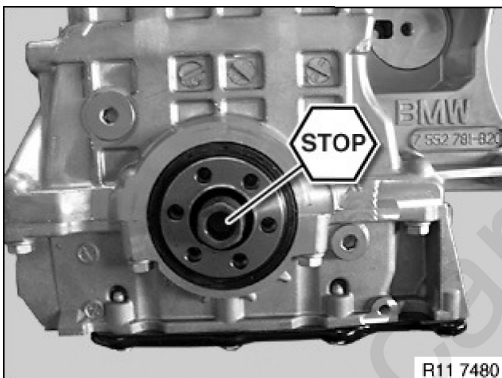


**Special tools required:**

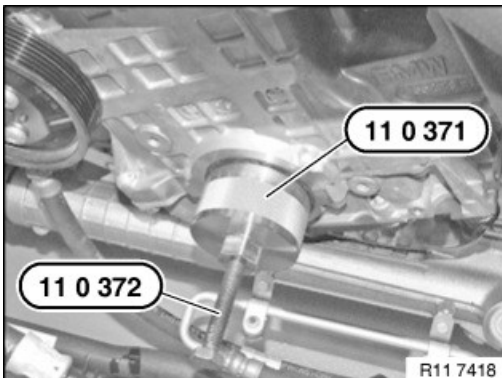
- 11 0 371
- 11 0 372
- 11 4 370
- 11 9 221
- 11 9 222
- 11 9 224
- 11 9 231
- 11 9 233
- 11 9 234
- 11 9 235

**Necessary preliminary tasks:**

- Remove vibration damper

**Attention!****Do not release central bolt.**

If the central bolt is released, the sprockets of the timing chain and the oil pump will no longer be non-positively connected to the crankshaft. Intake and exhaust camshafts can turn in relation to crankshaft.

**Risk of damage!**

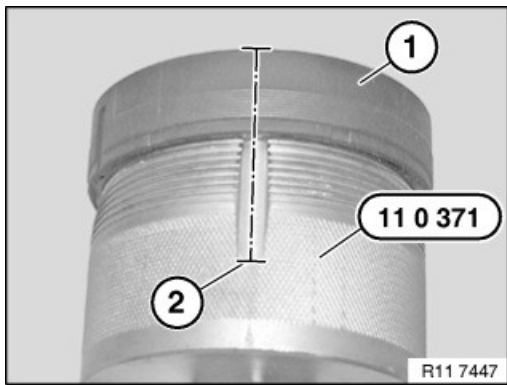
Screw special tool 11 0 371 with 80 Newton metres into the crankshaft seal.

Screw in spindle 11 0 372 .

Release crankshaft seal from housing.

Repeat the operation several times if necessary.





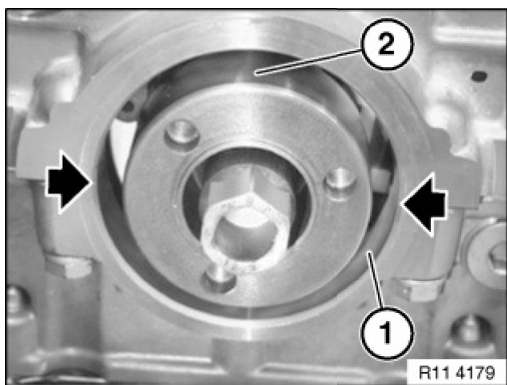
Carefully saw open crankshaft seal (1) at cutting line (2).  
Remove crankshaft seal (1) from special tool 11 0 371 .



#### Attention!

The following text describes installation and sealing between the engine block and crankshaft seal.

The engine block will not be leak proof at the outside of the crankshaft seal if you fail to comply with the individual work steps and the work sequence.

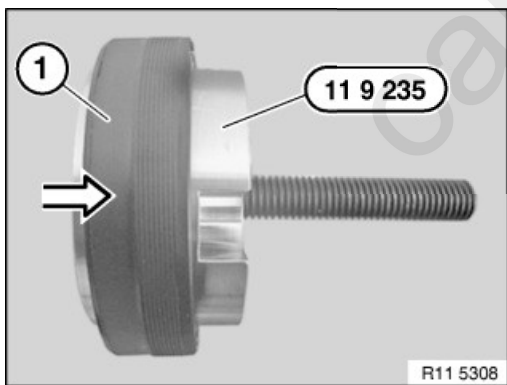


#### Installation note:

Clean sealing surface (1) and degrease thoroughly in area of housing partition.

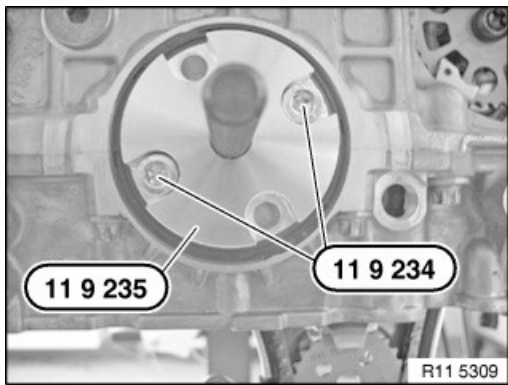
Apply a light coat of oil to running surface (2) of crankshaft seal.

Graphic N42.



Push radial shaft seal (1) 11 9 235 carefully in direction of arrow on the special tool .



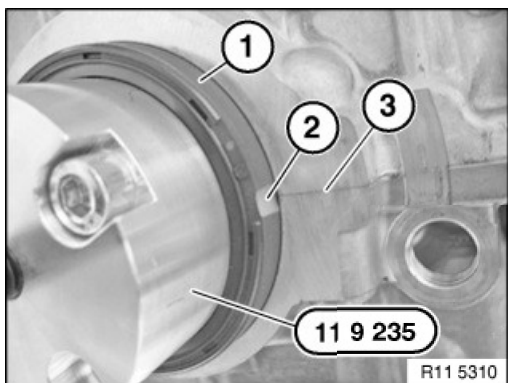


### Attention!

11 9 235 Special tool can only be fastened with  
2 opposite bolts.

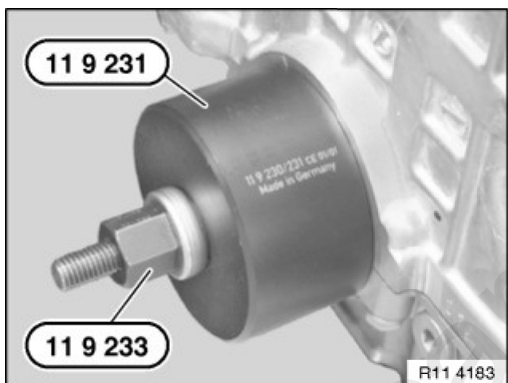
Determine hole pattern on special tool.

Screw special tool 11 9 235 with special tool 11 9 234 on crankshaft.

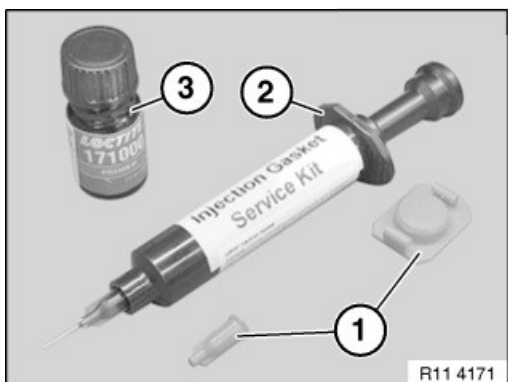


Align groove (2) of radial shaft seal (1) centred to the housing  
partition (3). **Attention!**

After installation, the grooves must be filled with sealing compound.



Draw in radial shaft seal with special tool 11 9 231 in conjunction with  
special tool 11 9 233 until flush.



### Installation note:

Use primer 1.3 and liquid seal 1.4.

Prepare liquid sealing compound (1) in special tool 11 4 370 .

Remove sealing caps (1) from injector (2).

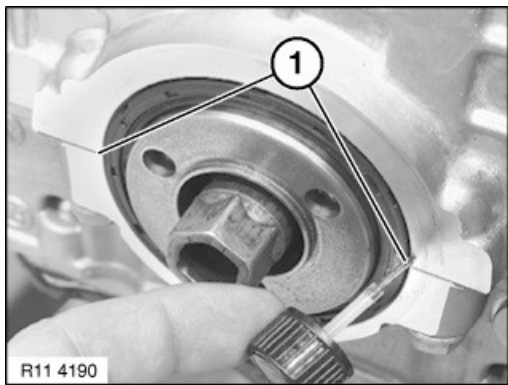
Screw on metering needle.

Insert piston for pressing out.

Syringe (2) contains the sealing compound Loctite, manufacturer's  
number 128357.

Bottle (3) contains the primer Loctite, manufacturer's number 171000.

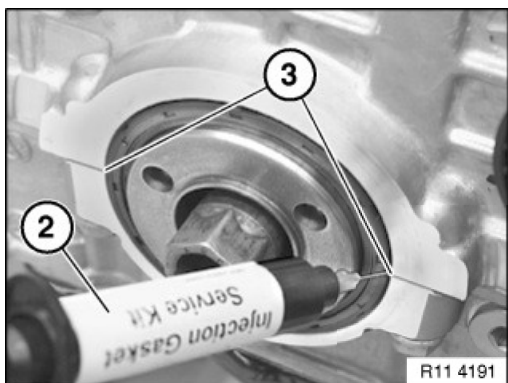




Before filling with sealing compound:

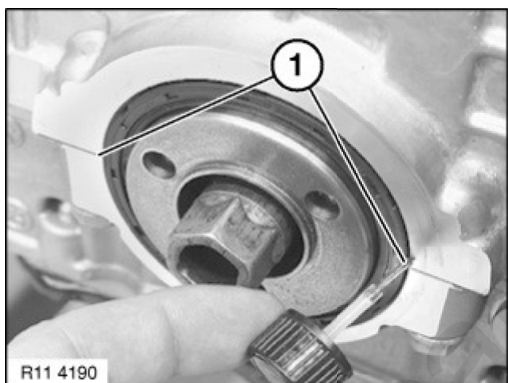
Moisten brush with Loctite primer, manufacturer's number 171000. Insert brush as far as possible into grooves (1) on crankshaft seal in order to coat housing partition on engine block.

Graphic N42.



Using syringe (2), fill both grooves (3) flush with Loctite sealing compound, manufacturer's number 128357.

Graphic N42.



*Note:*

Loctite primer, manufacturer's number 171000, binds the Loctite sealing compound, manufacturer's number 128357, and prevents leakage.

Coat surface of sealing compound in both grooves (1) with Loctite primer, manufacturer's number 171000.

Graphic N42.



Assemble engine.

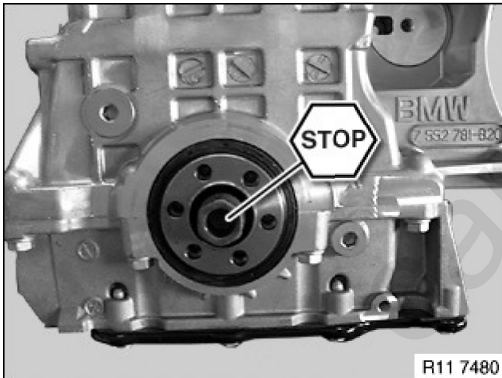


**Special tools required:**

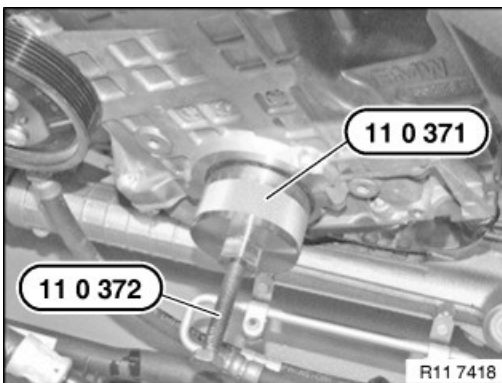
- 11 0 371
- 11 0 372
- 11 4 370
- 11 9 221
- 11 9 222
- 11 9 224
- 11 9 231
- 11 9 233
- 11 9 234
- 11 9 235
- 2 303 795

**Necessary preliminary tasks:**

- Remove vibration absorber.

**Attention!****Do not release central bolt.**

If the central bolt is released, the sprockets of the timing chain and the oil pump will no longer be non-positively connected to the crankshaft. Intake and exhaust camshafts can turn in relation to crankshaft.

**Risk of damage!**

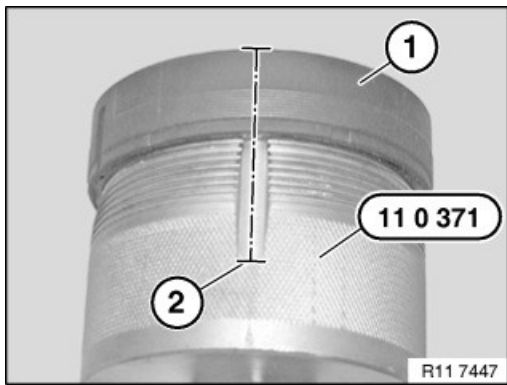
Screw special tool 11 0 371 to 80 Nm into crankshaft seal.

Screw in spindle 11 0 372 .

Release crankshaft seal from housing.

Repeat the operation several times if necessary.





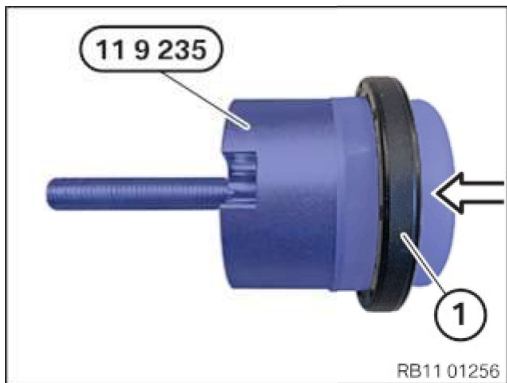
Carefully saw open crankshaft seal (1) at cutting line (2).  
Remove crankshaft seal (1) from special tool 11 0 371 .



#### Attention!

The following text describes installation and sealing between the engine block and crankshaft seal.

The engine block will not be leak proof at the outside of the crankshaft seal if you fail to comply with the individual work steps and the work sequence.

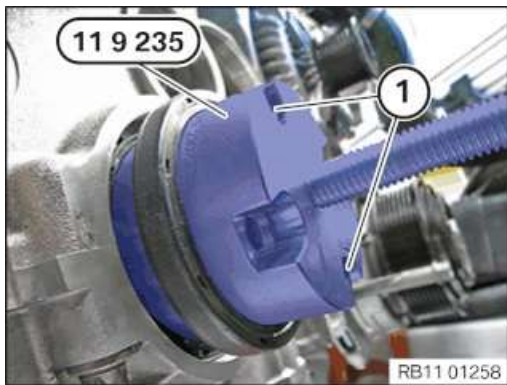


Push radial shaft seal (1) 11 9 235 carefully in direction of arrow on the special tool .



Remove support ring (1).

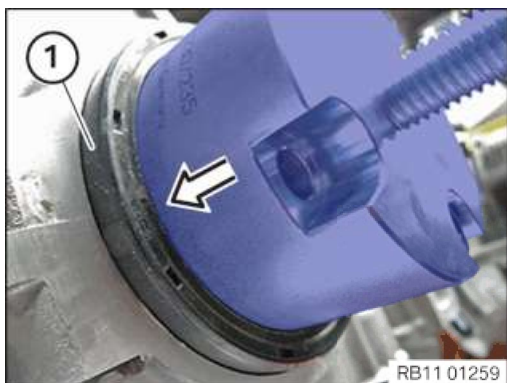




**Attention!**

Special tool 11 9 235 can only be fastened with  
2 opposite bolts.  
Determine hole pattern on special tool.

Fasten special tool 11 9 235 onto crankshaft by 2 screws (1).



Position radial shaft seal (1) on crankcase in direction of arrow using  
special tool 11 9 235 .



Insert radial shaft seal flush into crankcase with special tool 11 9 231 and  
2 303 795 .



Assemble engine.

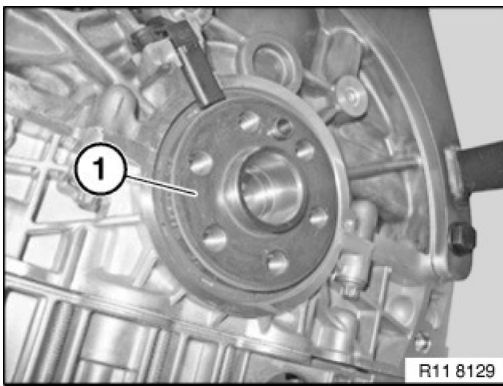


**Special tools required:**

- 11 8 220
- 23 0 490
- 11 9 180
- 11 9 183

**Necessary preliminary work:**

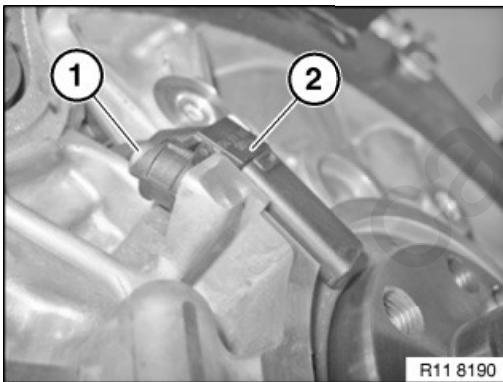
- Remove flywheel

**Important!**

Magnet wheel (1) is magnetic.

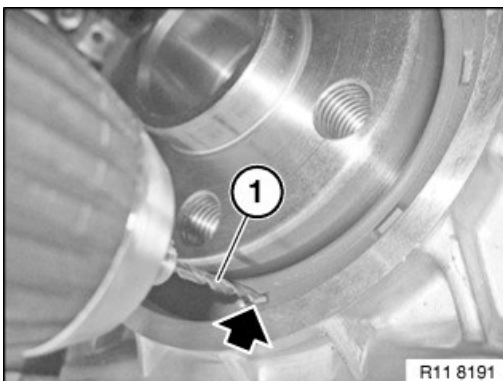
Keep magnet wheel (1) in a plastic bag away from swarf.

Remove magnet wheel (1) from crankshaft.



Release screw on pulse sensor (1).

Slide pulse sensor (2) upwards.

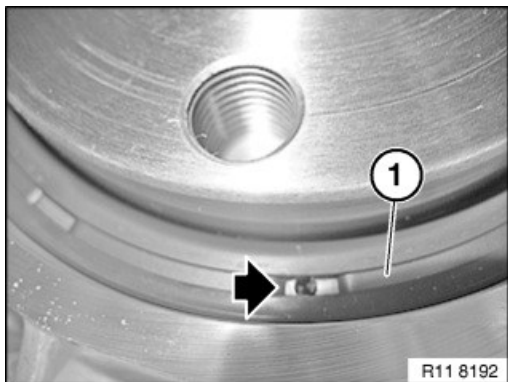
**Important!**

Drill size maximum 2.5 millimetres.

Remove swarf immediately.

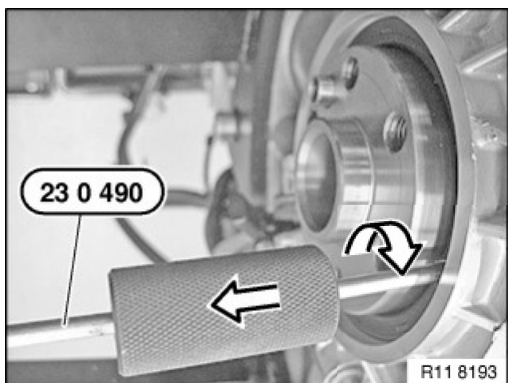
Drill a hole with a drill (1) in the radial shaft seal (see arrow).





**Important!**

Immediately carefully remove swarf on the radial shaft seal (1).

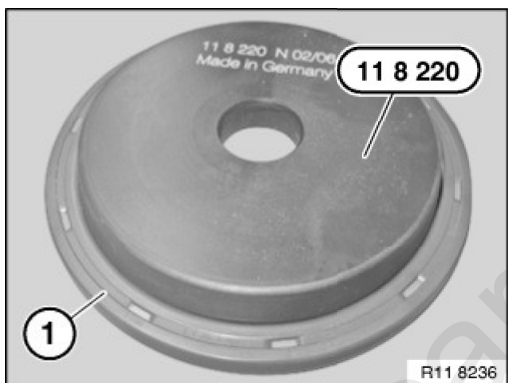


Screw in special tool 23 0 490 in direction of arrow.

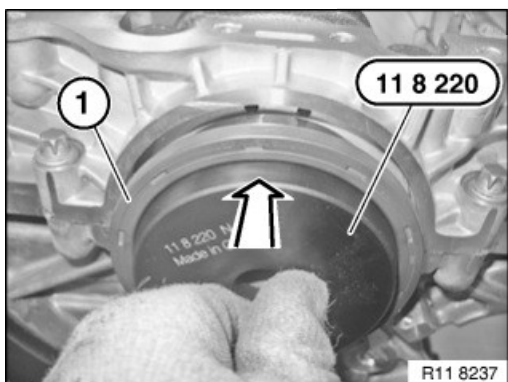
Drive out radial shaft seal with impact weight in direction of arrow.

**Important!**

Immediately carefully remove residual swarf.

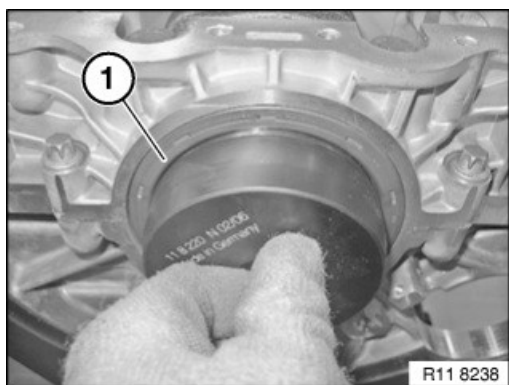


Prepare radial shaft seal (1) on special tool 11 8 220 .

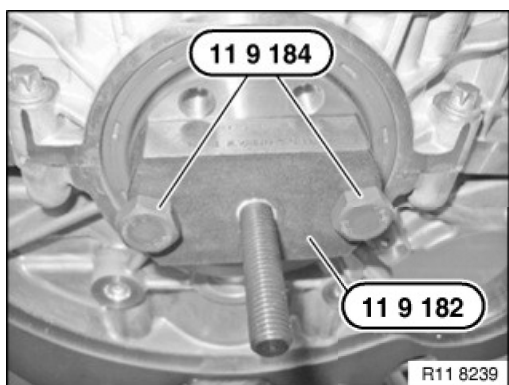


Position the radial shaft seal (1) with special tool 11 8 220 on the crankshaft.

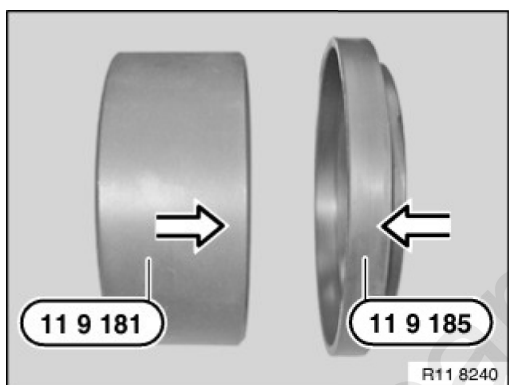




Brush radial shaft seal (1) over the special tool 11 8 220 .  
Move radial shaft seal (1) parallel up against the crankcase.

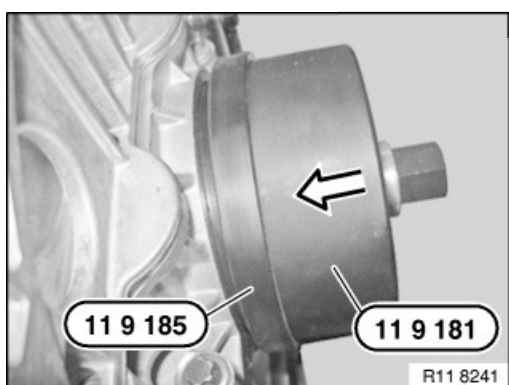


Secure special tool 11 9 182 to crankshaft with special tool 11 9 184 from set of special tools 11 9 180 .



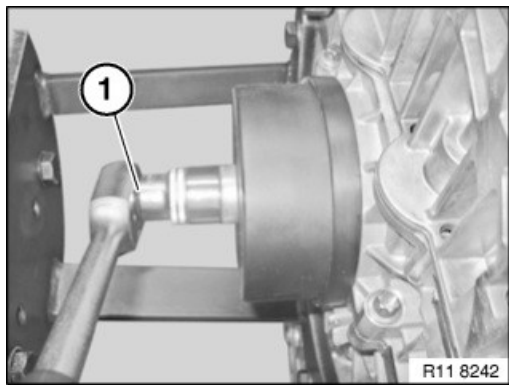
*Installation note:*  
Prepare special tool 11 9 181 from set of special tools 11 9 180 for installation.

Connect special tool 11 9 185 to special tool 11 9 181 from set of special tools 11 9 180 .



Pull in radial shaft seal with special tool 11 9 181 and 11 9 185 in conjunction with special tool 11 9 183 from set of special tools 11 9 180 .





Screw on radial shaft seal with special tool 11 9 183 to limit position.



Remove all special tools.  
Assemble engine.

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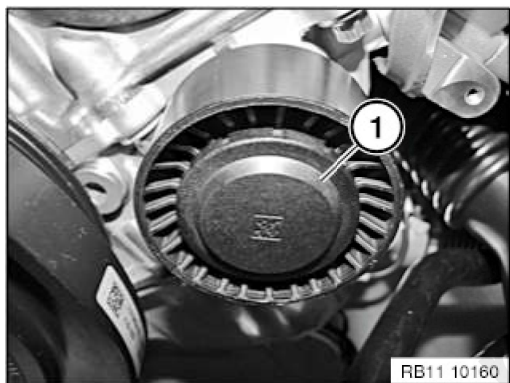


**Special tools required:**

- 11 8 530
- 11 8 531
- 11 8 532
- 11 8 533
- 11 8 534
- 11 8 535
- 11 8 537

*Necessary preliminary work:*

- Remove fan cowl.
- Remove drive belt tensioning devices.

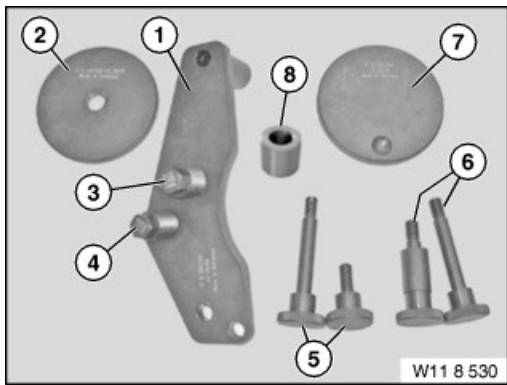


Remove cover (1) from deflecting element.



Release screw (1) and remove deflecting element.  
Tightening torque 11 28 2AZ.





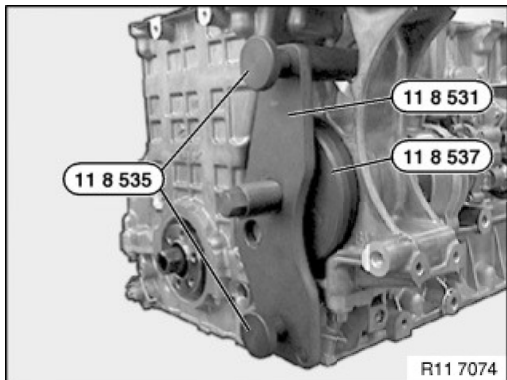
### Removing sealing cap:

Prepare special tool 11 8 530 .

Remove special tool 11 8 533 from special tool 11 8 532 .

Install special tool 11 8 534 .

Special tool 11 8 536 is not required.

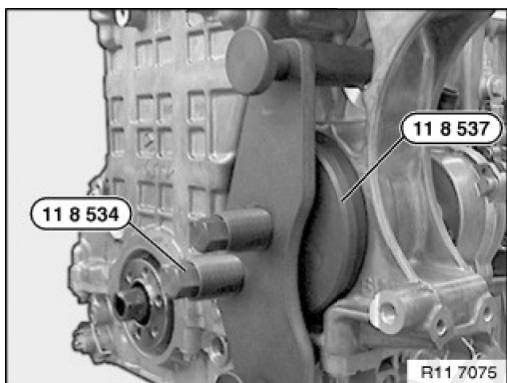


Attach special tool 11 8 531 to long special tool 11 8 535 .

Short special tool 11 8 535 (short); a 6 mm thick M10 washer must be placed underneath between crankcase and special tool 11 8 531 .

*Note:*

For purposes of clarity, graphics show alternator and power steering pump removed.

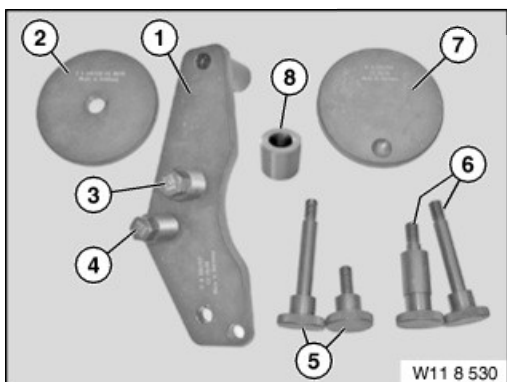


Special tool 11 8 537 must be positioned manually on sealing cap.

Screw in special tool 11 8 534 .

*Note:*

The sealing cap is pressed out diagonally during this work step



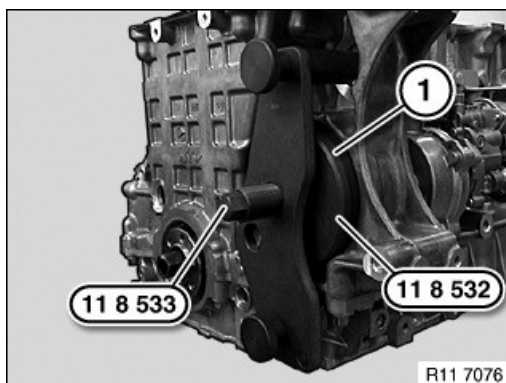
### Installing sealing cap:

Prepare special tool 11 8 530 .

Remove special tool 11 8 534 from special tool .

Install special tools 11 8 533 and 11 8 532 .





Screw in new sealing cap (1) with special tools 11 8 532 and 11 8 533 until flush with crankcase upper part.



Assemble engine.

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**Special tools required:**

- 11 4 180
- 11 9 260
- 11 9 265

**Attention!**

Aluminium screws/bolts must be replaced each time they are **released**.

Aluminium screws/bolts are permitted with and without colour coding (blue).

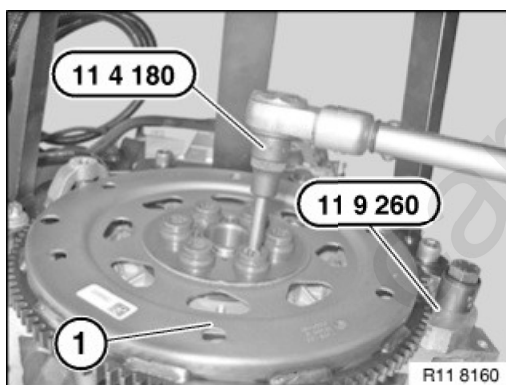
For reliable identification:

Aluminium screws/bolts are **not magnetic**.

Joining torque and angle of rotation must be observed without fail (**risk of damage**).

**Necessary preliminary work:**

- Remove transmission.
- Remove clutch.

**Automatic transmission:**

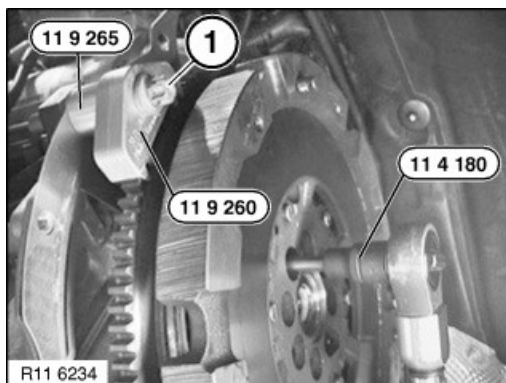
Secure flywheel (1) with special tool 11 9 260 .

Unfasten flywheel bolts.

Tightening torque 11 22 1AZ.

**Installation note:**

Flywheel (1) is secured with an dowel pin.

**Manual gearbox:**

Fasten dual-mass flywheel with special tool 11 9 260 and 11 9 265 .

Release flywheel bolts with special tool 11 4 180 /

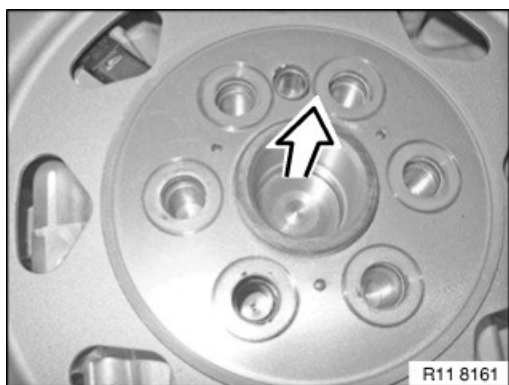
Tightening torque 11 22 2AZ.

**Installation note:**

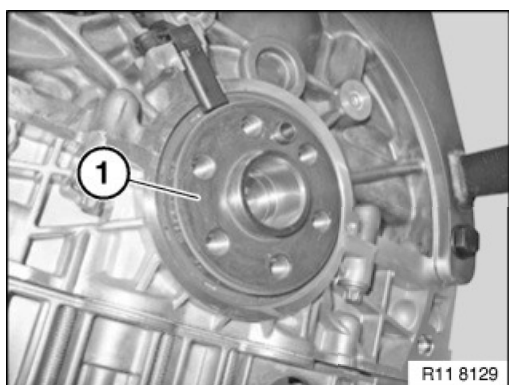
Renew flywheel bolts.

Clean all threads for flywheel bolts in crankshaft.





*Installation note:*  
Pay attention to dowel pin.



*Installation note:*  
Ensure installed position of magnet wheel is correct.



Assemble engine.

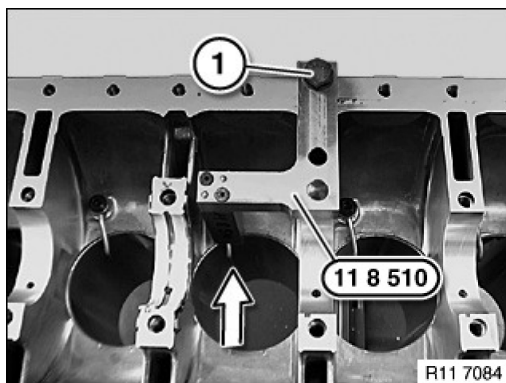


**Special tools required:**

- 00 2 590
- 11 4 470
- 11 8 510

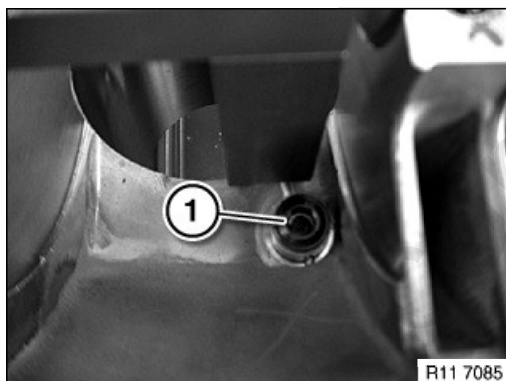
**Necessary preliminary work:**

- Remove crankshaft.

**Checking position of oil spray nozzles:**

Check position of oil spray nozzle according to position on special tool 11 8 510.

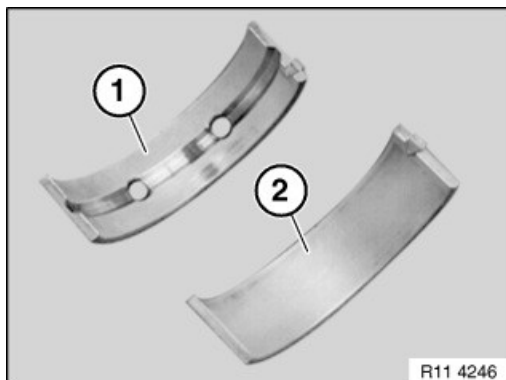
Insert special tool 11 8 510 into main bearing screw connection and secure from turning with screw (1).



If necessary, adjust oil spray nozzles and secure.

Tighten banjo bolt (1).

Tightening torque: 11 11 5AZ.

**Installation note:**

Bearing shell (1) with lubricating groove must be fitted in upper section of crankcase.

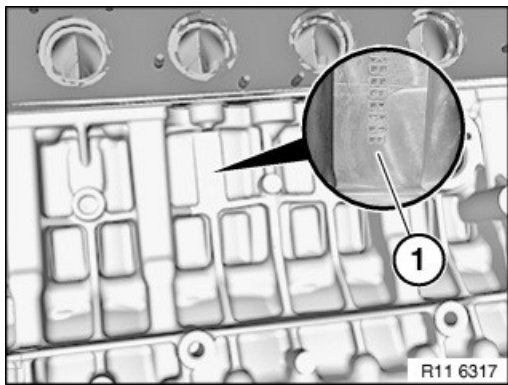
Bearing shell (2) without lubricating groove must be installed in lower section of crankcase.

**Attention!**

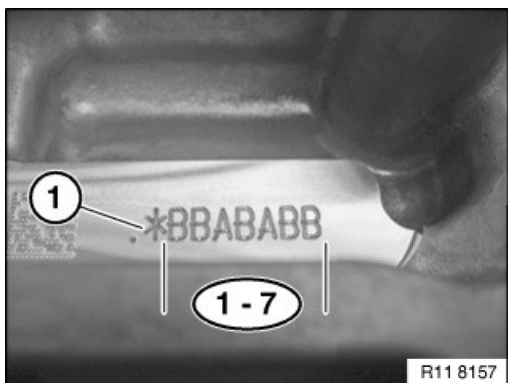
Allocation of bearing positions:

Bearing position 1 is at the front on the timing chain drive in the direction of travel.





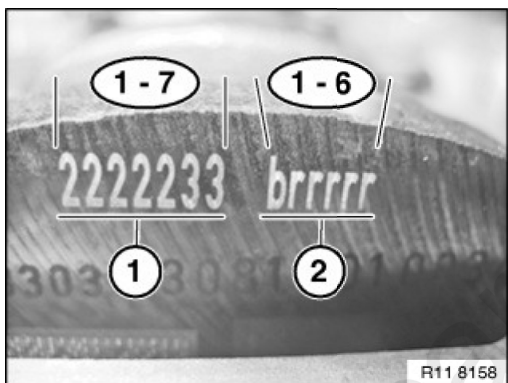
Main bearing classification (1) in crankcase. *Installation note:*  
When all the letters and number code have been determined, the bearing shell colour must be allocated, see table.



#### Main bearing classification:

Code letters A / B or C) are used for the crankcase upper section.

Bearing seat assignment from 1 to 7, the first bearing position is indicated by an asterisk (\*) on the transmission side.



#### Main bearing classification:

ID codes 1 / 2 or 3) are used for crankcase lower section.

Bearing seat assignment (1) from 1 to 7, the first bearing position is located on the timing chain drive.

#### Note:

Code letters (2) are required exclusively for classifying connecting rod bearing.

Observe bearing classification.



#### Installation note:

The letter / number combination produces a bearing shell pairing.  
Identification by different colours.

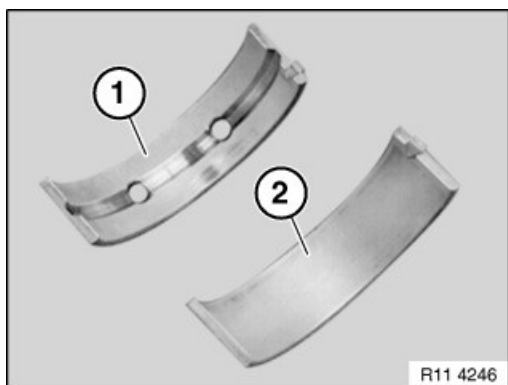
#### Attention!

First bearing position is on the timing drive.

Engine damage will result if an insufficiently small bearing play is determined.

If a large bearing clearance is determined, this can lead to noises in crankshaft drive.





#### Code letters on crankcase:

Code letter A = bearing shell (1) colour yellow with lubricating groove.

Code letter B = bearing shell (1) colour green with lubricating groove.

Code letter C = bearing shell (1) colour red with lubricating groove.

#### Code numbers on crankshaft:

Coefficient 1 = bearing shell (2) yellow without lubricating groove.

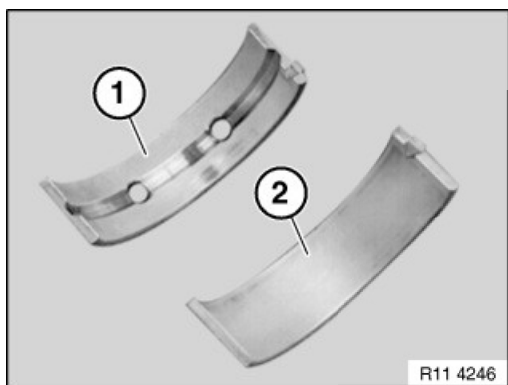
Coefficient 2 = bearing shell (2) green without lubricating groove.

Coefficient 3 = bearing shell (2) red without lubricating groove.

#### Attention!

The colour combination **yellow and red** must not be fitted.

The bearing colours green / green must be selected for this colour combination.



#### Installation note:

Possible colour combinations for mounting the crankshaft in the crankcase.

#### Installation example:

For bearing 1 with code letter **B** on the crankcase and code number **1** on the crankshaft, bearing shell (1) with the colour **green** is required for the crankcase upper section and bearing shell (2) with the colour **yellow** for the crankcase lower section (bedplate).

Bearing 2: **B** and **2** the colours green and green.

Bearing 3: **A** and **2** colours yellow and green.

Bearing 4: **B** and **2** the colours green and green.

Bearing 5: **A** and **1** colours yellow and yellow.

Bearing 6: **B** and **3** colours green and red.

Bearing 7: **B** and **1** colours green and yellow.

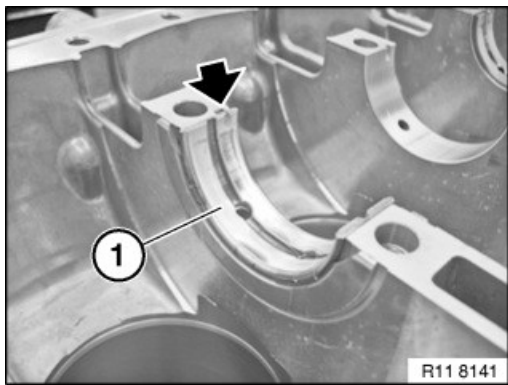
#### Attention!

The colour set **Yellow and Red** must not be fitted.

The bearing colours green / green must be selected for this colour combination.

|                                               |                                               |                                              |
|-----------------------------------------------|-----------------------------------------------|----------------------------------------------|
| (A 1) Crankcase / <b>yellow</b>               | (B 1) Crankcase / <b>green</b>                | (C 1) Crankcase / <b>green</b>               |
| (A 1) Crankcase lower section / <b>yellow</b> | (B 1) Crankcase lower section / <b>yellow</b> | (C 1) Crankcase lower section / <b>green</b> |
|                                               |                                               |                                              |
| (A 2) Crankcase / <b>yellow</b>               | (B 2) Crankcase / <b>green</b>                | (C 2) Crankcase / <b>red</b>                 |
| (A 2) Crankcase lower section / <b>green</b>  | (B 2) Crankcase lower section / <b>green</b>  | (C 2) Crankcase lower section / <b>green</b> |
|                                               |                                               |                                              |
| (A 3) Crankcase / <b>green</b>                | (B 3) Crankcase / <b>green</b>                | (C 3) Crankcase / <b>red</b>                 |
| (A 3) Crankcase lower section / <b>green</b>  | (B 3) Crankcase lower section / <b>red</b>    | (C 3) Crankcase lower section / <b>red</b>   |

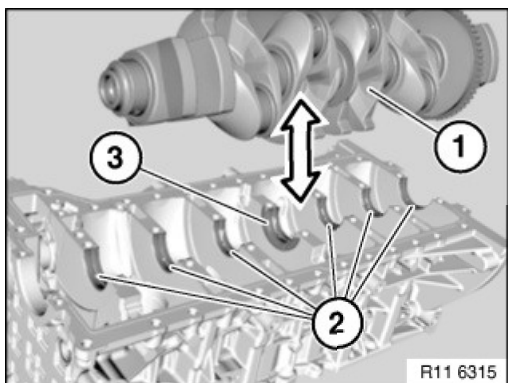




*Note:*

Guide bearing shell (1) at bearing seat 4 is a thrust bearing.

Observe bearing classification.



### **Attention!**

Do not use any metal-cutting tools.

Only use special tool 11 4 470 to clean sealing surfaces.

*Installation note:*

Clean all sealing surfaces.

Install bearing shells (2) and guide bearing shell (3).



*Installation note:*

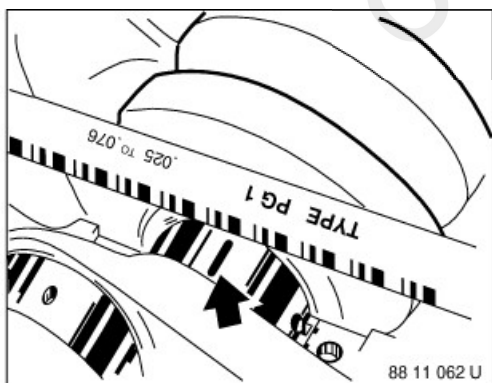
If a radial clearance needs to be redetermined, use special tool 00 2 590 to do this.

*Installation note:*

All measuring points must be clean and free from oil and grease. If necessary, clean all measuring points.

The old bearing screws can be used to determine the radial clearance.

Set up crankcase lower section with bearing shells.



Remove crankcase lower section.

Read off radial clearance at width of flattened Plastigage and measuring scale.

*Installation note:*

Remove Plastigage.

Apply a light coat of oil to bearing shells and crankshaft.



Fit crankcase lower section.

Assemble engine.



**Special tools required:**

- 00 2 010
- 00 9 120
- 11 4 370
- 11 4 440
- 11 4 470
- 11 6 251
- 11 6 252
- 11 9 360
- 2 469 803

**Caution!**

Aluminium screws/bolts are permitted with and without colour coding (blue).

Aluminium screws/bolts must be replaced each time they are **released**.

For reliable identification:

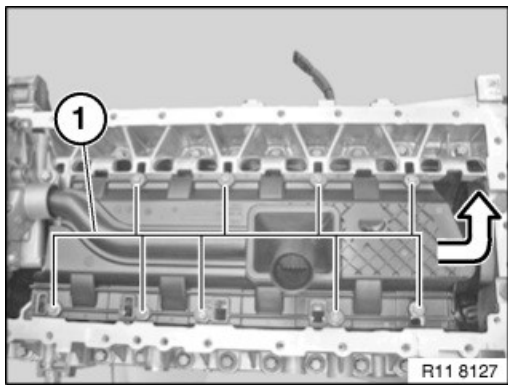
Aluminium screws/bolts are **not magnetic**.

Tightening torque and angle of rotation must be observed without fail (**risk of damage**).

**Necessary preliminary work:**

- Remove engine
- Mount engine on assembly stand
- Remove vibration damper
- Remove oil sump
- Remove oil pump
- Remove timing chain module
- Remove oil pump/vacuum pump chain module.
- Remove cylinder head.
- Remove flywheel
- Removing all pistons





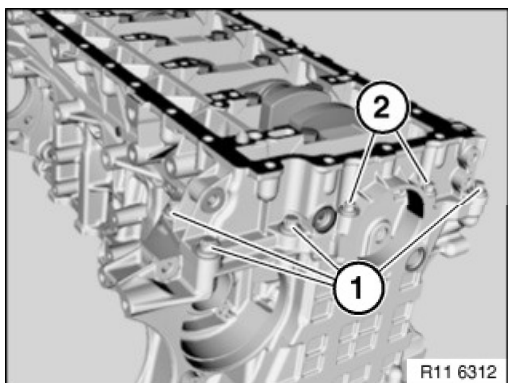
Release screws (1).

Tightening torque 11 13 5AZ.

*Installation note:*

**Replace aluminium screws.**

Remove oil deflector with oil intake snorkel.

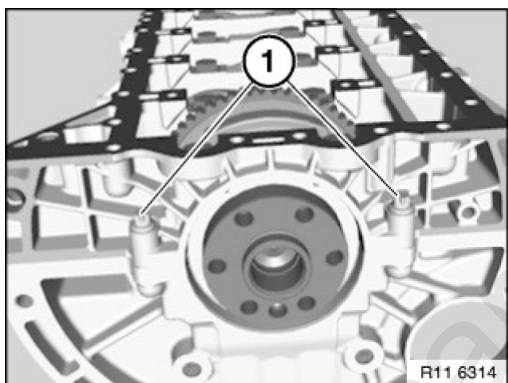


Release aluminium screws (1).

Release aluminium screws (2).

*Installation note:*

**Replace aluminium screws.**

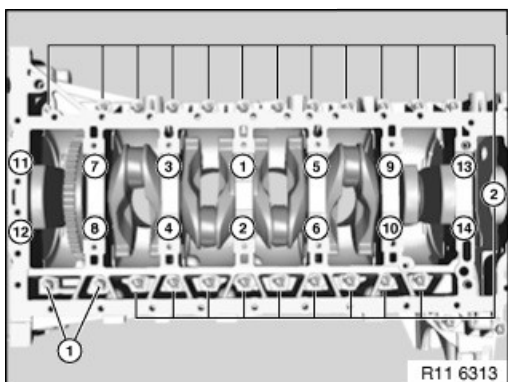


Release aluminium screws (1). *Installation note:*

**Replace aluminium screws.**

*Note:*

Figure N52.



Release screws (1).

Unfasten screws (2).

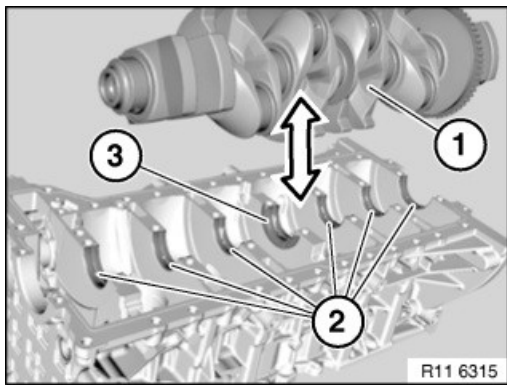
*Installation note:*

**Replace aluminium screws.**

Release steel screws (14 to 1) from outside inwards.

Remove crankcase lower section in upward direction.





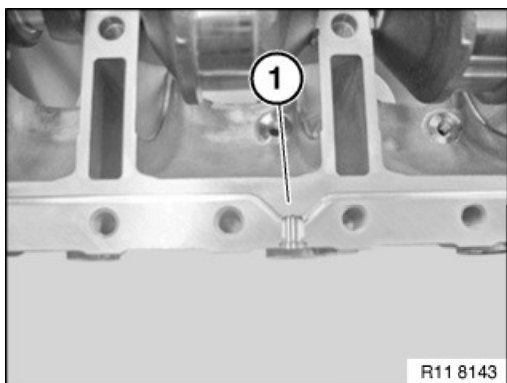
### Caution!

Remove crankshaft with aid of a second person.

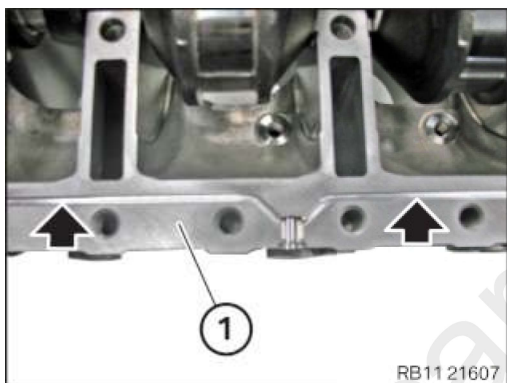
Weight of crankshaft approx. 25 kilograms.

Remove crankshaft (1) upward in direction of arrow.

Remove bearing shells (2) and guide bearing shell (3), replace if necessary.

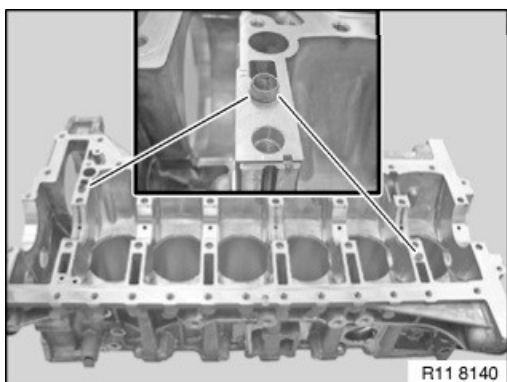


Clean all sealing surfaces (1) with special tool 11 4 470 .



Thoroughly clean seal duct in crankcase (1).

The seal duct is needed to inject the sealant.



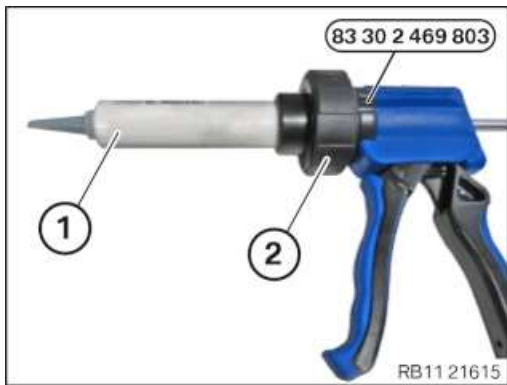
Check fitting bushes for damage and tight fit; replace if necessary.

Install all bearing shells.

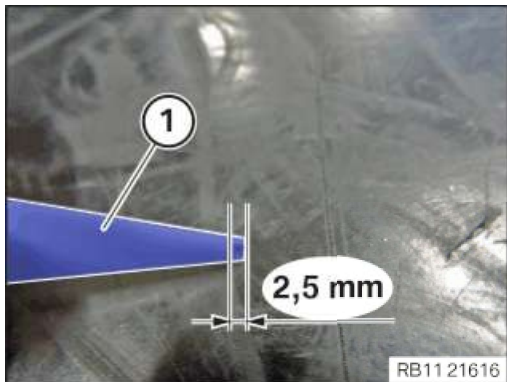
### Installation note:

Oil all bearing points adequately with engine oil.

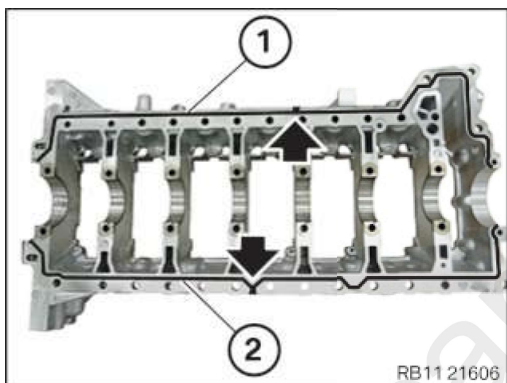




Prepare special tool 2 469 803 with cartridge (1).

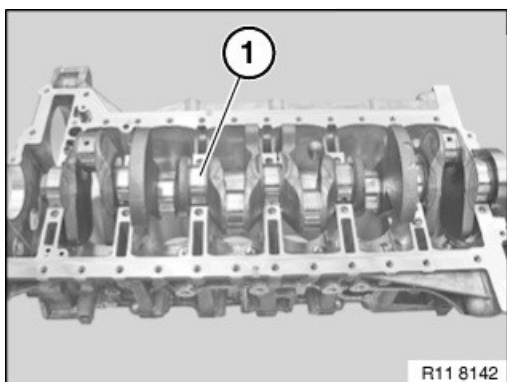


Trim sealant injection (1) to 2.5 mm with a knife.



Apply sealant bead (1 and 2) in the seal duct of the crankcase (see graphic).

In the area of the injection nozzles (see arrows) the space must be completely filled with sealant.



### Caution!

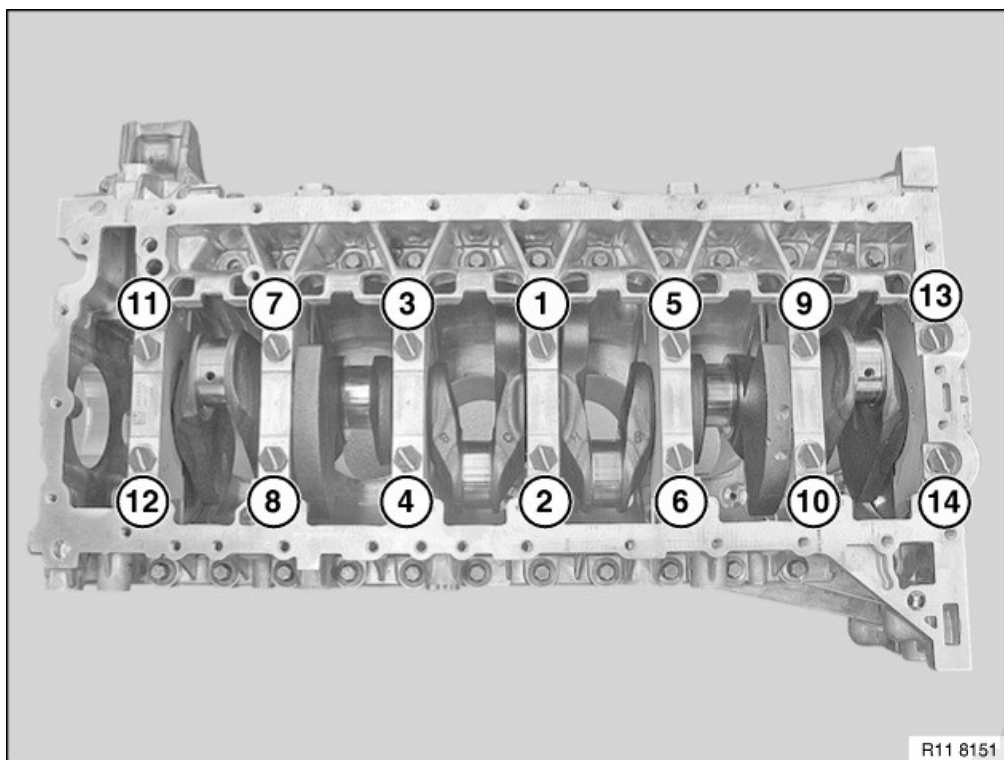
Insert crankshaft with aid of a second person.

Weight of crankshaft approx. 25 kilograms.

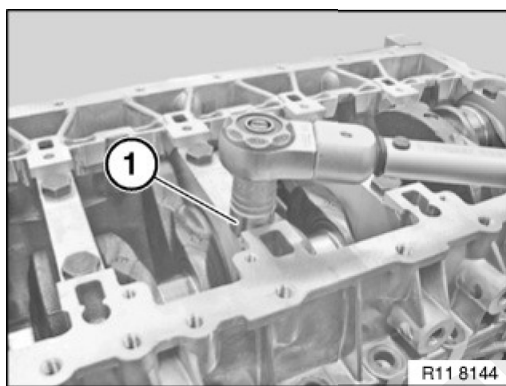
Insert crankshaft (1).

Fit crankcase lower section (note fitting bushes).

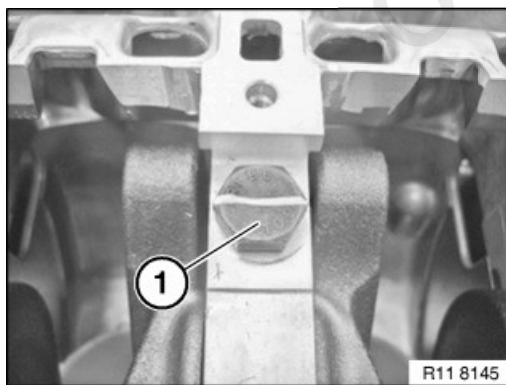




Follow tightening/torque sequence for the steel bolts (1 to 14).

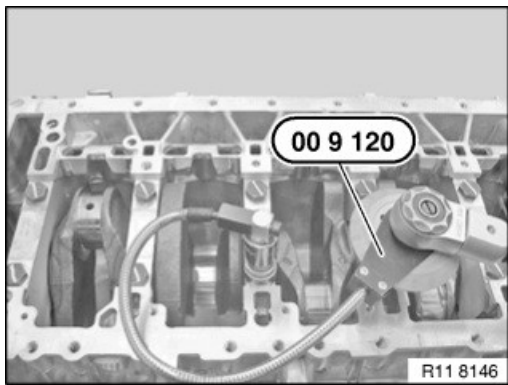


Join steel bolts (1).



Mark across all steel bolts (1) with a coloured mark.



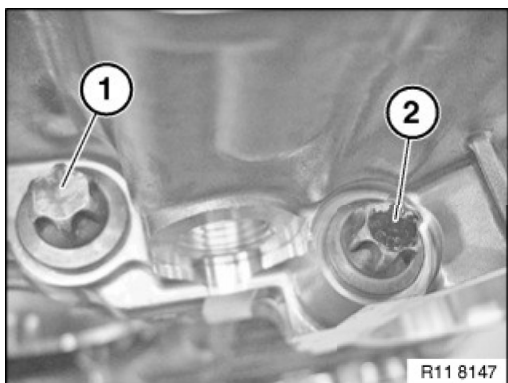


Tighten all steel bolts with a special tool 00 9 120 .

Tightening torque 11 11 1AZ.

*Installation note:*

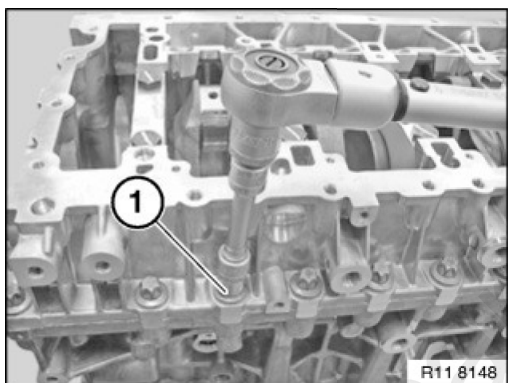
All steel bolts must be positioned identically with the coloured mark after attaching (see figure R 11 8151).



*Installation note:*

Aluminium bolts (1) and (2) can have a blue coloured mark.

Aluminium screws/bolts are **not magnetic**.

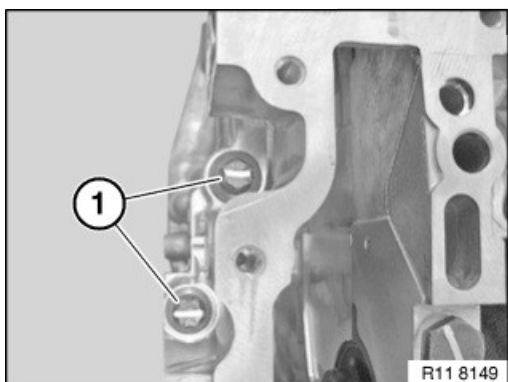


**Caution!**

In the case of aluminium screws, tightening torque and angle of rotation must be observed without fail.

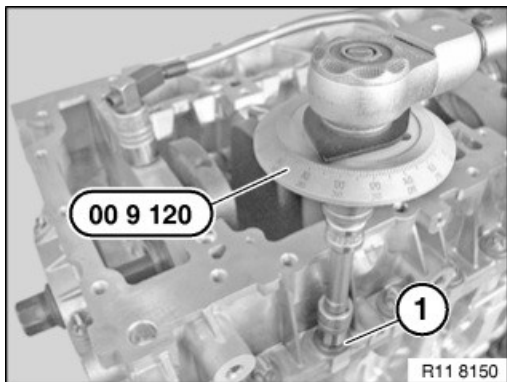
Join all aluminium bolts (1) from inside toward the outside.

Tightening torque 11 11 2AZ.



Mark across all aluminium bolts (1) with a coloured mark.





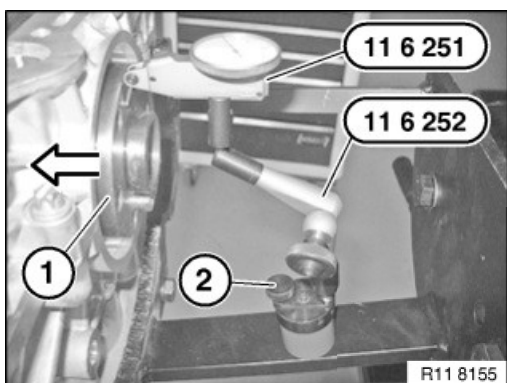
Tighten all aluminium bolts (1) only with special tool 00 9 120 .

Tightening torque 11 11 3AZ.

Tightening torque 11 11 4AZ.

*Installation note:*

All aluminium bolts must be equally positioned with respect to the coloured mark after being fastened.



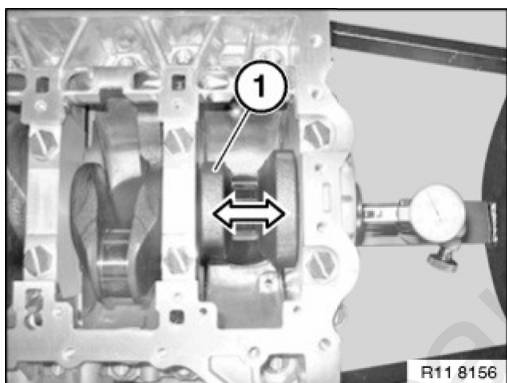
Fit special tool 11 6 252 with magnetic foot on special tool 11 4 440 .

Clamp special tool 11 6 251 to special tool 11 6 252 .

Position special tool 11 6 251 with button on the flat side of the crankshaft.

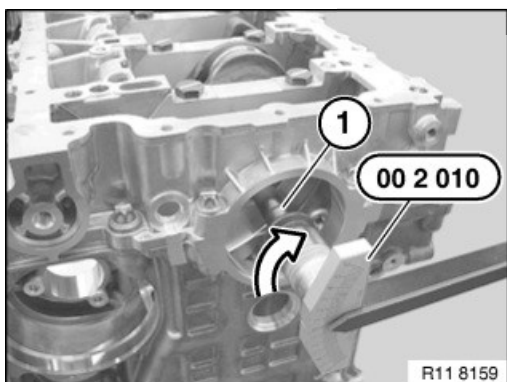
Press crankshaft (1) in direction of arrow up to stop.

Set dial gauge with knurled screw (2) on zero.



Press crankshaft (1) in direction of arrow from right to left up to limit position.

Determine crankshaft axial clearance.



Turn crankshaft (1) via the central bolt with special tool 00 2 010 to determine the coefficient of friction.



Replace front crankshaft seal.

Replace crankshaft seal (transmission side).

Assemble engine.



**Special tools required:**

- 00 9 120
- 11 0 300
- 11 4 180
- 11 4 370
- 11 4 470
- 11 8 181
- 11 8 220
- 11 8 640
- 11 9 181
- 11 9 182
- 11 9 183
- 11 9 184
- 11 9 185
- 11 9 231
- 11 9 233
- 11 9 234
- 11 9 235
- 11 9 260
- 11 9 360

**Caution!****Aluminium-magnesium materials.**

**No** steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminium screws/bolts exclusively.

Aluminium screws/bolts must be replaced each time they are **released**.

Aluminium screws/bolts are permitted with and without colour coding (blue).

For reliable identification:

Aluminium screws/bolts are **not magnetic**.

**Risk of damage!**

Tightening torque and angle of rotation must be observed without fail.



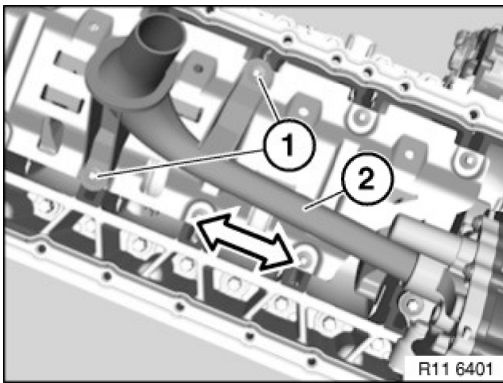
**Caution!**

Changed procedure.

It is not necessary to remove the cylinder head and the crankshaft.

**Necessary preliminary work:**

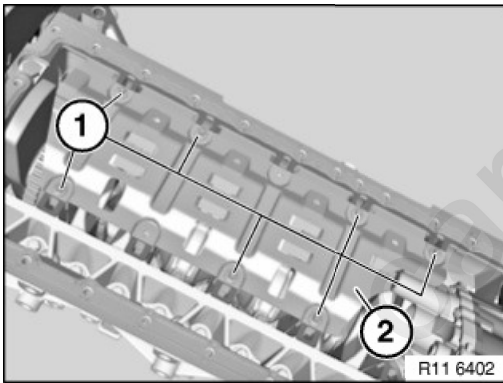
- Remove engine
- Installing engine on assembly stand
- Remove clutch (when installed)
- Remove left and right engine support arm
- Removing oil pan



Loosen screws (1).

Pull out oil pump intake pipe (2).

Tightening torque: 11 41 1 Tightening torque .



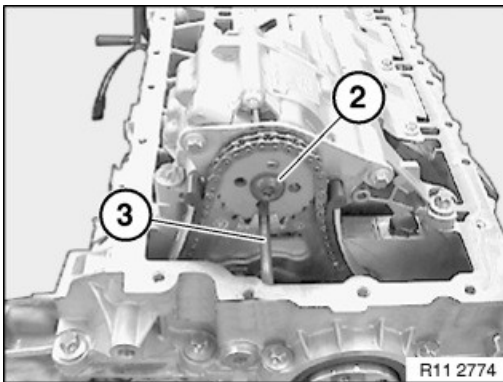
Loosen screws (1).

Tightening torque: 11 13 5AZ.

*Installation note:*

**Replace aluminium screws.**

Remove oil deflector (2).



Secure oil pump drive gear with 6.0 mm dia. steel pin (3) to oil pump.

**Caution!**

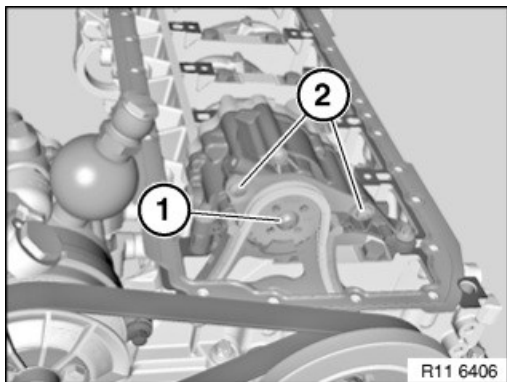
Release central bolt (2) only together with steel pin  $\varnothing$  6.0 mm (3).

Do not remove camshaft sprocket.

Release central bolt (2).

Tightening torque: 11 41 5AZ.



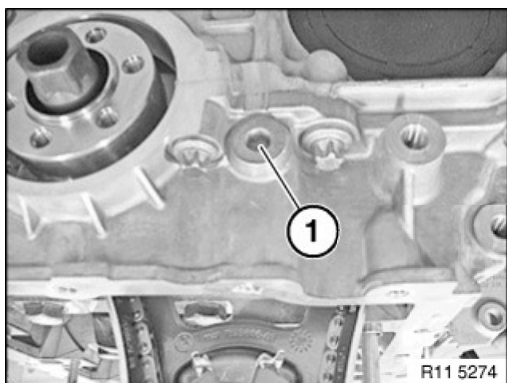


Unfasten screws (2).

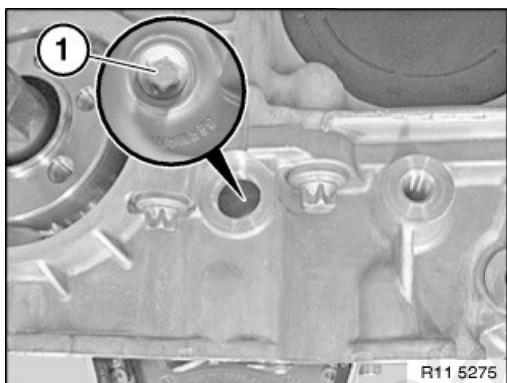
Tightening torque: 11 41 3AZ.

*Installation note:*

**Replace aluminium screws.**



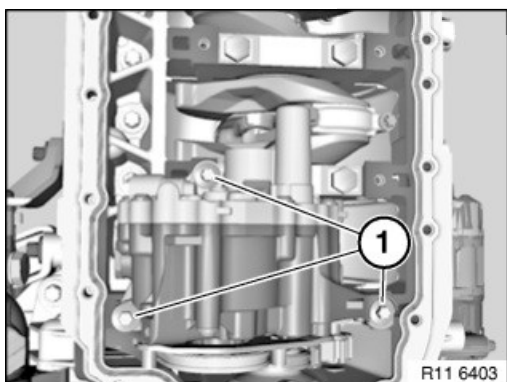
Remove screw plug (1) from crankcase at front. *Note:*  
Replace the gasket .



Release screw (1) for oil pump triangular drive with special tool 11 8 640

*.Note:*

It is not necessary to remove the triangular drive.



**Version 1:**

Caution!

Observe different screw lengths.

Loosen screws (1).

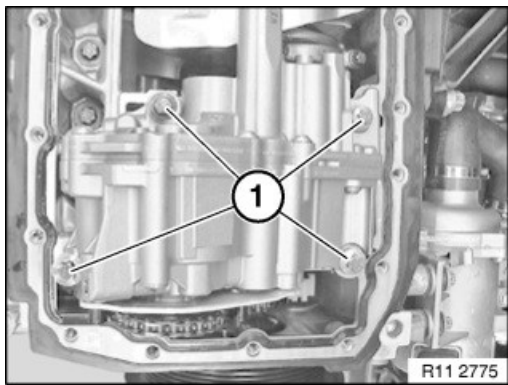
Tightening torque 11 41 2AZ.

Tightening torque 11 41 2AZ.

*Installation note:*

**Replace aluminium screws.**





## Version 2:

### Caution!

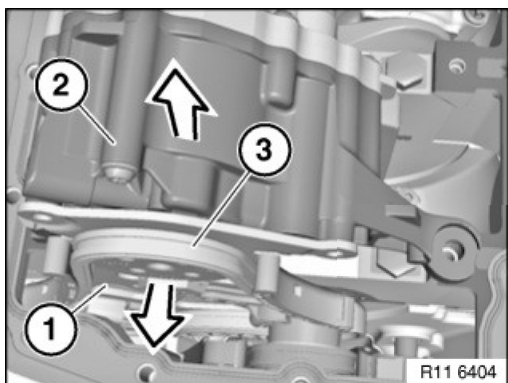
Observe different screw lengths.

Release oil pump screws (1).

Tightening torque: 11 41 2AZ.

*Installation note:*

**Replace aluminium screws.**



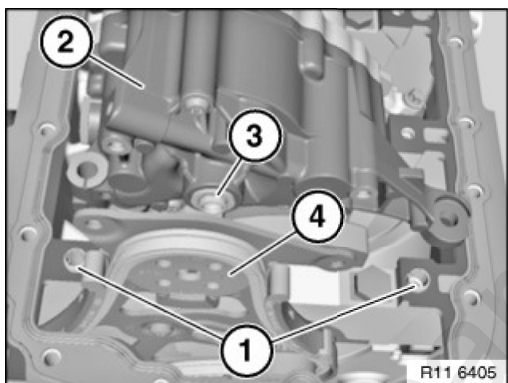
Detach sprocket (1) in direction of arrow.

*Note:*

The chain tensioner pushes the timing chain (3) of the triangular drive upward.

Do not remove camshaft sprocket.

Remove oil pump (2) in direction of arrow.

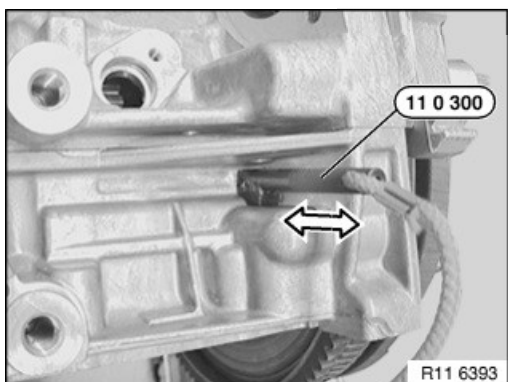


*Installation note:*

Check spacer bushings (1) for tight fit and damage; replace if necessary.

Align mounting flats (3) on oil pump (2) to sprocket wheel.

Install oil pump (2).

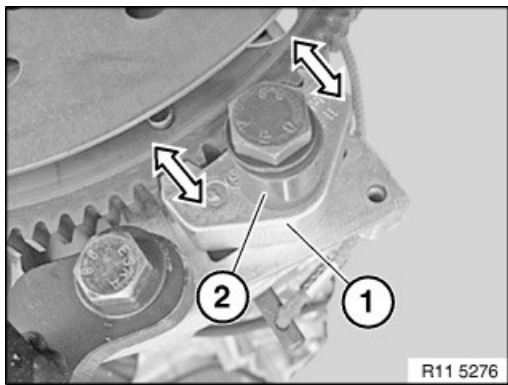


*Note:*

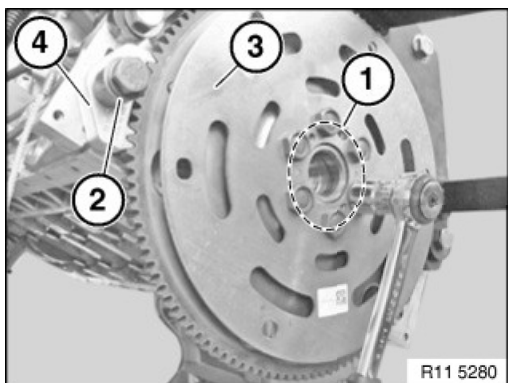
The dowel hole for the TDC setting is located on the intake side underneath the starter motor.

Rotate engine at central bolt and secure flywheel in position with special tool 11 0 300 .



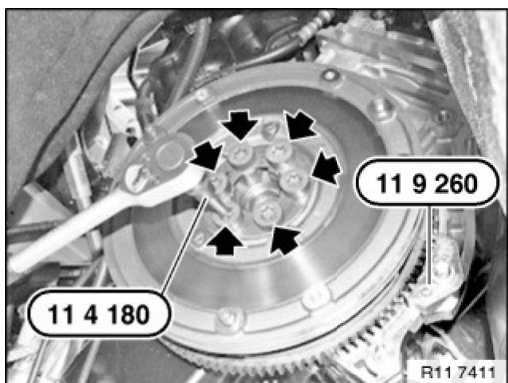


Secure flywheel with special tool (1) 11 9 260 and special tool (2) 11 9 266. *Note:*  
Make sure that the special tool (1) completely engages in the flywheel teeth (see arrow)



#### Automatic transmission:

Release flywheel bolts (1).  
Release special tool (2).  
Remove flywheel (3).



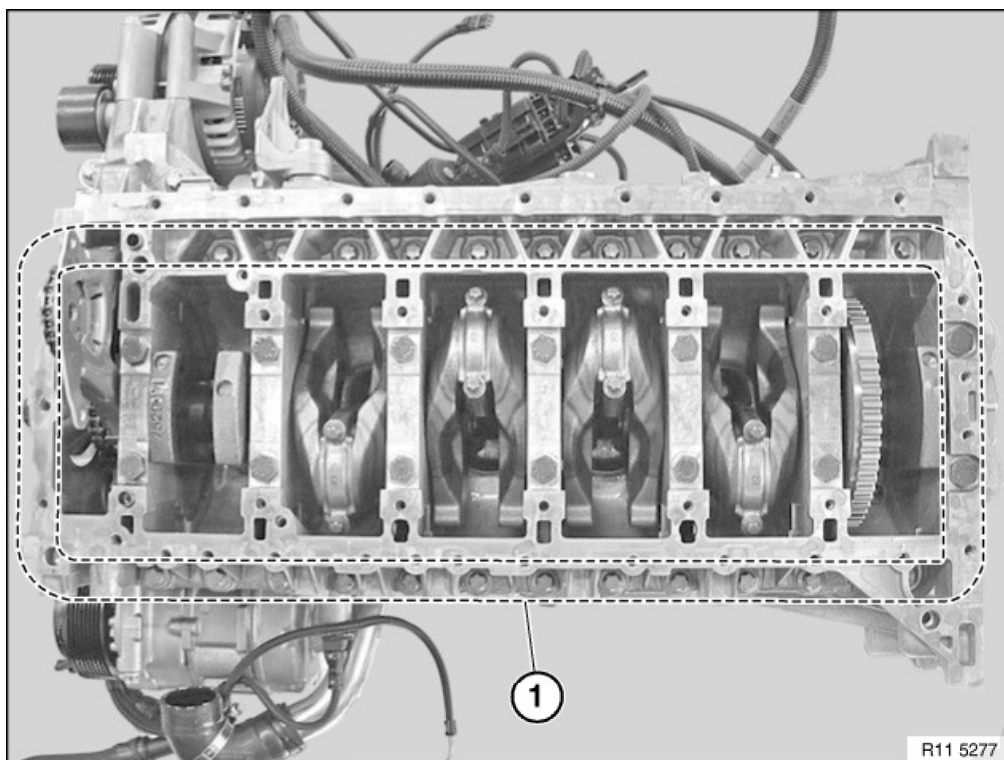
#### Manual gearbox:

##### Caution!

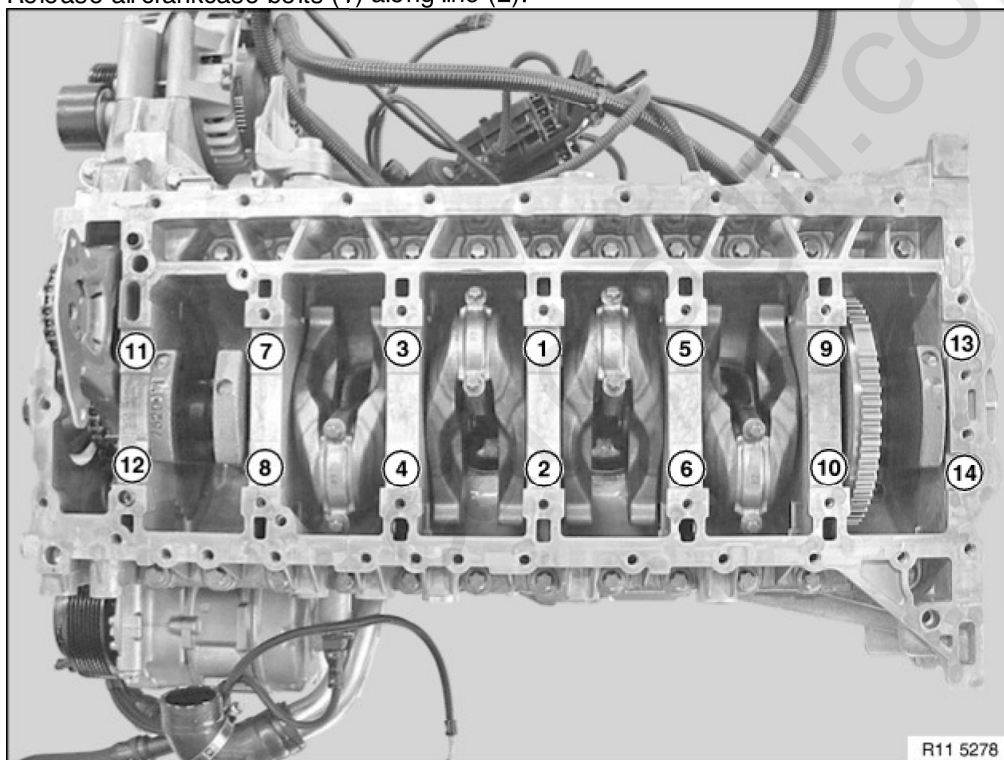
Position crankshaft at top dead centre.

Remove dual-mass flywheel.  
Fix flywheel with special tool 11 9 260 .  
Remove vibration damper.  
Release flywheel bolts using special tool 11 4 180 .



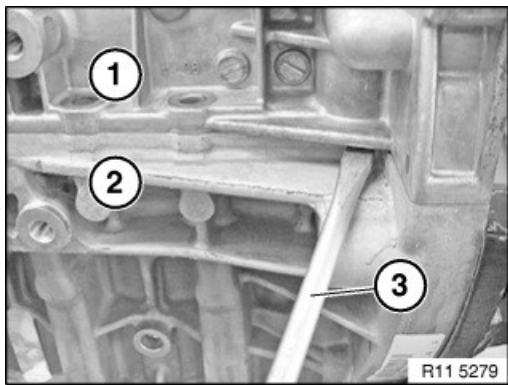


Release all crankcase bolts (1) along line (2).



Release crankcase bolts M10 in sequence 14 to 1.



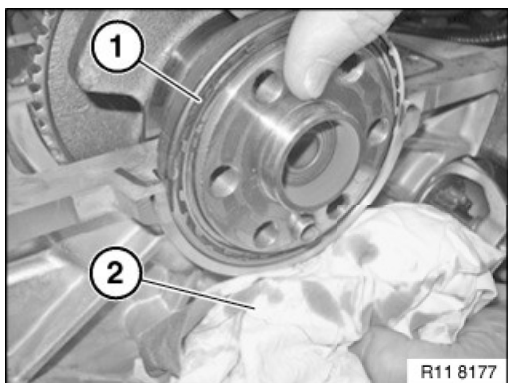


Release lower section of crankcase (1) from upper section of crankcase (2) using a suitable tool (3).

Remove lower section of crankcase (1) upwards.

**Caution!**

Do not rotate or twist crankshaft without lower section of crankcase (1) (**risk of damage**).



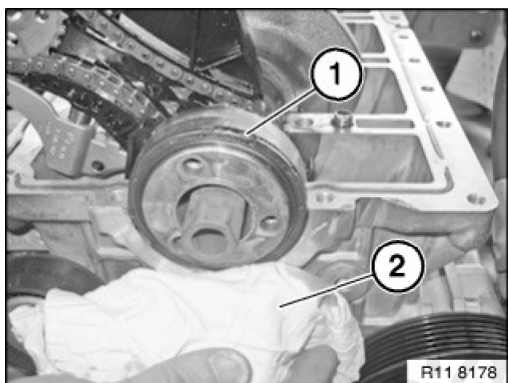
**Caution!**

Timing chain is preloaded.

Do not raise crankshaft.

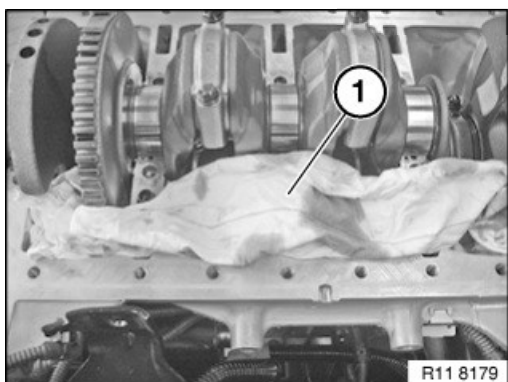
Carefully remove radial shaft seal (1).

Catch escaping engine oil with a cloth (2).



Carefully remove radial shaft seal (1) towards front.

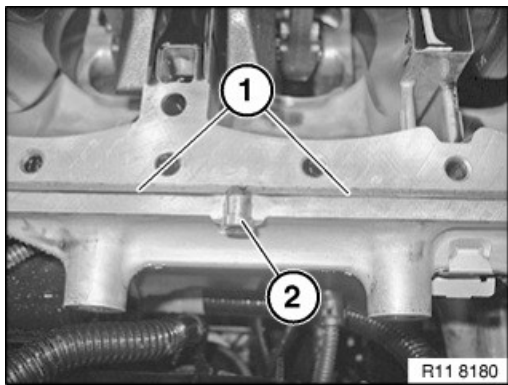
Catch escaping engine oil with a cloth (2).



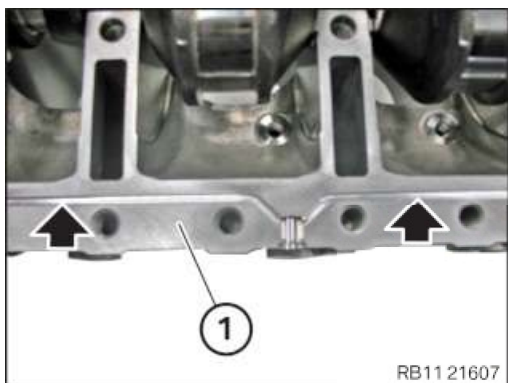
**Caution!**

Protect crankcase against sealant residues with a cloth (1).

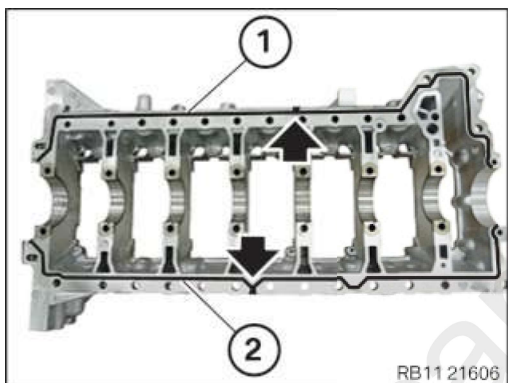




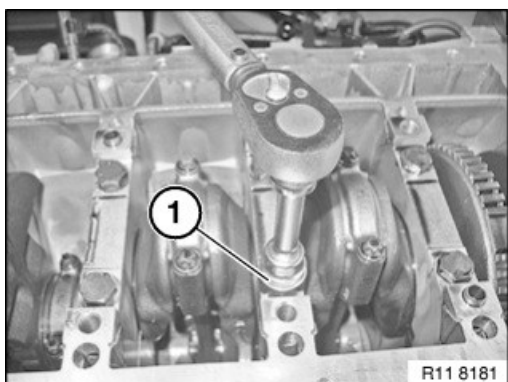
Remove sealing compound residues (1) with special tool 11 4 470 .  
 Remove injector nozzles (2) for liquid sealing compound on left and right.  
*Installation note:*  
 Injector nozzles (2) are no longer required.  
 Clean all threads with compressed air.



The groove on the crankcase (1) is important for the application of the sealant 2.2.

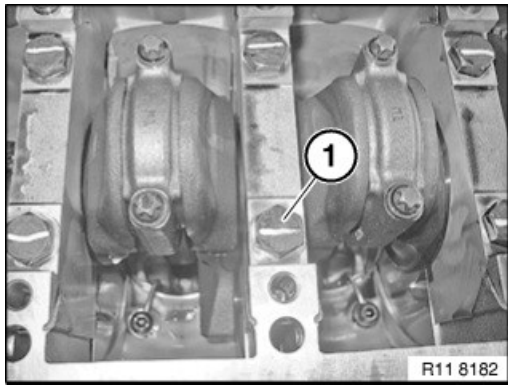


Apply sealant in areas (1) and (2).  
 More sealant must be applied in the area of the injector nozzle (see arrow).  
 Height of sealant bead approx. 1 mm.

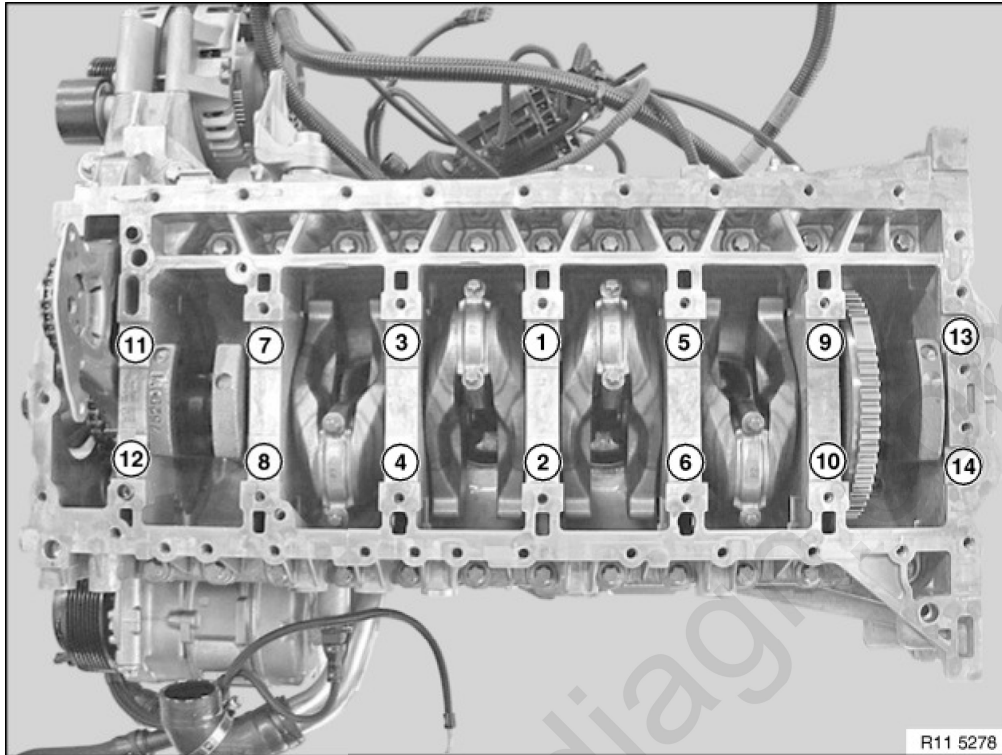


Position the lower section of the crankcase (1) on the upper section of the crankcase.  
 Screw in all M10 crankcase bolts.  
 Joint all M10 crankcase bolts (1) 20 Nm from inside outwards.



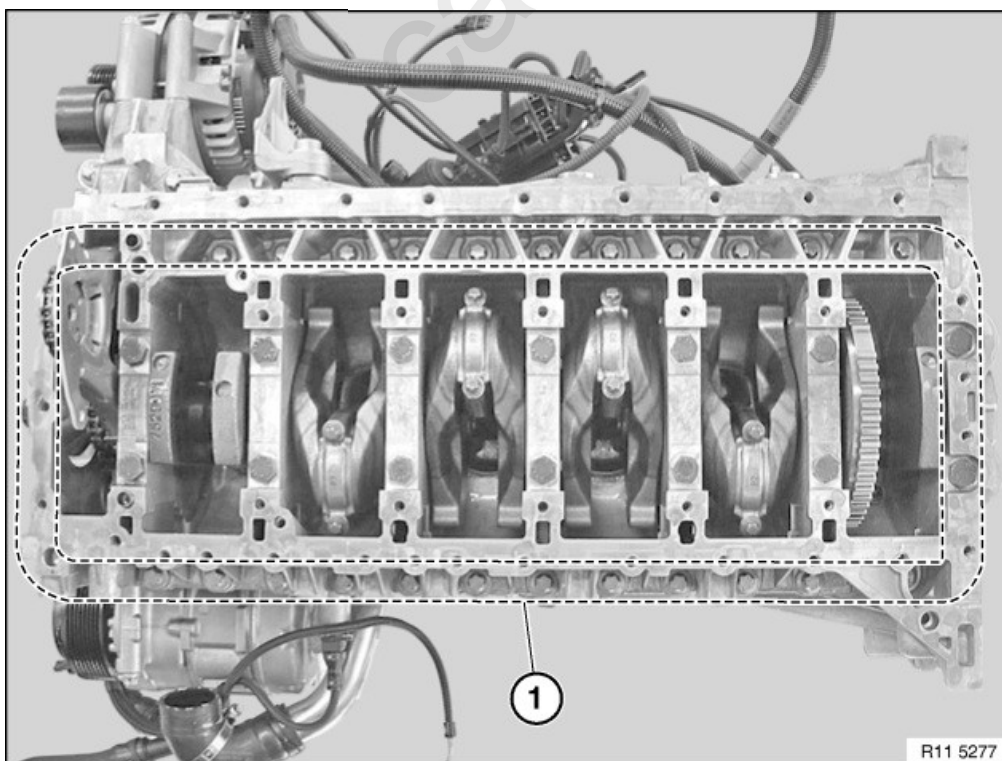


Identify all M10 crankcase bolts with a coloured marking (1) for checking.

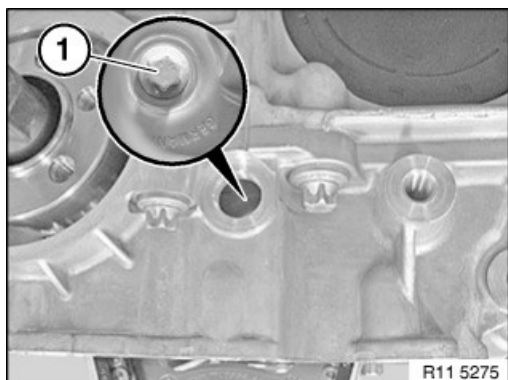


Secure crankcase bolts M10 in sequence 1 to 14 with special tool 00 9 120 .

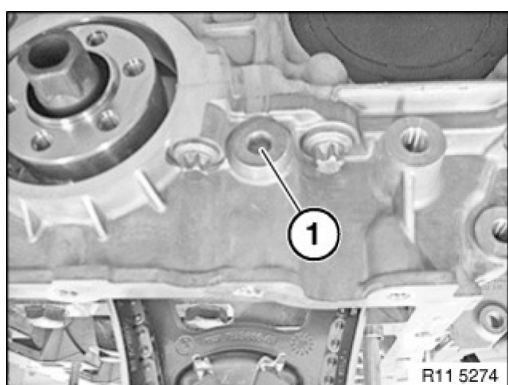
Tightening torque: 11 11 1AZ.



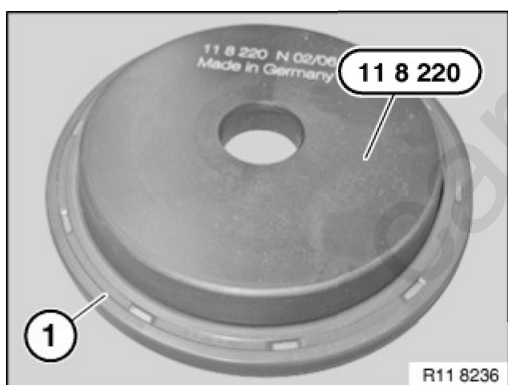
Insert all crankcase bolts (1). Caution!  
Observe different lengths and sizes of the bolts.  
Tightening torque: 11 11 2,3 and 4AZ.



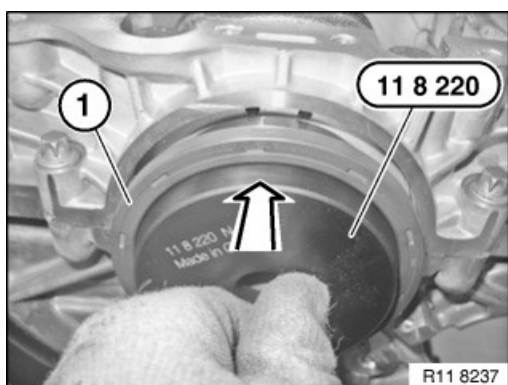
Tighten screw (1) for oil pump triangular drive with special tool 11 8 640  
.Note:  
Renew screw.  
Tightening torque: 11 41 4 AZ.



Tighten screw plug on front of crankcase.  
Tightening torque: 11 11 9  
*Installation note:*  
Renew the sealing ring.

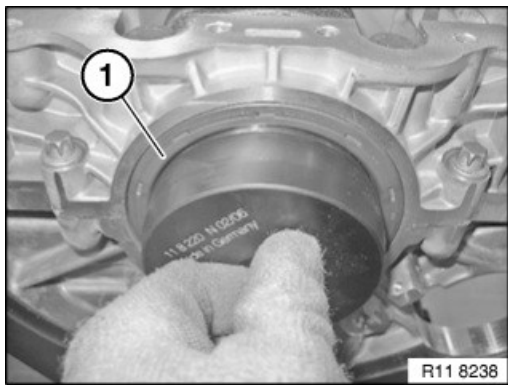


Prepare radial shaft seal (1) on special tool 11 8 220 .

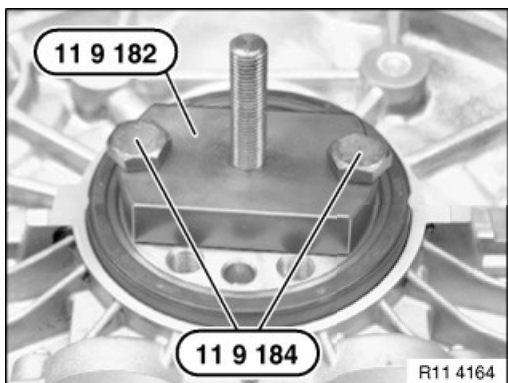


Position radial shaft seal (1) with special tool 11 8 220 on crankshaft.

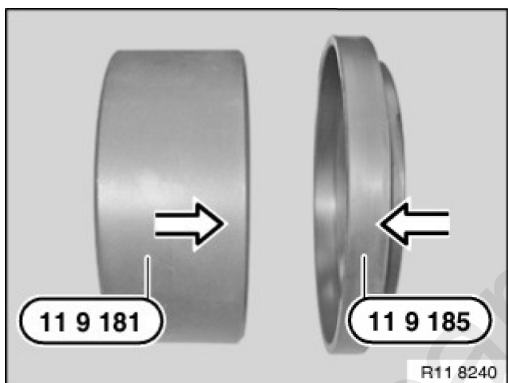




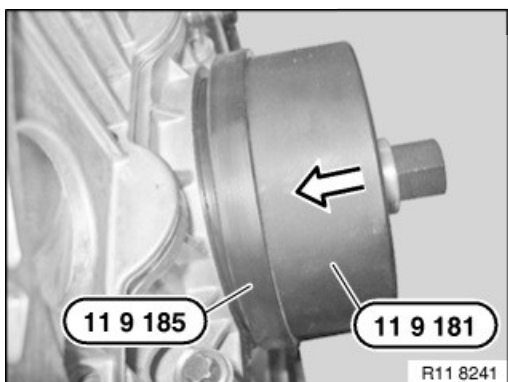
Brush radial shaft seal (1) over special tool 11 8 220 .  
Move radial shaft seal (1) parallel up against the crankcase.



Screw special tool 11 9 182 to the crankshaft using the screws (special tool 11 9 184 ).

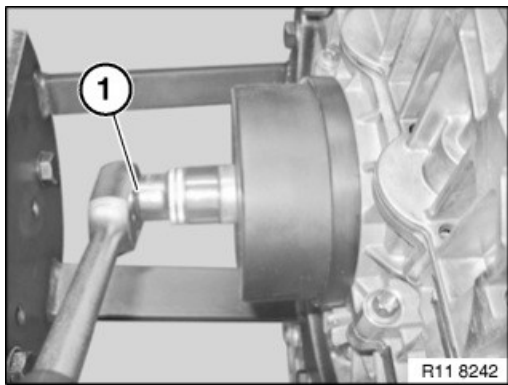


*Installation note:*  
Prepare special tool 11 9 181 for installation. Attach special tool 11 9 185 to special tool 11 8 181 .

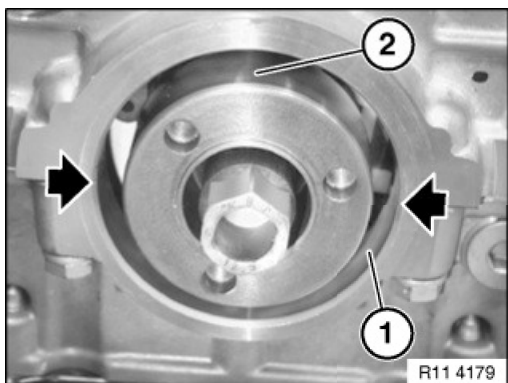


Pull on radial shaft seal with special tool 11 9 181 and 11 9 185 in combination with special tool 11 9 183 .





Screw on radial shaft seal with special tool 11 9 183 to limit position.



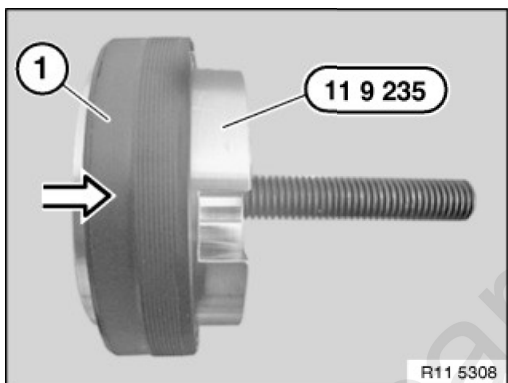
**Installation note:**

Clean sealing surface (1) and degrease thoroughly in area of housing partition.

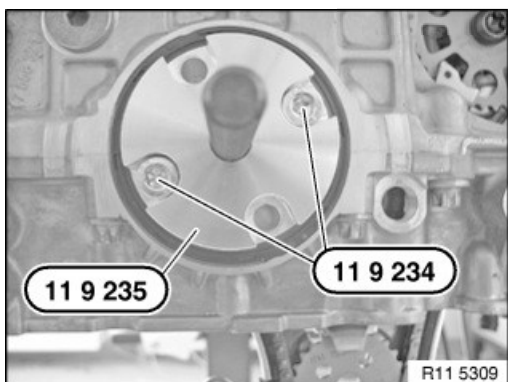
Apply a light coat of oil to running surface (2) of radial shaft seal.

**Note:**

Graphic N42.



Push radial shaft seal (1) 11 9 235 carefully in direction of arrow on the special tool .



**Caution!**

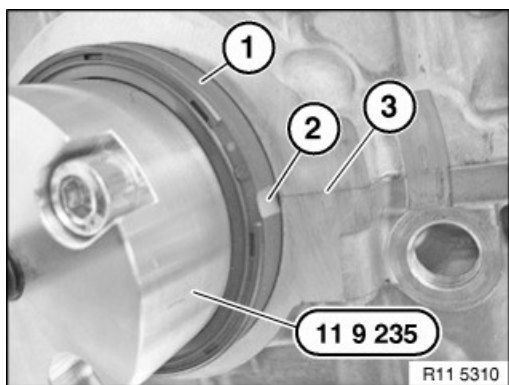
Special tool 11 9 235 can only be secured using

2 opposite bolts.

Determine hole pattern on special tool.

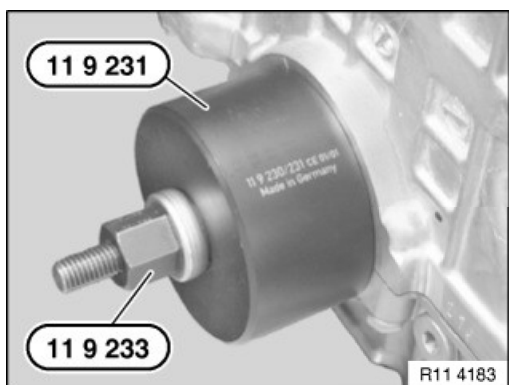
Screw special tool 11 9 235 to the crankshaft using special tool 11 9 234 .





Align groove (2) of radial shaft seal (1) centred to the housing partition (3). **Caution!**

After installation, the grooves must be filled with sealing compound.



Draw in radial shaft seal with special tool 11 9 231 in conjunction with special tool 11 9 233 until flush.



Assemble engine.

