



N63 and S63 Engine: Valve Seal Replacement

New information provided by this revision is preceded by this symbol  .

This Service Information bulletin replaces SI B11 08 15 dated **June 2017**

What's New:

- Diagnostic tips updated

MODEL

| | | | |
|--|--|---|--|
| F01 and F02 (7 Series Sedan) Produced from 9/2008 to 6/2012 | F04 (ActiveHybrid 7) Produced from 4/2010 to 6/2012 | F07 (Gran Turismo) Produced from 9/2009 to 6/2012 | F10 (5 Series Sedan) Produced from 3/2010 to 7/2013 |
| F12 (6 Series Convertible) Produced from 3/2011 to 7/2012 | F13 (6 Series Coupe) Produced from 7/2011 to 7/2012 | E70 (X5) Produced from 3/2010 to 6/2013 | E70 (X5M) Produced from 3/2010 |
| E71 (X6) Produced from 7/2008 to 6/2014 | E71 (X6M) Produced from 3/2010 | E72 (ActiveHybrid X6) Produced from 9/2009 to 9/2011 | |

SITUATION

Refer to the following applicable SIBs before replacing the valve seals.

- [B11 07 11](#) - Turbocharger Failure: Oil Supply and Return Line Blockage and Proper Repair
- [B11 07 12](#) - N63 Engine: Oil Consumption and/or Rough Running Complaints
- [B11 01 13](#) - N63 Engine: Engine Oil Consumption, Engine Oil Top-ups and Refill Capacity
- [B11 03 13](#) - Engine Oil Consumption (all models)

If the valve seals are leaking, one of the following will help determine if the seals should be replaced.

- Smoke from the tailpipe when starting or aggressively accelerating and decelerating the engine in addition to excessive engine oil consumption
- Spark plugs fouled with engine oil and excessive engine oil consumption
- Excessive engine oil consumption

All Vehicles:



On vehicles, **where an excessive oil consumption between services is the only complaint**, a complete oil consumption test as described in SI [B11 03 13](#), must be performed first before replacing the valve seals.

On vehicles exhibiting **reproducible smoking from the tailpipe when hot**, additional engine diagnostic steps (e.g. engine compression test, leak-down tests; inspection of the crankcase ventilation lines and turbo intake/outlet tubes for excessive oil accumulation) should be performed and documented prior to replacement of the valve seals, in order to eliminate other possible causes. Refer to the SIBs listed above for important diagnostic tips.

Do not remove the intake manifolds to clean the intake valve carbon.

PROCEDURE

If one of these conditions is verified, replace the intake and exhaust valve stem seals using special tool P/N 83 30 2 408 268.

| | |
|--|---|
|  <p>GRUSB1115-11</p> | <p>N63 Valve Seal Replacement Tool Kit P/N 83 30 2 408 268 Refer to SI B04 15 15 for additional ordering information. Attached to this bulletin is a replacement parts order form.</p> |
|  <p>GRUSB1116-01</p> | <p>N63/S63 Valve Seal Replacement Tool Update Kit P/N 83 30 2 443 944 Oil return plugs (1) Brush (2) Valve seal install tool (3) Refer to SI B04 15 15 for additional ordering information.</p> |

The attached valve seal replacement procedure supersedes the current version of the ISTA/D valve seal replacement repair instructions. **Do not remove the engine from the vehicle.**

Replace the engine oil and engine oil filter when the valve seal replacement is completed.

If the engine oil service task shows Recommended, Due or qualifies to be performed based on the “60-day Bundling” procedure ([see SI B01 06 13.](#)), reset the engine oil service CBS data to 100%. The video procedure for replacing the valve stem seals can be viewed via the TIS Website using the following path:

1. Select “Service Reference” from the top menu bar.
2. Select “Service Videos.”
3. Select “General Search.”
4. Select “[11] Engine” and “Submit.”

Select “V11 04 15 May 2015 – “N63 Valve Stem Seal Tool Procedure”

PARTS INFORMATION

The parts information below only applies to the intake and the exhaust valve seal replacement.

Refer to the ETK and the applicable repair instructions for one-time use fasteners and/or component information regarding additional or replacement screws, gaskets, and seals that need to be installed and claimed.

| Part Number | Description | Quantity |
|-----------------|--|----------|
| 11 34 0 039 494 | Valve seal repair kit | 2 |
| 11 12 7 566 281 | Timing chain tensioner cover gasket | 2 |
| 11 12 7 566 288 | Cylinder head cover profile gasket (cylinders 1-4) | 1 |
| 11 12 7 566 289 | Cylinder head cover profile gasket (cylinders 5-8) | 1 |
| 11 12 7 566 290 | High-pressure pump profile gasket | 2 |
| 11 36 7 564 346 | VANOS central screws | 4 |
| 11 42 7 583 220 | Engine oil filter | 1 |
| 13 53 7 584 315 | Injector gasket ring seal | 8 |
| 13 53 7 564 751 | Injector decoupling element | 8 |

Bulk Materials - Sublet

| Part Number | Description | Quantity |
|-----------------|---|------------------|
| 83 21 2 365 946 | 5W30 BMW Engine Oil 1 liter | Up to 9.6 liters |
| | | (E72, F04 8.5) |
| | | |
| 82 14 1 467 704 | Antifreeze | See Sublet |
| | | (1 Gallon) |
| | | |
| 83 29 0 429 576 | Hydraulic fluid CHF 11 S (F01, F02, F04, F07) | See Sublet |
| | | (up to 1) |

1 Gallon Antifreeze = 2 Gallons at a 50/50 mixture solution.

WARRANTY INFORMATION

Covered under the terms of the BMW New Vehicle Limited Warranty for Passenger Cars and Light Trucks or the BMW Certified Pre-Owned Program.

Note: The above procedure replaces performing and claiming labor operation 11 34 560, together with the corresponding "pre-work procedure" labor operations identified in KSD2 as applicable.

N63 Engine:

| | | |
|---------------------|-------------------|--|
| Defect Code: | 1134064800 | |
|---------------------|-------------------|--|

| Labor Operation: | Labor Allowance: | Description: |
|-------------------------|-------------------------|--|
| 11 31 019 | Refer to KSD2 | Removing and installing or replacing all camshafts (Main work) |
| Or: | | |
| 11 31 519 | Refer to KSD2 | Removing and installing or replacing all camshafts (Plus work) |
| And: | | |
| 11 34 570 | Refer to KSD2 | ** Replacing the valves seals using the attached procedure and BMW Special Tool 83 30 2 408 268 |
| And: | | |
| 11 99 000 | 3 FRU | Work time to change engine oil and filter (If not due, see below*) in conjunction with this repair |

Or, for the:

S63 Engine:

| Defect Code: | 1134064800 | |
|-------------------------|-------------------------|---|
| | | |
| Labor Operation: | Labor Allowance: | Description: |
| 11 31 019 | Refer to KSD2 | Removing and installing or replacing all camshafts |
| Or: | | |
| 11 31 519 | Refer to KSD2 | Removing and installing or replacing all camshafts (Plus work) |
| And: | | |
| 11 99 000 | 88 FRU | Work time for replacing the valves seals using the attached procedure and BMW Special Tool 83 30 2 408 268 (85 FRU) and changing the engine oil and filter (If not due, see below*) in conjunction with this repair (3 FRU) |

N63 Engine:

** The labor operation was changed from 11 99 000 to 11 34 570 and the corresponding number of FRU's was changed from 54 units to 85 units.

All Engines:

If you are using a Main labor code for another repair, use the Plus code labor operation 11 31 519 instead.

UPDATE ! Refer to KSD2/AIR for the corresponding flat rate unit (FRU) allowances.

S63 Engine:

Work time labor operation code 11 99 000 is not considered a Main labor operation. Also, since the “work time” FRU allowance to be claimed is specified, a separate punch time is not required.

BMW Maintenance Program

*If the vehicle has a “active” maintenance program and the “Engine oil” Service task shows “Recommended or Due” in the Service status field or it “qualifies” to be performed based on the “60-day Bundling” procedure (See [SI B01 06 13](#)), then:

- Perform the “Engine oil” Service task, and
- “Reset” the CBS data, then

Submit and claim the engine oil and filter “part numbers” under the BMW Maintenance Program.

UPDATE !

And:

Sublet – Materials

| | | |
|---------------|--|--|
| Sublet Code 4 | See sublet reimbursement calculation below | Reimbursement for used quantities of required operating fluids, including engine oil only when it is not claimed under the BMW Maintenance Program (applicable BMW part numbers). Please do not use these part numbers for claim submission. |
|---------------|--|--|

UPDATE ! Sublet reimbursement calculation for claiming repair-related bulk materials (BMW part numbers) is at dealer net price for the “used quantities” plus your center’s handling.

UPDATE ! Enter this material cost in sublet and itemize the amount on the repair order and in claim comment section.

Overlapping Labor Procedure – Other Repairs

If invoicing the KSD2 flat rate labor operation codes for other repair work results in overlapping labor, for those flat rate labor operations that are affected, you can now:

- Replace the stated KSD2 “FRU allowance” with a “reduced FRU value” to eliminate the overlapping labor.

For help in identifying the overlapping labor, please refer to the AIR FRU Plausibility Check (Overlapping Labor Tool) that is located in the AIR Client.

Eligible other repair work being claimed under a different defect code will require separate punch times.

On the repair order and in the claim comment section, please identify and itemize those labor operations being claimed with a “reduced FRU value.”

SPECIAL TOOL WARRANTY AND REPLACEMENT PARTS

The N63 valve seal replacement kit **is not covered** by the BMW Special Tool Warranty.

The limited warranty is administered by All German Auto – see details below.

The warranty period is 12 months from the date of purchase. In the event of a warranty or service replacement part-related issue, please refer to the attached order form.

Posted: Tuesday, November 07, 2017

ATTACHMENTS

View PDF attachment [B110815 N63.S63 Valve Seal Replacement Procedure TU](#).

View PDF attachment [B110815 N63 Valve Seal Tool Order Form](#).

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N63/S63 Valve Seal Tool Replacement Part Order Form

Email, fax or send this order form by USPS mail to:

AGA Tools and Products
1327 Simpson Way, STE C
Escondido, CA 92029
Phone: 760-738-4084
Email: rich@agatools.com
Fax: 760-889-2119

Refer to <https://www.agatools.com/n63-replacement-parts> for current pricing.
BMW Dealers receive 20% off the list price for replacement parts.

| Quantity | Part Number | Part Description |
|---|-------------------------------|--|
| | AGA-HB-8-34 | Brush |
| | AGA-CP-0-14 | Injection Rail Supply Cap |
| | AGA-IBPP-N63 (quantity - 2) | Injector Bore Plastic Plug |
| | AGA-N63-UP-8-34 | U-Bend Plug Brush |
| | AGA-N63-PB-34 (quantity - 8) | Plug Brush |
| | AGA-CI-Y12 (quantity - 16) | Injector and Injection Rail Cap |
| | AGA-CB-N63 | Compression Block |
| | AGA-CLR-N63 | Compression Lever Rod |
| | AGA-TDC-1 | TDC Indicator |
| | AGA-VST-LH | Locator Handle |
| | AGA-CAMB-N63 (quantity - 2) | Cam Bracket |
| | AGA-CS-N63 | Compression Screw |
| | AGA-N63-6MM-VKT | N63 Valve Keeper Tool |
| | AGA-FISP-N63 (quantity - 2) | Fuel Injector Sealing Plug |
| | AGA-FISP-O-N63 (quantity - 4) | Fuel Injector Sealing Plug Replacement O-Rings |
| | AGA-SPT12-125 (quantity - 8) | Spark Plug TDC Tool |
| | AGA-CH-N63 | Chain Holder |
| | AGA-RW-N63 | Ratcheting Wrench |
| | AGA-SRP-N63 | Seal Pliers |
| | AGA-CP-N63 | Compression Plate |
| | AGA-FL-N63 | Compression Foot Left |
| | AGA-FR-N63 | Compression Foot Right |
| | AGA-VSI-N63 | Valve Seal Tool |
| | AGA-CPS-N63 | Oil Drain Plugs |
| | AGA-THB-N63 | Strait Hole Brush |
| Note: All quantities are one, except where noted. | | |
| Dealer Name: | | Dealer Number: |
| Contact Name: | | Phone Number: |
| Shipping Address: | | |
| Email Address: | | Fax Number: |

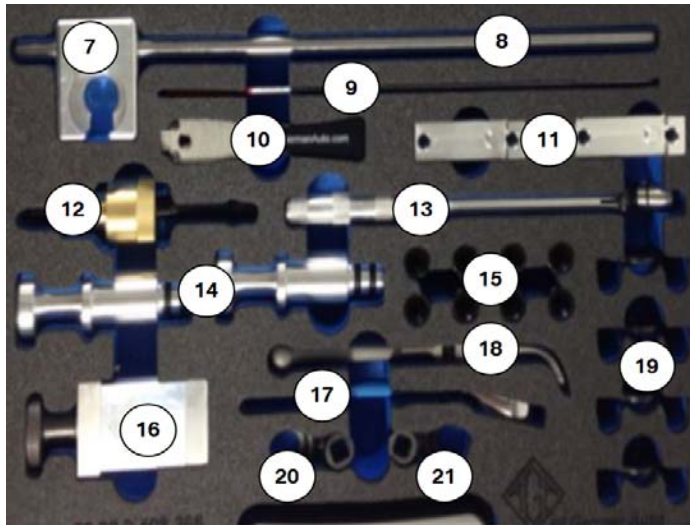
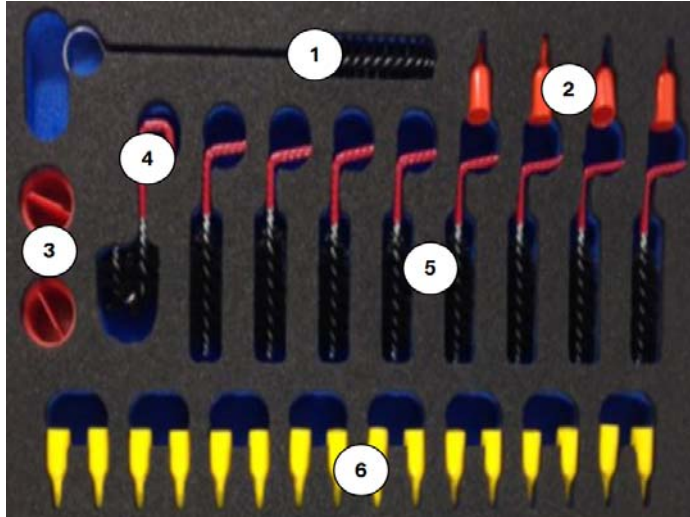
Your contact information is important. After your order is processed, a representative from AGA will contact your dealer for payment before shipping.

If a tool has failed due to a defect and your dealer needs a warranty replacement expedited then call AGA at 760-738-4084. Please have tool part numbers ready prior to calling. Thank you

Changes to this revision are identified by a black bar.

N63/S63 Valve Seal Replacement Procedure Using Special Tool P/N 83 30 2 408 268

Kit Overview:



Kit Parts List:

1. Brush P/N AGA-HB-8-34
2. Injection Rail Supply Cap P/N AGA-CP-0-14
3. Injector Bore Plastic Plug P/N AGA-IBPP-N63 (Quantity - 2)
4. U-Bend Plug Brush P/N AGA-N63-UP-8-34
5. Plug Brush P/N AGA-N63-PB-34 (Quantity - 8)
6. Injector and Injection Rail Cap P/N AGA-CI-Y12 (Quantity - 16)
7. Compression Block P/N AGA-CB-N63
8. Compression Lever Rod P/N AGA-CLR-N63
9. TDC Indicator P/N AGA-TDC-1
10. Locator Handle P/N AGA-VST-LH
11. Cam Bracket P/N AGA-CB-N63 (Quantity - 2)
12. Compression Screw P/N AGA-CS-N63
13. N63 Valve Keeper Tool P/N AGA-N63-6MM-VKT
14. Fuel Injector Sealing Plug P/N AGA-FISP-N63 (Quantity - 2)
- 14A. Fuel Injector Sealing Plug Replacement O-Rings P/N AGA-FISP-O-N63 (Quantity - 4)
15. Spark Plug TDC Tool P/N AGA-SPT12-125 (Quantity - 8)
16. Chain Holder P/N AGA-CH-N63
17. Ratcheting Wrench P/N AGA-RW-N63
18. Seal Pliers P/N AGA-SRP-N63
19. Compression Plate P/N AGA-CP-N63
20. Compression Foot Left P/N AGA-FL-N63
21. Compression Foot Right P/N AGA-FR-N63

All quantities are one unless otherwise specified.



N63/S63 Valve Seal Replacement Tool Update Kit

P/N 83 30 2 443 944

Oil return plugs (1) P/N AGA-CPS-N63

Strait plug brush (2) P/N AGA-THB-N63

Valve seal install tool (3) P/N AGA-VSI-N63

This update kit was developed to increase efficiency and safety of the valve seal replacement procedure. This procedure has been modified to include these new tools.

Note: For clarity purposes, the procedure described in this document was performed with the engine on an engine disassembly/assembly stand. Do not remove the engine when performing this procedure.

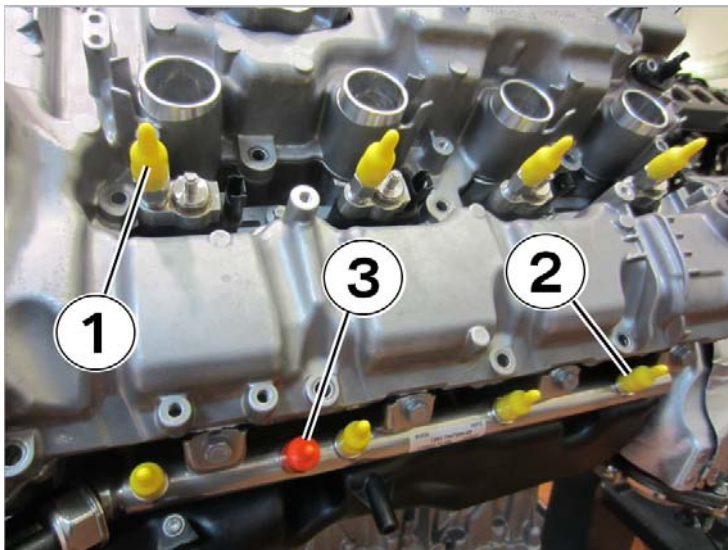
1. Refer to the following repair instructions for preliminary work.

11 33 054 "Removing and installing/renewing rocker arms on right side"

Note: Complete this repair instruction in its entirety. Used rocker arms may only be reused in the same position. Note the locations of all parts when they are removed. Part locations cannot be interchanged.

11 33 052 "Removing and installing/renewing rocker arms on left side"

Note: Complete a portion of this repair instruction only. Only removal of the cylinder head cover for bank 2 is necessary at this time. Do not remove the camshafts, timing chain, or VANOS gears. Proceed to step 2.



2. Install a yellow cap onto each of the injectors (1) and the high-pressure fuel supply rail (2).

Install one orange cap onto the supply high-pressure pump supply port (3).

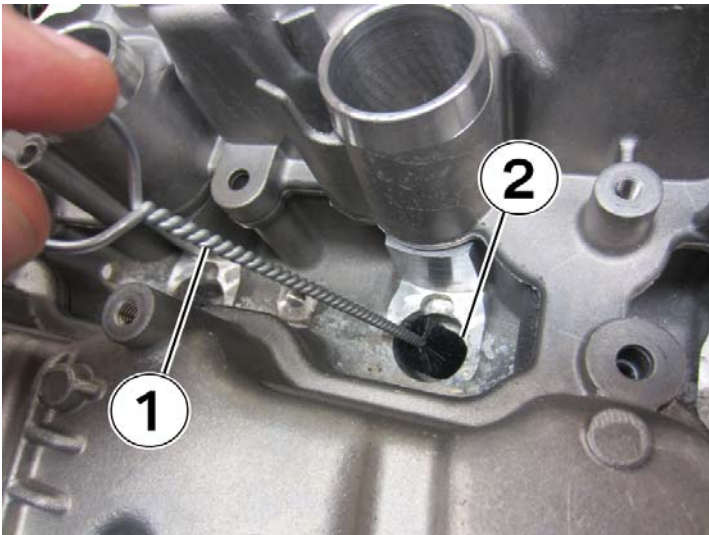
P/N AGA-CI-Y12 (yellow)

P/N AGA-CP-0-14 (orange)

Always store the high-pressure pumps in a clean location to avoid contamination.

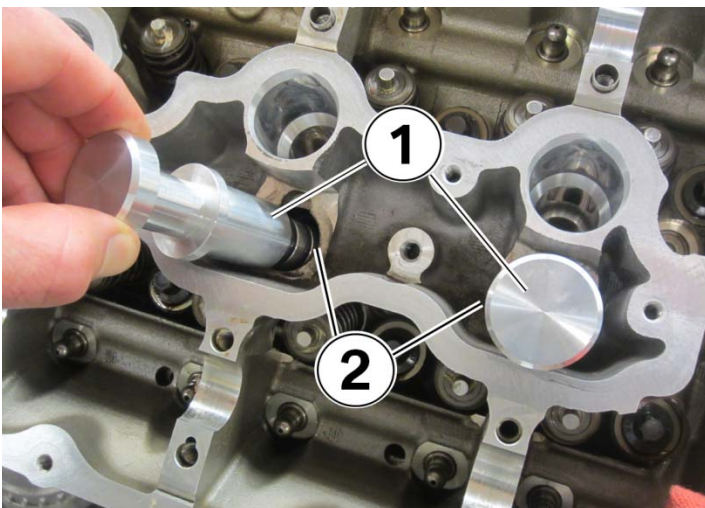


3. Wrap cylinder bank #1 timing chain with a small shop towel to protect it from contamination.



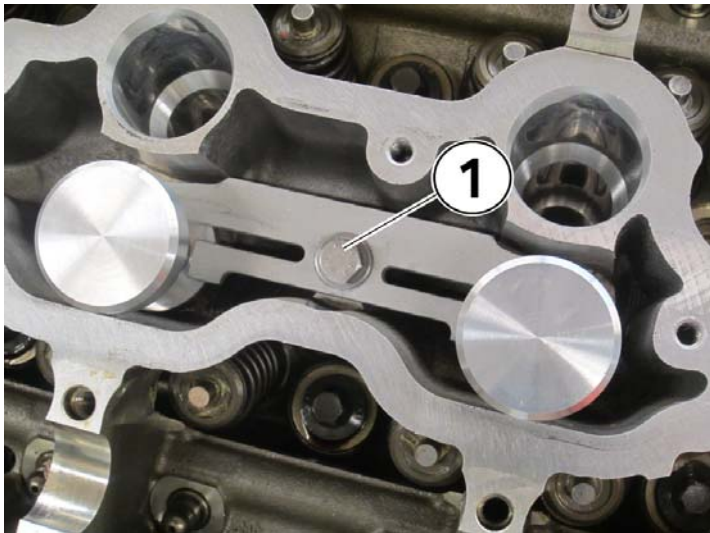
4. Gently clean the upper portion of the injector bores with the brush before installing the fuel injector sealing plug.

P/N AGA-HB-8-34

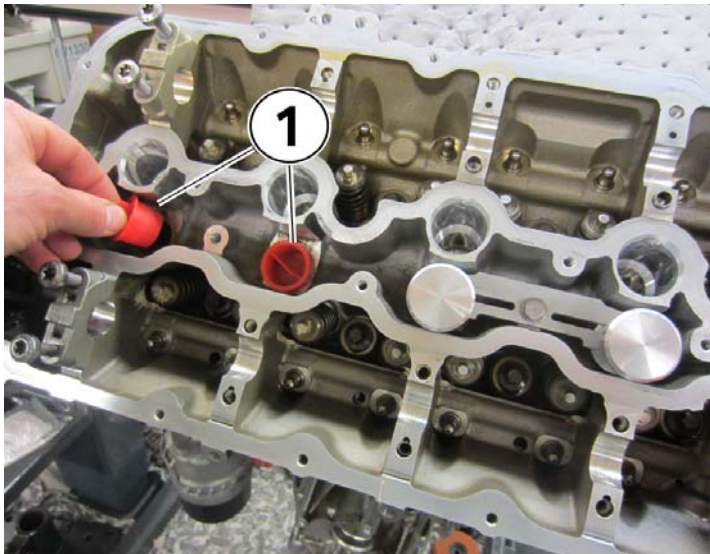


5. Install the fuel injector sealing plugs (1) into the cylinder 1 and 2 injector bores (2).

P/N AGA-FISP-N63

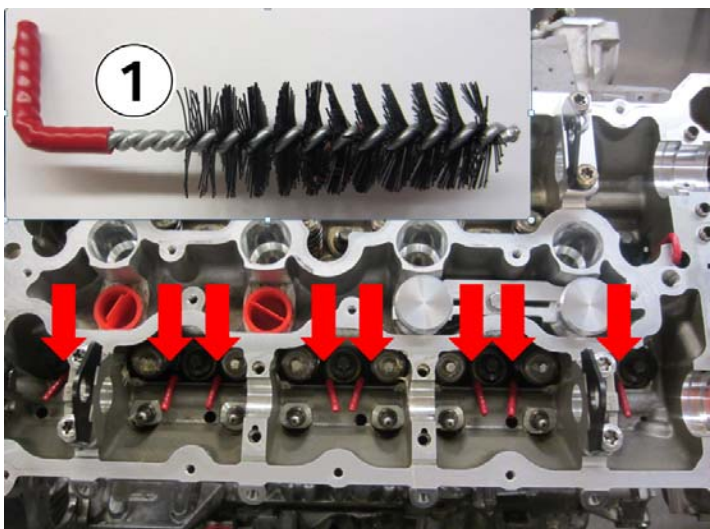


6. Reinstall the injector hold-down bracket and torque the M7 hex bolt to 13 Nm. (1)



7. Install the two red plugs into the remaining open injector bores (1), so that debris does not fall into the cylinders while performing the repairs.

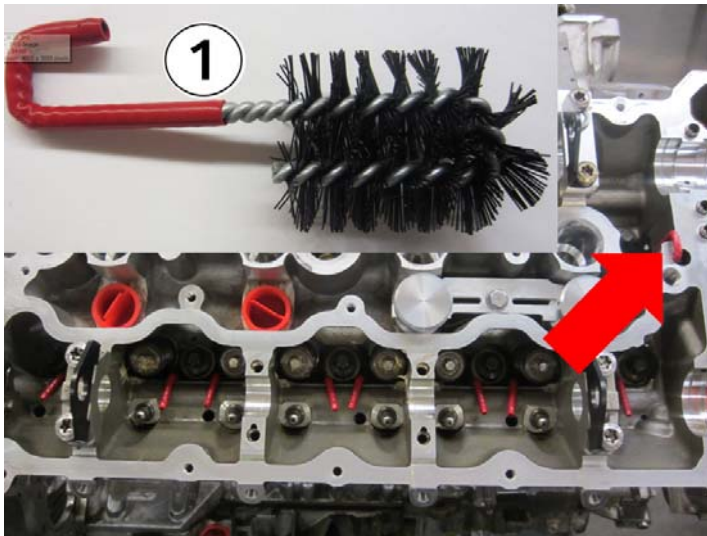
P/N AGA-IBPP-N63



8. Install the eight supplied plug brushes (1) into the eight oil drain back holes (see arrows) in the cylinder head, located on either side of the head bolts.

If a collet is dropped, use a magnet to retrieve the collet from around the brush. Do not remove the brushes until all collets are accounted for.

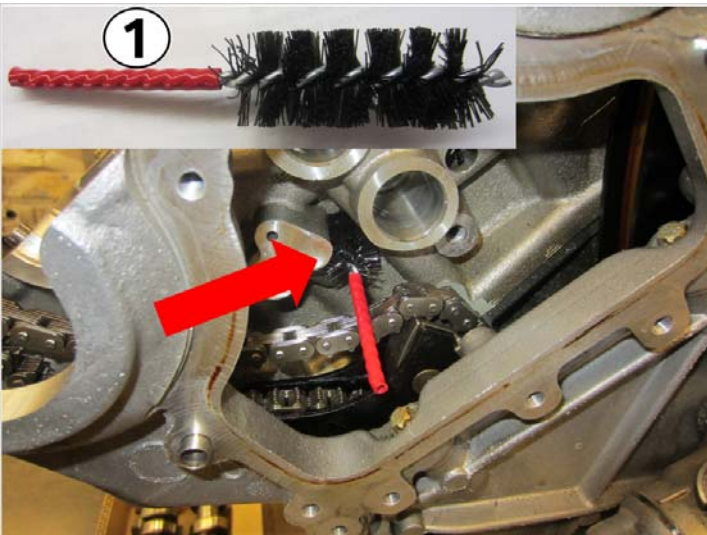
P/N AGA-N63-PB-34



- 9. Install the U-bend plug brush (1) into the cylinder head drain back hole just below the exhaust camshaft (see arrow).

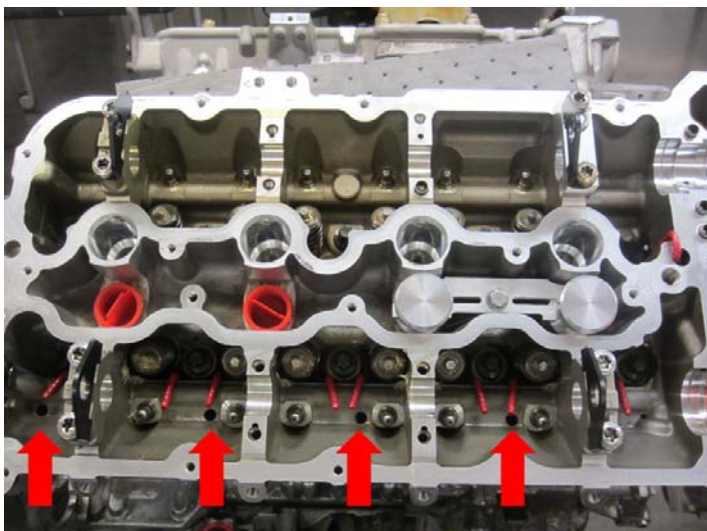
If a collet is dropped, use a magnet to retrieve the collet from around the brush. Do not remove the brushes until all collets are accounted for.

P/N AGA-N63-UP8-34

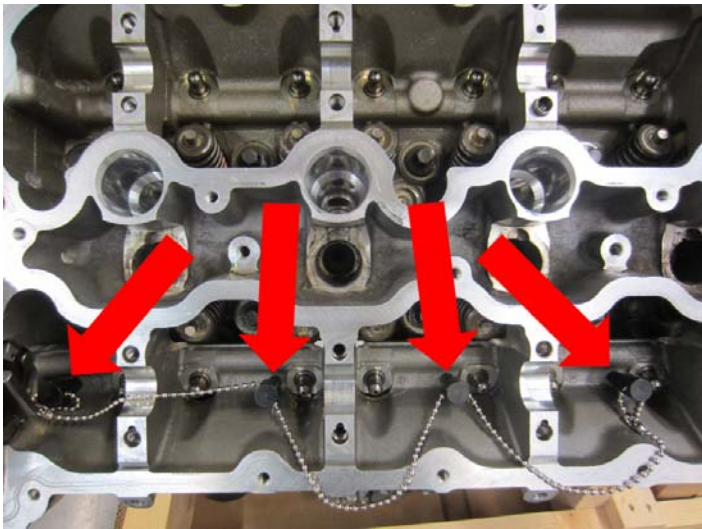


- 10. Install the new strait plug brush (1) from the update kit into the cylinder head oil drain hole as shown (see arrow).

P/N AGA-THB-N63



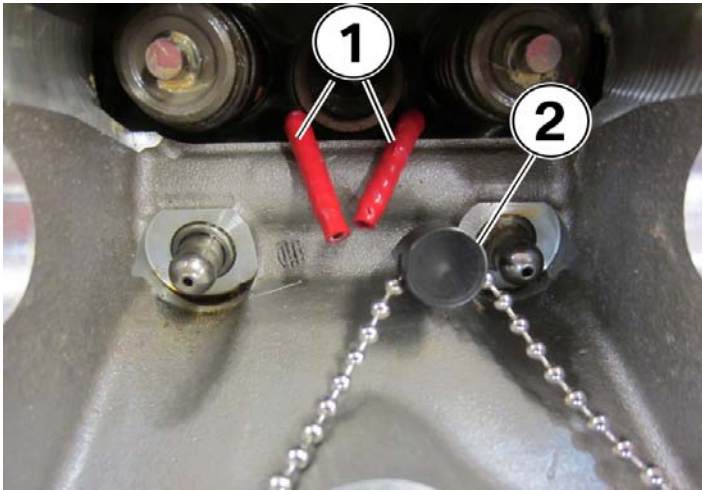
- 11. There are four drain back holes in the cylinder head near the hydraulic valve lash adjusters (HVA). See arrows.



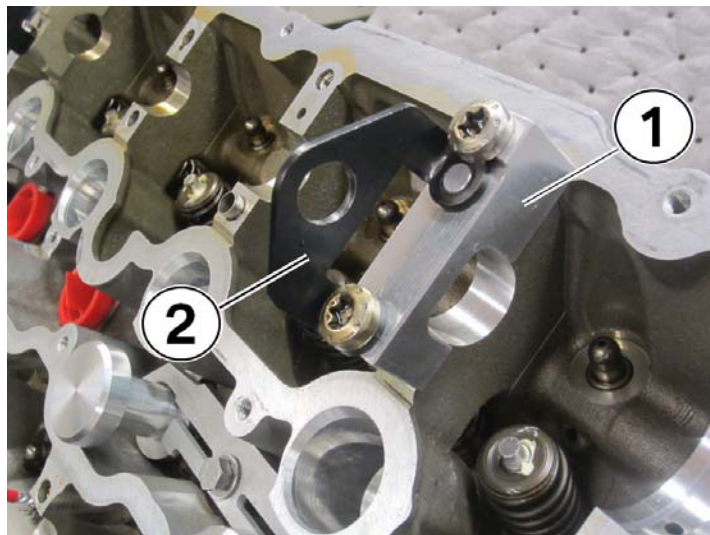
12. Block all four holes using the new oil return plugs found in the update kit (see arrows).

Do not use white lithium grease any longer.

P/N AGA-CPS-N63



Overview of the plug brushes (1) and the new oil return plug (2).

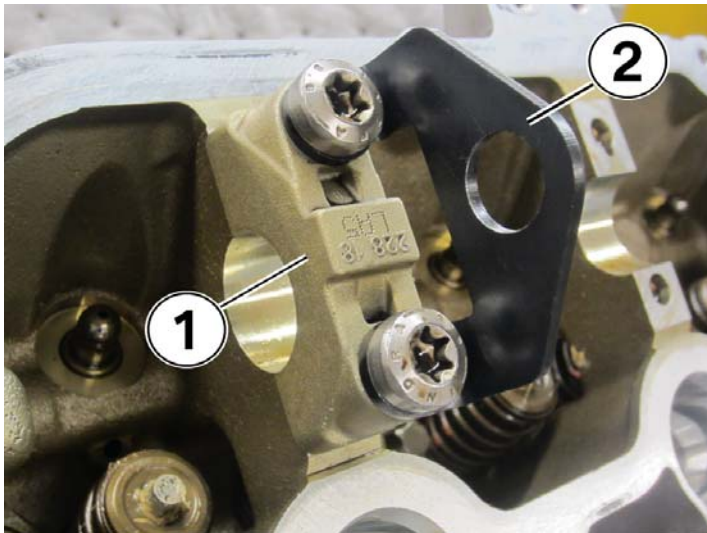


13. Exhaust camshaft position: Using two of the four bolts that hold the high-pressure pump housing, install the cam bracket (1) and a compression plate (2) onto the front of the cylinder head, above the cylinder 1 ignition coil bore.

Use a T45 and hand-tighten the bolts.

P/N AGA-CB-N63 (Cam Bracket)

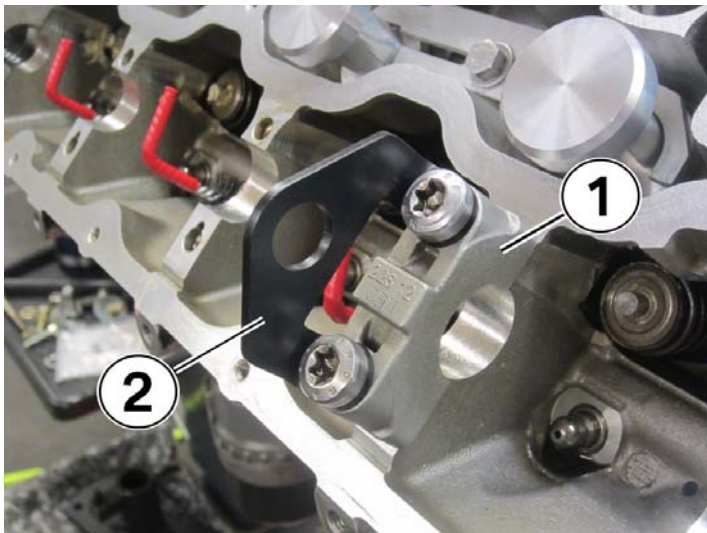
P/N AGA-CP-N63 (Compression Plate)



14. Exhaust camshaft position: Reinstall the “LA5” exhaust camshaft bearing cap (1) with a compression plate (2) onto the rear of the cylinder head.

Use a T45 and hand-tighten the bolts.

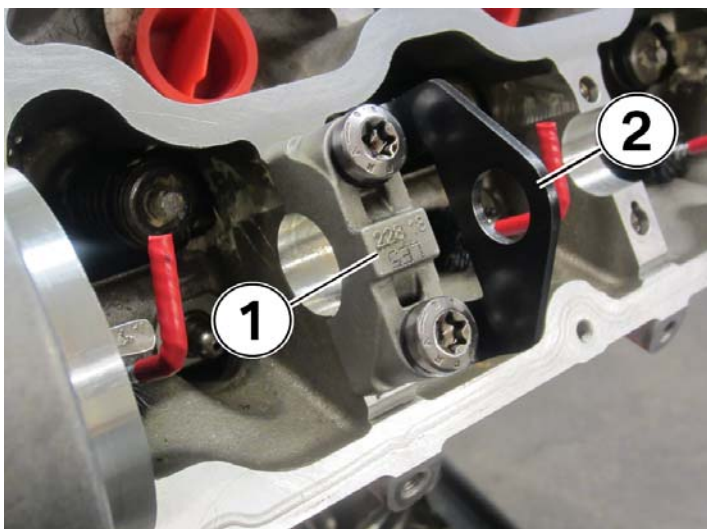
P/N AGA-CP-N63 (Compression Plate)



15. Intake camshaft position: Reinstall the “LE2” intake camshaft bearing cap (1) with a compression plate (2) onto the front of the cylinder head.

Use a T45 and hand-tighten the bolts.

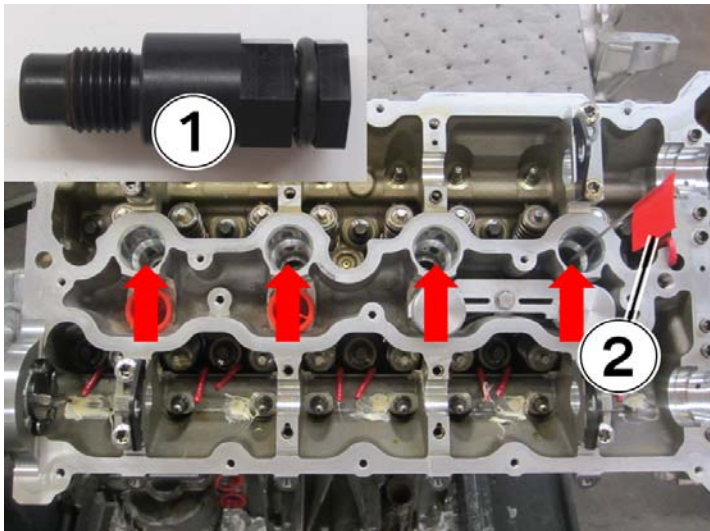
P/N AGA-CP-N63 (Compression Plate)



16. Intake camshaft position: Reinstall the “LE5” intake camshaft bearing cap (1) with a compression plate (2) onto the rear of the cylinder head.

Use a T45 and hand-tighten the bolts.

P/N AGA-CP-N63 (Compression Plate)

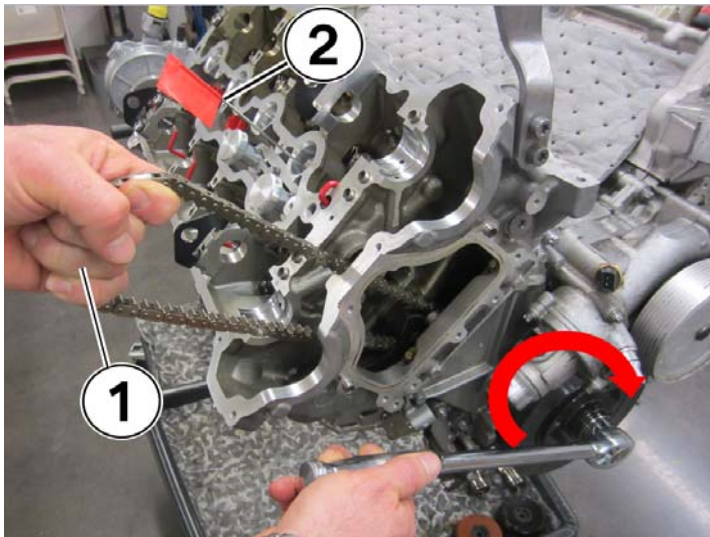


17. Screw four of the black plastic spark plug TDC tools (1) into each of the spark plug holes (see arrows) to avoid debris from falling into the cylinders.

Hand-tighten the tool (1) using tool number 12 1 220 and short 3/8 extension.

Insert the TDC flag into cylinder 1 (2).

P/N AGA-SPT12-125



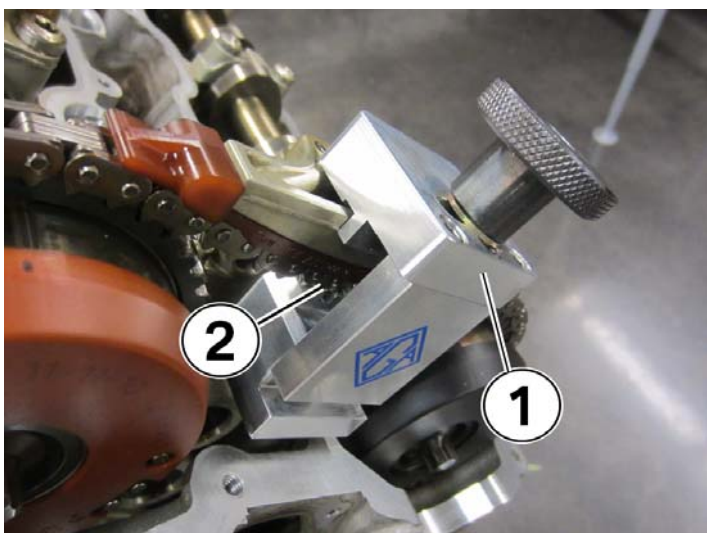
18. Hold the timing chain in one hand (1) and rotate the engine slowly in the clockwise direction (see arrow) while keeping the tension on the chain with one hand (1).

Do not allow the timing chain to fall down into the engine.

Stop turning the engine when TDC is reached.

It is good practice to turn the engine 1-2° past TDC (clockwise), so that the compressed air does not turn the engine backwards.

Do not apply compressed air to the cylinder yet.



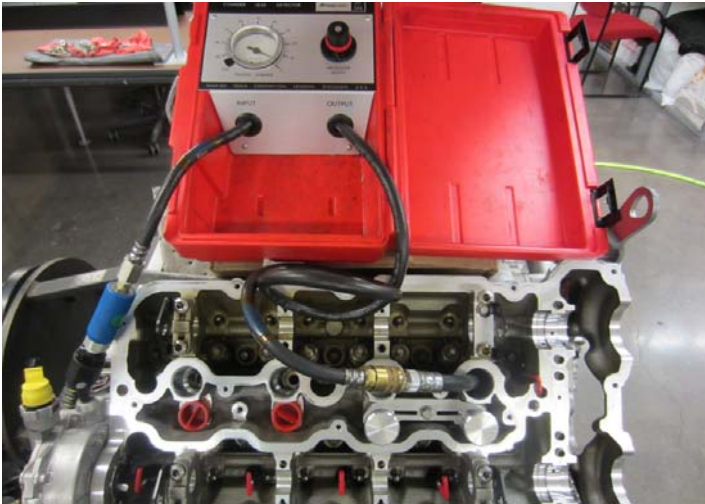
19. Install the timing chain holder (1) onto the opposite cylinder bank timing chain guide rail.

Installing this tool will prevent the engine from rotating when the compressed air is applied to the cylinders using a leak-down tester.

Make sure the teeth on the tool match the chain teeth (2) before tightening.

Tighten gently with just one hand.

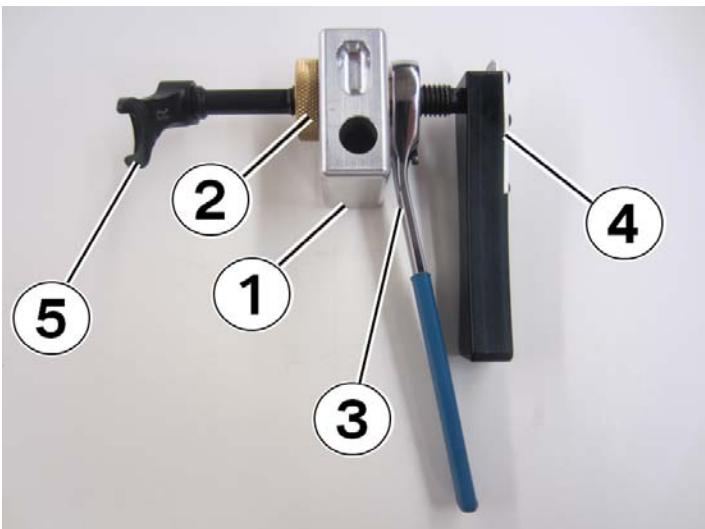
P/N AGA-CH-N63



20. Use a cylinder leak-down tester to supply air pressure to the cylinder. The air pressure will hold the valve in the closed position while removing the valve spring retainer, valve spring, and keepers.

A leak-down tester already has a predetermined pressure, so that no damage occurs to the engine.

Never apply shop air directly to the cylinder.



21. Assemble the compression block (1) onto the compression nut and compression screw (2).

Install the ratcheting box wrench (3) and the locator handle (4).

Use the laminated card in the kit to identify which compression foot (5) is required, based on the location of the valve spring in the cylinder head.

For example: The cylinder 1 exhaust front spring position requires the compression foot marked with an "R" = right (5).

P/N Overview:

P/N AGA-CB-N63 (1)

P/N AGA-CS-N63 (2)

P/N AGA-RW-N63 (3)

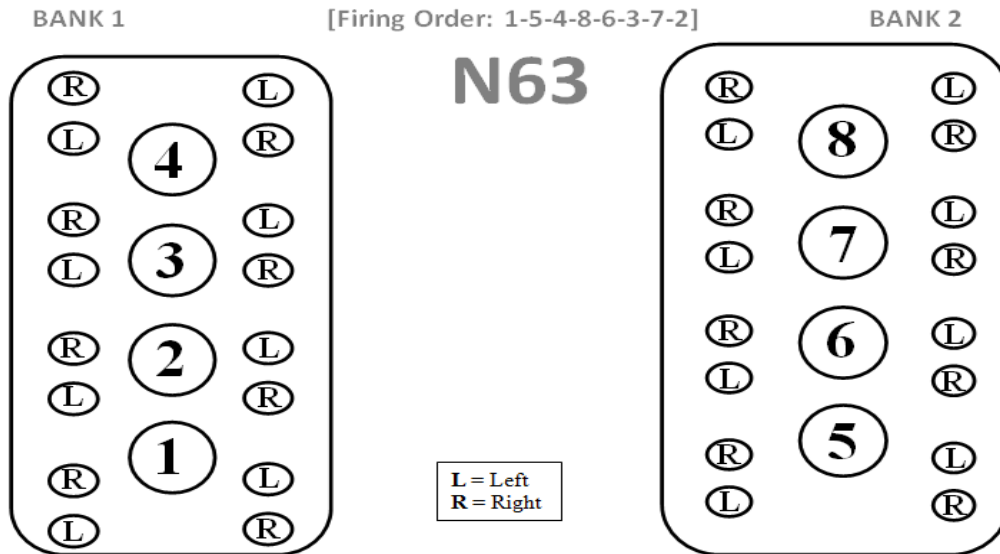
P/N AGA-VST-LH (4)

P/N AGA-FL-N63 (5)

or

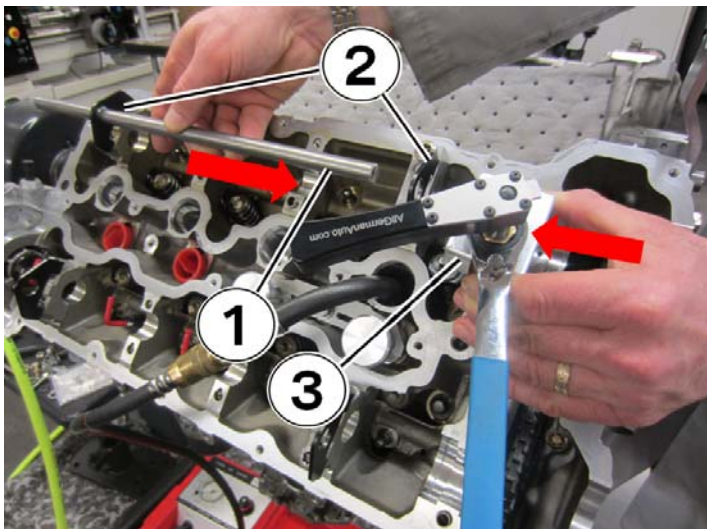
P/N AGA-FR-N63 (5)

Laminated Card Overview:



Front of Vehicle

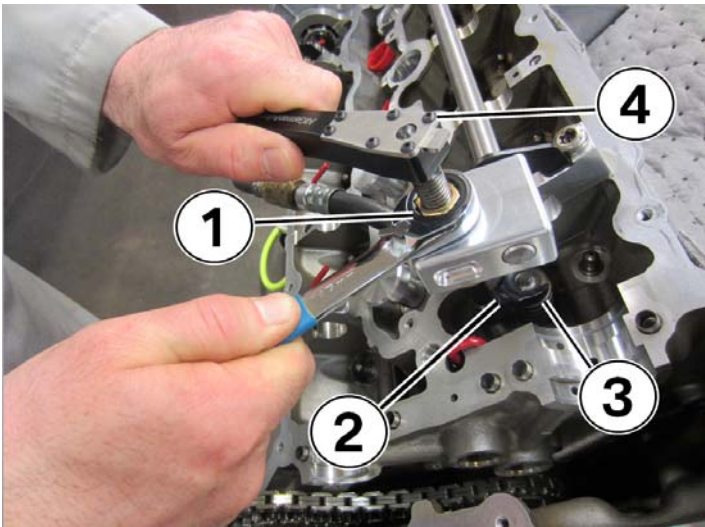
For replacement parts refer to: SI B11 08 15



22. Slide the compression lever rod (1) into the compression plates (2) located on the camshaft bearing caps.

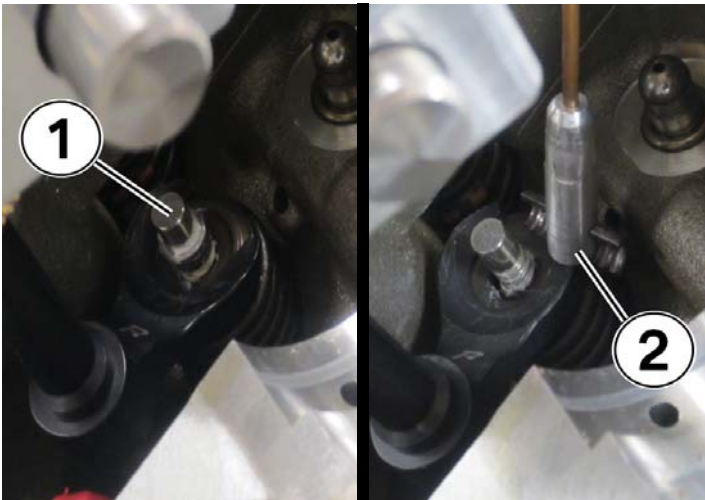
Slide the compression block (3) onto the compression lever rod (1) in the direction of the arrows.

P/N AGA-CLR-N63

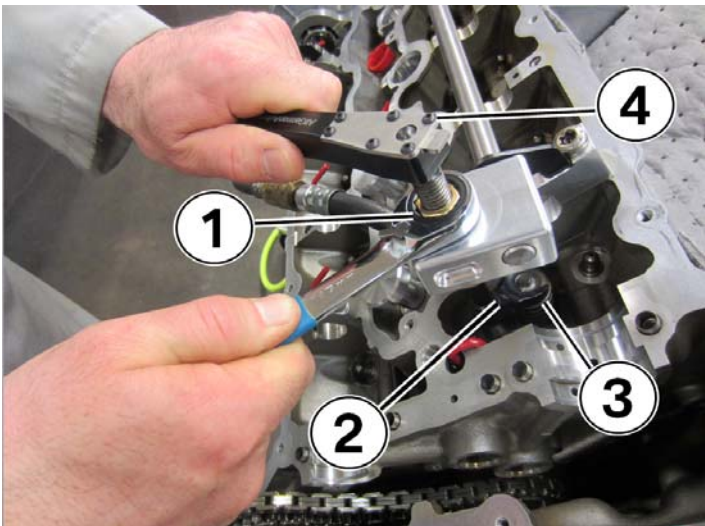


23. Rotate the compression nut (1) counter clockwise until the compression foot (2) contacts the valve spring retainer (3).

Hold the locator handle (4) firmly to keep the compression foot properly centered on the valve spring retainer (3).

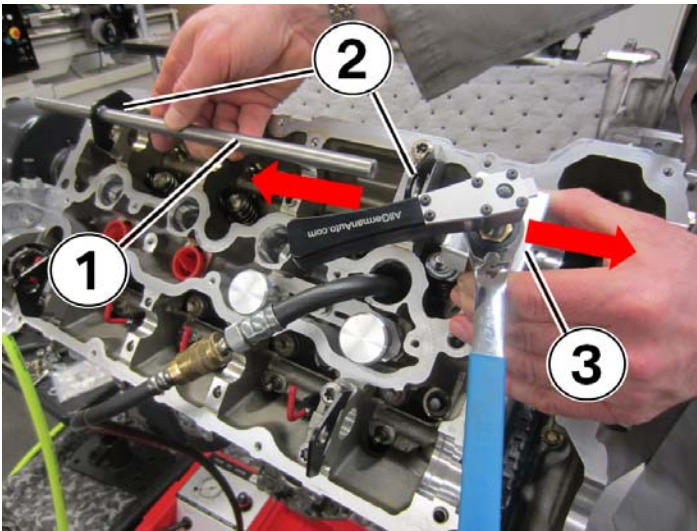


24. When the valve stem and keepers are exposed (1), the keepers can be removed with a magnet (2).



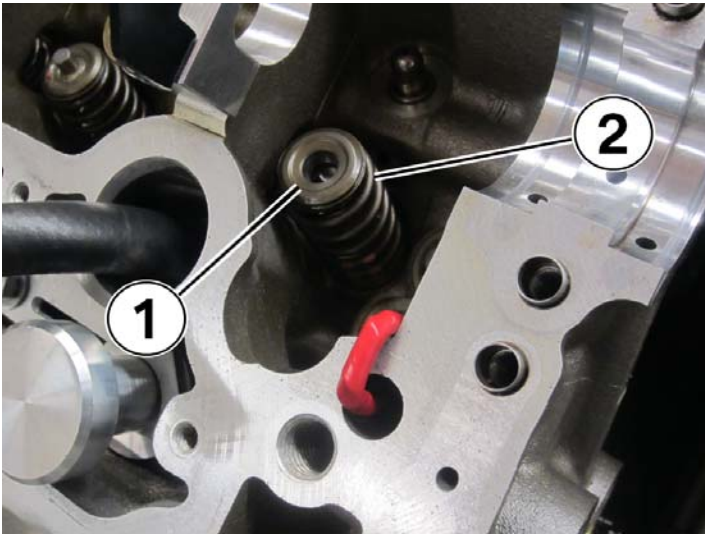
25. Rotate the compression nut (1) clockwise until the compression foot (2) releases the valve spring retainer (3).

Hold the locator handle (4) firmly to keep the compression foot properly centered on the valve spring retainer (3).

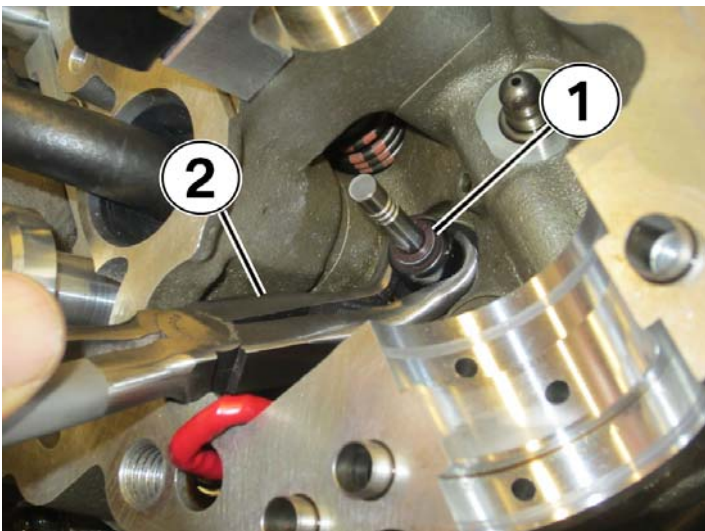


26. Remove the compression lever rod (1) from the compression plates (2), located on the camshaft bearing caps.

Remove the compression block (3) from the compression lever rod (1) in the direction of the arrows.

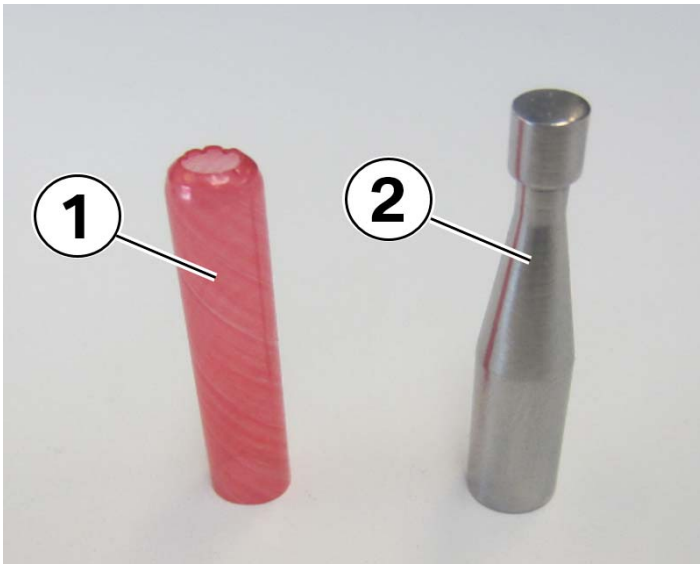


27. Remove the valve retainer (1) and valve spring (2) to expose the valve seal.



28. Remove the valve seal (1) with the seal pliers (2) included in the kit.

P/N AGA-SRP-N63



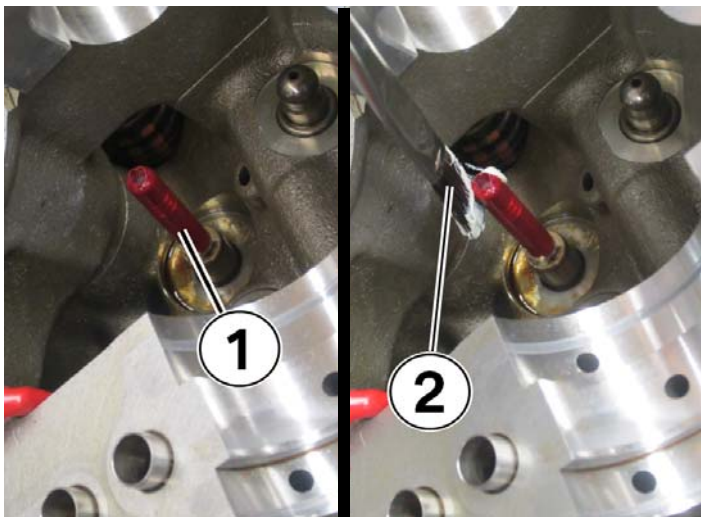
29. Installing the new valve seal can be done using either of these tools.

Valve stem protection sleeve (1) included with every valve seal kit P/N 11 34 0 039 494.

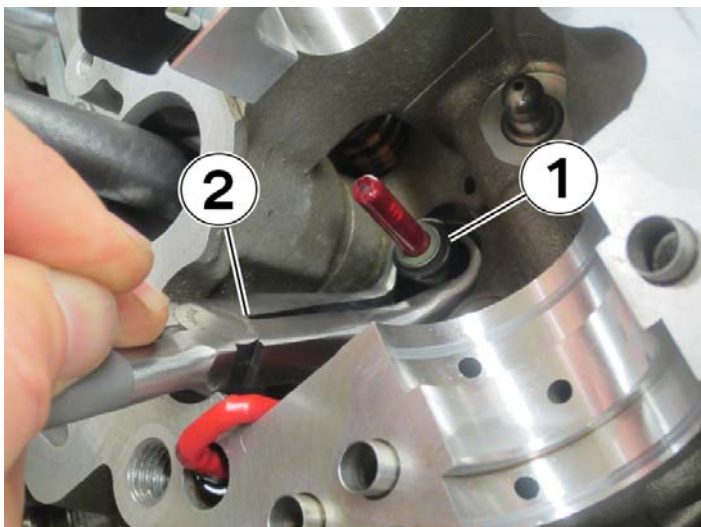
Or

Valve stem seal installation tool (2) P/N AGA-VSI-N63 that was provided with update kit P/N 83 30 2 443 944.

Both methods are shown in the next 4 illustrations.



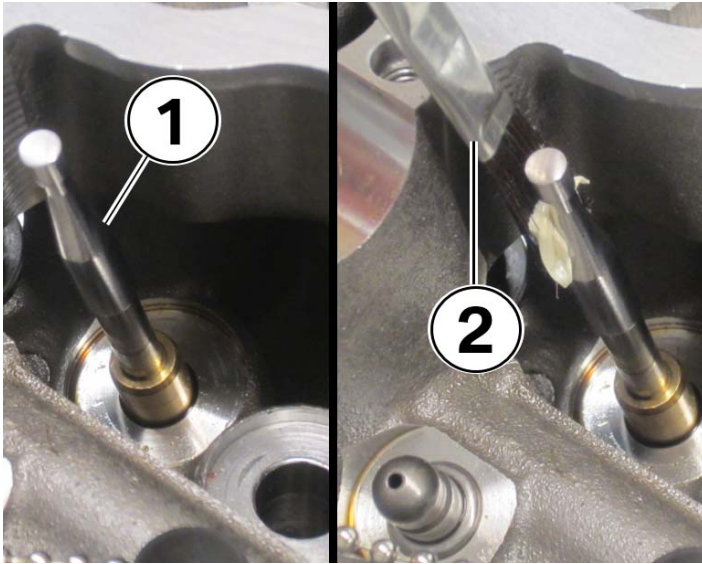
Install the valve stem protection sleeve (1) supplied with the valve seal kit. Apply a light coating of white lithium grease (2) to the sleeve exterior to help lubricate the valve seal installation.



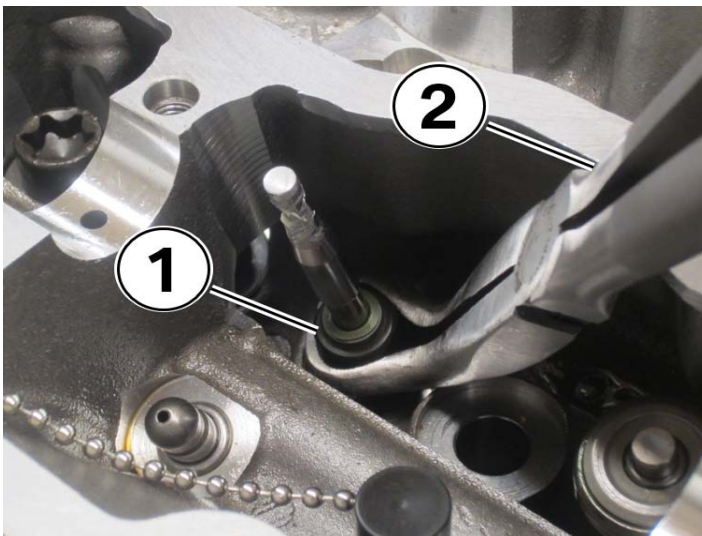
Install the new valve seal (1) with the seal pliers included in the kit (2).

Push firmly to seat the valve seal.

OR

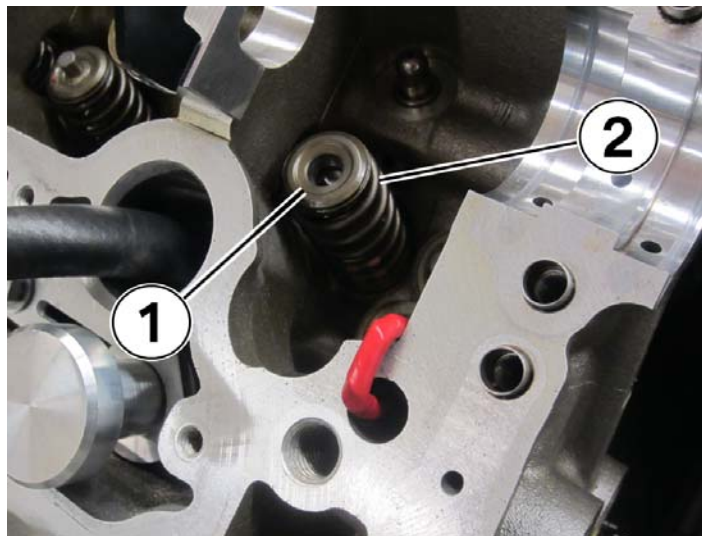


Install the valve stem seal install tool (1) supplied with update kit. Apply a light coating of white lithium grease (2) to the tool exterior to help lubricate the valve seal installation.

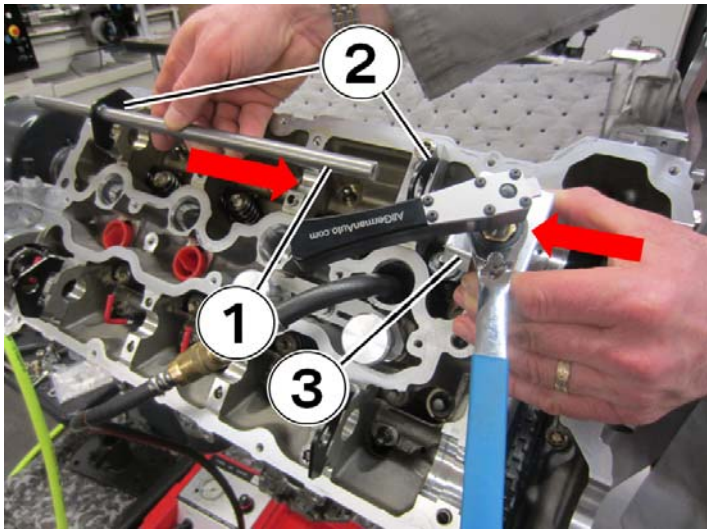


Install the new valve seal (1) with the seal pliers included in the kit (2).

Push firmly to seat the valve seal.

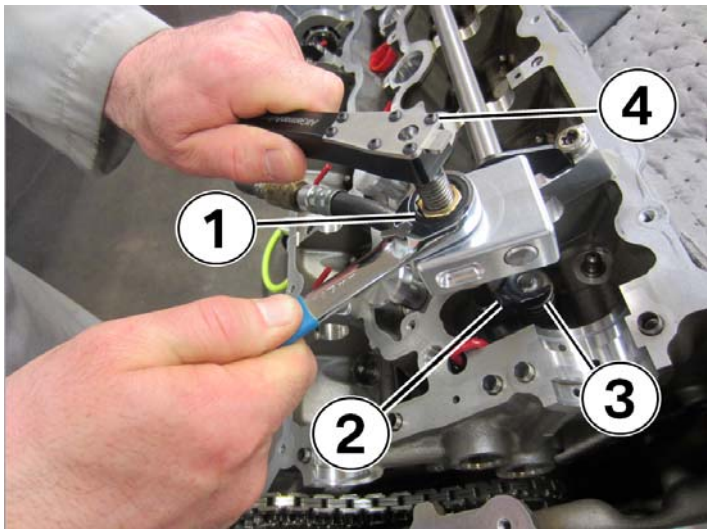


30. Install the valve spring retainer (1) and valve spring (2).



31. Slide the compression lever rod (1) into the compression plates (2) located on the camshaft bearing caps.

Slide the compression block (3) onto the compression lever rod (1) in the direction of the arrows.

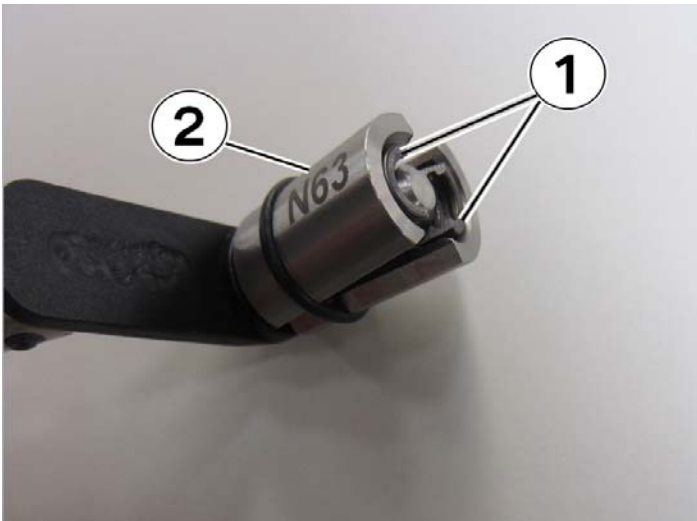


32. Rotate the compression nut (1) counter clockwise until the compression foot (2) depresses the valve spring (3).

Hold the locator handle (4) firmly to keep the compression foot properly centered on the valve spring retainer (3).



33. When the valve stem is exposed (1), apply a small amount of white lithium grease (2) with a brush to assist in holding the keepers in place.

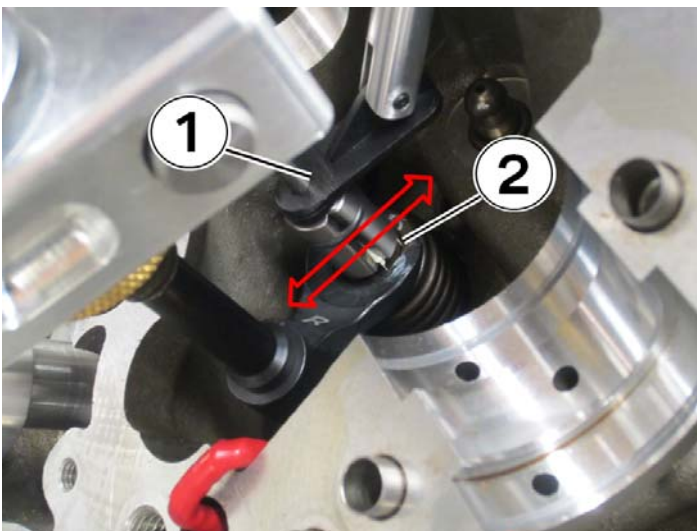


34. Install the keepers (1) into the N63 valve keeper tool (2) supplied in the kit.

P/N AGA-N63-6mm-VKT



35. Apply a small amount of white lithium grease to the keeper grooves (1).



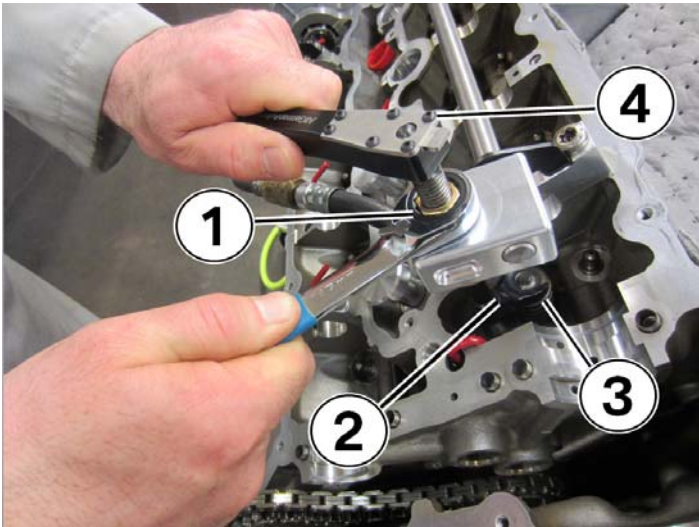
36. Place the N63 keeper tool with keepers (1) over the valve stem (2), and move the tool gently side to side to release the keepers (see arrow).

Gently lift the tool straight up, and the keepers will be left behind on the valve stem.



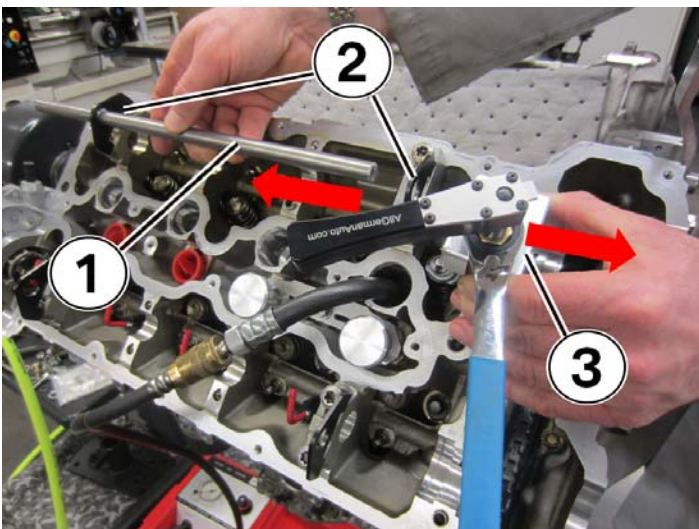
37. Inspect the position of the keepers on the valve stem to make sure they are in the proper position.

Do not wipe away any grease.



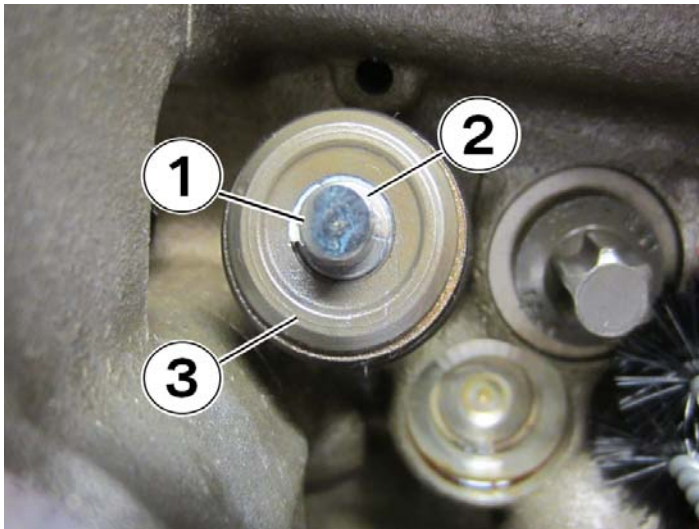
38. Rotate the compression nut (1) clockwise until the compression foot (2) releases the tension on the valve spring retainer (3).

Hold the locator handle (4) firmly to keep the compression foot properly centered on the valve spring retainer, so that the valve keepers seat correctly in the retainer (3).



39. Remove the compression lever rod (1) from the compression plates (2) located on the camshaft bearing caps.

Remove the compression block (3) from the compression lever rod (1) in the direction of the arrows.



40. Wipe away excess grease.

Inspect the valve stem (1), keepers (2), and the spring retainer (3) for the proper alignment before continuing.

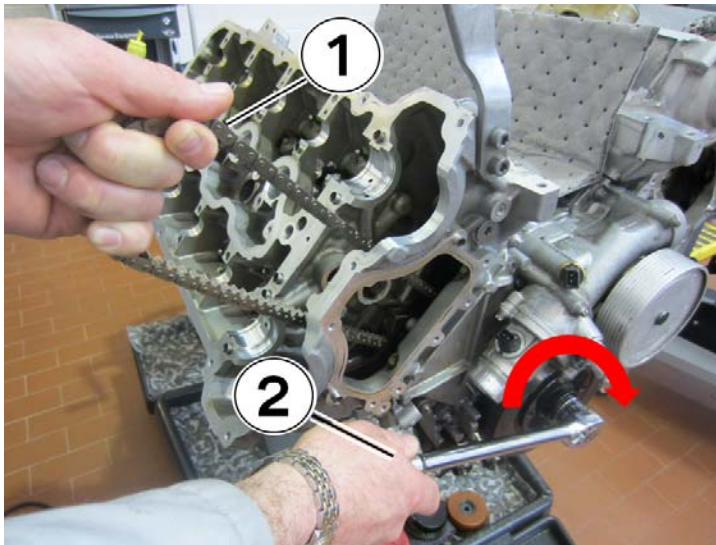
If the alignment is not correct, you will have to repeat steps 32-40.

41. Repeat steps 20 through 40 for the remaining valve seals on cylinder 1.

42. When cylinder 1 is complete, release the air supply from that cylinder and repeat steps 18 through 40 for cylinders 2, 3 and 4.

Fuel injector sealing plugs P/N AGA-FISP-N63 need to be moved to cylinders 3 and 4 when needed.

Injector bore plastic plugs P/N AGA-IBPP-N63 need to be moved to cylinders 1 and 2 when needed.



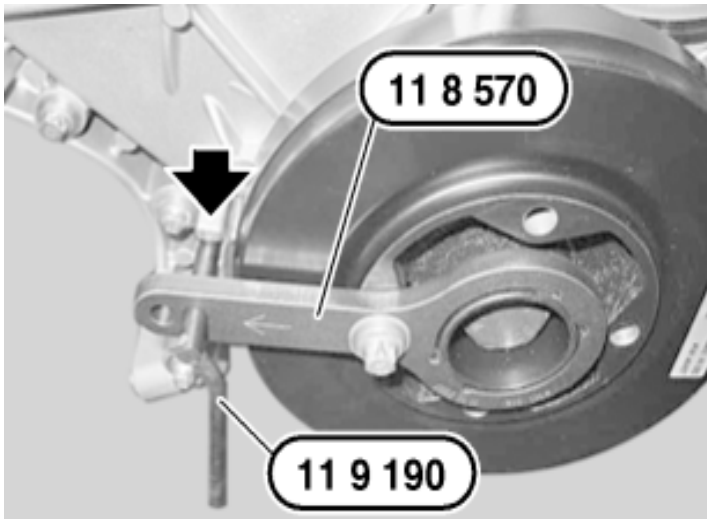
43. When cylinder bank 1 valve seal replacement is complete, the crankshaft has to be positioned 150° before cylinder 1 TDC.

Hold the timing chain with one hand (1) and rotate the engine (2) in the direction of the arrow.

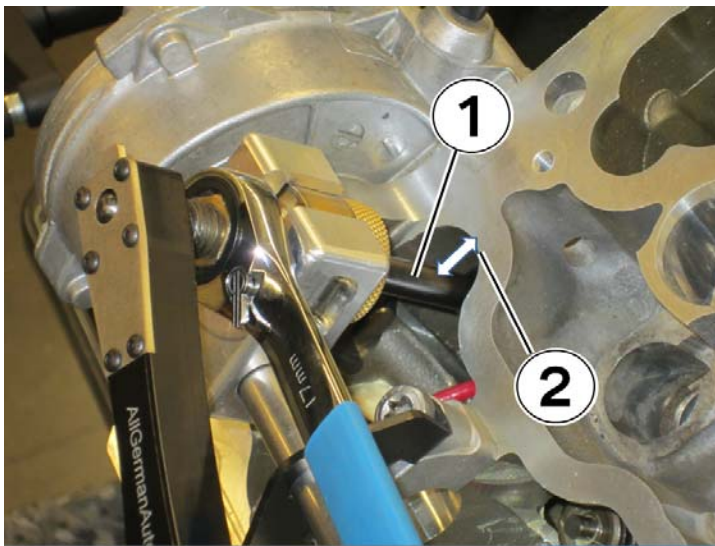
Do not allow the timing chain to get jammed.

Do not forget to remove the brushes from the oil return holes.

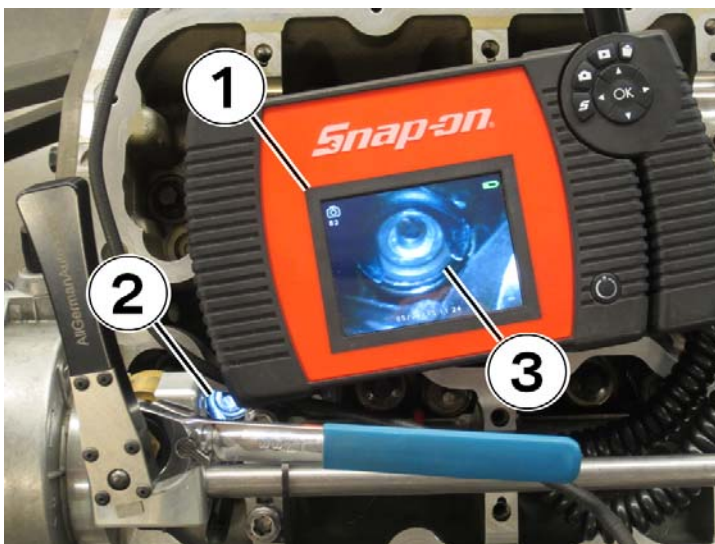
Clear the oil return holes covered with grease, using a small brush or cotton swab.



44. When the crankshaft is positioned correctly, install special tool 11 8 570 (crankshaft holding fixture) and special tool 11 9 190 (alignment pin). See arrow.

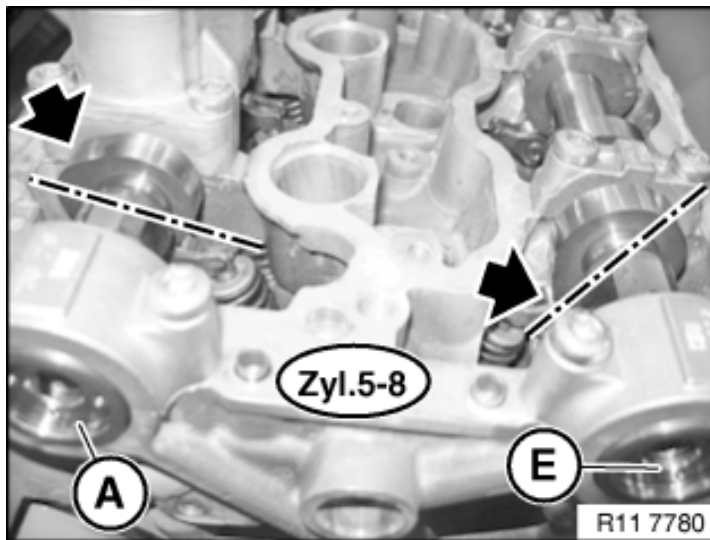


45. When replacing the valve seals on cylinder 4 and cylinder 8 it is recommended to rotate the shaft of the tool (1) so that it is as close as possible to the cylinder head casting (2). See arrow.



46. Use a bore scope or a mirror when replacing the valve seals to ensure reassembly is correct.

Using the “zoom” function of the bore scope will provide a closer look at the keepers and retainer (3).



47. With cylinder 1 at 150° before TDC:

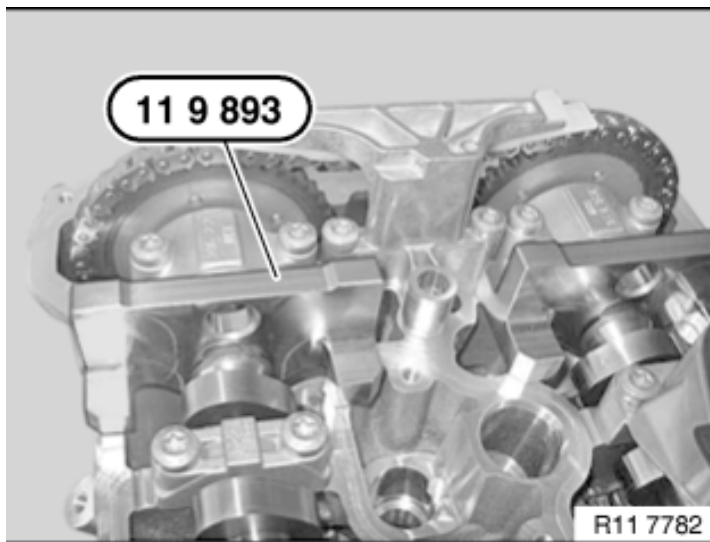
Cylinder 5 exhaust camshaft (A) lobes will point to the left. See arrow and line.

Cylinder 5 intake camshaft (E) lobes will point downward. See arrow and line.

Note: For purposes of clarity, the illustration shows the inlet and exhaust adjustment units removed.

Intake camshaft (A)

Exhaust camshaft (E)



48. Cylinder bank 2 timing is correct when special tool 11 9 893 (gauge) rests without a gap on the cylinder head.

This check is required to ensure the crankshaft is in the right position before assembling the bank 1 timing chain drive.

49. Reinstall the camshafts on cylinder bank 1, and reinstall the VANOS gears before starting the procedure on cylinder bank 2.

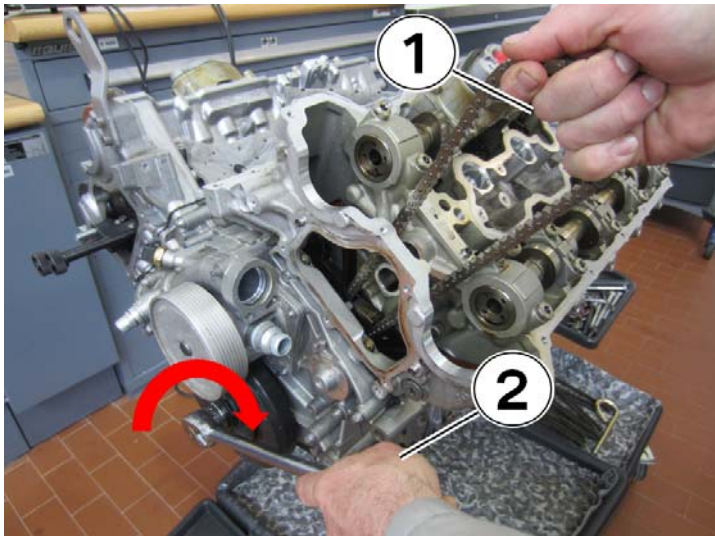
Refer to Repair Instruction 11 33 054, "Removing and installing/renewing rocker arms on right side" for reinstallation procedures.

50. After cylinder bank 1 is reassembled, remove the VANOS gears and camshafts on cylinder bank 2.

Repeat steps 1 through 40 on cylinder bank 2.

Note: Cylinder numbers start at the front of the cylinder head on cylinder bank 2.

Example: Cylinder 1 = Cylinder 5

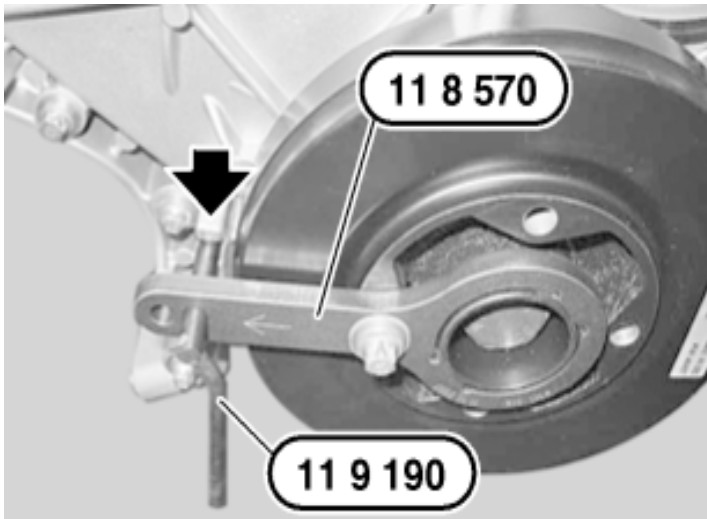


51. When cylinder bank 2 valve seal replacement is complete, the crankshaft has to be positioned 150° before cylinder 1 TDC.

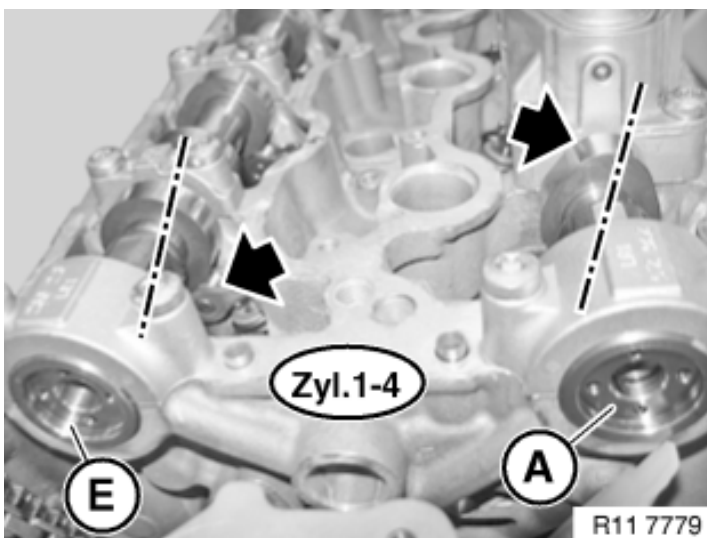
Rotate the engine in the direction of the arrow. Do not allow the chain to get jammed. Hold the timing chain with one hand (1).

Do not forget to remove the brushes from the oil return holes.

Clear the oil return holes covered with grease, using a small brush or cotton swab.



52. When the crankshaft is positioned correctly, install special tool 11 8 570 (crankshaft holding fixture) and special tool 11 9 190 (alignment pin). See arrow.



53. With cylinder 1 at 150° before TDC:

Cylinder 1 exhaust camshaft (A) lobes point at an angle upwards. See arrow and line.

Cylinder 1 intake camshaft (E) lobes point at an angle downwards. See arrow and line.

Note: For purposes of clarity, the illustration shows the inlet and exhaust adjustment units removed.

Intake camshaft (A)

Exhaust camshaft (E)

Refer to Repair Instruction 11 33 052, "Removing and installing/renewing rocker arms on left side" and 11 33 054, "Removing and installing/renewing rocker arms on right side" for reinstallation procedures.

Reassemble the remaining portion of the vehicle per the repair instructions.