

# Pre-Combustion Chamber Removal & Installation

## Tools Required:

- 003031 Pre-chamber Extraction Tool Assy
- Torque Wrenches 5nm & 45nm
- 5mm Hex Key Socket or 10mm ¼ Drive Socket
- 19mm spanner x 2 or 19mm Spanner & Socket Ratchet
- Small Flat Bladed Screw Driver
- 12mm Deep Socket
- 8mm Socket
- T bar or Breaker Bar
- 14mm Flare Nut Spanner (recommended)
- Nylon Mallet
- Pliers or similar for hose clip removal
- Heat Gun
- Torch

## Consumables

- RTV Sealant
- Silicone Grease
- Small Cable Ties

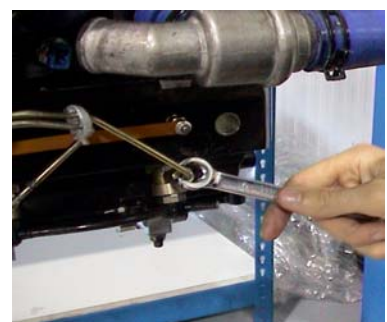


## Removal of Pre-chamber



1. Remove all allen bolts in the sump except for two opposing corners using a 5mm hex key or 10mm socket. Support the sump in the centre and remove the remaining two from the corners and drop the sump down, (be careful not to spill oil)  
This will require two people.

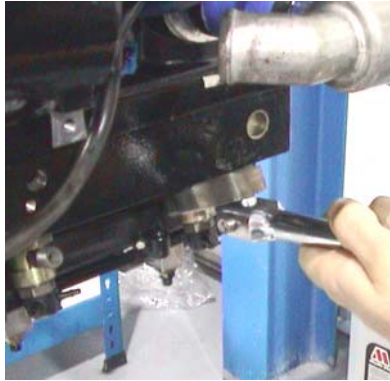
- 2) Drain coolant and remove coolant hose from radiator, water pump, expansion bottle and thermostat. This makes the job easier but is not essential.



- 3) Remove the cable ties from the fuel lines. Remove fuel line clamps. Using 14mm flare nut spanner remove fuel lines.
- 4) Remove the leak off hoses and black cap using small screwdriver, being careful not to split them.
- 5) Remove three flanged nuts from glow plug rail with an 8mm socket. Remove the rail by hand.

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- 6) Remove glow plugs with a 12mm deep socket. Mark or bag up each glow plug to ensure it is returned to its original cylinder position.



- 7) Using tool 001670 and ½" drive breaker bar undo injectors. (Some adjustment to tool may be required). Working one cylinder at a time undo and remove injectors with injector tool. Mark or bag up each injector to ensure it is returned to its original cylinder position.



- 8) Carefully screw the removal tool 001764 into base of the pre-chamber.



- 9) Using 003016 place flat face against head. Insert bolt, nut, washer and end cap

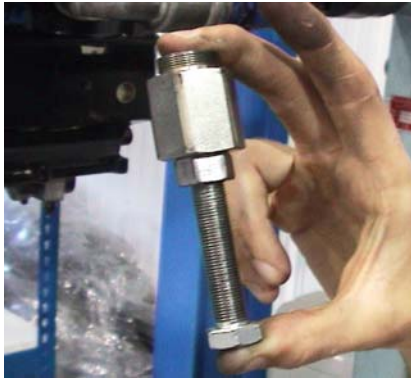


- 10) Using heat gun warm area around inserted tool for approximately 5 minutes (to warm the head not the tool)

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- 11) Holding bolt head steady wind the nut up the bolt clock-wise. The whole tool plus the pre-chamber will become loose so be prepared to support it. Make sure the 2 shims come down with the pre-chamber, if they don't check in bore. (*Be aware the tool might be hot*).



- 12) For the removal of the pre-chamber nearest to the water pump the tool 001764 must be screwed onto the end of the bolt with the nut locked up (hand tight only) Put this through the collar 003016, holding collar in place screw the tool 001764 into pre-chamber. Using finger/screw driver against head to keep it in place, unscrew bolt until removed.

13) After bolt removed return to step 8

14) The shims are retained to service the new pre-chamber and must go back into the cylinder from which they were removed. Mark or bag up each pre-chamber with shims to ensure it is returned to its original cylinder position.

**End of Removal**

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## Installation of Pre-chamber

- 1) Using old 'Scotchbrite' clean up inside the bores with Brake cleaner or equivalent to remove all dirt. (DO NOT USE AN AIR LINE AND AVOID CONTAMINATION OF MAIN CYLINDER) Taking your time at this stage will make it much easier to fit new pre-chambers.



- 2) Having removed the shims from the old chambers, and noting their cylinder position, install shims on to new pre-chambers to be refitted to original cylinder.

- 3) Pre-chambers should be as cold as possible. Place in a freezer if available.



- 4) Screw pre-chamber onto tool. Heat up area around bore on the head with heat gun. (NOT A NAKED FLAME) This will give you more clearance.

- 5) Smear clean engine oil around pre-chamber. Insert pre-chamber into cylinder head bore ensuring it is kept as square as possible, using hand pressure it should go in most of the way. Using a torch check that the vertical slot is aligned with the glow plug hole.

- 6) A light tapping may be needed to fully seat the pre-chamber in the head, this should be done with a nylon mallet.

- 7) Using tool 000792 insert into glow plug hole. Now holding pre-chamber remove insertion tool.



- 8) Leaving tool in glow plug hole, take injector for that cylinder and screw into place

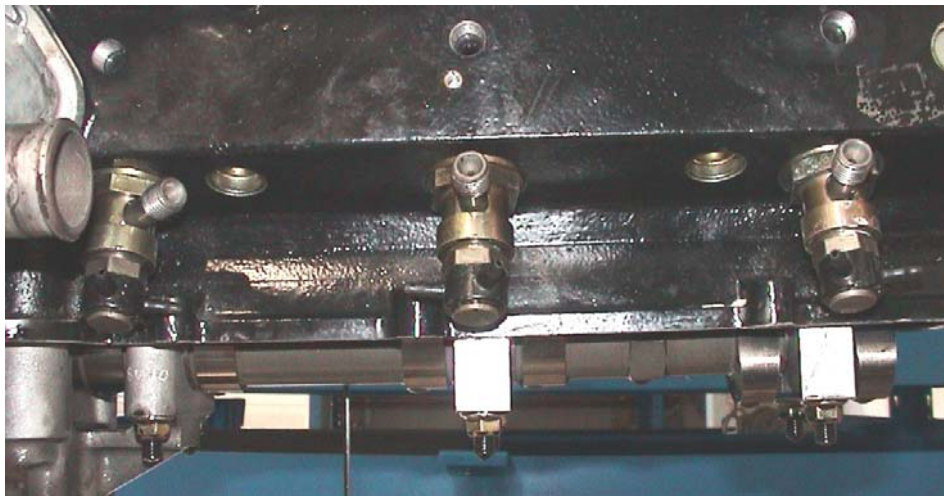


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- 9) Tighten the injector nuts to 45Nm (33 lbs.ft) making sure the injector is in-line with the fuel pipeline.



- 10) Ensure the fuel fitting closest to the water pump is at 45° to the head and the other two are at 90° to the head

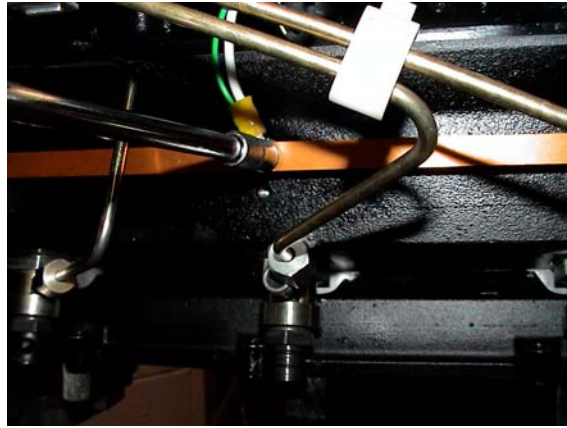


- 11) Remove the glow plug tool 000792, fit and torque glow plug to 12Nm using a deep 12mm socket and torque wrench.



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- 12) Repeat for the remaining cylinders.
- 13) Fit glow plug rail and loom using an 8mm socket. Only nip the nut as they are self locking and do not need much torque 5nm



- 14) Refit Leak-off hoses (push on) and cap.
- 15) Refit fuel lines to injectors and tighten with a split ended 14mm flare nut spanner. Refit supporting clamps if disturbed.



- 16) Refit leak-off hoses onto the banjo fittings. Fit new cable ties.

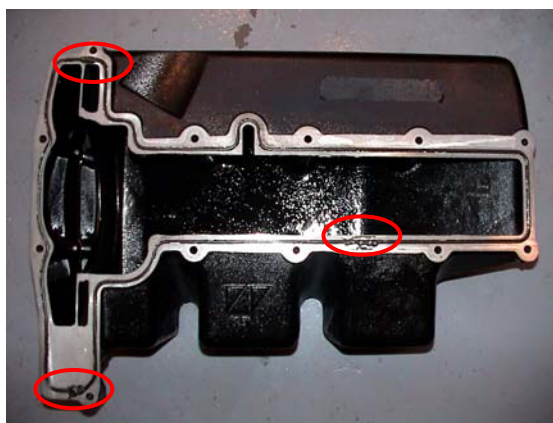


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- 17) Fit new O-ring to sump. Use silicone sealant on the O-ring joint (left) and at the two ends of the O-ring track where the timing cover meets the cylinder head (Middle and right).



- 18) Refit sump with allen bolts, torque from the middle outwards to 12Nm.



- 19) Refill engine with oil.
- 20) Refill coolant system, making sure there is no contamination if re-using drained coolant.
- 21) Turn engine over by hand (using propeller) to ensure all is well before using the starter motor.
- 22) Carry out an engine ground run checking for normal operation of all engine systems.
- 23) Carefully check for leaks.
- 24) If all is satisfactory the engine may be returned to service.

*If you have any problems or queries, please contact Wilksch Airmotive on 0870 170 9670 before taking any further action.*

**End of Installation**