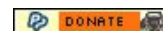


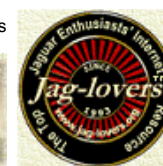
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XJLovers

FAQs

Removing the Cylinder Head

Dan Welchman

John Karr wrote: *I'm also removing the head myself. Egad, my kingdom for the job to ...*

..some (hopefully) useful info about removing the cylinder head yourself.

First, be sure to read the excellent online book "The Jaguar XJ6 from bumper to bumper" by Jim Isbell (another member of the list). This has a very good section on cylinder-head lifting. You can browse this at <http://www.ozemail.com.au/~vaughnb/xj6/index.html> thanks to the superb "HTMLisation" work of Vaughan Bromfield

I removed the head from my '85 4.2 XJ6 last year and wrote a few notes about it for the list. I've included these below for interest.

Well, I took the cylinder head of my 1985 (Series III) 4.2 XJ6 Sovereign. Actually, that was about four weeks ago but I've only just got around to writing it up!

THE REASON:

- At 105000 miles I have shaving-foam in the breather system (despite the fact that the oil looks fine - My usual trip is 30 miles to work so the engine has plenty of time to get nice and hot).
- I also had low compression on number three and need of a good de-coke plus valve bucket-guide stakedown measures.
- Oil pressure is fine:- 30psi at idle (hot) 60psi at 3000 on (15W-50)

THE DESIGN:

- The Aluminium XK engine cylinder head is clamped down onto the cast iron block by studs which are anchored right at the bottom of the block in the crankcase. This means that the studs are "wet" with coolant all the way up to the cylinder head nuts and consequently the studs get glued into their holes with all the clag that inevitably builds up. So unlike many engines where the head comes off easily once you've managed to get the head/block face split, the jag 6-cyl head has to be fought all the way!

THE APPROACH:

- I decided to pull the head off using home-made lifting beams straddling the engine compartment bearing on the inner-wing gutters using threaded rods and nuts (two on either end of each beam - eight in all).
- I left all three manifolds on (two exhaust and one inlet/fuel-injection) which gives you more mass to lift but means that you've got something to get hold of - I used four heavy-duty woven nylon straps going underneath the manifolds and over the beams. The beams themselves were 3" x 3" timber (you could use a bit of steel RSJ instead but I didn't have any).
- Actually I tried slightly smaller timbers first but broke them! - that gives you some idea of the force needed even with nice clean coolant and no noticable corrosion evident!
- I weighed the head after I got it off and it is about 25kg. With all three manifolds on that goes up to 50kg - (1 cwt). You need to be reasonably strong to lift that at arm's length so plan carefully and don't hurt your back. However, I assure you it CAN be done single-handed! (I didn't bother taking the bonnet off and lifted the head out sideways).
- The alternative approach I could have used is to unscrew the head studs first (see Jim Isbell's excellent XJ6 bumper-to-bumper book). If you do that then the head will come off easily once the joint is split - it's a cunning idea. It also has the advantage that you don't need to lift the so high because there are no studs to clear. Mind you;- if you snap off a stud INSIDE the block then you're in deep shit and are going to need specialist help of Micheal Neal calibre, (see his technical help section on the web page). You choose :~)

THE ACTUAL JOB:

- Having drained the coolant, the first thing you need to do is to disconnect everything. This includes exhaust, fuel injection hoses,

vacuum hoses, throttle cable, kickdown cable, wiring harness, air intake ducting & air-flow meter, coolant hoses etc etc etc. There are lots of connections so label everything up carefully. I used lots of cable ties to temporarily hold everything out of the way to ensure a clean lift. You may also have emissions control plumbing to disconnect as well if you're unlucky. You also need to disconnect the camshaft drives - after taking the cam-covers and breather housing off you can slacken the upper cam-chain and then un-bolt the cam sprockets from the camshafts (careful not to drop the screws or lock tabs down the timing case into the sump!). Jaguar have thoughtfully provided a beautiful cast aluminium bracket for you to strap the sprockets to. Late 4.2s like mine have four screws per camshaft and a plain shaft (+ circlip groove) sticking through the bracket whereas earlier ones (judging by the pictures in the manual) have two screws and a threaded shaft.

- The manual implies that you can lift the head without removing the camshafts but I found it impossible to do so because the little shaft sticking out of each sprocket (through the support bracket) fouls the front of the cylinder head as you lift... easier to remove the shafts. (Maybe the earlier threaded shafts are a bit shorter???) Also, if you DID manage to leave the shafts on the you must take care not to bend the valves when you put the head down, as they protrude below the block/head joint - although if you have left both manifolds on then they will hold the head clear.
- Mark the crank and cam positions before removing - if you get it wrong on reassembly then the intake and exhaust valves will hit each other and bend when you rotate the engine.
- Note also that there are six small studs at the front round the timing case as well as the fourteen main ones sticking up through the block. Don't forget these as the job is difficult enough as it is! To rotate the crankshaft into a convenient position beforehand (and for subsequent piston-top cleaning) I found it convenient to remove the water-pump/ power-steering belt and put a chain wrench on the pulley - it makes it easy to edge the crank round degree by degree.

(N.B. once the timing chain is disconnected never rotate one camshaft without removing the other one first - otherwise the inlets will hit the exhausts and they'll bend).

- OK. Once everything is disconnected ALL you have to is lift the head off:~)Ha! Ha! Ha! Ha Ha! Ha! Ha! Ha! Ha! How anyone manages to do this by hand (even with two strong men) I can't imagine. My engine has lovely clean coolant and I soaked the head studs/holes with penetrating oil for A WEEK before attempting it. Even then I had to exert a considerable force to get the head off. At least the dual lifting-beam arrangement allows a nice straight steady lift. I kept going around tightening the threaded rods a turn at a time, tapping down the studs with a rubber mallet (and steel rod in the later stages) and giving the head a wiggle (thermostat housing makes a good handhold!). Eventually it came free.
- I kept spraying penetrating oil down the stud holes from time to time. Due to the studs-glued-into-the-holes syndrome it's a hard pull all the way until the studs are cleared. I used a little wooden measuring stick to make sure that I wasn't lifting the head too high at one end at a time and making it bind. DON'T be tempted to stick a lever into the joint face and pry it 'cause you'll gouge a groove and most likely make the new gasket leak on reassembly.
- Incidentally, I draped old pieces of carpet soft side down over the wings throughout to prevent scratching (Don't you just HATE overalls with brass zips on the pockets? - should be velcro -..... I digress..)
- Once the head is clear of the studs and hanging from the beams you can lift it off. Actually I inserted another couple of wooden poles under it first, then undid the straps, then slid it towards the side of the engine bay so that it was nearer my body for an easier lift. 50kg (my estimate was 70kg!) may not sound that much but it feels heavier stretched out in front of you like that! (and you don't want to drop it on that lovely curvey Jaguar wing do you? :~) ...no, I thought not!)
- If you're working in covered garage and/or have an engine crane then you can put them to good use (I haven't).

POSTSCRIPT:

- Hoorah! the cylinder head is off.
- The exhaust manifolds came off easily. The inlet/fuel-injection manifold required a little bit of welly. I'll write what I actually DID to the head in another message when I get round to it - it was fun.
- I am amazed at the condition of the cylinder bores;- you can see the brown laquer mark where the top piston ring sits but there is practically no discernable ridge in the bore, you can't even feel it with a thumbnail. Looks like re-boring these engines at 100000 miles is a waste of time. More like re-bore at 300000 miles with a de-coke and fresh head gasket every 100000 or so.

..anyway, more waffle on my cylinder head rebuild in a week or two.

..kind regards,

....enjoy your Jaguars,

Removing and Replacing the XK (1984) Cylinder Head

Tom Graham

The following is a description of the procedure I used to remove the cylinder head from my 1984 SIII sedan. This was the first time I had tried this - and I was scared!!! But I knew I had a lot of good help. Ron Greim was always ready to help and encourage me. The fellows at Britalia, Haig and Walter, gave me a lot of hints. (Additional motivation was provided by Britalia's price of \$1,000 just to pull the head and put it back, plus another \$400 or more for the machine shop to check the head, valve job, etc.). It took me about one week to pull the head (had problems with the pulling tool), 3 days at Sid's machine shop (\$425) and about three days to put it all back together.

I basically used two simple techniques to give me confidence in doing this. First, every time I removed something, even a small hose, I wrote it down. Thus the re-assembly would be "the reverse of the removal". Secondly, I used little "pricing tags", paper tags about 1.5 x 2.5 inches with a string loop attached. So, when ever I took two things apart, like the rear heater hose from the tube that connects to the water pump, I put a tag on the hose saying it connected to the tube from the water pump and a number like 14. I also put a tag on the tube saying it connected to the top hose from the heater and the same number, 14. (Unless it was something very obvious like the ground wire to the battery).

The head may be pulled with or without both or either of the exhaust and intake manifolds attached. I choose to remove both, but, I did not take off the intake manifold until the head was about 4 inches up on the studs. However on reassembly, I believe it would have been much easier to bolt on the intake manifold then put the assembly on the head. If so, note the 4 electrical connectors hidden by the intake manifold and reconnect. And the heater tube from the front to the rear underneath the manifold and the bracket that holds the cam "Y" oiler tubes to the head. Reconnect these brackets before letting the head-manifold all the way down on the head.

I'm not claiming that the way I did it was the best way, it worked. Also, I believe these notes to be about 95% correct, but if you find something that simply looks wrong, it probably is.

So here we go-
Step Number -

1. Drink a large mug of ale and sing or hum "God Save the Queen".
2. Disconnect the ground from the battery.
3. Remove the front spray shield and drain the coolant. (2 bolts, 7/16)
4. Tighten the hose clamp and put the spray shield back on.
5. Disconnect 3 hoses from the air pump. Note the small hose that runs across the front of the engine.
6. Disconnect from the air pump the 2 wire electrical connector.
7. Remove the emissions air pump (1 bolt 5/8, 1 bolt 9/16).
8. Remove the U shape bracket that holds the air pump (1 bolt)
9. On the 2 wing braces disconnect the 2 hoses to the cruise control bellows, and the 2 hoses to the brake servo (one of each , each side).
10. Remove the 2 wing braces, note the exhaust side brace is bolted to the coolant tank. (3 bolts, 9/16).
11. Remove the long "nut" holding the transmission stick to the exhaust manifold (1 bolt, 1/2).
12. Remove the exhaust heat shield with the air pump hose assembly (2 bolts 9/16, 1 bolt 7/8).
13. Remove the two exhaust manifolds, disconnect from exhaust pipes first, then from head studs (8 bolts each manifold, 9/16).

This completes the work on the exhaust side. Now over to the intake side.

14. Remove the air filter canister.
15. Disconnect the electrical connector from the air flow meter.
16. Disconnect the accordion hose from the air flow meter to the engine intake.
17. Stuff a small rag into the intake manifold to keep dirt out of it.
18. Remove the air flow meter. There are 3 brackets holding it, one on top and two below.
19. Remove the tube from across the front of the head that goes to the air pump.
20. Remove the ignition coil, bolts and electrical connectors.
21. Remove the breather housing and rubber dome from the front of the head, disconnect the tube from the solenoid. If desired remove the 4 studs. Note the coarse threads go into the head and that the two longer studs are on the drivers side.
22. Remove the small vacuum hose that goes from the air pump to a manifold fitting.
23. Disconnect small coolant hose from the thermostat housing.
24. Remove the large main upper coolant hose.
25. Disconnect the coolant bypass hose from the head.
26. Disconnect the long hose from water pump to intake manifold.
27. Remove fuel pump relay (just as extra safety precaution).
28. Disconnect fuel supply hose (rear of injector rail) from injector rail.
29. Disconnect short fuel hose that connects pressure regulator to tube that runs across front of engine.
30. Disconnect 3 large electrical connectors at the back of the intake manifold in a wiring harness, and the 1 electrical connector at the intake manifold, low, on side, facing you.
31. Disconnect the heater hose from tube at back of engine.
32. Disconnect heater hose from same tube at water pump.
33. Disconnect the several black ground wires and other ground wires from the (rear) bolt on the manifold sensor rail.
34. Disconnect the 2 connectors from the solenoid.
35. Disconnect the electrical connector going from the distributor to the amplifier.
36. Disconnect the throttle cable and the kickdown cable from their arms on the manifold.
37. Disconnect kickdown cable bracket from manifold (2 bolts, 11mm).
38. Disconnect the throttle cable from bracket (1 bolt, 11mm).
39. Disconnect small hose from back of the intake manifold.
40. Disconnect the sparking plug wires. And maybe plug the holes with something.
41. Disconnect electrical cable across front of engine, pull it away from the exhaust side over to the intake side. I could not find the connector for the green and black wires at the exhaust side, so, I cut the wires on the exhaust side to be spliced together later on reassembly.
42. Remove the little heat shield from top of head.

43. Remove the air injector rail on top of head.
44. Remove the oil pipe "Y" at the back of the head (2 bolts, 5/8). Note this tube is held by a small bracket that is bolted underneath the intake manifold.
45. Remove the intake and exhaust cam covers.
46. Loosen the cam chain tension, take out the 4 cam/sprocket bolts and slide the cam sprockets off of the cam. Slide the cam sprockets toward the center of the engine. A small wire at the end of the sprockets will hold them at the center. (Note we are not doing the cam notch at 90 degrees routine because the cams will be taken off the head when the head is checked by the machine shop).
47. Remove 2 nuts from the bottom front of the head (2 bolts, 9/16)
48. Remove 2 nuts from both sides of the head (4 bolts, 9/16).
49. Remove the 14 head nuts (14 nuts 3/4). Note how the engine lifting brackets are fitted.
50. Pull the head up about 4 inches.
51. Disconnect vacuum hose from distributor.
52. Disconnect heater hose from water pump.
53. Disconnect the 4 electrical connectors underneath the manifold.
54. Remove the intake manifold, or, pull the head with the manifold attached.

The cylinder head is now off the block. Drink another large mug of ale and sing or hum "God Save the Queen". The assembly of the head back onto the block is the reverse of the removal - with two exceptions. 1) The number 6 cylinder (front one) must be at TDC firing, and 2) The cam notches need to be set at 90 degrees.

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