

## SOHC Head Comparison: Compression Ratios

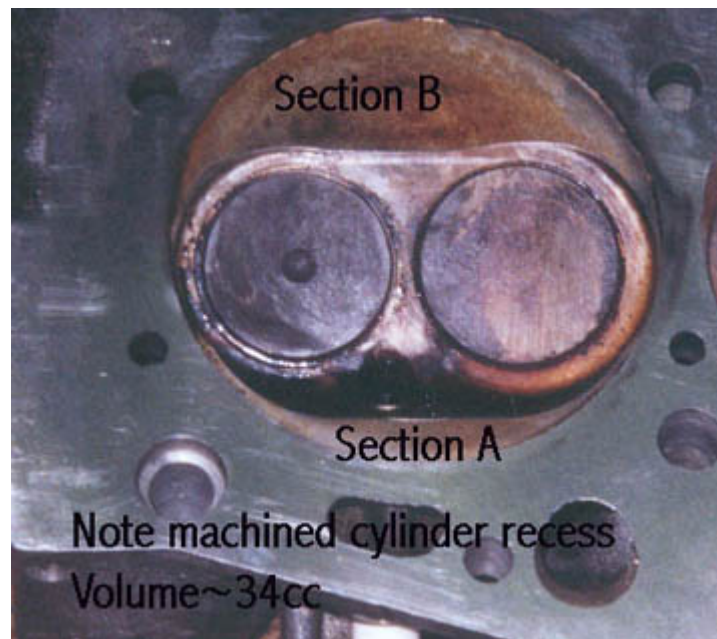
There's been a lot of talk about BV heads and Yugo heads and the relative gains in compression, etc. With Courtney's help I finally got some heads together for comparison. Court supplied the 1300cc Yugo head, my buddy Ed supplied the 1300cc X1/9 head and the 1500cc FI head came from my private reserve. I'm sure someone out there has done this before, I've just never seen the data and have always been curious about just exactly what the difference was.

The major differences in the heads are sections A and B, and the presence or absence of a machined cylinder recess. Section A is the spark plug area and section B is the machining around the valves on the manifold side of the head. When Court first brought the Yugo head over I immediately noticed that in section A, the Yugo head had considerably MORE material removed than the 1300 head (see Pics 3 and 4). I went so far as to pontificate that this amount of material would come close to equaling the machined cylinder recess in the 1300 head. Interestingly enough the FI head had this exact same machining done in section A.



**Pic 1. Measurement Set-Up**

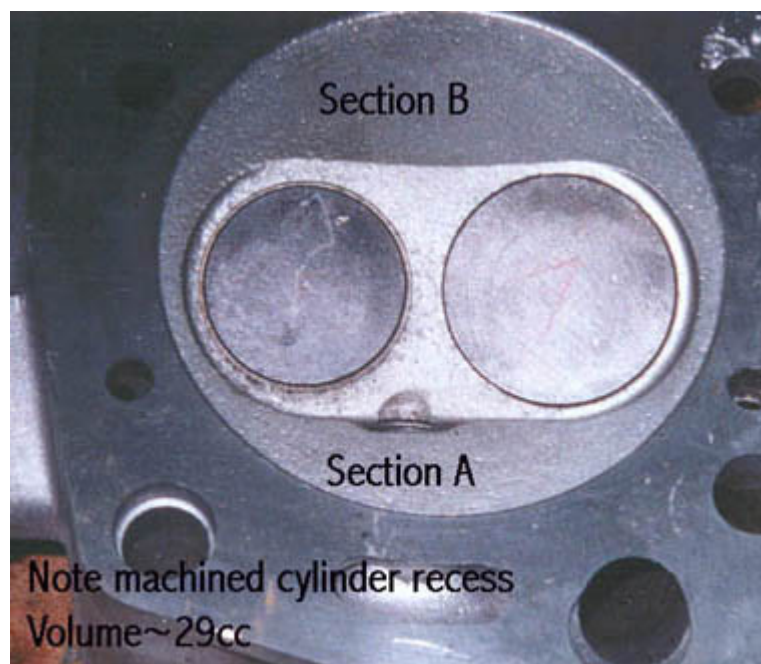
The set-up I used was pretty standard, a piece of plexiglass with a fill hole and a couple of bleed holes, a calibrated syringe, and a little grease to ensure water tightness. I measured each head a couple of times to ensure consistency.



**Pic 2. Standard 1500cc FI Head**

As noted in the picture, the volume of the combustion chamber is 34cc. This was the biggest of them all. In short, if you want compression, this is NOT the head to use in stock form. See how section B appears to have a deeper combustion chamber than the 1300 head but is shallower than the YUGO head. Rockwell welded his head and resurfaced it in order to remove the machined cylinder recess. My head was shaved .060 by [PBS](#), and that was on top of previous shavings, in order to get the compression up. I also used the European pistons which have the MUCH smaller fly-cuts.

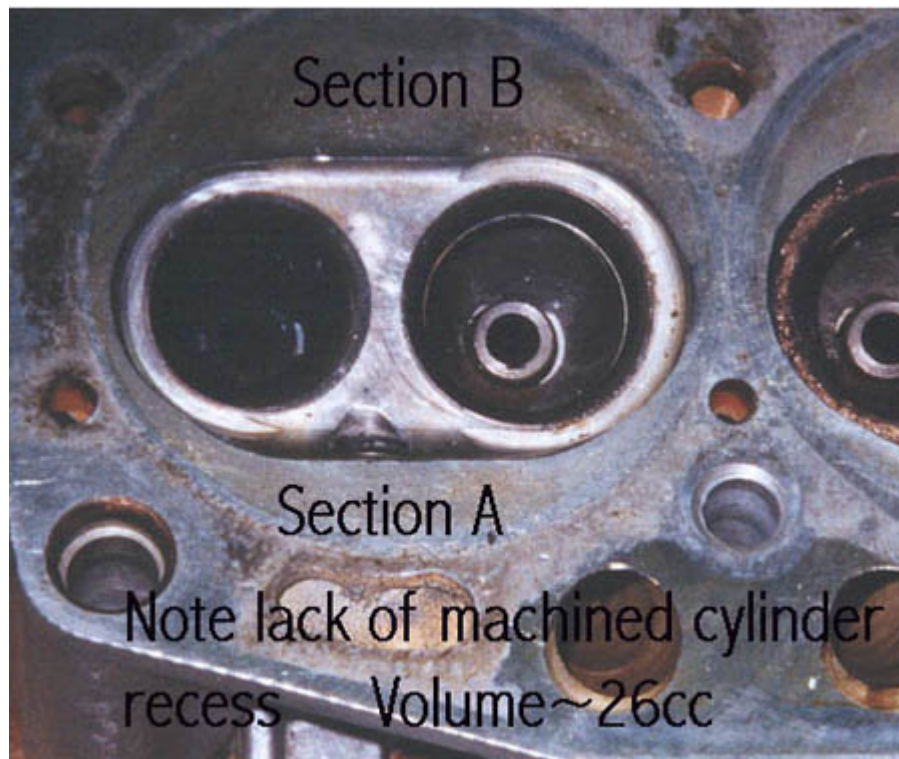
**NEW!** UPDATE Feb 6, 2000: As mentioned before, I had yet to see this data. So following with requests from Forum folks and others I went ahead and cc'd another couple of heads. This was made possible by Courtney who provided the heads. Unfortunately his FI head leaked through the valves, but the results seemed to support the 34cc value for the FI head.



**Pic 3. Standard 1300cc Head**

*The volume of this head is 29cc. Once again, note the difference in section A between this head and the others. I would guess that ALL three heads were cast with this extra material around the spark plug and was later removed from the YUGO and 1500 heads. It is considerable and I would imagine that if you were crazy enough you could take a YUGO head and weld this material back in. Go Scott go! :o) Also, compare section B with the other two heads, this does look like the combustion chamber is shallower.*

**NEW!** UPDATE Feb 6, 2000: This was where the numbers changed. I thought that the 1300 head that I had originally cc'd was only minimally shaved, but I was apparently wrong. The measured volume of the 1300 head that was cc'd at Courtney's was 33cc. Yup, just one cc less than the FI head. From looking at section A I would imagine that the 1cc difference is probably due to the extra meat around the spark plug.



**Pic 4. Standard 1300cc YUGO Head**

Finally we get to the YUGO head. Yup, 26cc. 21.2% less volume than the 1300cc and a whopping 23.5% less volume than the 1500 head. Of course this head features no machined cylinder recess. Scott must be proud. :o)

Ok, so what does all this mean? Let's look at compression numbers and build a virtual engine using a 1500cc engine as a basis:

**NEW!** UPDATE Feb 6, 2000: The numbers for the 1300 have been updated to reflect the new measurements.

**Stock** 1500 CR: **8.5/1**, this is what you get with the FI head.

1500 block with **1300cc head** CR: **8.7/1**, hmm, not that big of a change.

1500 block with **YUGO head** CR: **9.9/1**, now we're cookin' with gas. Add a little head shaving to get to 10/1 and that's an increase worth looking into.

For those interested in the calcs, click [here](#). They have been updated as well. They're really straightforward. If you want the quick and dirty calculation, note that the calculation of CR is a linear one. This means that if we know the percent change in combustion chamber volume we also know the percent change in CR, they're the same.

So the question is, should we all run to our local yard and pull all the Yugo heads we can get our hands on? If you want an increase in COMPRESSION, I say go for it. If you want an increase in PERFORMANCE, I say hold the boat. There are some important issues that have not been resolved yet, at least no one has showed me the data. Those issues are things like valve sizes, port sizes, head bolt sizes. The latter is one that Court immediately discovered. The holes in the Yugo 1300head are smaller than the Fiat 1300 head. Break out the drill press. As time permits I'll look in to these other critical performance areas. I'm not sure how much, if any, flow you are giving up in exchange for compression. At what point is this no longer a good trade-off?

Ok, I've consulted the 'experts' at the Mirafiori Forum and the following appears to be a pretty good rundown of what bolt sizes came with what heads on the Yugos. For those on the Forum, this info was provided by Scott P.:

*"The early 1500 blocks used 12mm bolts studs, and the later injected blocks used 10mm. All fiat 1300 blocks used the 12mm. Yugo heads produced up to '87 used the 12mm size. Yugo heads manufactured after late '87 used the 10mm size. SOOOOOO... Pick the right head to go with your block or vice versa. There is a Yugo head out there that will fit your block, no matter what the head bolt size."*

More to come.



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