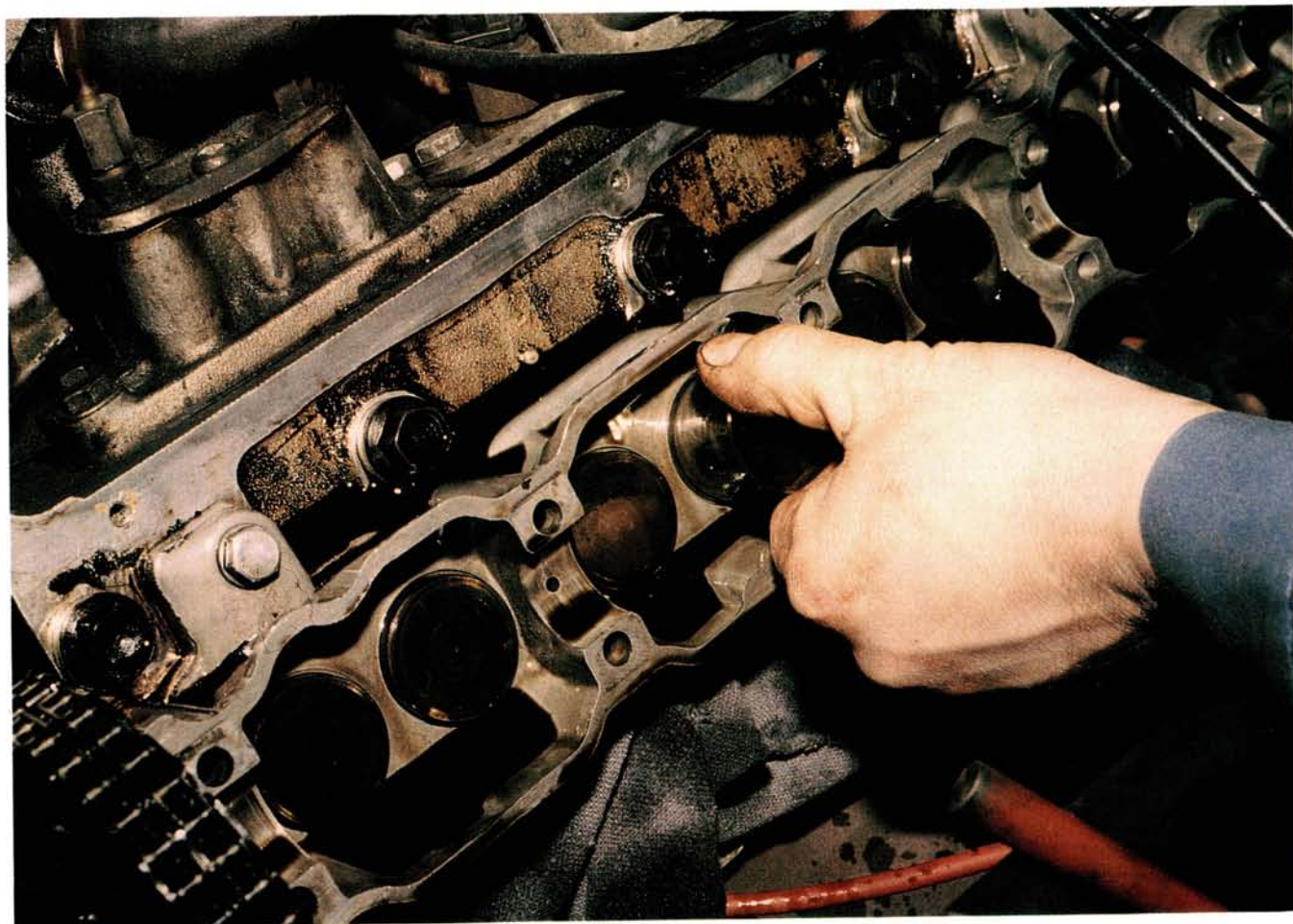


Saab Valve Adjustment



Return with us to a simpler time when an import technician needed to know his way around a set of feeler gauges to make a living practicing his trade. Back then, most import cars soldiered along with breaker point ignition systems and mechanical valve lifters.

Many import car manufacturers held onto their mechanical lifters, long after hydraulic lifters had been

standard equipment on domestic cars for years. Import technicians got plenty of feeler gauge practice.

Let's jump forward to the present. As we mentioned in our Toyota Twin Cam Valve Adjustment article in October '89, mechanical lifters are becoming nearly as scarce on newer import engines as they are on their domestic cousins. One by one, import manufacturers are making the switch to hydraulic

lifters.

We decided to bring back the good old days, and brush up our feeler gauge skills at the same time by doing a valve adjustment on a Saab "B" engine. Saab used the "B" engine in their 99 models through 1979, and also in some early 900 models.

Describing a valve adjustment procedure should be pretty routine on most cars. But it turns out that a Saab valve adjustment is unlike most others that come to mind.

Small selective thickness shims (Saab calls them pallets) sit on top of the valve stems and ride *under* the cam follower buckets. This is the opposite of other shim-style adjusters (like Volkswagen, Toyota, or Fiat), whose adjustment shims sit on top of the buckets and under the cam.

Since the Saab adjusting shims ride under the cam follower buckets, the only way to get to them is to remove the camshaft first. Depressing the buckets won't let you exchange the shims like the other engines we mentioned.

Outpatient Surgery

Removing the camshaft each time the valves need adjusting might seem like a major project at first glance. It isn't nearly as bad as it seems.

- The valve cover can be removed quickly, and access for checking valve clearances and cam removal is very good.
- The camshaft timing sprocket support maintains proper valve timing during adjustments and simplifies reinstallation of the sprocket.
- A hex boss on the camshaft makes it easy to turn the camshaft during valve adjustments.
- When properly adjusted, the valves will hold their adjustment for a long time. Saab recommends a 15,000

mile valve clearance inspection, and adjustment only if necessary.

Clearance Recommendations

- Intake Valves 0.20-0.25 mm (0.008-0.010 in)
- Exhaust Valves 0.40-0.45 mm (0.016-0.018 in)
- Turbo Exhaust Valves 0.045-0.050 mm (0.18-0.20 in)

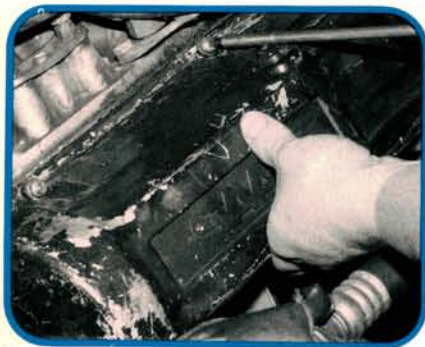
You're probably accustomed to seeing measurements quoted in the metric system in the pages of *Import Service*. After all, we're writing about imported cars, and the metric system is standard where they come from.

We found that Saab lists their valve clearance specifications in the English decimal system first, and metric second. Their adjustment shims are available in 0.002 inch (not metric) steps. So take your pick when you pull out your feeler gauges and micrometer. We'll list everything both ways for you.

Saab specifies a very narrow 0.051 mm (0.002 in) clearance range for both intake and exhaust valves on the "B" engine. Normal wear shouldn't take the valves very far outside of this range. Finding an extra tight exhaust valve during an adjustment may be an early sign of a burnt valve. A very loose valve clearance may be caused by a valve seat that's started to work loose in the head. Alarm bells should be going off in your head in either case.

Valve adjustment procedures for the later Saab 900 "H" engine are similar to those used on the earlier "B" engine. Because it lacks an auxiliary shaft, there are fewer steps required for cam sprocket removal on an "H" engine. Refer to the *Saab Cylinder Head Removal* article in the June 1988 *Import Service* for proper "H" engine timing chain tensioner handling techniques.

—By Karl Seyfert



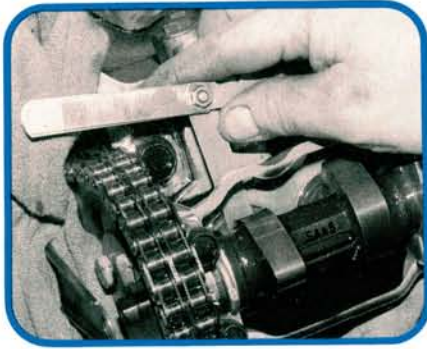
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2

Most engine service procedures start with "disconnect the battery". It's especially important here. You could end up pulling the engine to replace the timing chain if the crankshaft turns during the later steps of a Saab "B" engine valve adjustment. Remove the spark plug wiring, crankcase breather hose, and valve cover.

Saab recommends placing the transaxle in third gear, then rolling the car forward or backward to check valve clearances. Using a wrench to turn the cam boss while the cam sprocket is still attached may stretch the timing chain. A remote starter switch will do the job safely on stick or automatic models.



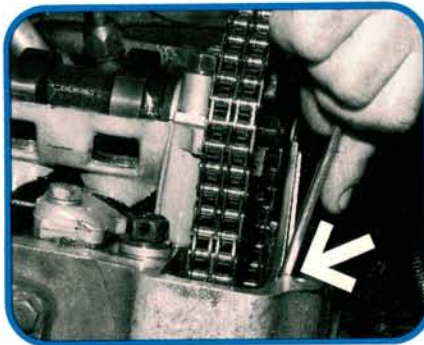
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Turn the engine over until the number one exhaust lobe points 180 degrees away from the valve stem. Measure the valve clearance through the window in the cam carrier. If your measurement is between Saab's maximum and minimum allowable clearances, no further adjustment is needed.



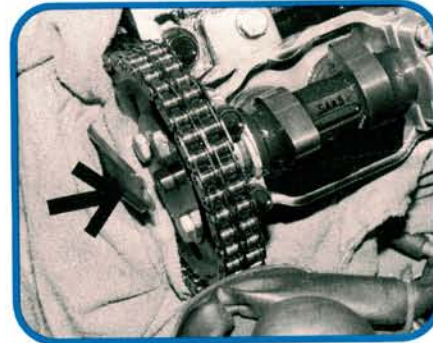
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The recommended adjustment range for intake and exhaust valves is only 0.051 mm (0.002 in). Saab adjusting shims come in 0.051 mm steps, so you can always find the right shim to put your valve adjustment in the recommended range. We measured the valve clearances, and marked the results on a chart as we went along.



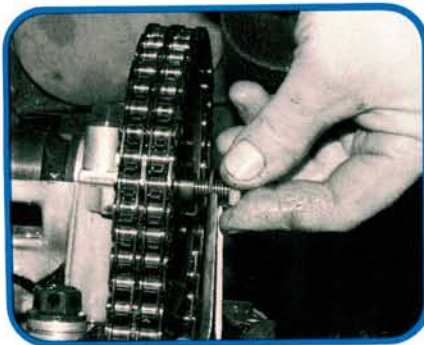
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The cam sprocket support is attached to the upper timing chain guide. Use an offset box wrench (arrow) to loosen the upper chain guide bolt, then move the guide until the support aligns with the center cam sprocket bolt hole. Don't pry between the timing chain and the chain guide.



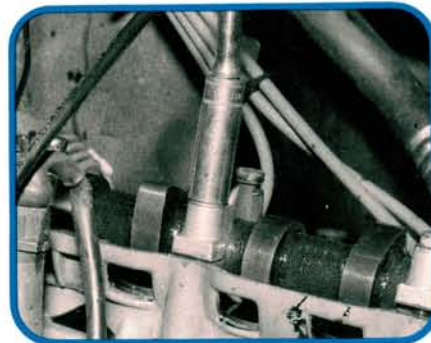
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Moving the chain guide also loosens the chain enough to make cam sprocket removal a little easier. Place a rag over the timing chain opening to catch loose bolts. The support (arrow) holds the cam sprocket and maintains valve timing when the sprocket is slipped off the camshaft.



7

Remove one of the cam sprocket bolts, then use the bolt to mount the center of the sprocket to the support bracket. Remove the two remaining sprocket bolts, then slide the sprocket off the end of the camshaft. Staggered cam and sprocket mounting holes prevent incorrect reassembly.



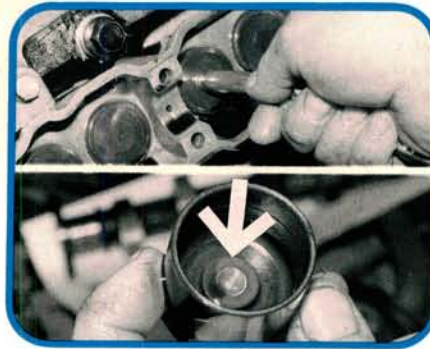
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Slowly and evenly loosen the camshaft bearing cap bolts. Loosening the bolts unevenly may cause damage to the camshaft, aluminum bearing caps, aluminum camshaft carrier threads, or mounting bolts. Note the location of the numbered bearing caps.



9

Lift the camshaft straight off the camshaft bearings, then check it for damaged lobes or scored bearing surfaces. Also check the tops of the cam follower buckets for wear. The camshaft and other valve train parts are well oiled, so wear shouldn't be a problem unless oil changes have been ignored.



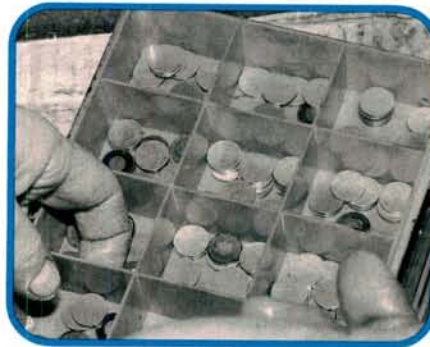
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The valve adjusting shims ride under the cam follower buckets, between the buckets and the valve stems. We used a magnet (upper photo) to break the oil suction and remove the buckets. A film of oil usually sticks the adjusting shim to the underside of the bucket (lower photo).



11

Measure the thickness of the original adjusting shim with a micrometer. Either add or subtract the number you marked on your chart to the thickness of the original shim. This gives you the correct thickness for the new adjusting shim.



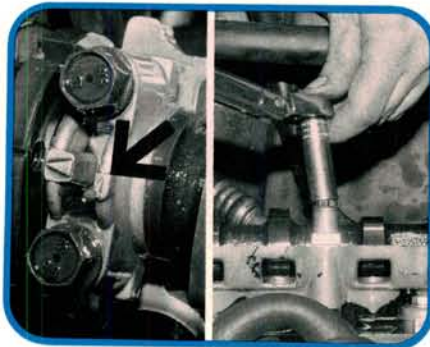
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We measured an 0.18 mm (0.007 in) clearance on the number one intake valve before removing the cam. The original shim measured 1.880 mm (0.074 in). We selected a 1.829 mm (0.072 in) shim from the shim assortment. The 0.051 mm thinner shim puts the adjustment in the middle of the range with a 0.023 mm (0.09 in) clearance.



13

Measure the new adjusting shim just to be sure, then place the shim in its slot on top of the valve stem (arrow). Carefully lower the bucket into place over the shim and valve spring. The bucket must turn freely once it's back in place. Adjust all eight valves using the same procedure.



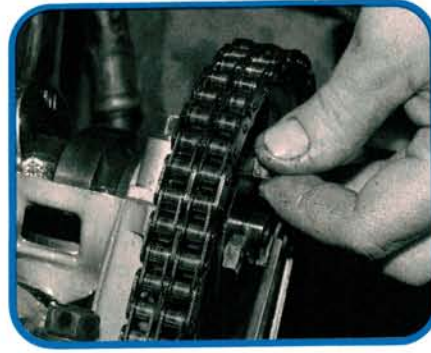
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Lower the camshaft back into place. Begin installing the bearing cap bolts by hand. The numbered bearing caps start with number one closest to the cam sprocket (left photo). Slowly and evenly tighten the bolts to a final torque of 19 Nm (14 ft-lb).



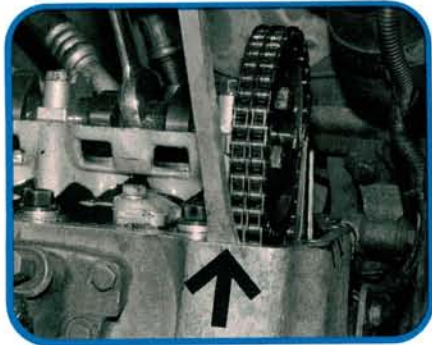
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Run through the valves and recheck the clearances before reinstalling the cam sprocket. The engine is a free wheeler. The valves won't hit the pistons if the cam is turned using the hex boss. If you've done your addition and subtraction correctly, the clearances should be where you want them.



16

Turn the camshaft until the mounting holes in the camshaft line up with the cam sprocket holes. Slide the cam sprocket back into place, and reinstall two mounting bolts before removing the bolt from the sprocket support. Reinstall the third bolt, then torque all three bolts evenly.



17

Turn the cam (using the hex boss) until the timing chain slack between the cam and crankshaft sprockets is removed. Use a wide screwdriver to push between the cylinder head lip and the upper chain guide. This removes the chain slack between the cam and auxiliary shaft sprockets. Retighten the chain guide bolt.



18

The "B" engine sits in the chassis on a slant, so oil leaks at the lower edge of the valve cover can be a problem. Remove and replace the old valve cover gasket. Each valve cover screw should have a new rubber grommet and lock washer (arrow) installed. Torque the screws evenly.