

## R50/R53 MINI Camshaft Installation How-To

This how-to is meant as an overview of the procedure and not a substitution for professional installation and set-up.

There are alternate methods for holding the camshaft sprocket during bolt removal than using the BMW/MINI tool, but by far the OEM tool is the most secure and least likely to cause error; the author recommends it highly.



Replacing the camshaft sprocket bolt is required and installing a new cam chain tensioner is recommended.



Raise and support the front of the vehicle, and remove the right front wheel. Removing the wheel is optional, but without it in the way avoids having to blind guide the socket on the cam chain tensioner bolt from the engine bay.



Remove the hydraulic engine mount nut with an 18mm socket, and the grounding strap nut or bolt with a 13mm socket.



Early model R53s will include removal of the pitch bracket bolts with a 16mm socket.



Pull the hose and sensor wire anchors from the valve cover bolt (later models).



Raise the engine enough to lift the engine bracket off the hydraulic mount, place support underneath the oil pan.



Remove the engine bracket bolts with a 16mm socket, and remove the fuel tank vent valve.



For MCS models, remove the intercooler cover, front mount brackets (8mm), bellows clamp bolts (T-30), and intercooler, plus the rear IC mounts (8mm)



Clean the valve cover edges and area around the valve cover with compressed air to prevent surface dirt from contaminating the exposed valve train when the cover is removed.



Unclip the cam position sensor and pull the vent hoses from the valve cover.



On MC models unclip the injector connectors, pull up on red tap, push down on the connector body, squeeze black tab behind the red tab, and pull upwards. Caution, these injector connectors are brittle, don't force them off.



To remove the wire tray above the MC injectors, pull the front tabs towards you, and lift the tray up and back.



Next, unscrew the cam chain tensioner cover bolt (19mm). It's located to the left (facing the engine) of the oil filter housing on the backside of the block. For the MC a hose bracket will need to be bent slightly to gain access with a socket extension.



The MCS poses a challenge because the coolant/oil heat exchanger is in the way. A universal joint is helpful for breaking the bolt loose, and a wobble extension when applying torque to spec. If a straight extension is used there is a risk of rounding off the bolt hex because the socket will be cocked at an angle.



Remove the valve cover bolts (8mm deep socket), starting at the outer edges and progressively move inwards to the center bolts.



Remove the cam position sensor (10mm).



Using an 18mm socket and long handle ratchet wrench, rotate the camshaft sprocket clockwise till the triangle mark points upwards. Although the cam chain should not leave the sprocket for this procedure, for the sake of Murphy's Law, mark the chain & sprocket for correct alignment if needed later.



The camshaft sprocket locking tool may take a few taps to drive the locking dowels in place.



Loosen the camshaft bolt before loosening the rocker rail bolts, but don't remove completely.



Unscrew the rocker rail bolts in small increments; starting on the outside bolts moving in a circle inwards towards the middle.

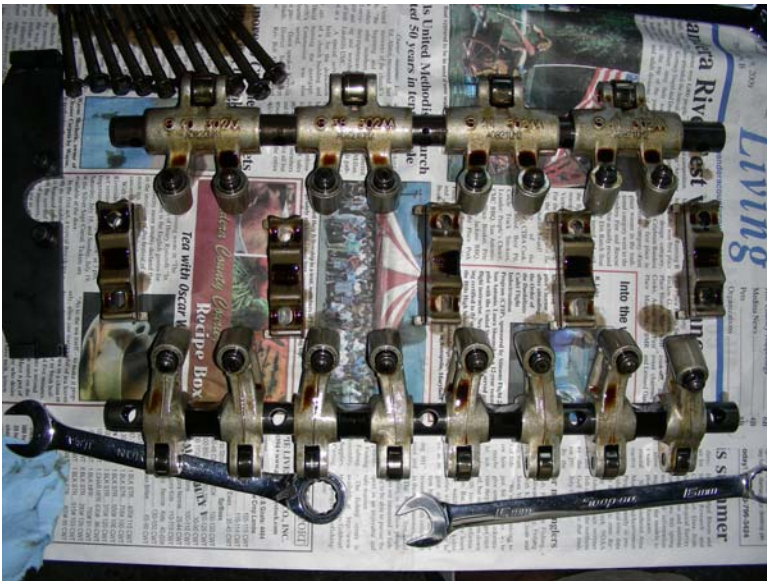


Before removing the rail bolts, unscrew the camshaft bolt completely keeping the chain in place on the sprocket. Pull the rail bolts, move the rockers to a side table keeping the intake and exhaust rockers in their respective locations. Inspect hydraulic valve lash adjuster retainers for cracks. Early model retainers are made of nylon and become brittle with age and numerous heat cycles. Sometime in late 2006 durable metal retainers were used in place of nylon.





Remove the cam caps and place in the same order as they were on the head.



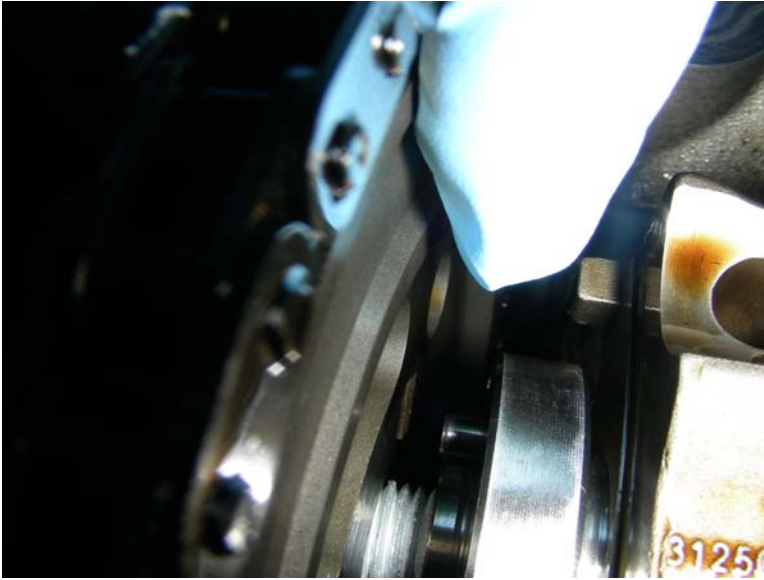
Wipe any oil from the contact surface on the cam towers and cam caps. Clearances for the cam journals are very precise so the mating surfaces between the towers and caps should be free of fluid that may prevent complete occlusion.



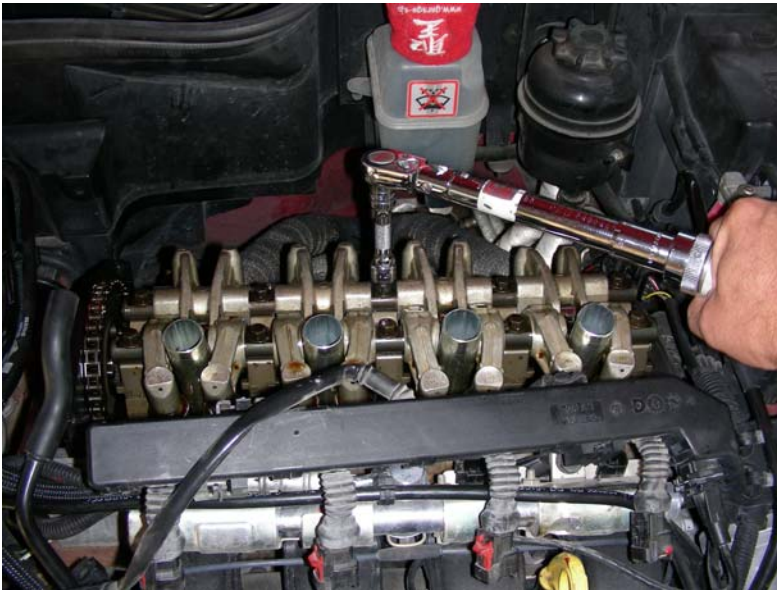
Spread assembly lube on the tower and cap bearing surfaces, and on the cam lobes.



Place the cam caps over the cam in the same order they were originally. Rotate the cam to line up the dowel to camshaft sprocket before tightening any bolts.



Place the rockers and rails on the head, making sure the tappet buckets are over and in contact with the valve stems. Tighten the rail bolts in a couple turn increments starting in the middle and working outwards in a circle, final torque to 22 ft-lb.



Torque the camshaft bolt to 75 ft-lb.



Pour engine oil over the entire valve train, including springs and cam chain.



Put the valve cover back on and tighten the fasteners starting with the inside bolts moving outwards in a circle, final torque of 9 ft-lb.



Reinstall the remaining components in reverse order with these torque values: camshaft position sensor to head 7 ft-lb, engine bracket to engine 74 ft-lb, engine bracket to hydraulic mount 50 ft-lb, pitch brace 74 ft-lb, cam chain tensioner cover bolt 46 ft-lb, intercooler mounts and bellows clamp bolts 7 ft-lb, wheel lug bolts 90 ft-lb.

When the car starts for the first time, pressurized oil will fill the cam chain tensioner causing it to apply correct tension on the cam chain. A short rattling/ratcheting noise may be heard as the tensioner extends. The MINI is equipped with rocker rollers that allow it to be driven shortly after a new roller camshaft install, unlike other types of valve trains and follower cams that require a 20-minute break-in period with special rpm requirements.