How to replace cam's on VZ-VE Alloytec's

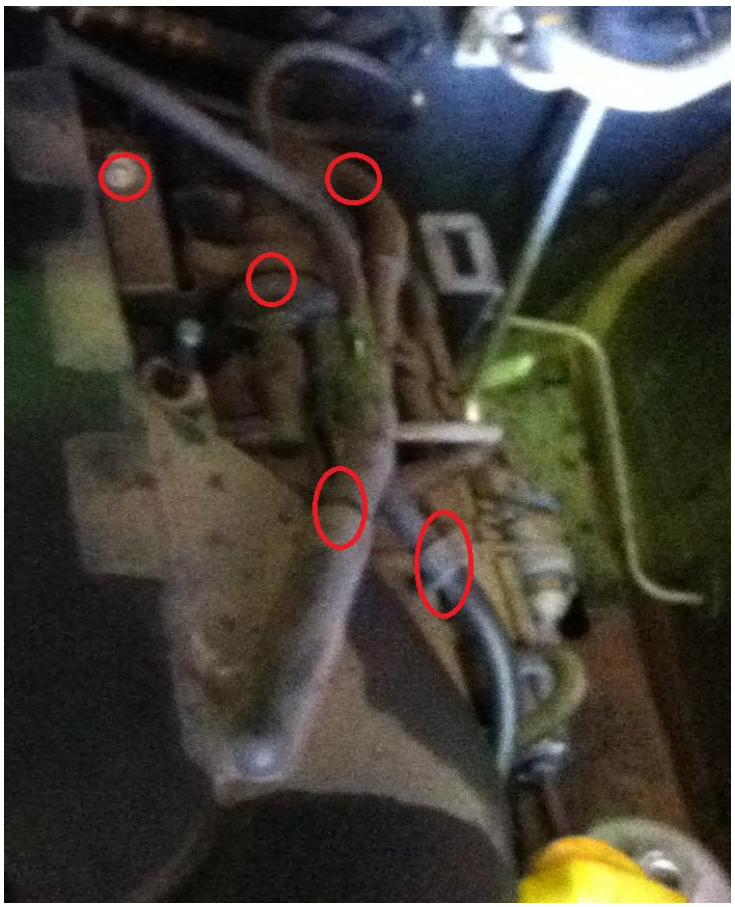
First let's get rid of those pesky cover's that make it look pretty but trap all the heat in! Now gently lifting straight up on each side where I have indicated in red circle as these can break if pulled on an angle or harshly.

Just to give you more room & make it easier I removed the radiator cover by pulling the plastic lugs where indicated & then lift up in the middle where indicated in picture above.

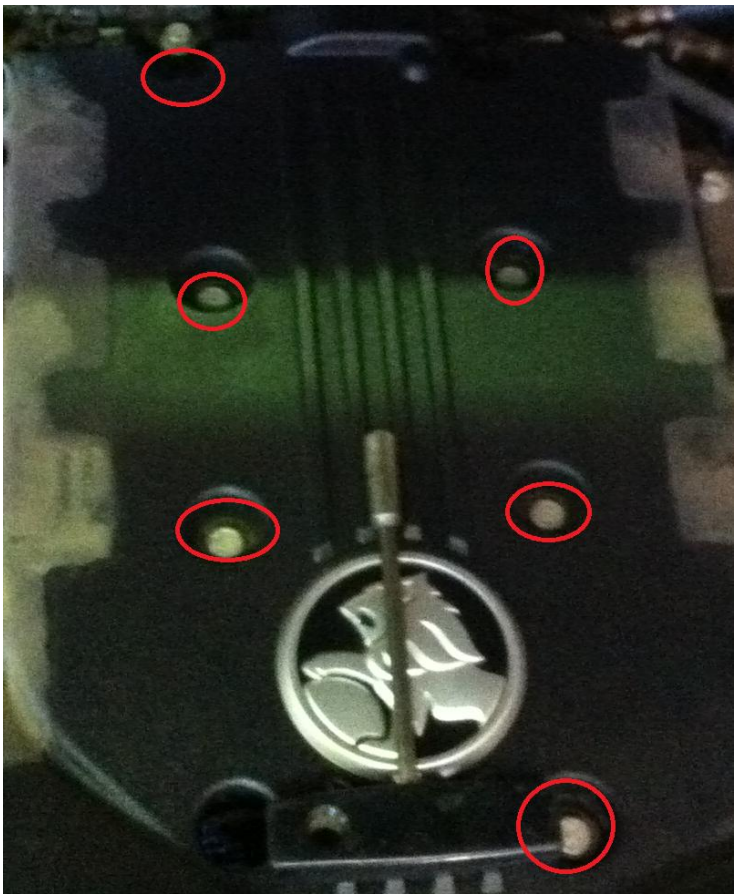
Now we need to take the intake hose at the throttle body & MAF sensor by loosening the 7mm head bolts for clamps & then take the breather hose off the intake hose by gently levering with pointy nose pliers as to not break or split the hose.

Then once that is out of the way pull the

yellow tongue out of the throttle body wiring harness, not to remove it just to allow access to the connector button & press it in & gently wiggle harness off (I find it easier to get a small screwdriver or pick & gently lever tab from inside & pull harness from the other side as the buttons or tabs can break due to heat & cool over the years & making them brittle) then take the harness out of the clips that hold it under throttle body 1 metal & 1 plastic (can't see this as it's underneath but marked where it is) I've never been able to remove the plastic 1 without breaking it but can try by getting a small screwdriver in between & wiggle it out (good luck). Then with pointy nose pliers again take the breather hose off the top off the throttle body normally these are split & best to replace with 10mm right angle breather hose rather than the complete pipe.



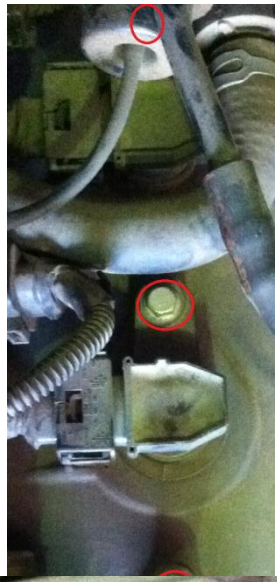
Now at the rear on the passenger side remove the breather hose pipe that went to intake hose from clip on side of upper plenum & remove hose from rocker cover & place that pipe to the side. There is a bracket for purge solenoid that I remove the rubber ring to dampen from solenoid & leave it on the bracket & while bracket is supported get a small screwdriver in wring connector between red cover & black body & gently lever red tab out to separate connector & then undo the 10mm headed bolt for bracket & push it away from top cover.



Now you need to pry clip for brake booster vacuum hose & pull it off the upper plenum cover & then remove small vacuum hose for heater control & undo the wiring clip for barometric sensor here too by either pressing tab down or get small screwdriver under tab & wiggle connector off. This car has the quad timed cam's & has a sensor on the back of plenum which is an intake manifold runner so you need to remove that harness too as described with other connectors. Get the pointy nose pliers out again & carefully remove the P.C.V. hoses that go to the top of the upper plenum on both sides & these pipes can break easy if pulled off

quickly as this plastic has gone brittle too & right at the back behind the barometric sensor there is a clip that supports this pipe so push the pipe out of clip towards firewall. Now you can undo the 6 bolts for the top cover which has 2 short bolts at front & rear most & 4 long bolts in the middle which these 4 have sleeves to help centralise bolt locations which I like to make sure they stay on the bolt so may need to pull the bolt out on an angle to get them free from housing (saves any chance of them dropping in engine when removing or refitting plenum) & then lift entire plenum up & off & put it to the side!

Now we need to get the wiring harness out of the way as best possible & best to do it 1 side at a time for more movement in the harness & that way only need 1 tool for timing chain spreading too. Let's start on the driver's side & the way I did this I didn't disconnect the hoses to the heater pipes beside the brake master cylinder (as you can see in photo I left them connected & tied them up out of the way), but I believe if I did disconnect them then the wiring harness could be tucked out of the way behind them.

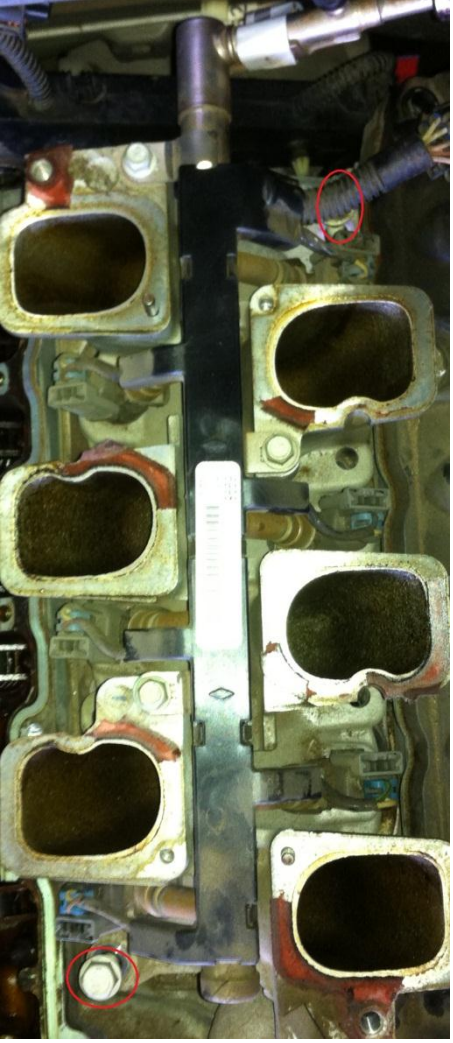


Now undo the 3 x 10mm headed bolts for the ignition coils & the last bit you need to lift the coils straight up a little bit to get the last thread of the bolts to come out & lift them up & press the back side legs of the harness to get it moving & pull harness off coil & put coils to the side & keep them in line if you want to put them back in the same cylinder but it's not a necessity.

Then you need to unplug the ECU harnesses by pressing the button in on top & then there normally stuck so it's easiest to push the purple & grey legs indicated in this photo & then can pull the lever once they start moving & again wiggle as your pulling to free it up & should completely separate. Then do the same for the other harness & then undo the 7mm headed bolt for earth & undo the 2 x 10mm bolts for bracket & the 13mm bolt & get a little screwdriver in behind harness clip on side near dip stick & remove bracket with PCM still attached & put it to the side too. Now you can undo the connectors on the cam phase sensor (mine has 2 on both sides most only have 1) & the same for the solenoid connectors. Now near the dipstick tube there is an earth with 10mm head bolt can undo it & then the bolt for the dip stick tube & pull it out of the way & undo the wiring connector clips to allow it all to move further. Then move to the back section there is a 10mm headed bolt on the side of head behind heater hose connector's remove this & then undo the 15mm headed bolt on the very back of the head that supports wiring harness. This should allow enough room to tie the harness up out of the way with the heater hoses. This harness has 3 push in plastic lugs that locate it in rocker cover & just need to get a screwdriver under & lever them directly up.

There is the P.C.V. hose clip that's a bit awkward to get off on the driver's side rocker cover, it's right at the back closest to firewall & get your finger in behind it & push gently towards passenger side & lift pipe off the P.C.V. (clip is marked in this photo to try & give you an idea).

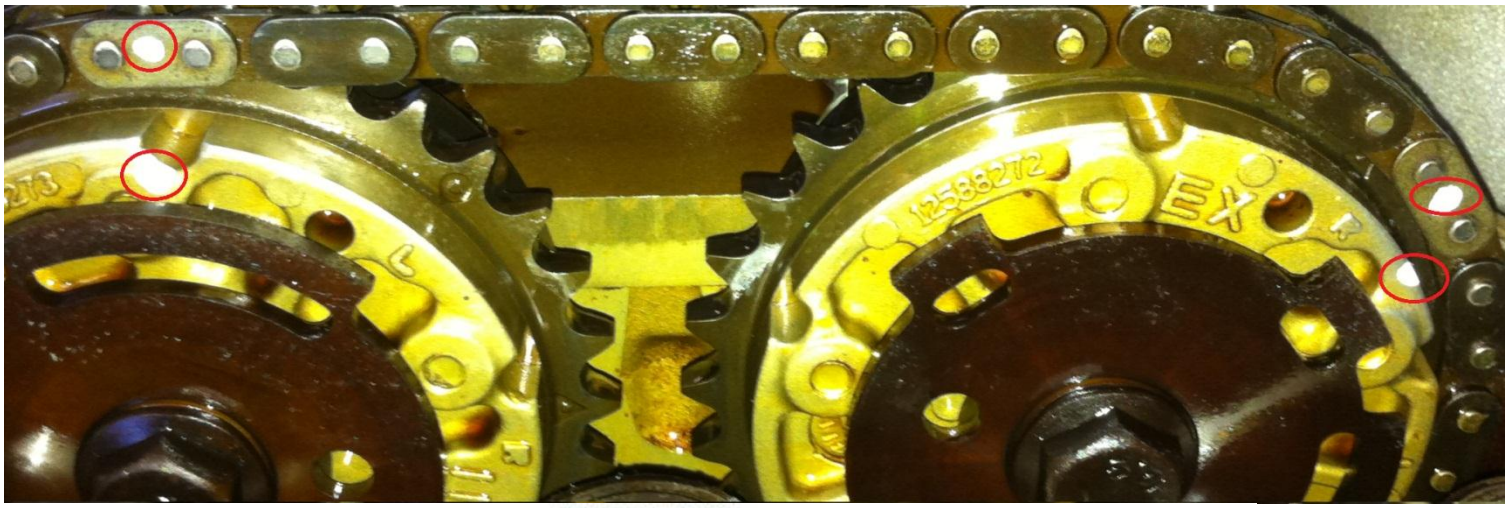
It's best to remove the spark plugs at this stage too with 5/8 spark plug socket so that the engine can't compression lock & make it hard to get timing marks lined up or so it doesn't try & rotate the engine back or fourth when cam's are un done.

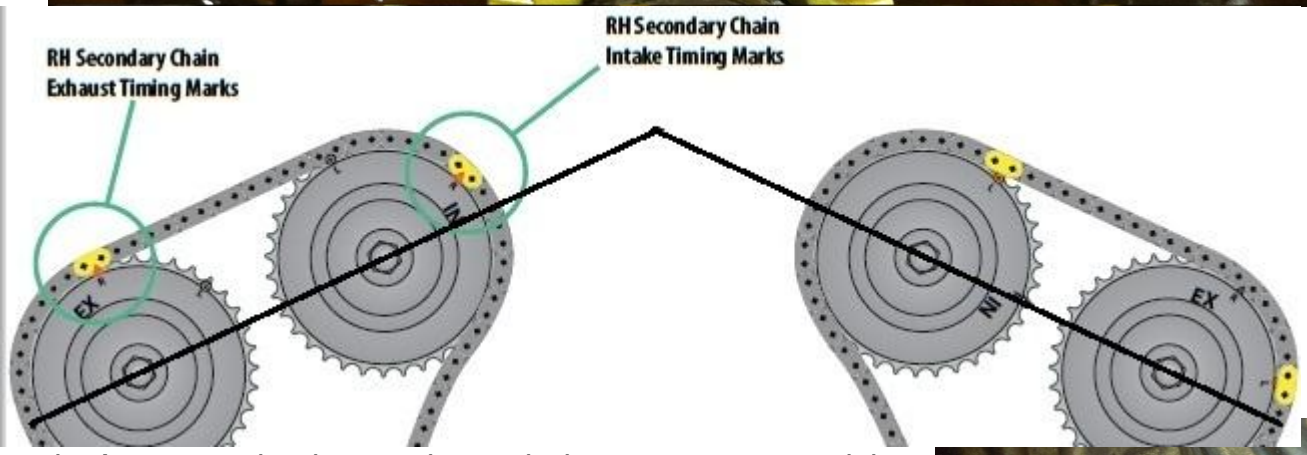


You can get this drivers side rocker cover off without removing the lower section of inlet manifold, but the passenger side has to have it removed as you can't lift the rocker cover off between oil filter housing & inlet manifold lower section. So remove the 13mm headed bolt at the front & back of the inlet manifold lower section (seems like too few bolts for this big adapter but that is what the 4 long bolts also hold in upper section). There is a tool

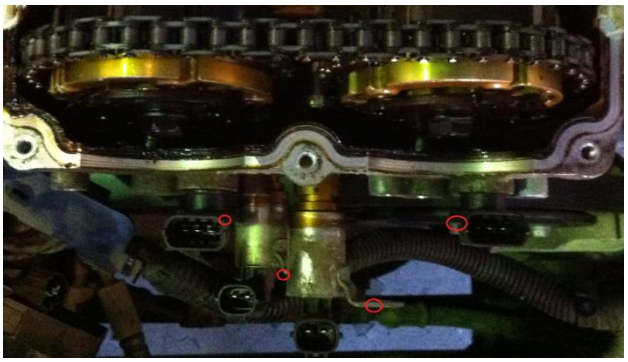
to release the plastic hose for canister purge pipe at the back, but your fingers should be strong enough to press the ridged sections in on both sides & firstly push pipe further on with pressing clips & then pull out (this helps make sure the clips don't get stuck right on the lip & makes it easier to remove) take this off as 1 unit with the bracket (there's 2 clips to release wiring harness from bracket & that stays with intake manifold lower section) & put canister purge solenoid with pipes to the side. Now you can lift the lower intake manifold section up & out (gasket might get stuck to bottom & needs to be wiggled out) with leaving the fuel line attached the assembly can just be put up on the passenger shocker tower out of the way for now. You now need to remove ALL the bolts from the drivers side rocker cover (there's more than what I have marked but sure you'll find them all & there all the same size so you don't need to keep track of them) & can lift rocker cover up, off & out of the way & gasket may get stuck to head where silicone is between timing cover & head but can gently lift it off & clean oil of it & channel of rocker cover & re-use or replace if they look to have been leaking.

Now where getting to the serious stuff & you need to get the cam timing marks in a position to make



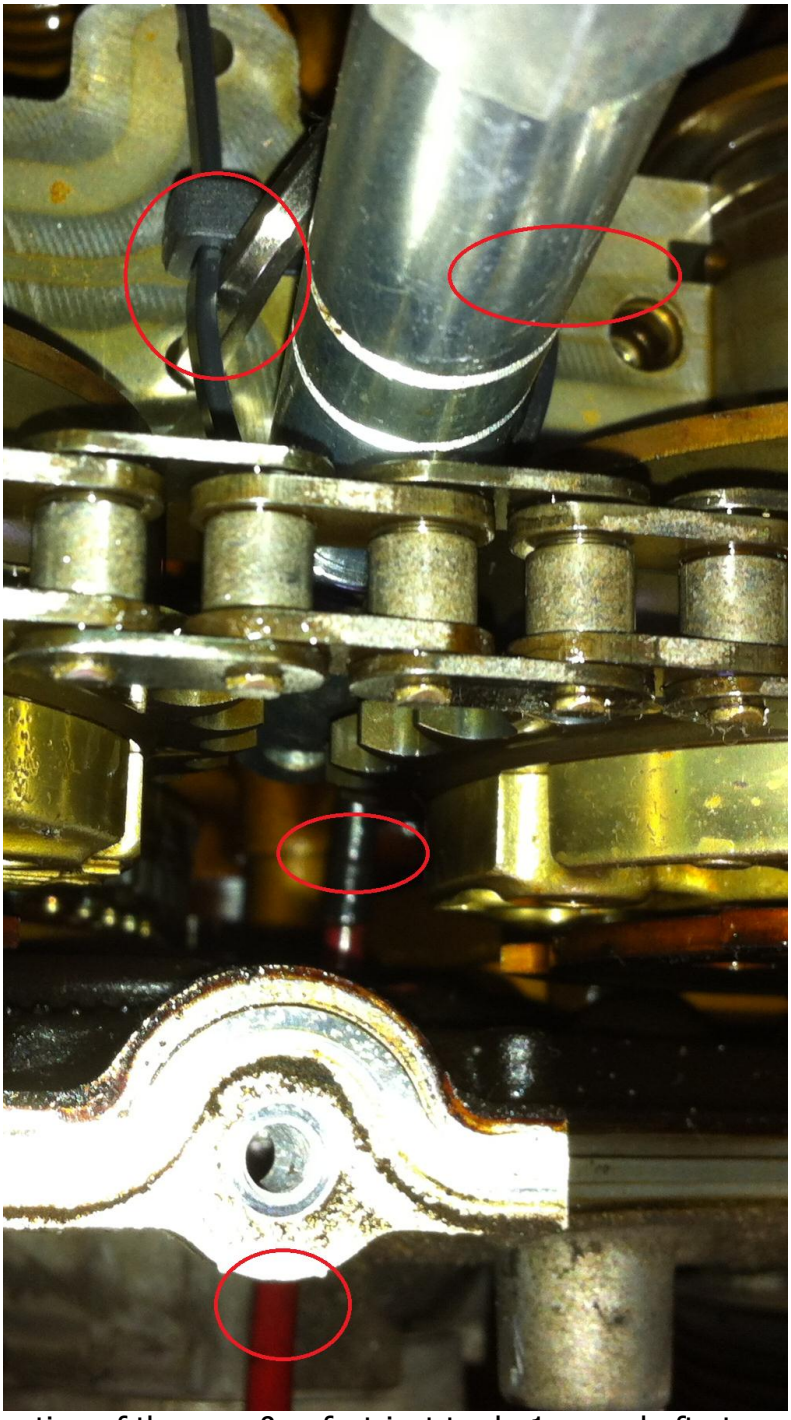


sure they don't move. If you rotate the engine over enough times there is a shinier link that's supposed to line up, but with this engine it never did (was off by 2 links on both banks). I've attached an image here of how it's supposed to look with centreline marked so you can see exactly how many links from the top of the cylinder head. There is an R with an arrow for both sprockets the E is for exhaust so the outer cam & I for inlet closest to the middle of the motor. Now the right is the drivers side & left is passenger side & once you have marked the sprockets if the links didn't line up I find it safest to also mark the crank (seeing this motor doesn't have a mark on crank) you can also see this engine has the water pump leaking from rust stains but can also see the white marks to make sure crank stays in the same position. While it's all marked now & before anything else is taken off you need to loosen the front 16mm headed bolt on the sprocket & there is a 19mm hex section half way down the cam to lock it in place while loosening the 16mm bolt anti-clockwise a fraction. The easiest way I have found to get the chain tensioner locking tool in place is to remove the 4 x 8mm headed bolts for the



complete front cam support (holds both sides) & put it to the side & note the direction it came off although it has 1E with an arrow on it & this 1 really can't be put on the wrong way. Wipe down the oil from under where the cap was you removed & you need to now remove the cam position sensors & oil feed solenoids (depending on how many on your application) this also gives you an access hole to see where the tool sits on the chain.

With those out of the motor the chain support tool can fit in by feeding it down the back at the top in between both sprockets behind chain & obviously need to have the tee handle at top of the tool unscrewed so feet are together & pointing to the front & I used the hole where solenoids came out of to see with a little light indicated in this photo too & guide the feet on to the chain & need to make sure it's in between links where the skinner plate isn't (otherwise tool can slip off, I learnt this the hard way even though the instructions for tool actually show it in that skinner link!). Once it's in place hold the body of the chain locking tool (or 16mm hex head) & screw the tee handle clockwise to put tension on chain & just depends where that fatter link gap lines up but generally the 2 lines on the tool end up roughly around the centreline marked in picture above or the 16mm hex head is near top of actual chain. Now another trick learned the hard way is to put a couple of 4mm allen key's in the oil feed holes from where the front cam support plate was removed & zip tie or similar the tool to the allen key's & this stops it from allowing to move when cam's are removed. Now that's all supported & can't move you should be safe to remove the 16mm bolt out of the front of the sprocket again by supporting the 19mm hex section of the cam & safest just to do 1 cam shaft at a time & leave the sprocket sit in the front of the head (don't try & remove!!!). As you can see on this photo below I actually removed both the camshafts in 1 hit, but if you want to keep it safe just do 1 at a time.



Now the cam's are out you need to swap the oil sleeves from the old camshafts to the new camshafts, these are to feed oil to the sprockets for variable control from solenoids & they have an angle cut on the & can take a few attempts to just run your fingers around them & will eventually catch the end & roll them out (if you try to use a pick or razor blade to get it out it may damage so do this at your own risk).

As you can see the cam cap is in this image too & has the same identifier as the bigger front cap.

For the right (drivers) side it has 1E, 3E, 5E, 1I, 3I & 5I which obviously relating to cylinder location & inlet or exhaust, so for the left (passenger) side it has 2E, 4E, 6E, 2I, 4I & 6I for the same reason & an arrow to show you to have them facing the front of the motor!

So once you have the sleeves in the front of the new camshafts you just need to guide the slot in the front of the camshaft to the dowelled section in the sprocket & then do the same for the other cam & just have bolts done reasonably tight & put the cam caps back on except for big front one & do the caps down evenly in sequence & once the bolts are tight you can release the chain tool & all should have stayed in place & make sure the timing marks line up & then put the main front cam cap in & need to guide the cam into thrust holder & tighten bolts for this cap evenly & once that's done you need to get a bigger shifter or 30mm open ended spanner & hold the hex section on the new cams & tighten the 16mm bolts for sprockets & do the same process for over side of motor but this is slightly easier as you can flick the full wiring harness over the edge & out of the way & then once that side is done reverse the whole process & put it all back together!

I'd personally recommend replacing the solenoid seals as they get very dry & brittle & the spark plug tube seals for the same reason & if there was a paper gasket for upper plenum you need to replace this but if

it had the later alloy/rubber seal you can re-use this. Generally the rocker cover gaskets are pretty good on these but if in doubt chuck them out for any of the gasket & seals!

GOOD LUCK!!!