Ducati 900 SS ie valve shim adjustments

Some notes and ramblings by

Having now completed my first valve shim replacements I offer some advice to those yet to tackle this daunting task.

First and foremost I'm not out to compete with the authoritative work already penned by Monsterman and Chris Kelley and would commend you to their articles on the following sites:-

http://www.ducatisuite.com/

http://www.ducatitech.com/

My observations are really in addition/amplification of the above.

- Do the valve adjustment before you replace the timing belts.
- Do take the tank off.
- After removing the battery you will be confronted by a small aperture in the bottom and rear of the battery tray through which you are meant to check and adjust the inlet valve on the vertical cylinder. They must be joking! I also took the air box off which improves access tenfold and it also gives advantage for the inlet on the horizontal cylinder. You will have to snip some cable ties and most importantly disconnect the large multi-connector on the timing belt side that is bolted to the fairing stay where the side fairing meet the nose fairing. In removing the cable ties it also gives the opportunity to secure the cables just as well but without having to use the frame rails, giving a neater finished appearance.
- Remove the timing belt covers and rotate the engine to TDC on the VERTICAL cylinder and then mark the cam pulleys and the engine pulley (I filed a small notch on the inside edge of the pulley with a needle file). This enables you to rotate the cams to TDC when you have the crank in any position.
- Get plenty of light on the subject even with a six foot fluorescent tube over the bike and a 500 watt halogen floodlight at one end of the garage I still, on occasions, resorted to my rechargeable spotlight!
- To support the rear of the bike independently from the track stand (to be able to remove the rear shock) I positioned my domestic aluminium step ladder over the bike as an A frame (with the rear track stand in place) and then tied the rear subframe to the top rung with non-stretching webbing (like those used to tie stuff on a roof rack or push bikes to a cycle carrier). Pass the webbing through the pillion footrest hangers and once secure you can lower the track stand. On replacement of the rear shock lower the track stand and fix (but not tighten) the top fixing), then you can gently use the track stand to bring up the swinging arm to be able to push the lower bolt through.
- You do **NOT** need any device to measure your shims thickness. Just make a note of your clearances and then (having labelled where each comes from) go to the dealer and say "I need XX thou or mm thicker or thinner than this). I did this and was told the only reliable way to measure shims was with a micrometer (having previously purchased a digital calliper). So with my new micrometer I then measured my new shims and, shock horror, they weren't the thickness I thought I had purchased. So another trip to Silverstone to get the "correct size" shims where the new ones were re-measured at exactly what was needed! The lesson learned was, it doesn't matter what you measure the shims with as long as you measure the old and the new replacements with the same piece of kit. Incidentally my new digital micrometer and my digital calliper both agree on a measured test piece!
- Where a micrometer or calliper will come in handy is when you are needing to reduce a shim's thickness. It allows frequent checking on progress without re-installation and measurement insitu.
- To prevent the half rings or collets disappearing down the oil drain holes in the cam box the recommendation is to put one of the rocker cover screws in the hole. It is not an exact fit and there is still a gap so I cleaned up the surrounding area and used a small piece of gaffer tape. Then you have to remember to remove it so I stuck another piece of tape over the ignition switch with "oil ways" written on it.

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- When putting the belts back on for the final time (and it was some time since I had removed them as into every motorcyclist life some painting and decorating falls) I was a little unsure as to the exact position of the horizontal cam pulley. If you look at the plastic rear enclosure of both pulleys you will see a small machine screw and washer coming in from the side at an angle near the timing marks. You will also see that the pulleys have a flange on the back face. This flange is continuous except for one groove. The purpose is so that on removal of the screws you can insert a rod into the groove in the pulley without the flange and lock the pulley in the desired position (the vertical pulley does tend to flip away from the desired position when replacing the belt, but nothing that ten fingers on each hand can't overcome!).
- The spring clip on the opening rocker shaft is easy to remove with a pair of long nose pliers. But as you will see on the photos on Monsterman's site there is a great temptation to use the mating surface for the rocker cover gasket as a leverage point. So I made a small spring puller from a wire coat hanger you get from the dry cleaners. It ended up as an unequal "U" shape with a long base, one upright the length of the spring and the other sufficient to get three fingers under. When using it tease the short side under dimple in the spring and put finger on the spring whilst pulling with the other hand (they can ping an awfully long way it you don't!).
- When exposing the half rings or collets I used a long electrical screwdriver with an old speaker magnet stuck on the top end. You just do not want to loose those things, especially if not intending to renew. One of mine very nearly made a home run!
- When installing the collets a dob of grease to the groove in the valve stem is a big help.
- If replacement of the collets is desired do this before replacing any shims and then re-measure the clearances. Then if necessary replace the closers and again re-measure clearances. Only then replace the openers. Before measuring clearances rotate the cams a couple of times to properly seat the new collets or shims. This will give you a consistent reading. The above advice may mean more than one trip to the shop but you do get it right.
- With the cam at TDC and the rocker shaft spring pulled the opening rocker will not immediately slide across to allow shim removal. The cam needs to be rotated a bit. It is a feely thing, and for the inlets the cam needs to go clockwise when viewed from the cam belt side.
- We have all read about the dreaded scenario of dropping a valve into the cylinder when the closing shim has been removed. I was told the valve guide oil seal will stop it. Unless the seal catches the groove in the valve stem I very much doubt this. Therefore I threaded an elastic band under the closing rocker (using a piece of thin gauge garden tying wire) and anchored the ends on an adjacent exhaust or inlet stud nut. As the most likely valves to fall in are on the vertical cylinder I kept this piston at TDC (you can only do this if the belts are off). Remove the band before measuring any clearances.
- I ended up replacing openers and closers on both inlet valves and set them to zero for the closers and a tight 4 and 6 thou for the openers to inlet and exhaust respectively. Apologies for using imperial units but 2 thou means something to me, it's a very flimsy feeler gauge. 0.05mm just doesn't have the same poetry.
- So you will ask, if I'm aiming at zero for the closers how will I know if I have over egged it? And the answer is you will not be able to turn the camshaft over. Yet another good reason for taking the cam belts off. I removed the shims to both valves on the vertical cylinder with belts on and could have kicked myself when seeing how much easier it was on the other cylinder with them off.
- To rotate the engine to TDC I put the bike in 6th gear and rotated the back wheel (spark plugs out). With two sets of marks now on the engine belt pulley the engine can be brought to any position irrespective of camshafts. Whilst the marks on the belt pulleys are approximate, confirmation can be had by observing that the marks on the flywheel line up. In this respect, because of the gearing, it is not that easy to get the marks spot on. So, as long as the flywheel mark is visible, you can grip the back tyre and rotate in the opposite direction to what you will want (this takes up the slack in the drive train and will only be 2 or 3 inches) and then bring the wheel back again with a little bit of force and you will find that you can nudge the flywheel around (backwards and forwards) to achieve exact alignment. Effort required is really small, grip tyre and rim between forefinger and thumb. To triple check the crank was on the TDC I thought it was I also checked for the presence of the piston by probing down the spark plug hole.

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- When you release the horizontal exhaust rocker cover be prepared for a quantity of engine oil to drain out. I was surprised at the amount. I had already changed the oil before starting the valves and omitted to fill the new oil filter with oil prior to screwing it back on. So on checking the oil level after running the bike for the first time I found that the amount needed for the filter plus that retained in the horizontal cam box was enough to reduce the level from max to just under minimum.

Take these ramblings from a fifty something BAB for what they are worth. Some will say its common sense, some will find it helpful. Whatever, for the first timers, like me, read everything you can on the subject and make sure you are fully conversant with the procedure before starting.

Finally I must give acknowledgement and thanks to John Baines and Derek at Baines Racing of Silverstone who had the patience to suffer this rambling idiot who pestered them. Whilst at their premises I had the opportunity to sit astride one of their Project Imola machines (very similar to the forthcoming Paul Smart replica by Ducati but here now). Very nice, and I can get both feet flat on the ground, which I can't with present bike. See http://www.bainesracing.com/

Happy spannering,

Barry