Timing BSA Singles

There are 3 problems that continually crop up when novice mechanics do major work on BSA singles. All these problems leave the bike unable to start despite repeated attempts to understand what's happening. Of course most of this information applies to all single cylinder machines, but it seems to me that BSA owners get more than their fair share! Both problems have the same symptom in that the bike will not run, but will only backfire loudly when prodded to start.

Ignition Timing
On a Triumph twin the auto-advance unit (AAU) is pinned to the camshaft that turns it. So the AAU always goes back in the exact position it came out. It's simply a "no-brainer". Even if you assemble the AAU backwards or somehow get the timing off, the most you have to do is swap the BLK/WHT and BLK/YEL wires because it's off by one whole crank revolution. Not so on a BSA.

First of all, BSA never pinned their AAU. Of course if you're using a Boyer you're in the same boat anyway. So the first issue is locating the AAU (or magnetic rotor on a Boyer) to the correct angular position in the camshaft taper, relative to the correct piston position. The problem is, with an un-pinned taper instead of 1 position you have an infinite number to choose from. Yikes!

Secondly, on a single there is the additional issue of doing the first step on the correct piston stroke. On a twin, as I said, if you screw it up, all you're required to do is swap 2 wires since both pistons are rising at the same time and one of them is on the correct stroke. But on a single you cannot time to just any old piston rise. You MUST be on the *compression stroke*.

So just in case you find yourself in this predicament, here's what you can do...

Remove both valve caps and put the bike up on a milk crate, center stand or other support so you can spin the rear wheel. Remove the spark plug and place the bike in top gear. Then commit to memory, "The rear wheel spins in the same direction as the crankshaft."

Using a straw down the spark plug hole, find the piston TDC wherein neither valve is moving. That is to say, on the wrong TDC both rocker arms will be in motion (intake opening; exhaust closing). On the correct TDC both valves will be closed with slack in the rocker arms. There are only 2 TDCs to choose from since the 4-strokes of these engines take 720 degrees of crank rotation. [By-the-way, this "both valves closed" position is the correct TDC to adjust your valves. So you might want to also check those valve clearances while you're there.]

From the compression stroke TDC (both rocker arms loose), back up the rear wheel until the piston drops in the bore about 2 inches. Now bump the rear wheel forward until you find your timing mark. STOP when the pointer and your mark align. On 1968 and later models you can use the strobe mark and pointer inside the primary cover. On bikes made before 1968 you'll have to add your own degree wheel.

If you have points, from that crank position you should be able to manually rotate the AAU against the AAU springs (in the counter-clockwise direction on a BSA) and the points should break open at the exact instant the AAU reaches full advance. You can use a light bulb connected between the points spring and an engine fin to very accurately indicate when the points open.

On a Boyer, from that crank position the magnetic rotor should be in the position indicated in your paperwork, with the painted dot visible through one of the holes in the "points plate".

WARNING: These procedures only get the ignition close enough to start the engine. To accurately set the timing requires a strobe light with the engine running at high RPM.

I hate to ascribe my weaknesses to anyone else, but after going through this exercise you may find the bike's ignition timing off by 1 full crankshaft rotation (360 degrees). That is, the ignition was firing on the exhaust stroke with the valves open, hence the loud “backfire” sound. Relax, it could be worse; no harm has been done.

Push Rod Placement

The second most common issue that is very easy to check at this time is the placement of the push rods. On BSA singles it is especially easy to set the push rods on the wrong tappet and reverse their order. You can easily check this by slowly moving the rear wheel in the forward direction. While you move the rear wheel forward, you should see the exhaust valve open, then the exhaust valve close while the intake immediately starts to open. If this is reversed, then the push rods have been seated on the wrong lifter (tappet), or worse yet, jumped off the tappet and not seated in the tappet top cup at all.

The rocker box need not always come back off to fix this. If you rotate the crankshaft back around to the ignition firing point (with both valves loose), then you should have enough piston clearance to depress the rocker arms manually one at a time with a pry bar through the valve inspection cap. With this extra bit of slack you can use a small tool to work through the push rod inspection window and place the push rods on their correct rocker arm.

Cam Timing

BSA singles also have the unfortunate problem of dual camshaft timing marks. The rule is, if the camshaft has a “V” marked on the cam gear, then you should most probably set the “V” to align with the crankshaft mark. If not, the cam timing will be off about 15 degrees.

Hope this helps!

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