

Unit 650 Twins: Triumph vs. BSA
by Lynn Bennett

What makes people choose one vintage bike over another? Today we vintage riders tend to pick either the bike we had then or one we really wanted but couldn't have, for one reason or another. The argument seems to always come up as to which is better for a 650 twin, Triumph or BSA. For this article I shall attempt to lay out all the pro's and con's of the selection of either of these bikes, the Triumph or BSA unit 650 cc twin (circa 1960 through the mid 1970's).

Engines:

By the mid 1960's both BSA and Triumph had repackaged their non-unit motors into a single case for both the transmission and the engine. In each, the internals were extremely close to that used prior to unitizing. Triumph retained their separate rocker boxes, twin cams located fore and aft of the cylinder with exposed chrome tubes, sealed at each end, for the push rods, plunger style oil pump, duplex primary chain, and the triangular shaped timing chest cover. The crankshaft ran on a ball bearing on the timing side and a roller bearing on the highly loaded primary side. Triumph offered both single and twin carbureted version as did BSA. Both shared a similar crankshaft design that included a large bolted on central flywheel but a one piece forged crankshaft component. Both included a sludge trap inside the crankshaft, aluminum rods running on insert bearings on the big end and with piston pins riding in a bush (or directly on the rod end in some years). Triumph end fed the oil to the crankshaft for the rods on the timing side while BSA chose to feed the oil for the rods through a plain bearing that acted as the timing side crankshaft supporting bearing. BSA at first used a ball bearing on the crankshaft primary side but later changed it to a roller bearing. BSA used a single camshaft running behind the cylinder with a completely enclosed, one piece rocker box cast onto the head with a simple unstressed cover. The push rods ran inside a tunnel cast into the cylinder while the rockers ran on shafts that pushed into pedestals that were part of the head. So BSA totally enclosed and hid from view all of the valve gear. BSA used a triplex primary chain with a clutch assembly of virtually the same design as Triumph, which included a set of rubber shock absorbers inside the center of the clutch hub. The most basic difference is in displacement dimensions: Triumph has a longer stroke than its' bore while BSA's bore is a single millimeter larger than its' stroke. The transmission designs are equivalent, both using the classic British design of coaxial input and output (hiding the output sprocket behind the clutch) and transferring first, second, and third gear ratios through two gear sets while locking the input and output shaft together (1:1) for fourth gear. Each uses a slightly different gear selector mechanism but both are flat selector plates working through shifting forks on a set of transmission shafts located one above the other. (Modern bikes almost universally use a rotating shift drum.) Only the details of the transmissions are different. BSA used their standard for an oil pump, the rotary gear pump, driven off the timing side crankshaft end.

BSA gets points for enclosing the valve gear eliminating leaks from push rod tubes while Triumph gets points for allowing racers to degree the cams for different advance between the exhaust and intake cam timing (only a small advantage at best for us). Triumph gets points for a slim looking motor while BSA loses points for their "power egg" engine look. It's BSA over Triumph for a stronger primary chain. BSA gets recognition for a more modern engine design with a square bore to stroke ratio while Triumph retains the old fashion long stroke motor. BSA loses big points for the crankshaft design that uses a plain bearing on the timing side and has a totally inadequate crankshaft end play control design. (Triumph uses a ball bearing on the timing side which controls the crankshaft endplay, while BSA uses an inadequate floating arrangement even in the light of axial forces from the oil pump). BSA's rotary pump has theoretical advantages but of the three that I have had apart, two were close to seizure for totally unknown reasons. Triumphs rarely need new oil pumps (double plunger oil pump). To my way of thinking Triumph wins the motor category, if only for the excellent crankshaft design, although BSA had the more modern design elsewhere in the motor. BSA's Lightning cam, used in the high end models, was much hotter than even Triumph's Bonneville TT racer's cam. If only BSA had fixed their bad crankshaft end play design (the fix is available through SRM in England and a few places in the USA) and used a plunger oil pump, they would have had the superior design, at least in my mind.

Frame:

Triumph's frame is straight out of the 1930's: furnace brazed tube and lug design. The frame is made up of straight and bent tubes terminated in heavy forged lugs. The frame is assembled with brass embedded brazing paste and placed in a furnace to make the brass flow by capillary action into each joint of every lug. The frame is a two piece bolt together affair after completion of the manufacturing process to which a pair of strengthening plates were later added (just behind the foot pegs). They tie the ends of the swinging arm, the front frame piece and the rear frame piece together. This makes for a heavy frame. BSA's used a welded frame assembly developed in the 1950's with their Gold Star road racing program and first used on the non-unit 650 twin. While the Triumph used a single down tube design the BSA is a twin down tube design, which is inherently more flex free. Triumph's non-unit, twin down tube frame was a disaster, breaking regularly such that it was used for only a year or two.

I believe the frame design points go to BSA, overwhelmingly, due to their modern all welded super strong design. But I'm not sure any of us could tell the difference on a twisty road.

Suspension and wheels:

Both Triumph and BSA used then current design practices for their suspension components (Girling rear shocks and proprietary forks). BSA's used, in most years, an internal cartridge fork that relegated all the dampening to a piston inside of a closed tube, fed oil from the bottom through holes. The remaining volume of the lower fork leg was the oil reservoir. The cartridge piston was connected to the upper tube fork cap by a long slender rod. The rod passed through a top cap of the cartridge. The dampening action was crude compared to today's forks but not all that bad for its' time. Triumph used a shuttle valve attached to the bottom of the upper fork leg and the clearance volume between the upper and lower fork tubes to generate the required dampening action. Triumph's forks seem to work OK, again good enough for the times.

BSA and Triumph are about equal as far as suspension goes.

There was a marked difference in wheels between the two. The difference eventually evolved into sameness when the oil-in-the-frame models appeared and slightly before. Initially BSA used Gold Star wheels (at least on the top of the line models). The front was the narrow braked Gold Star unit while the back was the really neat quick disconnect Gold Star model. The front was barely adequate while the rear was OK for the time. The rear allowed wheel removal without disconnecting the chain. The rear brake and chain wheel (with the chain going around it) were left on the bike undisturbed at wheel removal time. The power was transmitted across a fine spline arrangement. If you failed to be careful the axle could be cross-threaded (don't ask me how I know) but generally this was a superior arrangement. Triumph used full width hubs in the front but the assembly was a lot heavier than needed as it was all steel. This wheel was in later years used along with the double leading backing plate on both BSA's and Triumph's. The Triumph rear wheel looked similar to the BSA rear wheel but was one piece requiring the chain to be removed to get the wheel out of the frame. This rear wheel was not overly strong and the hub has been known to separate at the welded flange when used heavily, like in desert racing.

I'd give BSA the nod for the wheels but in latter years both used the same front wheel. In still later years both used a new conical set of wheels, shared between BSA and Triumph. These later wheels are laughingly referred to a "comical hub wheels" due to their poor brakes (I am told).

Electrical:

Both BSA and Triumph used Lucas electrical components in virtually identical electrical systems. In the mid 1960's BSA was suffering with an image of a problem, engined motorcycle. It turned out that the engine's problem was the Lucas points cam. It apparently caused the ignition points to bounce at an inopportune time in the engines cycle resulting in a maverick spark. The result was poor performance and ultimately seizures. It took a year or so to figure it out but apparently Triumph's points cam did not suffer the same malady. Triumph earned the reliability reputation while BSA got the opposite, thanks to Lucas.

Conclusions:

In general the BSA was perhaps a little more modern design and as such should of had potential as a race dominator. But the opposite was true. Triumph got the performance tag due to many TT racing wins. Racers had a very hard time keeping BSA's together it appears. In virtually all areas the BSA was slightly better except the engine. But a motorcycle is the engine. What is not covered here is personal appeal. More people (at least Americans) are more drawn to the Triumph sport look than BSA's utilitarian power egg look.

What are my conclusions? I ride a BSA, but it was a bike of opportunity, arriving in my field of view when I knew nothing about the vintage scene, at the right price. With the knowledge I have gained since buying it, today I would choose the Triumph. I really hate that I have spent more than \$1000 on my BSA motor and it is no more reliable than before due to that stupid BSA crankshaft endplay control design. Oh well, that's life for you

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